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Director

Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon

by
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Contents

Contents……... ii
Definition of Selected Terms…….....xv
Executive Summary……1
Investigation Purpose……...1
Geography, Climate and Land Use……..1
Geologic Framework……... 2
Geologic History……..2
Ground Water Occurrence……... 3
Ground Water Temperatures……4
Hydraulic Properties of Basalt and Basin Fill…….……4
Ground Water Flow……..4
Influences Upon Ground Water Elevations……5
Ground Water Response to Development……6
Ground Water Drawdown Calculations……...7
Conclusions……..8
Introduction……11
Problem Statement……...…….. 11
Investigation Purpose……13
Statutory Authority to Conduct an Investigation……... 13
Project Wells……...……... 14
Well Identification and Location……16
Well Identification……..16
Locations……16
Acknowledgements……18
Geography and Climate……..19
Location……..19
Physical Geography……19
Climate……...……21
Land Ownership and Use……...…24
Ground Water Development History……27
Well Drilling History……27
Ground Water Irrigation Rights……28
ADR Ground Water Irrigation Rights……32
Ground Water Response to Development……..33
Geologic Framework……..37
Introduction……37
Physiographic Province……..37
Stratigraphy……38
Development of Stratigraphic Understanding……38
Current Stratigraphic Understanding……40

Geologic Structure……..42
Exposed Structure…….. 42
Buried Structure……44
Age of Sub-basin Structures…….. 45
Sub-basin Geologic History……...…45
Hydrogeology……...…. 47
Previous Investigations…….. 47
Ground Water in the Major Stratigraphic Units…… 49
General Stratigraphy and Ground Water Occurrence……49
Ground Water in Basalt……..49
Ground Water in Sedimentary Deposits…… 52
Ground Water Level Data Collection…… 56
Ground Water Response to Stress……...….. 58
Precipitation, Barometric Pressure, and Earth Tides……..….. 58
Canal Leakage……62
River Stage……...…….63
Irrigation……64
Ground Water Use……. 65
Relationship Between Ground Water in Basalt and in Sedimentary Deposits……. 67
Relationship Between Ground Water and the Lost River……..71
Introduction……71
Seepage Run Method to Quantify a Ground Water and River Relationship……....71
Lost River Seepage Run Conducted by OWRD…… 72
Bonanza Big Springs Historical Discharge……78
Ground Water Sub-Areas……...78
Introduction……78
South Langell Valley Sub-Area……81
Lorella Sub-Area……82
Bonanza Sub-Area……. 87
Swan Lake Valley to Poe Valley Sub-Area……... 89
Horizontal Ground Water Flow……..94
Introduction……...…94
General Sub-Basin Flow……...……95
South Langell Valley Sub-Area……...…….. 96
Lorella Sub-Area……...…….98
Bonanza Sub-Area……..…. 100
Swan Lake Valley to Poe Valley Sub-Area……102
Vertical Ground Water Flow……104
Introduction……..104
South Langell Valley Sub-Area……...…… 105
Lorella Sub-Area……..105
Bonanza Sub-Area……...… 110
Swan Lake Valley to Poe Valley Sub-Area……111
Summary…….. 113

Aquifer Properties……...…….115
Introduction……..115
Effective Transmissivity and Storage Coefficient……...… 118
Aquifer Tests Conducted……..119
South Langell Valley Sub-Area Test……...…… 119
Lorella Sub-Area Tests…….123
Bonanza Sub-Area Tests……..129
Swan Lake Valley to Poe Valley Sub-Area Test……. 133
Aquifer Properties Conclusion…….137
Potential Ground Water Drawdowns Related to ADR Ground Water Permits... 138
Introduction……..138
Method Used for Estimating Potential Ground Water Drawdowns…….138
South Langell Valley Sub-Area……...… 141
Lorella Sub-Area……..145
Bonanza Sub-Area……...…… 148
Swan Lake Valley to Poe Valley Sub-Area…….156
Summary of Drawdown Calculations……..159
Investigation Conclusions……162
General Technical Conclusions……162
Ground Water Response to Development……164
Potential Impact Upon the Lost River and Bonanza Big Springs……165
References Cited…….. 168

Figures

Figure 1. Project wells used for the eastern Lost River sub-basin ground water investigation……14

Figure 2. Illustration of the public land survey system……...…. 17

Figure 3. Ground water investigation location…….…..…..19

Figure 4. Geography of the eastern Lost River sub-basin……20

Figure 5. Total precipitation and cumulative departure from average by water year at Klamath Falls from 1921 to 2000……22

Figure 6. Monthly maximum, minimum, and average precipitation at Klamath Falls from 1921 to 2000……23

Figure 7. Daily maximum, minimum, and average temperatures averaged by month for Klamath Falls from 1971 to 2000……23

Figure 8. Areas enclosed by the boundaries of irrigation districts relying upon U.S. Bureau of Reclamation Klamath Project surface water…….25

Figure 9. Areas where irrigation independent of the Klamath Project water can occur under existing Oregon surface water and ground water rights……26

Figure 10. Cumulative number of water wells constructed in eastern Lost River sub-basin from 1950 to mid 2002……...…27

Figure 11. Cumulative number of applications for the ground water rights for the eastern Lost River sub-basin valid in 2002…..……..29

Figure 12. Distribution of eastern Lost River sub-basin acreage related to primary ground water rights valid for irrigation in 2002……..30

Figure 13. Distribution of eastern Lost River sub-basin acreage related to supplemental ground water rights valid for irrigation in 2002……..31

Figure 14. Distribution of existing or proposed wells related to the ground water rights valid for irrigation in the eastern Lost River sub-basin in 2002…….……32

Figure 15. Distribution of eastern Lost River sub-basin acreage and wells related to ADR permits for primary or supplemental ground water use for irrigation……..33

Figure 16. Hydrograph of ground water levels measurements at state observation well 288 (well KLAM 13427)……...……34

Figure 17. Hydrograph of ground water level measurements at state observation well 288 (KLAM 13427) with graph of cumulative departure from average precipitation by water year at Klamath Falls……35

Figure 18. Hydrograph of ground water levels measurements at state observation well 292 (well KLAM 14731)……...…36

Figure 19. Areas of geologic mapping in or near the eastern Lost River sub-basin from the mid 1990s through 2001……41

Figure 20. Faults mapped in or near the eastern Lost River sub-basin…….…..43

Figure 21. Reported well yield at 199 wells obtaining ground water from basalt within or adjacent to east Lost River sub-basin valleys……..51

Figure 22. Calculated specific capacity at 115 wells obtaining ground water from basalt within or adjacent to east Lost River sub-basin valleys……...51

Figure 23. Reported water temperature for ground water in basalt at 157 wells within or adjacent to east Lost River sub-basin valleys……...52

Figure 24. Reported well yield for sediment at 44 ground water wells Within or adjacent to east Lost River sub-basin valleys……..……54

Figure 25. Calculated specific capacity at 7 sediment ground water wells within or adjacent to east Lost River sub-basin valleys……55

Figure 26. Reported water temperature for ground water in sediment at 24 wells within or adjacent to east Lost River sub-basin valleys……...55

Figure 27. Location of the investigation ground water level measurement wells…….. 57

Figure 28. Graph of ground water levels measurements at state observation well 288 (well KLAM 13427) and cumulative departure from average precipitation by water year at Klamath Falls from 1950 to 2000……..58

Figure 29. Hydrograph of OWRD south Langell Valley aquifer test ground water level measurements at well KLAM 10641 showing pumping and barometric pressure influences…….…..…….60

Figure 30. Graph of barometric pressure during OWRD south Langell Valley aquifer test…….60

Figure 31. Hydrograph of OWRD south Langell Valley aquifer test ground water level measurements at well KLAM 10641 with barometric pressure influences removed…….……61

Figure 32. Hydrograph of OWRD Lorella aquifer test ground water level measurements at well KLAM 10362 and graph of the ocean tide at Coos Bay……...…….61

Figure 33. Hydrograph of OWRD ground water level measurements at well KLAM 13582 showing a canal leakage influence……..…….62

Figure 34. Hydrograph of OWRD measurements of the ground water level at well KLAM 50318 and the Lost River at Bonanza Big Springs Park……...… 63

Figure 35. Hydrograph of OWRD ground water level measurements at well KLAM 10813 showing irrigation influence…….….64

Figure 36. Hydrograph of OWRD ground water level measurements at well KLAM 10814 showing no irrigation influence…….……65

Figure 37. Hydrograph of OWRD ground water level measurements at well KLAM 10641 showing ground water use influence in basalt……...66

Figure 38. Hydrograph of OWRD ground water level measurements at well KLAM 14871 showing ground water use influence in basin fill…..66

Figure 39. Hydrograph of OWRD ground water level measurements at well KLAM 10699 showing ground water use influence superimposed upon canal leakage influence……...……..67

Figure 40. Hydrograph of ground water level measurements at sediment well KLAM 11473 and basalt well KLAM 13456 showing an efficient (direct) hydraulic connection……..68

Figure 41. Hydrograph of ground water level measurements at sediment well KLAM 10159 and basalt well KLAM 51131 showing an inefficient hydraulic connection……....69

Figure 42. Hydrograph of ground water level measurements at sediment well KLAM 11569 and basalt well KLAM 12369 showing perched ground water……....70

Figure 43. Lost River flow measurement sites for December 1997 seepage run……...…….73

Figure 44. Lost River flow in December 1997……..….76

Figure 45. Lost River specific electrical conductance in December 1997….… 76

Figure 46. Lost River elevation variability above Bonanza Big Springs during five-day December 1997 seepage run……77

Figure 47. Bonanza Big Springs Discharge and cumulative departure from average of water year precipitation at Klamath Falls……..….78

Figure 48. Eastern Lost River sub-basin sub-areas with associated wells and approximate boundaries…….….79

Figure 49. Representative hydrographs for the four sub-areas in the eastern Lost River sub-basin……80

Figure 50. South Langell Valley sub-area wells and approximate north boundary location……..…81

Figure 51. Hydrograph of ground water in basalt at 4 wells and basin fill sedimentary deposits at 1 well in the south Langell Valley sub-area……82

Figure 52. Lorella sub-area wells and approximate north and south boundary locations……83

Figure 53. Hydrograph of ground water in basalt and basin fill in the Lorella sub-area……84

Figure 54. Extreme example of ground water in basalt in the Lorella sub-area responding strongly to ground water pumping……...85

Figure 55. Hydrograph of ground water in different basalt water bearing zones at a double completion well in the Lorella sub-area……...85

Figure 56. Lorella sub-area wells separated into 9 compartments……...……86

Figure 57. Bonanza sub-area wells and approximate boundary locations……..87

Figure 58. Hydrograph of ground water in basalt and basin fill in the Bonanza sub-area……...…...88

Figure 59. Swan Lake Valley to Poe Valley sub-area wells and approximate boundary locations……...89

Figure 60. Hydrograph of ground water in basalt and basin fill in the Swan Lake Valley to Poe Valley sub-area……90

Figure 61. Swan Lake Valley to Poe Valley sub-area wells separated into the central portion and 3 adjoining compartments……91

Figure 62. Normalized hydrograph of ground water in basalt at and basin fill in the central portion of the Swan Lake Valley to Poe Valley sub-area……..92

Figure 63. Example ground water hydrograph for the north Swan Lake Valley compartment of the Swan Lake Valley to Poe Valley sub-area……93

Figure 64. Example ground water hydrograph for the south Poe Valley compartment of the Swan Lake Valley to Poe Valley sub-area……94

Figure 65. Comparison of south Langell Valley ground water from basalt level at well KLAM 10641 and Kilgore Spring water level in 2001……..97

Figure 66. Well water temperature versus well depth at well KLAM 10362 in the Lorella sub-area…….107

Figure 67. Well water temperature versus well depth at well KLAM 52096 in the Lorella sub-area…….108

Figure 68. Hydrograph of ground water level measurements at KLAM 52204 and KLAM 52096 double completion well in the Lorella sub-area…….110

Figure 69. Comparison of ground water elevations in Pine Flat sediment and basalt…….112

Figure 70. Well water temperature versus well depth at well KLAM 51131 in the Swan Lake to Poe Valley sub-area……... 114

Figure 71. Linear graph of idealized ground water level at an observation well responding to pumping and shut off at a neighboring well….115

Figure 72. Semi-log graph of idealized ground water level at an observation well responding to pumping and shut off at a neighboring well……. 116

Figure 73. Semi-log graph of idealized ground water level at an observation well responding to pumping at a neighboring well and a no-flow boundary influence……...……... 117

Figure 74. Semi-log graph of idealized ground water level at an observation well responding to pumping at a neighboring well and a recharge boundary influence……. 118

Figure 75. Location of wells used for the OWRD 1999 aquifer test in south Langell Valley……... 120

Figure 76. Location of wells used for the OWRD 1999 aquifer test in the Lorella Sub-area…… 124

Figure 77. Location of wells used for the OWRD 1999 aquifer test in north Poe Valley within the Swan Lake Valley to Poe Valley sub-area……... 134

Figure 78. Location of south Langell Valley sub-area wells subject to ADR permit conditions …….……. 142

Figure 79. Location of Lorella sub-area wells subject to ADR permit conditions…… 146

Figure 80. Location of Bonanza sub-area wells subject to ADR permit Conditions……... 149

Figure 81. Location of Swan Lake Valley to Poe Valley sub-area wells subject to ADR permit conditions……...156

Tables

Table 1. Summary of 32 applications received from 1991 to 1993 to appropriate ground water in the Langell, Yonna, and Poe Valleys for supplemental and primary irrigation use……...11

Table 2. Investigation data derived from 239 project wells and 18 other wells in the eastern Lost River sub-basin…….15

Table 3. Summary of ground water temperature, well yield, and specific capacity on water well reports for 205 eastern Lost River sub-basin basalt wells……...50

Table 4. Summary of ground water temperature, well yield, and specific capacity on water well reports for 48 eastern Lost River sub-basin wells producing from or penetrating through sediments overlying basalt……...53

Table 5. Type of water level measurements conducted at 205 wells for the eastern Lost River sub-basin ground water investigation…….. 56

Table 6. Summary of December 1997 Lost River seepage run……. 75

Table 7. General information related to wells used for the OWRD 1999 aquifer test in the south Langell Valley sub-area……...119

Table 8. Summary of estimated south Langell Valley basalt transmissivity and storage coefficient values using OWRD 1999 aquifer test data adjusted for barometric pressure changes…….. 122

Table 9. General information related to wells used for the OWRD 1999 aquifer test in the Lorella sub-area…….124

Table 10. Summary of transmissivity and storage coefficient values estimated for canal-influenced basalt in the Lorella northeast compartment, Lorella sub-area using OWRD 1999 aquifer test data adjusted for barometric pressure changes…….. 127

Table 11. Summary of transmissivity and storage coefficient values reported by CH2MHill (1994) for canal-influenced basalt in the Bryant Mountain to Dead Indian Hill terrace middle compartment, Lorella sub-area…….. 128

Table 12. Summary of transmissivity and storage coefficient values for the Bonanza sub-area basalt water bearing zones hydraulically connected to Bonanza Big Springs as reported by the U.S. Geological Survey and CH2MHill ……130

Table 13. Summary of transmissivity values for the Bonanza Sub-area deep basalt water bearing zones reported by CH2MHill (1994 and 2002)……131

Table 14. General information related to wells used for the OWRD 1999 aquifer test in northern Poe Valley, Swan Lake Valley to Poe Valley sub-area…….. 134

Table 15. Summary of estimated basalt transmissivity and storage coefficient values for basalt in the central portion of the Swan Lake Valley to Poe Valley sub-area using OWRD 1999 north Poe Valley aquifer test data……... 135

Table 16. Summary of effective basalt transmissivity and storage coefficient values for the eastern Lost River sub-basin……. 137

Table 17. Summary of calculated potential drawdowns at the Lost River caused by exercising ADR permits in the south Langell Valley sub-area…….. 143

Table 18. Summary of calculated potential drawdowns at Kilgore Springs caused by exercising ADR permits in the south Langell Valley sub-area…….. 144

Table 19. Summary of calculated potential drawdowns at the Lost River caused by exercising ADR ground water permits in the Lorella sub-area…….. 147

Table 20. Summary of calculated potential drawdowns at the Lost River caused by exercising ADR permits in the Bonanza sub-area…… 150

Table 21. Summary of calculated potential drawdowns at Bonanza Big Springs caused by exercising ADR permits in the Bonanza sub-area…….. 153

Table 22. Summary of calculated potential drawdowns at the Lost River caused by exercising ADR permits in the Swan Lake Valley to Poe Valley sub-area……... 157

Table 23. Summary of calculated potential drawdowns at west Poe Valley springs caused by exercising ADR permits in the Swan Lake Valley to Poe Valley sub-area……158

Plates

Plate 1 Geography of the eastern Lost River sub-basin

Plate 2. Eastern Lost River sub-basin project wells

Plate 3 Top of basalt below basin fill sedimentary deposits in the eastern Lost River sub-basin.

Plate 4 Eastern Lost River sub-basin potentiometric map, basalt ground water elevations in March 1999

Plate 5 Lorella sub-area potentiometric map, canal influenced basalt ground water elevations in March 1999

Appendices

Appendix 1 Permited supplemental and primary irrigation water use related to 32 applications received from 1991 to 1993 to appropriate ground water in the Langell, Yonna, and Poe Valleys

Appendix 2 Project Wells

Appendix 3 Klamath Falls precipitation in inches from 1921 to 2000

Appendix 4 Klamath Falls average daily maximum, minimum, and average temperatures by month in degrees Fahrenheit from 1971 to 2000

Appendix 5 Number of water wells constructed for different uses by location as noted on water well report

Appendix 6 State Observation Well Hydrographs

Appendix 7 Summary of Stratigraphic Units Identified in the Eastern Lost River Sub-basin by 1974 to 2004 Investigations

Appendix 8 Correlation of geologic units identified by previous investigators from 1974 to 2004 and as generalized by this study

Appendix 9 Geologic Cross Sections

Appendix 10 Hypotheses for Sub-basin Stratigraphy and Structural Development

Appendix 11 Hydrogeologic Information found on or derived from water well reports

Appendix 12 Project Recorder and Monthly Well Hydrographs

Appendix 13 Ground Water Elevation Measurements

Appendix 14 Land Elevation for Each Project Well Site

Appendix 15 Hydrographs comparing water level fluctuations in basalt and basin fill sedimentary deposits

Appendix 16 Project Surface Water Sites

Appendix 17 Lost River Seepage Run Data

Appendix 18 Lost River Seepage Run Conductivity Analysis

Appendix 19 USGS Lost River Seepage Run Data

Appendix 20 Bonanza Big Springs historical discharge measurements

Appendix 21 South Langell Valley 1999 OWRD aquifer test graphs

Appendix 22 South Langell Valley 1999 OWRD aquifer test, pumping well data (KLAM 10495)

Appendix 23 South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 10641)

Appendix 24 South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 15129)

Appendix 25 South Langell Valley 1999 OWRD aquifer test, observation well data (domestic sedimentary well)

Appendix 26 South Langell Valley 1999 OWRD aquifer test, discharge data

Appendix 27 Lorella 1999 OWRD aquifer test graphs

Appendix 28 Lorella 1999 OWRD aquifer test, observation well data (KLAM 10554)

Appendix 29 Lorella 1999 OWRD aquifer test, observation well data (KLAM 52204)

Appendix 30 Lorella 1999 OWRD aquifer test, observation well data (KLAM 52096)

Appendix 31 Lorella 1999 OWRD aquifer test, observation well data (KLAM 10362)

Appendix 32--Lorella 1999 OWRD aquifer test, observation well data (KLAM 10364)

Appendix 33 Lorella 1999 OWRD aquifer test, discharge data

Appendix 34 North Poe Valley 1999 OWRD aquifer test graphs

Appendix 35--North Poe Valley 1999 OWRD aquifer test, pumping well data (KLAM 10292)

Appendix 36 North Poe Valley 1999 OWRD aquifer test, observation well data (KLAM 10252)

Appendix 37 North Poe Valley 1999 OWRD aquifer test, observation well data (KLAM 51131)

Appendix 38 North Poe Valley 1999 OWRD aquifer test, discharge data

Appendix 39 Ground water drawdown calculated for South Langell Valley sub-area ADR ground water permits

Appendix 40 Ground water drawdown calculated for Lorella sub-area ADR ground water permits

Appendix 41 Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Appendix 42 Ground water drawdown calculated for Swan Lake Valley to Poe Valley sub-area ADR ground water permits

Definition of Selected Terms

Acre-foot: The volume required to cover 1 acre to a depth of 1 foot. This volume equals 43,560 cubic feet or 325,851 gallons.

Aquifer: A body of rock and/or sediments that will yield water in a usable quantity to a well or spring.

Alluvium: Clay, silt, sand, gravel or similar material deposited by running water.

Andesite: A fine grained, gray to grayish black volcanic rock, typically containing the minerals plagioclase, augite, biotite, or hornblende.

Barometric Efficiency: A ratio of the water level change in a well to the inverse barometric pressure change (converted to feet of water).

Basalt: A very fine grained, dark gray to black volcanic rock. The minerals it contains (pyroxene, plagioclase, olivine) are relatively high in iron and magnesium.

Confined Aquifer: An aquifer bounded above and below by material of distinctly lower permeability than the aquifer itself. Ground water in the aquifer is under sufficient pressure to rise above the level at which it is encountered by a well. The water in a well may or may not rise above land surface.

Earth Tide: The rising and falling of the earth crust in response to the same forces that produce ocean tides. During high (maximum) tides, the crust dilates which reduces pressure on ground water and causes water in a well to drop (generally less than 0.10 foot). During low tide, the crust relaxes which increases pressure on ground water and causes water in a well to rise.

Effective Transmissivity and Storage Coefficient: This investigation used the Theis equation to calculate the potential ground water drawdown at the Lost River and at springs due to pumping at individual wells. The actual drawdown is related to the pumping rate, the hydraulic properties of the geologic units (transmissivity and storage coefficient), and boundary influences. The Theis equation does not include boundary influences. That can lead to incorrect drawdown calculations, too much or too little depending upon the boundary influence. This investigation indirectly added boundary influences by using an effective transmissivity and storage coefficient for the actual values in the Theis equation calculations. The effective values are the actual values adjusted to include boundary influences. They were obtained by iteratively using an aquifer test derived storage coefficient and a range of aquifer test derived tranmissivities in Theis equation calculations. The values that best reproduced observed drawdown and/or recovery at different locations were used.

Excessively Declining Water Levels as defined in Oregon Administrative Rule OAR 690-08-001 (6) means any ongoing lowering of the water level in a ground water reservoir or part thereof which: (a) precludes, or could preclude, the perpetual us of the reservoir; or (b) represents an average downward trend of three or more feet per year for at least 10 years; or (c) represents, over a five year period, an average annual lowering of the water level by 1% or more of the initial saturated thickness as determined by observation or investigation in the affected area; or (d) results in water quality deterioration.

Fault: A fracture or zone of fractures in the earth's crust along which there has been displacement of one side relative to the other.

Geologic Structure: A general term for features created by movement, bending, tilting, or breaking of rock layers or units.

Hydraulic Conductivity: A measure of the capacity of rock and/or sediment to transmit water. It is expressed as the rate (volume/time) at which water moves through a unit area of an aquifer under a unit hydraulic gradient. Its value depends upon the physical properties of the water and the aquifer. Larger values means water can move more easily.

Hydraulic Gradient: A measure of the slope of the potentiometric surface. It is the change in total head per unit distance measured in the direction of steepest change. This gradient drives ground water flow.

$$\text{Hydraulic Gradient} = \frac{\text{(Total Head at Point A)} - \text{(Total Head at Point B)}}{\text{Distance Between A and B}}$$

Lithology: The description of rocks on the basis of color, mineral composition, and grain size.

Palagonite: Basaltic glass weathered to a yellow or orange mineral.

Paleomagnetism: The intensity and direction of residual magnetization in ancient rocks. The magnetic particles in the rock were oriented by the earth's magnetic field as it existed when the rock was formed.

Phenocryst: A crystal conspicuously larger than most crystals in the rock.

Phyric (porphyritic): A basalt rock texture in which larger crystals (phenocrysts) are set in a matrix of finer grained crystals and glass (groundmass).

Pillow Lava: Lobes of lava stacked one upon another resembling a pile of bed pillows. They are formed by lava flowing into water.

Pillow-Palagonite (Pillow Breccia): Pillow lava surrounded by yellow or orange minerals formed as the pillow lava weathers.

Potentiometric Surface: A surface that represents the total head in an aquifer. It is defined by the elevation at which water stands in cased wells that penetrate the aquifer. A water table is a particular potentiometric surface for unconfined ground water.

Saturated: The condition in which the pores and/or fractures in rock and/or sediment are filled with water.

Sediment: Solid fragmental material that settled down from a state of suspension in wind, water, or ice, was chemically precipitated from solution, or was secreted by organisms. The settling process forms layers.

Specific Capacity: The yield (rate of discharge) from a pumped well divided by the water level drawdown in the well due to the pumping. It is often expressed as gallons per minute per foot of drawdown (gpm/ft).

Speicifc Yield (Unconfined Storativity): The volume of water released from or added to storage in a unit prism of an unconfined aquifer per unit change in the water table. Water released is due to dewatering of aquifer pore spaces and water added is due to filling of aquifer pore spaces.

$$\text{Specfic Yield} = \frac{\text{(volume of water released)(aquifer thickness)}}{\text{(aquifer volume with unit base)(unit decline of water table)}}$$

Storage Coefficient (Storativity): The volume of water released from or added to storage in a unit prism of a confined aquifer per unit change in total head. Water released is due to compaction of the aquifer and expansion of water when pressure is relieved. Water added is due to expansion of the aquifer and compaction of the water associated with an increase of pressure.

$$\text{Storage Coefficient} = \frac{\text{(volume of water released)(aquifer thickness)}}{\text{(aquifer volume with unit base)(unit decline of total head)}}$$

Stratigraphy: The branch of geology which treats the formation, composition, sequence, and correlation of rock layers.

Total Head: Total Head = Elevation Head + Pressure Head

Elevation Head = the elevation of a point of interest in an aquifer relative to some reference measuring point (i.e. sea level).

Pressure Head = the water column height that can be supported by the pressure at the point of interest in the aquifer.

Transmissivity: A measure indicating how easily water can move through an aquifer. The rate at which water is transmitted through a unit width of aquifer under a unit hydraulic gradient.

Transmissivity = (hydraulic conductivity)(aquifer thickness)

Tuffaceous: A rock containing up to 50 percent volcanic ash.

Unconfined Aquifer Water Table Aquifer): An aquifer in which a water table forms the upper ground water surface.

Volcanic Breccia (agglomerate): A rock composed of angular volcanic fragments (larger than 64 mm) set in finer volcanic material.

Volcaniclastic: A rock composed of volcanic fragments.

Water Table: The upper ground water surface in an unconfined aquifer where the pressure of the water in the porous medium equals atmospheric pressure.

Executive Summary

Investigation Purpose

In 1996, the Oregon Water Resources Department issued thirty-two ADR ground water permits for primary and supplemental irrigation in the eastern Lost River sub-basin. The permit conditions require the Department to decide whether the permits will expire or can mature into certificates based upon the following:

A. River stage or Bonanza Big Springs flows are not significantly diminished by use of water under each permit as determined by the Oregon Water Resources Department, in consultation with the Bureau of Reclamation and Oregon Department of Fish and Wildlife, using quantifiable groundwater and hydrologic science that stands up to peer review;

B. Within two years of permit issuance for primary use, the permittee/appropriator has submitted a plan to the Department indicating potential economic sources for an alternative long-term water supply;

C. Periodic water level reports have been submitted; and

D. Excessively declining ground water levels have not occurred due to well use as determined by the Oregon Water Resources Department, in consultation with the Bureau of Reclamation and Oregon Department of Fish and Wildlife, using quantifiable groundwater and hydrologic science that stands up to peer review.

This investigation was conducted to address conditions A and D. That effort necessitated advancing the state of knowledge about the ground water system.

Geography, Climate and Land Use

The 920 square mile ground water investigation area was limited to the eastern portion of the Lost River sub-basin, east of Klamath Falls. The area includes the Town of Bonanza and the communities of Dairy, Yonna, and Lorella.

Northwest trending uplands separate the interconnected Langell, Yonna, Poe, and Swan Lake Valleys and Pine Flat lowlands. Annual average precipitation and native vegetation indicate the sub-basin is semi-arid.

Agriculture is the dominant private land use. It includes cattle and sheep ranches, dairies, and irrigated acreages. Irrigation water comes from surface and ground water sources allocated by Oregon water rights. The U.S. Bureau of Reclamation Klamath Project delivers most of the surface water used via irrigation districts. In 2002, about 225 ground water rights were valid for irrigation in the sub-basin.

Geologic Framework (compiled from other investigations)

The geology of the upper Klamath basin and the eastern Lost River sub-basin is complex. The upper Klamath basin is located in the transition area between the Cascade Mountain and the Basin and Range physiographic provinces. The eastern Lost River sub-basin is located within the Basin and Range province. The province is characterized by long and narrow, north-south trending fault-block mountains separated by broad basins filled with sedimentary rock and sediments.

The stratigraphy of the sub-basin consists of numerous units of basalt and sedimentary rock and sediments. Many units are contemporaneous with complex relationships. Water influenced the deposition of many units. Some units show evidence of hydrothermal alteration or secondary mineralization that followed deposition.

Geologically young (3.8 to 8.2 million years) basalt occurs throughout the sub-basin as multiple layers with some sedimentary interbeds between layers. Unit thickness ranges from less than 50 ft to approximately 2,000 ft. Individual flows may be discontinuous and can vary in texture. Depositional environments range from subaerial, to some interaction with water, to submerged. Some units show gradations indicating they experienced multiple depositional environments. Most exposed basalt occur in the uplands. In the valleys, basin fill sedimentary rock and sediments bury the basalt units except at buttes.

Sub-basin sedimentary rock and sediments predominantly occur in the valleys as lacustrine, fluvial, and volcaniclastic basin fill that overlies the basalt. The thickness of the basin fill can range from a few feet to hundreds of feet. Some basalt dikes, sills, and flows are found within the basin fill.

The general sub-basin geologic structure includes numerous north-northwest trending and occasional east-west trending faults. Most of the faults vertically offset geologic units creating upland blocks (horsts) with steep escarpments along the fault. Down-dropped blocks (grabens) form valleys between the horsts.

Geologic History (compiled from Black, 2004)

The oldest exposed rocks in the sub-basin are late Miocene (7.32 and 8.18 million year age dates) basalts found on Bryant Mountain and Gift Butte. They were deposited as thin horizontal sheets erupted over subdued topography. The units show interaction with water, and lacustrine sedimentary interbeds occur between some flows. These flows are assumed to underlie the entire sub-basin.

Master Basin and Range faulting commenced about 7 million years ago. This started erosion of fully emplaced basalt units creating low hills and broad valleys. Lacustrine mudstone and fluvial deltaic sandstone accumulated in the developing basins during a period of volcanic inactivity. The mudstone came from volcanic ash from nearby eruptive centers.

Volcanic activity in the sub-basin eventually resumed (5.4 million year maximum age date, 4.6 to 3.8 million year age for most samples), and non-master faults that produced buttes and other small uplands within the valleys commenced about 4.5 million years ago. Eruptions occurred along master graben-bounding faults and within the basins. Flows erupted onto the sediments, flowed into the basins and up against the basaltic highs, locally ponded, and/or interacted with water over large areas.

More recently during the Pleistocene, pluvial Lake Modoc purportedly inundated the sub-basin valleys in addition to the Upper Klamath Lake and Tule Lake valleys. The lake elevation apparently fluctuated rising to a maximum elevation of 4,240 ft. During this period, lacustrine deposition occurred within the lake, Miller Creek formed a gravel delta as it flowed into the lake, and other alluvial fans were deposited by other drainages. When Lake Modoc receded, it left behind Upper Klamath Lake, Tule Lake, Alkali Lake, and Swan Lake. Additionally, the Lost River was established. Subsequently, some sedimentary deposition has occurred. No evidence has been found for volcanism occurring in the sub-basin during the Pleistocene to the present.

Ground Water Occurrence

Water well reports indicate ground water occurs in both basalt and basin fill sedimentary rocks and sediments. Despite the complex geology in the sub-basin, sufficient hydraulic connection exists between water bearing zones in predominantly basalt units to allow lumping them as undifferentiated basalt. Additionally, sufficient hydraulic connection exists between water bearing zones in predominantly basin fill sedimentary rock and sediment units to allow lumping them as undifferentiated sediments.

Ground water in basalt and the overlying basin fill is generally hydraulically interconnected, especially in Langell, Poe, and Yonna Valleys. Evidence includes similar ground water elevations and ground water level trends. In Swan Lake Valley and Pine Flat, ground water in the deeper portion of the basin fill has an efficient (direct) hydraulic connection to ground water in the basalt below. Ground water in the upper portion of the basin fill is either perched above deeper ground water or has a high vertical gradient to deeper ground water. Evidence includes anomalously high ground water elevations at a few wells surrounded by wells showing much lower ground water elevations and different ground water trends.

Data indicate four sub-areas exist in the eastern Lost River sub-basin: south Langell Valley, Lorella, Bonanza, and Swan Lake Valley to Poe Valley. In addition, nine compartments exist within the Lorella sub-area and three compartments exist in the Swan Lake Valley to Poe Valley sub-area adjoining the central portion of the sub-area. The compartment boundaries are poorly defined, but they likely correspond to buried geologic structures.

Ground Water Temperatures

The temperature range of ground water in basalt and the basin fill is similar. The reported ground water temperatures for 157 wells completed in basalt range from 45 to 90°F. The reported ground water temperatures for 24 wells completed in sediments range from 45 to 80°F. The higher temperatures indicate the presence of water heated during deep circulation.

Hydraulic Properties of Basalt and Basin Fill

Water well reports indicate the hydraulic properties of the basalt and basin fill generally differ. The reported yield of 199 wells completed in basalt range from 4 gal/min minimum to 5,500 gal/min maximum. The average and median yields are 1,470 and 1,500 gal/min respectively. The reported yield of 44 wells completed in basin fill sediments range from 2 gal/min minimum to 950 gal/min maximum. The average and median yields are 82 and 30 gal/min respectively.

Aquifer tests were conducted at various sub-basin locations to determine the hydraulic properties of basalt. The Oregon Water Resources Department, the U.S. Geological Survey, and CH2MHill consultants conducted the tests. The aquifer test data yielded a range of hydraulic property values. Transmissivity varies by sub-area and sub-area compartments, ranging from less than 50,000 ft^2/d (375,000 gal/d/ft) to over 100,000 ft^2/d (750,000 gal/d/ft). Storage coefficient values are generally less than 10^{-3} with most close to 10^{-4}. Many of the tests showed the influence of no-flow boundaries and/or responses from recharge boundaries, leaky confining layers, or delayed yield.

Ground Water Flow

Ground water in basalt generally flows toward the valleys from the surrounding uplands and then flows down valley toward or parallel to the Lost River. Recharge appears to occur locally in both the uplands and valleys. Most discharge occurs at fault-related valley springs within or near the Lost River. Limited discharge occurs through the basin fill and stratigraphically controlled springs above the valley floors. The occasional hot springs present are fault controlled with water absorbing heat during deep circulation along faults.

The geologic influence upon horizontal ground water flow in basalt varies. As previously noted, data indicate four sub-areas exist in the eastern Lost River sub-basin: south Langell Valley, Lorella, Bonanza, and Swan Lake Valley to Poe Valley, and compartments exist within the Lorella sub-area and the Swan Lake Valley to Poe Valley sub-area. Water level data show relatively small horizontal hydraulic gradients (change in ground water elevation for a given horizontal distance) exist in most sub-area valleys. This indicates low resistance to flow within a given sub-area valley, even in areas with numerous geologic structures and geologic units that are discontinuous or changing in character. Structures in these areas are transparent to flow rather than impede flow. Steeper gradients exist at valley margins, neighboring uplands, and between sub-areas, sub-area compartments, and neighboring sub-basins. The larger gradients in these areas indicate higher resistance to flow by the geologic structures and units.

The vertical ground water gradient within the sediments, between the sediments and basalt, and within basalt range from downward to upward depending upon location relative to recharge or discharge areas.

Sets of relatively concurrent surface water flow measurements (seepage run data) confirm the ground water in basalt is hydraulically connected to the Lost River. Free flowing springs occur within and adjacent to the river at Bonanza and western Poe Valley. They respectively discharged about 60 and 20 ft^3/s to the river in December 1997. Other springs located away from the river discharge to the river via ditches and/or overland flow. Elsewhere, discharge from the basalt to the river occurs as diffuse, low flow, seepage through the overlying basin fill.

Influences Upon Ground Water Elevations

Climate influences the elevation of ground water in basalt. The annual ground water elevation trend generally declines during years of below average precipitation and rises during years of above average precipitation. Additionally, barometric pressure changes (expressed as feet of water) inversely changes the ground water elevation at some wells with 30 to 50 percent efficiency.

Investigation data also revealed earth tides can influence ground water in basalt causing the ground water elevation to fluctuate, generally less than 0.1 ft.

Canal leakage occurs within the sub-basin. It notably influences ground water in basalt in the Lorella sub-area in mid Langell Valley. The elevations rise when the canals flow and decline when canals are empty. In most areas, however, a canal influence upon ground water in basalt is not apparent in the water level data. This is because aquifer properties help dissipate the canal influence, and climate and ground water use masks the canal influence.

Lost River stage can influence the elevation of ground water in basalt. However, the influence appears limited.

Ground water use clearly influences ground water in both the basalt and sediments. Most ground water elevations decline during major ground water use periods (the irrigation season) and recover during periods of reduced or no use.

Limited data indicate ground water near land surface in basin fill responds to irrigation, precipitation, and snowmelt events. These events appear as short-term spikes on water level hydrographs. The influence of these short-term events upon ground water deeper in the basin fill is dampened and lost with depth.

Ground Water Response to Development

Ground water use in the sub-basin has increased over the decades. The ADR permit condition D requires the Oregon water Resources Department to determine whether "excessively declining ground water levels" have occurred due to well use. The definition exists in Oregon Administrative Rule OAR 690-08-001 (6).

Water level measurements at nine state observation wells (generally from the 1960s through the 1990s) indicate ground water levels in the sub-basin decline and recover seasonally and over multiple years. The seasonal fluctuations correspond to the seasonality of ground water recharge and ground water use. The fluctuation over multiple years corresponds to long-term precipitation trend variations.

At eight of the nine sites, water levels during the late 1990s are similar to the initial levels. Over a 40-year period, a possible decline of 1 to 2 ft occurred in south Swan Lake Valley, Yonna Valley, and south Langell Valley, and a possible 3 ft decline may have occurred near Lorella. These declines are not considered "excessive" as defined by OAR 690-08-001 (6).

At the ninth site located in southeast Poe Valley, a 20 ft total decline occurred as two 10 ft steps, first in the 1960s and subsequently in the 1990s. The decline resulted from local aquifer properties and compartmentalization amplifying ground water use impacts during droughts. The decline is notable, a concern, and deserves continued monitoring. However, it is geographically limited and not considered "excessive" as defined by OAR 690-08-001 (6).

Under the rule, an "excessive" decline includes water quality deterioration as a result of "ongoing lowering" of the ground water level. Periodic ground water quality deterioration has occurred in the vicinity of Bonanza Big Springs as a result of drought, seasonal ground water use, and management of the Lost River. This situation is not considered an "excessive" decline under OAR 690-08-001 (6) since the deterioration is not related to an "ongoing lowering" of ground water levels.

Ground Water Drawdown Calculations

To address ADR permit condition A, this investigation calculated the potential drawdown of ground water in basalt at the Lost River, Bonanza Big Springs, and other springs due to pumping ground water as allowed by the ADR permits. River and spring sites selected for the drawdown calculations were limited to sites within the same sub-area or compartment as the pumping well.

The interference affect on the Lost River and springs due to pumping ground water from basalt is directly proportional to the ground water drawdown in basalt at the river and springs. Larger drawdowns cause larger affects at the river and spring. The rate of ground water discharge to a river via springs and seepage decreases as the ground water level above river stage falls. Discharge ceases when the ground water level equals river stage. Then, the rate of reverse flow (river water loss to ground water) increases as the ground water level falls below river stage.

Drawdown from a pumping well at any location is dependent upon the pumping rate, aquifer transmissivity and storage coefficient, distance from the pumping well, and elapsed pumping time. Higher pumping rates, smaller transmissivity, and storage coefficient, shorter distance from the pumping well, and longer elapsed time lead to larger drawdown estimates. Conversely, smaller pumping rates, larger transmissivity and storage coefficient, greater distance from the pumping well, and shorter elapsed time lead to smaller drawdown estimates.

For each ADR permit, a drawdown was calculated at the closest Lost River site in the same sub-area or compartment as the ADR permit well, a different site for each permit. These individual drawdowns represent the maximum ground water drawdown pumping a given well will cause at the river.

Again for each ADR permit, a drawdown was calculated at one of three springs if present in the same sub-area or compartment as the ADR permit well. The springs are Bonanza Big Springs in the Bonanza sub-area, Kilgore Spring in the south Langell Valley sub-area, and High spring in the central portion of the Swan Lake Valley to Poe Valley sub-area. The ADR permit conditions address Bonanza Big Springs only. In addition to these individual drawdowns, the principle of superposition allowed calculating a cumulative drawdown at the spring sites, all the calculated drawdowns at a spring added together.

The drawdown calculations included using continuous pumping at the maximum rates allowed by the ground water permits and pumping at pro-rated rates. Given the permits specify a maximum pumping rate allowed, it was necessary to calculate ground water drawdowns using that rate. However, irrigators rarely use the maximum pumping rate for the entire period of use for a variety of reasons. Therefore, it was necessary to calculate ground water drawdowns using pro-rated pumping rates. The pro-rated pumping rates were obtained by dividing the total volume of water allowed by the total period of use allowed.

The calculated cumulative ground water drawdown in basalt at Kilgore Spring in the south Langell Valley sub-area for 30 and 184 days of continuous pumping at the maximum permitted rate ranged from nearly 3.00 ft to more than 3.50 ft respectively. The total drawdown for 30 and 184 days of pro-rated pumping ranged from nearly 1.75 ft to more than 2.00 ft respectively.

The calculated cumulative ground water drawdown in basalt at Bonanza Big Springs in the Bonanza sub-area for 30 and 184 days of continuous pumping at the maximum permitted rate ranged from more than 5.40 ft to nearly 7.25 ft respectively. The total drawdown for 30 and 184 days of pro-rated pumping ranged from nearly 3.10 ft to more than 4.10 ft respectively.

The calculated cumulative ground water drawdown in basalt at High spring in the central portion of the Swan Lake Valley to Poe Valley sub-area for 30 and 184 days of continuous pumping at the maximum rate permitted ranged from nearly 3.00 ft to less than 5.00 ft respectively. The total drawdown for 30 and 184 days of pro-rated pumping ranged from over 1.50 ft to over 2.50 ft respectively.

All the calculation results by ADR permit and sub-area can be found in tables in the full report. Each calculation conducted can be found in the report appendices.

Conclusions

1. Ground water occurs in both basalt and basin fill in the eastern Lost River sub-basin. However, wells with higher yields are generally located within the valleys and produce from basalt. Therefore, this investigation focused primarily upon the various influences affecting the behavior of ground water in basalt including pumping and climatic events.

2. No “excessively declining ground water levels”, as defined in Oregon Administrative Rule OAR 690-08-001 (6), occurred before, or subsequent to, issuance of the ADR permits.

3. Long-term water level trends in basalt generally correlate with climatic trends. An exception is a step-wise decline in southeast Poe Valley.

4. Short-term ground water level fluctuations in basalt (annual decline and recovery) correspond to annual pumping and precipitation patterns.

5. The study area can be divided into four sub-areas based primarily on the behavior of ground water in basalt and in part on geology. At different locations within each sub-area, the ground water response to natural and anthropogenic stress is similar. Some sub-areas can be further divided into compartments based on the behavior of ground water affected by geologic structure.

6. Water level data from 1999 through 2002 indicate the impacts of summer ground water pumping from basalt did not propagate beyond sub-area or compartment boundaries during those years. This does not imply the sub-areas and compartments are hydraulically isolated or that any long-term effects, such as year-to-year declines, from future ground water uses will not propagate to neighboring areas in the long-term.

7. Ground water in basalt is hydraulically connected to the Lost River via springs and diffuse seepage through overlying basin fill.

8. Investigation data indicate springs showing an acute response to seasonal ground water pumping from basalt were located in the same sub-area or compartment as the seasonal ground water use. For example, Bonanza Big Springs responded to summer ground water use in the Bonanza sub-area only. This does not imply that long-term effects from any future ground water uses will not propagate in the long-term to affect springs in neighboring sub-areas or compartments.

9. The effect of pumping ground water from basalt upon surface water is proportional to the amount of ground water drawdown caused by the pumping and the efficiency of the interconnection between the ground water in basalt and surface water.

10. The most efficient interconnection between ground water in sub-basin basalt and the Lost River occurs at fault controlled valley floor springs where basalt is at or near land surface. The greatest ground water discharge from basalt to the Lost River occurs at Bonanza Big Springs and west Poe Valley springs located in or adjacent to the river. Additional discharge occurs at south Langell Valley springs located away from the river.

11. The least efficient interconnection between ground water in sub-basin basalt and the Lost River is through basin fill that overlies the basalt. Ground water discharge to the river occurs as diffuse, low flow, seepage.

12. High basalt transmissivities exist in the Bonanza and south Langell Valley sub-areas and the central portion of the Swan Lake Valley to Poe Valley sub-area. These transmissivities facilitate smaller, but very rapid ground water level responses at springs and other locations within the same sub-area or compartment where pumping ground water from basalt occurs. Even though the water level response at a spring is small, the impact upon spring discharge is large given the higher transmissivities and direct connection between the basalt and springs. Most of the ADR permit wells are located in these areas, especially the Bonanza sub-area.

13. Low basalt transmissivities and compartmentalization generally exist in the Lorella sub-area and in south and eastern Poe Valley. These facilitate greater ground water level drawdown when a well pumps from basalt in these areas. Despite the greater water level response, the short-term impact upon surface water is small in these areas. This is due to the lower transmissivities, compartmentalization, and/or thicker basin fill making the interconnection between the basalt and surface water inefficient. Fewer of the ADR permits are located in these areas.

14. From 1997 through 2002, the ground water level in the basalt at Bonanza Big Springs nearly met the river stage in the summer of 1997 and 2000, and dropped below the river stage in the summer of 2001 and 2002.

15. Under current management of the Lost River, the calculated total ground water drawdown in basalt by pro-rated pumping of the Bonanza sub-area ADR permit wells is sufficient to terminate Bonanza Big Springs flow (lower the ground water level to or below river stage) in most years.

16. Fewer ADR ground water permit wells are located in the central portion of the Swan Lake Valley to Poe Valley sub-area where a direct connection with High spring exists, and the south Langell Valley sub-area where a direct connection with Kilgore Spring exists. In 2001, both springs stopped flowing due the lowering of ground water levels in the basalt caused by drought and increased pumping.

Introduction

Problem Statement

A late 1980s to early 1990s drought increased the demand for ground water use in the eastern Lost River sub-basin. As a result, the Oregon Water Resources Department received 32 applications from 1991 to 1993 to appropriate ground water in the Langell, Yonna, and Poe Valleys for supplemental and primary irrigation use (table 1).

Table 1. Summary of 32 applications received from 1991 to 1993 to appropriate ground water in the Langell, Yonna, and Poe Valleys for supplemental and primary irrigation use

	Primary Irrigation Use	**Supplemental Irrigation Use**	**Total**
Number of Applications	27	23	32*
Proposed Number of Wells	39	34	45**
Area (acres)	3,600.0	7,790.5	11,390.5
Annual Volume (acre-ft)	9,180	19,476	28,656
Maximum Rate (gal/min)	19,239	41,634	60,873
Maximum Rate (ft^3/s)	43	93	136
Maximum Rate (acre-ft/d)	85	184	269

* Note: 18 applications include both primary and supplemental irrigation use.
**Note: 28 wells proposed for both primary and supplemental irrigation use.

In 1992, Department staff identified conditions generally unfavorable to issuing additional ground water rights in the area (Director, 1992). They noted:

- A hydraulic connection between ground water and the Lost River exists.
- Granting permits would approximately double local ground water use.
- No additional surface water was available for use.

- Ground water levels at state observation wells and discharge at Bonanza Big Springs were declining. However, information was insufficient to determine the degree to which the declines were caused by climate trends or ground water use.

- Fecal coliform contamination of ground water occurred near Bonanza Big Springs in 1991. An Oregon Health Division investigation attributed the contamination to Lost River inflow at Bonanza Big Springs due to ground water levels falling below river level (Nelson, 1991).

In June 1992, a Department staff report requested and recommended Water Resources Commission authorization to initiate withdrawal proceedings for the Lost River ground water resource (Director, 1992). The recommendation for a withdrawal included:

- Holding all pending ground water applications and withdrawing the ground water resource from further appropriation except for municipal, exempt (OAR 537.545), and drought related ground water uses

- Ending the withdrawal order on December 31, 1997 and processing the pending applications based upon information available at the time.

- Ending the withdrawal order before December 31, 1997 if spring flows recovered to historic rates (90 ft^3/s), or new information showed additional ground water use would not harm the public interest.

A need for additional data was acknowledged in the staff report and during public testimony at a June 1992 Water Resources Commission meeting. A Commission vote to approve the staff recommendation failed three to two with one abstention and one absent (Oregon Water Resources Commission, 1992).

In 1994, the Oregon Water Resources Department released a report (Gorman, 1994) that assessed the potential impact of the ground water right applications upon surface water sources near Bonanza Big Springs. The assessment used data collected from July 1992 to June 1993 and information from previous ground water investigations. The report concluded that different geologic units are hydraulically connected allowing circulation between units, spring discharge is sensitive to both climatic and human caused stresses, and a strong relationship exists between ground water levels and spring discharge. Local objections to the report arose with demands for more data to test the conclusions.

In 1996, the applicants received a permit. Each permit is summarized in appendix 1. All the permits include alternative dispute resolution (ADR) negotiated conditions that require the Oregon Water Resources Department to decide whether the permits will expire or can mature into certificates based upon the following:

A. River stage or Bonanza Big Springs flows are not significantly diminished by use of water under each permit as determined by the Oregon Water Resources Department, in consultation with the Bureau of Reclamation and Oregon Department of Fish and Wildlife, using quantifiable groundwater and hydrologic science that stands up to peer review;

B. Within two years of permit issuance for primary use, the permittee/appropriator has submitted a plan to the Department indicating potential economic sources for an alternative long-term water supply;

C. Periodic water level reports have been submitted; and

D. Excessively declining ground water levels have not occurred due to well use as determined by the Oregon Water Resources Department, in consultation with the Bureau of Reclamation and Oregon Department of Fish and Wildlife, using quantifiable groundwater and hydrologic science that stands up to peer review.

Investigation Purpose

The need to address alternative dispute resolution conditions A and D in the ADR permits led to the OWRD ground water investigation that is the subject of this report. Condition A requires addressing the potential impact of each permit upon the Lost River and Bonanza Big Springs. Condition D requires assessing the long-term ground water level trends in the sub-basin. Accomplishing each task required extensive data collection and analysis.

The Oregon Water Resources Department will use the investigation results presented in this report and Oregon water law to determine whether the ADR permits can mature to certificates. Additionally, the Department will use the investigation results to determine the fate of future applications for groundwater use in the sub-basin.

Statutory Authority to Conduct an Investigation

This investigation was conducted under the authority of ORS 537.525, 537.621, and 537.665. These statutes require determining the location, extent, capacity, depth, and other characteristics of each ground water source in Oregon. Additionally, ORS 537.621 requires assessing whether a proposed water use would injure existing water rights.

Project Wells

This investigation relied upon data from 239 project wells and supplemental information from 18 other wells. Project well selection depended upon the existence of a corresponding water well report (well log), adequate information on the water well report, the ability to locate the well, existing geographic coverage, existing depth and geologic unit coverage, access for water level measurements, and owner permission. Figure 1 shows the distribution of the 239 project wells, and plate 1 shows the distribution and identity of the project wells. Table 2 summarizes the investigation data derived from these wells. Appendix 2 lists each well by primary data obtained and location. Most of the wells are located within the eastern Lost River sub-basin valleys. Few wells exist in the uplands. Seven wells are located outside the sub-basin. They were used to understand the relationship of ground water in the sub-basin to ground water in the surrounding area.

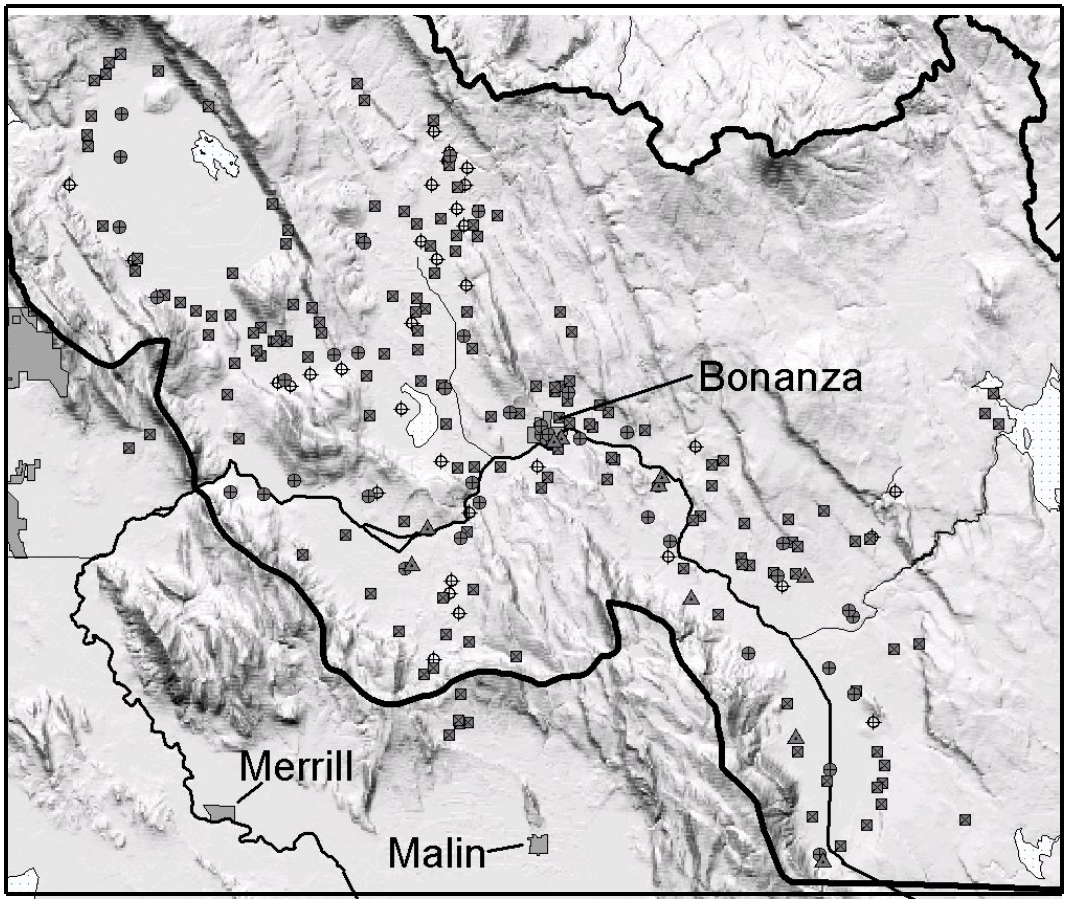


Figure 1. Project wells used for the eastern Lost River sub-basin ground water investigation (Filled triangles are recorder observation wells, filled circles are monthly observation wells, filled squares are synoptic observation wells, and unfilled circles are geology wells)

Table 2. Investigation data derived from 239 project wells and 18 other wells in the eastern Lost River sub-basin

Number of Wells	Recorder Water Level Data	Monthly Water Level Data	Synoptic Water Level Data	Geologic Data	Other (misc.)
10	X	X	X	X	X
41		X	X	X	X
154			X	X	X
34				X	X
18					X

The 18 other wells were mostly new irrigation wells with locations submitted with a ground water permit application and two state observation wells. Geologic and non-project water level data related to these wells were used for data control when making maps and for vertical ground water gradient analyses.

Investigation data collection at project wells included recorder, monthly, and synoptic water level measurements. Recorder water level data came from electronic water level instruments installed at unused wells and programmed to record ground water levels every two hours. The data were used to assess very short-term water level variability as well as seasonal and annual water level trends. Monthly water level data came from regularly scheduled hand measurements using an electronic or steel tape measure. Measurements occurred monthly from December 1998 to October 1999, bi-monthly from January 2000 to September 2001, and quarterly from January 2002 to investigation end. The data were used to assess seasonal and annual water level trends. Synoptic water level data came from March and October 1999 hand measurements at many wells. The data were used to make potentiometric (ground water elevation) maps.

Most geologic data at well sites came from water well reports where well drillers record the description, depth and thickness of each geologic unit at each well. Other data came from geophysical methods and on-site sample collection. These data were used to make geologic cross-sections and a geologic map (elevation of the top of basalt underlying the basin fill in the valleys).

Other data associated with wells came from water well reports and non-project derived water level data. These other data included water bearing zones encountered, water level measurements related to different water bearing zones, ground water temperatures, well yield, and water level drawdown during test pumping at a well.

Well Identification and Location

Well Identification

This investigation and report identifies wells by the water well report number assigned by the Oregon Water Resources Department. Each number begins with four letters to identify the county in which the well is located and ends with a four to six-digit number. For this sub-basin, all well numbers begin with the letters KLAM for Klamath County. An example is KLAM 50318 for a well at Bonanza Big Springs Park. This investigation attempted to assign the number of the earliest report to a well when it had two or more water well reports, as can happen when a well is reconstructed or deepened. However, there may be instances where assigning the number of the earliest report did not occur.

This investigation and report temporarily assigned numbers KLAM 999901 to KLAM 999999 to located wells having no water well report. These numbers are valid for this investigation and report only. They do not appear in Oregon Water Resources Department well records.

Locations

This investigation used the public land survey system to identify locations to wells and other features (fig. 2). The system divides land into subsequently smaller north-south, east-west grids. Townships are the largest grid tracts, generally 36 mi^2 (6 mi by 6 mi). Each township is subdivided into 36 sections that are generally 1 mi^2 (640 acres) each. Sections are subdivided into quarter sections (160 acres), which are subdivided into quarter-quarter sections (40 acres), and into quarter-quarter-quarter sections (10 acres).

Listing land tracts by descending size identifies each location. For example, well KLAM 10242 is located at T39S/R11E-sec 10abc. This means the well is within:

- The 36 mi^2 township (6 mi north-south by 6 mi east-west) called township 39 south and range 11 east;
- The 1 mi^2 (640 acre) section called section 10;
- The northeast quarter section (160 acre) identified by the first letter (the letter a in this example);
- The northwest quarter-quarter section (40 acre) tract identified by the second letter (the letter b in this example); and
- The southwest quarter-quarter-quarter section (10 acre) tract identified by the third letter (the letter c in this example).

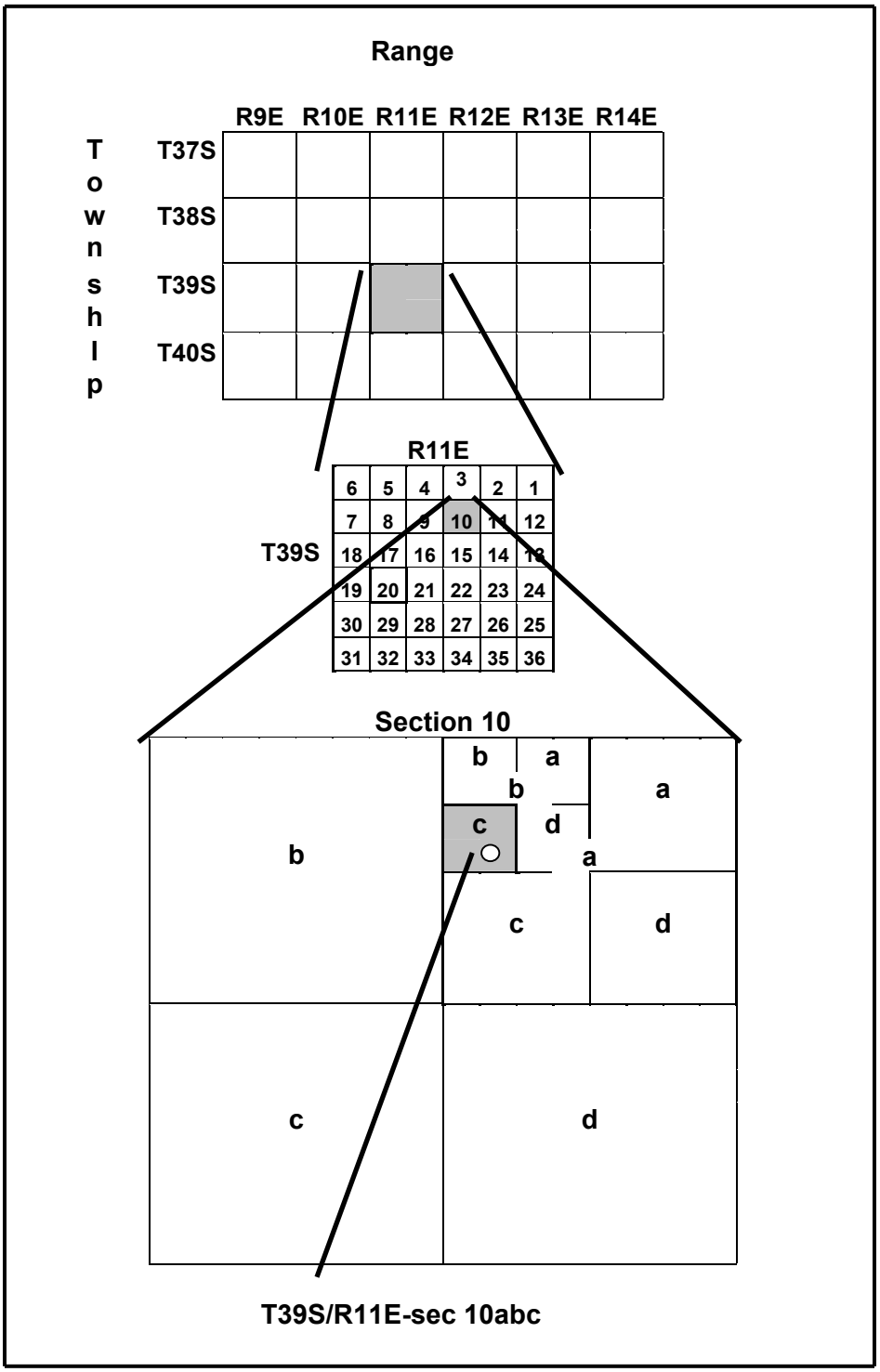


Figure 2. Illustration of the public land survey system

Acknowledgements

This author gratefully acknowledges and thanks area residents, well owners, irrigation districts, private consultants, the Town of Bonanza, and county, state and federal agencies for their assistance, cooperation, and comments. Well and property owners allowed access for water level measurements, river flow measurements, aquifer tests, land elevation surveying, and well drilling. Many people and agencies provided very useful information and comments. Oregon Department of Geology & Mineral Industries conducted geologic mapping. The U.S. Geological Survey provided equipment and staff to conduct the land elevation survey as well as shared information, data, and technical comments. Oregon Water Resources Department staff conducted many tasks for the investigation. Prior to the report being written, OWRD, USGS, and U.S. Army Corps of Engineers technical staff reviewed investigation data analyses related to potential ground water use impacts to the Lost River. Fred Lissner, Ken Lite, Doug Woodcock, Barry Norris, Ned Gates, Marshall Gannett, Gerald Black, Rodney Weick, Dr. Lewis Hunter, Gail Hildreth Whitsett, and Karen Russell reviewed drafts of this report.

Geography and Climate

Location

The 920-mi^2 ground water investigation area is limited to the eastern portion of the Lost River sub-basin, east of Klamath Falls in southeast Klamath County (fig. 3). The investigation area includes the Town of Bonanza and the communities of Dairy, Yonna, and Lorella.

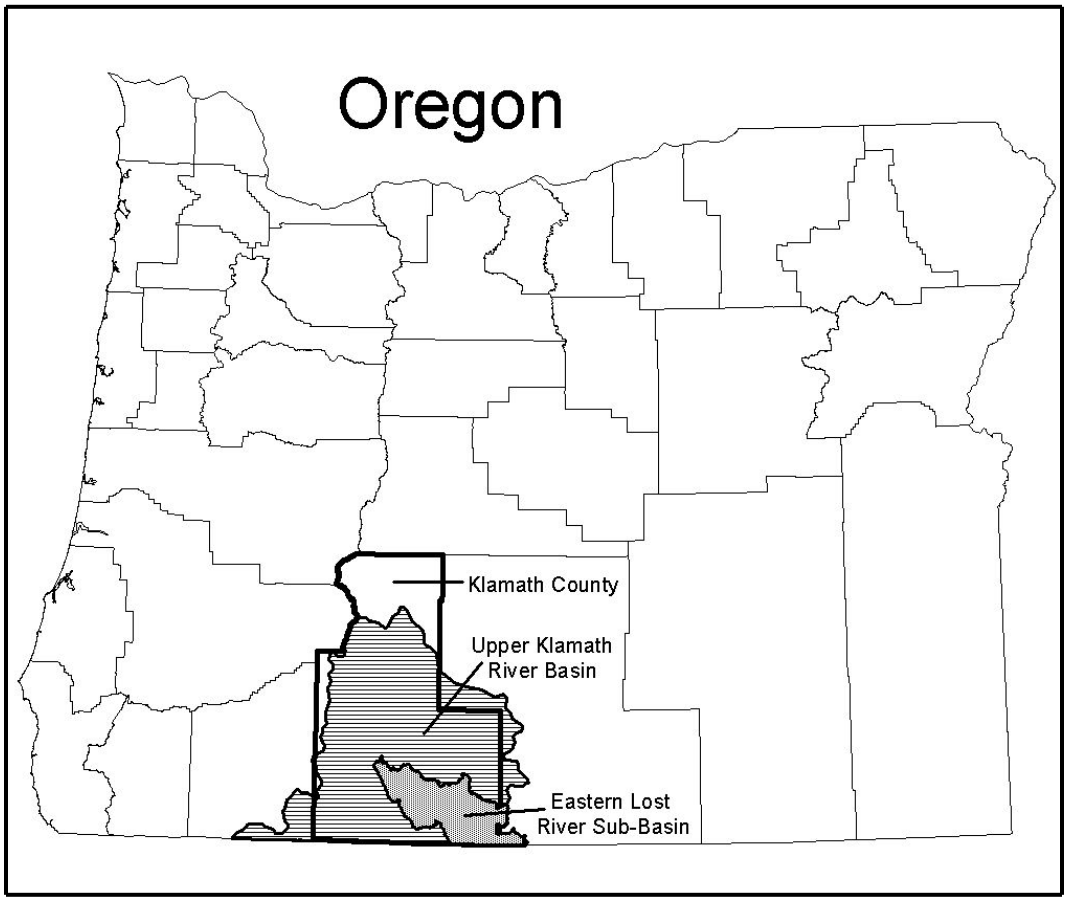


Figure 3. Ground water investigation location (eastern Lost River sub-basin)

Physical Geography

Northwest trending uplands separate interconnected Langell, Yonna, Poe, and Swan Lake Valleys and Pine Flat lowlands (fig. 4 and pl. 1). Upland elevations range from 4,300 ft on eastern plateaus to more than 6,000 ft in the west and north. The western uplands peak at 6,475 ft, and the northern uplands peak at 7,226 ft at Yainax Butte. Valley floor elevations range from 4,100 to 4,200 ft.

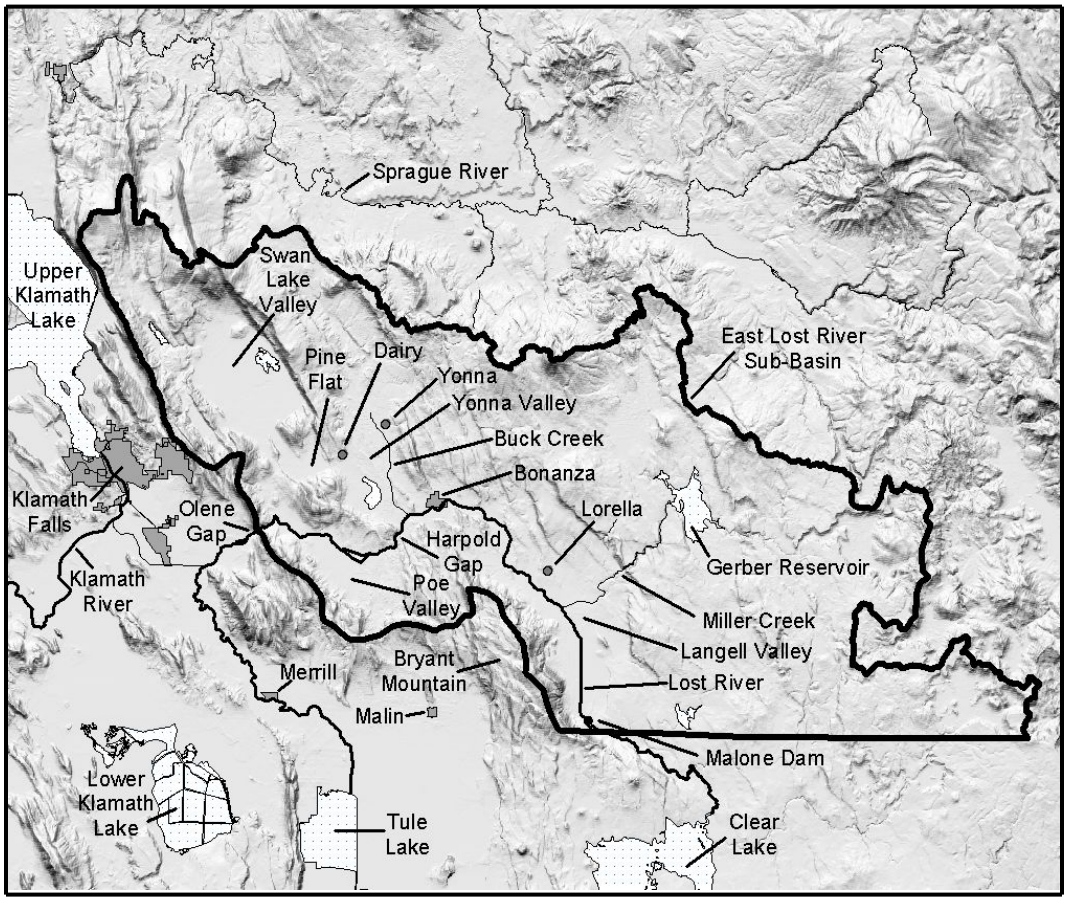


Figure 4. Geography of the eastern Lost River sub-basin

Gaps in the upland topography interconnect the lowlands. A mile-wide gap at Bonanza occurs between Langell Valley and Yonna Valley. Harpold Gap occurs between Yonna and Poe Valleys. Un-named gaps occur between the Swan Lake Valley-Pine Flat lowland and Yonna Valley to the east and Poe Valley to the south. At the west end of Poe Valley, Olene Gap occurs at the boundary between the eastern Lost River sub-basin and the western Lost River sub-basin.

The Lost River is the primary stream in the sub-basin. It flows north through Langell Valley from Clear Lake, California to Bonanza, and then flows west from Bonanza to Olene Gap via southern Yonna and northern Poe Valleys. Miller Creek in Langell Valley and Buck Creek in Yonna Valley are the primary tributaries. Bonanza Big Springs at Bonanza and un-named springs in western Poe Valley make important contributions to river flow. Surface drainage from Swan Lake Valley and Pine Flat to the Lost River is largely through constructed drains and pumpage.

Climate

Climate analyses in this report used data from the Klamath Falls climate station as reported by the State Climatologist (2002) for the 1920 through 2000 calendar years. Klamath Falls is the station closest to the eastern Lost River sub-basin that has long-term climate data, and it has an elevation similar to the sub-basin valleys. This investigation organized the data by water year for the analyses conducted. A water year captures the entire annual wet season from October 1 through September 30 rather than split it between two calendar years. For example, water year 2000 ran from October 1, 1999 to September 30, 2000.

The area is semi-arid. The average annual precipitation in Klamath Falls by water year from 1921 to 2000 is 13.7 inches with a minimum of 6.6 inches and a maximum of 22.8 inches (fig. 5 and app. 3).

A graph of cumulative departure from average water year precipitation shows wet and dry period trends (fig. 5). Above average precipitation trends occurred during the early 1940s, most of the 1950s, early 1980s, and late 1990s. Below average precipitation trends occurred during the early 1930s, late 1970s, and late 1980s to early 1990s. Periods of nearly average precipitation occurred through the 1940s and through the 1960s to the early 1970s.

On average, the wettest months in Klamath Falls are November through January, and the driest months are July through September (fig. 6 and app. 3). The average monthly precipitation in November, December, and January is about two-inches. In July, August, and September, it is about a half-inch or less. Monthly extremes range from no precipitation to nearly nine-inches.

Total annual precipitation in the eastern Lost River sub-basin varies by topography and location. Results of Spatial Climate Analysis Service (2001) use of a PRISM climate modeling system first described by Daly and Neilson (1992) and Daly and others (1994) indicate annual average precipitation on the valley floors is 12 inches in Yonna Valley, 13 inches in Langell and Poe Valleys, and 14 inches in Swan Lake Valley. The results indicate greater annual average precipitation occurs in the uplands, generally exceeding 20 inches.

Temperatures vary greatly. The overall average in Klamath Falls is 48°F. However, daily temperatures averaged by month from 1971 to 2000 ranged from 40°F maximum and 22°F minimum in December and January to 85°F maximum and 50°F minimum in July and August (fig. 7 and app. 4). Extreme temperatures exceeded 100°F during the summer and minus 10°F during the winter.

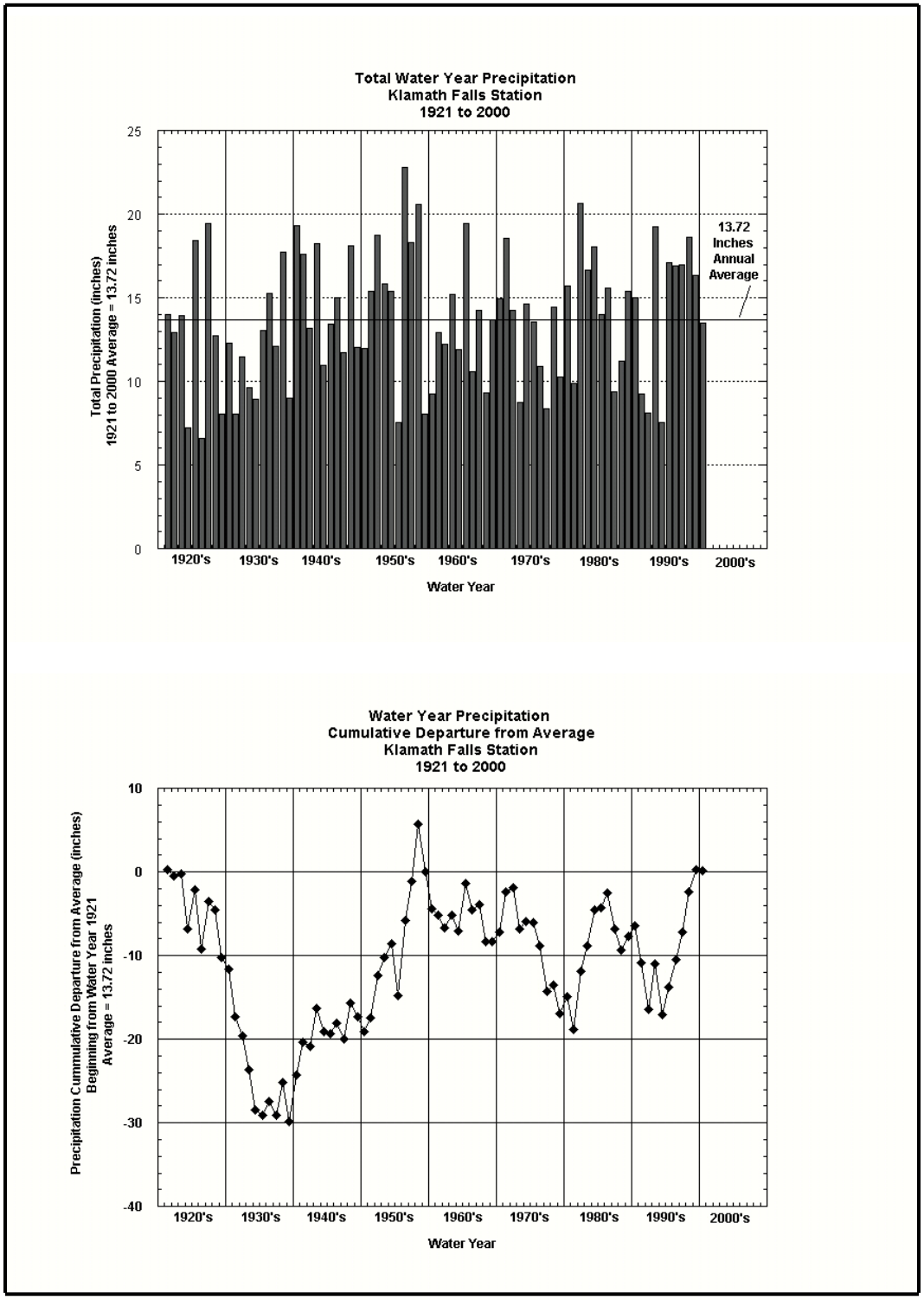


Figure 5. Total precipitation and cumulative departure from average by water year at Klamath Falls from 1921 to 2000

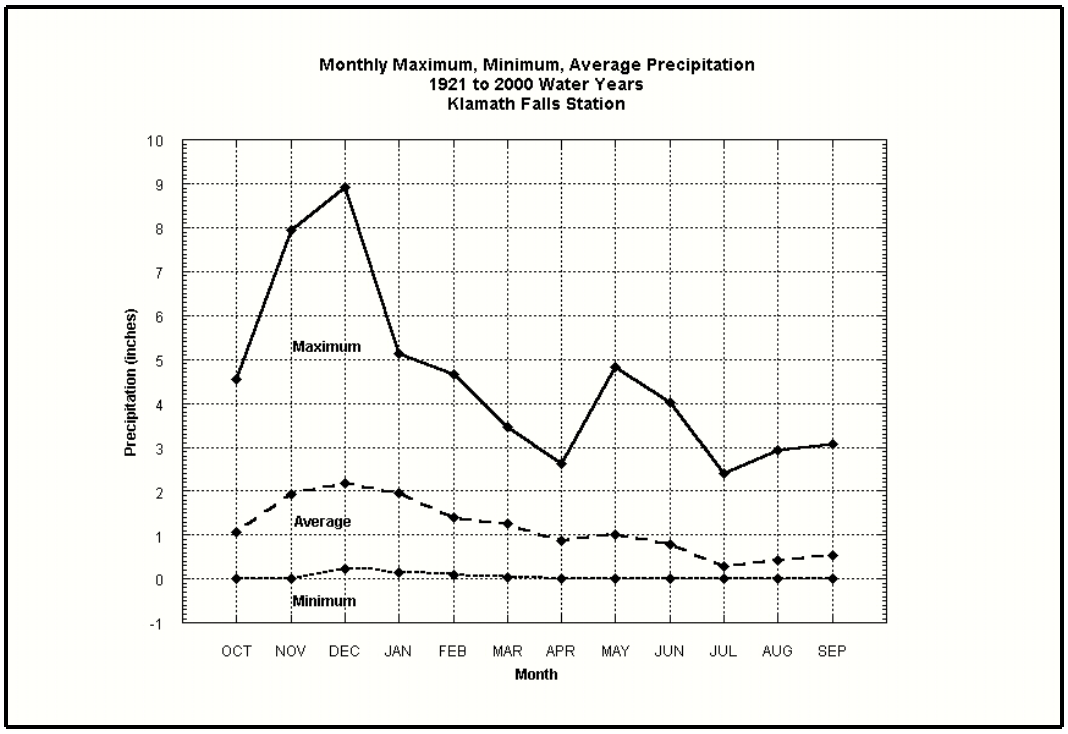


Figure 6. Monthly maximum, minimum, and average precipitation at Klamath Falls from 1921 to 2000

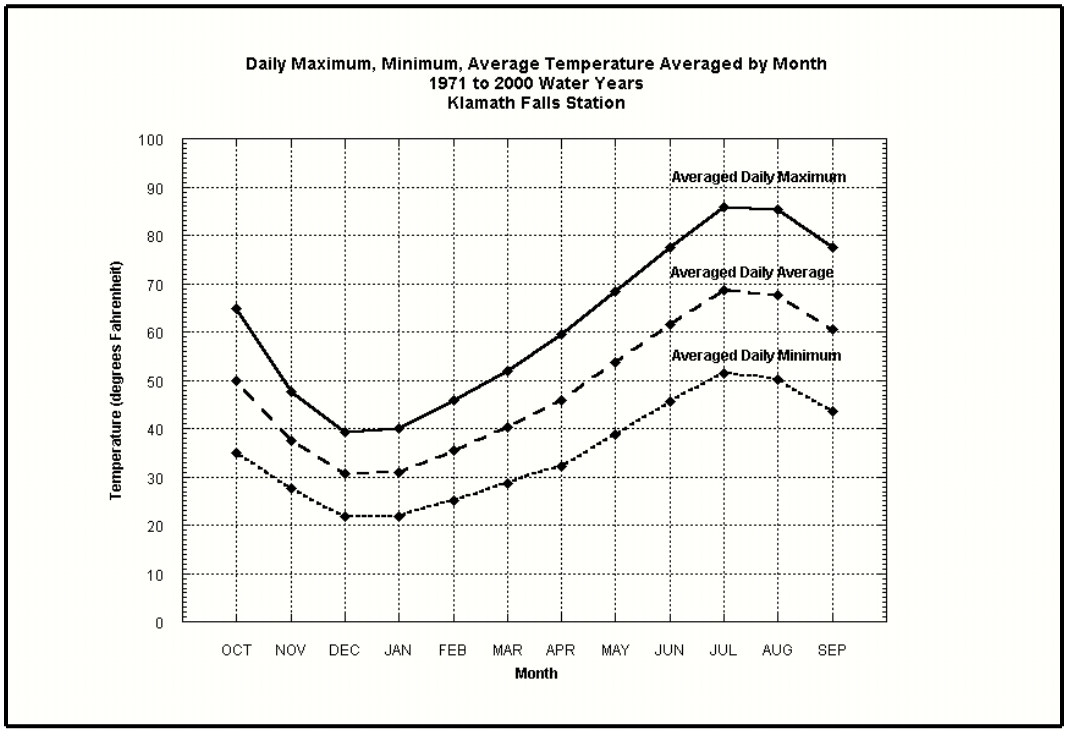


Figure 7. Daily maximum, minimum, and average temperatures averaged by month for Klamath Falls from 1971 to 2000

Land Ownership and Use

Both private and public land ownership occurs in the sub-basin. Private land dominates the valleys and exists in some upland areas. Public land is generally limited to upland areas.

Public land holdings include U.S. Forest Service and U.S. Bureau of Land Management. The public lands are managed for timber, livestock grazing, wildlife, and recreation. The U.S. Bureau of Reclamation's Gerber Reservoir and many private reservoirs reside on U.S. Bureau of Land Management administered land.

Agriculture is the predominant private land use. Agricultural activities include cattle and sheep ranching, dairies, and irrigated crop production. Crops irrigated during the investigation included alfalfa and grass hay, potatoes, sugar beets, and frost-resistant strawberry plants.

Irrigation water used in the sub-basin comes from surface and ground water sources allocated by Oregon water rights. Most of the surface water comes from U.S. Bureau of Reclamation Klamath Project impoundments at Clear Lake, Gerber Reservoir, and Upper Klamath Lake. Klamath Project water delivery occurs via irrigation districts. Figure 8 shows areas enclosed by the boundaries of irrigation districts supplied by Klamath Project water. Areas where irrigation independent of Klamath Project water can occur under existing Oregon surface water and/or ground water rights is shown in figure 9. Some overlap occurs between figures 8 and 9. These overlaps exist because landowners obtained the right to a supplemental source of surface or ground water for the times their primary source of surface or ground water is not available.

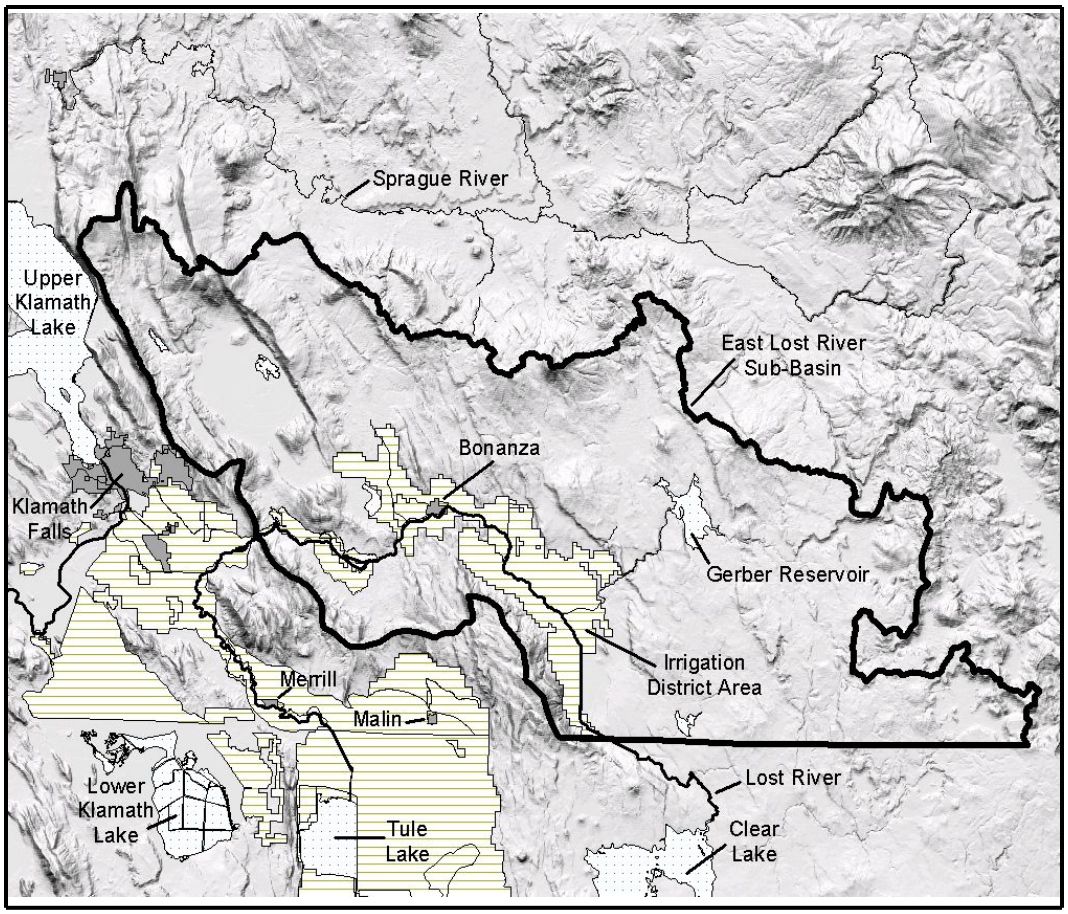


Figure 8. Areas enclosed by the boundaries of irrigation districts relying upon U.S. Bureau of Reclamation Klamath Project surface water (Irrigation district boundaries from U.S. Bureau of Reclamation, 1997)

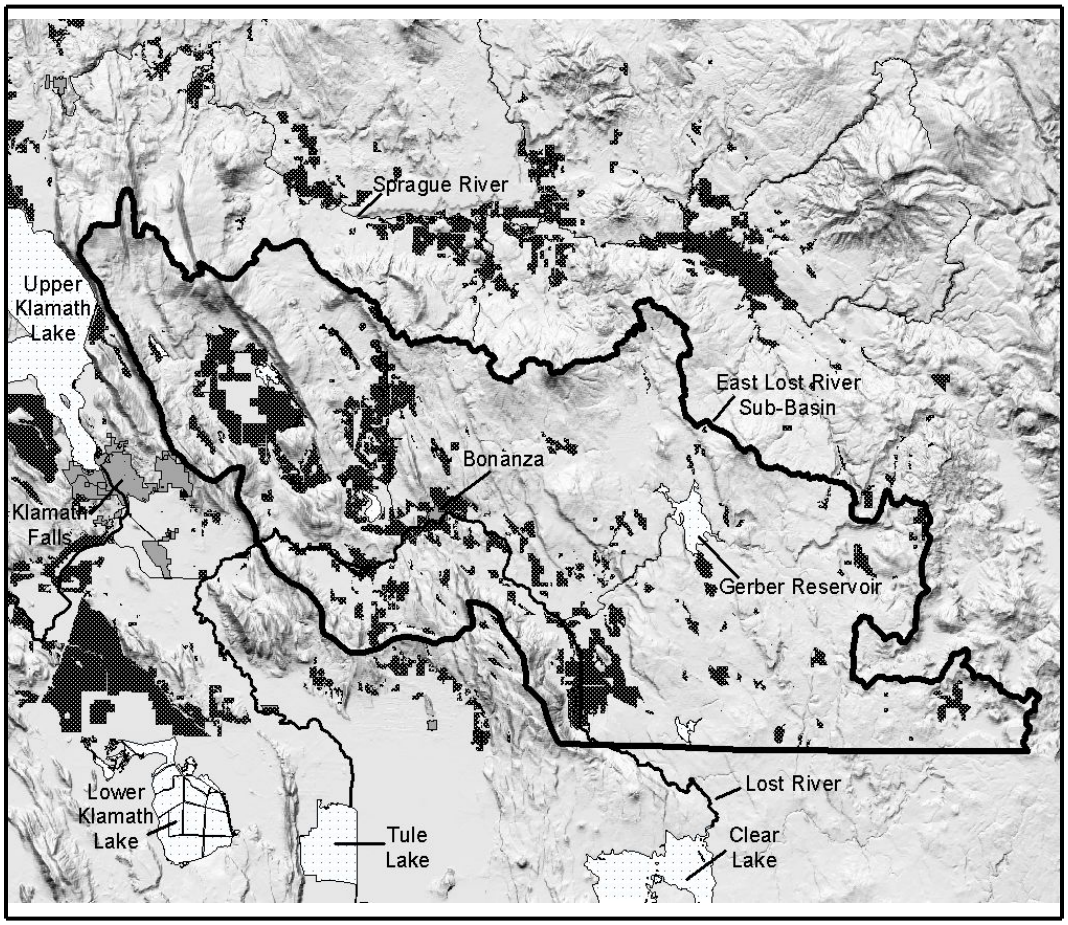


Figure 9. Areas where irrigation independent of the Klamath Project water can occur under existing Oregon surface water and ground water rights (adjudication claims not shown)

Ground Water Development History

Well Drilling History

The location and construction of water wells are documented by water well reports filed at the Oregon Water Resources Department. Nearly 1,200 reports are filed for wells in the eastern Lost River sub-basin. Figure 10 shows the cumulative number of water wells constructed for different uses from 1950 to mid 2002. Appendix 5 shows the number of water wells constructed for different uses by location (townships). Wells with no water well reports are not represented.

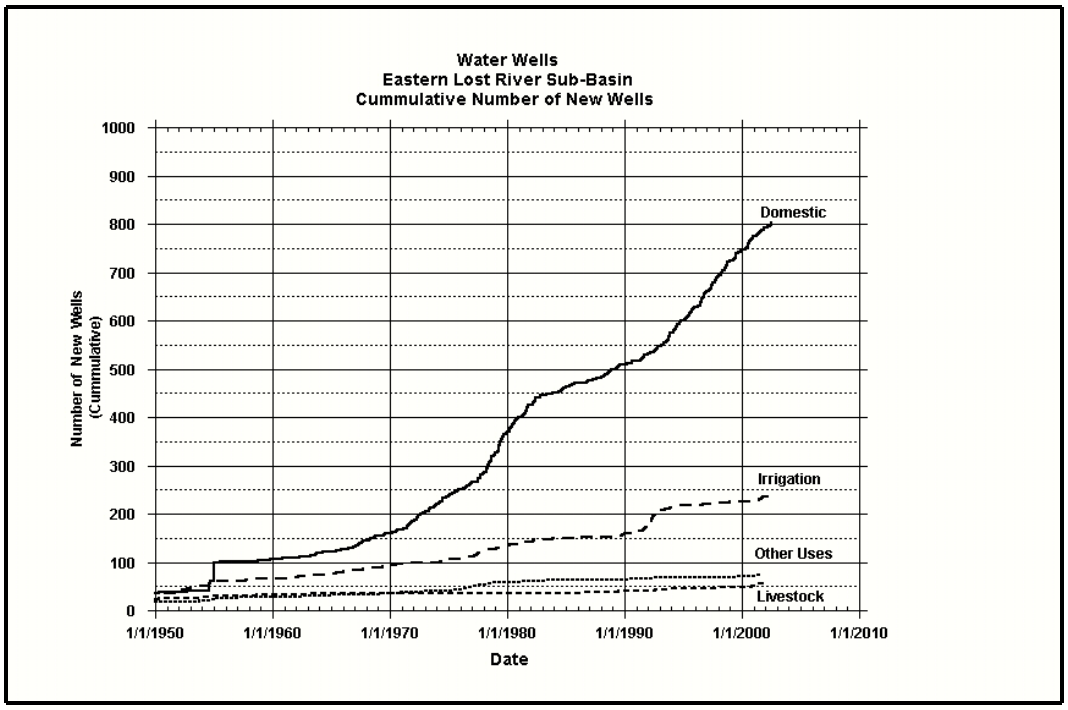


Figure 10. Cumulative number of water wells constructed in eastern Lost River sub-basin from 1950 to mid 2002 (The number of wells is based upon water well reports for wells filed at Oregon Water Resources Department. Not represented are 17 wells with no construction date and wells with no report filed)

Most domestic wells in the sub-basin were constructed after 1970 (nearly 80 percent) when the construction rate accelerated (fig. 10). An apparent jump in the number of wells during the mid 1950s coincides with Oregon adopting its first state-wide ground water statute. The law included a requirement that well owners submit a water well report for each of their wells.

The majority of domestic wells are located in two townships according to location information on water well reports (app. 5). About 30 percent of the wells are located in a rural residential area off Highway 140 and Bly Mountain Cutoff Road in township 38 south, range 11 east. About 18 to 25 percent of the wells are located in or near the Town of Bonanza (township 39 south, range 11 east). The percentage uncertainty is due to incorrect locations recorded on the water well reports.

About 60 percent of the irrigation wells in the sub-basin were constructed after 1970 (fig. 10). Most of that construction coincided with droughts in the late 1970s and early 1990s.

The majority of the irrigation wells are located in six adjoining townships according to location information on water well reports (app. 5). About 33 percent of the wells are located in two adjacent townships (township 38 south, range 11 east and township 39 south, range 11 east which contains the Town of Bonanza). An additional 36 percent of the wells are located in the other four townships (township 38 south, range 10, and 11.5 east and township 39 south, range 11.5 and 12 east).

Ground Water Irrigation Rights

About 225 ground water rights were valid for irrigation in the eastern Lost River sub-basin in 2002. This total includes 168 primary ground water rights, 10 supplemental ground water rights, and 46 for both primary and supplemental ground water use.

The cumulative number of applications for the ground water rights valid for irrigation in 2002 for the sub-basin is shown in figure 11. A higher demand for new primary ground water rights occurred from the mid 1960s to the recession of the early 1980s and during the early 1990s drought. This is very similar to the history of new irrigation wells constructed in the sub-basin.

Figures 12 and 13 show the distribution of sub-basin acreage related to the primary and supplemental ground water rights valid for irrigation in 2002, and figure 14 shows the distribution of existing or proposed wells related to those rights. Primary ground water right acreage with priority dates before 1990 are generally located outside irrigation districts (Swan lake Valley, Pine Flat, northern Yonna Valley, and eastern Poe Valley). Some acreage has overlapping rights.

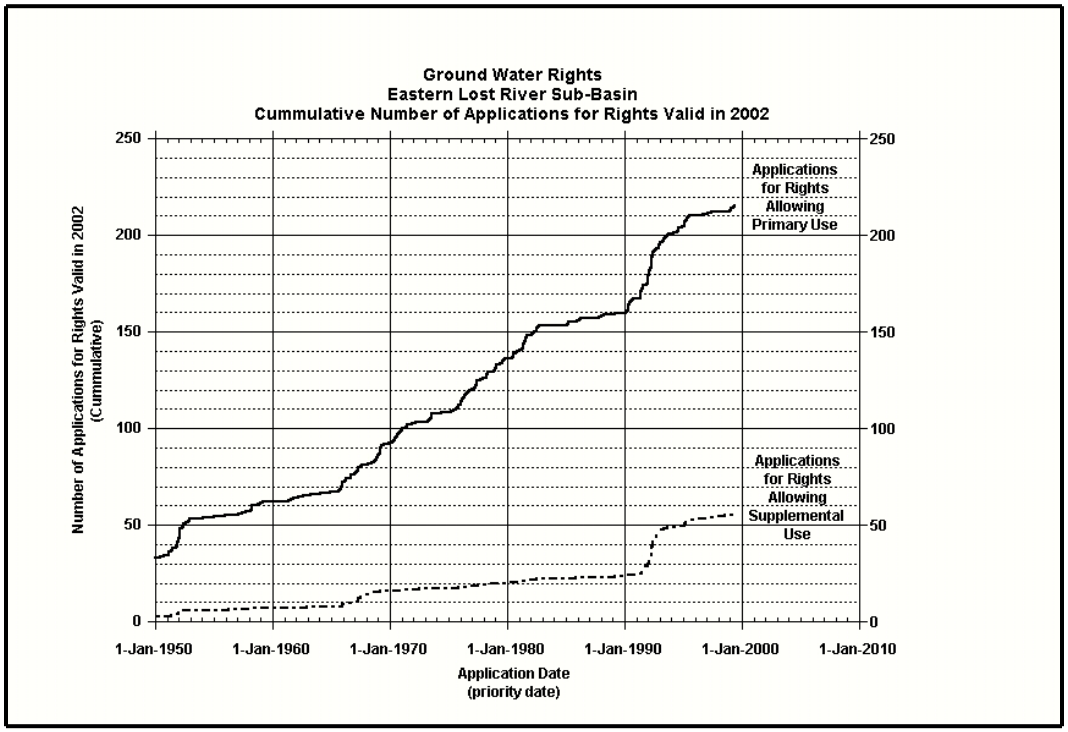


Figure 11. Cumulative number of applications for the ground water rights for the eastern Lost River sub-basin valid in 2002. (Primary and supplemental ground water rights are plotted as different lines.)

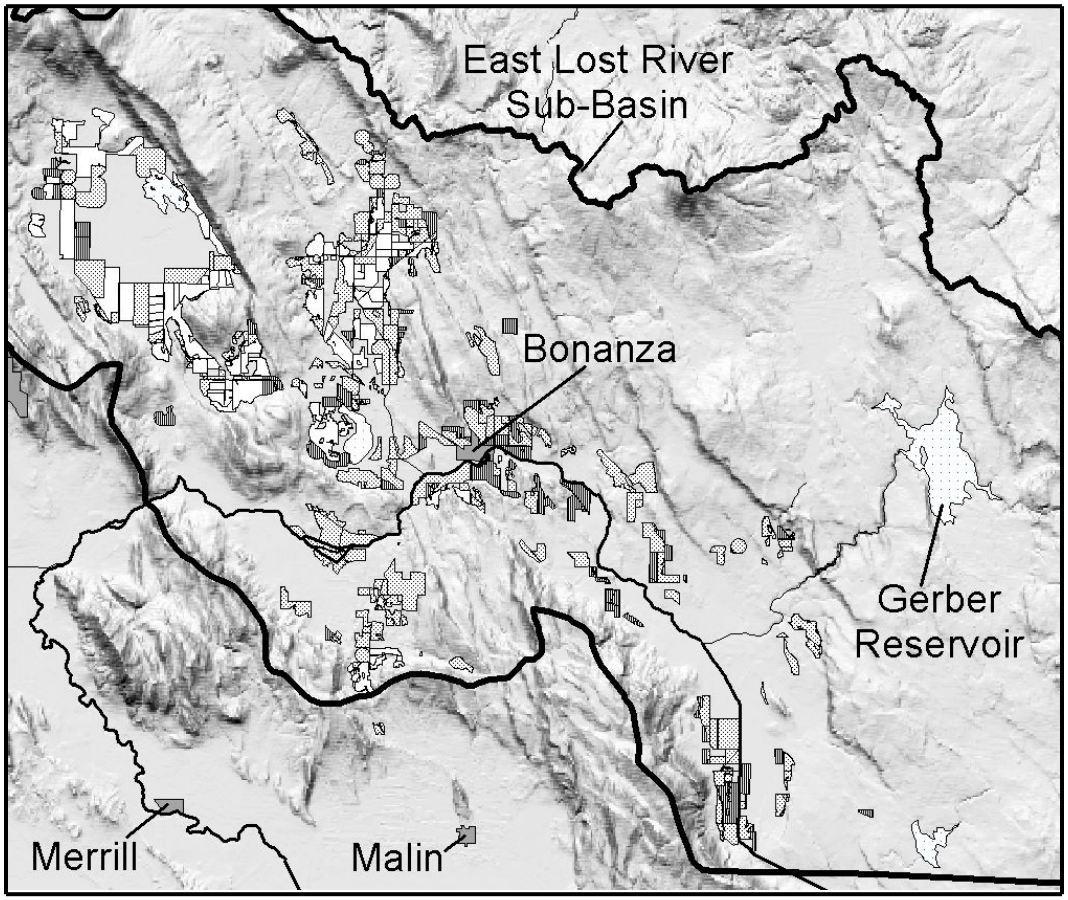


Figure 12. Distribution of eastern Lost River sub-basin acreage related to primary ground water rights valid for irrigation in 2002 (Acreage related to water rights with a priority date prior to 1960 is white. Acreage related to water rights with a priority date from 1960 through 1989 is stippled. Acreage related to water rights with a priority date of 1990 or later has closely spaced vertical lines)

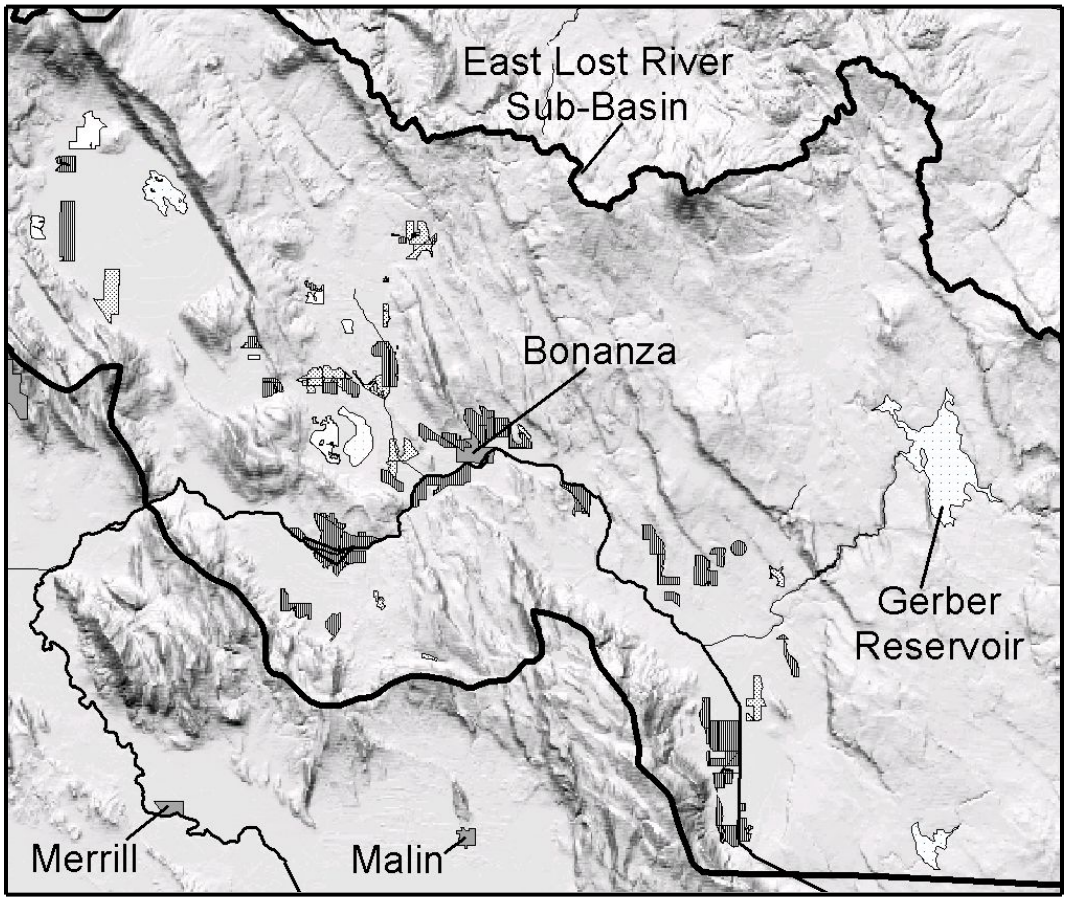


Figure 13. Distribution of eastern Lost River sub-basin acreage related to supplemental ground water rights valid for irrigation in 2002 (Acreage related to water rights with a priority date prior to 1960 is white. Acreage related to water rights with a priority date from 1960 through 1989 is stippled. Acreage related to water rights with a priority date of 1990 or later has closely spaced vertical lines)

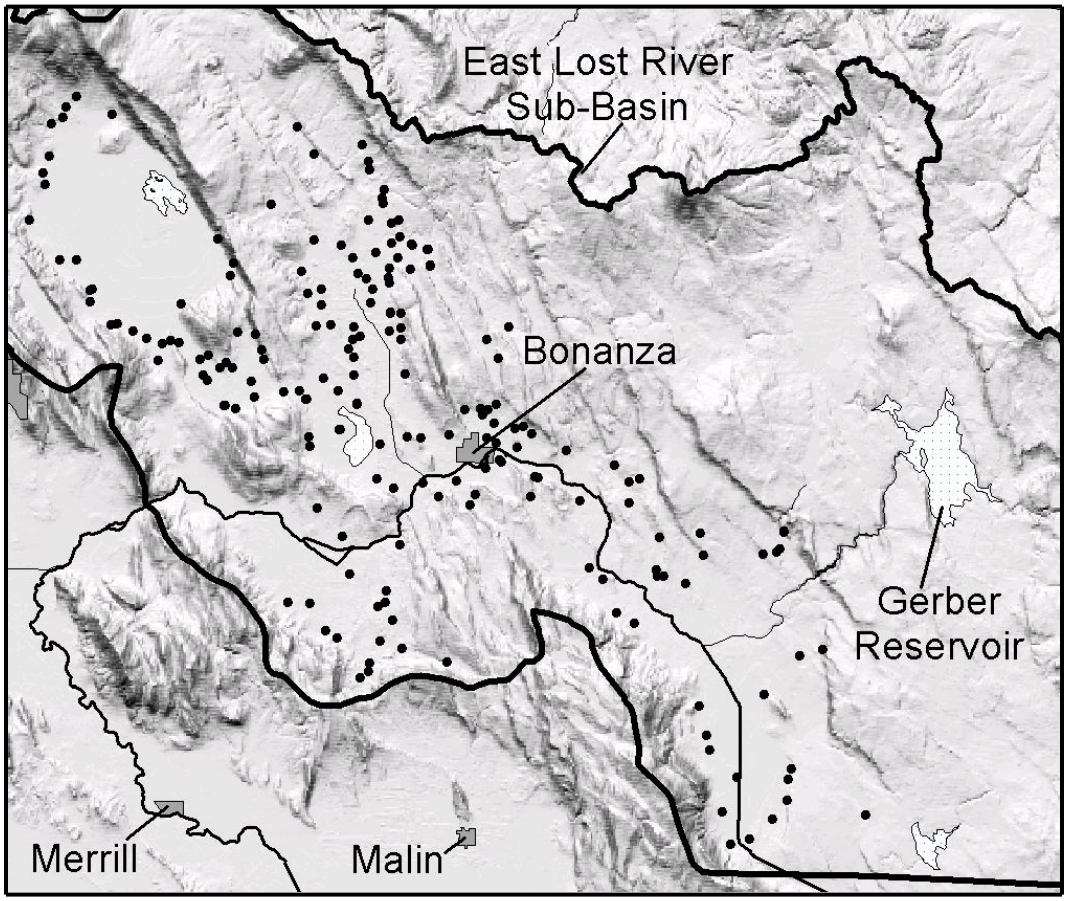


Figure 14. Distribution of existing or proposed wells related to the ground water rights valid for irrigation in the eastern Lost River sub-basin in 2002 (The locations are as noted in the water right permit. About 15 wells without water well reports are included.)

ADR Ground Water Irrigation Rights

Among the ground water irrigation rights are 32 ADR permits with priority dates (application dates) from 1991 to 1993. Figure 15 shows the acreage and wells related to the permits.

The ADR permits were issued in July 1996. Ground water use under the permits remains valid via permit extensions until the completion of this investigation. Then, it will be determined whether each permit will be cancelled, allowed to mature into a certificate, or be extended.

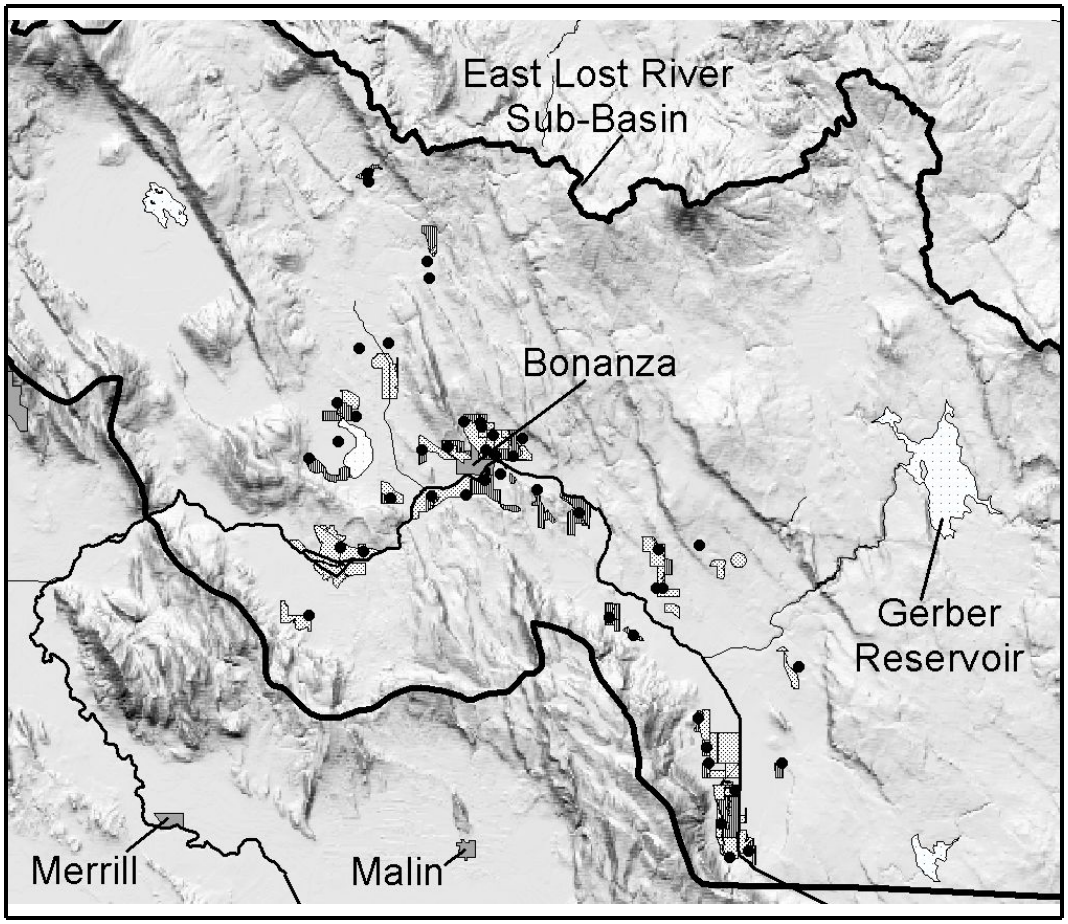


Figure 15. Distribution of eastern Lost River sub-basin acreage and wells related to ADR permits for primary or supplemental ground water use for irrigation (Acreage related to primary ground water use for irrigation has closely spaced vertical lines. Acreage related to supplemental ground water use for irrigation is stippled. Wells are black dots.)

Ground Water Response to Development

One task of this investigation is to determine whether "excessively declining ground water levels" has occurred due to well use. The definition exists in Oregon Administrative Rules. The rules state in OAR 690-08-001 (6):

> "Excessively Declining Water Levels"…means any ongoing lowering of the water level in a ground water reservoir or part thereof which:

(a) Precludes, or could preclude, the perpetual use of the reservoir; or
(b) Represents an average downward trend of three or more feet per year for at least 10 years; or
(c) Represents, over a five year period, an average annual lowering of the water level by 1% or more of the initial saturated thickness as determined by observation or investigation in the affected area; or
(d) Results in water quality deterioration

Ground water use has increased over the decades given the history of new well construction and ground water rights in the sub-basin. Water level measurements at nine state observation wells provide information as to whether "excessively declining ground water levels" has occurred in the sub-basin. The measurement period at each well generally extends from the 1960s through the 1990s (fig. 16 and app. 6). Data at one site begins in the 1980s.

Generally, the data indicate ground water levels in the sub-basin decline and recover seasonally and over multiple years. The seasonal fluctuations correspond to the seasonality of ground water recharge and ground water use. The fluctuation over multiple years corresponds to variations in long-term precipitation trend (fig. 17).

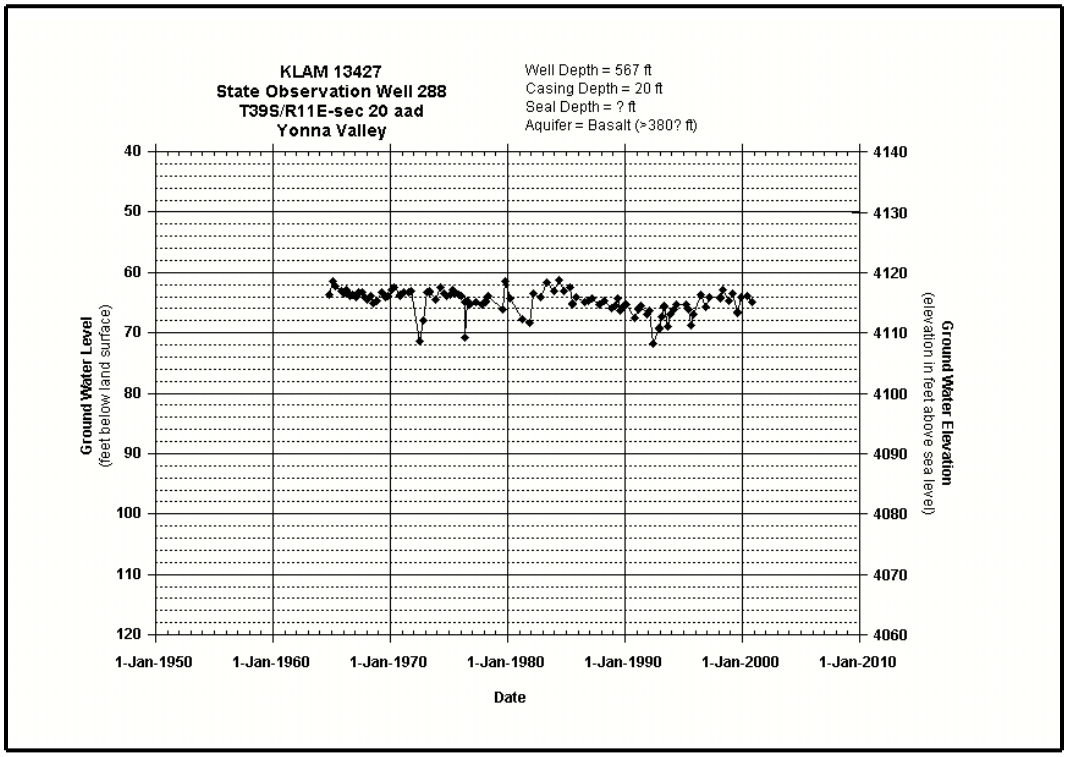


Figure 16. Hydrograph of ground water levels measurements at state observation well 288 (well KLAM 13427)

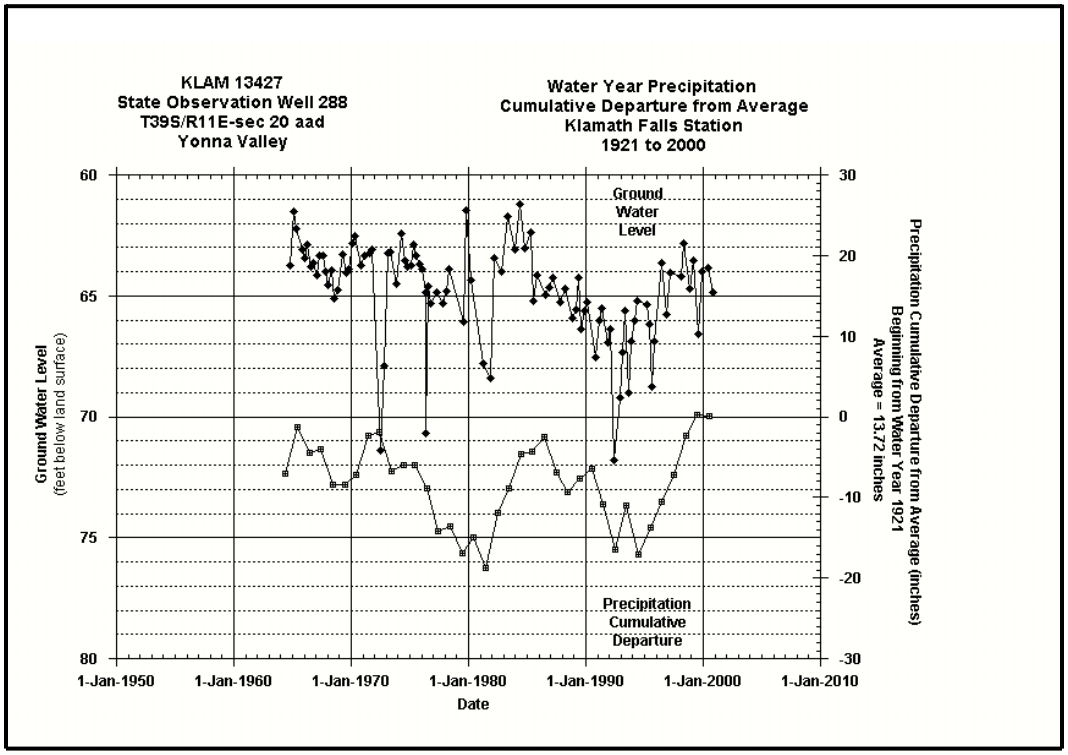


Figure 17. Hydrograph of ground water level measurements at state observation well 288 (KLAM 13427) with graph of cumulative departure from average precipitation by water year at Klamath Falls (Some of the ground water level measurements are pumping levels)

At eight of the nine observation well sites, water levels during the late 1990s are similar to initial levels. Over a 40 yr period, a possible decline of 1 to 2 ft occurred in south Swan Lake Valley, Yonna Valley, and south Langell Valley, and a possible 3 ft decline occurred near Lorella. As observed, these declines are not considered "excessive."

At the ninth site located in southeast Poe Valley, a 20 ft total decline occurred as two 10 ft steps, first in the 1960s and subsequently in the 1990s (fig 18). The decline resulted from local aquifer properties and compartmentalization amplifying ground water use impacts during droughts. The decline is notable and deserves continued monitoring. However, it is geographically limited and not considered "excessive" as defined by OAR 690-08-001 (6).

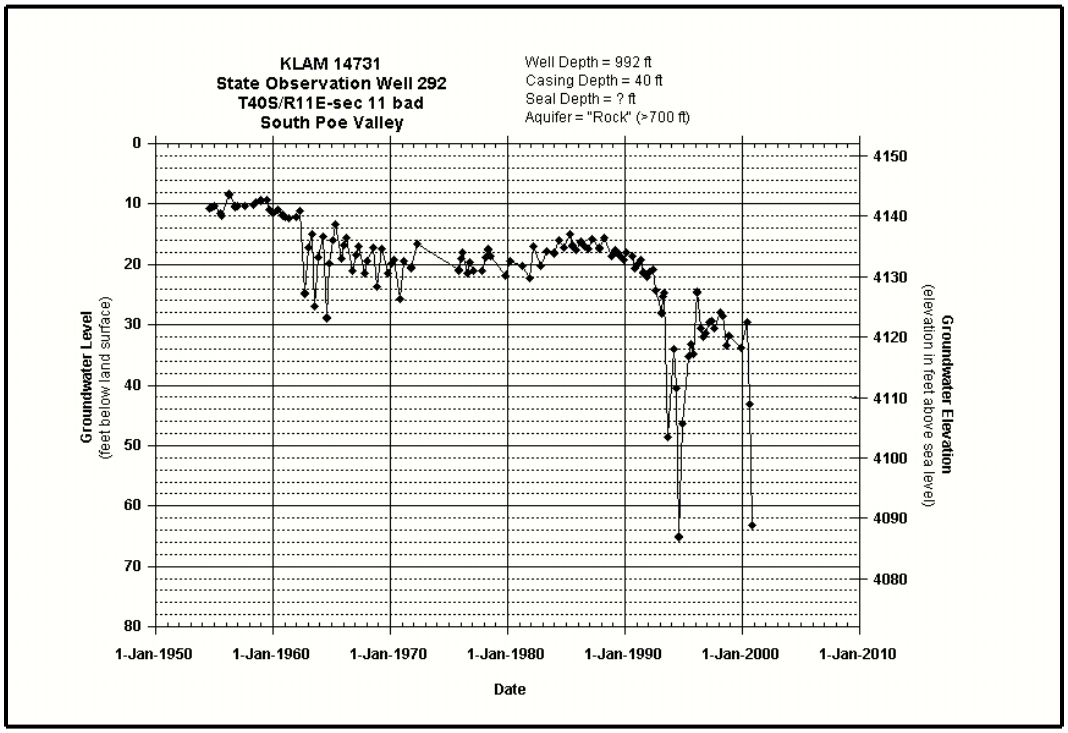


Figure 18. Hydrograph of ground water levels measurements at state observation well 292 (well KLAM 14731)

Under the rule, an "excessive" decline includes water quality deterioration as a result of "ongoing lowering" of the ground water level. Periodic ground water quality deterioration has occurred in the vicinity of Bonanza Big Springs as a result of drought, seasonal ground water use, and management of the Lost River. This situation is not considered an "excessive" decline under OAR 690-08-001 (6) since the deterioration is not related to an "ongoing lowering" of ground water levels.

Geologic Framework

Introduction

Geology affects ground water occurrence and movement. Understanding the local geologic structures (primarily faults) and stratigraphy (origin, vertical sequence and horizontal extent of different rock formations) is important to the evaluation of the ground water resource.

This investigation relies upon the geologic work conducted in or near the eastern Lost River sub-basin by other investigators. Their work demonstrates the sub-basin geology is complex. The use of rock chemistry and radiometric age dating analyses by more recent investigations has aided geologic interpretations.

The general stratigraphy of the sub-basin consists of basalt and sedimentary rock and sediments. Basalt occurs throughout the sub-basin as multiple layers with some sedimentary interbeds between layers. Basalt exposure is generally limited to the uplands. Sub-basin sedimentary rock and sediments predominantly occur in the valleys as lacustrine, fluvial, and volcaniclastic basin fill that overlies the basalt. The thickness of the basin fill can range from a few feet to hundreds of feet. Some basalt dikes, sills, and flows are found within the basin fill.

The general sub-basin geologic structure includes numerous north-northwest trending and occasional east-west trending faults. Most of the faults vertically offset geologic units creating upland blocks (horsts) with steep escarpments along the fault. Down-dropped blocks (grabens) form valleys between the horsts.

Physiographic Province

The upper Klamath basin is located in the transition area between the Cascade Mountain and the Basin and Range physiographic provinces. The eastern Lost River sub-basin is located within the Basin and Range province. That province in Oregon is a small northwestern portion of the 300,000 mi^2 Basin and Range physiographic province extending into California, Idaho, Nevada, Utah, Arizona, New Mexico, and Mexico (Orr and others, 1992). Generally, the province is characterized by long and narrow, north-south trending fault-block mountains separated by broad sediment filled basins.

Stratigraphy

Development of Stratigraphic Understanding

Stratigraphic interpretations for the eastern Lost River sub-basin are becoming more detailed with the aid of rock chemistry analyses, radiometric age dating, and other tools. The greater detail has caused interpretation modifications over time regarding rock origin and the relationship between rock units. Understanding the historical development of stratigraphic interpretation for the sub-basin is important for minimizing technical confusion or conflict among researchers, interest groups, and/or the public discussing various hydrogeologic issues.

From 1950 to the mid-1970s, geologists largely divided basin sediments into two units: recent surficial deposits and the Yonna Formation. Lavas were assigned to a few units. The relationship between the sediments and the lavas was problematic.

Meyers and Newcomb (1952) separated the geologic units into younger (upper) and older (lower) alluvial deposits and upper and lower (bedrock) lava rock. They described the upper sediments as water deposited lapilli tuff and the lower sediments as a composite of lacustrine diatomite, stratified sandstone, laminated siltstone, water laid ash, pumice, and semi-consolidated gravel. They noted the sedimentary units included interfingering sedimentary layers, intrusions by basalt dikes and sills, and thin gravel layers that produced small quantities of ground water. Lavas identified were predominantly basalt or andesite with some dacite observed locally at the north end of Yonna Valley. Meyers and Newcomb reported the largest quantities of ground water coming from the lavas (flow breccia, shattered vesicular zones, broken or porous lava, cooling joints, and effusive cinders, scoria, or lapilli), and they described the ability of solid flows to confine ground water to the more porous lava rocks as very limited.

Newcomb (1958) defined the upper and lower sediments of Meyers and Newcomb (1952) as the Yonna Formation. Newcomb noted interfingering between the upper and lower sediments in northern Yonna Valley, structural influences upon the formation in Yonna Valley, and varying formation thickness (100 to 900 ft in Yonna Valley and exceeding 1,500 ft in northwest Swan Lake Valley). He interpreted the lapilli tuff deposits in northern Yonna Valley as truncated tuff cones (volcanic vents).

Peterson and McIntyre (1970) described the regional stratigraphic units for the basin. Units identified in order of decreasing age were: Oligocene or older dacite flows exposed outside the eastern Lost River sub-basin; Oligocene to early Miocene andesite and basalt flows, pyroclastic rocks, and andesitic sediments with total thickness exceeding 2,500 ft; Miocene to early Pliocene rhyolitic and

dacitic pyroclastics, palagonite tuff, tuffaceous sediments, and minor basalt and andesite flows with total thickness possibly exceeding 13,000 ft locally; early Pliocene basalt flows with total thickness ranging from 20 to 600 ft; middle to late Pliocene complex of diatomaceous and tuffaceous lacustrine sediments, eruptive centers, maars and tuff rings, palagonite tuffs, welded tuffs, and basaltic tuffs, breccias, and flow interbeds (all Yonna Formation equivalent); early Pleistocene basalt flows; and Pleistocene to recent eruptive centers and local deposition of various sediments.

Illian (1970) relied upon Peterson and McIntyre (1970) but summarized the regional stratigraphy a little differently. Rocks described in order of decreasing age were: aerial dacitic lava flows exposed at Quartz Mountain; sands, muds, and volcanic ash from explosive volcanic activity; thin basalt and andesite lava flows (unit total thickness possibly exceeding 13,000 ft locally); basalt lava flows from eastern basin vents filling erosional depressions to form the most permeable aquifer (unit total thickness ranging from 20 to 600 ft); Yonna Formation formed by lowland lakes filled with diatoms, mud and fine sands, ash from volcanic eruptions, and lavas; cap rock lava erupted from fissures; sub-basin sediments deposited after faulting created the sub-basins and rejuvenated erosion and deposition; and pumice deposits from the Mt. Mazama eruption about 6,600 years ago.

Leonard and Harris (1974) focused upon the eastern Lost River sub-basin as well as the Klamath Marsh and Sprague River Valley. They combined units mapped separately by Peterson and McIntyre (1970). They identified nine units divided into three age groups that overlap (three units per age group). Three units identified as Tertiary (Pliocene) age were: lower basalt unit composed of jointed lava, breccia, and interbeds that forms the most productive aquifer (equivalent to the lower lava rocks of Meyers and Newcomb (1952) and Newcomb and Hart (1958) and to the volcanic rocks of the High Cascades of Moore (1937) and Wood (1960)); breccia and tuff of volcanic maars (highly dipping tuff and breccia near volcanic vents); and Yonna Formation deposits of layered siltstone, diatomite, sandstone, pumice, gravel, and tuff primarily of lacustrine origin. Three units identified as Tertiary and Quaternary age (Pliocene and Pleistocene) were: rocks of volcanic eruptive centers that occur as an assemblage dominated by basalt and some andesite, rhyolite, and dacite occurring predominantly as tuff, cinder cones, and lava flows (Swan Lake Rim was used as an example) and occasionally as dikes and sills; andesitic lava flows exposed outside the sub-basin; and basalt, breccia and pyroclastic rocks that form Bryant Mountain and other uplands and locally interfingers with the Yonna Formation. Three units identified as Quaternary age (Pleistocene and/or Holocene) were: basalt flows that form rimrock or caps valley margin slopes; alluvium composed of alluvial silt, sand, clay, peat, volcanic ash, pumice, gravel, and slope debris; and pumice from Mt. Mazama. The description of geologic units mapped by Leonard and Harris in the sub-basin are summarized in appendix 7.

Pickthorn and Sherrod (1990) and Sherrod and Pickthorn (1992) conducted a regional investigation analyzing, dating, and mapping rock units in most of the upper Klamath basin in Oregon. Their work significantly modified stratigraphic interpretations. For example, eleven samples from volcanic rocks previously identified as partly or entirely Pleistocene were found to be older, 6.88 Ma (mega-annum: million years before present) to 2.80 Ma range (late Miocene to Pliocene). They narrowed the age range of most Yonna Formation equivalent sediment exposures to 5.5 Ma to 3.6 Ma. They separated previously lumped units into 13 Quaternary units (four in the sub-basin) and 17 Tertiary units (12 in the sub-basin). Quaternary units mapped in the eastern Lost River sub-basin included surficial deposits composed of channel, flood plain, marsh, and lake deposits; alluvial fan and talus deposits; landslide debris; and sedimentary deposits and rocks composed of unconsolidated sand and gravel, sandstone and conglomerate, and diatomite. Tertiary units mapped in the sub-basin included three Basin and Range basalt units included vent deposits; younger palagonite tuff; continental sedimentary rocks; tuff and sandstone; basaltic andesite and andesite; andesite and dacite; rhyolite and rhyodacite; tuff and lapilli tuff; and older palagonite tuff. Many unit ages were identified as contemporaneous. The description of units Sherrod and Pickthorn mapped in the sub-basin are summarized in appendix 7.

Black (2004), Hladky (2003), Jenks (2004), Jenks and Madin (2003), and others conducted detailed (1:24,000 scale) investigations in and near the eastern Lost River sub-basin from the mid 1990s through 2001. Figure 19 shows areas they mapped. Their work refines and further modifies earlier stratigraphic interpretations. A synthesis of their investigations follows.

Current Stratigraphic Understanding

The stratigraphy reported by Black (2004), Hladky (2003), Jenks (2004), and Jenks and Madin (2003) identifies multiple Quaternary surficial deposits and numerous, predominantly Tertiary (Miocene to Pliocene) volcanic and sedimentary units. The surficial deposits include modern fill, modern dredge spoil, lakebed sediments, alluvium, colluvium, alluvial fan deposits, landslide deposits, basin fill sediments, stream gravel deposits, and windblown sand. The predominantly Tertiary volcanic and sedimentary units include numerous basalt flow units, basaltic andesite flow units, basaltic andesite dikes, tholeiitic olivine basalt, cinder deposits (basaltic and basaltic andesite), altered basalt, lahar deposits, volcanic breccia, volcanic surge deposits, mudstone, siltstone, and sandstone units, and diatomaceous and tuffaceous mudstone units. Many units were identified as contemporaneous with complex relationships. Faulting made interpreting the relationships difficult. Units mapped in the Bonanza, Bryant Mountain, Dairy, Langell Valley, Malin, Merrill, and Lorella 1:24,000 scale quadrangles are summarized in appendix 7. Correlations to Leonard and Harris (1974) and Sherrod and Pickthorn (1992) stratigraphy are shown in appendix 8.

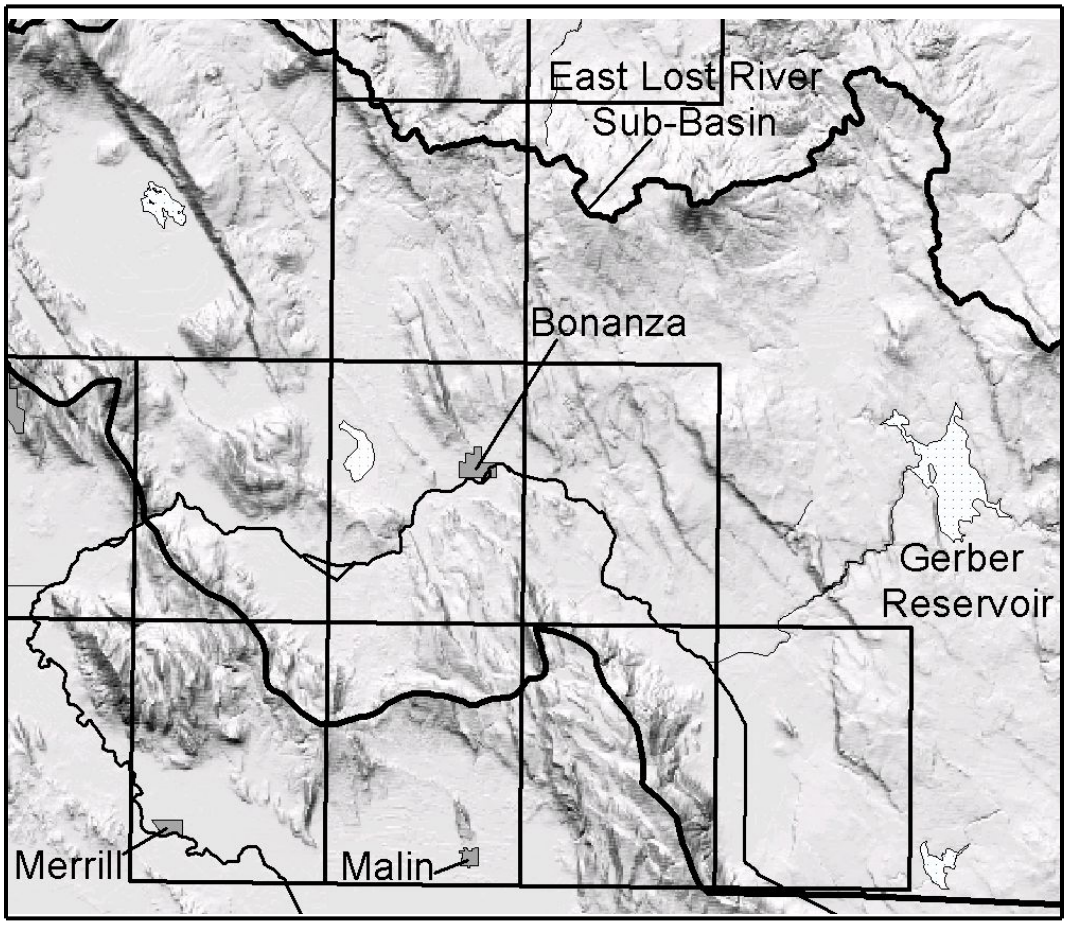


Figure 19. Areas of geologic mapping in or near the eastern Lost River sub-basin from the mid 1990s through 2001 (each rectangle is a 1:24,000 scale quadrangle mapped)

Sedimentary unit depositional environments described by the authors include fluvial, lacustrine and volcanic. Lavas associated with the sedimentary units include subaerial over-land flows, valley fill, sills, and dikes. Volcanic unit depositional environments are also described as variable, ranging from subaerial, to showing some interaction with water, to submerged. Some volcanic units described show gradations indicating they experienced multiple depositional environments. Unit thickness ranges from less than 50 ft to about 2,000 ft. Sedimentary interbeds identified between some flows came from various sources. The vents for most flow units were not found.

The authors noted the importance of water in the depositional history of geologic units mapped. Many volcanic units show a water influence. These include hydrovolcanic eruptive centers, surge deposits (tuff cones), pillowed and palagonitized flows, and basalts with altered groundmass. Additionally, lacustrine (lake-deposits) sediments are extensive in the valleys. Dicken (1980) noted a pluvial Lake Modoc inundated the Upper Klamath basin valleys (including the eastern Lost River sub-basin) during the Pleistocene with a maximum shoreline elevation of 4,240 ft. M.D. Jenks (oral commun., 2000) found fish bones in the sub-basin, and I. Madin, (oral commun., 2001) observed shoreline features and deposits outside the sub-basin. Valley floor elevations in the eastern Lost River sub-basin range from 4,100 to 4,200 ft.

The sub-basin basalts with altered groundmass were described as basalt flows that encountered water but maintained a basalt flow appearance, similar to Snake River Plain basalts that encountered water (Jenks and Bonnichsen, 1989 and unpublished). Exposed units appear to be older, weathered basalt. Buried units appear fresh when first exposed, but rapidly decompose when exposed due to the altered groundmass. This alteration can affect K-Ar and Ar-Ar ratios causing possible age dating errors.

Some units show evidence of hydrothermal alteration or secondary mineralization. Jenks (2004) noted altered sediments cemented by hot spring deposits near Lorella. Hladky (oral commun, 1999) observed hydrothermally altered sediments at Olene Gap. He additionally noted celadonite and zeolite lining basalt vesicles in drill cuttings from well KLAM 52096 near Lorella. A 1999 downhole video log of KLAM 10362 near Lorella and KLAM 51131 in Poe Valley also revealed secondary minerals within basalt vesicles. The location of the wells and the hot springs near Lorella and Olene Gap can be found on plate 2.

The authors postulate that geologically young, Miocene age basalt exceeding 7 Ma underlies the sub-basin. Most exposed units sampled in the sub-basin dated from 3.8 Ma to 4.6 Ma. Samples yielding the oldest dates were tholeiitic olivine basalt from Bryant Mountain (7.33 ± 0.77 Ma) and basaltic andesite from Gift Butte (8.18 ± 0.12 Ma). Tholeiitic basalt from 905 ft depth at well KLAM 52096 near Lorella yielded an age of 5.79 ± 0.12 Ma.

Geologic Structure

Exposed Structure

Many north-northwest trending and fewer east-west trending faults dominate the sub-basin's geologic structure (fig. 20). Most are normal faults creating tilted horsts separated by grabens.

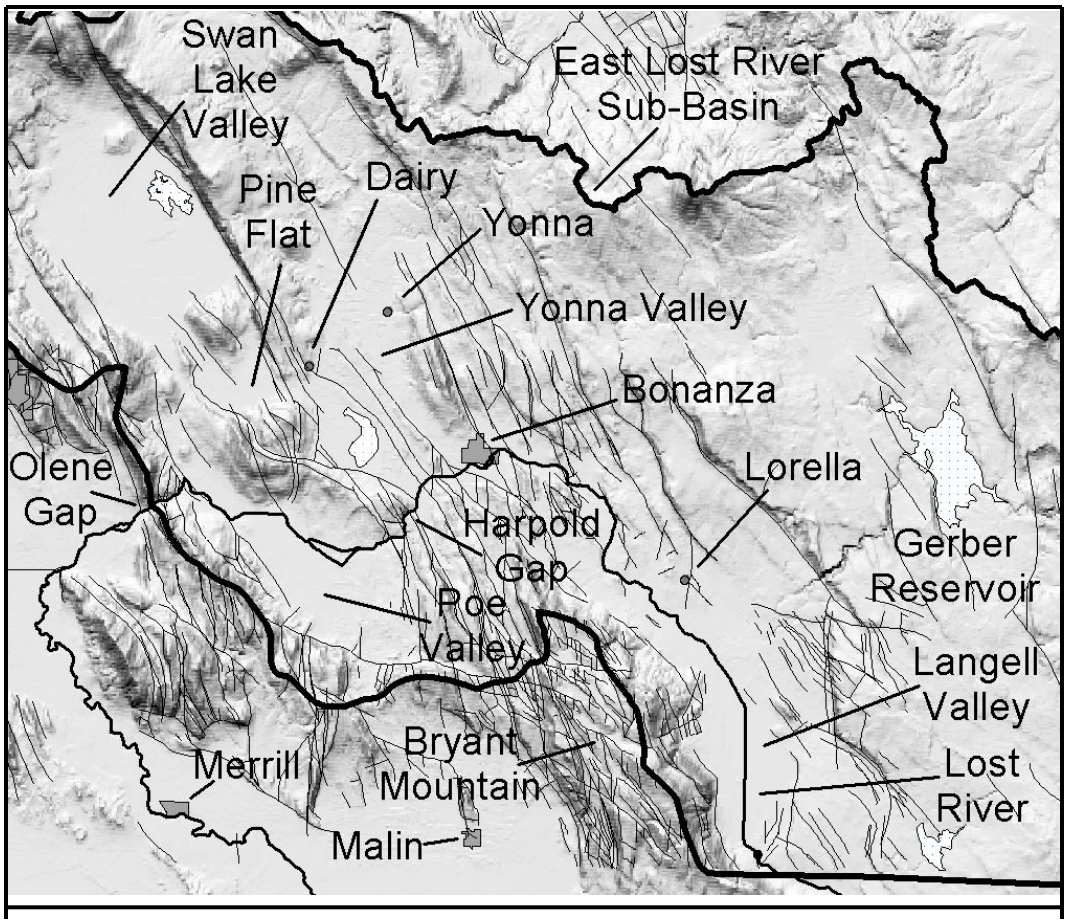


Figure 20. Faults mapped in or near the eastern Lost River sub-basin (from Sherrod and Pickthorn, 1992, Black, 2004, Hladky, 2003, Jenks, 2004, Jenks and Madin, 2003)

Langell Valley is bounded by faults on the east. Black (2004) noted normal faults east of Lorella make three steps down from Goodlow Mountain to Langell Valley where the total offset remains unknown due to the difficulty of correlating stratigraphic units. The minimum topographic offsets reported are 600 ft along Goodlow Rim, 1,285 ft along the middle fault, and 700 ft on the north portion of the western fault, decreasing to the south. Jenks (2004) noted individual fault offsets of less than 400 ft in south Langell Valley. She interpreted the south valley as a half- or trap-door graben with the hinge on the east and the major graben on the west (cross section 1 in app. 9). On the west side of the valley, Jenks mapped faults coincident with Ralston Spring and neighboring springs.

In the Bonanza area, Hladky (2003) mapped a fault along the base of Short Lake Mountain escarpment extending through the eastern portion of the Town of Bonanza near Bonanza Big Springs. He additionally mapped faults within Yonna Valley in preference to an anticlinal interpretation of earlier investigators.

The Swan Lake Rim is also the result of normal faulting and bounds the east side of Swan Lake Valley and Pine Flat. Hladky (2003) mapped branches of the fault extending into Dairy. The topographic offset can range from about 200 ft in Pine Flat to more than 1,300 ft in north Swan Lake Valley.

In Poe Valley, Hladky (2003) mapped faults in the eastern and western portion of the valley, and Jenks and Madin (2003) mapped Buck Butte and other faults in the southern portion of the valley. One fault mapped in western Poe Valley coincides with the Lost River and adjacent springs. Buck Butte Fault extends east from Stukel Mountain into Bryant Mountain with an apparent offset of nearly 1,000 ft.

Buried Structure

The relatively flat surface of the basin fill in the sub-basin valleys conceals many structures. Some of those structures are apparent on plate 3 and in appendix 9. Plate 3 shows the top elevation of units dominated by basalt and buried beneath basin fill sedimentary units. Appendix 9 shows ten cross sections distributed across different valleys in the sub-basin. The cross sections include projection of faults identified by previous investigators and faults inferred on plate 3. The limitations of plate 3 and appendix 9 include a lack of well-to-well stratigraphic control for the top of basalt, limited well density, and variable information quality from water well reports. Recognizing these limitations, several interpretations follow.

In south Langell Valley, the geologic structure appears relatively uncomplicated. A cross-valley, east to west dip to the top of basalt shown on plate 3 and on cross section 1 in appendix 9 supports the trap-door graben postulated by Jenks (2004).

Northward, the structure in Langell Valley becomes more complicated. First, the top of basalt elevation contours turn westward in the vicinity of the Miller Creek-Lost River confluence (pl. 3). The change indicates an east-west structure across the valley south of Miller Creek, possibly an extension of an east-west fault mapped across Bryant Mountain by Jenks (2004). Further north, an apparent series of two graben and two horsts occur between Goodlow Rim and Bryant Mountain along an east-west line through Lorella (pl. 3 and cross-section 3 in app. 9). The horst locations coincide with locations labeled Lorella and Lost River in cross section 3 of appendix 9. The graben locations coincide with wells identified as KLAM 10362 and KLAM 10634 in the cross section. Hot springs southwest of Lorella occur in the vicinity of intersecting faults apparent on plate 3. The fault between the horst containing Lorella and the graben containing well KLAM 10634 intersects a fault along the east escarpment of Bryant Mountain and the apparent east-west fault near Miller Creek.

Around Bonanza, a series of westerly dipping fault blocks (faulted up on the east side and dipping west on the back side) predominate the structure (pl. 3, cross sections 4 and 5 in app. 9). Multiple tilted fault blocks occur from Keller Bridge to Harpold Gap/Horton Rim (cross section 4 in app. 9). One fault intersects Bonanza Big Springs. Structure contoured within Yonna Valley from Bryant Mountain to the Highway 140 vicinity (pl. 3) generally support the northwest-trending faults mapped between Bonanza and Dairy by Hladky (2003). Two deep, northwest-elongated depressions occur within western Yonna Valley in the vicinity of Alkali Lake and the intersection of Highway 140 and Bliss Road between Dairy and Yonna (pl. 3, cross section 5 in app. 9). They are westerly-dipping fault blocks abutting faults on the west.

Data within Swan Lake Valley and Pine Flat are limited. A depression occurs in western Pine Flat (pl. 3, cross section 7 in app. 9). Within Swan Lake Valley, the top of basalt in the southern valley dips to the northwest. A fault occurs along the western valley (pl. 3, cross section 6 in app. 9), and a possible east-west fault crosses the northern valley south of Grizzly Butte (pl. 3).

Data within Poe Valley are also limited. A northwest trending fault mapped by Hladky (2003) parallels the Lost River in western Poe Valley and intersects High spring (cross section 8 in app. 9). One east-west fault crosses the valley in the vicinity of South Poe Valley Road and wells KLAM 51131 and KLAM 14795 (pl. 3, cross sections 9 and 10 in app. 9). Further south, a second east-west fault coincides with Buck Butte Fault mapped by Jenks and Madin (2003), including a buried portion crossing the north end of a southern valley extension. A buried north-south ridge occurs in the southeastern portion of the valley near Harpold Road and the north-south line between townships 40 south, 11 east and 40 south, 12 east (pl. 3).

Age of Sub-basin Structures

Multiple hypotheses for the structural development of the sub-basin exist (app. 10). Before Black (2004), determining the likely hypothesis made assigning an age to the structures problematic. Black notes the geologic data indicate the onset of master Basin and Range faulting in the sub-basin commenced about 7 Ma (late Miocene), and non-master faults commenced about 4.5 Ma (late Pliocene or Pleistocene). The master Basin and Range faults produced the major uplands. The non-master faults produced low-relief, intragraben horsts (small uplands within a valley).

Sub-basin Geologic History

This history summarizes the geologic histories found in Black (2004), Hladky (2003), Jenks (2004), and Jenks and Madin (2003).

Calc-alkaline basaltic trachyandesites exposed on Bryant Mountain are the oldest observed rocks in the sub-basin. They were deposited as thin horizontal sheets by a late Miocene (7.32 Ma and 8.18 Ma) eruption over subdued topography. Some flows show alteration of groundmass by interaction with water. Lacustrine sedimentary interbeds occur between some flows. Field work revealed no vents for these flows. The flows are assumed to underlie the entire sub-basin.

Basin and Range faulting commenced about 7 Ma. This started erosion of fully emplaced basaltic trachyandesites creating low hills and broad valleys.

Faulting continued through the late Miocene into Pliocene (5.27 Ma to 4.15 Ma). Lacustrine mudstone and fluvial deltaic sandstone accumulated in the developing basins during a period of volcanic inactivity in the late Miocene. The mudstone came from volcanic ash from nearby eruptive centers.

Volcanic activity eventually resumed and continued to the late Pliocene with eruptions occurring along master graben-bounding faults and within the basins. Andesite and dacite flows erupted onto the sediments in the north and calc-alkaline basalt erupted in the south. The calc-alkaline basalts have two different chemistries and a maximum age of 5.4 Ma. They erupted from currently visible and buried vents and flowed into the basins and up against the basaltic trachyandesite highs. Flows locally ponded and/or interacted with water over large areas. Volcanism during this period created subaerial flows, pillowed lavas and basalt with groundmass altered by interaction with water, palogonitized basaltic tuff, hydroclastic surge deposits (tuff cones) and basaltic cinder deposits. Exposures include sediments and pyroclastic tuffs interbedded with pillowed lavas and basalt with groundmass altered by interaction with water. On Bryant Mountain near Lorella, the tholeiitic basalts cover a thick sequence of interbedded sedimentary rock and basalt with groundmass altered by interaction with water indicating fault movement was ongoing during this period. Evidence of faulting within the basins (grabens) comes from low relief horsts capped by basalt with groundmass altered by interaction with water such as Dead Indian Hill.

During the Pleistocene, pluvial Lake Modoc (Dicken, 1980) purportedly inundated the sub-basin valleys in addition to the Upper Klamath Lake and Tule Lake valleys. The lake elevation apparently fluctuated rising to a maximum elevation of 4,240 ft. During this period, lacustrine deposition occurred within the lake, Miller Creek formed a gravel delta as it flowed into the lake, and other alluvial fans were deposited by other drainages. Some geologists suggest separate lakes existed in each valley.

When Lake Modoc receded, it left behind Upper Klamath Lake, Tule Lake, Alkali Lake, and Swan Lake. Additionally, the Lost River was established. Subsequent deposition includes colluvium, playa deposits, windblown sand, landslide deposits, and stream alluvium. No local volcanism reportedly occurred during the Pleistocene to the present.

Hydrogeology

Previous Investigations

The eastern Lost River sub-basin has been included in regional and local ground water investigations and discussions since the 1950s.

Meyers and Newcomb (1952) investigated ground water in the Swan Lake and Yonna Valleys. They noted the largest quantities of water came from lava rocks and poor but adequate yields for domestic use came from permeable zones within sediments. They observed few instances where a solid lava flow confined ground water in adjacent, more porous lava rocks. Their ground water level data indicated a ground water divide separated the Swan Lake and Yonna Valleys from the Sprague River Valley. Interestingly, they recommended constructing wells away from fault zones anticipating them to be impervious and unable to transmit ground water rapidly. The current OWRD investigation observed many high production wells located along valley margin faults and one valley margin fault acting as a ground water collector.

Hart (1958) made several hydrogeologic observations as he reported on a ground water recharge project operating in the Pine Flat area during the early 1950s. The project involved resolving a lower Pine Flat water logging problem by draining about 75 to 100 acre-ft of water from fields into three basalt wells at a total rate of 5,000 gal/min. Hart's descriptions of ground water in basalt included an uninterrupted water table between Pine Flat, Swan Lake Valley, and Yonna Valley; a southerly water level gradient of 3 ft/mi toward the Lost River; and ground water discharge at Bonanza Big Springs and springs in the river bed nearby. The current OWRD investigation finds that a small ground water divide separates Pine Flat and Swan Lake Valley from Yonna Valley; a nearly flat ground water gradient in basalt within Yonna Valley; Yonna Valley and northwest Langell Valley ground water discharges from basalt at Bonanza Big Springs and neighboring springs; and Swan Lake Valley and Pine Flat ground water appears to discharge from basalt at springs adjacent to the Lost River in western Poe Valley.

Newcomb and Hart (1958) investigated the ground water resources of the entire upper Klamath River basin. They noted that water at most large springs in the basin emerged from lava rocks, often at an escarpment base. They described Bonanza Big Springs as unique because it occurred along a fault trace. Their data indicated the Lost River gained approximately 100 ft^3/s (44,880 gal/min) over a 6 mi reach through Bonanza with about 20 ft^3/s (8,980 gal/min) coming from visible springs and the remaining volume coming from inconspicuous springs in the river bed.

Illian (1970) summarizes ground water in the Klamath basin regionally and by sub-basin. The report was included in a state basin report (State Water Resources Board, 1971). Illian describes ground water occurrence, well yields, estimated ground water use and recharge, and occurrence of geothermal ground water. However, the report uses general ground water concepts with little supporting data to describe ground water flow in the basin. Given the generalized approach, the Illian report is of limited value to address the current problem.

Leonard and Harris (1974) describe ground water in selected sub-areas within the Klamath basin including Swan Lake, Yonna, Poe, and Langell Valleys. They describe ground water occurrence, aquifer properties, ground water level fluctuations, estimated ground water use, and recharge. They noted ground water flow from the uplands to the valleys, high basalt transmissivity in Yonna Valley, ground water compartmentalization and lower basalt transmissivities in Poe Valley, perched ground water in Swan Lake Valley sediments, and the possibility of ground water in basalt flowing in from the Sprague River Valley.

Nelson (1991) assessed the occurrence of bacterial contamination of ground water at Bonanza wells. Nelson observed wells producing from different lithologies (rock types) and depths were hydraulically connected. He concluded a connection between the Lost River and local ground water exists via Bonanza Big Springs based upon dye tests and measurements of electrical conductivity and water temperature.

CH2M-Hill (1992, 1994, and 2002) described basalt aquifer tests they conducted in northwest Langell Valley and Yonna Valley. The northwest Langell Valley tests relate to ground water in a deep basalt water bearing zone below 1,500 ft depth at the well site. The 1994 and 2002 reports concluded that the deep ground water from basalt is isolated from shallower ground water from basalt (water bearing zones above 600 ft depth). Analysis of data in the 2002 report, however, leads the Oregon Water Resources Department (OWRD) to conclude a partial hydraulic connection exists between the deep and shallow ground water in basalt.

Gorman (1994) assessed the potential impact of 36 ground water right applications upon surface water sources near Bonanza Big Springs. Gorman used previous ground water investigations and OWRD data collected from July 1992 to June 1993 (2-hour recorder and monthly ground water levels, spring discharge, and river flow). Gorman concluded different geologic units are hydraulically connected allowing circulation between units; spring discharge is sensitive to both climatic and human caused events; and a strong relationship exists between ground water levels and spring discharge. Local objections and demand for more data to test Gorman's conclusions led to the current OWRD ground water investigation in the sub-basin. The current OWRD ground water investigation data supports Gorman's general conclusions.

Ground Water in the Major Stratigraphic Units

General Stratigraphy and Ground Water Occurrence

The general stratigraphy of the sub-basin consists of basalt and sedimentary rock and sediments. Basalt exposures predominate in the uplands. In the valleys, lacustrine, fluvial, and volcaniclastic sediments cover the basalt as basin fill. Some basalt dikes, sills, and flows occur within the basin fill.

Water well reports indicate ground water occurs in both basalt and basin fill sedimentary rocks and sediments. Despite the complex geology in the sub-basin, sufficient hydraulic connection exists between water bearing zones in predominantly basalt units to allow lumping them as undifferentiated basalt. Additionally, sufficient hydraulic connection exists between water bearing zones in predominantly basin fill sedimentary rock and sediment units to allow lumping them as undifferentiated sediments. Appendix 8 shows their correlation to the multiple sedimentary and basalt units identified by previous investigators.

The hydraulic properties of the major units are generally different, resulting in low yield from the basin fill and much higher yields from the basalt. Ground water in the basalt and overlying fill is generally hydraulically interconnected, especially in Langell, Poe, and Yonna Valleys. Evidence includes similar ground water elevations and ground water level trends. Some ground water in the uppermost portion of the basin fill in Swan Lake Valley and Pine Flat is perched or has a high vertical gradient. Evidence includes anomalously high ground water elevations in a few wells surrounded by wells showing much lower ground water elevations and different water level trends.

Ground Water in Basalt

Basalt occurs throughout the sub-basin as multiple layers with some sedimentary interbeds. Individual flows may be discontinuous and may vary in texture and water bearing characteristics. Most land surface exposures of basalt occur in the uplands, with few exposures occurring in the valleys.

This investigation found ground water in different water bearing zones in a sequence of basalt is often hydraulically interconnected locally. Evidence for this includes similar ground water elevations, ground water level trends, and responses to ground water use.

Water well reports for 205 wells that produce water from basalt within or adjacent to the sub-basin valleys were reviewed (app. 11, table 3). Productive basalt water bearing zones identified by drillers are described as: black, brown, gray, red, burnt, hard, broken, fractured, brecciated, creviced, porous, honeycomb, vesicular, bubbly basalt lava rock; red or black cinders; pumice; and black, brown, yellow sandstone or sand.

Table 3. Summary of ground water temperature, well yield, and specific capacity on water well reports for 205 eastern Lost River sub-basin basalt wells

Area		Reported Water Temp (Fahrenheit)	Reported Well Yield (gal/min)	Calculated Specific Capacity (gal/min/ft)
Swan Lake Valley Pine Flat Dairy	Average	58	2,222	541
	Maximum	68	4,750	3,970
	Minimum	48	30	10
	Median	58	2,283	210
Poe Valley	Average	69	1,129	61
	Maximum	90	4,000	400
	Minimum	51	3	1
	Median	65	800	25
Yonna Valley Bonanza NW Langell Valley	Average	59	1,553	428
	Maximum	72	5,500	4,300
	Minimum	46	10	7
	Median	58	1,500	97
Lorella (mid-Langell Valley)	Average	62	759	22
	Maximum	76	3,200	91
	Minimum	53	4	2
	Median	61	400	10
South Langell Valley	Average	69	1,271	123
	Maximum	80	3,700	367
	Minimum	60	20	1
	Median	68	1,500	35
All	Average	62	1,469	363
	Maximum	90	5,500	4,300
	Minimum	46	3	1
	Median	60	1,500	77

Well yield information was found on 199 of the 205 water well reports. The reported yield exceeded 100 gal/min at 171 wells and 1,000 gal/min at 117 wells (table 3 and fig. 21). A yield less than 50 gal/min was reported for 19 wells.

Specific capacity (a measure of a well's productivity) could be calculated for 115 of the 205 wells. It is the rate of discharge from a pumped well divided by the water level drawdown in the well due to pumping. It is often expressed as gallons per minute per foot of drawdown (gal/min/ft). The specific capacity exceeded 10 gal/min/ft at 101 wells and 100 gal/min/ft at 51 wells (table 3 and fig. 22).

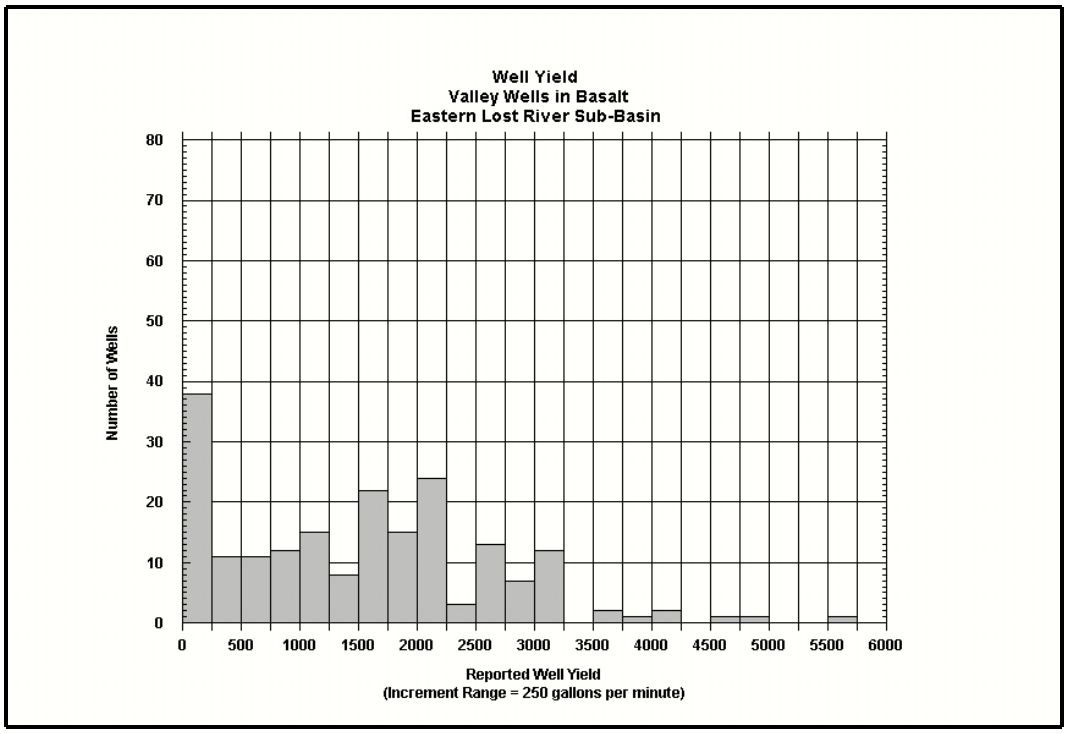


Figure 21. Reported well yield at 199 wells obtaining ground water from basalt within or adjacent to east Lost River sub-basin valleys

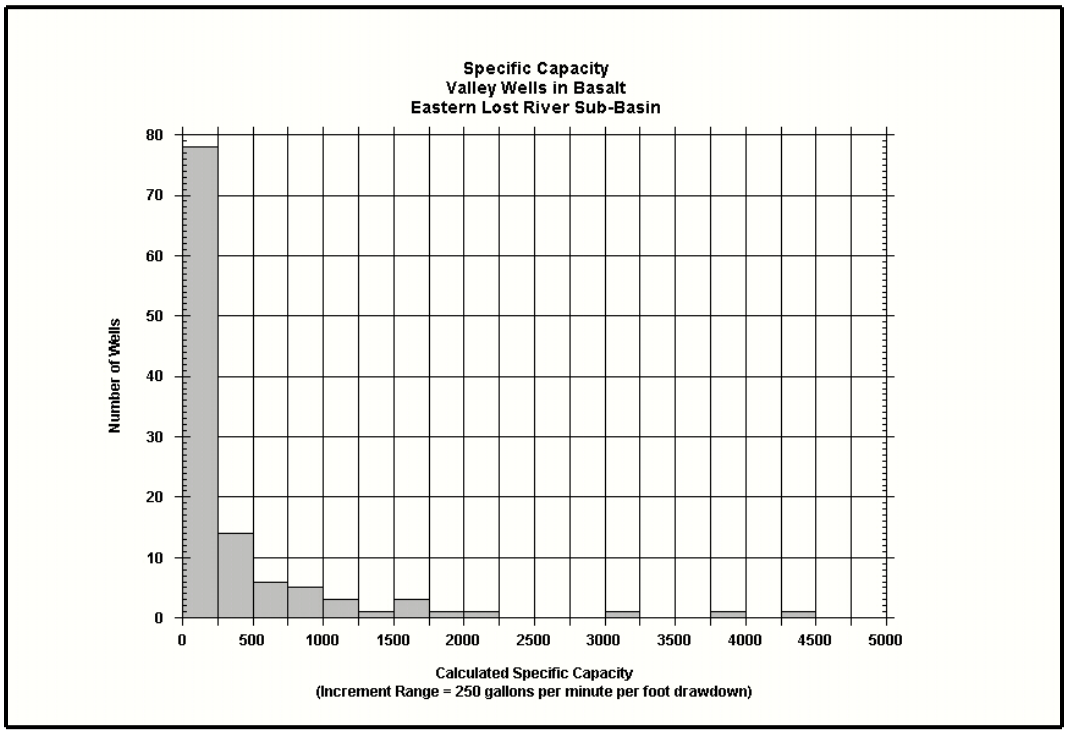


Figure 22. Calculated specific capacity at 115 wells obtaining ground water from basalt within or adjacent to east Lost River sub-basin valleys

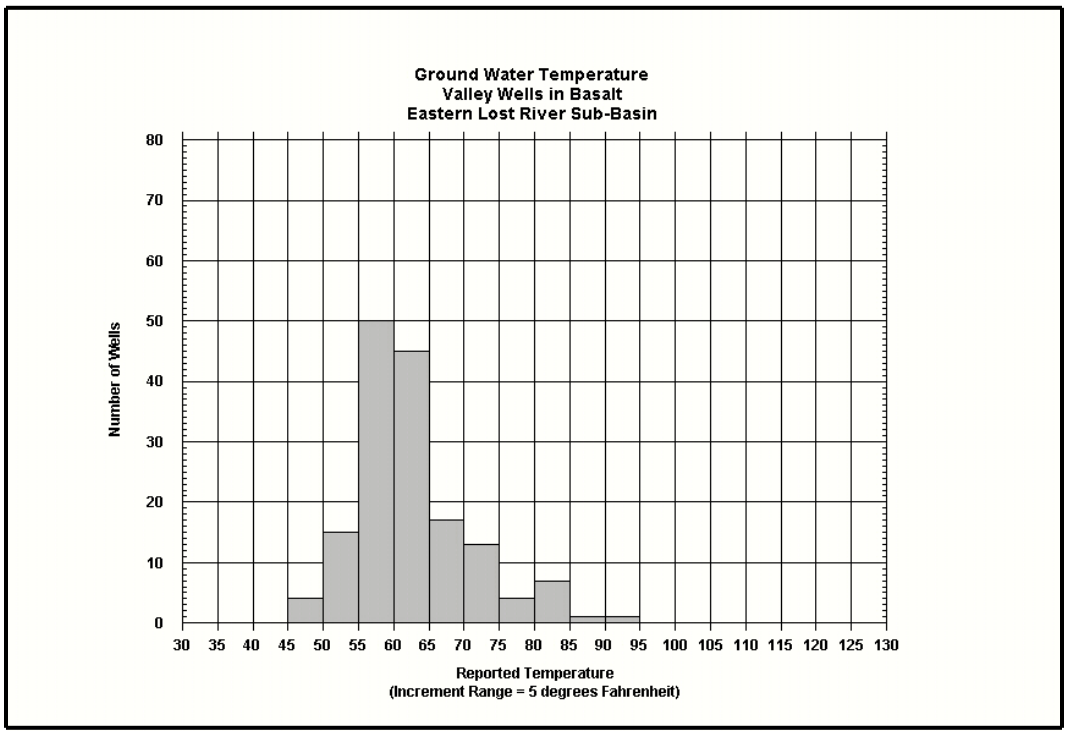


Figure 23. Reported water temperature for ground water in basalt at 157 wells within or adjacent to east Lost River sub-basin valleys

The temperature of ground water from basalt was recorded on 157 of the 205 water well reports. Reported temperatures ranged from 45 to 90°F which is 7.2 to 32.2^{o}C (table 3 and fig. 23). The higher temperatures in the range indicate the presence of water that absorbed heat during deep circulation along faults.

Ground Water in Sedimentary Deposits

In the valleys, lacustrine, fluvial, and volcaniclastic sediments cover the basalt as basin fill. Some basalt dikes, sills, and flows occur within the sediments. Water well reports for 48 wells producing from or penetrating through basin fill sediments within or adjacent to the sub-basin valleys were reviewed (app. 8, table 4). Productive water bearing zones identified by drillers are described as black or brown sandstone or sand, black cinders, pumice, gravel, fractured claystone, or basalt within a thick sediment sequence.

This investigation found ground water in different water bearing zones in a sequence of basin fill is often hydraulically interconnected locally. Evidence includes similar ground water elevations and ground water level trends. Some ground water in the uppermost portion of the basin fill in Swan Lake Valley and Pine Flat is perched or has a high vertical gradient to water deeper in the fill.

Table 4. Summary of ground water temperature, well yield, and specific capacity on water well reports for 48 eastern Lost River sub-basin wells producing from or penetrating through sediments overlying basalt

Area		Reported Water Temp (Fahrenheit)	Reported Well Yield (gal/min)	Calculated Specific Capacity (gal/min/ft)
Swan Lake Valley Pine Flat Dairy	Average	51	52	
	Maximum	56	100	3.46
	Minimum	46	10	0.36
	Median	52	45	
Poe Valley	Average	62	126	
	Maximum	78	950	7.92
	Minimum	52	15	0.40
	Median	62	20	
Yonna Valley Bonanza NW Langell Valley	Average	58	43	
	Maximum	64	200	6.67
	Minimum	51	2	
	Median	58	24	
Lorella (mid-Langell Valley)	Average	65	98	
	Maximum	80	320	3.52
	Minimum	55	5	
	Median	60	60	
South Langell Valley	Average	62	128	
	Maximum	63	335	1.00
	Minimum	60	27	
	Median	62	50	
All	Average	60	85	
	Maximum	80	950	7.92
	Minimum	46	2	0.40
	Median	59	33	

As previously noted, ground water in the basin fill is hydraulically interconnected to ground water in the underlying basalt, especially in Langell, Poe, and Yonna Valleys. Evidence includes similar ground water elevations and ground water level trends. However, these major units generally have different hydraulic properties. Wells obtaining ground water from the basin fill have lower yield and specific capacity than wells obtaining ground water from basalt.

Well yield information was found on 44 of the 48 water well reports. The yield exceeded 10 gal/min at 35 wells, 50 gal/min at 14 wells, and 100 gal/min at 7 wells (table 4 and fig. 24). These yields are smaller than the yields reported for wells obtaining ground water from basalt.

Specific capacity (a measure of a well's productivity) could be calculated for 7 of the 48 wells. The specific capacity never exceeded 10 gal/min/ft (table 4 and fig. 25). These few values are much smaller than the specific capacity calculated for wells obtaining ground water from basalt.

The temperature of ground water from basin fill sediments was recorded on 24 of the 48 water well reports. Reported temperatures ranged from 45 to 80°F, 7.2 to 26.7^{o}C (table 4 and fig. 26). The higher temperatures in the range indicate the presence of water that absorbed heat during deep circulation along faults.

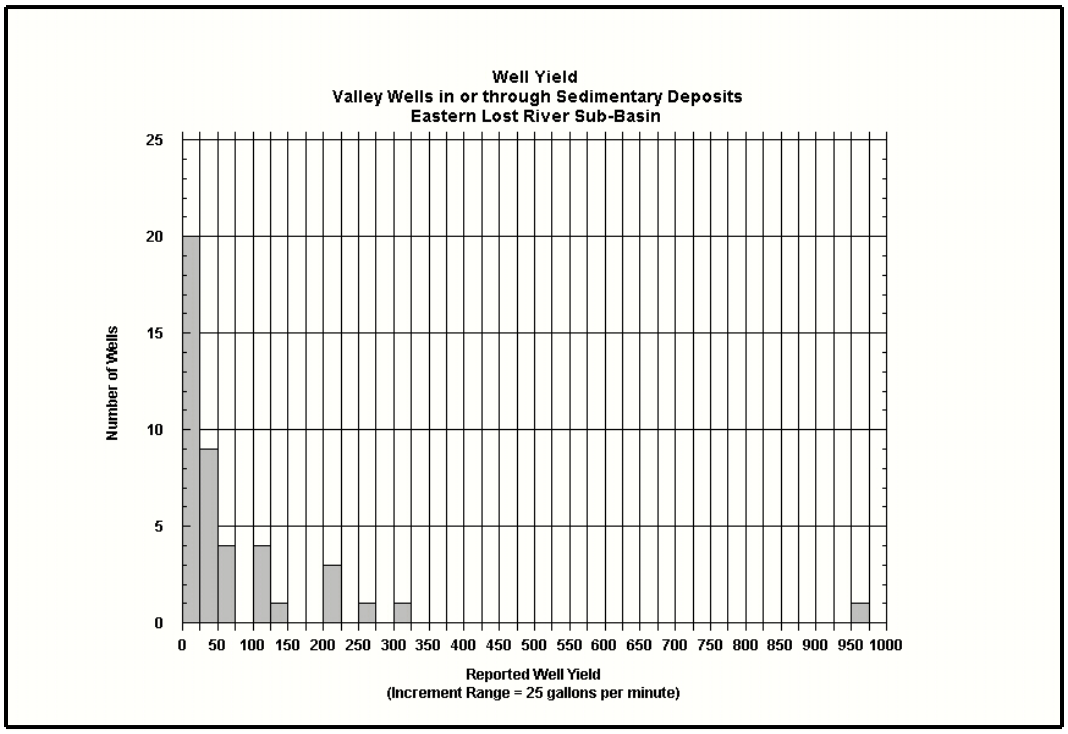


Figure 24. Reported well yield for sediment at 44 ground water wells within or adjacent to east Lost River sub-basin valleys

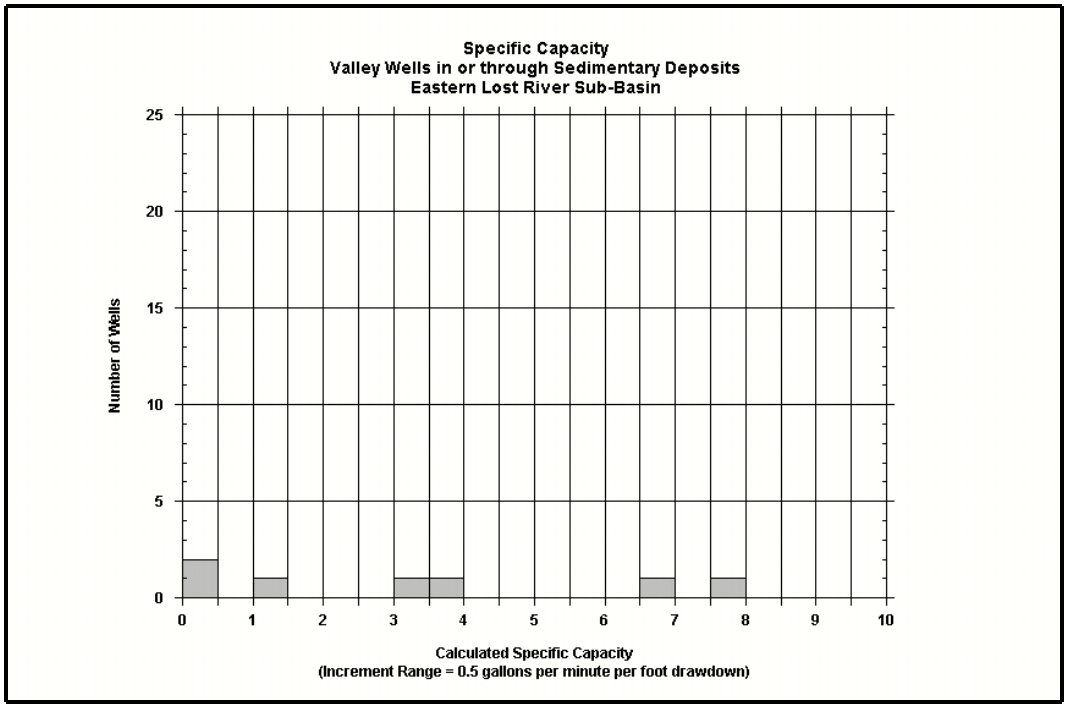


Figure 25. Calculated specific capacity at 7 sediment ground water wells within or adjacent to east Lost River sub-basin valleys

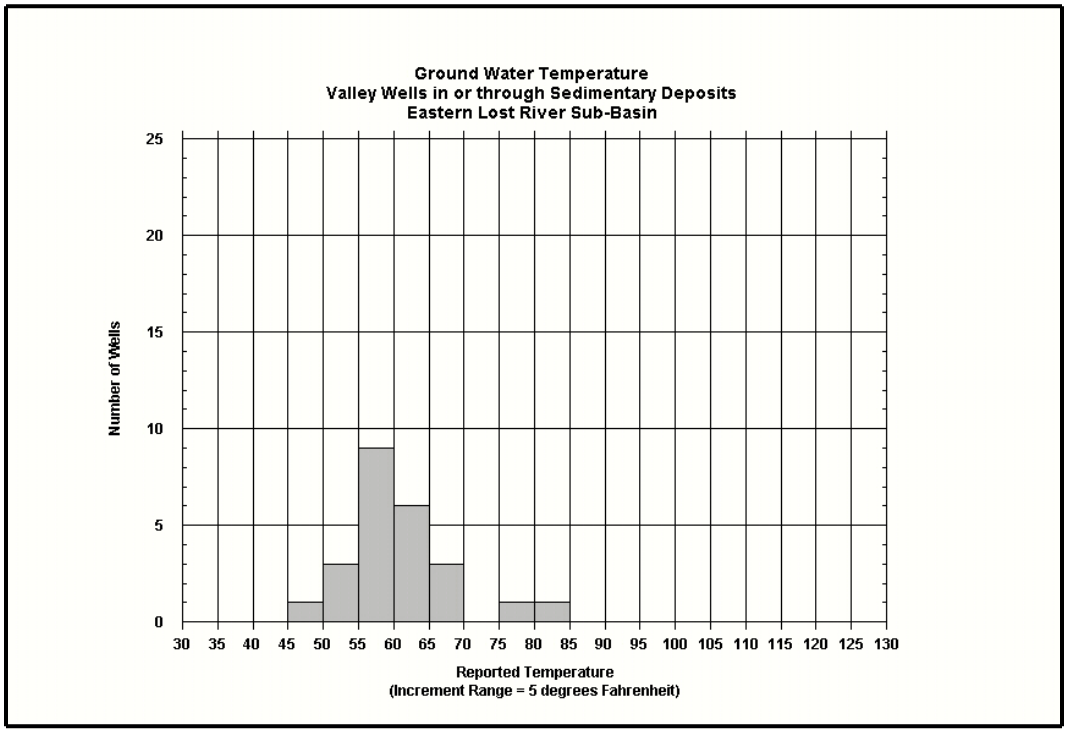


Figure 26. Reported water temperature for ground water in sediment at 24 wells within or adjacent to east Lost River sub-basin valleys

Ground Water Level Data Collection

This investigation conducted ground water level measurements at 205 wells. The various types of water level data collected included recorder, monthly, and synoptic measurements (table 5, fig. 27, pl. 2, and app. 2).

Recorder water level data came from electronic water level instruments installed at 10 unused wells and programmed to record ground water levels every two hours. The data were used to assess very short-term water level variability as well as seasonal and annual water level trends. The measurements began in 1992 at one well east of Bonanza Big Springs. A second well adjacent to Bonanza Big Springs Park was added in 1997, and the remaining 8 wells were added in 1999. Water level versus time graphs for each well can be found in appendix 12.

Monthly water level data came from regularly scheduled hand measurements at 51 wells (including the 10 recorder wells) using an electronic or steel tape measure. The data were used to assess seasonal and annual water level trends. The measurements began in December 1998. The measurement schedule and number of wells changed over the history of the investigation. The schedule was monthly at 49 wells from December 1998 to October 1999, bi-monthly at 39 wells (12 wells discontinued and 2 new wells added) from January 2000 to September 2001, and quarterly at 23 wells (16 more wells discontinued) from January 2002 to investigation end. Water level versus time graphs for each well can be found in appendix 12, and individual measurements can be found in appendix 13.

Synoptic water level data came from hand measurements made at 200 wells in March and October 1999. The 200 wells included 49 recorder and monthly wells. Two monthly wells (actually a double completion well) were not constructed when the synoptic measurements were made. The March 1999 measurements were used to make potentiometric (ground water elevation or water table) maps (pls. 4 and 5). Individual measurements can be found in appendix 13.

Table 5. Type of water level measurements conducted at 205 wells for the eastern Lost River sub-basin ground water investigation

Number of Wells	Recorder Water Level Data	Monthly Water Level Data	Synoptic Water Level Data
10	X	X	X
41		X	X
154*			X
*Note: synoptic measurement successfully completed at 151 of 154 synoptic wells attempted			

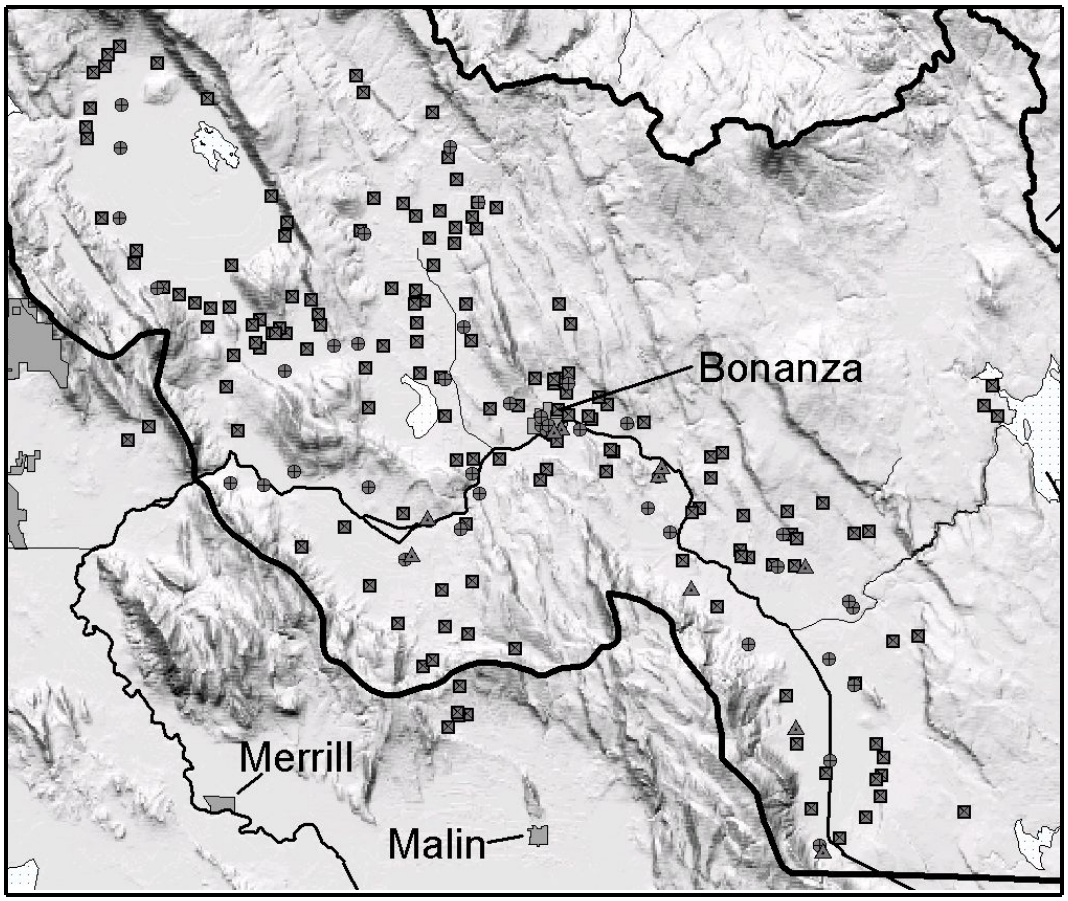


Figure 27. Location of the investigation ground water level measurement wells (triangles are recorder observation wells, filled circles are monthly observation wells, filled squares are synoptic observation wells)

All hand measurements were recorded as feet below land surface datum (ft blsd). Each measurement was converted to an elevation above sea level by subtracting the depth to water measurement from the land surface elevation at the appropriate well site (app. 14).

Multiple methods were used to determine land elevation. Initially, land elevation for all well sites was determined by using 1:24,000 scale USGS quadrangle maps having a 20 ft contour interval. These elevations have an accuracy of plus or minus 10 ft. Using these elevations to calculate ground water elevations and make potentiometric maps revealed a need for much greater elevation accuracy. The elevation error exceeded the hydraulic gradient across many areas. Improved land surface elevations came from USGS and OWRD staff measuring the land elevation at 130 wells using global positioning satellite technology. Additionally, Oregon Institute of Technology (OIT) surveying students and OWRD staff surveyed another two wells. These efforts improved the elevation accuracy at the 132 wells to plus or minus 0.10 ft (app. 14).

Ground Water Response to Stress

Precipitation, Barometric Pressure, and Earth Tides

Precipitation influences the water level elevation trend of sub-basin ground water in basalt. Data generally show declining ground water level trends occur during successive years of predominantly below average precipitation, and rising ground water level trends occur during successive years of predominantly above average precipitation. Figure 28 is an example of water level changing with climate trends. The overall ground water elevation at KLAM 13427 declined in the late 1960s, late 1970s, and the late 1980s to early 1990s. This corresponds to generally drier water years as indicated by downward trends in the cumulative departure from average annual precipitation. The overall ground water elevation rose in the early 1970s, the mid-1980s, and the late 1990s. This corresponds to generally above average precipitation water years as indicated by upward trends in the cumulative departure from average annual precipitation. The ground water in basalt responds to above or below average precipitation within the same water year in which the precipitation occurs.

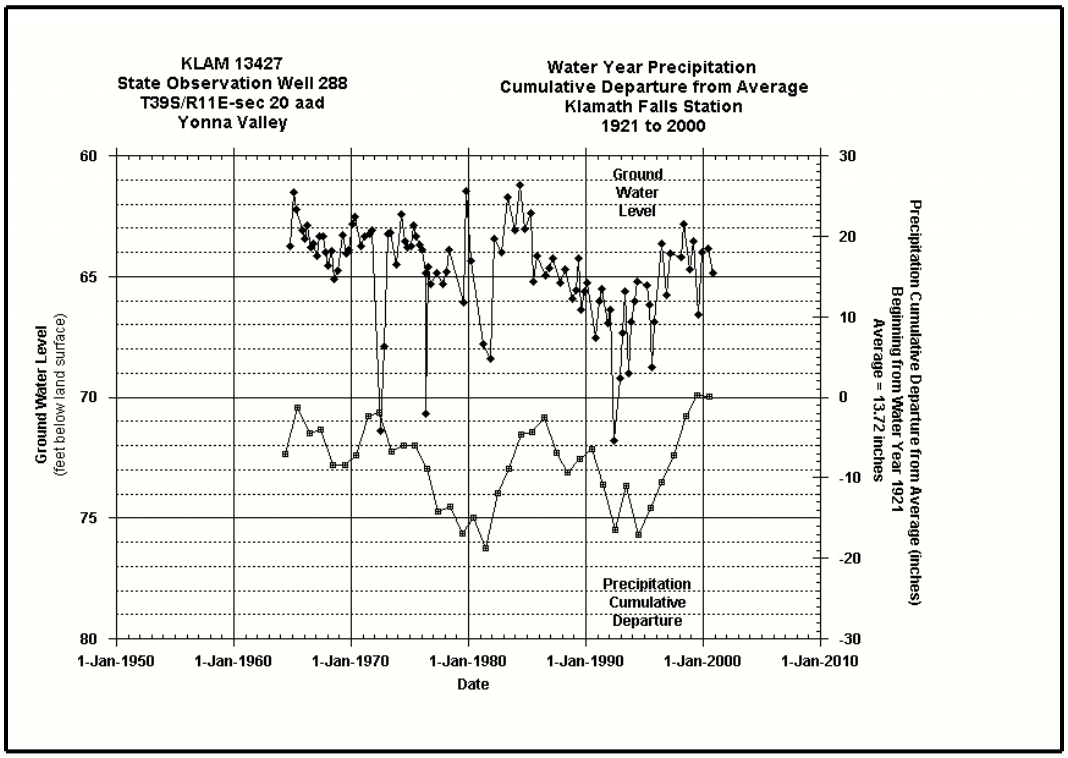


Figure 28. Graph of ground water levels measurements at state observation well 288 (well KLAM 13427) and cumulative departure from average precipitation by water year at Klamath Falls from 1950 to 2000

Analysis of 1999 OWRD aquifer tests revealed barometric pressure influences the water level elevation of sub-basin ground water in basalt. The water level in wells measured during the aquifer tests declined when the barometric pressure rose, and the water level rose when the barometric pressure fell. The estimated barometric efficiency was 50 percent for a Lorella aquifer test and 30 to 50 percent for a south Langell Valley aquifer test.

Barometric efficiency is the ratio of water level change in a well corresponding to the inverse change in barometric pressure (converted to feet of water). A 30 percent barometric efficiency means the water level in a well will change 30 percent of a barometric pressure change (converted to feet of water). For example, a rise in barometric pressure of 0.30 ft water equivalent will cause the water level in a well to decline 0.09 ft.

As a specific example, barometric pressure influenced ground water levels in basalt measured at observation well KLAM 10641 before, during, and after an aquifer test in south Langell Valley. The ground water level measured at this well fluctuated about 0.45 ft during this period (fig. 29). The barometric pressure fluctuated nearly an equal amount, about 0.40 ft of water equivalent (fig. 30). A 50 percent barometric efficiency was calculated for the well. This was used to adjust the ground water level data by subtracting 50 percent of the cumulative barometric pressure change from the ground water level measured. This yielded water level trends similar to those observed for a typical aquifer test (fig. 31) and improved the data analyses.

Earth tides can also influence ground water elevations in basalt in the sub-basin. For example, earth tides influenced the ground water level measured at well KLAM 10362 during a 1999 OWRD aquifer test in Lorella. The measurements show a 12-hour cycle of small ground water level fluctuations that inversely correspond to southern Oregon ocean tides (fig. 32).

Like the ocean, the earth's crust responds to the moon's gravitational pull, and this can cause small water level fluctuations, generally less than 0.1 ft in some wells (Davis and DeWiest, 1966). During maximum tidal attraction, the moon's gravitational pull causes the ocean tide to peak, and can cause the earth's crust to dilate. Any crustal dilation can reduce the pressure on ground water causing the water level in a well to drop. During minimum tidal attraction, the reverse occurs. This can be seen in figure 32. The ground water level at well KLAM 10362 generally fluctuated up and down about 0.1 ft during the period shown. The water level was generally at a high during low ocean tide (minimum tidal attraction) and at a low during high ocean tide (maximum tidal attraction).

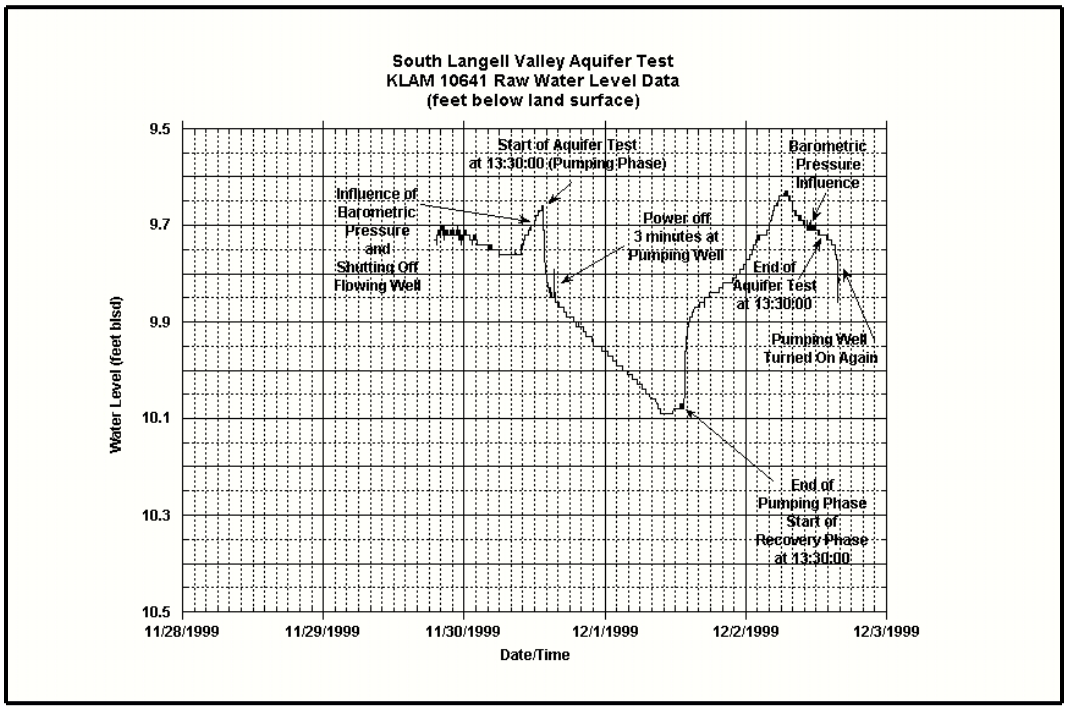


Figure 29. Hydrograph of OWRD south Langell Valley aquifer test ground water level measurements at well KLAM 10641 showing pumping and barometric pressure influences

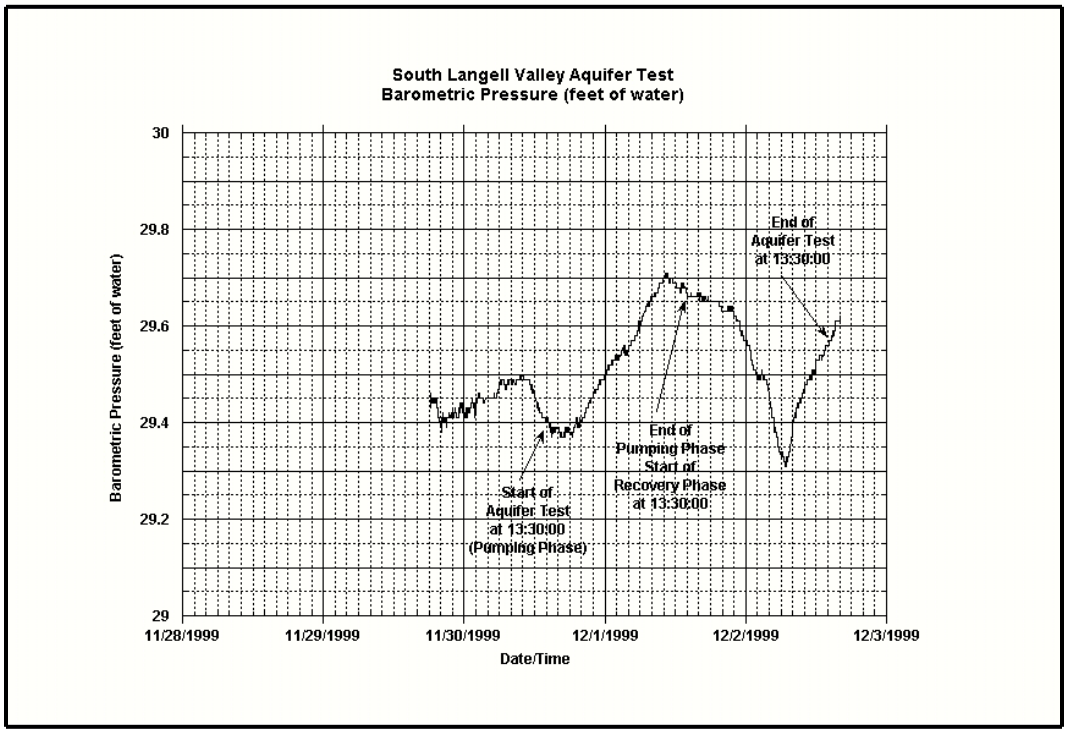


Figure 30. Graph of barometric pressure during OWRD south Langell Valley aquifer test (note: the pressure is converted to feet of water)

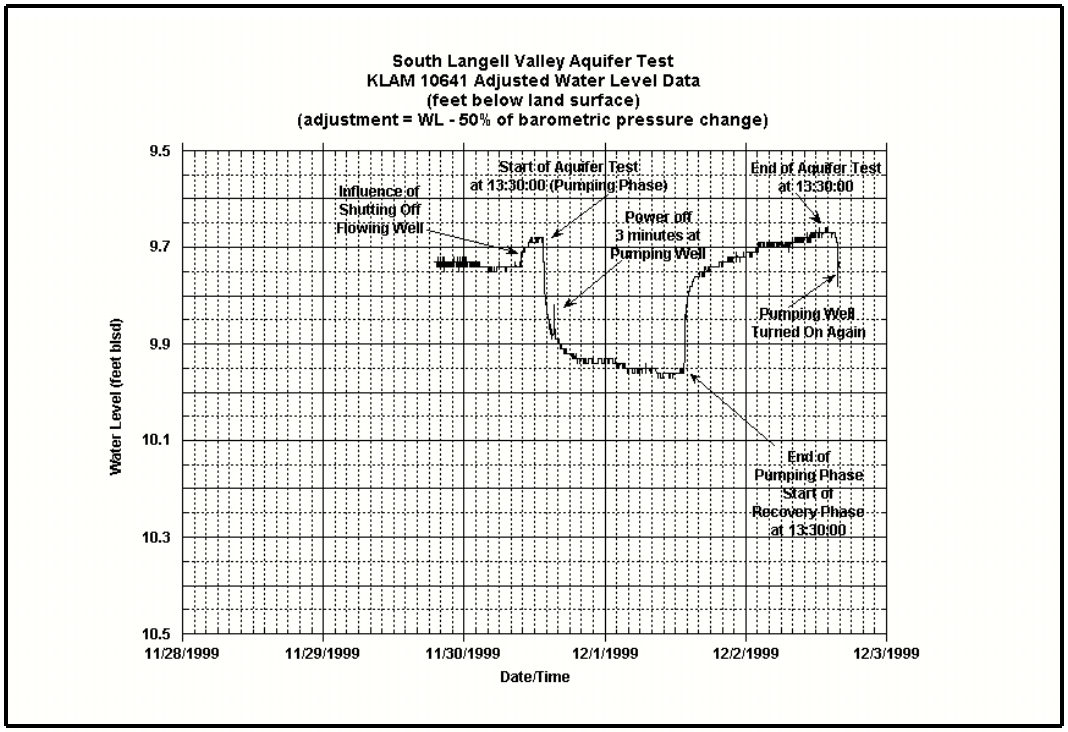


Figure 31. Hydrograph of OWRD south Langell Valley aquifer test ground water level measurements at well KLAM 10641 with barometric pressure influences removed

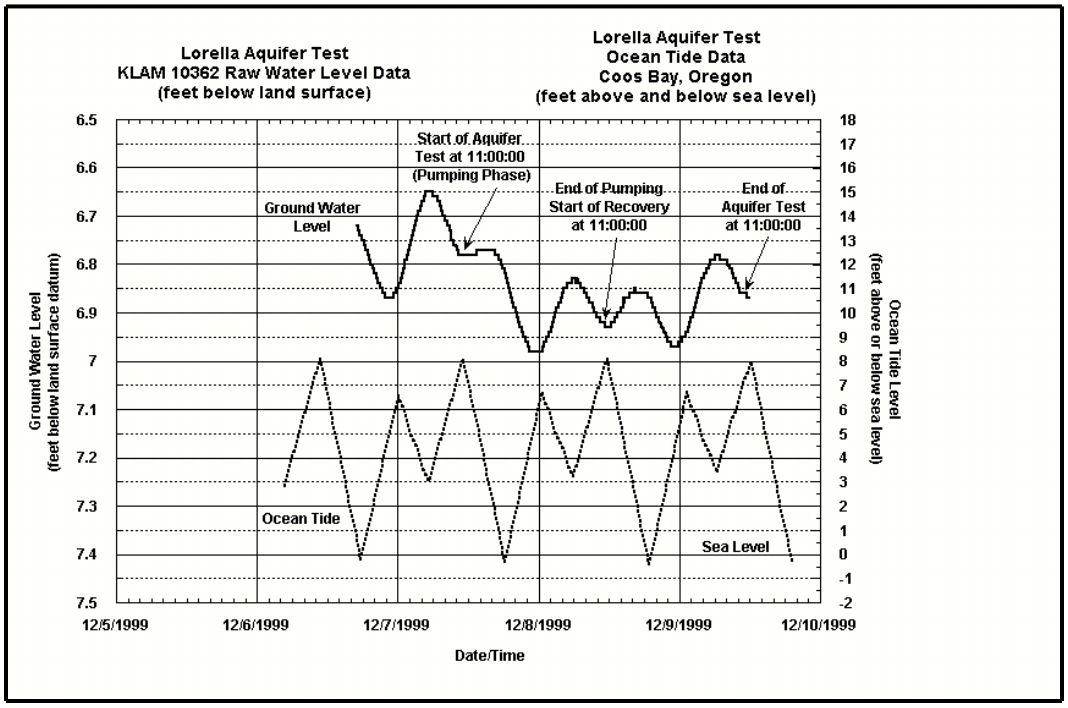


Figure 32. Hydrograph of OWRD Lorella aquifer test ground water level measurements at well KLAM 10362 and graph of the ocean tide at Coos Bay

Canal Leakage

Canal leakage occurs in the sub-basin. However, the influence of canal leakage upon ground water in basalt is not apparent in the water level data for most areas. Generally, the elevation of ground water in basalt declines during the dry, ground water use season, and rises during the wet season when little ground water use occurs. A notable exception is the area around Lorella in mid Langell Valley from Gift Road-Miller Creek in the south to Keller Bridge in the north. Here, canal leakage obviously influences ground water levels in basalt. The elevation of ground water in basalt rises when the canals flow and declines when canals are empty. An example is well KLAM 13582 (fig. 33). The ground water elevation rose when canals began flowing and peaked during summer months. The elevation declined as canals emptied and reached its lowest point during winter months.

Attempts by this investigation from August 31 to September 2, 1999 to quantify leakage in selected sub-basin canal segments proved unsuccessful. Weeds, very low flow velocities, and other factors resulted in very large uncertainty in the measurements.

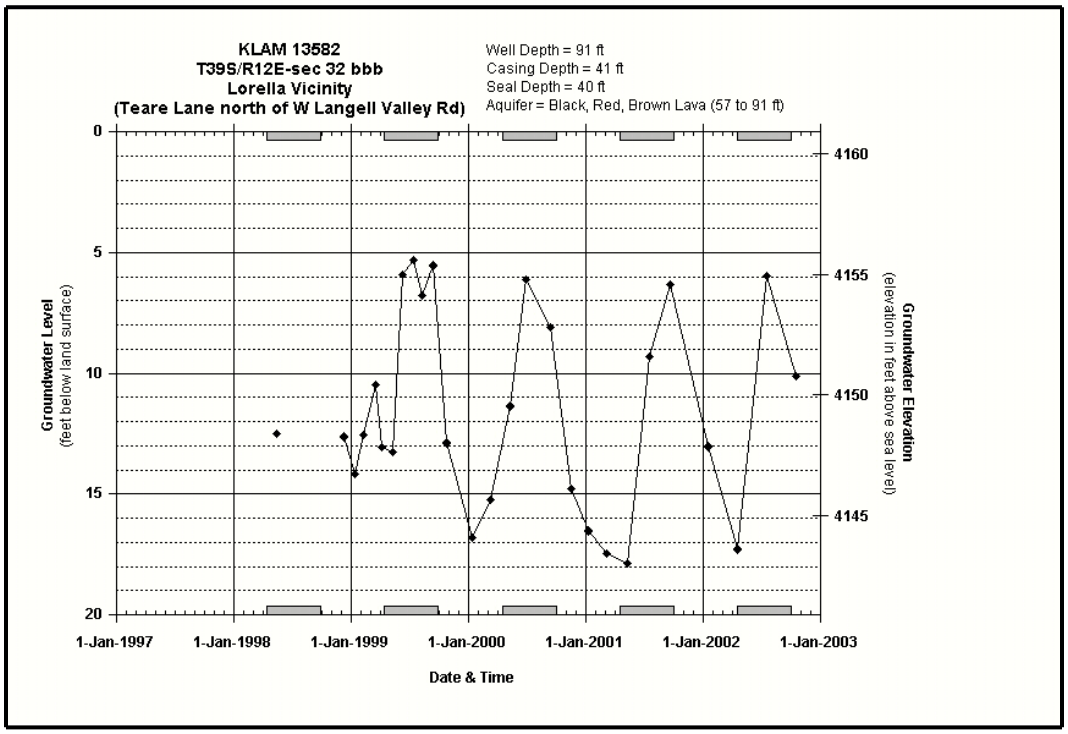


Figure 33. Hydrograph of OWRD ground water level measurements at well KLAM 13582 showing a canal leakage influence (shading denotes the period when area canals annually flow)

River Stage

The Lost River stage in the sub-basin locally influences the elevation of ground water in basalt. Observable influences appear limited to areas near the river and where a direct connection between the ground water in basalt and the river exists. An example is recorder data for well KLAM 50318 and the Lost River adjacent to Bonanza Big Springs (fig. 34). In this area, basalt is exposed in the riverbed, and a direct connection between the river and the ground water in basalt exists via springs (Nelson, 1991). The river stage influence upon the ground water in basalt is obvious when the river rises or falls rapidly and the ground water level rises and falls 10 to 30 percent of the river stage change. The variable ground water response to river stage change and occasions when ground water elevation change appeared independent of the river stage indicate additional influences affect the ground water elevation at KLAM 50318. The river influences the local ground water elevation by hydraulic damming. A higher river stage increases hydraulic backpressure through the springs to ground water. That decreases spring discharge and raises the ground water elevation. A lower river stage reduces the hydraulic backpressure resulting in increased spring discharge and a lower ground water elevation.

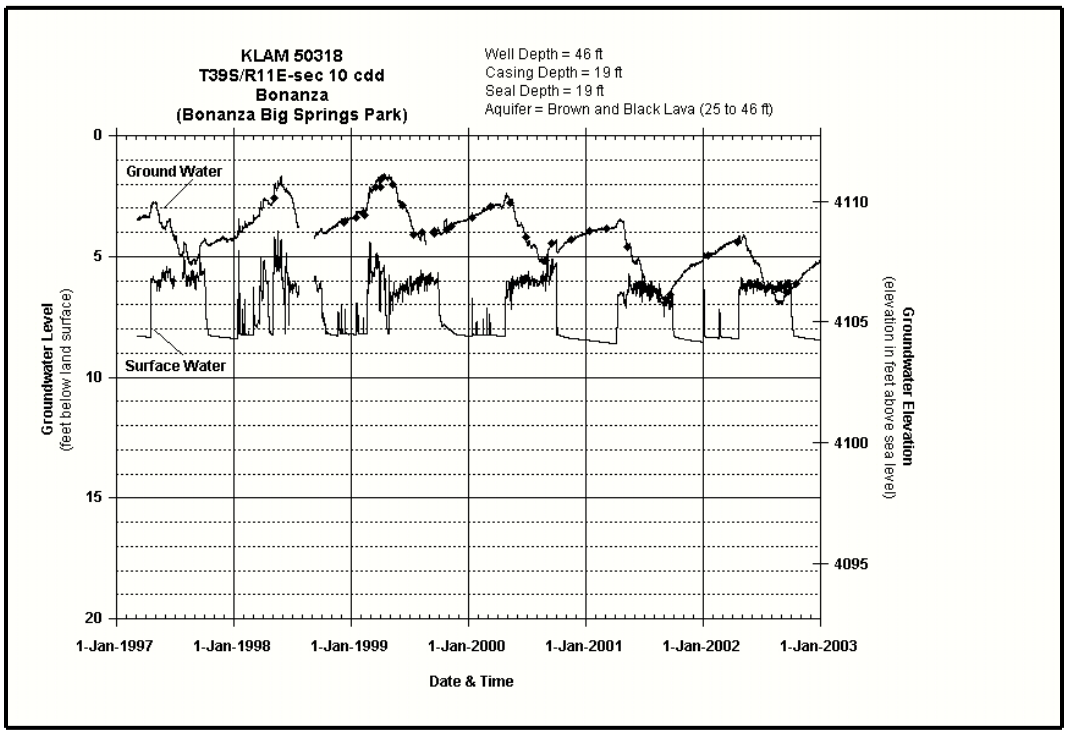


Figure 34. Hydrograph of OWRD measurements of the ground water level at well KLAM 50318 and the Lost River at Bonanza Big Springs Park

At many locations, little or no river stage influence upon ground water in basalt may occur. This can be expected at sites sufficiently up the ground water gradient away from the Lost River and in areas where sufficient sediment exists between the river and basalt to dampen the river influence.

Irrigation

Data showing a ground water response to irrigation is limited to measurements at recorder well KLAM 10813, a 55 ft deep well located about 3.75 mi southeast of Bonanza in a flood-irrigated pasture. The well is open to ground water in basin fill sedimentary deposits only (silty sand from 47 to 55 ft depth). The data show the ground water elevation at the well rises during the irrigation season and spikes when flood irrigation occurs (fig. 35). Additionally, the data indicate the ground water at the well responds to other events such as heavy precipitation and snowmelt.

With well depth and distance, irrigation affects are dampened, lost, or dominated by other influences. As an example, the ground water level measured at recorder well KLAM 10814 (fig, 36) located in the same pasture as well KLAM 10813 (about 1,500 ft north) shows no irrigation influences. The well is 280 ft deep and is open only to ground water deeper in the basin fill sedimentary deposits (silty sand from 258 to 280 ft depth).

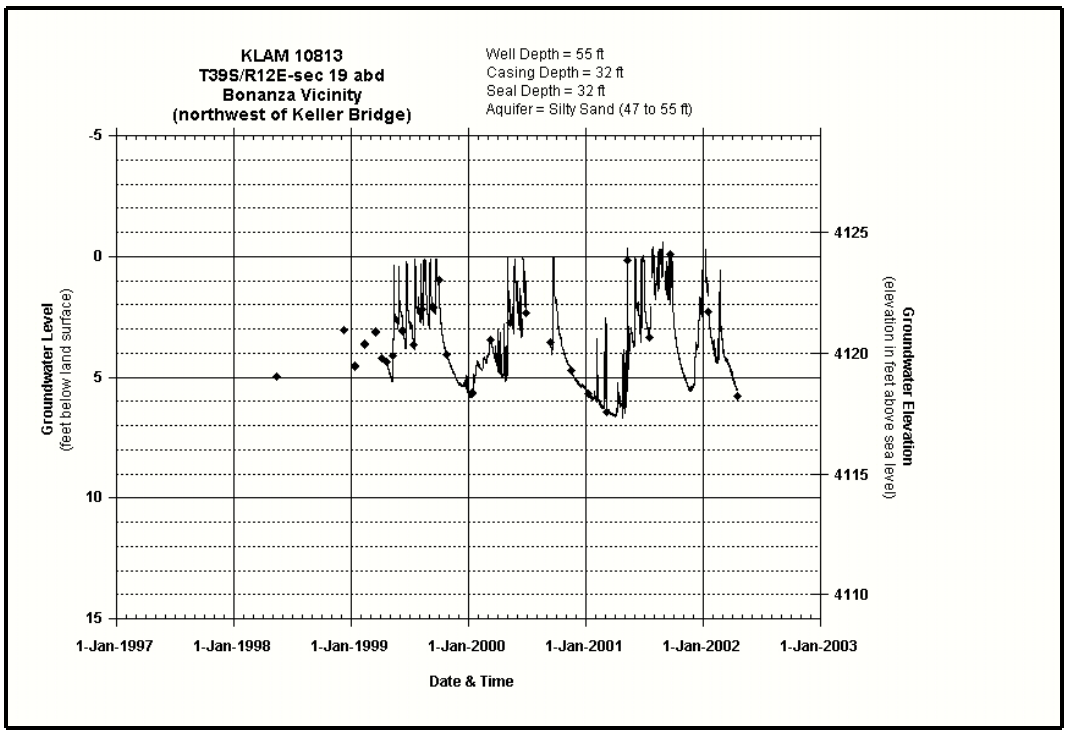


Figure 35. Hydrograph of OWRD ground water level measurements at well KLAM 10813 showing irrigation influence

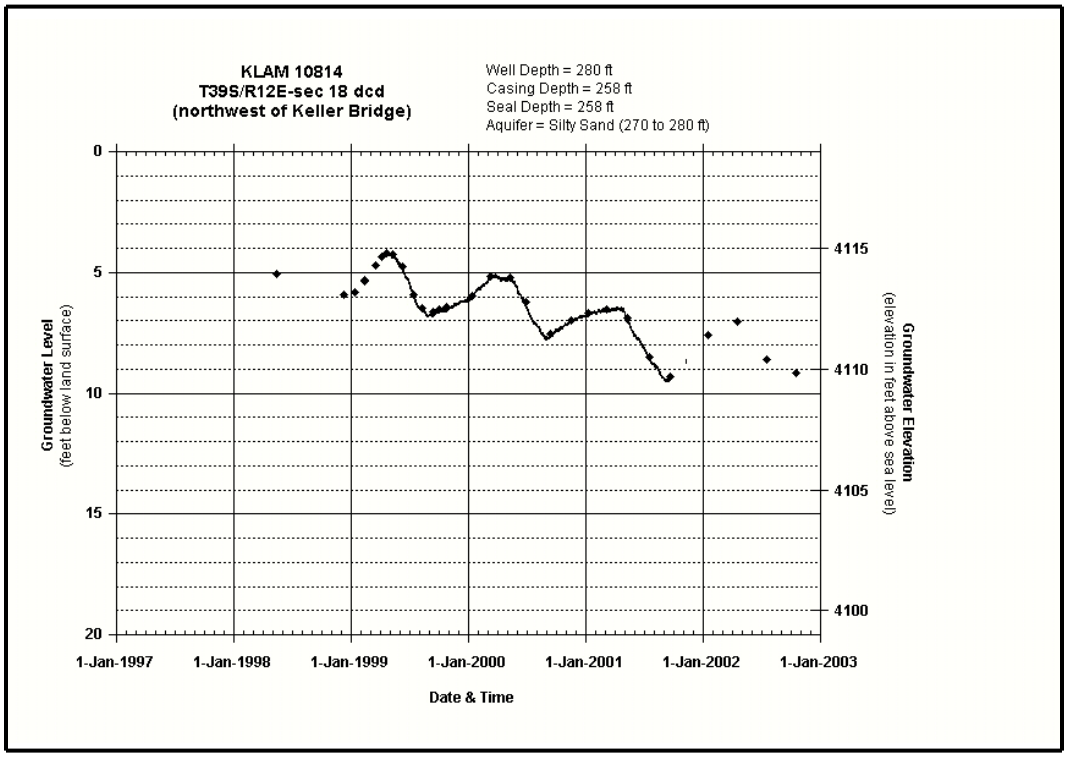


Figure 36. Hydrograph of OWRD ground water level measurements at well KLAM 10814 showing no irrigation influence

Ground Water Use

Ground water use clearly influences the elevation of ground water in basalt and basin fill sedimentary deposits. Most ground water elevations in the sub-basin decline during periods of greater ground water use and recover during periods of reduced use or non-use. For example, the ground water level in both basalt and basin fill sedimentary deposits in south Langell Valley responds to local seasonal use of ground water from basalt (figs. 37 and 38). The greater ground water level declines during the summer of 2001 were caused by drought and increased pumping of ground water from basalt to replace diminished surface water supplies.

Ground water use also affects the canal-influenced ground water in the Lorella area. The ground water level measured at recorder well KLAM 10699 is an example (fig. 39). The ground water elevation at the well rises when the nearby High Line Canal flows and declines when the canal empties. However, intermittent ground water use about one mile away superimposes several feet of water level fluctuation.

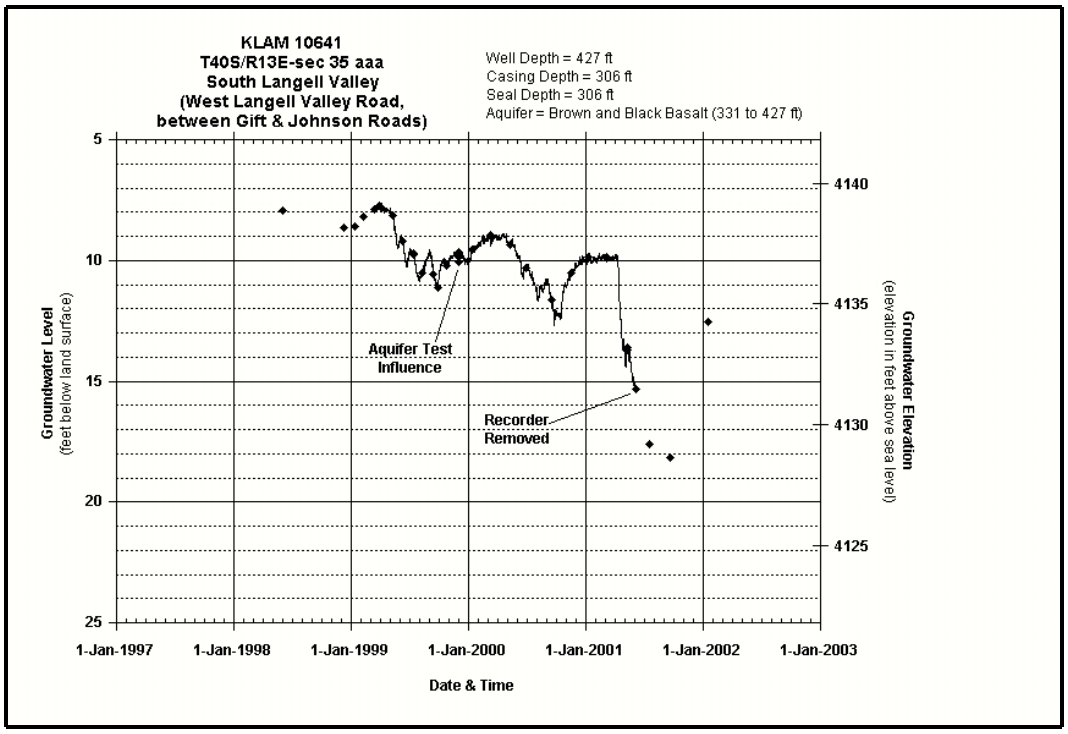


Figure 37. Hydrograph of OWRD ground water level measurements at well KLAM 10641 showing ground water use influence in basalt

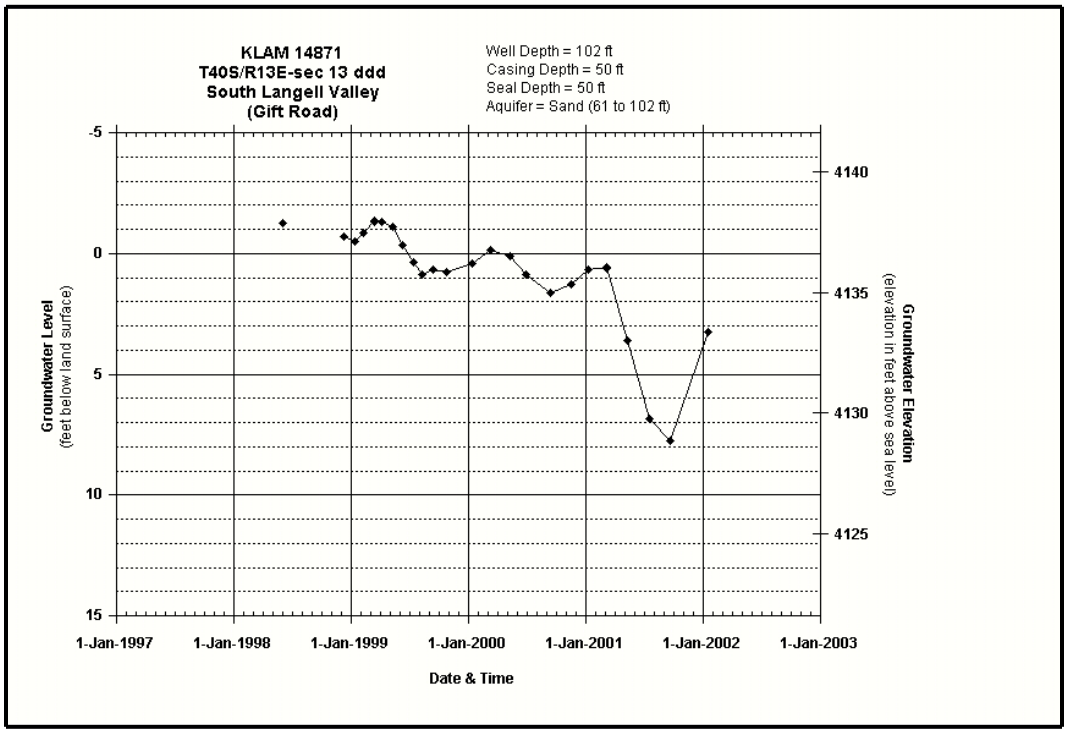


Figure 38. Hydrograph of OWRD ground water level measurements at well KLAM 14871 showing ground water use influence in basin fill

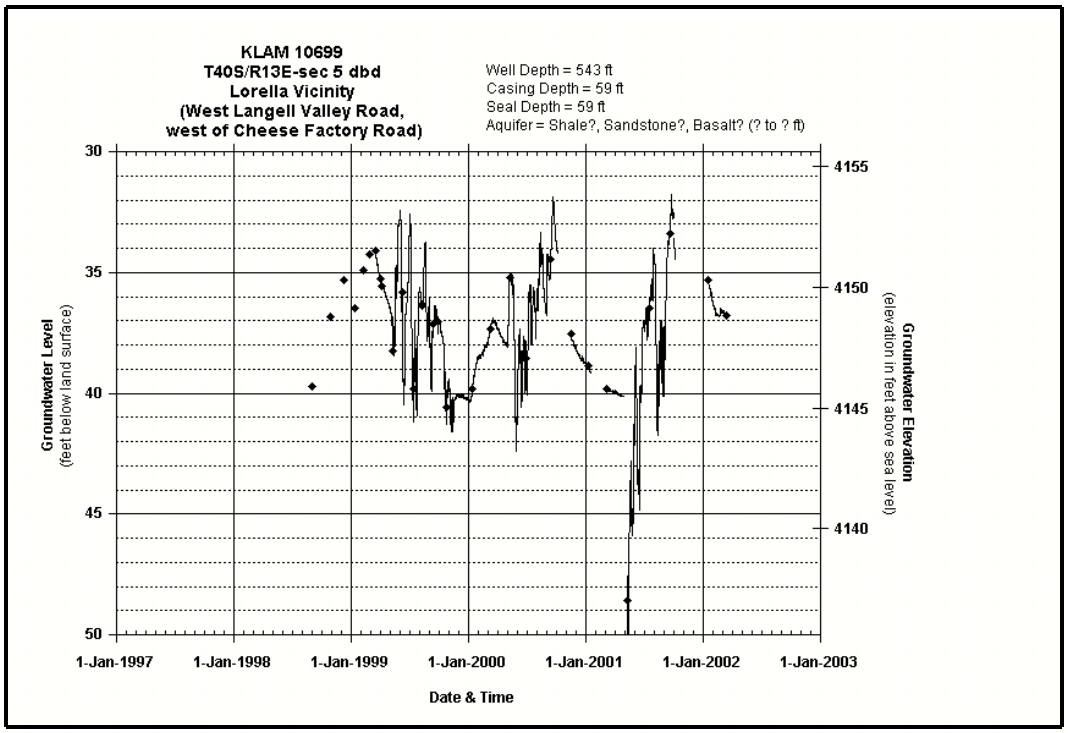


Figure 39. Hydrograph of OWRD ground water level measurements at well KLAM 10699 showing ground water use influence superimposed upon canal leakage influence

Relationship Between Ground Water in Basalt and in Sedimentary Deposits

In many valleys of the study area, an efficient (direct) hydraulic connection exists between ground water in basalt and ground water in overlying sediments. This occurs in thin basin fill deposits and also in the deeper portion of thick basin fill. These valleys include Poe, Yonna, and Langell Valleys excluding Lorella. Evidence of an efficient hydraulic connection between ground water in basalt and overlying basin fill sedimentary deposits includes similar ground water elevations and similar responses to stress (figs. 37 and 38, fig 40, and app. 15).

Where thick basin fill sedimentary deposits (hundreds of feet) overlie basalt, the hydraulic connection between ground water in basalt and the upper portion of the basin fill sedimentary deposits appears inefficient (less direct). This is evidenced by figure 41 showing ground water in the basin fill sediments responding to greater ground water pumping from basalt in 2000 and 2001. Land owner S. Balin (oral commun., 2001) noted a similar response in south Langell Valley. The ground water level in the upper portion of the basin fill sedimentary deposits at his shallow domestic well showed a delayed and dampened response to nearby pumping of ground water from basalt in 2001.

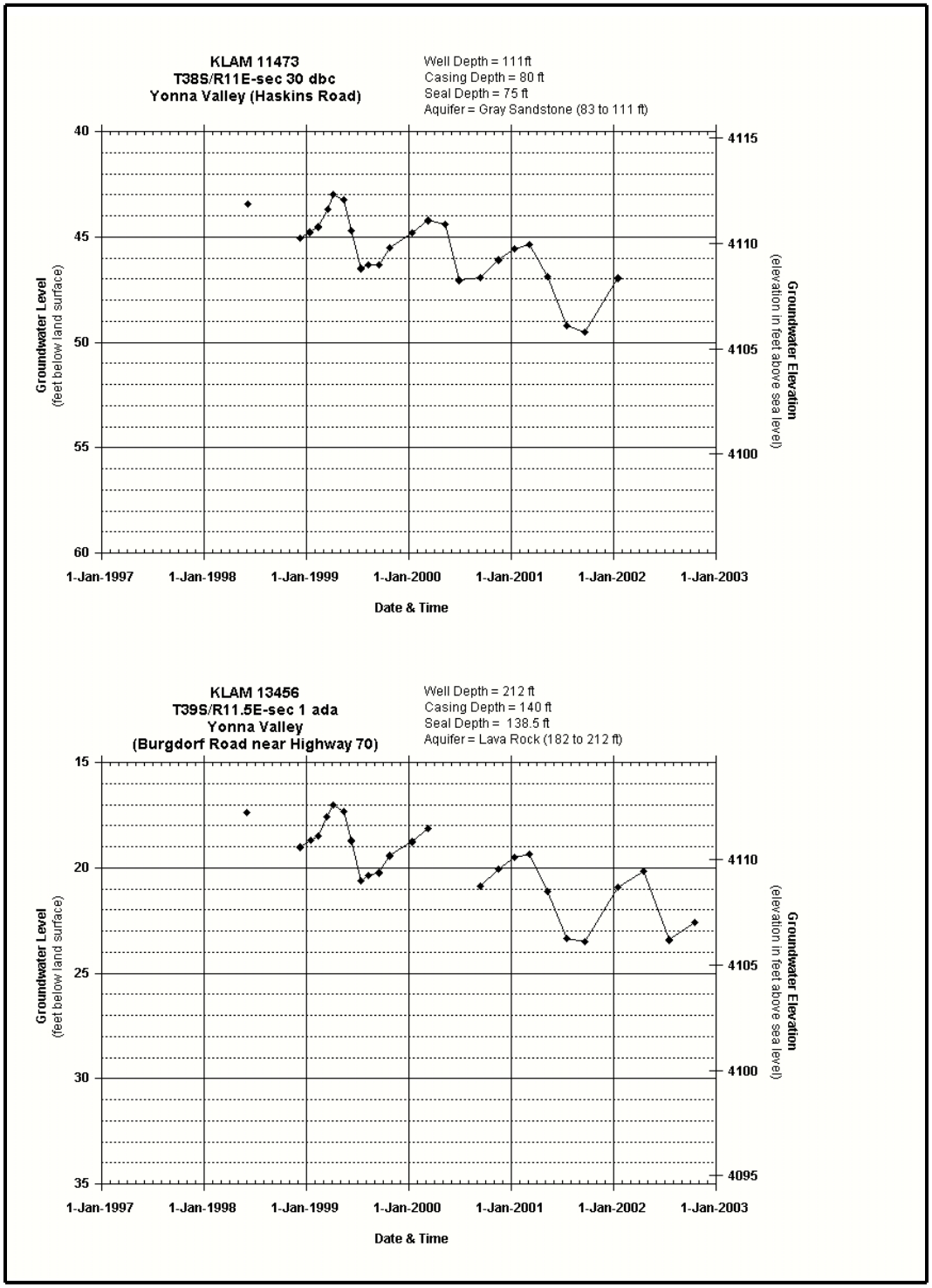


Figure 40. Hydrograph of ground water level measurements at sediment well KLAM 11473 and basalt well KLAM 13456 showing an efficient (direct) hydraulic connection

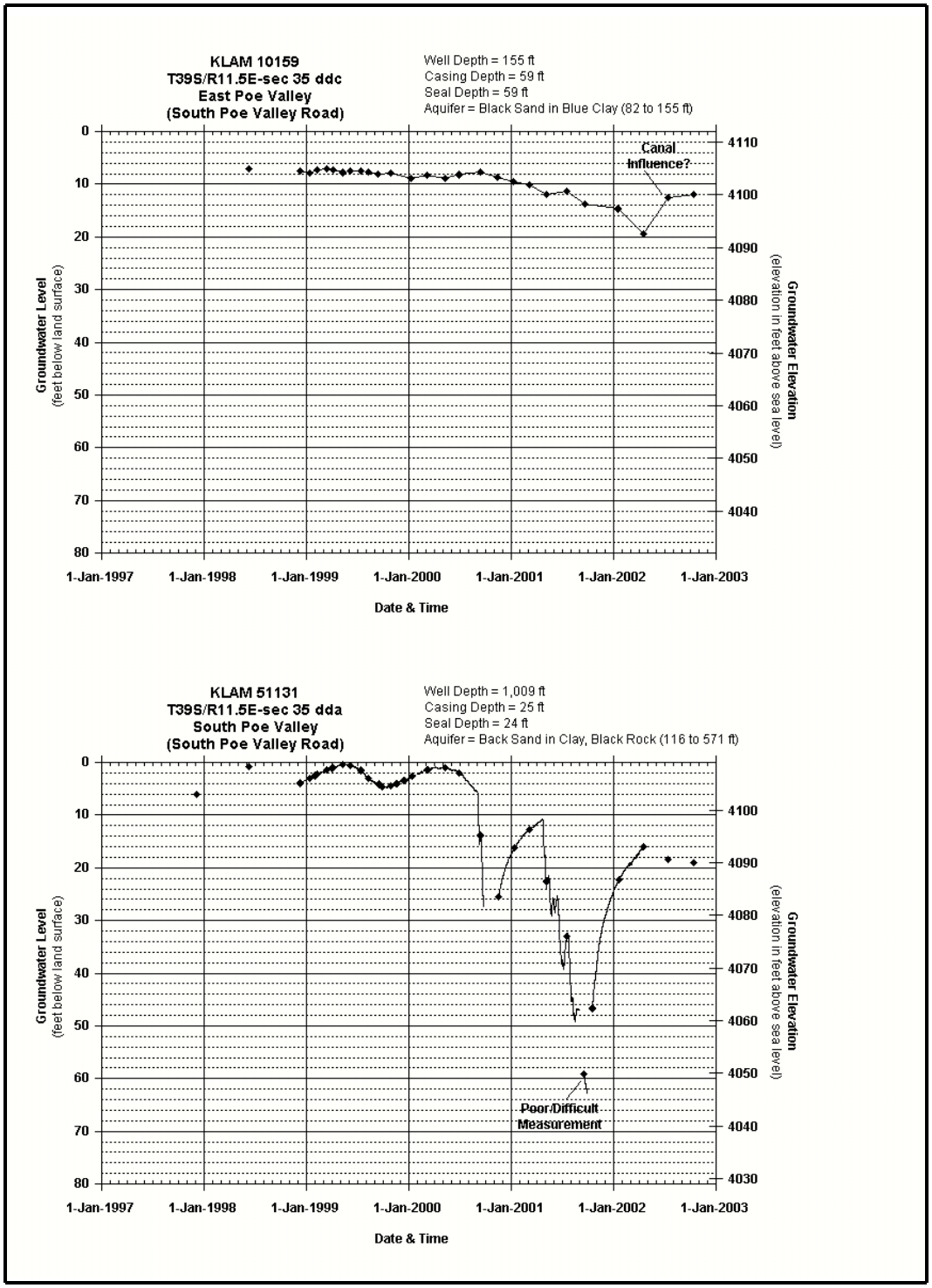


Figure 41. Hydrograph of ground water level measurements at sediment well KLAM 10159 and basalt well KLAM 51131 showing an inefficient hydraulic connection (note the vertical axis range is 80 ft instead of 20 ft seen on most other graphs)

In Swan Lake Valley and Pine Flat, the basin fill sedimentary deposits form the valley floor with an elevation near 4,200 ft, 60 to 100 ft higher than neighboring valleys. In areas, the basin fill is hundreds of feet thick. Ground water in the deeper portion of the basin fill has an efficient hydraulic connection to ground water in the underlying basalt. Ground water in the upper portion of the basin fill sedimentary deposits is either perched above deeper ground water or has a high vertical gradient to deeper ground water. Evidence includes the occurrence of anomalously high ground water elevations in a few shallow wells in the upper portion of the basin fill sedimentary deposits, surrounded by deeper wells in basalt showing much lower ground water elevations and different ground water level trends. An example is ground water in basin fill at well KLAM 11569 in Pine Flat. The ground water elevation was more than 60 ft higher than ground water in basalt at surrounding Pine Flat wells such as KLAM 12369 (fig. 42), and it trends differently.

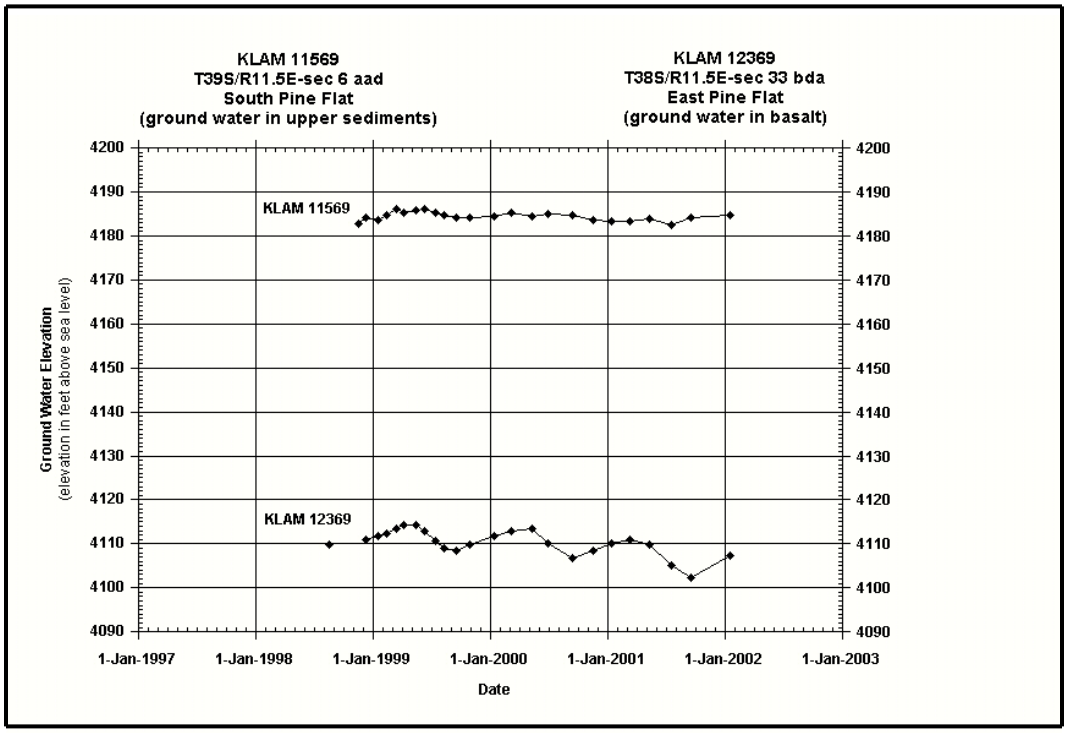


Figure 42. Hydrograph of ground water level measurements at sediment well KLAM 11569 and basalt well KLAM 12369 showing perched ground water (note the vertical axis range is 110 ft instead of 20 ft seen on most other graphs)

Relationship Between Ground Water and the Lost River

Introduction

Sub-basin ground water in basalt is hydraulically connected to the Lost River. The most efficient connection to the river occurs at fault-controlled valley floor springs where basalt is at or near land surface. The greatest discharge from basalt to the river occurs at Bonanza Big Springs and west Poe Valley springs, which are located in or adjacent to the river. Additional discharge occurs at south Langell Valley springs located away from the river, and it is conveyed to the river via ditches and overland flow when it is not used. The least efficient connection to the river exists where thick basin fill sedimentary deposits overlie the basalt. In those areas, discharge to the river occurs as diffuse, low-flow seepage.

Seepage Run Method to Quantify a Ground Water and River Relationship

The seepage run technique of conducting nearly concurrent flow measurements along a river is a useful method to obtain data needed to quantify the natural river gains and losses. The flow measurements occur within the river channel at multiple locations and at river inflow or outflow sites where flow is observable and measurable. River inflow and outflow sites include springs, creeks, ditches, drains, pumping stations, and diversions. Ideally, for each river reach, the flow in the river channel at the start and end of the reach, and all measurable inflow and outflow within the reach are measured within a several hour period during dry weather and stable, low river stage conditions. The low river stage condition exposes more inflow sites and makes river flow changes more apparent, which facilitates identifying reaches where ground water inflow occurs via submerged springs and/or seepage.

Ground water discharge to a river reach is quantified from the seepage run data by adding any unaccounted river gain to the total spring discharge measured. Conversely, river loss to ground water is quantified from the seepage run data by adding any unaccounted river loss to any observed and measured loss (outflow) to the subsurface. The unaccounted river gain or loss for a river reach occurs via diffuse seepage and/or submerged springs, and it is quantified by:

$$U = (RE - RS) - (I - O)$$

Where:
- U = unaccounted river gain (U is positive) or loss (U is negative)
- RE = river flow at the end of the river reach
- RS = river flow at the start of the river reach
- I = total of all inflow measured within the river reach
- O = total of all the outflow measured within the river reach

Measuring specific electrical conductance (the ability of a substance to conduct an electric current) of water at all seepage run flow measurement sites provides additional data useful to confirm seepage run data analyses. The conductance of river water changes downstream as water from different sources with different conductance flow into and mix with the river water. After knowing the flow rate and conductance at the start and end of a given river reach, and for each inflow and outflow measured in that reach, it is possible to calculate a specific electrical conductance for the unaccounted flow by using a mass balance equation:

$$UC = [((REC*RE) - (RSC*RS)) - (SUM(IC*I) - SUM(OC*O))]/U$$

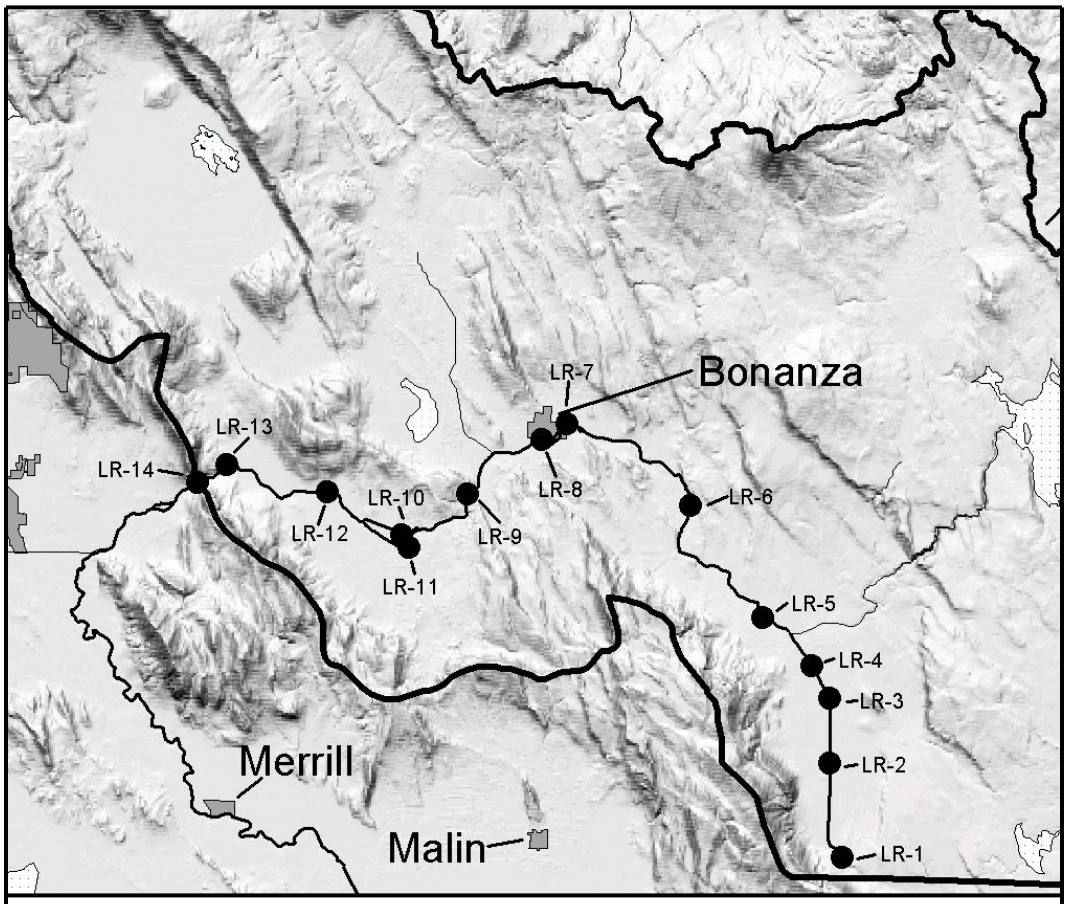
Where:
- U = unaccounted river gain (U is positive)
- UC = calculated specific electrical conductance for unaccounted river gain
- REC*RE = specific electrical conductance of river water at end of the river reach times river flow at the end of the river reach
- REC*RS = specific electrical conductance of river water at start of the river reach times river flow at the start of the river reach
- SUM(IC*I) = the sum of each inflow within the river reach times its specific electrical conductance
- SUM(OC*O) = the sum of each outflow within the river reach times its specific electrical conductance

If ground water is the source of the unaccounted river gain for a given river reach, the calculated specific electrical conductance for the unaccounted river gain should be similar to the specific electrical conductance of ground water discharge identified in that or neighboring river reaches.

Graphically displaying the seepage run data helps illustrate the ground water interaction with surface water at the time of the seepage run. Visually comparing by river mile the river flow to the cumulative spring and unaccounted inflow shows the likely ground water contribution to river gains. Visually comparing by river mile the river specific electrical conductance to the river flow and the cumulative spring and unaccounted inflow can provide additional evidence. A ground water contribution to river gain is likely when a notable river gain from spring and unaccounted inflow corresponds to a change in river electrical conductance consistent with ground water discharge.

Lost River Seepage Run Conducted by OWRD

This investigation conducted a five-day seepage run along the Lost River from Malone Dam to Olene Gap in December 1997. Measurement locations included 14 river channel sites that divide the river into 12 reaches (fig. 43), and 235 inflow and outflow sites. All the sites are listed and described with location information in appendix 16.



LR-1 = Lost River below Malone Dam
LR-2 = Lost River at Johnson Road
LR-3 = Lost River west of Gift Butte
LR-4 = Lost River at Gift Road
LR-5 = Lost River at Cheese factory Road
LR-6 = Lost River at Keller Bridge
LR-7 = Lost River at east Bonanza (town east boundary)
LR-8 = Lost River at west Bonanza (Harpold Road Bridge)
LR-9 = Lost River below Harpold Dam
LR-10 = Lost River at Lost River Ranch (north channel bridge)
LR-11 = Lost River at Lost River Ranch (south channel bridge)
LR-12 = Lost River at Kirsch Ranch (bridge)
LR-13 = Lost River at Stevenson Park
LR-14 = Lost River at Olene Gap (bridge)

Figure 43. Lost River flow measurement sites for December 1997 seepage run

The seepage run included measuring river flow, inflows and outflows, water temperature, and collecting water samples at each site for specific electrical conductance measurements. The flow measurements are summarized in table 6. River flow and conductivity measurement data are shown in figures 44 and 45. All the flow, temperature, and conductivity data and calculations for analyses are presented in appendix 17 and 18.

Weather conditions for the seepage run were mostly dry and mild with overnight freezing. A light drizzle occurred one night dampening the ground with no visible runoff. The dry weather helped minimize inflow to the river. However, daily temperature variability likely caused some variability to diurnal inflow and subsequently to river flow. Evidence comes from river flow measurements west of Gift Butte (LR-3) and at Keller Bridge (LR-6), the last measurement of one day and the beginning (morning) measurement of the following day (table 6). The morning measurements had lower flow, likely due to some overnight freezing in ditches and drains.

River conditions for the seepage run consisted of a low river stage and mostly stable flows. Some small river stage variability did occur. For example, the river stage above Bonanza Big Springs declined about 0.10 ft over the five-day measurement period (fig. 46) while the river stage below Bonanza Big Springs did not change at all. The different river stage trends are due to different sensitivity to river flow variability. River flow above and below Bonanza Big Springs was about 34 and 94 ft^3/s respectively. Thus, any flow variability was a larger percentage of the total flow at the upstream site than at the downstream site.

The data show that the river gained total flow in each reach from Malone Dam (LR-1) in south Langell Valley to Stevenson Park (LR-13) in west Poe Valley (fig. 44). The total flow grew from less than 10 ft^3/s to more than 130 ft^3/s. Possible river flow changes in the last reach from Stevenson Park to Olene Gap remains uncertain due to measurement problems at Olene Gap.

Tributaries, drainage, and spring inflows to the Lost River were measured. Tributaries included Miller Creek in mid-Langell Valley and Buck Creek west of Bonanza. Each contributed about 6 ft^3/s. In south Langell Valley, a north-south line of springs about 0.5 mi east of the river, and connected via drainage ditches likely contributed some of the approximately 8.5 ft^3/s measured inflow between Malone Dam (LR-1) and Gift Road (LR-4). The greatest spring inflows (measured and unaccounted) occurred at Bonanza and west Poe Valley, about 60 and 20 ft^3/s respectively (fig. 44).

Table 6. Summary of December 1997 Lost River seepage run

River Sites	Measured Flow* (ft^3/s)			Unaccounted River Reach Gain/Loss (ft^3/s)	Cumulative River Gain Or Loss (ft^3/s)
	Lost River	Various In/Outflow	Spring Inflow		
LR-1	7.250				0.000
		3.900	0.000	-0.050	
LR-2	11.100				3.850
		2.143	0.000	2.157	
LR-3	15.400				8.150
LR-3	11.550**				
		2.456	0.000	0.064	
LR-4	14.070				10.670
		8.147	0.000	0.733	
LR-5	22.950				19.550
		4.277	0.046	3.167	
LR-6	30.440				27.040
LR-6	24.840**				
		1.166	0.014	7.700	
LR-7	33.720				35.920
		0.558	34.761	25.311	
LR-8	94.350				96.550
		7.214	0.620	-4.554	
LR-9	97.630				99.830
		0.002	0.000	4.568	
LR-10, 11	102.200				104.400
		6.094	0.000	-0.784	
LR-12	107.510				109.710
		9.067	0.308	19.685	
LR-13	136.570				138.770
		0.290	0.000	?	
LR-14	106.320***				
Total		45.314	35.749	57.997	

*Note: the measurement error is plus or minus 5 percent
**Note: a second measurement occurred the following day, a lower value on the following day apparently reflects diurnal variability
***Note: river flow measurement at LR-14 had serious problems due to weeds

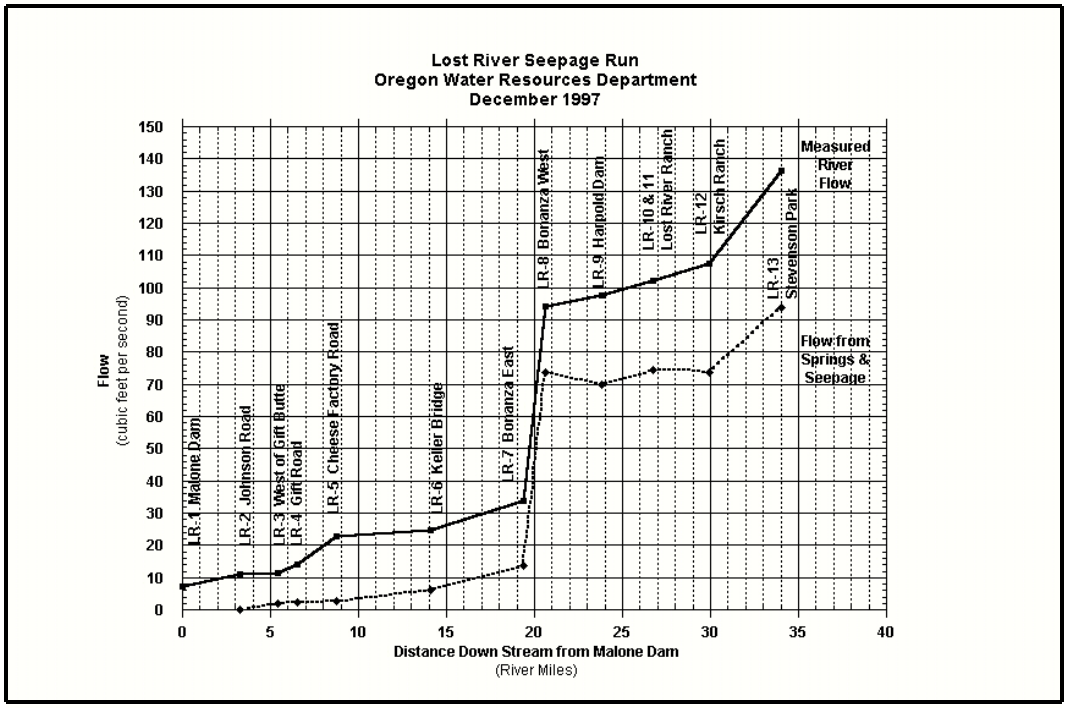


Figure 44. Lost River flow in December 1997 (note site LR-14 is missing due to flow measurement uncertainty)

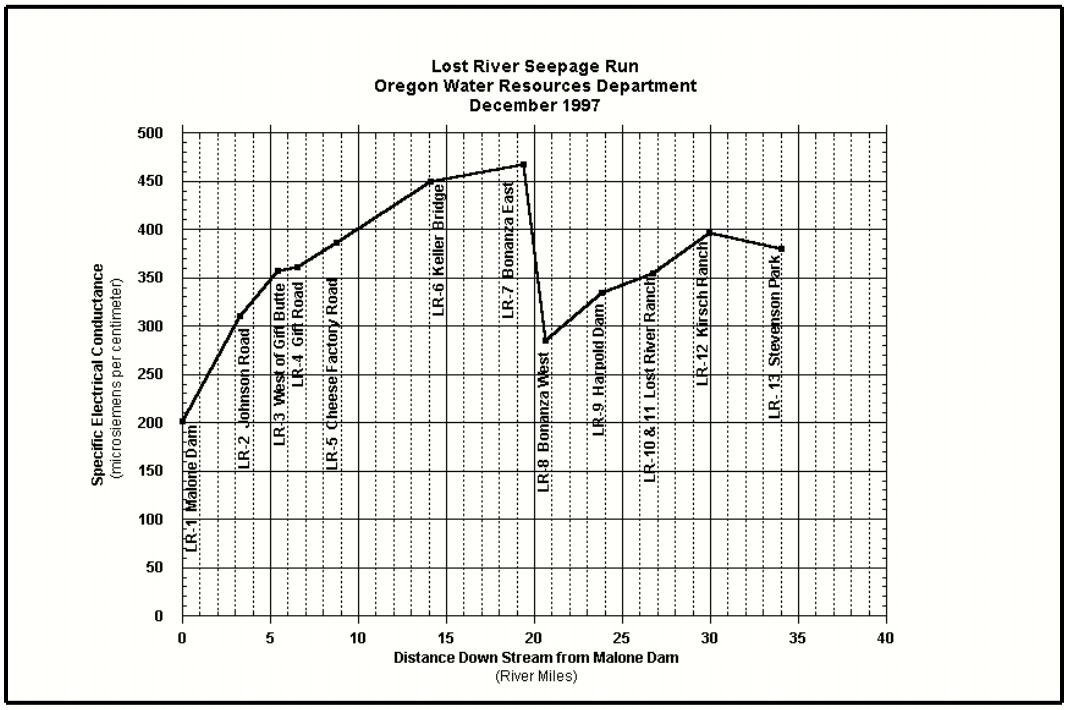


Figure 45. Lost River specific electrical conductance in December 1997 (note site LR-14 is missing due to flow measurement uncertainty)

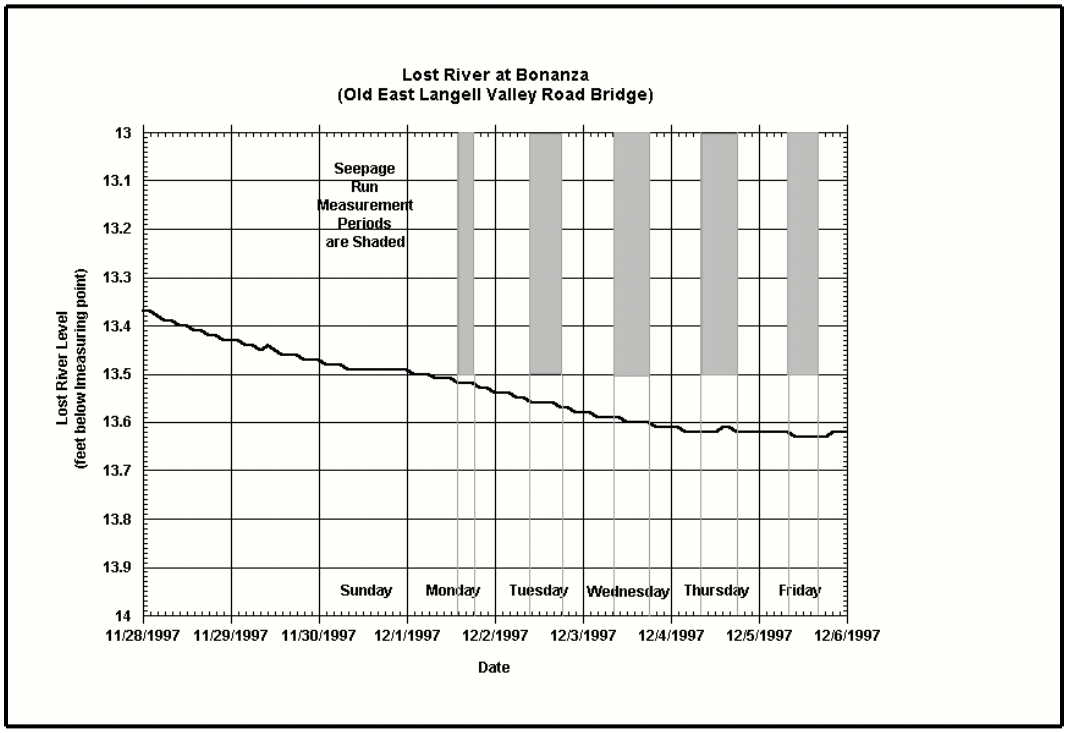


Figure 46. Lost River elevation variability above Bonanza Big Springs during five-day December 1997 seepage run (note the shaded areas correspond to the times when flow measurements were made)

The unaccounted flow calculated from the seepage run data indicate limited seepage through the sediments occurs. Seepage inflow primarily occurs between Cheese Factory Road (LR-5) and east Bonanza (LR-7). Apparent seepage losses in south Yonna Valley, west of Bonanza, and in mid-Poe Valley are uncertain. They are within the 5 percent flow measurement error and occur where ground water gradients are generally toward the river (pl. 4).

The specific electrical conductance data correspond well to the flow data. The specific conductance for ground water inflow (springs and seepage) was generally lower than for surface or near surface inflow sources. As a result, the specific electrical conductance of the river rose when surface or near surface inflow sources dominated and fell when ground water inflow dominated (fig. 45). Additionally, for river reaches with an unaccounted inflow larger than the five percent measurement error, the specific electrical conductance calculated for that inflow was consistent with the lower specific electrical conductance of ground water (app. 18).

The OWRD seepage run data were compared to 1950, 1966, and 1970 U.S. Geological Survey seepage run data copied in appendix 19. Some differences exist. However, the overall OWRD and USGS data are comparable.

Bonanza Big Springs Historical Discharge

Limited miscellaneous data of varying quality exist for Bonanza Big Springs discharge from 1918 to 2001 (app. 20). The data show the spring discharge varies. That variability largely corresponds to precipitation trends (fig. 47).

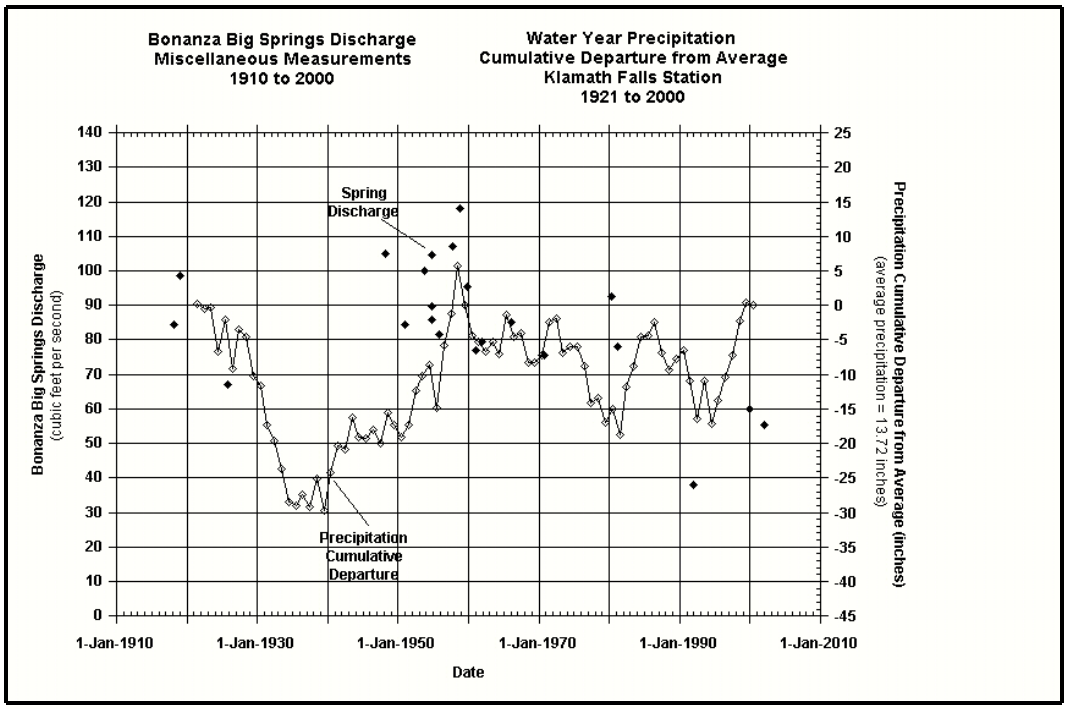


Figure 47. Bonanza Big Springs Discharge and cumulative departure from average of water year precipitation at Klamath Falls

Ground Water Sub-Areas

Introduction

Four hydrologically distinct ground water sub-areas exist in the eastern Lost River sub-basin (fig. 48). This investigation informally calls them the south Langell Valley, Lorella, Bonanza, and Swan Lake Valley to Poe Valley sub-areas. They were primarily identified by analysis of 1999 through 2002 water level fluctuation data from the 10 recorder and 40 monthly wells (fig. 49). Within a given sub-area, the ground water elevation at wells at different locations generally rose and declined similarly with each regularly scheduled water level measurement. The water level versus time graph for each well plotted similarly. Conversely, water levels at wells located within different sub-areas rose and declined differently and the graphs plotted differently. Additional hydrologic evidence came from the 1999 synoptic ground water level data. Ground water elevations within a given sub-area rose or declined similarly between March and October.

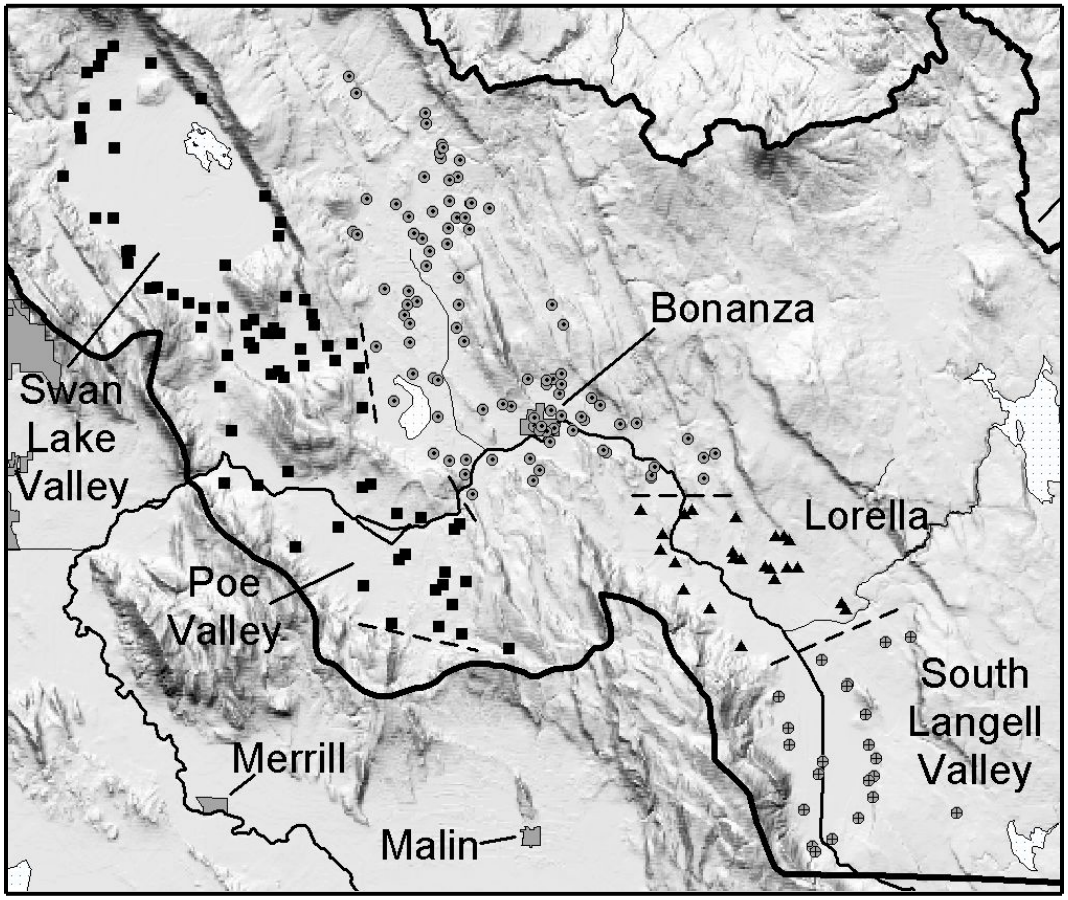


Figure 48. Eastern Lost River sub-basin sub-areas with associated wells and approximate boundaries (wells in the south Langell Valley sub-area are shaded circles with crosses, wells in the Lorella sub-area are dark triangles, wells in the Bonanza sub-area are shaded circles with dot centers, wells in the Swan Lake Valley to Poe Valley sub-area are dark squares, dashed lines are approximate sub-area boundaries)

Hydrologic features apparent on plate 4 (March 1999 ground water level in basalt) also helped distinguish the sub-areas. A small ground water divide near Dairy separates the Swan Lake Valley to Poe Valley and Bonanza sub-areas. The elevation of ground water in basalt in the south Langell Valley and Bonanza sub-areas is relatively flat, but at different elevations. A 20 ft water level change across the Lorella sub-area separates them. Ground water level data also indicate compartmentalization exists throughout the Lorella sub-area and in the northern and southeastern portions of the Swan Lake Valley to Poe Valley sub-area.

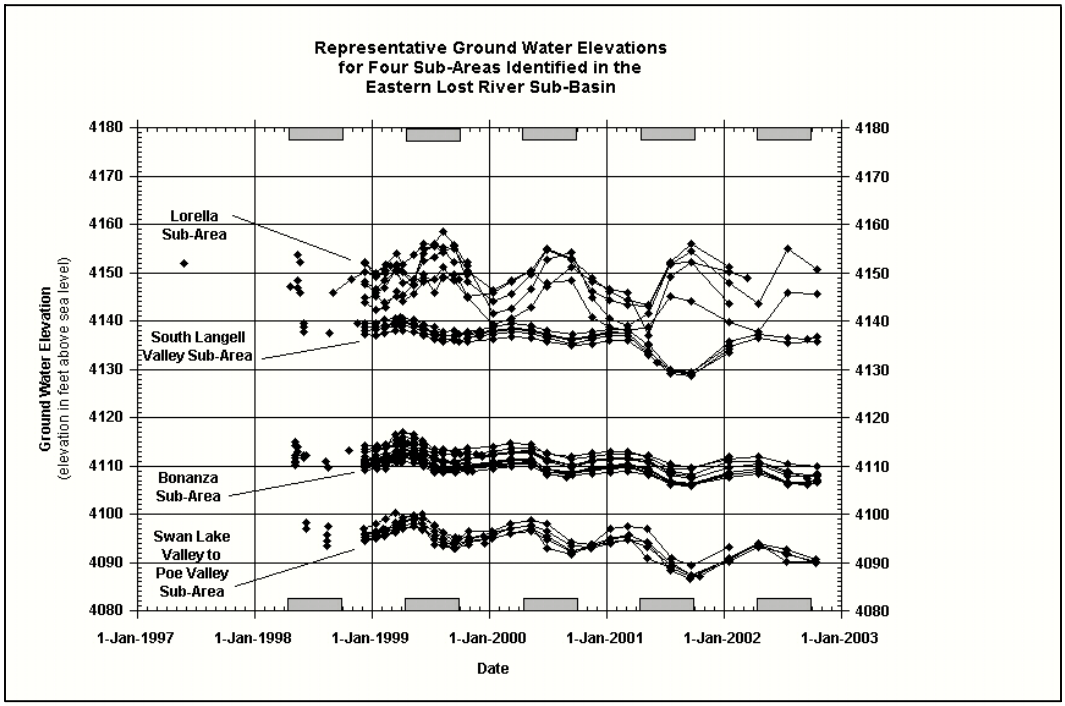


Figure 49. Representative hydrographs for the four sub-areas in the eastern Lost River sub-basin (shading denotes the period when sub-basin canals annually flow)

Ground water level data from1999 through 2002 indicate the impacts of summer ground water pumping from basalt did not propagate beyond sub-area or compartment boundaries during those years. This does not imply the sub-areas and compartments are hydraulically isolated or that any long-term effects, such as year-to-year declines, from future ground water uses will not propagate to neighboring areas in the long-term.

Most of the boundaries between the sub-areas correspond to a geologic structure. The boundaries between the Swan Lake Valley to Poe Valley and Bonanza sub-areas correspond to faults and their extensions as mapped by Hladky (2003). The boundary between the south Langell Valley and Lorella sub-areas is in the vicinity of a buried structure noted in the geology section. That structure is a possible extension of an east-west fault mapped across Bryant Mountain by Jenks (2004). The relationship of geologic structure to the boundary between the Lorella and Bonanza sub-areas remains undetermined.

As previously noted, compartments exist in the Lorella sub-area and the Swan Lake Valley to Poe Valley sub-area. The boundaries are poorly defined due to limited data. They likely correspond to geologic structure also.

South Langell Valley Sub-Area

The south Langell Valley sub-area extends from Bryant Mountain on the west to the plateau east of Langell Valley, and from the state line on the south to a north boundary crossing the valley between Miller Creek and Gift Road. Wells within the sub-area and the approximate northern boundary are shown in figure 50.

The south Langell Valley sub-area geology is relatively uncomplicated. South Langell Valley is a down-dropped block (graben) separating the Bryant Mountain and east plateau upland blocks (horsts). Basin fill sedimentary deposits overlie basalt in the valley. Half- or trap-door faulting causes the buried basalt to dip from east to west (Jenks, 2004). The sedimentary deposits above thicken east to west from none to hundreds of feet (cross-section 1 and 2 in app. 9).

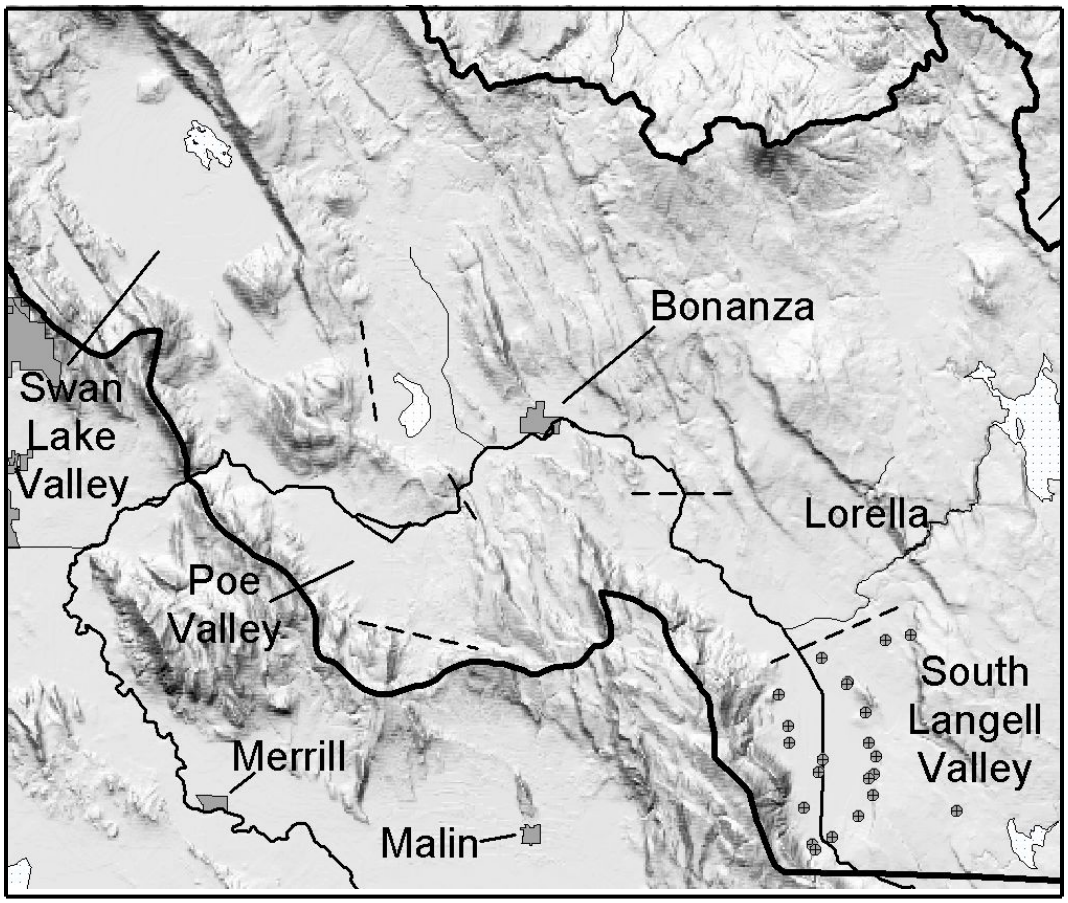


Figure 50. South Langell Valley sub-area wells and approximate north boundary location (the dashed line is the approximate north boundary location)

The ground water elevation and fluctuations in the basalt and basin fill sedimentary deposits throughout the south Langell Valley sub-area are very similar (fig. 51, pl. 4). Data show the ground water levels declined during the period of ground water use and rose during the period of non-use. They generally fluctuated 2 to 3 ft annually with the exception of 2001. In that year, the ground water level in the basalt and basin fill sedimentary deposits declined 8 to 10 ft due to drought related increased ground water pumping from basalt.

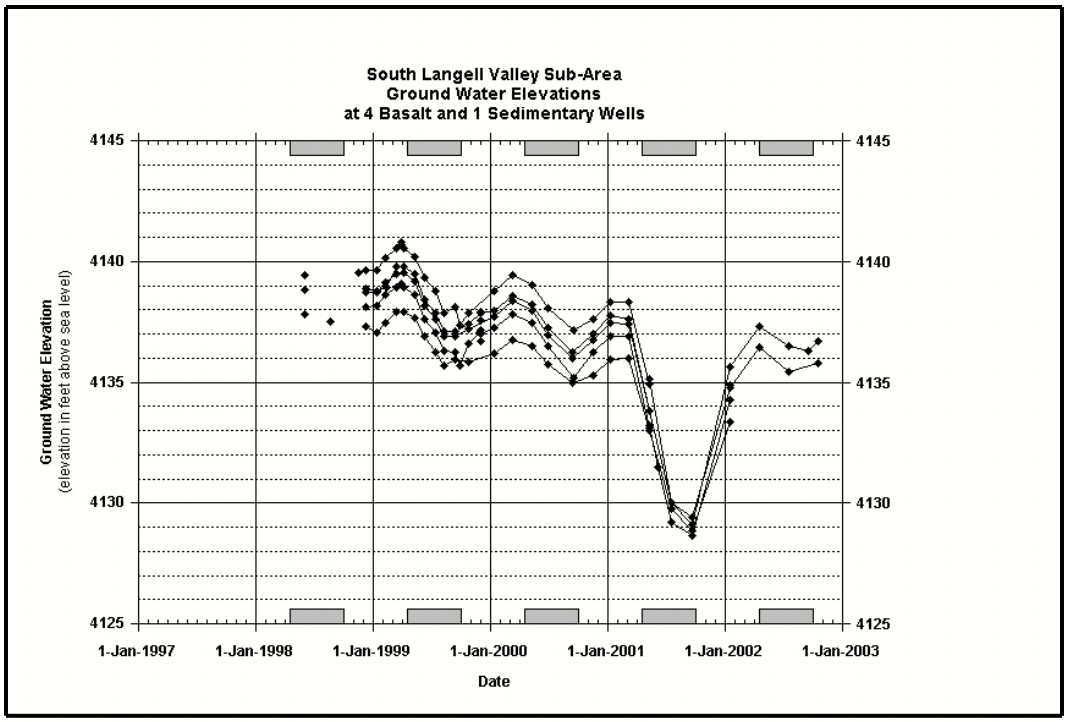


Figure 51. Hydrograph of ground water in basalt at 4 wells and basin fill sedimentary deposits at 1 well in the south Langell Valley sub-area (shading denotes the period when sub-basin canals annually flow)

Lorella Sub-Area

The Lorella sub-area is located midway between south Langell Valley and Bonanza. The sub-area extends from Bryant Mountain in the west to the area below Gerber Reservoir and Goodlow Rim in the east. It extends north to south from approximately Keller Bridge in the north to the Miller Creek vicinity in the south. Figure 52 shows the wells within the sub-area and the approximate north and south boundary locations.

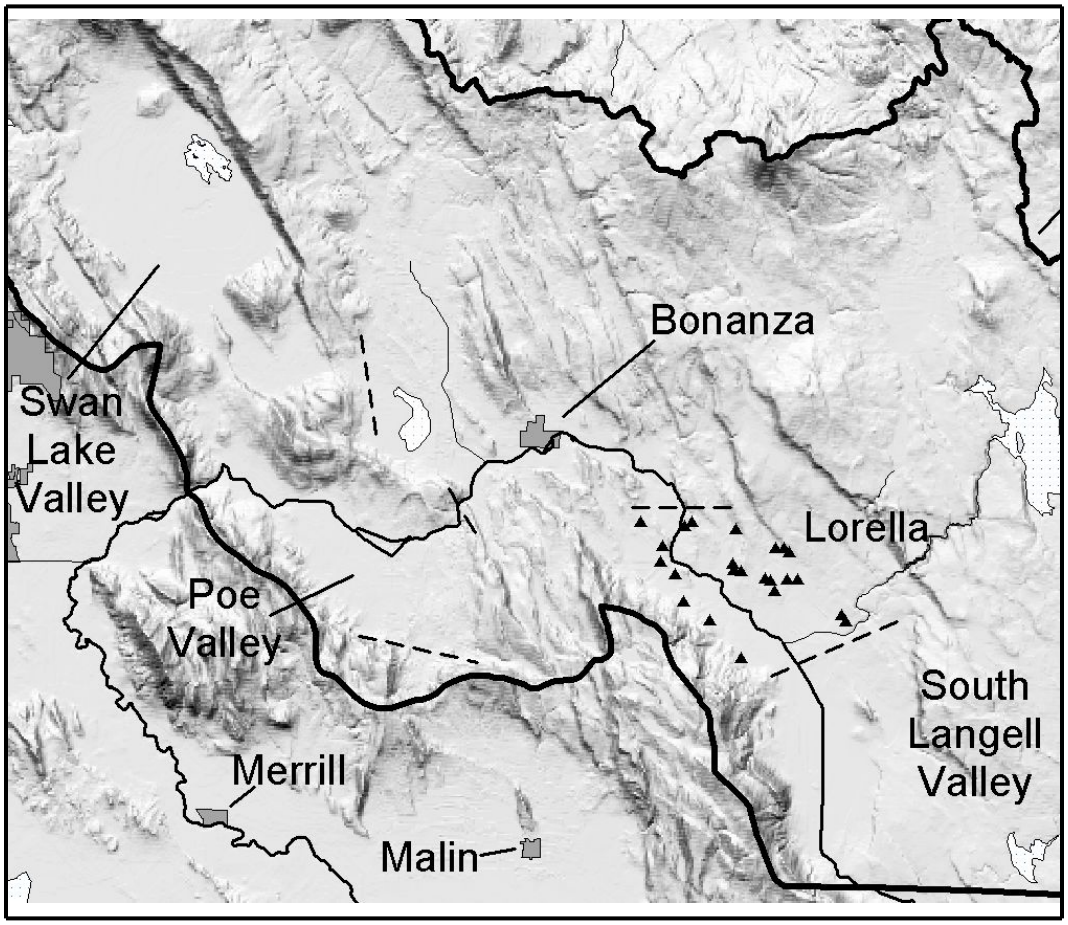


Figure 52. Lorella sub-area wells and approximate north and south boundary locations (the dashed lines are the approximate boundary locations)

The geology in the Lorella sub-area is more complex than in south Langell Valley. At the regional scale, the valley is a down-dropped block separating the Bryant Mountain and east plateau upland blocks. At the local scale, an east-west series of basalt horsts and grabens exist within the valley (pl. 3, cross-section 3 in app. 9). Normal faults east of Lorella make three steps down from the east terrace to the valley (Black, 2004). In the valley, basin fill sedimentary deposits of varying thickness overlie the basalt, thinner at horsts and thicker at grabens. The south boundary of the sub-area is in the vicinity of a buried structure noted in the geology section.

The ground water hydrology in the Lorella sub-area is unique. Hot springs occur southwest of Lorella in the vicinity of intersecting faults. Most wells in the sub-area measured by this investigation produce from an upper basalt (above 500 ft depth) where ground water clearly responds to canal leakage (fig. 53). The ground water levels at these wells are generally higher than adjoining sub-areas (fig. 49) and fluctuate much less uniformly from well to well than observed for the adjoining sub-areas (fig. 49). Some ground water levels responded strongly to ground water use (fig. 54).

A few wells in the northeastern portion of the sub-area are deeper and produce ground water from basalt where the ground water elevations and fluctuations are more similar to those observed for the Bonanza sub-area to the north than the Lorella sub-area. Figure 55 is a hydrograph for a double completion well that shows the difference. Well KLAM 52204 is the shallow portion of the well and produces from a basalt and pumice water bearing zone. This shallow ground water exhibits the Lorella sub-area characteristics of higher elevation and a response to canal leakage. Well KLAM 52096 is the deeper portion of the double completion well. It produces from a deeper basalt water bearing zone where ground water exhibits elevation and fluctuation characteristics similar to the Bonanza sub-area.

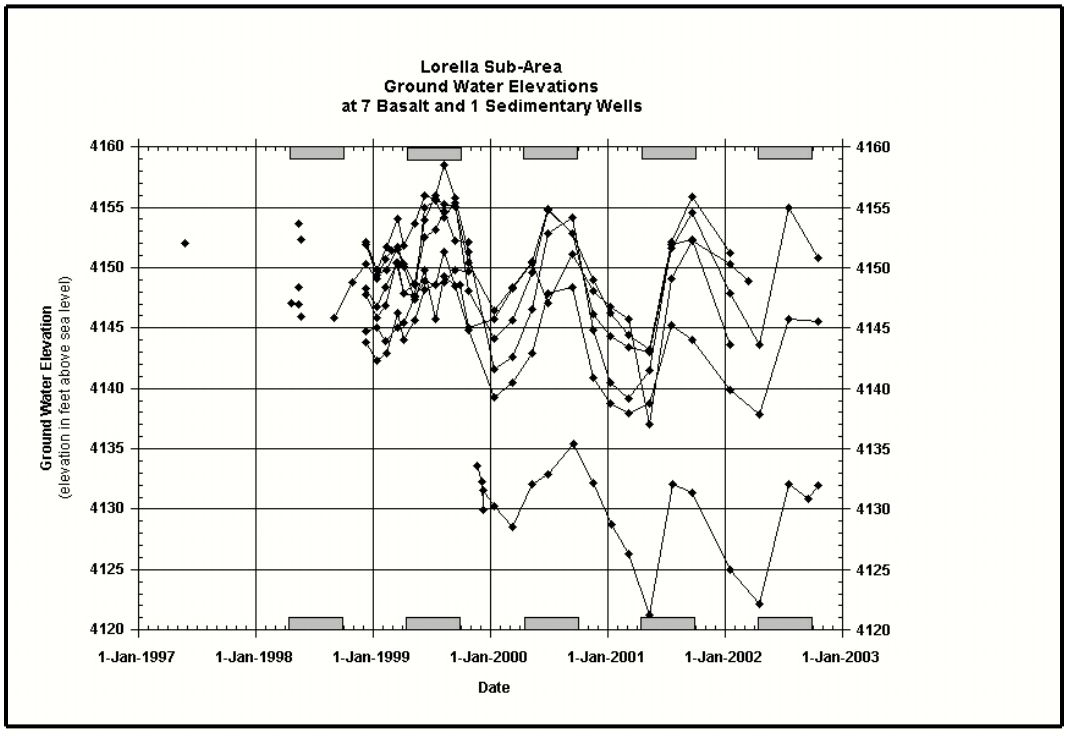


Figure 53. Hydrograph of ground water in basalt and basin fill in the Lorella sub-area (shading denotes the period when sub-basin canals annually flow, note the vertical axis range is 40 ft rather than the 20 ft range on most other graphs)

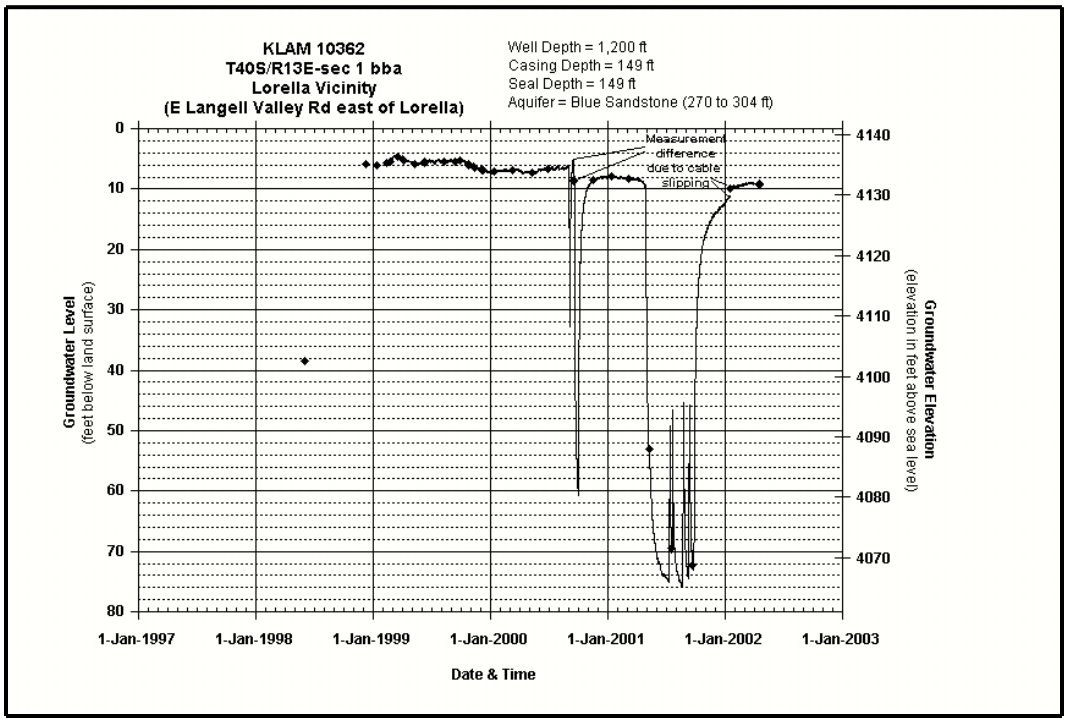


Figure 54. Extreme example of ground water in basalt in the Lorella sub-area responding strongly to ground water pumping (note the vertical axis range is 80 ft rather than the 20 ft range on most other graphs)

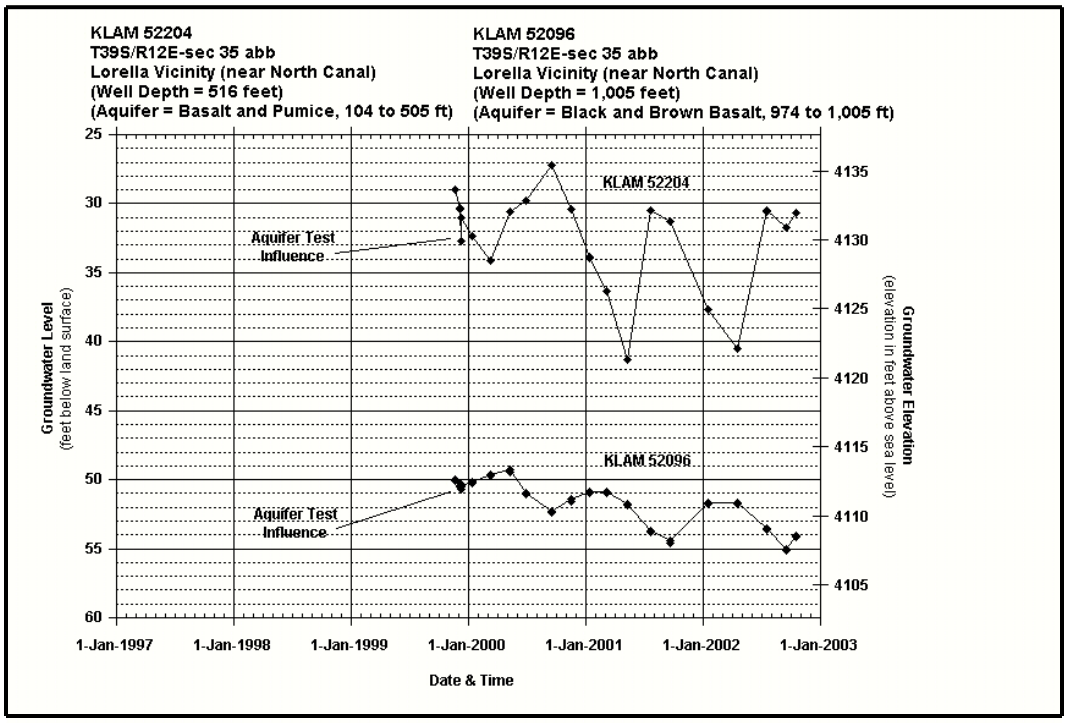
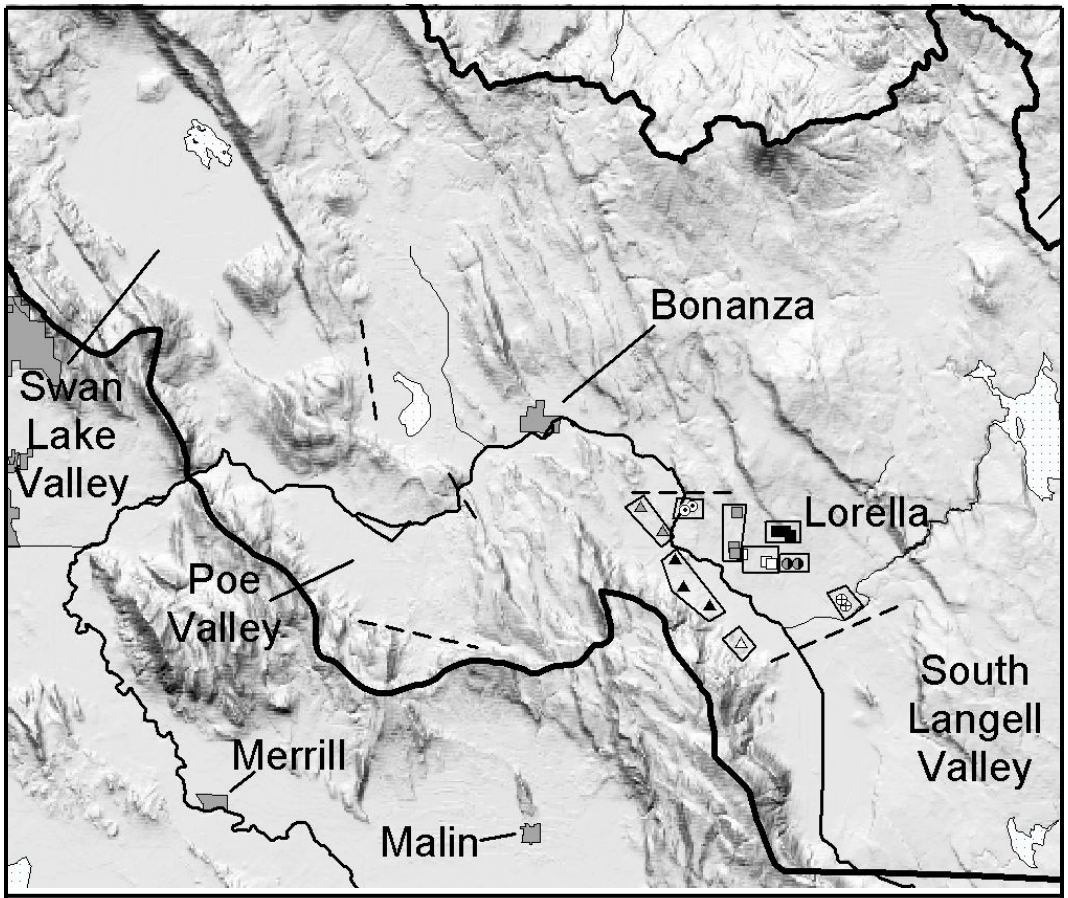


Figure 55. Hydrograph of ground water in different basalt water bearing zones at a double completion well in the Lorella sub-area (note the vertical axis range is 35 ft rather than the 20 ft range on most other graphs)

A minimum of nine compartments exist in the Lorella sub-area. They were identified from aquifer test and water level data. Wells in each compartment are shown in figure 56. The compartment boundaries are poorly defined due to limited data, but they likely correspond to mapped and unmapped buried geologic structures.



Compartments

Bryant Mountain to Dead Indian Hill terrace north = shaded triangles
Bryant Mountain to Dead Indian Hill terrace middle = dark triangles
Bryant Mountain to Dead Indian Hill terrace south = light triangle
near Keller Bridge = light circles with dot center
west of Wolf Flat terrace = shaded squares
Wolf Flat terrace = light squares
Lorella northeast = dark squares
Lorella southeast = half shaded and half dark circles
near Miller Creek = light circles with cross

Figure 56. Lorella sub-area wells separated into 9 compartments (note the enclosure around each well group is for display purposes and does not constitute a hydrologic boundary)

Bonanza Sub-Area

The Bonanza sub-area surrounds the Town of Bonanza. Figure 57 shows wells within the sub-area and approximate boundary locations. The sub-area includes northern Langell Valley and most of Yonna Valley. It extends from Keller Bridge (east) to Harpold Dam (west), and throughout Yonna Valley (north) except Horton Road and Dairy. The sub-area includes Bonanza Big Springs and Alkali Lake. Surrounding uplands include Bryant Mountain and Horton Rim (south), Swan Lake Rim (west), and Yainax Butte (northeast). Small uplands occur within the sub-area, including Short Lake Mountain.

The sub-area geology is complex. Regionally, the valleys are down-dropped blocks (grabens) separating the upland blocks (horsts). Locally, basalt horsts, grabens and tilted fault blocks exist within the valleys (pl. 3, cross-section 4 and 5 in app. 9). In the valleys, basin fill sedimentary deposits of varying thickness overlie the basalt. The deposits are absent or thin where the basalt is at or near land surface and hundreds of feet thick where the basalt is deep.

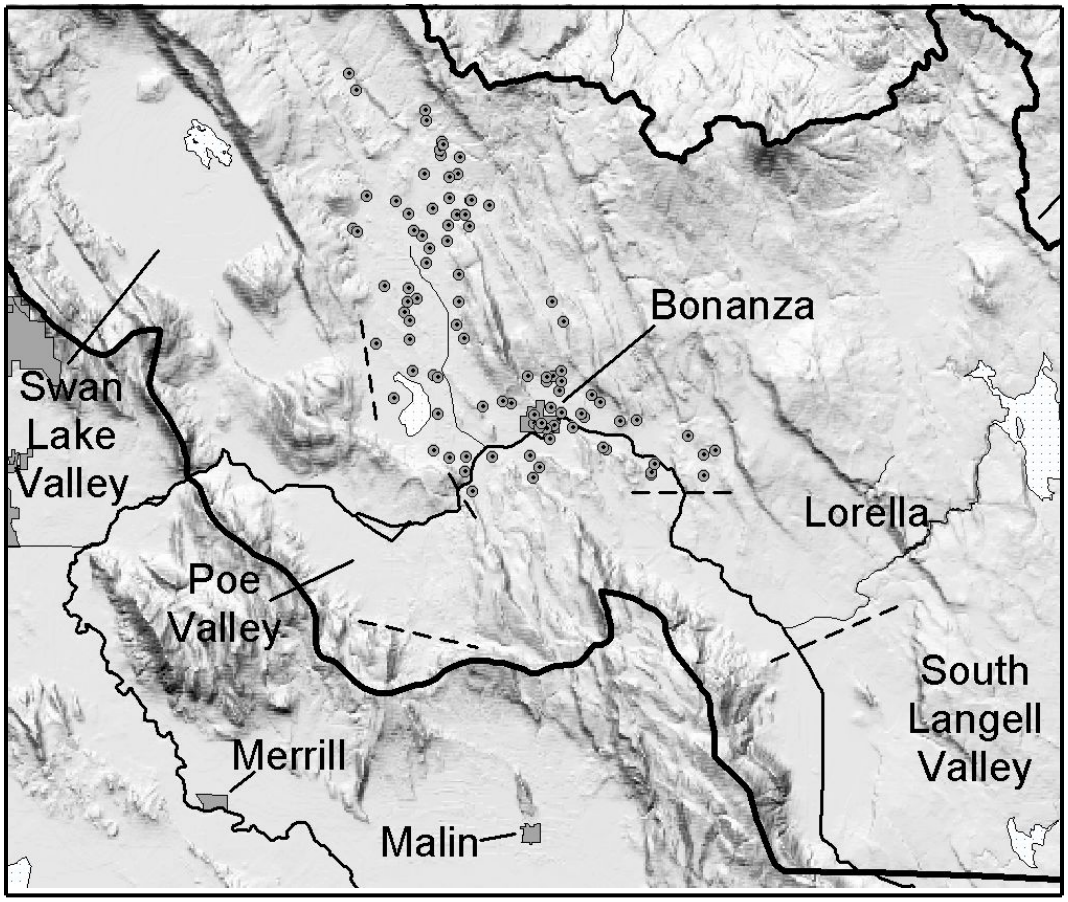


Figure 57. Bonanza sub-area wells and approximate boundary locations (the dashed lines are the approximate boundary locations)

The ground water elevation in the basalt and basin fill sedimentary deposits throughout the Bonanza sub-area fluctuates very similarly, and the ground water gradient across the sub-area is small (fig. 58, pl. 4). Data show the ground water levels declined during periods of ground water use and rose during periods of non-use. The ground water levels measured generally fluctuated from 2 to 4 ft. At Bonanza Big Springs, the ground water level fluctuations were similar to the rest of the sub-area but dampened. The reason is uncertain, but it may relate to a change in the hydraulic properties of the basalt at the springs due to a local fault and/or to the head dependent ground water discharge at the springs. Despite the presence of numerous geologic structures, no evidence of ground water compartmentalization in the sub-area was observed.

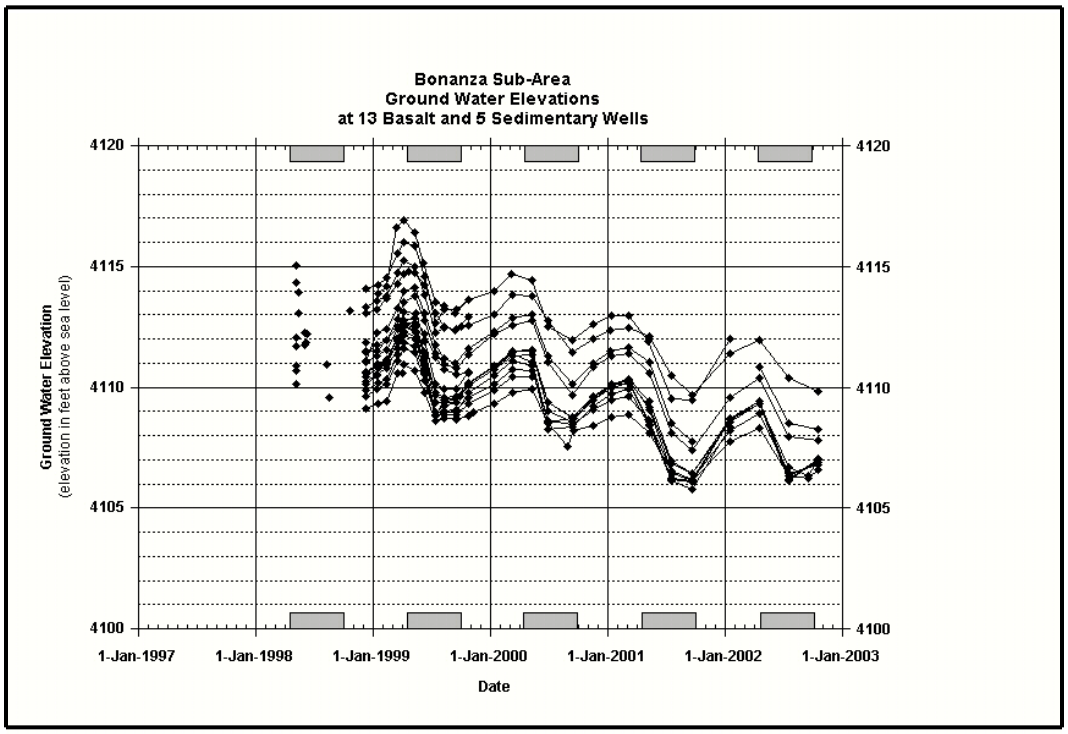


Figure 58. Hydrograph of ground water in basalt and basin fill in the Bonanza sub-area (shading denotes the period when sub-basin canals annually flow, note the vertical axis range is 20 ft)

Swan Lake Valley to Poe Valley Sub-Area

The Swan Lake Valley to Poe Valley sub-area is located between the Bonanza sub-area and Olene Gap. Wells within the Swan Lake Valley to Poe Valley sub-area and approximate boundary locations are shown in figure 59. The sub-area extends from Dairy and Harpold Dam (east) to Olene Gap (west). It includes Swan Lake Valley (north), Pine Flat (middle), and Poe Valley (south). Uplands surround the sub-area and smaller uplands occur within the sub-area including Hopper Hill between southeast Swan Lake Valley and Pine Flat and Horton Rim between Poe Valley and Pine Flat.

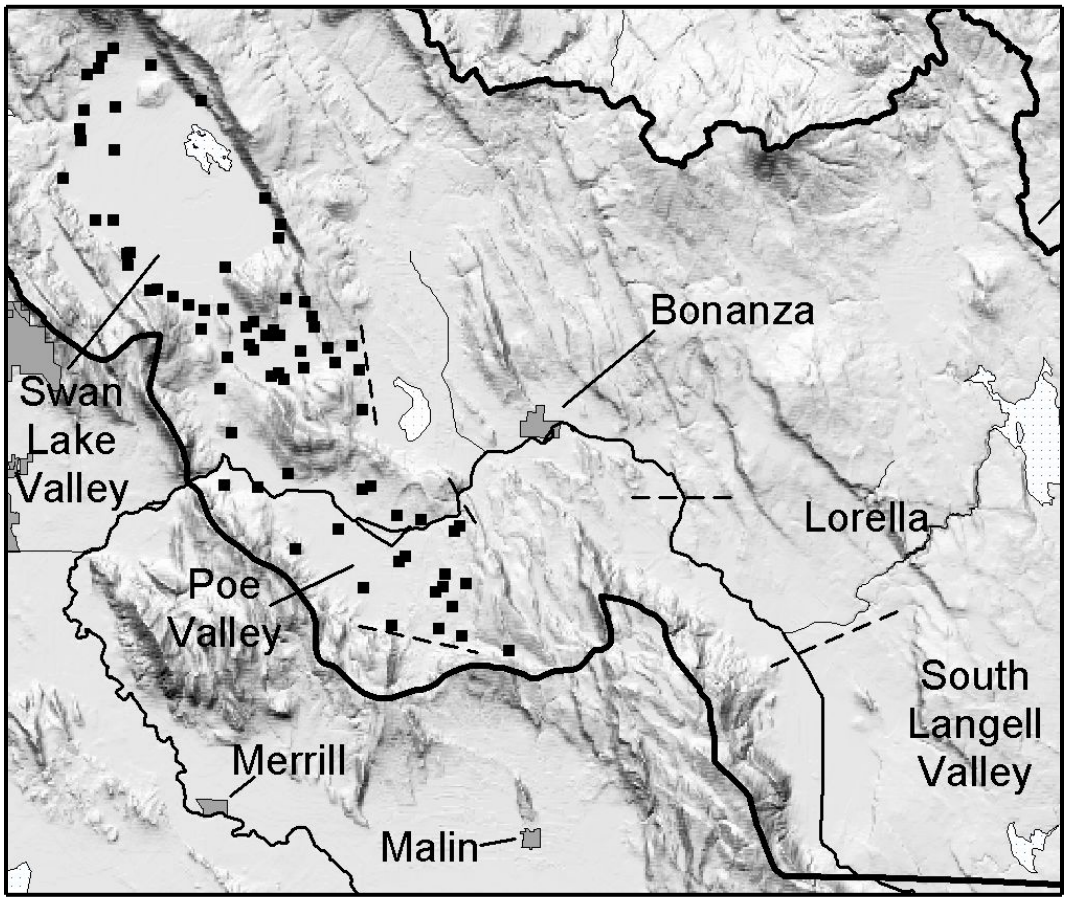


Figure 59. Swan Lake Valley to Poe Valley sub-area wells and approximate boundary locations (the dashed lines are the approximate boundary locations)

The sub-area geology has complexities. At the regional scale, the valleys are a graben separating horsts. Volcanic eruptive centers (buttes), such as Hopper Hill and Horton Rim, exist within the mid-section of the graben. At the local scale, basalt horsts, grabens and tilted fault blocks exist within the valleys (pl. 3, cross-sections 6 through 10 in app. 9). Basin fill sedimentary deposits overlie the basalt. The basin fill thickness varies from absent or thin where the basalt is at or near land surface to hundreds of feet thick where the basalt is deep. The basalt is generally deep in western Swan Lake Valley, in western Pine Flat, and in central Poe Valley.

The ground water hydrology in the sub-area has complexities also. Hot springs occur at Olene Gap in the vicinity of faults. The ground water gradient in the sub-area is variable. It is relatively flat in northern Swan Lake Valley, most of Pine Flat, and in northern Poe Valley. It is steeper in mid- to southern Swan Lake Valley, in western Pine Flat, and in eastern Poe Valley (pl. 4). Additionally, available water level data (fig. 60) and aquifer test data indicate three ground water compartments in basalt adjoin the sub-area's central portion (fig. 61).

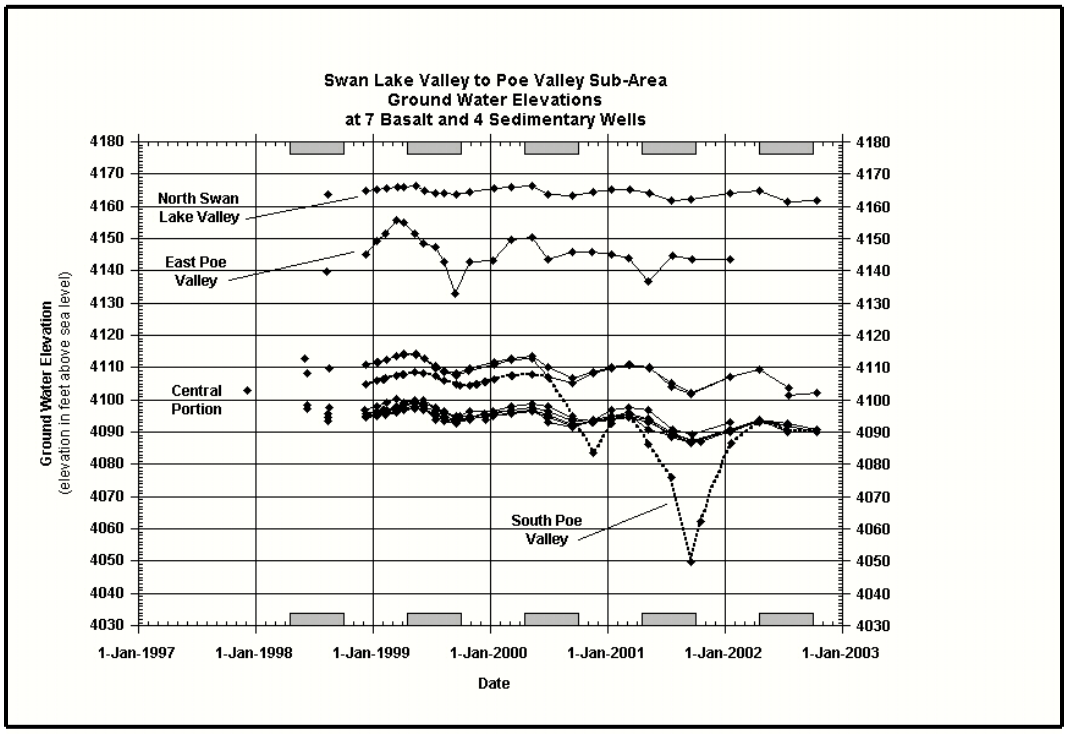
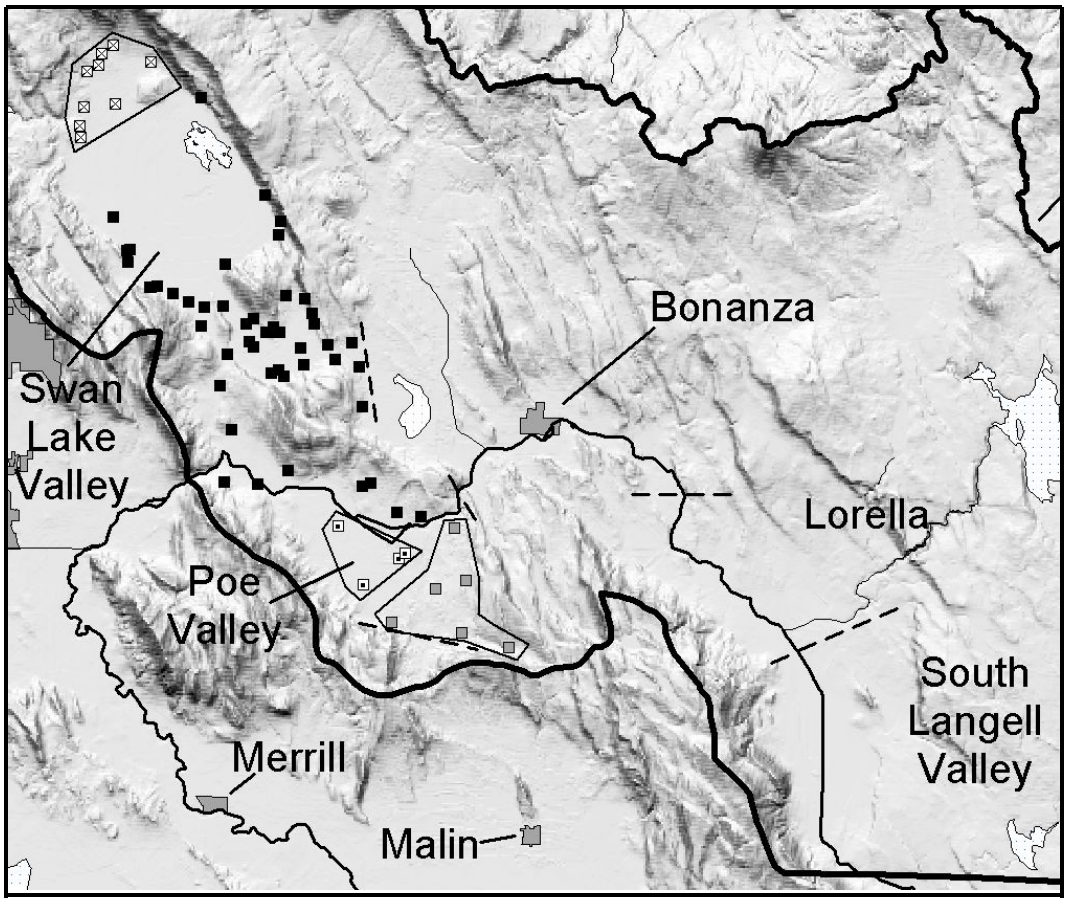


Figure 60. Hydrograph of ground water in basalt and basin fill in the Swan Lake Valley to Poe Valley sub-area (shading denotes the period when sub-basin canals annually flow, note the vertical axis range is 150 ft rather than the 20 ft range on most other graphs)



central (main) sub-area portion = dark squares

Compartments
north Swan Lake Valley compartment = light squares with cross
south Poe Valley compartment = light squares with dots
east Poe Valley compartment = shaded squares

Figure 61. Swan Lake Valley to Poe Valley sub-area wells separated into the central portion and 3 adjoining compartments (note the enclosure around each well group is for display purposes and does not constitute a hydrologic boundary)

The central portion of the Swan Lake Valley to Poe Valley sub-area includes mid- and southern Swan Lake Valley, Pine Flat (including Dairy) and northern Poe Valley. Three compartments adjoining the central portion are north Swan Lake Valley, south Poe Valley, and eastern Poe Valley. The compartment boundaries are poorly defined due to limited data, but they likely correspond to buried geologic structures.

Water level data indicate a hydraulic connection in basalt exists throughout the central portion of the Swan Lake valley to Poe Valley sub-area despite geologic structures, changes in ground water gradient in southwest Swan Lake Valley and west Pine Flat, and some elevation differences. The data show the ground water levels in basalt declined during periods of ground water use and rose during periods of non-use. The ground water levels fluctuated similarly throughout the central portion (fig. 62), but not as uniformly as observed in the Bonanza and south Langell Valley sub-areas. The fluctuation in the central portion generally ranged from 4 to 7 ft. An 8 to 9 ft fluctuation occurred during the 2001 drought in response to increased ground water use.

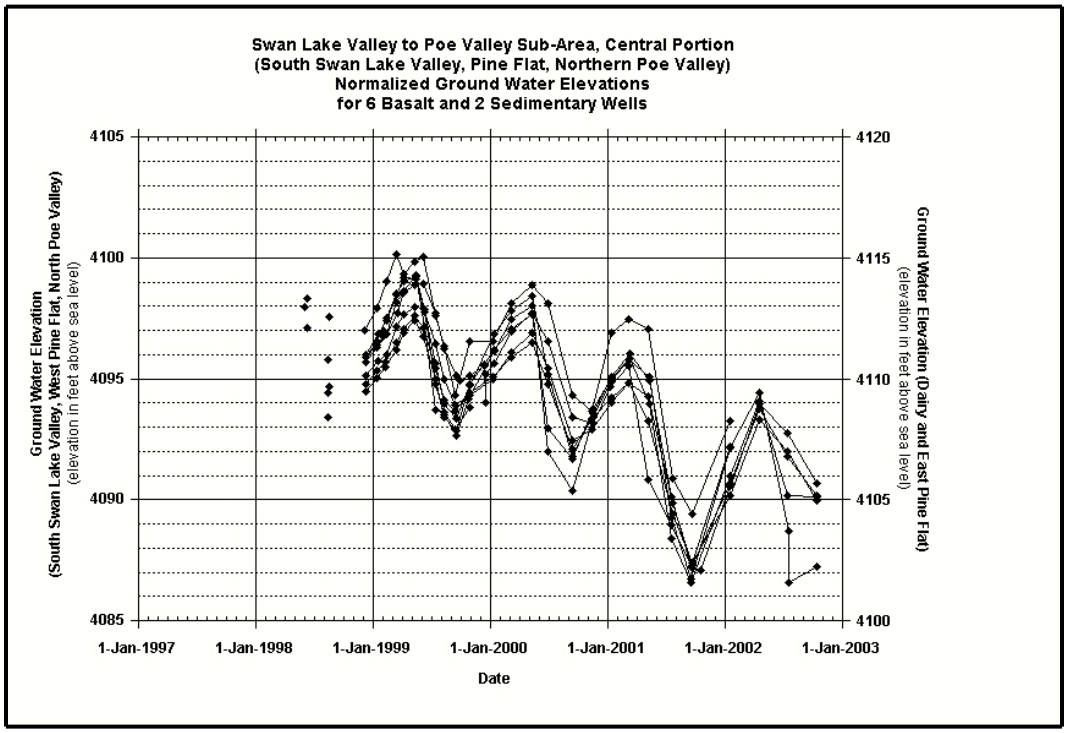


Figure 62. Normalized hydrograph of ground water in basalt at and basin fill in the central portion of the Swan Lake Valley to Poe Valley sub-area (note the ground water elevation in Dairy and east Pine Flat is about 15 ft higher than in south Swan Lake Valley, west Pine Flat, and north Poe Valley, the vertical axis range for the entire graph is 20 ft)

In the three compartments adjoining the sub-area's central portion, data show ground water levels in basalt also declined during periods of ground water use and rose during periods of non-use. However, the ground water level fluctuation in each compartment varied from the central portion and the other compartments (fig. 60). In northern Swan Lake Valley, limited data indicate the water levels generally fluctuate 2 to 4 ft (fig. 63). In the south Poe Valley, ground water levels in basalt from 1998 to early 2000 fluctuated similarly to the central portion. Then, the water levels responded very strongly to increased pumping of ground water from basalt in south Poe Valley in 2000 and 2001 (figs. 60 and 64). In eastern Poe Valley, the annual ground water level fluctuation varied from less than 10 ft to more than 20 ft (fig. 60).

Ground water in basalt in the southern toe of Poe Valley should be considered outside the Swan Lake Valley to Poe Valley sub-area and included with ground water in the neighboring Shasta View-Malin area. The toe is located south of a fault aligned with Buck Butte where a ground water flow divide occurs (pl. 4). Water level elevations immediately south of the fault are 90 to 100 ft lower than elevations at wells immediately north of the fault.

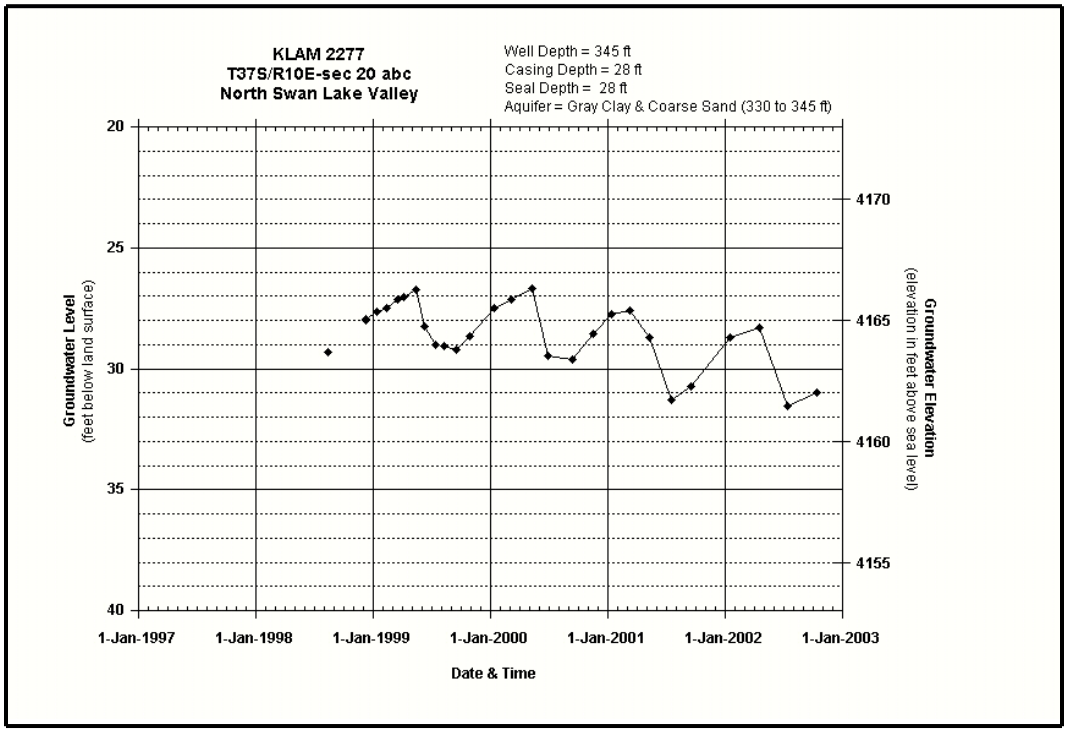


Figure 63. Example ground water hydrograph for the north Swan Lake Valley compartment of the Swan Lake Valley to Poe Valley sub-area (note the water level is for ground water in basin fill sedimentary deposits which is hydraulically connected to ground water in basalt)

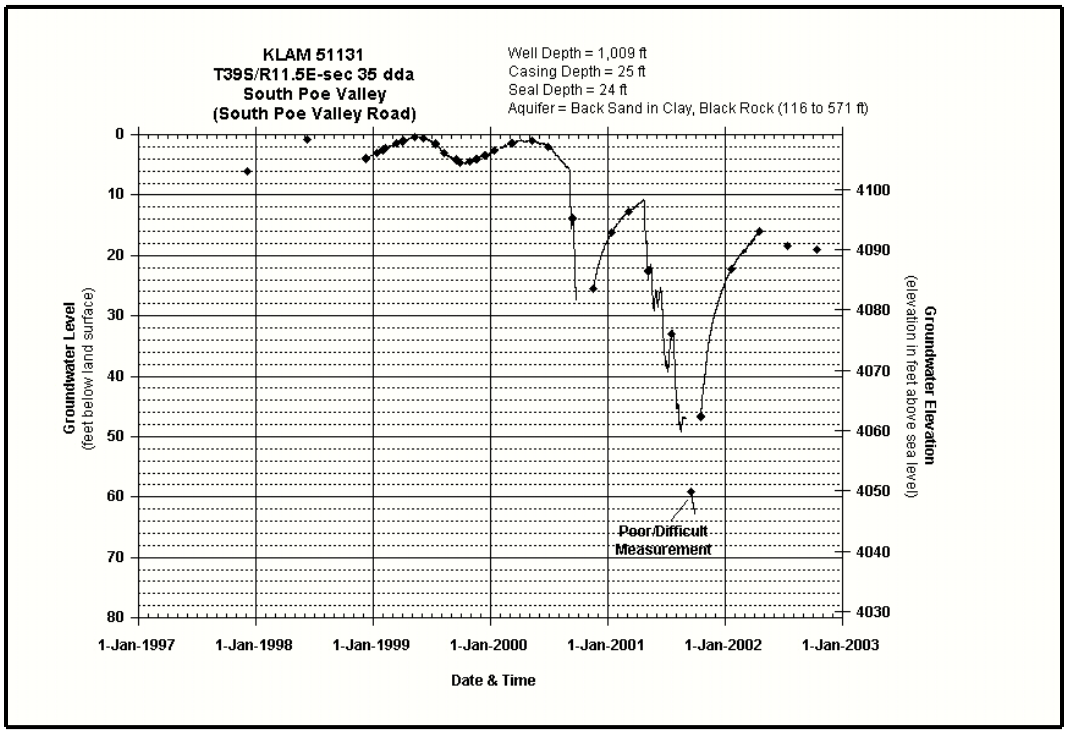


Figure 64. Example ground water hydrograph for the south Poe Valley compartment of the Swan Lake Valley to Poe Valley sub-area (note the vertical axis range is 80 ft rather than the 20 ft range on most other graphs)

Horizontal Ground Water Flow

Introduction

The horizontal ground water flow discussion is generally limited to ground water in basalt water bearing zones. The discussion relies upon analysis of plates 4 and 5. That analysis applies the accepted principle that ground water flows from areas of higher ground water elevation to areas of lower ground water elevation.

Ground water elevations on plate 4 are contoured with 1 ft, 5 ft, 10 ft, and 20 ft contour intervals. The 1 ft and 5 ft contour intervals were used in most valley locations where the elevation accuracy is plus or minus 0.10 ft (surveyed elevations). They reveal details and subtleties previous investigations could not achieve. The larger 10 ft and 20 ft contour intervals were used in areas with steeper ground water gradients and/or in areas where the water level elevation accuracy is plus or minus 10 ft (elevations derived from maps with 20 ft contour intervals).

General Sub-Basin Flow

Analysis of plate 4 indicates ground water in basalt generally flows into the sub-basin valleys from the surrounding uplands and then flows down valley toward, or parallel to, the Lost River. Recharge appears to occur locally in both the uplands and valleys. Seepage run data indicate most discharge occurs at fault related valley springs within or near the Lost River (Bonanza, western Poe Valley, and southern Langell Valley). The data further indicate less discharge occurs through the valley sediments. Published maps and field observations indicate additional limited discharge occurs at springs in exposures above the valley floors. These springs appear to be stratigraphically controlled rather than fault controlled (M.D. Jenks, oral commun., 2000). The few hot springs present in the sub-basin are fault controlled with water absorbing heat during deep circulation along faults (Sammel, 1980).

Plate 4 shows a relatively small horizontal hydraulic gradient exists within most sub-area valleys. This indicates low resistance to flow within a given sub-area valley even in areas with numerous geologic structures and geologic units that are discontinuous or changing in character. Structures in these areas are transparent to flow rather than impede flow. The low resistance to flow means ground water in these areas is well connected. That does not imply flow paths between up gradient and down gradient locations are direct. The well connected ground water flow paths in this geologic environment could be tortuous.

Plate 4 shows steeper horizontal hydraulic gradients exist in other areas such as valley margins, neighboring uplands, and between some sub-areas, sub-area compartments, and/or neighboring sub-basins. The larger gradients indicate higher resistance to flow by the geologic structures and geologic units in these areas.

Ground water flow between compartments, between sub-areas, and between the eastern Lost River sub-basin and neighboring sub-basins is likely limited. Hydrologic evidence includes water level contours on plates 4 and 5. They show steeper gradients or ground water divides at different boundaries. Additionally, water level data shown by Leonard and Harris (1974) for the eastern Sprague River area and shown by Sammel (1980) for the Altamont-Klamath Falls area indicates a ground water divide exists between the eastern Lost River sub-basin and sub-basins to the north and west. Evaluating the degree of interconnection and quantifying the flow between compartments, sub-areas, and sub-basins was beyond the scope of this study.

South Langell Valley Sub-Area

The south Langell Valley sub-area was previously shown in figure 50. Ground water flow in the sub-area is toward the valley axis (coincident with the Lost River) and to the north (pl. 4). Ground water elevations change little within the valley. The south to north ground water gradient was 0.44 ft/mi in March 1999. The largest March 1999 gradient observed within the valley occurred in the northwest portion. In that area, the ground water gradient from Bryant Mountain in the west to the valley center was 3.00 ft/mi (pl. 4).

The small ground water gradient within the valley is likely the result of a large transmissivity in the basalt. Analyses of a 24-hour aquifer test conducted in December 1999 by this investigation yielded transmissivity values from 100,000 ft^2/d to more than 1,000,000 ft^2/d, which is discussed in the Aquifer Properties sub-section. This investigation found using an effective basalt transmissivity of 600,000 ft^2/d (4,490,000 gal/d/ft) in Theis equation calculations closely reproduced the aquifer test ground water level drawdowns at different locations.

Ground water discharges from basalt within the sub-area at a number of springs located away from the Lost River, by limited seepage to the river through the sediments, and through some wells whose construction allows overflow during high ground water elevation periods. These discharges were not measured directly. However, data from a December 1997 OWRD seepage run (app. 17, table 6) allows approximating an upper limit at that time. The combined discharge from different sources reaching the Lost River was less than 11 ft^3/s (less than 4,940 gal/min). Of that amount, discharge through the riverbed sediments was about 2 ft^3/s (900 gal/min). The balance is the upper limit for discharge at springs away from the river and/or any flowing wells.

A series of springs are located above the Langell Valley floor about halfway up a north-south escarpment on the east side of valley. Jenks (2004) noted the springs issue from the same geologic horizon, the base of the lowermost basalt flow exposed. Some of the springs are seasonal and others flow sufficiently to supply stock water tanks year-round.

A north-south series of springs extend from Kilgore Springs (pl. 1) to Gift Road in an area between the Lost River and East Langell Valley Road. The springs generally align with a north-south fault mapped south of Kilgore Spring (Jenks, 2004). Historically, the springs discharged to a marsh. Now, many of the springs discharge to ponds and ditches used for flood irrigation. The relationship between the springs and ground water in basalt was established during the summer of 2001. Ground water levels at wells producing from basalt and the water level at Kilgore Spring responded similarly to changes in local ground water pumping rates (fig. 65).

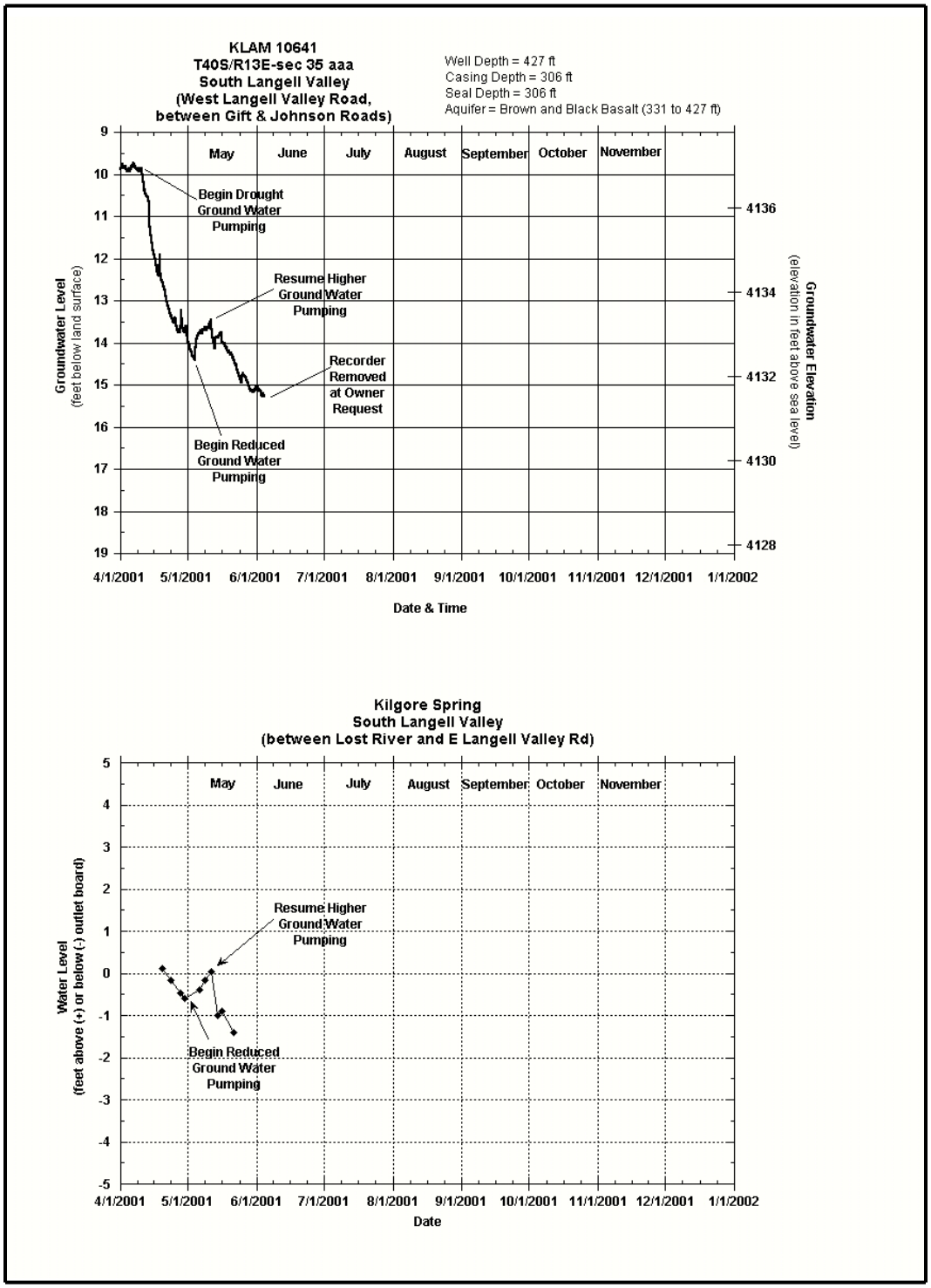


Figure 65. Comparison of south Langell Valley ground water from basalt level at well KLAM 10641 and Kilgore Spring water level in 2001

Ralston Spring is located near the base of Bryant Mountain (pl. 1). Jenks (2004) noted the spring occurs at the intersection of two faults and smaller springs nearby occur along the same or similar trending faults.

Five flowing wells were observed in south Langell Valley. Four wells produce from basalt (KLAM 10764, KLAM 15129, KLAM 10473, and KLAM 14896). Two of these wells flow during high ground water elevation periods only. The fifth well (KLAM 14871) produces from sediment. It stopped flowing in 2000 due to a sub-area ground water level decline related to climate and ground water use.

Lorella Sub-Area

The Lorella sub-area is located midway between south Langell Valley and Bonanza (figs. 52 and 56).

The ground water hydrology in the sub-area is complex and unique for the sub-basin. Most wells produce ground water from basalt that is strongly canal-influenced and shallower than 500 ft depth. This ground water has elevations higher than ground water in basalt in neighboring sub-areas (fig. 49). Aquifer test and water level data indicate a minimum of nine compartments exist in the sub-area (fig. 56). The compartment boundaries are poorly defined due to limited data, but they likely correspond to mapped and buried geologic structures. The hydraulic connection of the canal-influenced ground water in basalt in this sub-area and neighboring sub-areas is likely inefficient due to compartmentalization.

An additional complexity is the existence of a few wells in the northern portion of the sub-area that produce ground water from basalt below 500 ft depth. This ground water is not canal influenced, has lower elevations and fluctuations similar to those observed in the Bonanza sub-area (fig. 55), and has some hydraulic connection to the canal-influenced ground water above. For example, the deeper ground water in basalt at well KLAM 52096 showed a dampened response to a December 1999 OWRD aquifer test of shallower, canal-influenced ground water in the Lorella northeast compartment. This is discussed more in the Aquifer Properties sub-section. The hydraulic connection of the deeper ground water in basalt in the Lorella sub-area to ground water in basalt in the neighboring sub-areas is likely inefficient given a steeper ground water gradient across the sub-area (pl. 4) and the existence of compartments within the Lorella sub-area.

Available data indicate hydraulic properties of the canal-influenced ground water within the sub-area vary by location and boundary influence. The transmissivity values are summarized here and discussed more in the Aquifer Properties sub-section. CH2MHill (1994) conducted two aquifer tests in the Bryant Mountain to Dead Indian Hill terrace middle compartment. Their analyses yielded transmissivities from 2,670 to 17,780 ft^2/d (20,000 to 133,000 gal/d/ft). An OWRD aquifer test conducted in the Lorella northeast compartment yielded transmissivities from 23,140 to 128,650 ft^2/d (173,100 to 962,400 gal/d/ft). An OWRD analysis of recorder data documenting 65 ft of drawdown at well KLAM 10362 in the Lorella southeast compartment in response to pumping at well KLAM 10364 yielded a transmissivity range from 1,565 to 3,225 ft^2/d (11,710 to 24,130 gal/d/ft). Each range of transmissivity values related to the analysis used and late-time boundary influences.

March 1999 synoptic water level data for canal-influenced ground water in basalt show the ground water elevations across the sub-area vary more than 30 ft, and flow is generally north (pl. 5). In the western half of the sub-area, flow is generally toward the Lost River and north. In the eastern half of the sub-area, flow is generally north toward the uplands. Steep gradients occur between some compartments. A relatively small gradient occurs south of Dead Indian Hill on the terrace between Bryant Mountain and the Lost River.

The amount of ground water flow in basalt within and between compartments remains undetermined. Assessing that flow was beyond the scope of this study. The hydraulic connection between compartments is likely inefficient. Evidence includes recorder and monthly water level measurement data (app. 12 and 13) and short-term aquifer test data (Aquifer Test sub-section) that do not show pumping effects or other short-term stresses propagating to neighboring compartments. This does not imply the compartments are hydraulically isolated or that any long-term effects, such as year-to-year declines, from future ground water uses will not propagate to neighboring compartments in the long-term.

Ground water in the deeper basalt that is not influenced by canal leakage flows into the Lorella sub-area from the south and from neighboring uplands. Then, flow continues through the sub-area, and exits flowing toward Bonanza (pl. 4). Synoptic water level measurement data indicate ground water flow in basalt between the south Langell Valley and the Bonanza sub-areas is limited. For example, in March 1999, the ground water elevation in the Bonanza sub-area north of Lorella was approximately 20 ft lower than the elevation in the south Langell Valley sub-area south of Lorella (pl. 4). The role of geologic influences upon ground water flow or lack of flow between the two sub-areas (across the Lorella sub-area) is not well known but likely relates to geologic structures, secondary mineralization, or hydrothermal alteration.

Ground water discharges from basalt within the Lorella sub-area at springs, some flowing wells, and minor seepage through the sediments. Data from a December 1997 OWRD seepage run indicate little discharge reaches the Lost River. The river gained about 10.4 ft^3/s (less than 4,670 gal/min) from Gift Road to Keller Bridge not counting Miller Creek inflow. The river gain included: 6.5 ft^3/s (less than 2,920 gal/min) from canals, ditches, culverts, and field drains (some of these receive spring discharge); about 0.05 ft^3/s (less than 25 gal/min) of direct spring discharge to the river; and 3.9 ft^3/s (1,750 gal/min) through riverbed sediments.

Many springs and flowing wells in the eastern portion of the sub-area identified on U.S. Geological Survey 1:24,000 scale quadrangle maps occur above the valley floor in the vicinity of eastern escarpments below Goodlow Rim. Many of the springs discharge to reservoirs. Geologic factors controlling the occurrence of springs below Goodlow Rim remain undetermined.

Cold and hot springs and a flowing well occur in the western portion of the sub-area. The hot springs occur in the vicinity of faults mapped by Jenks (2004) and/or in the vicinity of intersecting geologic structures apparent on plate 3. The hot water source is most likely the result of deep circulation of ground water along regional (basin and range style) faults (Sammel, 1980). The flowing well (KLAM 13578) is located on the Bryant Mountain to Dead Indian Hill terrace.

Bonanza Sub-Area

The Bonanza sub-area surrounds the Town of Bonanza as shown in figure 57. The sub-area includes northern Langell Valley and most of Yonna Valley, excluding Dairy and Horton Road west of Alkali Lake.

The ground water elevation in the basalt and basin fill sedimentary deposits throughout the Bonanza sub-area fluctuates very similarly (fig. 58) and the ground water gradient across the sub-area is small (pl. 4). This similarity occurs despite the presence of numerous geologic structures within the sub-area mapped by Sherrod and Pickthorn (1992), Hladky (2003) and Black (2004), and apparent in appendix 9 and plate 3. No evidence of ground water compartmentalization in the sub-area was observed.

Ground water in basalt in the Bonanza sub-area generally flows from surrounding uplands toward valley axes and down valley toward a group of springs collectively called Bonanza Big Springs (pl. 4). Ground water in southwest Yonna Valley flows to Alkali Lake where some discharge occurs. March 1999 synoptic water level data show the ground water gradient in northwest Langell Valley from Keller Bridge to Bonanza is about 0.31 ft/mi. The gradient in Yonna Valley from Yonna Loop Road to Bonanza is about 0.11 ft/mi. Near Bonanza Big Springs, the ground water gradient increases to about 5.57 ft/mi from the east and 2.20 ft/mi from the west as ground water converges and discharges at the springs.

Ground water elevation variability within the Bonanza sub-area valleys is generally small due to a large transmissivity in the basalt aquifer. Leonard and Harris (1974) estimated the Yonna Valley transmissivity to be 270,000 ft^2/d (about 2,000,000 gal/d/ft) after a 24-hour test at well KLAM 12380. Tests conducted by CH2MHill (1992, 1994, and 2002) yielded transmissivity estimates from 17,000 to 400,000 ft^2/d (127,000 to 3,000,000 gal/d/ft) depending upon location and boundary influences. A CH2MHill test using wells KLAM 13427 and KLAM 10432 southwest of Bonanza, within an apparently steeper water level gradient area (pl. 4), yielded consistently lower transmissivities. This OWRD investigation evaluated the range of estimated transmissivities by using them in calculations of ground water level drawdowns caused by pumping ground water from basalt. The evaluation found using an effective basalt transmissivity of 334,200 ft^2/d (2,500,000 gal/d/ft) in Theis equation calculations yielded drawdown results most consistent with existing aquifer tests and water level fluctuations observed in the sub-area. Consideration of larger and smaller transmissivity values yielded a number of consistency problems. This is further explained in the Aquifer Properties sub-section.

Ground water discharges from basalt within the sub-area to Bonanza Big Springs and to Alkali Lake via a flowing well (KLAM 13462) and possibly via ground water seepage to the lake. Limited data indicate ground water discharge at Bonanza Big Springs varies from less than 40 ft^3/s to more than 100 ft^3/s (app. 20). The variability largely corresponds to precipitation trends (fig. 47). In December 1997, the springs discharged about 60 ft^3/s (26,900 gal/min) to the Lost River. The water well report for KLAM 13462 near Alkali Lake indicated well KLAM 13462 flowed 1,200 gal/min (2.7 ft^3/s) in 1955. In October 1969, the U.S. Geological Survey recorded 1,100 gal/min (2.5 ft^3/s) flow from the well. In October 1998, OWRD staff estimated 550 gal/min (1.2 ft^3/s) discharge. Estimating ground water seepage through the sediments into Alkali Lake was beyond the scope of this study.

About 3.75 mi southeast of Bonanza, well KLAM 51920 intercepts water bearing zones in basalt both above 500 ft depth and below 1,500 ft depth (CH2MHill, 1994). This investigation evaluated project data and aquifer tests conducted at the well by CH2MHill (1994, 2002) to determine the relationship between ground water at the well and the Bonanza sub-area. This investigation concludes the water bearing zones above the 500 ft depth are directly connected to Bonanza sub-area ground water in basalt and the water bearing zones below the 1,500 ft depth has a less direct connection. The limited data preclude an evaluation of the extent, source of recharge, the ground water flow direction, and the discharge areas for the deeper water bearing zones.

The degree of connection and ground water flow between the Bonanza sub-area and surrounding areas appears limited. Analysis of Yonna Valley ground water elevations by Meyers and Newcomb (1952) and an OWRD review of Sprague River Valley ground water elevations from Leonard and Harris (1974) indicate a ground water divide exists between the Bonanza sub-area and the Sprague River sub-basin to the north. Faulting and an apparent ground water elevation divide exist between the Bonanza sub-area and areas to the west in Pine Flat and Swan Lake Valley (pl. 4). The ground water gradient and lower well production rates in northeast Poe Valley suggest the connection between the Bonanza sub-area and Poe Valley across Harpold Gap is poor. Additionally, recorder and monthly water level measurements by this investigation (app. 12 and 13) do not show pumping effects or other short-term stresses propagating between the Bonanza sub-area and neighboring sub-areas. This does not imply the sub-areas are hydraulically isolated or that any long-term effects from future ground water uses will not propagate between neighboring sub-areas in the long-term.

Swan Lake Valley to Poe Valley Sub-Area

The Swan Lake Valley to Poe Valley sub-area is located between the Bonanza sub-area and Olene Gap (figs. 59 and 61). The sub-area includes Swan Lake Valley, Pine Flat, Dairy, and Poe Valley. Uplands surround the sub-area and smaller uplands occur within the sub-area including Hopper Hill and Horton Rim.

The ground water hydrology in the sub-area has complexities. Ground water elevations and responses to stress across the sub-area lack uniformity (fig. 60), and the ground water gradient across the sub-area varies (pl. 4). Three compartments of ground water in basalt adjoin the sub-area's central portion (fig. 61). The boundaries likely correspond to buried geologic structures that limit the hydraulic connection between compartments. Conversely, geologic structures are transparent to ground water flow in the sub-area's central portion, and faults in southwest Swan Lake Valley and west Pine Flat appear to facilitate ground water drainage toward northwest Poe Valley. At Olene Gap (pl. 1), hot springs occur in the vicinity of faults.

Water level data indicate that the entire central portion of the sub-area (fig. 61) is hydraulically interconnected and has the most direct connection to the Lost River via springs adjacent to the river in western Poe Valley. The area includes mid- and southern Swan Lake Valley, Pine Flat (including Dairy) and northern Poe Valley. The hydraulic interconnection exists within the central portion despite the presence of geologic structures apparent on plate 3 and faults mapped by Sherrod and Pickthorn (1992) and Hladky (2003).

Analyses of water level data and aquifer test data found three compartments of ground water in basalt adjoin the sub-area central portion. Their locations are northern Swan Lake Valley, eastern Poe Valley, and south Poe Valley. The elevation of ground water in basalt within the compartments is generally higher than elevation in the central portion (pl. 4). Their boundaries are poorly defined due to limited data, but they likely correspond to buried geologic structures apparent from contours on plate 3.

Ground water in basalt in the southern toe of Poe Valley appears to be better connected to ground water in basalt in the Shasta View-Malin area than the Swan Lake Valley to Poe Valley sub-area. The toe is located south of a ground water flow divide (pl. 4) that is coincident with Buck Butte fault mapped by Jenks and Madin (2003). The gradient north of the divide is northerly and the gradient south of the divide is southerly. Additionally, water level elevations in the toe area immediately south of the fault are 90 to 100 ft lower than elevations at wells immediately north of the fault. These lower water level elevations are similar to ground water elevations in basalt in the Shasta View-Malin area.

Limited data indicate the hydraulic properties of basalt within the sub-area vary by location and boundary influence. OWRD conducted an aquifer test in the sub-area central portion. Multiple data analyses yielded transmissivities values that range mostly from 105,000 to 261,000 ft^2/d (785,500 to 1,950,000 gal/d/ft). The range relates to the analysis used and boundary influences upon later time data. This investigation found using an effective basalt transmissivity of 150,000 ft^2/d (about 1,122,000 gal/d/ft) best reproduced the observed aquifer test ground water level drawdowns in Theis equation calculations. OWRD also analyzed two-hour recorder data documenting drawdown at well KLAM 51131 in the south Poe Valley compartment caused by pumping at another well within the compartment. The analysis yielded transmissivities ranging from 7,200 to 77,100 ft^2/d (54,000 to 577,000 gal/d/ft). The range resulted from the analysis used and boundary influences upon later time data. Given available data, the best effective transmissivity to represent this compartment in Theis equation calculations of ground water drawdown is 7,260 ft^2/d (about 54,300 gal/d/ft). All these values and their derivation are discussed further in the Aquifer Properties sub-section.

Synoptic ground water level data collected in March 1999 show the ground water elevation in basalt across the sub-basin varied more than 70 ft (pl. 4). Limited data indicate ground water flows from the uplands to the valleys. In Swan Lake Valley, ground water generally flows south and through a gap west of Hopper Hill. The ground water elevation gradient is less than 10 ft/mi southward in most of the valley and significantly steeper in the southwest. In Pine Flat, ground water generally flows west. The ground water elevation gradient is less than 5 ft/mi in eastern Pine Flat, and more than 15 ft/mi in western Pine Flat. In Poe Valley, ground water generally flows toward western Poe Valley. The ground water elevation gradient is less than 0.5 ft/mi in northern Poe Valley and much steeper in south and east Poe Valley where compartments with lower transmissivities

exist, possibly due to structure and/or secondary mineralization. The ground water elevation gradient changes in the sub-area generally coincide with structures inferred from contours on plate 3.

Steep ground water elevation gradients in southwest Swan Lake Valley and west Pine Flat coincide with structures inferred from contours on plate 3. Irrigation well production capacities exceeding 1,000 gal/min and specific capacities often exceeding 50 gal/min/ft of drawdown indicate ground water flow in basalt is not impeded by the structures. Instead, ground water appears to step down into the structures and drain south toward western Poe Valley.

Ground water discharges from basalt in the sub-area to the Lost River via springs in western Poe Valley. Hydraulic connection between ground water in basalt and the springs is evident by comparison of the ground water level changes measured by OWRD staff at well KLAM 16807 and the corresponding water level changes at a nearby western Poe Valley spring-fed pond monitored by the pond owner. In December 1997, the western Poe Valley springs discharged about 20 ft^3/s (8,980 gal/min) to the Lost River.

The degree of connection and ground water flow between the Swan Lake Valley to Poe Valley sub-area and neighboring sub-areas and sub-basins appears limited. Faulting and an apparent ground water elevation divide exist between Pine Flat and the Bonanza sub-area (pl. 4). The ground water gradient and lower well production rates in northeast Poe Valley suggest the connection between the Bonanza sub-area and Poe Valley across Harpold Gap is poor. A ground water divide coincident with Buck Butte separates the sub-area from ground water in basalt in the Shasta View-Malin area to the south (pl. 4). A poor hydraulic connection and possible ground water divide likely exist between the Swan Lake Valley to Poe Valley sub-area and the Altamont-Klamath Falls area west of Olene Gap where Hladky (2003) noted faults, hydrothermal alteration, and hot springs. Evidence for a divide comes from ground water elevation data shown by Leonard and Harris (1974), Sammel (1980), and measured by this investigation. The hot water for the hot springs likely came from deep circulation of ground water along regional (basin and range style) faults (Sammel, 1980).

Vertical Ground Water Flow

Introduction

The vertical ground water flow discussion includes water bearing zones in sediment and basalt. The discussion relies upon review of the water well reports listed in appendix 11 and geophysical logs for 4 wells.

Eighty-five of the water well reports reviewed record water levels for different water bearing zones in the sediments or basalt. Seventeen of the 85 reports include more than one ground water level for the sediments. These reports are limited to the Bonanza and the Swan Lake to Poe Valley sub-areas. For wells distributed across all the sub-areas, 23 of the 85 reports include water levels for both sedimentary and basalt water bearing zones, and 65 of the 85 reports include more than one ground water level for water in basalt. The vertical ground water gradients within the sediments, between the sediments and basalt, and within basalt range from downward to upward depending upon location relative to recharge or discharge areas.

South Langell Valley Sub-Area

Twenty-one south Langell Valley sub-area water well reports were reviewed. Seven reports included water levels for multiple water bearing zones in the sediments and/or basalt.

Three of the reports include water levels for both basalt and sedimentary water bearing zones. The gradient between the sediment and basalt is different at each well. Well KLAM 10575 is located near the base of Bryant Mountain in the southwest corner of south Langell Valley. The water level recorded for the sediment was about 16 ft higher than for the underlying basalt with 23 ft separation between the sediment and basalt water bearing zones. This indicates a downward ground water gradient from the sediment to the basalt at this location. Well KLAM 15129 is located in the center of the valley. The water level recorded for the sediment was about 10 ft lower than the level for the underlying basalt below with 85 ft separation between the sediment and basalt water bearing zones. This indicates an upward ground water gradient from the basalt to the sediment at this location. Well KLAM 10473 is located on the eastern side of the valley. The water level recorded for the sediment was the same as for the basalt with 38 ft separation between the sediment and basalt water bearing zones. This indicates no vertical ground water gradient between the basalt to the sediment at this location.

Seven of the reports include water levels for different basalt water bearing zones. At each well, no change in water level was recorded, indicating little or no vertical ground water flow in the basalt at these locations. Instead, ground water flow in the basalt is predominantly horizontal.

Lorella Sub-Area

Thirty-three Lorella sub-area water well reports were reviewed. Twenty reports included water levels for different water bearing zones in the sediments and/or basalt.

Nine of the reports include water levels for both basalt and sedimentary water bearing zones. The vertical ground water gradient between the sediment and basalt was downward at five wells and nil at four wells. Two wells with a downward gradient are located in the Lorella northeast compartment. The water level recorded for the sediment was 52 ft and 21 ft higher than for the underlying basalt. The other three wells with a downward gradient are located north-south along the divide between the Wolf Flat terrace compartment and the west of Wolf Flat terrace compartment. The water level recorded for the sediment was from one to seven feet higher than for the underlying basalt. The four wells having the same water level recorded for the sediment and for basalt are located in three different compartments: the Wolf Flat terrace compartment (one well); the western portion of the west of Wolf Flat terrace compartment (one well); and the Bryant Mountain to Dead Indian Hill terrace north compartment (two wells).

Eighteen of the reports include water levels for different water bearing zones in basalt influenced by canal leakage. The well locations cover all of the sub-area compartments. At each well, no change in ground water from basalt level was recorded. This indicates that once water reaches the basalt, ground water flow is predominantly horizontal.

Downhole water temperature data at well KLAM 10362 (fig. 66) in the Lorella southeast compartment and well KLAM 52096 (fig. 67) in the Lorella northeast compartment were analyzed for possible vertical ground water gradients at those locations. When no vertical ground water gradient exists, water in a well will remain static and the water temperature change with depth will correspond to the geothermal gradient. Blackwell and others (1978) note the geothermal gradient for the Klamath Falls area ranges from 100 to 150°C per km depth (6.5 to 9.2^{o}F per 100 ft depth) for lake sediments and 50 to 100°C per km depth (3.7 to 6.5^{o}F per 100 ft depth) for basalt. When a vertical gradient does exist and the well bore is sufficiently open, water will move up or down the well bore depending upon the gradient. This will cause the water temperature change with depth in a well to deviate from the geothermal gradient.

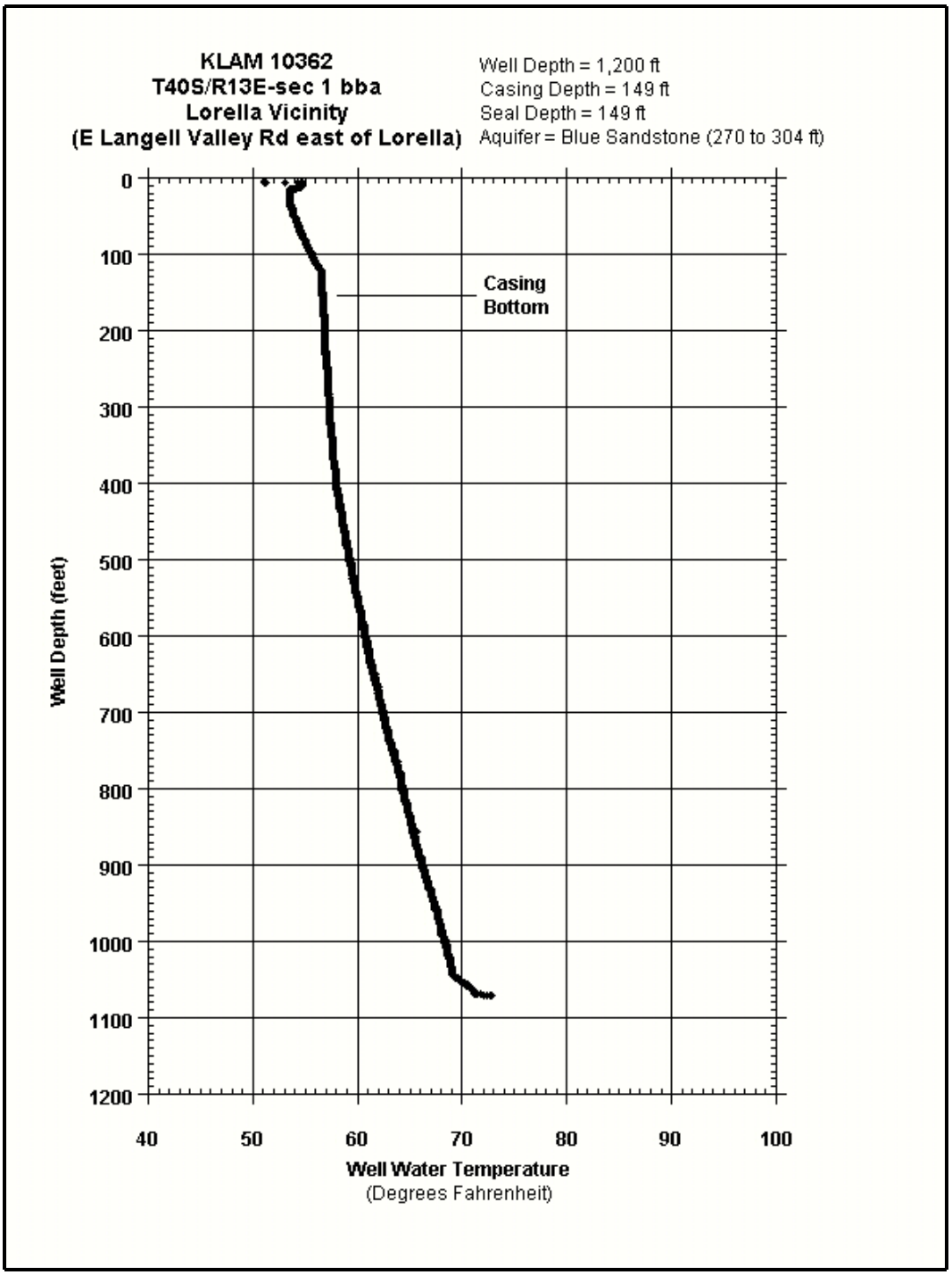


Figure 66. Well water temperature versus well depth at well KLAM 10362 in the Lorella sub-area

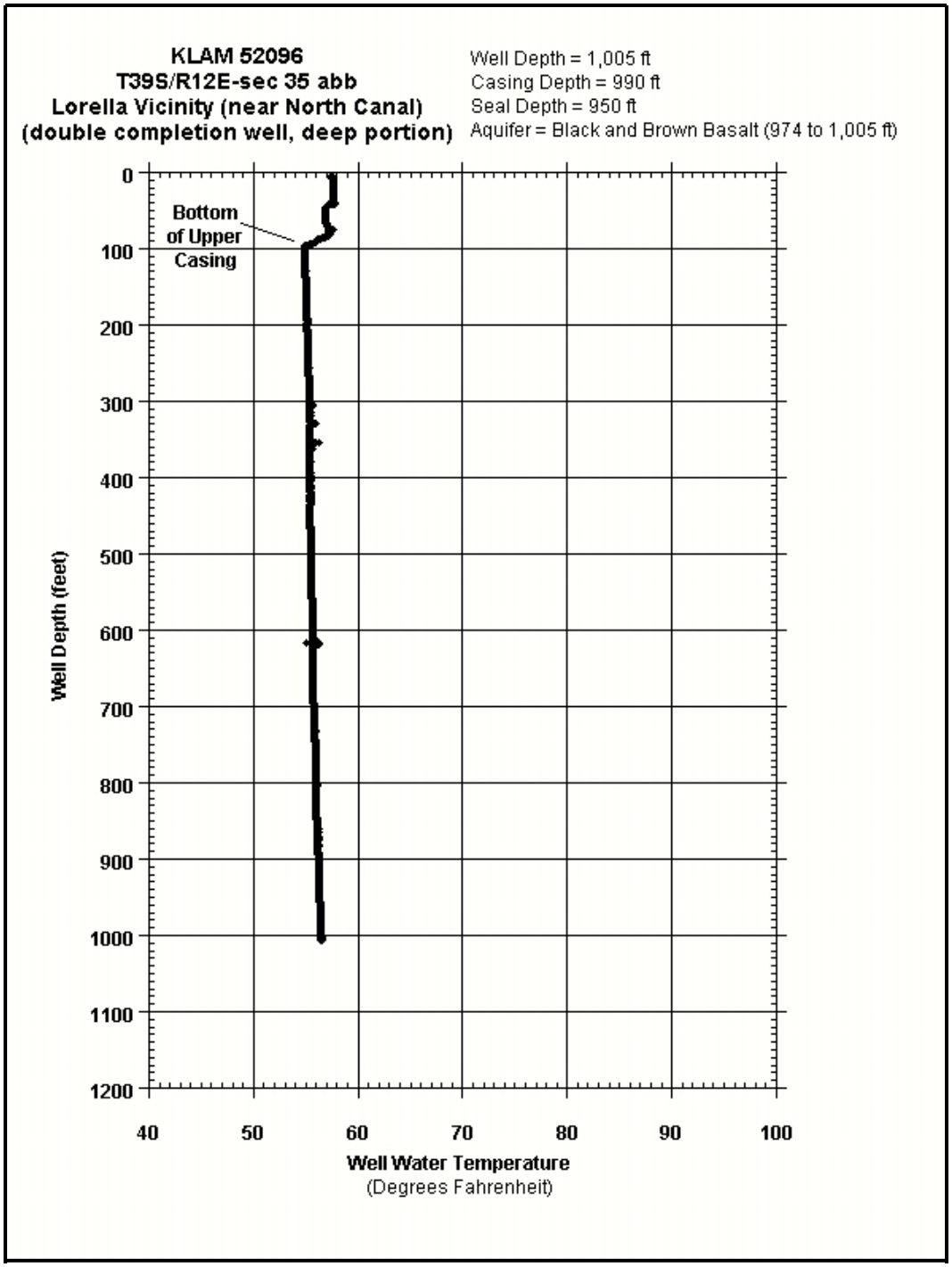


Figure 67. Well water temperature versus well depth at well KLAM 52096 in the Lorella sub-area

KLAM 10362 is a deep well located about 1.25 mi east of Lorella. Downhole caliper and temperature data indicate the well casing ends about the 120 ft depth instead of the reported 149 ft depth, and the well bottom is now 1,072 ft deep instead of the original 1,200 ft depth. The well owner noted the well did cave and was redrilled (R.A. Smith, oral commun., 1999). At the well, sediment predominates from land surface to 144 ft depth, and basalt predominates from 144 ft depth to the well bottom. The temperature change in the cased part of the well is close to the geothermal gradient (fig. 66). Below the casing, the depressed temperature gradient and concave profile indicates downward flow (a downward ground water gradient exists) from 125 to 1050 ft depth. Around 400 ft depth, the rate of downward flow decreases. Water may be leaving the borehole there. Below 1,050 ft depth, the well water temperature indicates little or no vertical flow in that portion.

Well KLAM 52096 is a 1,005 ft deep well located about one mile northeast of Lorella. The well penetrates canal-influenced ground water bearing zones and intercepts a deeper water bearing zone that appears to be hydraulically connected to ground water in the neighboring Bonanza sub-area. The upper casing from land surface to 92 ft depth was the only casing installed during temperature measurements. Other casing and seal was installed later. At the well, sediment predominates from land surface to 81 ft depth, and basalt predominates from 81 ft depth to the well bottom. The change in temperature with depth below the casing (fig. 67) is much less than the probable geothermal gradient for the area. This indicates downward flow and a downward ground water gradient between the canal-influenced and the deeper water bearing zones.

Construction of well KLAM 52096 was completed after the downhole temperature measurements. That construction made the single hole into two wells (KLAM 52204 and KLAM 52096 respectively) that isolated the canal-influenced ground water bearing zones from the deeper water bearing zone. The upper portion of the well (KLAM 52204) is open to the canal-influenced ground water bearing zones only. The lower portion of the well (KLAM 52096) is open to the deeper water bearing zone only. Water level data from both wells confirm a downward ground water gradient exists between the canal-influenced ground water bearing zones and the deeper water bearing zone.

The water level differences between the canal-influenced ground water bearing zones at well KLAM 52204 and the deeper water bearing zone at well KLAM 52096 vary seasonally from 10 to 25 ft (fig. 68). The greatest water level difference occurs during the summer. At well KLAM 52204, canal leakage causes the water level to rise. At the same time, ground water use and reduced climatic recharge cause the water level to fall at well KLAM 52096. The water level difference is least in the winter when the water level at well KLAM 52204 declines from reduced recharge and the water level at well KLAM 52096 rises from reduced ground water use and higher climatic recharge.

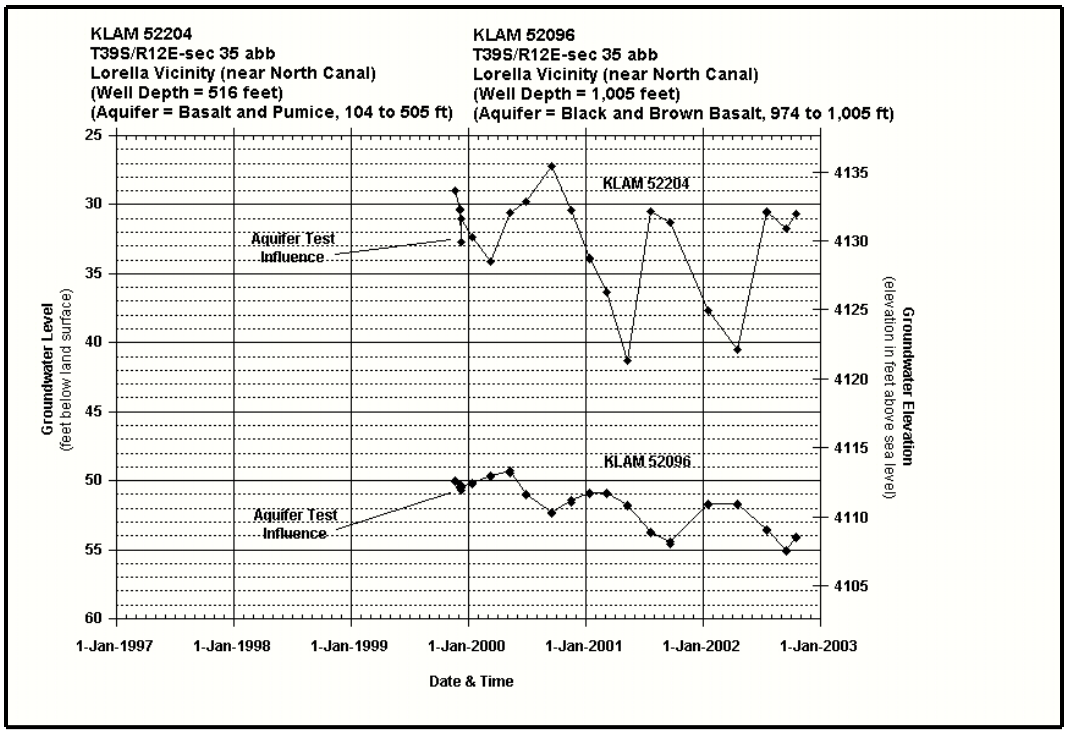


Figure 68. Hydrograph of ground water level measurements at KLAM 52204 and KLAM 52096 double completion well in the Lorella sub-area

Bonanza Sub-Area

Ninety-three Bonanza sub-area water well reports were reviewed. Thirty-three reports included water levels for different water bearing zones in the sediments and/ the basalt.

Eight reports included more than one water level for ground water in the sediments. Reports for five wells dispersed throughout the sub-area indicate the water levels in the deeper portion of the sedimentary section are 1 to 13 ft lower than water levels in the shallower portion. The report for a well near Bonanza Big Springs recorded a 4 ft higher water level with depth. Reports for two other wells located in south Yonna Valley and immediately east of Bonanza recorded no water level change with depth.

Nine reports included water levels for both sedimentary and basalt water bearing zones. The water levels in the basalt were 19 and 205 ft lower than the sediment above at two wells located in mid to north Yonna Valley. Water levels in the basalt were 2.5 and 8 ft higher than the overlying sediment at two wells located in south Yonna Valley and near Bonanza Big Springs. Water levels in the sediment and basalt were the same at five wells located adjacent to, and east of, Bonanza.

Twenty-four water well reports included water level measurements for different basalt water bearing zones. The well locations are dispersed throughout the sub-area. At 23 wells, no change in water level with depth in the basalt was recorded. At well KLAM 13403 southeast of Bonanza, the reported water level remained steady at 30 ft below land surface for the basalt water bearing zones from 191 to 557 ft depth. Then, the water level rose to 14 ft below land surface once the well reached the 615 ft depth.

Well KLAM 51920 is located about 3.75 mi southeast of Bonanza and was previously described in the Bonanza Sub-Area portion of the Horizontal Ground Water Flow section. The well was reportedly drilled between 1920 and 1940 (CH2M-Hill, 1994). Pre-1940 downhole temperature data for the well indicate the open well bore depth was at least 3,800 ft deep by 1938 (Van Ostrand, 1938, Peterson and McIntyre, 1970). The temperature data reproduced by Peterson and McIntyre (1970) show a nearly constant temperature of about 70°F from about 350 to 2,100 ft depth. That indicates downward flow in the borehole occurred in that interval, indicating a downward ground water gradient exists. The temperature rose from about 72 to 199°F at a nearly constant rate from 2,200 to 3,800 ft depth. The thermal gradient over this interval indicates little or no flow in the borehole here, and little or no hydraulic gradient exists.

Swan Lake Valley to Poe Valley Sub-Area

Ninety Swan Lake to Poe Valley sub-area water well reports were reviewed. Twenty-five reports included water levels for different water bearing zones in the sediments and basalt.

Nine water well reports included more than one water level for ground water in the sediments. The reports record lower water levels with depth at six wells (three in Swan Lake Valley, two in or adjacent to Pine Flat, and one in Poe Valley). The recorded difference in water level exceeded 10 ft at the Swan Lake Valley wells and less than 5 ft at the Pine Flat wells. No water level change with depth in the sedimentary strata was recorded for three wells located in Poe Valley.

Limited data for south Swan Lake Valley and Pine Flat show a downward gradient between the sediments and underlying basalt. For example, the water well report for well KLAM 10336 (1,670 ft deep) in Swan Lake Valley records a 66 ft water level difference between the sedimentary and basalt water bearing zones. Additionally, a comparison of ground water elevation data for two Pine Flat wells (KLAM 11569 and KLAM 12369) indicate the water level in the local sediments can be more than 70 ft higher than the water level in basalt (fig. 69). The ground water in the upper portion of the sedimentary deposits is either perched above deeper ground water or has a high vertical gradient to deeper ground water.

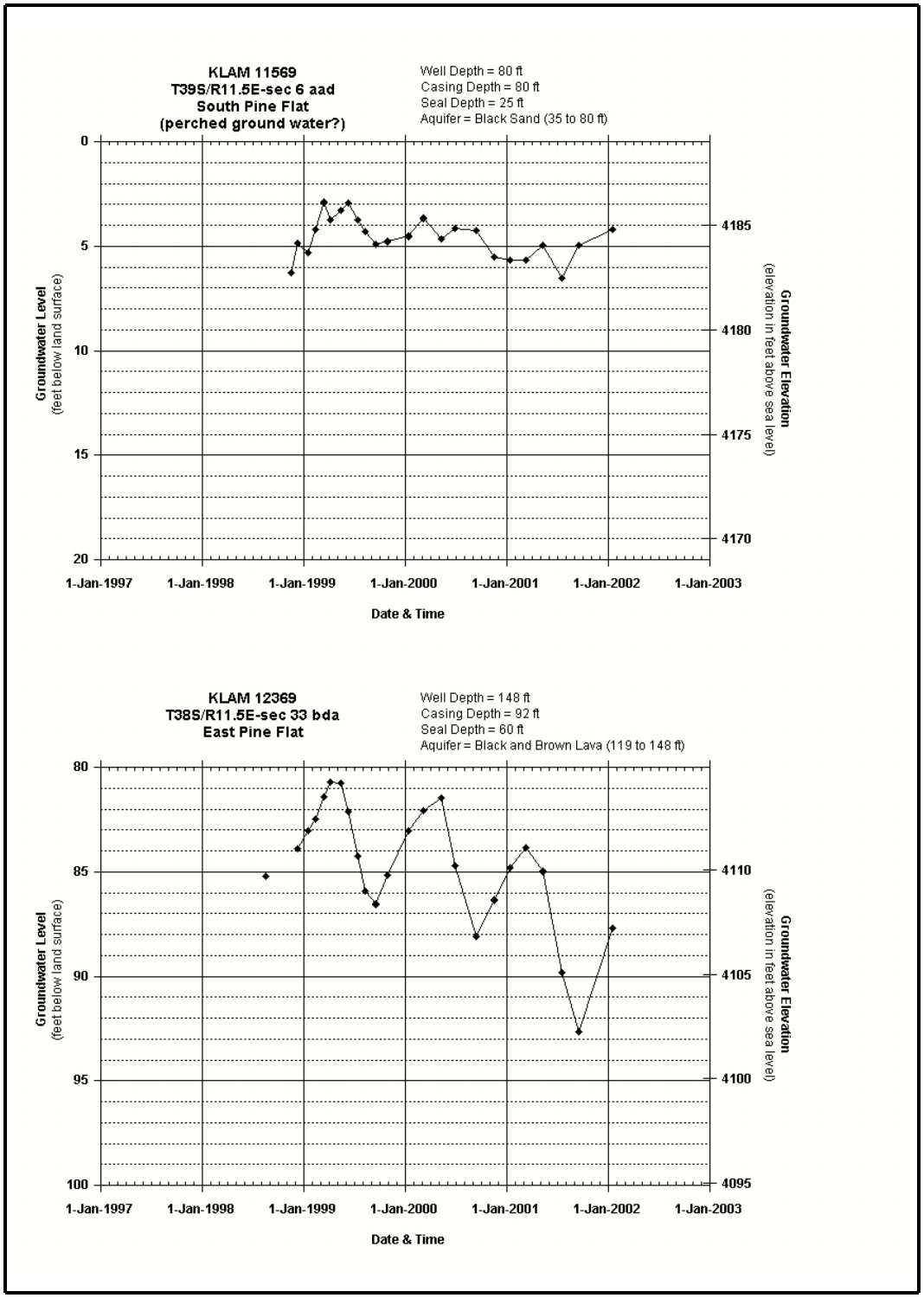


Figure 69. Comparison of ground water elevations in Pine Flat sediment and basalt (note on the right side that the vertical axis elevation for KLAM 11569 is 74 ft higher than the elevation for KLAM 12369)

Ground water elevation data for Poe Valley sedimentary deposits and basalt show little or no vertical ground water gradient. For example, the water well report for well KLAM 51131 (1,009 ft deep) records no change in water level from the sedimentary to basalt water bearing zones. Supporting evidence includes downhole temperature data for the well (fig. 70). The data largely show two different water temperature gradients. A decrease in the gradient occurs around the 550 ft depth where the geologic units change from predominantly sedimentary deposits to predominantly basalt. The temperature gradient from land surface to the 550 ft depth and below the 550 ft depth is close to the geothermal gradient Blackwell and others (1978) estimated for Klamath Falls lake sediments and basalt respectively. The corresponding water temperature and geothermal gradients indicate little or no vertical flow in the borehole occurred within these intervals, indicating little or no ground water gradient exists. Elsewhere in Poe Valley, the ground water elevation data show similar ground water elevations and trends in the sedimentary deposits and underlying basalt (app. 12: compare the hydrograph for KLAM 13478 to KLAM 16807 and KLAM 13491). This also indicates little or no vertical ground water gradient exists.

Sixteen well reports include water levels for different basalt water bearing zones. Three wells are located in Swan Lake Valley or Pine Flat, and the remaining 13 wells are located in Poe Valley. At 15 wells, no change in water level with depth was recorded. At well KLAM 16807 in west Poe Valley, the recorded ground water level in basalt dropped one-foot once the well reached the 42 ft depth. This data indicate the vertical ground water gradient in the basalt is nil to very small at these locations, and little or no vertical ground water flow occurs. Instead, the ground water flow in the basalt is primarily horizontal.

Summary

Some vertical ground water gradients exist in the eastern Lost River sub-basin. When present, they primarily occur in the basin fill sedimentary deposits and/or between the sedimentary deposits and the underlying basalt. Downward gradients and downward flow generally occur at locations near recharge areas and areas distant from ground water discharge. Upward gradients and upward flow occur at or near ground water discharge areas. Elsewhere, no vertical ground water gradient exists in the basin fill sedimentary deposits or between the sedimentary deposits and the basalt below. This indicates the ground water flow at these locations is primarily horizontal.

The vertical ground water gradient in basalt is mostly nil with a few exceptions. This indicates the ground water flow in the basalt is predominantly horizontal.

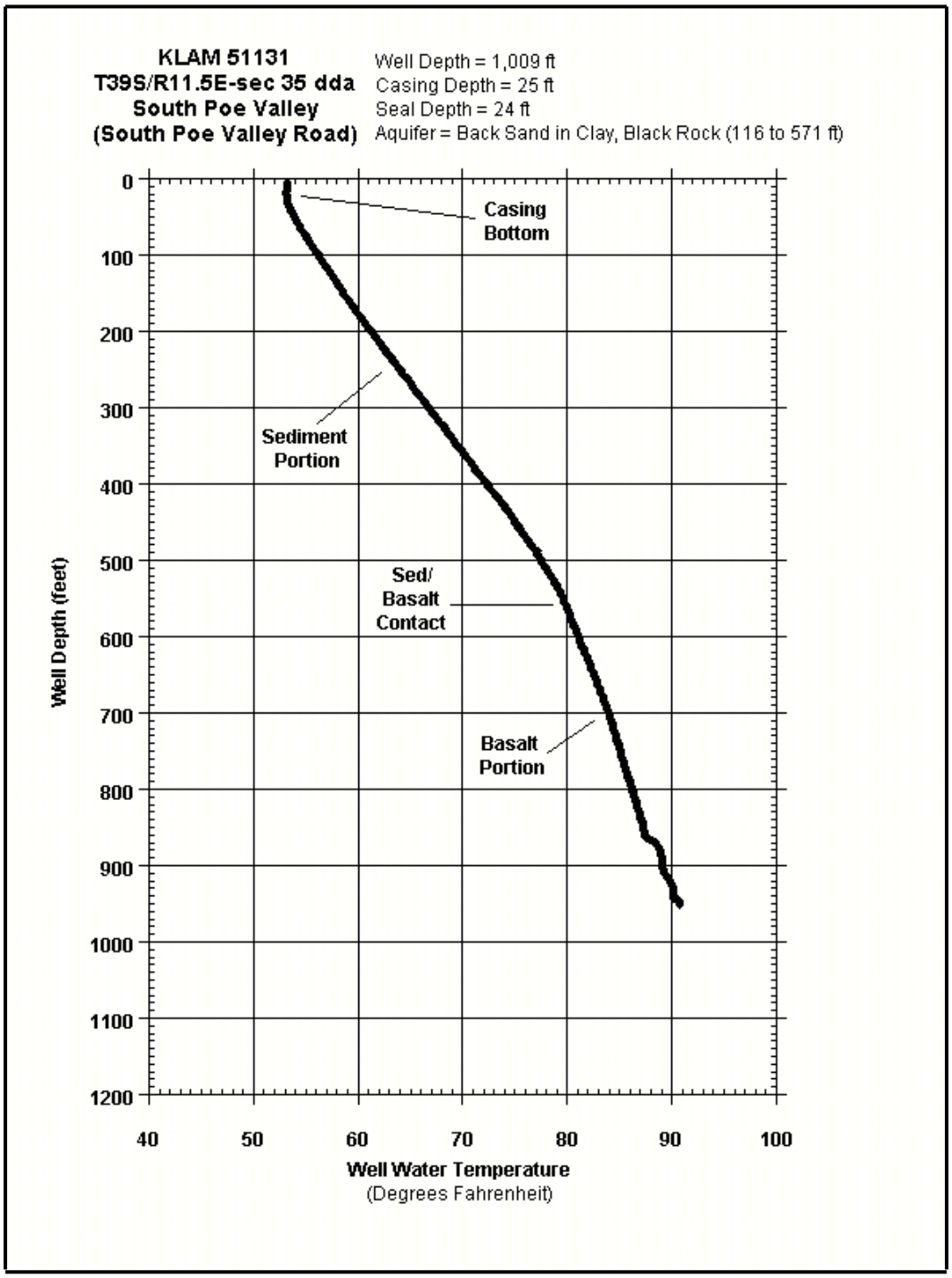


Figure 70. Well water temperature versus well depth at well KLAM 51131 in the Swan Lake to Poe Valley sub-area

Aquifer Properties

Introduction

Aquifer tests are commonly conducted to determine the hydraulic properties of an aquifer. Normally, a test consists of pumping water from an aquifer and recording water level changes at the pumping well and neighboring wells (figs. 71 and 72). Aquifer test data analyses include calculating transmissivity and storage values for an aquifer and determining the presence, type, and possible location of flow boundaries.

Transmissivity is a measure of how easily water moves through an aquifer at a given location. Transmissivity is the product of hydraulic conductivity and the aquifer saturated thickness. The values are expressed as feet squared per day (ft^2/d) or gallons per day per foot (gal/d/ft). Large transmissivity values indicate a greater capacity to transmit water.

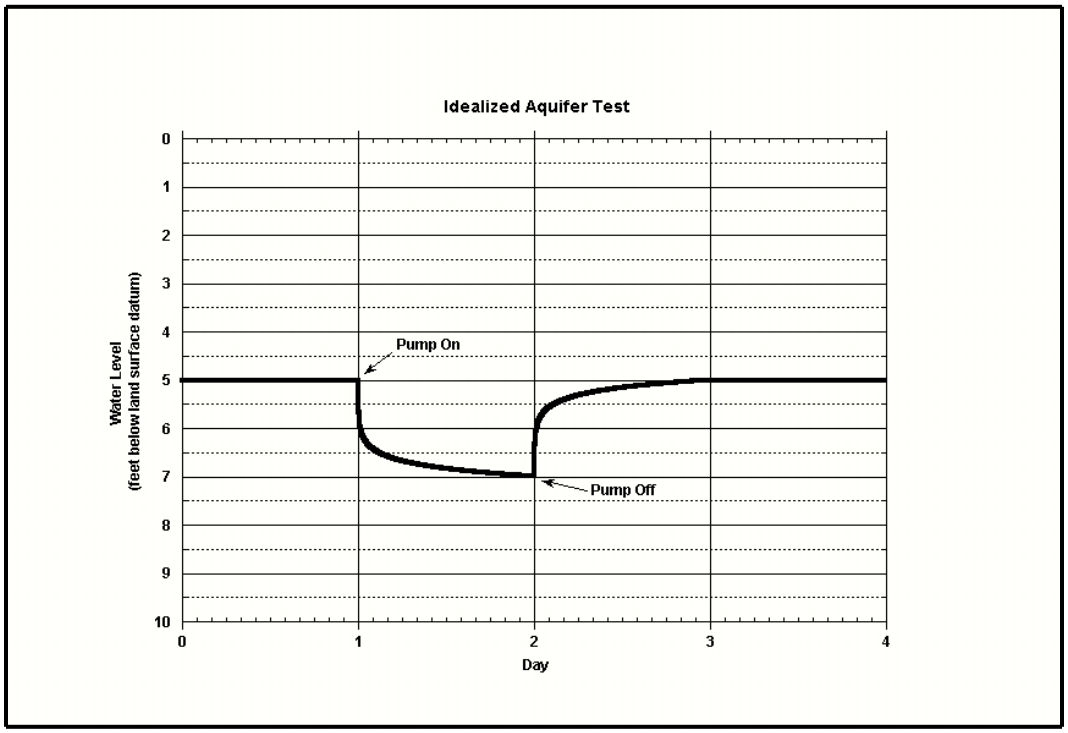


Figure 71. Linear graph of idealized ground water level at an observation well responding to pumping and shut off at a neighboring well

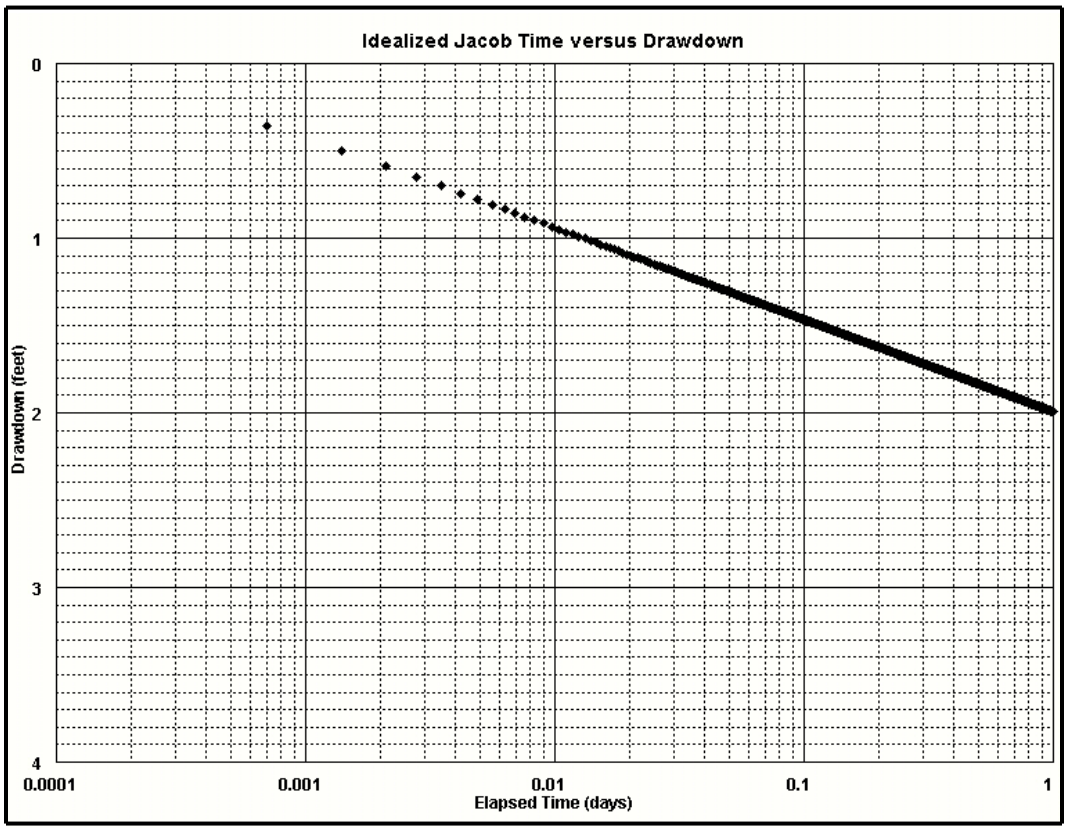


Figure 72. Semi-log graph of idealized ground water level at an observation well responding to pumping and shut off at a neighboring well

Storage values indicate the storage characterisitics of an aquifer (unconfined to confined) and how an aquifer releases or takes in water. The values are dimensionless. High storage values (0.01 to 0.30) generally indicate an unconfined aquifer with a water table. These storage values are termed specific yield or unconfined storativity. Specific yield is defined as the volume of water that an unconfined aquifer releases per unit surface area of aquifer per unit decline in the water table (Freeze and Cherry, 1979). Water is added to, or subtracted from, an unconfined aquifer by filling or dewatering pore spaces. Storage values 0.005 and smaller generally indicate a confined aquifer where ground water is present under pressure. It can also include aquifers that are hydraulically connected to overlying units (a partially or poorly confined aquifer) where the horizontal hydraulic conductivity is much greater than the vertical hydraulic conductivity. These lower storage values are termed storage coefficient or storativity. The storage coefficient is defined as the volume of water that an aquifer releases from storage per unit surface area of aquifer per unit decline in the component of hydraulic head normal to that surface (Freeze and Cherry, 1979). Water is added or subtracted from the aquifer by increasing or decreasing the water pressure and/or expanding or contracting the water and aquifer material.

Various analytical methods exist to calculate transmissivity and storage values from aquifer test data. They include log-log methods (plotting time versus drawdown and time/distance squared versus drawdown) and semi-log methods (time versus drawdown, distance versus drawdown, and time versus recovery). Davis and DeWiest (1966), Bear (1979), Lohman (1979), Freeze and Cherry (1979), Fetter (1980), Todd (1980), and Driscoll (1986) describe these methods of analyses.

Ground water flow boundaries can affect the rate of water level change observed during an aquifer test (figs. 72, 73, 74). Impermeable (no-flow or negative) boundaries restrict ground water flow. Their presence can accelerate drawdowns observed during pumping (fig. 73). Recharge (positive) boundaries provide a source of water to pumping. Their presence can reduce drawdowns observed during pumping (fig. 74). Good aquifer test data and careful data analysis can determine approximate ground water flow boundary locations. The method of images is commonly used. Davis and DeWiest (1966), Bear (1979), Lohman (1979), Freeze and Cherry (1979), and Todd (1980) describe this analysis.

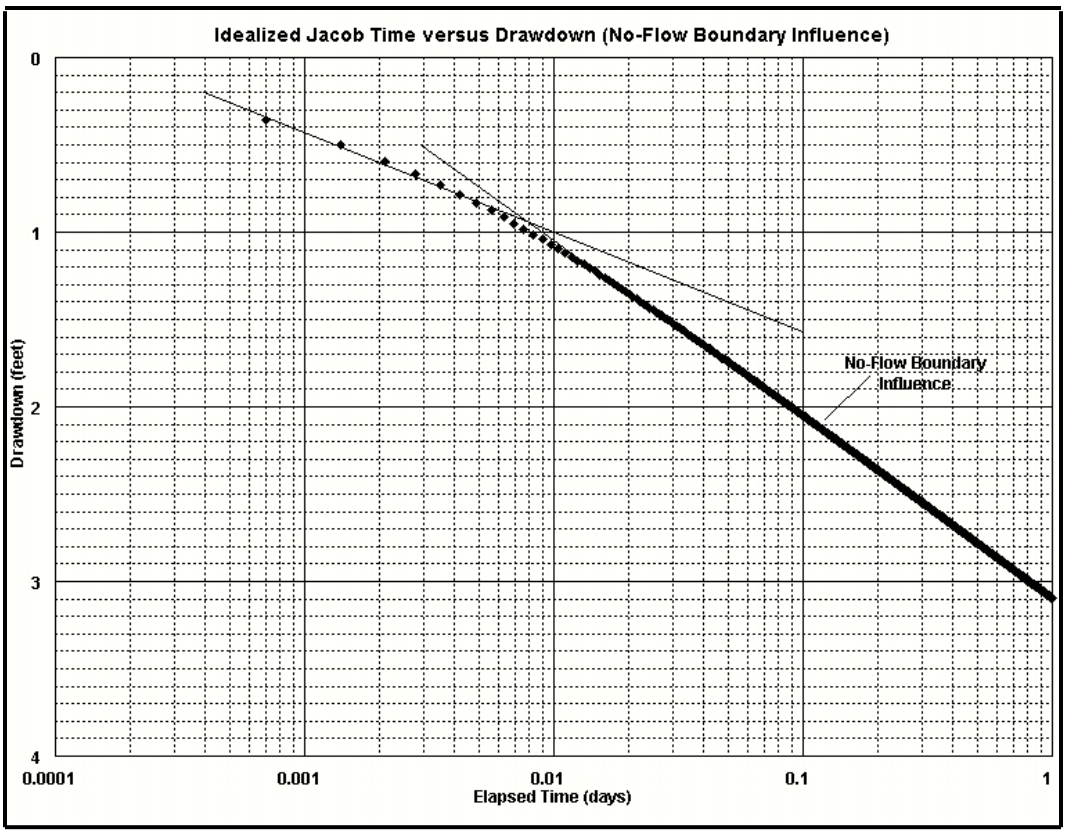


Figure 73. Semi-log graph of idealized ground water level at an observation well responding to pumping at a neighboring well and a no-flow boundary influence

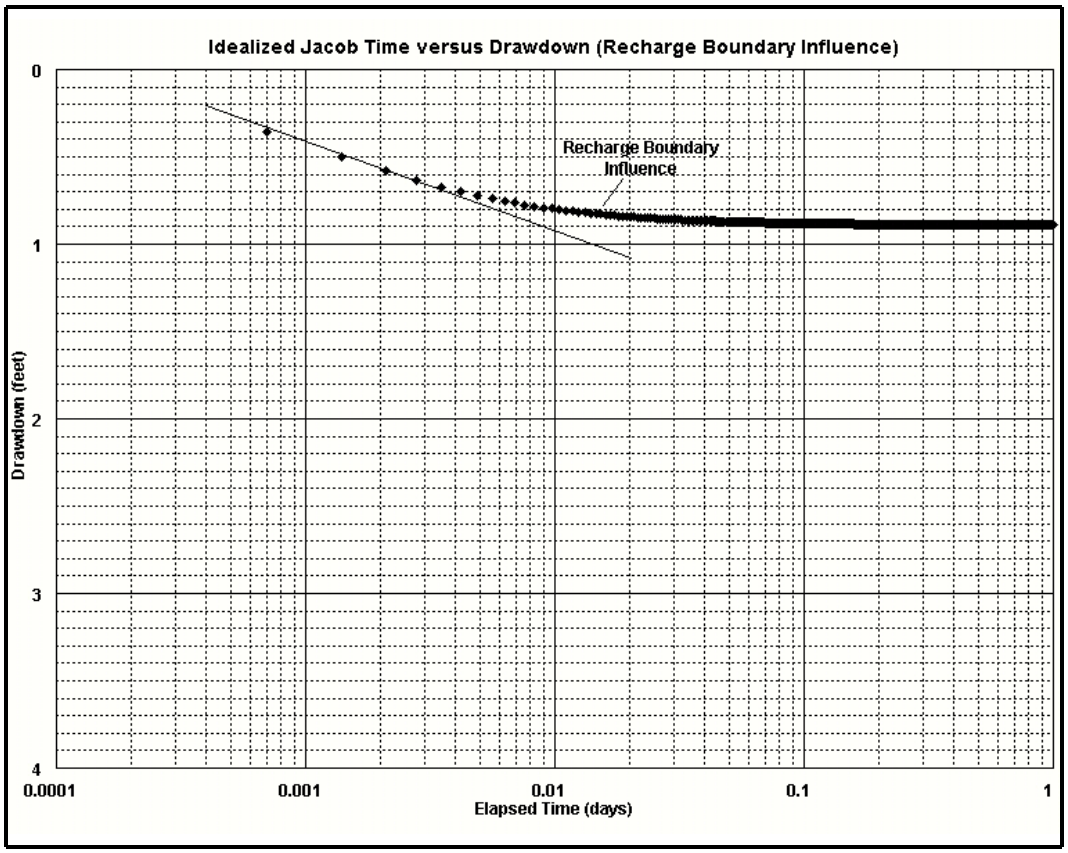


Figure 74. Semi-log graph of idealized ground water level at an observation well responding to pumping at a neighboring well and a recharge boundary influence

Effective Transmissivity and Storage Coefficient

This investigation found it necessary to derive effective transmissivity and storage values in addition to actual values. The need arose from using the Theis equation to calculate the potential ground water drawdown at the Lost River and at springs due to pumping ground water. The actual drawdown is related to the pumping rate, the hydraulic properties of the geologic units (transmissivity and storage), and boundary influences. The Theis equation does not include boundary influences. That can lead to incorrect drawdown calculations, too much or too little depending upon the boundary influence. This investigation indirectly added boundary influences by using effective transmissivity and storage values for the actual values in the Theis equation calculations. The effective values were derived by iteratively using an aquifer test derived storage value and a range of aquifer test derived tranmissivity values in Theis equation calculations. The values that best reproduced observed drawdown and/or recovery at different locations were used.

Aquifer Tests Conducted

The Oregon Water Resources Department, the U.S. Geological Survey, and CH2MHill consultants have conducted aquifer tests in the eastern Lost River sub-basin. OWRD conducted three tests, each in different sub-areas (south Langell Valley, Lorella, and Poe Valley). The USGS conducted one test in northern Yonna Valley. CH2MHill conducted at least six tests. Two were in the Lorella sub-area. Four were in the Bonanza sub-area. The various tests are summarized by sub-area.

Many sub-basin ground water permit holders conducted pump tests in accordance with Oregon Administrative Rules 690-217. The data quality generally proved unsatisfactory for determining transmissivity. Problems with the data included measurement frequency and accuracy.

South Langell Valley Sub-Area Test

The Oregon Water Resources Department conducted an aquifer test in south Langell Valley from November 30 to December 2, 1999. The test included pumping a basalt well (KLAM 10495) at an average of 2,034 gal/min at and measuring ground water levels at the pumping well and three neighboring wells prior to the test, during the 24-hour pumping period, and during a 24-hour recovery period. Ground water level measurements included hand measurements at the pumping well, 1-minute recorder measurements at basalt well KLAM 10641, hand measurements at basalt well KLAM 15129, and hand measurements at a sedimentary deposit domestic well (no water well report) about 50 ft from the pumping well. The general well information locations are shown in table 7 and figure 75. Aquifer test water level data for each well are presented as graphs in appendix 21 and as tables in appendices 22 through 25. The pumping well discharge data are presented in appendix 26.

Table 7. General information related to wells used for the OWRD 1999 aquifer test in the south Langell Valley sub-area (the depth to basalt indicates the thickness of the overlying sedimentary deposits)

Well	Total Depth (feet)	Casing Interval (feet)	Seal Interval (feet)	Depth to Basalt (feet)
KLAM 10495	287	+2 to 269	0 to 269	267
KLAM 10641	427	+1 to 306	0 to 306	304
KLAM 15129	503	+2 to 329	0 to 329	301
domestic	? (<267)	?	?	267

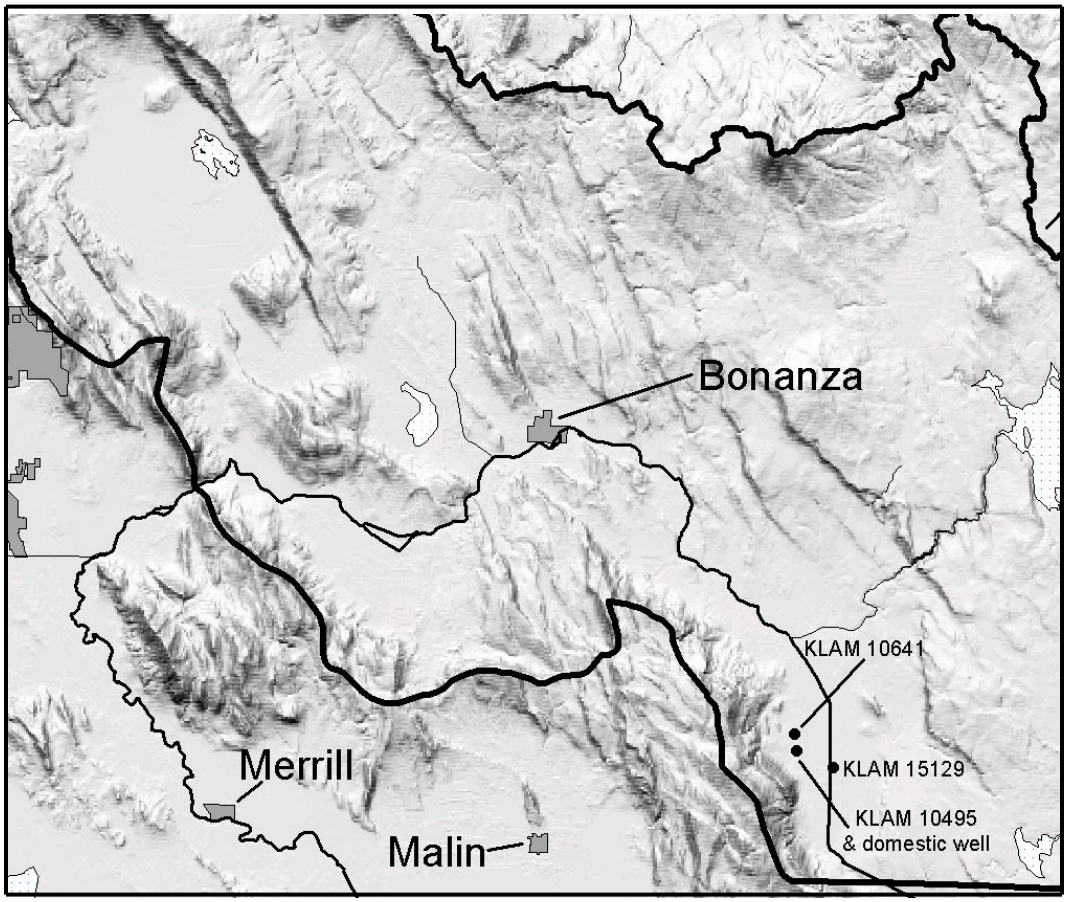


Figure 75. Location of wells used for the OWRD 1999 aquifer test in south Langell Valley

A 3-minute power outage temporarily shut off the pump during the test. This event appears as an immediate recovery spike within in the drawdown data for well KLAM 10641 and well KLAM 15129 (app. 21). Coincidently, the ground water level data recorded for pumping well KLAM 10495 uniformly shifted more than 0.2 ft downward after the outage (a possible human measurement or recording error). This made it necessary to correct the pumping well data to eliminate the post-outage shift. The data were corrected by subtracting the post-outage shift from the post-outage drawdown data (app. 22). The pre-outage drawdown data for each well are the most reliable drawdown data for determining transmissivity and storage values. The post-outage drawdown data remains useful for approximating transmissivity and storage values and for evaluating the presence and influence of boundaries. The influence of the power outage upon the recovery data was too small to detect.

Weather change during the aquifer test influenced ground water levels. Rising barometric pressure depressed ground water levels and falling pressure allowed ground water levels to rebound. The overall barometric pressure change equaled about 0.4 ft of water level change (app. 21). This made it necessary to calculate a barometric efficiency for each well using pre-test data and adjust the raw ground water level data. The barometric efficiency varied from 30 to 50 percent of the barometric pressure change, depending upon the influence at each well. The raw ground water level data were adjusted by multiplying the cumulative barometric pressure change (water equivalent) by the barometric efficiency and subtracting this value from the measured ground water level. Both the raw and adjusted data were analyzed. However, analyses of the adjusted data are considered more reliable, and those results are reported here.

Ground water level data for the basalt wells show boundary influences. All the data for ground water in basalt show a recharge boundary. The influence of a no-flow boundary is less conclusive. For pumping well KLAM 10495, an apparent no-flow boundary influence occurred prior to the recharge boundary. For well KLAM 10641, a possible no-flow boundary influence occurred after the recharge boundary influence. For well KLAM 15129, the recovery data may indicate a no-flow boundary influence after the recharge boundary influence.

Efforts to estimate the recharge boundary location(s) proved unsatisfactory. The radial distances from KLAM 10641 and KLAM 15129 to the boundary-related image well were estimated as 47,000 to 56,000 ft and 143,000 ft respectively. Circles were drawn around each observation well using the respective radial distance to image well. The circles should intersect at possible image well locations. They did not. The apparent recharge is most likely delayed yield or a leaky aquifer response where pumping ground water from the basalt induces an inflow of water from the overlying sedimentary deposits.

Water level measurement data for a domestic well completed in the sedimentary deposits reveal no obvious response to pumping ground water from basalt over 24-hours (app. 21). However, a response may occur with longer pumping as it did for S. Balin (oral commun., 2001). He noted water levels in his shallow south Langell Valley domestic well responded to sustained pumping of ground water from basalt in 2001.

Multiple analyses yielded a range of basalt transmissvity values for south Langell Valley (table 8). The transmissvity values estimated ranged from 100,000 to over 1,000,000 ft^2/d (about 750,000 to over 7,500,000 gal/d/ft). The higher values were generally derived from data affected by a recharge boundary, delayed yield, or leaky aquifer influence. The lower values were generally derived from data affected by an apparent no-flow boundary influence.

Table 8. Summary of estimated south Langell Valley basalt transmissivity and storage coefficient values using OWRD 1999 aquifer test data adjusted for barometric pressure changes

Well	Analysis Method	Transmissivity (ft^2/d)	Storage Coefficient	Comment
KLAM 10495 Pumping Well	3	478,478	N.A.	Early Data
		196,635**	N.A.	Middle Data
		N.A. Recharge	N.A.	Late Data
	4	100,380**	N.A.	Earlier Data
		797,464	N.A.	Middle Data
		N.A. Recharge	N.A.	Late Data
KLAM 10641 2,825 ft to Pumping Well	1	373,973	0.00025	Early Data
		623,289	0.00025	All Data
	2	389,556	0.00023	Early Data
		623,289	0.00022	All Data
	3	593,155*	0.00017*	Early Data
		989,955***	0.00003***	Late Data
	4	844,373	0.00012	Early Data
		1,055,467***	0.00002***	Middle Data
KLAM 15129 6,045 ft to Pumping Well	1	623,289	0.00007	Early Data
		692,543	0.00008	All Data
	2	831,052	0.00007	Early Data
		692,543	0.00006	All Data
	3	755,492*	0.00006*	Early Data
		1,079,274*&***	0.00001*& ***	Late Data
	4	755,492	0.00011	Early Data
		1,157,609***	0.00001***	Late Data
Domestic Well (about 50 ft to pumping well): No analysis, no response to pumping in 24 hours				

Analysis Method
1 = Theis log-log Time versus drawdown method
2 = Theis log-log time/distance^2 versus drawdown method
3 = Jacob-Cooper semi-log time versus drawdown method
4 = Semi-log time versus recovery method

*Note: means caution, u value is greater than 0.01
**Note: means possible no-flow boundary influence
***Note: means possible recharge boundary or leaky aquifer influence

Multiple analyses also yielded a range of basalt storage coefficient values for south Langell Valley (table 8). The storage coefficient values ranged from 0.00001 to 0.00025. Those values indicate the ground water from basalt is confined (under pressure). This does not imply ground water from basalt is isolated from ground water in the overlying sediments.

This investigation sought effective transmissivity and storage coefficient values for the basalt in south Langell Valley. The effective values were obtained by iteratively using a range of transmissivity and storage coefficient values constrained by table 8 in Theis equation calculations, and identifying the values that best approximated the 24-hour aquifer test drawdowns observed at well KLAM 10641 and well KLAM 15129 (adjusted data).

The solution for an effective transmissivity and storage coefficient is non-unique. However, an effective transmissivity of 600,000 ft^2/d (about 4,490,000 gal/d/ft) and storage coefficient of 0.00025 are reasonable for the south Langell Valley basalt. Using these values in the Theis equation approximated the 24-hour total drawdowns observed (0.34 ft estimated versus 0.28 ft observed at well KLAM 10641 and 0.26 ft estimated versus 0.25 ft observed at KLAM 15129).

Lorella Sub-Area Tests

The Oregon Water Resources Department conducted an aquifer test in the Lorella sub-area from December 7 to 9, 1999. The test included pumping ground water from canal-influenced basalt for 24 hours at an average of 1,404 gal/min at well KLAM 10175, and measuring ground water levels at five observation wells prior to the test, during the 24-hour pumping period, and during a 24-hour recovery period. Water level measurements at the pumping well were not possible during the pumping period. The general well information is shown in table 9. The locations are shown in figure 76. Aquifer test water level data for each well are presented as graphs in appendix 27 and as tables in appendices 28 through 32. The pumping data are presented in appendix 33.

The five observation wells included four wells that produce ground water from basalt influenced by canal leakage (wells KLAM 10554, KLAM 52204, KLAM 10362, and KLAM 10364) and one well (KLAM 52096) that produces ground water from basalt not influenced by canal leakage. Wells KLAM 52204 and KLAM 52096 are the isolated shallow and deep portions of the same 1,005-foot hole. Well KLAM 52096 is constructed to seal off the water bearing zones that are canal-influenced and is open to the deeper water bearing zone. That deeper zone appears hydraulically connected to ground water in the neighboring Bonanza sub-area.

Water levels measured during the test included hand and recorder measurements. Hand measurements occurred at all five observation wells. Additionally, 1-minute recorder measurements were logged at well KLAM 52204 and well KLAM 10362.

Table 9. General information related to wells used for the OWRD 1999 aquifer test in the Lorella sub-area (the depth to basalt indicates the thickness of the overlying sedimentary deposits)

Well	Total Depth (feet)	Casing Interval (feet)	Seal Interval (feet)	Depth to Basalt (feet)
KLAM 10175*	465	0 to 171	0 to 171	165
KLAM 10554*	453	+1 to 165	0 to 165	160
KLAM 52204*	516	+2.5 to 92	0 to 92	81
KLAM 52096*	1,005	+3 to 990	516 to 950	81
KLAM 10364**	524	+1 to 129	0 to 129	124
KLAM 10362**	1,200	+1 to 149	0 to 149	144
* Lorella northeast compartment			**Lorella southeast compartment	

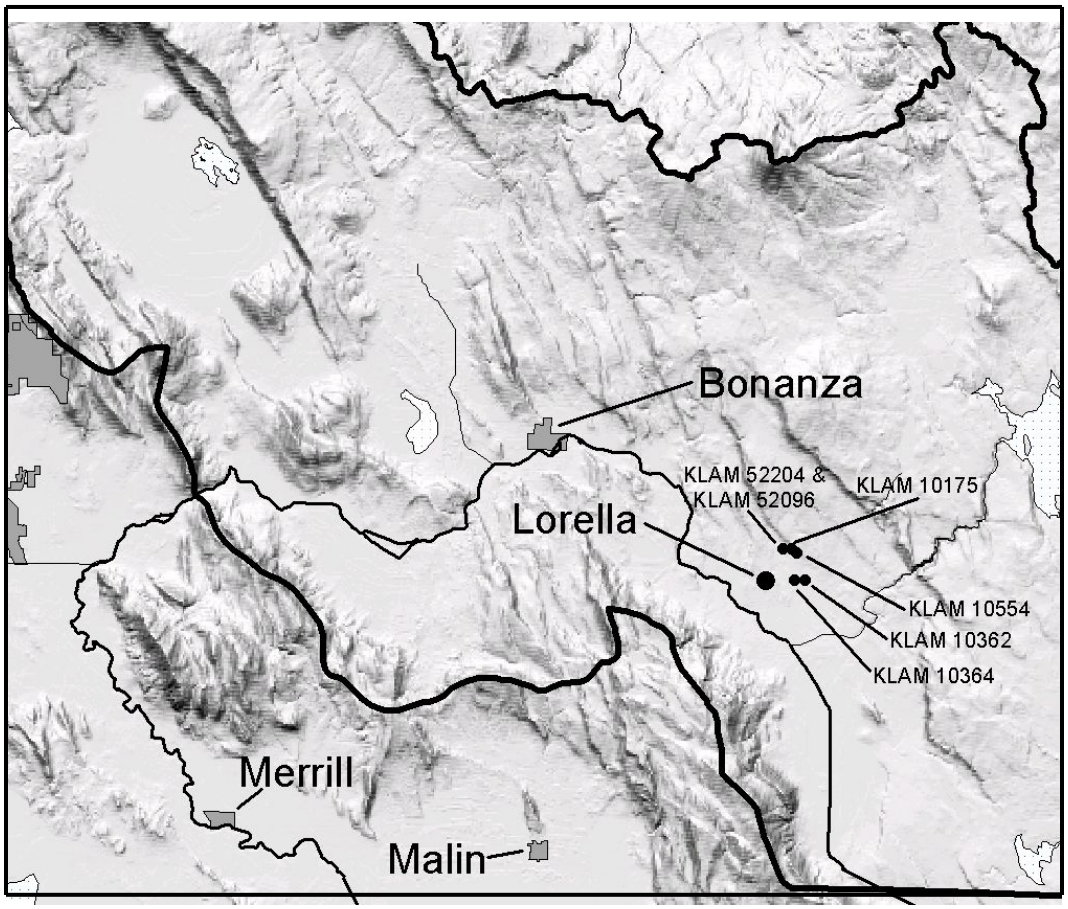


Figure 76. Location of wells used for the OWRD 1999 aquifer test in the Lorella Sub-area

The ground water level response to pumping varied. Ground water in the canal-influenced basalt responded directly to the pumping at wells KLAM 10554 and KLAM 52204 (the upper portion of a double completion well). At two other wells (KLAM 10362 and KLAM 10364), the ground water in canal-influenced basalt did not respond to the pumping, but did respond to earth tides (app. 27). The different responses to pumping, local geologic structure apparent on plate 3, and water level data (app. 12, pl. 5) all indicate well KLAM 10554 and well KLAM 52204 are in the same ground water compartment as the pumping well (Lorella northeast) and wells KLAM 10362 and KLAM 10364 are in a different ground water compartment (Lorella southeast). Ground water in deeper basalt at well KLAM 52096 (the deeper portion of the double completion well) showed a limited response to the pumping (app. 27). The different responses observed in the upper and deeper portions of the double completion well (KLAM 52204 and KLAM 52096, respectively) indicate the ground water in the deeper basalt at the well is partially rather than directly hydraulic connected to the shallower canal-influenced basalt.

Weather change during the aquifer test caused barometric pressure changes equal to about 0.35 ft of water level change. Concurrent ground water level changes were more than 2 ft at wells KLAM 10554 and KLAM 52204 and about 0.2 ft at well KLAM 52096 (app. 27). A barometric efficiency of 50 percent was calculated for the three wells using pre-test data. The raw ground water level data were adjusted by multiplying the cumulative barometric pressure change (water equivalent) by the barometric efficiency and subtracting this value from the measured ground water level (Appendix 27 to 30). Aquifer test analyses conducted used both the raw and adjusted data.

The data for ground water in canal-influenced basalt at wells KLAM 10554 and KLAM 52204 show no-flow boundary influences. The semi-log graphs indicate one or two boundaries for the KLAM 10554 data and one to three boundaries for the KLAM 52204 data.

Locating no-flow boundaries from the aquifer test data was partially successful. The estimated radial distances from the observation wells to the no-flow boundary image wells varied (about 2,600 and 3,080 ft from well KLAM 10554 and about 1,650, 3,030, and 4,260 ft from well KLAM 52204). The circles around each observation well did intersect, yielding 10 image well locations leading to 10 boundary lines less than a half-mile from pumping well KLAM 10175. Four boundary lines appear related to a northwest-trending fault Black (2004) mapped coincident with North Canal and adjacent to well KLAM 10175. A pair of boundary lines suggest a northeast trending boundary may exist less than 1,000 ft northwest of well KLAM 10175. Black (2004) mapped a north-south trending fault a half-mile further west. The remaining four boundary lines indicate a boundary may exist less than 2,000 ft south of well KLAM 10175.

Multiple analyses yielded a range of transmissvity and storage coefficient values for the basalt influenced by canal leakage in the Lorella northeast compartment (table 10). Transmissvity estimates ranged from 20,000 to over 100,000 ft^2/d (149,600 to over 748,000 gal/d/ft). The higher values were calculated using early-time data. The lower values were calculated using data affected by subsequent no-flow boundaries. The storage coefficient generally ranged from 0.00020 to 0.00099. Those values generally indicate confined ground water conditions. As previously mentioned, that does not imply ground water in the basalt is hydraulically isolated from ground water in the overlying sediments.

This investigation sought effective transmissivity and storage coefficient values for the basalt influenced by canal leakage in the Lorella northeast compartment for use in Theis equation calculations. This was necessary to account for boundary influences. The values were obtained by iteratively using a range of transmissivity and storage coefficient values constrained by table 10 in Theis equation calculations, and identifying the values that best approximated the 24-hour aquifer test drawdowns observed at well KLAM 10554 and well KLAM 52204 (adjusted data).

The solution for an effective transmissivity and storage coefficient is non-unique. However, an effective transmissivity of 50,000 ft^2/d (about 374,000 gal/d/ft) and storage coefficient of 0.00030 are reasonable values for calculating drawdown in canal-influenced basalt in the Lorella northeast compartment. Using these values in the Theis equation yielded 2.44 ft estimated drawdown versus 2.64 ft observed at well KLAM 10554 and 2.22 ft estimated drawdown versus 2.31 ft observed at well KLAM 52204.

CH2MHill conducted two aquifer tests of canal-influenced basalt in the Bryant Mountain to Dead Indian Hill terrace middle compartment in December 1992 and January 1993 (CH2MHill, 1994). The December 1992 test (Wright well aquifer test) included pumping well KLAM 13578 for about 40 hours at an average rate of 1,430 gal/min, and measuring water levels at four observation wells during the pumping period and 23 hours of recovery. Water level measurements at the pumping well were not possible during pumping. The January 1993 test included about 41 hours of pumping at well KLAM 13583 (Liston well), and measuring water levels at the production and three observation wells during the pumping period and about 23 hours of recovery. The pumping included 3 hours of stepped rate pumping (420 gal/min, 700 gal/min, and 970 gal/min for 60 minutes each) followed by 38 hours of constant rate pumping (940 gal/min).

CH2MHill (1994) analyses of the two tests yielded a range of transmissvities and one storage coefficient value (table 11). Transmissvity estimates ranged from 2,500 to over 40,000 ft^2/d (18,700 to over 300,000 gal/min/ft). The single storage coefficient value of 0.00100 indicates confined ground water conditions.

Table 10. Summary of transmissivity and storage coefficient values estimated for canal-influenced basalt in the Lorella northeast compartment, Lorella sub-area using OWRD 1999 aquifer test data adjusted for barometric pressure changes

Well	Analysis Method	Transmissivity (ft^2/d)	Storage Coefficient	Comment
KLAM 10554 1,140 ft to Pumping Well	1	107,532	0.00033	Early Data
		48,390	0.00030	All Data
	2	96,779	0.00031	Early Data
		47,792	0.00029	All Data
	3	128,648*	0.00022*	Early Data
		66,039*&**	0.00023*&**	Middle Data
		48,087**	0.00029**	Late Data
	4	112,567	3.12×10^{-7}	Early Data
		65,170**	0.00005**	Middle Data
		46,726**	0.00032**	Late Data
KLAM 52204 1,475 ft to Pumping Well	1	71,688	0.00092	Early Data
		43,013	0.00079	All Data
	2	64,519	0.00097	Early Data
		43,013	0.00086	All Data
	3	235,855*	0.00085*	Early Data
		76,199*&**	0.00066*&**	Middle Data
		46,289*&**	0.00081*&**	Middle Data
		32,801*&**	0.00119*&**	Late Data
	4	198,118	2.70×10^{-10}	Early Data
		85,396**	0.00001**	Middle Data
		47,624**	0.00036**	Middle Data
		23,145**	0.00220**	Late Data

KLAM 10175 (Pumping Well): No measurement possible during pumping
KLAM 52096 (1,475 ft to pumping well): No analysis, limited, indirect response
KLAM 10362 (5,775 ft to pumping well): No analysis, no response to pumping in 24 hours
KLAM 10364 (5,340 ft to pumping well): No analysis, no response to pumping in 24 hours

Analysis Method
1 = Theis log-log Time versus drawdown method
2 = Theis log-log time/distance^2 versus drawdown method
3 = Jacob-Cooper semi-log time versus drawdown method
4 = Semi-log time versus recovery method

*Note: means caution, u value is greater than 0.01
**Note: means possible no-flow boundary influence

Table 11. Summary of transmissivity and storage coefficient values reported by CH2MHill (1994) for canal-influenced basalt in the Bryant Mountain to Dead Indian Hill terrace middle compartment, Lorella sub-area

Test	Well	Transmissivity (ft^2/d)	Storage Coefficient	Comment
Wright	KLAM 13583 Liston	17,812	NR	Drawdown Data
		43,847	NR	Recovery Data
	Rector"	>80,208	NR	Drawdown Data
		NR	NR	Recovery Data
	Horton No. 2*	50,531	NR	Drawdown Data
		NR	NR	Recovery Data
	Hubbard*	NR	NR	Drawdown Data
		NR	NR	Recovery Data
	*Note: these wells are in a compartment different from the pumping well KLAM 13578 (Pumping Well): No measurement possible during pumping			
Liston	KLAM 13583 Liston	6,978	NR	Drawdown Data
		3,320**	NR	Drawdown Data
		2,630	NR	Recovery Data
	KLAM 13578 Wright	12,212	NR	Drawdown Data
		17,111	NR	Recovery Data
	Gallup well (KLAM 14864l): No analysis, no response to pumping Rector well: No analysis, no response to pumping in 24 hours NR: means not reported **Note: means possible no-flow boundary influence			

CH2MHill (1994) observed possible recharge and no-flow boundary influences in the Liston test data and observed no boundary influences in the Wright test data. CH2MHill attributed the apparent recharge boundary to possible sediment leakage or a possible connection to the Lost River. They attributed the different boundary influences observed and the different transmissivity estimates to hydrogeologic heterogeneity.

Effective transmissivity and storage coefficient values that included boundary influences were obtained for the canal-influenced basalt in the Bryant Mountain to Dead Indian Hill terrace middle compartment. They were obtained by iteratively using a range of transmissivity and storage coefficient values constrained by table 11 in Theis equation calculations, and identifying the values that best approximated the drawdowns reported for the CH2MHill aquifer tests and the OWRD observed drawdowns at KLAM 10699.

The solution for an effective transmissivity and storage coefficient is non-unique. An effective transmissivity of 12,000 ft^2/d (about 89,800 gal/d/ft) and storage coefficient of 0.00015 best estimated observed ground water drawdown in the Bryant Mountain to Dead Indian Hill terrace middle compartment for basalt influenced by canal leakage. While useful, the results clearly revealed a need for additional aquifer testing. For example, the Theis equation calculations yielded ground water drawdowns of 1.81 ft, 3.61 ft, 4.54 ft, and 5.37 ft at well KLAM 10699 due to 0.5 days, 2.5 days, 5.5 days, and 11 days of pumping at well KLAM 13583 (Liston well) respectively. The OWRD observed drawdowns were 1.34 ft, 3.50 ft, 5.60 ft, and 8.50 ft respectively.

For basalt in the Lorella southeast compartment, the Theis equation was used to find an effective transmissivity value that best approximated 65.44 ft of drawdown observed at well KLAM 10364 in response to 72 days of pumping at well KLAM 10362, located 1,600 ft to the west. The drawdown data on a semi-log graph show a no-flow boundary influence. The effective transmissivity identified is about 2,050 ft^2/d (about 15,300 gal/d/ft) when the storage coefficient is 0.00030 and the average pumping rate is 1,500 gal/min.

The preceding aquifer test and Theis equation results show the transmissivity and storage coefficient values for each Lorella sub-area compartment are different.

Bonanza Sub-Area Tests

This investigation relied upon basalt aquifer tests previously conducted in the Bonanza sub-area. The U.S. Geological Survey (Leonard and Harris, 1974) and CH2MHill (1992) conducted tests of ground water in basalt water bearing zones hydraulically connected to Bonanza Big Springs. Additionally, CH2MHill (1994 and 2002) conducted tests of ground water in deeper basalt water bearing zones having limited connection to the springs. The reported transmissivity and storage coefficient values for the different tests are summarized in tables 12 and 13.

Leonard and Harris (1974) conducted a single well test in northern Yonna Valley on September 22 and 23, 1970. The test included pumping more than 1,600 gal/min from basalt at well KLAM 12380 for 24 hours, and measuring water levels in the pumping well during the pumping period and four hours of recovery. They estimated a basalt transmissivity of 270,000 ft^2/d (2,020,000 gal/d/ft).

CH2MHill (1992) conducted an aquifer test of basalt south of Bonanza on March 24, 1992. The test consisted of 150 minutes of pumping and 130 minutes of recovery. Ground water levels were measured at the production well (KLAM 10431) and an observation well (KLAM 13428). Two pumping rates occurred during the test (table 12) with an average rate of 3,587 gal/min. Their analyses yielded transmissivity estimates from 127,000 to 400,000 ft^2/d (950,000 to 3,000,000 gal/d/ft) and a storage coefficient of 0.00038 indicating confined ground water conditions.

Table 12. Summary of transmissivity and storage coefficient values for the Bonanza sub-area basalt water bearing zones hydraulically connected to Bonanza Big Springs as reported by the U.S. Geological Survey and CH2MHill

Test	Well	Transmissivity (ft^2/d)	Storage Coefficient	Comment
USGS Test (Leonard and Harris, 1974)	KLAM 12380	270,000	NR	
	Note: single well 24 hour test conducted in north Yonna Valley Note: analysis of storage coefficient not possible with a single well test			
CH2MHill (1992) Bend Test	KLAM 10431 Bend/Pump	334,201	NR	Drawdown Data
		401,041	NR	Recovery Data
	KLAM 13428 Observation	126,997	0.00038	Drawdown Data
		NR	NR	Recovery Data
	Note: 150 minute test Note: pumping = 2,600 gal/min first 45 minutes and Note: pumping = 4,010 gal/min last 105 minutes Note: average pumping rate = 3,587 gal/min			
CH2MHill (1992) Bonanza Test	KLAM 13427 Bonanza/Pump	18,715	NR	Drawdown Data
		17,378	NR	Recovery Data
	KLAM 10432 Observation	22,726	0.00045	Drawdown Data
		NR	NR	Recovery Data
	Note: 12 hour constant rate test			

CH2MHill (1992) conducted a longer aquifer test of basalt southwest of Bonanza on March 26, 1992. The test consisted of 12 hours of pumping and 9 hours of recovery. Ground water levels were measured at the production well (KLAM 13427), observation well KLAM 10432, five other wells, and at two springs. CH2MHill reported that apparent boundaries limited a response to the production well (KLAM 13427) and well KLAM 10432 only. Their analyses yielded smaller transmissivities, 17,375 to 22,725 ft^2/d (about 130,000 to 170,000 gal/d/ft) and a storage coefficient of 0.00045. The lower transmissivity occurs where the ground water gradient is steeper than nearby areas (pl. 4).

Table 13. Summary of transmissivity values for the Bonanza Sub-area deep basalt water bearing zones reported by CH2MHill (1994 and 2002)

Test	Well	Transmissivity (ft^2/d)	Storage Coefficient	Comment
CH2MHill (1994) 30 day Test	KLAM 51920 Pumping Well	425,853	NR	Drawdown Data
		NR	NR	Recovery Data
	Note: pumping of deep water bearing zones only Note: average pumping rate was 3,258 gal/min Note: analysis of storage coefficient not possible with a single well test Note: conditions precluded analysis of recovery			
CH2MHill (1994) Baseline CompositeTests	KLAM 51920 Pumping Well 15 April 1993	441,146	NR	Drawdown Data
		45,451*	NR	Drawdown Data
		350,911	NR	Recovery Data
	KLAM 51920 Pumping Well 27 Oct 1993	282,066	NR	Drawdown Data
		58,819*	NR	Drawdown Data
		147,049	NR	Recovery Data
	Note: pumping of shallow and deep basalt water bearing zones Note: 15 April 1993 pumping was 225 minutes at 3,733 gal/min average Note: 27 Oct 1993 pumping was 225 minutes at 4,000 gal/min average Note: analysis of storage coefficient not possible with a single well test *Note: means possible no-flow boundary influence			
CH2MHill (2002) 30 day Test	KLAM 51920 Pumping Well	64,033	NR	Early Drawdown Start of Test
		64,835	NR	Early Drawdown After Restart 1
		81,411	NR	Early Drawdown After Restart 2
		82,748	NR	Early Drawdown After Restart 3
		>267,361**	NR	All Late Drawdown Data
		NR	NR	Recovery Data
	Note: pumping of deep water bearing zones only Note: average pumping rate was 6,800 gal/min Note: conditions precluded analysis of recovery Note: analysis of storage coefficient not possible with a single well test **Note: means possible recharge boundary influence			

CH2MHill (1994 and 2002) conducted tests in 1993 and 2002 at well KLAM 51920, a 2,050 ft deep well located about 3.75 mi southeast of Bonanza. Basalt water bearing zones hydraulically connected to Bonanza Big Springs occur above 500 ft depth at the well. Deeper basalt water bearing zones occur below 1,500 ft depth. CH2MHill designed the tests to assess the production potential of the deeper water bearing zones, and to assess the potential for interference with the shallower basalt water bearing zones, Bonanza Big Springs, and the Lost River. The tests included installing an inflatable packer in the well to facilitate pumping from the deeper basalt water bearing zones only. The test consisted of pumping for approximately 30 days and measuring ground water levels at the pumping well (deep and shallow zones) and at a number of observation wells before, during and after the pumping period. Monitoring occurred at Bonanza Big Springs, other springs, and the Lost River. The average pumping rate was 3,258 gal/min in 1993 and 6,800 gal/min in 2002. The 1993 test included baseline pumping the entire well (all the water bearing zones) for 3.75 hours before and after the test.

The CH2MHill (1994 and 2002) analyses of data from the pumping well yielded transmissivity estimates from 64,000 to 425,850 ft^2/d (480,000 to 3,190,000 gal/d/ft) for the deeper basalt water bearing zones and 45,450 to 441,140 ft^2/d (340,000 to 3,300,000 gal/d/ft) composite for all the basalt water bearing zones. CH2MHill attributed the range of values to no-flow and recharge boundary influences.

CH2MHill (2002) noted that ground water in the shallower basalt at the pumping well and 2 observation wells (1,500 ft and 10,500 ft away) clearly responded to the 2002 test of the deeper basalt water bearing zones. This response was most notable during an unscheduled 45-hour pump shut-off due to engine problems. CH2MHill attributed the entire response to leakage across the packer in the pumping well. An OWRD analysis (Grondin, 2002) concluded the response could not be limited to packer leakage. A limited hydraulic connection between the deeper and shallower basalt water bearing zones likely contributed to the water level response. At the other observation wells, CH2MHill observed no response to the pumping and 45-hour pump shut-off. OWRD noted the lack of observable response at these wells could be explained given some are located in another sub-area, others are distant from the pumping well, and other ground water pumping occurred in closer proximity to many of these wells.

This investigation sought effective transmissivity and storage coefficient values for calculating drawdown in the Bonanza sub-area basalt that is hydraulically connected to Bonanza Big Springs. I iterative use of transmissivity and storage coefficient values constrained by table 12 in the Theis equation resulted in values that best approximated aquifer test drawdowns and water level fluctuations observed by this investigation.

The solution for an effective transmissivity and storage coefficient is non-unique. However, an effective transmissivity of 334,201 ft^2/d (2,500,000 gal/d/ft) and a storage coefficient of 0.00096 reasonably represent the Bonanza sub-area basalt that is hydraulically connected to Bonanza Big Springs. The values account for boundary influences. The transmissivity is within the range of aquifer test derived values. The storage coefficient was derived by using a distance versus drawdown analysis of the CH2MHill (2002) test data for ground water in basalt directly connected to Bonanza Big Springs. It is consistent with the values in table 12. Use of these effective values to reproduce the CH2MHill (1992) Bend well test yielded 3.22 ft estimated drawdown versus 3.20 ft observed drawdown at pumping well KLAM 10431, and 0.30 ft estimated drawdown versus 0.83 ft observed drawdown at observation well KLAM 13428. Use of these values to calculate ground water drawdown at Bonanza yielded cumulative drawdowns within the range of those observed by this investigation. Use of other effective values yielded much greater or smaller cumulative drawdowns at Bonanza than observed by this investigation.

Swan Lake Valley to Poe Valley Sub-Area Test

Oregon Water Resources Department staff conducted an aquifer test of ground water in basalt in north Poe Valley from December 14 to 16, 1999. The test included pumping ground water from basalt at well KLAM 10292 for 24-hours, and measuring water levels at the production well and two observation wells (KLAM 10252 and KLAM 51131) during the pumping period and 24 hours of recovery. Hand measurements were made at the pumping well and one-minute recorder readings were made at each observation well. The general well information is shown in table 14, and the well locations are shown in figure 77. The aquifer test data are presented as graphs in appendix 34 and as tables in appendices 35 through 37. The pumping well discharge data is presented in appendix 38, and the data analysis results are summarized in table 15.

Little weather change occurred during the aquifer test. The maximum barometric pressure change was about 0.10 ft (app. 34), a small percentage of the observed drawdowns. Thus, adjusting the raw data prior to data analyses was unnecessary.

The response to pumping at different wells varied, revealing a Poe Valley compartment. The pumping well KLAM 10292 and well KLAM 10252 are in the central portion of the Swan Lake Valley to Poe Valley sub-area. Ground water in basalt at well KLAM 10252 responded directly to pumping. Conversely, the response of ground water in basalt at well KLAM 51131 was slight, the first indication the well is within a ground water compartment (south Poe Valley). Subsequent evidence included a local geologic structure apparent on plate 3 and ground water level fluctuations over time at KLAM 51131 differing from KLAM 10252 (app. 12).

Table 14. General information related to wells used for the OWRD 1999 aquifer test in northern Poe Valley, Swan Lake Valley to Poe Valley sub-area (the depth to basalt indicates the thickness of the overlying sedimentary deposits)

Well	Total Depth (feet)	Casing Interval (feet)	Seal Interval (feet)	Depth to Basalt (feet)
KLAM 10292*	432	+1 to 39	0 to 39	123
KLAM 10252*	543	+1 to 41	0 to 41	160
KLAM 51131**	1,009	+1 to 24	0 to 24	565
*central (main) portion		**south Poe Valley compartment		

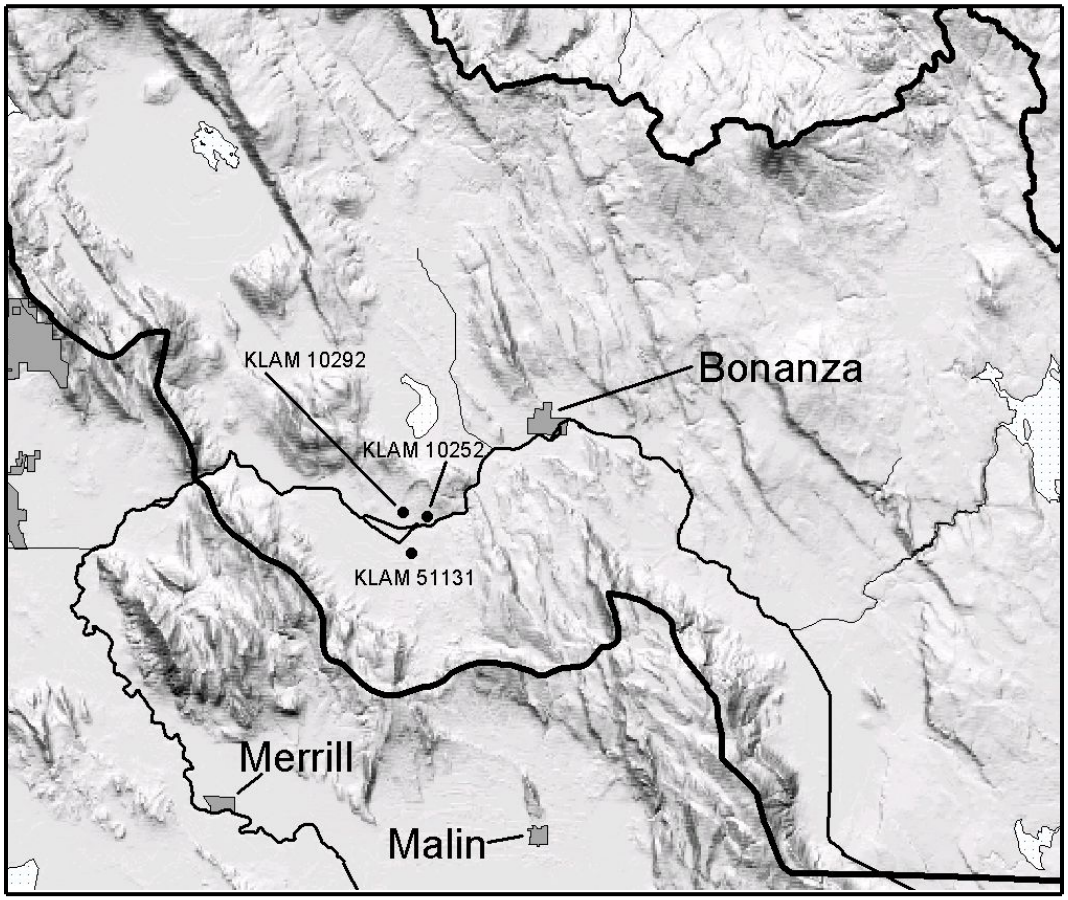


Figure 77. Location of wells used for the OWRD 1999 aquifer test in north Poe Valley within the Swan Lake Valley to Poe Valley sub-area

Table 15. Summary of estimated basalt transmissivity and storage coefficient values for basalt in the central portion of the Swan Lake Valley to Poe Valley sub-area using OWRD 1999 north Poe Valley aquifer test data

Well	Analysis Method	Transmissivity (ft^2/d)	Storage Coefficient	Comment
KLAM 10292 Pumping Well	3	55,544	N.A.	Early Data
		280,420***	N.A.	Middle Data
		111,110**	N.A.	Late Data
	4	N.A.	N.A.	Early Data
		471,106***	N.A.	Middle Data
		261,726**	N.A.	Late Data
KLAM 10252 4,020 ft to Pumping Well	1	170,468	0.00047	Early Data
		127,851	0.00041	All Data
	2	230,132	0.00053	Early Data
		119,328	0.00040	All Data
	3	841,261*	0.00045	Early Data 1
		261,726*&**	0.00031*&**	Early Data 2
		141,899*&**	0.00030*&**	Middle Data
		105,158*&**	0.00056*&**	Late Data
	4	692,803	4.9×10^{-11}	Early Data 1
		261,726**	0.00001**	Early Data 2
		147,221**	0.00022**	Middle Data
		210,315***	0.00004***	Late Data

KLAM 10292 and KLAM 10252 are in the central portion of the sub-area
KLAM 51131 south Poe Valley compartment, no or slight response to pumping, no analysis

Analysis Method
1 = Theis log-log Time versus drawdown method
2 = Theis log-log time/distance^2 versus drawdown method
3 = Jacob-Cooper semi-log time versus drawdown method
4 = Semi-log time versus recovery method
Note: measurement difficulties precluded analysis of KLAM 10292 early recovery data
*Note: means caution, u value is greater than 0.01
**Note: means possible no-flow boundary influence
***Note: means possible recharge boundary or leaky aquifer influence

The water level data for ground water in basalt at wells KLAM 10252 and KLAM 10292 show boundary influences. The late drawdown and recovery data from pumping well KLAM 10292 indicate a no-flow boundary. The middle drawdown and recovery data may indicate a recharge boundary, delayed yield or a leaky aquifer response due to induced inflow of water to the basalt from the overlying sedimentary deposits. The drawdown data from observation well KLAM 10252 indicate three possible no-flow boundaries. The recovery data indicate two or possibly three no-flow boundaries and an apparent recharge boundary, delayed yield or a leaky aquifer response.

Efforts to locate the no-flow boundaries from the aquifer test data were partially successful. Locating flow boundaries from aquifer test data requires two or more boundary influenced observation wells. This aquifer test had one. The estimated radial distances from that well to the multiple no-flow boundary image wells were about 4,580 ft, 5,790 ft, 7,840 ft, and 17,300 ft. This could put possible boundaries from about 250 ft to 10,600 ft from the pumping well. Faults mapped by Hladky (2003) and others apparent on plate 3 occur within these distances.

Multiple analyses yielded a range of basalt transmissivity and storage coefficient values for the central portion of the sub-area (table 15). The transmissivity values estimated ranged from 55,500 to over 840,000 ft^2/d (415,000 to over 6,284,000 gal/d/ft). Most values ranged from 105,000 to 261,000 ft^2/d (785,000 to 1,952,000 gal/d/ft). The storage coefficient values generally ranged from 0.00022 to 0.00056, indicating confined ground water conditions. However, that does not imply ground water in basalt is isolated from ground water in the overlying sediments as the previous discussion about storage coefficient values noted.

This investigation derived an effective transmissivity of 150,000 ft^2/d (1,122,000 gal/d/ft) and storage coefficient of 0.00040 for basalt in the central portion of the Swan Lake Valley to Poe Valley sub-area. The values account for boundary influences. The values were needed for use in Theis equation calculations of ground water drawdown in the area due to pumping ground water from the basalt. Again, the values were determined after iteratively using the Theis equation with various transmissivity and storage coefficient value combinations (constrained by table 15) to approximate the 24-hour aquifer test drawdowns observed at KLAM 10252 and KLAM 10292. The values yielded 1.35 ft estimated drawdown versus 1.58 ft observed for KLAM 10252 and 7.01 ft estimated versus 6.78 ft observed for KLAM 10292 (after accounting for well efficiency).

This investigation also obtained an effective transmissivity of 7,260 ft^2/d and storage coefficient of 0.000575 for the basalt in the south Poe Valley compartment. The values include possible boundary influences and can be used to estimate drawdown in the south Poe Valley compartment. In lieu of aquifer test data, the values were derived using early 2000 and 2001 drawdown data at recorder well KLAM 51131 (app. 12), ground water pumping data supplied to the Bureau of Reclamation, and graphical analyses (Theis log-log and Jacob-Copper semi-log). The semi-log graphs of the drawdown data indicate the presence of multiple no-flow boundaries. The values were obtained by using Theis equation calculations to reproduce the 2000 and 2001 drawdowns. The values yielded an estimated drawdown of 5.93 ft and 11.18 ft versus observed drawdown of 8.83 ft and 12.95 ft after 4.5 and 11.5 days of pumping respectively.

Aquifer Properties Conclusion

The eastern Lost River sub-basin hydrogeologic complexities are reflected in the different aquifer properties for the different sub-areas and sub-area compartments. This is evident in the values for each sub-area shown in tables 8 through 15 and in the effective transmissivities and storage coefficients estimated for those areas (table 16). The effective values are the actual values adjusted to include various boundary, delayed yield, or leaky aquifer influences. This adjustment is necessary when using the Theis equation to calculate ground water drawdown in areas where these influences are present.

Table 16. Summary of effective basalt transmissivity and storage coefficient values for the eastern Lost River sub-basin

Sub-Area	Compartment	Transmissivity (ft^2/d)	Storage Coefficient
South Langell Valley	N.A.	600,000	0.00025
Lorella	Northeast	50,000	0.00030
	Southeast	2,050	0.00030
	Terrace	12,000	0.00015
Bonanza	N.A.	334,201	0.00096
Swan Lake Valley to Poe Valley	Central Portion	150,000	0.00040
	South Poe Valley	7,260	0.00058

Note: the Terrace compartment is the Bryant Mountain to Dead Indian Hill terrace middle
Note: no values were estimated for the other Lorella compartments
Note: no values were estimated for the other Swan Lake Valley to Poe Valley compartments
Note: the effective values include various boundary or leaky aquifer influences

Potential Ground Water Drawdowns
Related to ADR Ground Water Permits

Introduction

In 1996, thirty-two ground water applicants in the eastern Lost River sub-basin received permits (app. 1) after completing an alternative dispute resolution (ADR) negotiation process. These ADR permits include conditions requiring the Oregon Water Resources Department to decide whether the permits will expire or will mature into certificates based upon four conditions, two technical and two non-technical. The Ground Water Development section addresses one technical condition: whether ground water use has caused long-term water level declines. This section addresses the other technical condition, whether:

> "River stage or Bonanza Big Springs flows are not significantly diminished by use of water under each permit…using quantifiable groundwater and hydrologic science that stands up to peer review"

To address this condition, this investigation used the Theis equation to calculate the potential drawdown of ground water in basalt at the Lost River, Bonanza Big Springs, and other springs due to pumping ground water as allowed by the ADR permits.

The affect of pumping ground water from basalt upon the river or springs is directly proportional to the ground water drawdown in basalt it causes at the river or springs. Larger drawdowns cause larger affects at the river or spring. The rate of ground water discharge to a river via springs or seepage decreases as the ground water level above river stage falls. Discharge ceases when the ground water level equals river stage. Then, the rate of reverse flow (river water loss to ground water) increases as the ground water level falls below river stage. Sophocleous (2002) and Rushton and Tomlinson (1979) discuss in more detail the relationship between ground water elevation, river stage and the rate of water exchange between ground water and a river via seepage and springs.

Method Used for Estimating Potential Ground Water Drawdowns

Theis (1935) developed an analytic mathematical solution for ground water flow to a pumping well. It can be written in terms of ground water drawdown:

$$s = \frac{Q}{4\Pi T} W(u)$$

where:

$$u = \frac{r^2 S}{4Tt}$$

s = drawdown at a specific time and distance from the pumping well
Q = well constant pumping rate
Π = pi = 3.14159
T = transmissivity
W(u) = well function (an exponential integral)
$= (-0.5772157)-(\ln u)+(u)-(u^2/(2\bullet 2!))+(u^3/(3\bullet 3!))-(u^4/(4\bullet 4!))+...$
r = radial distance from site of interest to the pumping well
S = storage coefficient
t = time since pumping began

Drawdown at any location is dependent upon the well pumping rate, aquifer transmissivity and storage coefficient, site distance from the pumping well, and elapsed pumping time. Higher pumping rates, smaller transmissivity and storage coefficient, shorter distance from the pumping well, and longer elapsed time lead to larger drawdown estimates. Conversely, smaller pumping rates, larger transmissivity and storage coefficient, greater distance from the pumping well, and shorter elapsed time lead to smaller drawdown estimates.

The solution assumes:

1. the well discharge is constant;
2. the aquifer is homogeneous and isotropic;
3. the aquifer has no boundaries (infinite extent);
4. the well diameter is infinitely small;
5. the well fully penetrates the entire aquifer thickness;
6. the aquifer storage coefficient is constant; and
7. the water from storage is discharged immediately with drawdown

Rarely do field conditions fully satisfy these assumptions. Nevertheless, the Theis solution is the most widely accepted analytical technique, and it yields useful estimates of ground water response to pumping.

This investigation used the Theis solution to calculate:

1. the potential drawdown at the Lost River (nearest sub-area reach) caused by ground water pumping by each ADR permit well;
2. the drawdown at an identified spring within the same sub-area caused by ground water pumping by each ADR permit well;

3. the drawdown using the maximum permitted pumping rate;
    a. irrigating all acreage permitted;
    b. irrigating primary acreage only;
    c. irrigating supplemental acreage only;
4. the drawdown using a pro-rated pumping rate (total permitted volume divided by the total permitted pumping period);
    a. irrigating all acreage permitted;
    b. irrigating primary acreage only;
    c. irrigating supplemental acreage only;
5. the drawdowns at the end of 30 days and the end of the irrigation season (most often 184 days) for each pumping rate; and
6. the range of drawdown caused by ADR permits with multiple wells by successively assigning 100 percent of the pro-rated and maximum permitted pumping rate to each well unless the permit assigned a pumping rate to each well;

Each calculation accounted for boundary or leaky aquifer influences by:

1. limiting drawdown to the immediate sub-area or compartment only; and
2. using effective transmissivities and storage coefficients for each sub-area or compartment (table 16).

As noted above, the drawdown calculations included using continuous pumping at the maximum rates allowed by the ground water permits and a pro-rated rate. Using the different pumping rates was necessary for the following reason. Ground water permits for irrigation often specify the maximum pumping rate allowed, the period of use (beginning and ending dates pumping can occur), and the maximum volume of water that can be used during that period. Given the permits specify a maximum pumping rate allowed, it was necessary to calculate ground water drawdowns using that rate. However, irrigators rarely use the maximum pumping rate for the entire irrigation season. Moving irrigation equipment, harvesting, weather, and other factors often interrupt ground water pumping. Additionally, irrigators may use a pumping rate less than the maximum allowed, or pump intermittently to ensure they can legitimately use ground water late in the irrigation season. Continuously pumping at the maximum rate allowed would cause many irrigators to use the total volume of permitted ground water before the end of the irrigation season. Given the reduced pumping rate or intermittent pumping conditions, it was also necessary to calculate ground water drawdown using pro-rated pumping rates. The pro-rated pumping rates were obtained by:

$$\text{Pro-rated pumping rate} = \frac{\text{total volume allowed (cubic feet or gallons)}}{\text{total period of use (seconds or minutes)}}$$

River and spring sites selected for drawdown calculations were limited to sites within the same sub-area or compartment as the pumping well. For example, individual and cumulative ground water drawdown calculated for the Bonanza Big Springs site was limited to ADR permits with wells located in Bonanza sub-area only. The reason for limiting the drawdown calculations to the same sub-area or compartment as the pumping well relates to 1999 through 2002 water level data indicating the ground water response to summer pumping from basalt did not propagate beyond sub-area or compartment boundaries during those years.

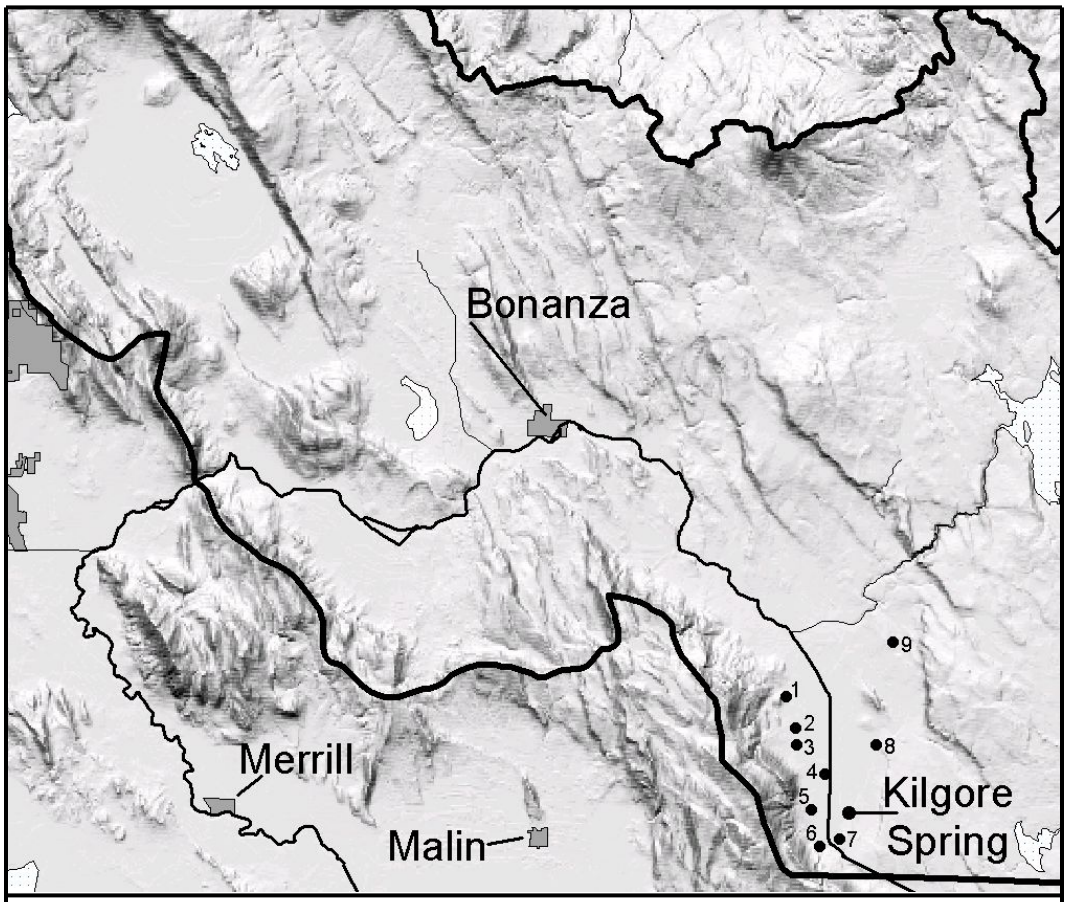
For each ADR permit, a drawdown was calculated at the closest Lost River site in the same sub-area or compartment as the ADR permit well, a different site for each permit. These individual drawdowns represent the maximum ground water drawdown pumping a given well will cause at the river.

Again for each ADR permit, a drawdown was calculated at one of three springs if present in the same sub-area or compartment as the ADR permit well. The springs are Bonanza Big Springs in the Bonanza sub-area, Kilgore Spring in the south Langell Valley sub-area, and High spring in the central portion of the Swan Lake Valley to Poe Valley sub-area. The ADR permit conditions address Bonanza Big Springs only. In addition to these individual drawdowns, the principle of superposition allowed calculating a cumulative drawdown at the spring sites, all the calculated drawdowns at a spring added together.

South Langell Valley Sub-Area

The Theis solution was used to calculate the potential ground water drawdown in basalt at the nearest Lost River reach and at Kilgore Spring due to the use of nine wells associated with seven ADR ground water permits. The well locations are shown in figure 78. All the calculations used an effective basalt transmissivity and storage coefficient value of 600,000 ft^2/d (4,490,000 gal/d/ft) and 0.00025 respectively. The calculations are detailed in appendix 39, and the results are summarized in tables 17 and 18.

The calculated potential drawdown of ground water in basalt at the nearest Lost River reach for each ADR permit well varied (table 17). The individual total drawdowns ranged from less than 0.10 ft to nearly 1.00 ft for 30 and 184 days of continuous pumping at the maximum rate permitted. The individual totals ranged from less than 0.10 ft to over 0.50 ft for 30 and 184 days of pro-rated pumping. No cumulative drawdown was calculated for the Lost River because the nearest Lost River reach for each well is a different river location.



Site 1 = KLAM 14873
Site 2 = KLAM 10641
Site 3 = KLAM 10495
Site 4 = KLAM 10764
Site 5 = KLAM 10748
Site 6 = KLAM 10575
Site 7 = KLAM 10642
Site 8 = KLAM 10473
Site 9 = KLAM 10458

Figure 78. Location of south Langell Valley sub-area wells subject to ADR permit conditions

Table 17. Summary of calculated potential drawdowns at the Lost River caused by exercising ADR permits in the south Langell Valley sub-area

Application Permit Applicant Priority	Well	Primary Acres Drawdowns (feet)	Supplemental Acres Drawdowns (feet)	Total Acres Drawdowns (feet)	Comments
G-12885 G-12455 Biaggi 4/20/1992	KLAM 14873	**62.60**	**165.00**	**227.60**	Acres
		0.02	0.05	0.07	30 days cont
		0.02	0.06	0.09	184 days cont
		0.02	0.05	0.07	30 days pro
		0.02	0.06	0.09	184 days pro
G-13011 G-12459 Hammerich 6/29/1992	KLAM 10641	**108.00**	**981.20**	**1,089.20**	Acres
		0.13	1.20	1.33	30 days cont
		0.16	1.46	1.62	184 days cont
		0.07	0.66	0.73	30 days pro
		0.09	0.80	0.89	184 days pro
	or KLAM 10495	0.13	1.22	1.35	30 days cont
		0.16	1.47	1.63	184 days cont
		0.07	0.67	0.74	30 days pro
		0.09	0.81	0.90	184 days pro
	or KLAM 10764	0.20	1.83	2.03	30 days cont
		0.23	2.08	2.31	184 days cont
		0.11	1.00	1.11	30 days pro
		0.13	1.14	1.27	184 days pro
G-12901 G-13743 Smith 5/4/1992	KLAM 10458	**0.00**	**170.70**	**170.70**	Acres
		0.00	0.16	0.16	30 days cont
		0.00	0.20	0.20	184 days cont
		0.00	0.09	0.09	30 days pro
		0.00	0.12	0.12	184 days pro
G-13514 G-13775 Randall 9/13/1993	KLAM 10473	**87.60**	**0.00**	**87.60**	Acres
		0.10	0.00	0.10	30 days cont
		0.12	0.00	0.12	184 days cont
		0.10	0.00	0.10	30 days pro
		0.12	0.00	0.12	184 days pro
G-13184 G-12463 Balin 11/13/1992	KLAM 10748	**476.00**	**96.90**	**572.90**	Acres
		0.68	0.14	0.82	30 days cont
		0.80	0.16	0.96	184 days cont
		0.37	0.08	0.45	30 days pro
		0.44	0.09	0.53	184 days pro
G-13106 G-12462 Grohs 9/8/1992	KLAM 10575	**0.00**	**408.40**	**408.40**	Acres
		0.00	0.56	0.56	30 days cont
		0.00	0.65	0.65	184 days cont
		0.00	0.35	0.35	30 days pro
		0.00	0.41	0.41	184 days pro
G-12972 G- 12458 Balin 6/5/1992	KLAM 10642	**77.80**	**229.30**	**307.10**	Acres
		0.11	0.34	0.45	30 days cont
		0.13	0.39	0.52	184 days cont
		0.07	0.20	0.27	30 days pro
		0.08	0.23	0.31	184 days pro
Totals		**812.00**	**2,051.50**	**2,863.50**	Acres
		N.A.	**N.A.**	**N.A.**	30 days cont
		N.A.	**N.A.**	**N.A.**	184 days cont
		N.A.	**N.A.**	**N.A.**	30 days pro
		N.A.	**N.A.**	**N.A.**	184 days pro

Note: the estimated drawdowns for each well are for the river location closest to that well
Note: local basalt ground water is generally separated from the Lost River by sediments
Note: cont means continuous pumping at full rate allowed
Note: pro means pro-rated pumping (total volume allowed/total pumping period allowed)
Note: sum of primary and supplemental values does not always equal total value due to rounding

Table 18. Summary of calculated potential drawdowns at Kilgore Springs caused by exercising ADR permits in the south Langell Valley sub-area

Application Permit Applicant Priority	Well	Primary Acres Drawdowns (feet)	Supplemental Acres Drawdowns (feet)	Total Acres Drawdowns (feet)	Comments
G-12885 G-12455 Biaggi 4/20/1992	KLAM 14873	**62.60**	**165.00**	**227.60**	Acres
		0.01	0.04	0.05	30 days cont
		0.02	0.05	0.07	184 days cont
		0.01	0.04	0.05	30 days pro
		0.02	0.05	0.07	184 days pro
G-13011 G-12459 Hammerich 6/29/1992	KLAM 10641	**108.00**	**981.20**	**1,089.20**	Acres
		0.10	0.90	1.00	30 days cont
		0.13	1.15	1.28	184 days cont
		0.05	0.49	0.55	30 days pro
		0.07	0.63	0.70	184 days pro
	or KLAM 10495	0.10	0.94	1.05	30 days cont
		0.13	1.20	1.33	184 days cont
		0.06	0.52	0.57	30 days pro
		0.07	0.66	0.73	184 days pro
	or KLAM 10764	0.12	1.13	1.25	30 days cont
		0.15	1.38	1.53	184 days cont
		0.07	0.62	0.69	30 days pro
		0.08	0.76	0.84	184 days pro
G-12901 G-13743 Smith 5/4/1992	KLAM 10458	**0.00**	**170.70**	**170.70**	Acres
		0.00	0.12	0.12	30 days cont
		0.00	0.16	0.16	184 days cont
		0.00	0.07	0.07	30 days pro
		0.00	0.09	0.09	184 days pro
G-13514 G-13775 Randall 9/13/1993	KLAM 10473	**87.60**	**0.00**	**87.60**	Acres
		0.09	0.00	0.09	30 days cont
		0.11	0.00	0.11	184 days cont
		0.09	0.00	0.09	30 days pro
		0.11	0.00	0.11	184 days pro
G-13184 G-12463 Balin 11/13/1992	KLAM 10748	**476.00**	**96.90**	**572.90**	Acres
		0.57	0.12	0.68	30 days cont
		0.69	0.14	0.83	184 days cont
		0.31	0.06	0.37	30 days pro
		0.38	0.08	0.45	184 days pro
G-13106 G-12462 Grohs 9/8/1992	KLAM 10575	**0.00**	**408.40**	**408.40**	Acres
		0.00	0.41	0.41	30 days cont
		0.00	0.50	0.50	184 days cont
		0.00	0.25	0.25	30 days pro
		0.00	0.31	0.31	184 days pro
G-12972 G- 12458 Balin 6/5/1992	KLAM 10642	**77.80**	**229.30**	**307.10**	Acres
		0.09	0.27	0.36	30 days cont
		0.11	0.32	0.43	184 days cont
		0.05	0.16	0.21	30 days pro
		0.07	0.19	0.26	184 days pro
Totals		**812.00**	**2,051.50**	**2,863.50**	Acres
		0.88	**2.07**	**2.95**	30 days cont
		1.08	**2.55**	**3.63**	184 days cont
		0.53	**1.20**	**1.74**	30 days pro
		0.66	**1.48**	**2.14**	184 days pro

Note: Kilgore Springs is part of a north-south series of springs located between the Lost River And East Langell Valley Road
Note: cont means continuous pumping at full rate allowed
Note: pro means pro-rated pumping (total volume allowed/total pumping period allowed)
Note: sum of primary and supplemental values does not always equal total value due to rounding

The south Langell Valley sub-area drawdown calculations also included individual and cumulative drawdown at Kilgore Spring (table 18). The spring is part of a north-south series of springs located between the Lost River and East Langell Valley Road. The ADR permit conditions do not address these springs, but 2001 data indicate a direct connection exists between them and south Langell Valley basalt ground water (fig. 65). Individual calculated drawdowns ranged from less than 0.10 ft to over 1.50 ft for 30 and 184 days of continuous pumping at the maximum rate permitted and ranged from less than 0.10 ft to over 0.80 ft for 30 and 184 days of pro-rated pumping. The cumulative total drawdowns ranged from nearly 3.00 ft to more than 3.50 ft for 30 and 184 days of continuous pumping at the maximum rate permitted, and nearly 1.75 ft to more than 2.00 ft for 30 and 184 days of pro-rated pumping. Cumulative drawdown is the total of all the individual drawdowns calculated for the same location added together.

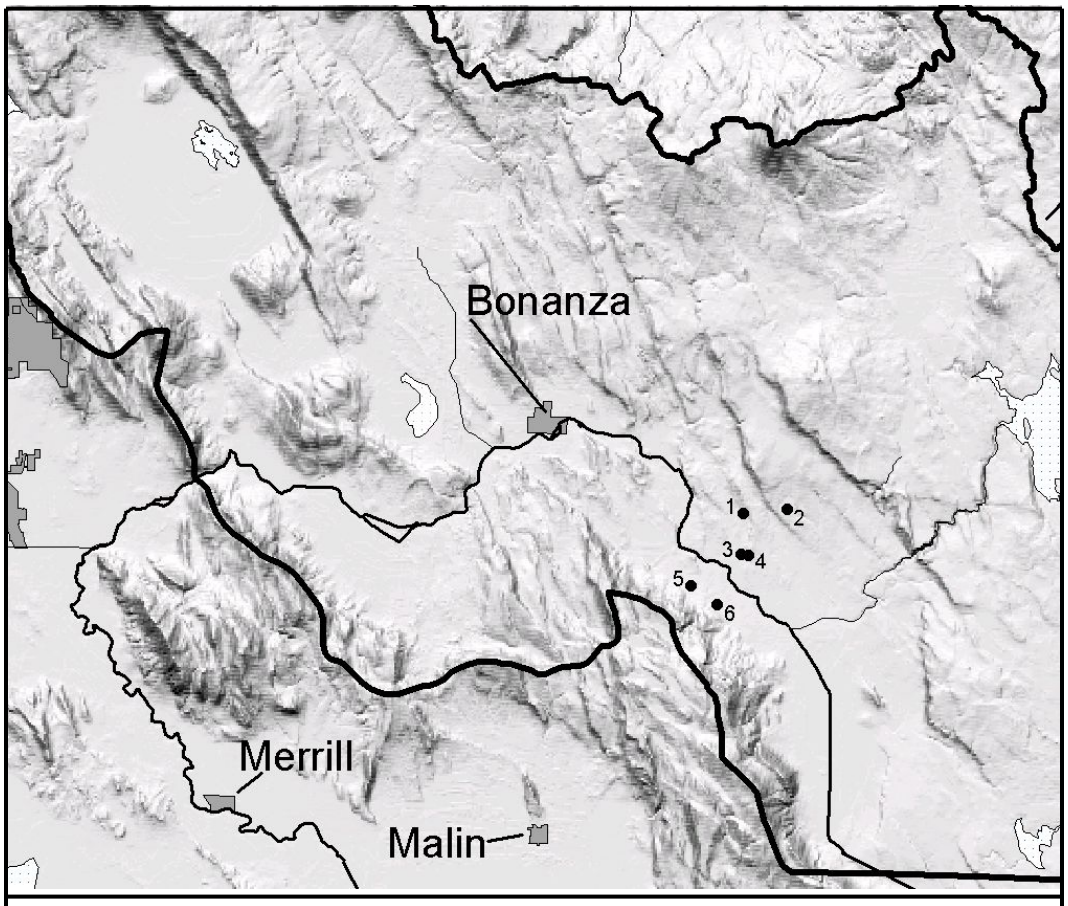
Lorella Sub-Area

The Theis solution was used to calculate the potential ground water drawdowns in basalt caused by individually pumping six Lorella sub-area wells associated with seven ADR ground water permits. The well locations are shown in figure 79. The potential drawdown calculated for each well are detailed in appendix 40 and summarized in table 19.

The potential drawdown calculations for each well were limited to the nearest Lost River reach only, because no obvious short-term connection between any of the wells or springs was established, including Bonanza Big Springs. The calculations assumed drawdown in each compartment could reach the Lost River. However, the compartments likely limit or prevent short-term drawdown at the river. If true, actual drawdown at the river is probably much less than calculated.

The calculations used three different effective basalt transmissivity and storage coefficient values due to different sub-area compartments with different aquifer properties and boundary influences. The various effective basalt transmissivity and storage coefficient values for the Lorella sub-area are generally smaller than for neighboring sub-areas. That led to larger potential drawdown calculations for the sub-area. For well KLAM 10608, no effective values were established for the well's compartment. In lieu of specific values, the low values of a neighboring compartment were used to estimate worst-case drawdowns.

The calculated potential drawdowns of ground water in basalt at the nearest Lost River reach for each ADR permit well are summarized in table 19. The individual total drawdowns ranged from less than 2.00 ft to over 10 ft (over 85 ft, worst-case) for 30 and 184 days of continuous pumping at the maximum rate permitted. The individual totals ranged from less than 1 ft to over 5 ft (over 45 ft, worst-case) for 30 and 184 days of pro-rated pumping. No cumulative drawdown is given in the table because of compartmentalization and that the nearest Lost River reach for each well is a different river location.



Site 1 = KLAM 10526
Site 2 = KLAM 13556
Site 3 = KLAM 10634
Site 4 = KLAM 10608
Site 5 = KLAM 10699
Site 6 = KLAM 14864

Figure 79. Location of Lorella sub-area wells subject to ADR permit conditions

Table 19. Summary of calculated potential drawdowns at the Lost River caused by exercising ADR ground water permits in the Lorella sub-area

Application Permit Applicant Priority	Well	Primary Acres Drawdowns (feet)	Supplemental Acres Drawdowns (feet)	Total Acres Drawdowns (feet)	Comments
G- 12493 G- 12624 Randall 4/22/1991	KLAM[1] 13556	**5.50**	**244.50**	**250.00**	Acres
		0.04	1.73	1.77	30 days cont
		0.06	2.49	2.55	184 days cont
		0.02	0.95	0.97	30 days pro
		0.03	1.36	1.39	184 days pro
G- 13387 G- 12465 DeJong 5/3/1993	KLAM[2] 10526	**57.90**	**276.00**	**333.90**	Acres
		0.49	2.34	2.83	30 days cont
		0.67	3.20	3.87	184 days cont
		0.27	1.28	1.55	30 days pro
		0.37	1.75	2.12	184 days pro
G-13101 G-12461 Barrett 8/31/1992	KLAM[2] 10634	**106.50**	**285.00**	**391.50**	Acres
		1.31	3.49	4.80	30 days cont
		1.64	4.38	6.02	184 days cont
		0.72	1.91	2.63	30 days pro
		0.90	2.40	3.30	184 days pro
	or KLAM[3] 10608	15.54*	41.58*	57.11*	30 days cont
		23.57*	63.07*	86.64*	184 days cont
		8.51*	22.78*	31.30*	30 days pro
		12.92*	34.56*	47.48*	184 days pro
G-12772 G-12448 Gibson 2/5/1992	KLAM[4] 10699	**94.40**	**153.40**	**247.80**	Acres
		3.85	6.25	10.10	30 days cont
		5.11	8.30	13.40	184 days cont
		2.05	3.34	5.39	30 days pro
		2.73	4.43	7.15	184 days pro
G-13198 G-12497 Gallup 11/25/1992	KLAM[4] 14864	**72.20**	**0.00**	**72.20**	Acres
		2.99	0.00	2.99	30 days cont
		3.92	0.00	3.92	184 days cont
		1.64	0.00	1.64	30 days pro
		2.15	0.00	2.15	184 days pro
Totals		**336.50**	**958.90**	**1,295.40**	Acres
		N.A.	**N.A.**	**N.A.**	30 days cont
		N.A.	**N.A.**	**N.A.**	184 days cont
		N.A.	**N.A.**	**N.A.**	30 days pro
		N.A.	**N.A.**	**N.A.**	184 days pro

Note: compartmentalization may limit short-term connections between wells and the Lost River
Note: conducted calculations as if the wells are hydraulically connected to the Lost River
Note: the estimated drawdowns for each well are for the river location closest to that well
Note: local basalt ground water is generally separated from the Lost River by sediments
Note: cont means continuous pumping at full rate allowed
Note: pro means pro-rated pumping (total volume allowed/total pumping period allowed)
Note: sum of primary and supplemental values does not always equal total value due to rounding

* no aquifer parameters for this low transmissivity compartment, used southeast compartment values for worst case, well owner finds the production at this well very inadequate

1 = northeast of Lorella compartment
2 = west of Wolf Flat terrace compartment
3 = Wolf Flat terrace compartment
4 = terrace between Bryant Mountain and the Lost River compartment

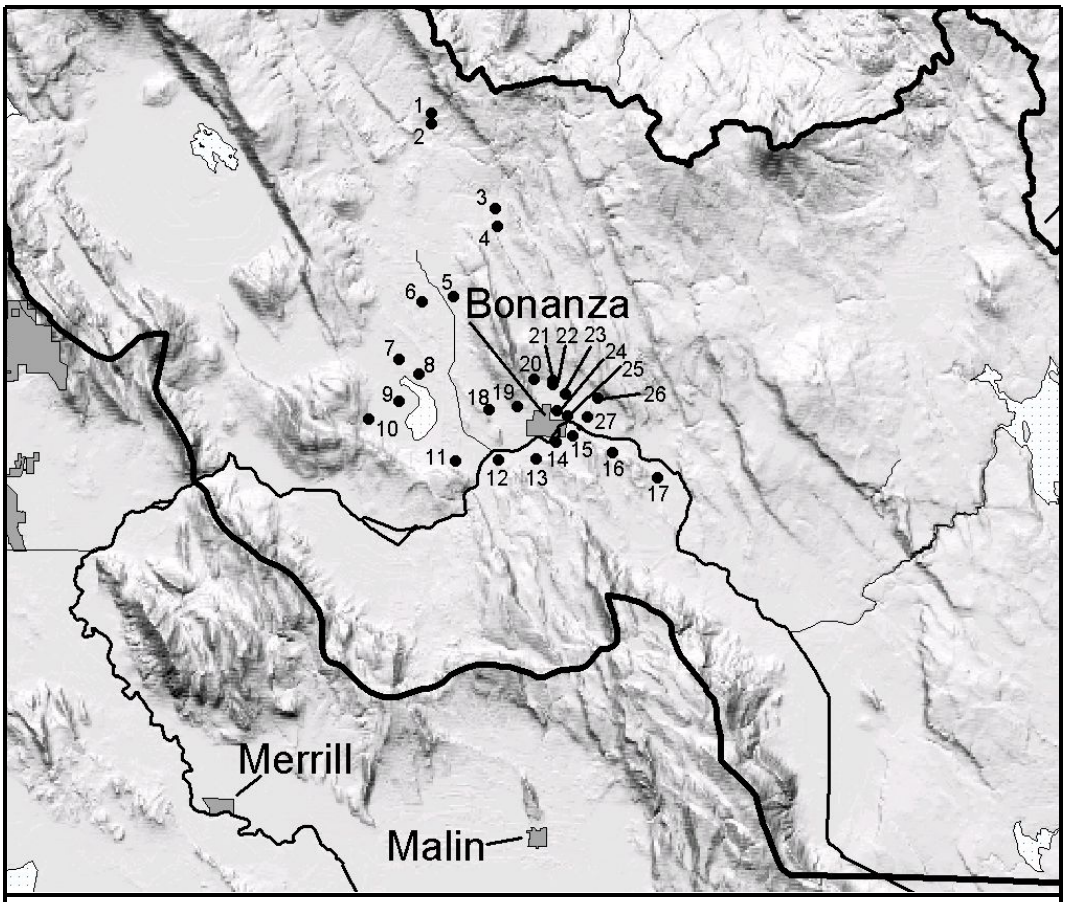
Bonanza Sub-Area

The Theis solution was used to calculate the potential drawdown of ground water in basalt at the nearest Lost River reach and at Bonanza Big Springs caused by individually pumping twenty-seven wells associated with eighteen ADR ground water permits. The well locations are shown in figure 80. All the estimates used an effective basalt transmissivity and storage coefficient value of 334,201 ft^2/d (2,500,000 gal/d/ft) and 0.00096 respectively. These are consistent with available data. The drawdown calculations are detailed in appendix 41 and summarized in tables 20 and 21.

The potential drawdown of ground water in basalt at the nearest Lost River reach was calculated for each ADR ground water permit well. The individual total drawdowns ranged from less than 0.05 ft to over 1.75 ft for 30 and 184 days of continuous pumping at the maximum rate permitted. The individual totals ranged from less than 0.05 ft to nearly 1.00 ft for 30 and 184 days of pro-rated pumping. No cumulative drawdown was calculated because the nearest Lost River reach for each well is a different river location.

Calculating drawdowns at Bonanza Big Springs required a 75 percent adjustment (a 25 percent reduction) of the Theis solution derived drawdowns. The reason for the adjustment relates to observed ground water levels in basalt at the springs showing the same fluctuations as the rest of the sub-area but dampened. The adjustment came from analysis of water level data. The analysis compared multiple ground water level changes at well KLAM 50318 (adjacent to Bonanza Big Springs and the Lost River) to the changes at well KLAM 13353 (about 3,100 ft to the northwest in northwest Bonanza) and well KLAM 51922 (about 1,300 ft to the northeast, east of Bonanza). The reason for the dampened ground water level fluctuations at Bonanza Big Springs is uncertain. It may relate to a change in the hydraulic properties of the basalt at the springs due to a local fault and/or to the head dependent ground water discharge at the springs.

The total potential drawdown of ground water in basalt at Bonanza Big Springs for each ADR ground water permit well is summarized in table 21. The individual total drawdowns ranged from less than 0.05 ft to over 1.00 ft for 30 and 184 days of continuous pumping at the maximum rate permitted. The individual totals ranged from less than 0.05 ft to nearly 0.60 ft for 30 and 184 days of pro-rated pumping. The cumulative total drawdowns ranged from over 5.40 ft to nearly 7.25 ft for 30 and 184 days of continuous pumping at the maximum rate permitted and nearly 3.10 ft to more than 4.10 ft for 30 and 184 days of pro-rated pumping. Cumulative drawdown is the total of the individual drawdowns calculated for the same location added together. The estimated drawdowns using the pro-rated pumping rate best represent existing ground water irrigation practices.



Site 1 = KLAM 10181	Site 14 = KLAM 10378
Site 2 = KLAM 2373	Site 15 = KLAM 999976
Site 3 = KLAM 12261	Site 16 = KLAM 13403
Site 4 = KLAM 999990	Site 17 = KLAM 51920
Site 5 = KLAM 999991	Site 18 = KLAM 10475
Site 6 = KLAM 12415	Site 19 = KLAM 10460
Site 7 = KLAM 999995	Site 20 = KLAM 10421
Site 8 = KLAM 13458	Site 21 = KLAM 10352
Site 9 = KLAM 13462	Site 22 = KLAM 10357
Site 10 = KLAM 999997	Site 23 = KLAM 10461
Site 11 = KLAM 10498	Site 24 = KLAM 10242
Site 12 = KLAM 10432	Site 25 = KLAM 10416
Site 13 = KLAM 10431	Site 26 = KLAM 13326
Site 27 = KLAM 10440	

Figure 80. Location of Bonanza sub-area wells subject to ADR permit conditions (numbers beginning with 9 are project assigned numbers for wells with no water well report)

Table 20. Summary of calculated potential drawdowns at the Lost River caused by exercising ADR permits in the Bonanza sub-area

Application Permit Applicant Priority	Well	Primary Acres Drawdowns (feet)	Supplemental Acres Drawdowns (feet)	Total Acres Drawdowns (feet)	Comments
G- 13013 G- 12435 Johnson/ Jeld-Wen 6/29/1992	KLAM 2373	**31.60**	**0.00**	**31.60**	Acres
		0.02	0.00	0.02	30 days cont
		0.03	0.00	0.03	184 days cont
		0.01	0.00	0.01	30 days pro
		0.02	0.00	0.02	184 days pro
	and KLAM 10181	**31.00**	**0.00**	**31.00**	Acres
		0.02	0.00	0.02	30 days cont
		0.03	0.00	0.03	184 days cont
		0.01	0.00	0.01	30 days pro
		0.02	0.00	0.02	184 days pro
G- 12618 G-12441 Haskins 7/22/1991	KLAM 12415	**17.80**	**497.30**	**515.10**	Acres
		0.02	0.43	0.45	30 days cont
		0.02	0.66	0.68	184 days cont
		0.01	0.24	0.25	30 days pro
		0.01	0.36	0.38	184 days pro
	or KLAM 999991 (no well log)	0.02	0.44	0.46	30 days cont
		0.02	0.67	0.70	184 days cont
		0.01	0.24	0.25	30 days pro
		0.01	0.37	0.38	184 days pro
G- 12769 G- 13178 Ritter 8/15/1994	KLAM 12261	**172.10**	**26.40**	**198.50**	Acres
		0.07	0.01	0.08	30 days cont
		0.12	0.02	0.14	214 days cont
		0.05	0.01	0.06	30 days pro
		0.09	0.01	0.11	214 days pro
	or KLAM 999990 (no well log)	0.06	0.01	0.07	30 days cont
		0.12	0.02	0.13	214 days cont
		0.05	0.01	0.06	30 days pro
		0.09	0.01	0.10	214 days pro
G-12897 G-12456 Gorden 4/30/1992	KLAM 13458	**106.30**	**184.60**	**290.90**	Acres
		0.12	0.21	0.33	30 days cont
		0.17	0.29	0.46	184 days cont
		0.07	0.11	0.18	30 days pro
		0.09	0.16	0.25	184 days pro
	or KLAM 999995 (no well log)	0.11	0.19	0.30	30 days cont
		0.16	0.27	0.43	184 days cont
		0.06	0.10	0.16	30 days pro
		0.09	0.15	0.24	184 days pro
G-12617 G-12440 Newman & Uecker 7/22/1991	KLAM 13462	**525.30**	**0.00**	**525.30**	Acres
		0.33	0.00	0.33	30 days cont
		0.47	0.00	0.47	184 days cont
		0.33	0.00	0.33	30 days pro
		0.46	0.00	0.46	184 days pro
	or KLAM 999997 (no well log)	0.31	0.00	0.31	30 days cont
		0.45	0.00	0.45	184 days cont
		0.31	0.00	0.31	30 days pro
		0.44	0.00	0.44	184 days pro

Table 20 (continued)

Application Permit Applicant Priority	Well	Primary Acres Drawdowns (feet)	Supplemental Acres Drawdowns (feet)	Total Acres Drawdowns (feet)	Comments
G-12746 G-12445 Horsley 12/31/1991	KLAM 13326	**139.00**	**193.20**	**332.20**	Acres
		0.23	0.32	0.56	30 days cont
		0.30	0.41	0.71	184 days cont
		0.13	0.18	0.30	30 days pro
		0.16	0.23	0.39	184 days pro
	or KLAM 10440	0.30	0.42	0.73	30 days cont
		0.37	0.51	0.88	184 days cont
		0.17	0.23	0.40	30 days pro
		0.20	0.28	0.48	184 days pro
G-12735 G-12444 Teague 12/19/1991	KLAM 10352	**35.30**	**120.80**	**156.10**	Acres
		0.06	0.19	0.25	30 days cont
		0.07	0.25	0.32	184 days cont
		0.03	0.11	0.14	30 days pro
		0.04	0.14	0.18	184 days pro
	or KLAM 10357	0.06	0.20	0.26	30 days cont
		0.07	0.25	0.33	184 days cont
		0.03	0.11	0.14	30 days pro
		0.04	0.14	0.18	184 days pro
G-12876 G-12453 Masten 4/15/1992	KLAM 10461	**0.00**	**265.10**	**265.10**	Acres
		0.00	0.49	0.49	30 days cont
		0.00	0.61	0.61	184 days cont
		0.00	0.27	0.27	30 days pro
		0.00	0.34	0.34	184 days pro
G-12955 G-12457 Brock 6/4/1992	KLAM 10421	**91.50**	**316.20**	**407.70**	Acres
		0.12	0.41	0.53	30 days cont
		0.16	0.54	0.70	184 days cont
		0.08	0.26	0.33	30 days pro
		0.10	0.34	0.44	184 days pro
G-12877 G-12454 Masten 4/15/1992	KLAM 10475	**188.80**	**373.50**	**562.30**	Acres
		0.29	0.57	0.85	30 days cont
		0.37	0.74	1.11	184 days cont
		0.16	0.31	0.47	30 days pro
		0.21	0.41	0.61	184 days pro
	or KLAM 10460	0.32	0.64	0.96	30 days cont
		0.41	0.81	1.22	184 days cont
		0.18	0.35	0.52	30 days pro
		0.22	0.44	0.67	184 days pro
G-12518 G-12469 Wells 5/6/1991	KLAM 10242	**40.10**	**0.00**	**40.10**	Acres
		0.09	0.00	0.09	30 days cont
		0.11	0.00	0.11	184 days cont
		0.05	0.00	0.05	30 days pro
		0.06	0.00	0.06	184 days pro
G-12814 G-12449 Manning 3/9/1992	KLAM 10416	**118.90**	**0.00**	**118.90**	Acres
		0.34	0.00	0.34	30 days cont
		0.39	0.00	0.39	184 days cont
		0.19	0.00	0.19	30 days pro
		0.22	0.00	0.22	184 days pro
G-12766 G-12446 Hill 1/24/1992	KLAM 999976 (no well log)	**96.00**	**0.00**	**96.00**	Acres
		0.23	0.00	0.23	30 days cont
		0.27	0.00	0.27	184 days cont
		0.13	0.00	0.13	30 days pro
		0.15	0.00	0.15	184 days pro

Table 20 (continued)

Application Permit Applicant Priority	Well	Primary Acres Drawdowns (feet)	Supplemental Acres Drawdowns (feet)	Total Acres Drawdowns (feet)	Comments
G-12507 G-12439 Babson 4/26/1991	KLAM 13403	**229.30**	**0.00**	**229.30**	Acres
		0.50	0.00	0.50	30 days cont
		0.60	0.00	0.60	184 days cont
		0.27	0.00	0.27	30 days pro
		0.33	0.00	0.33	184 days pro
G-12732 G-12443 Wiersma 12/12/1991	KLAM 10378	**350.40**	**0.00**	**350.40**	Acres
		1.00	0.00	1.00	30 days cont
		1.16	0.00	1.16	184 days cont
		0.55	0.00	0.55	30 days pro
		0.64	0.00	0.64	184 days pro
G-12768 G-12447 DeJong 2/3/1992	or KLAM 10431	**93.70**	**543.20**	**636.90**	Acres
		0.19	1.12	1.31	30 days cont
		0.24	1.37	1.61	184 days cont
		0.11	0.61	0.72	30 days pro
		0.13	0.75	0.88	184 days pro
	KLAM 10432	0.22	1.27	1.49	30 days cont
		0.26	1.53	1.79	184 days cont
		0.12	0.70	0.82	30 days pro
		0.14	0.84	0.98	184 days pro
G-12874 G-12452 Masten 4/14/1992	KLAM 10498	**68.30**	**180.40**	**248.70**	Acres
		0.17	0.45	0.61	30 days cont
		0.21	0.55	0.76	184 days cont
		0.07	0.19	0.26	30 days pro
		0.09	0.24	0.33	184 days pro
G-12869 G-12451 Babson 4/10/1992	KLAM 51920	**116.10**	**324.20**	**440.30**	Acres
		0.25	0.71	0.96	30 days cont
		0.31	0.86	1.17	184 days cont
		0.14	0.39	0.53	30 days pro
		0.17	0.47	0.64	184 days pro
Totals		**2,451.50**	**3,024.90**	**5,476.40**	Acres
		N.A.	**N.A.**	**N.A.**	30 days cont
		N.A.	**N.A.**	**N.A.**	184 days cont
		N.A.	**N.A.**	**N.A.**	30 days pro
		N.A.	**N.A.**	**N.A.**	184 days pro

Note: the estimated drawdowns for each well are for the river location closest to that well
Note: local basalt ground water is generally separated from the Lost River by sediments
Note: cont means continuous pumping at full rate allowed
Note: pro means pro-rated pumping (total volume allowed/total pumping period allowed)
Note: sum of primary and supplemental values does not always equal total value due to rounding

Table 21. Summary of calculated potential drawdowns at Bonanza Big Springs caused by exercising ADR permits in the Bonanza sub-area

Application Permit Applicant Priority	Well	Primary Acres Drawdowns (feet)	Supplemental Acres Drawdowns (feet)	Total Acres Drawdowns (feet)	Comments
G- 13013 G- 12435 Johnson/ Jeld-Wen 6/29/1992	KLAM 2373	**31.60**	**0.00**	**31.60**	Acres
		0.01	0.00	0.01	30 days cont
		0.02	0.00	0.02	184 days cont
		0.01	0.00	0.01	30 days pro
		0.01	0.00	0.01	184 days pro
	and KLAM 10181	**31.00**	**0.00**	**31.00**	Acres
		0.01	0.00	0.01	30 days cont
		0.02	0.00	0.02	184 days cont
		0.01	0.00	0.01	30 days pro
		0.01	0.00	0.01	184 days pro
G- 12618 G-12441 Haskins 7/22/1991	KLAM 12415	**17.80**	**497.30**	**515.10**	Acres
		0.01	0.31	0.32	30 days cont
		0.02	0.48	0.50	184 days cont
		0.01	0.17	0.18	30 days pro
		0.01	0.26	0.27	184 days pro
	or KLAM 999991 (no well log)	0.01	0.32	0.33	30 days cont
		0.02	0.49	0.51	184 days cont
		0.01	0.18	0.18	30 days pro
		0.01	0.27	0.28	184 days pro
G- 12769 G- 13178 Ritter 8/15/1994	KLAM 12261	**172.10**	**26.40**	**198.50**	Acres
		0.05	0.01	0.06	30 days cont
		0.09	0.01	0.10	214 days cont
		0.04	0.01	0.05	30 days pro
		0.07	0.01	0.08	214 days pro
	or KLAM 999990 (no well log)	0.05	0.01	0.05	30 days cont
		0.09	0.01	0.10	214 days cont
		0.04	0.01	0.04	30 days pro
		0.07	0.01	0.08	214 days pro
G-12897 G-12456 Gorden 4/30/1992	KLAM 13458	**106.30**	**184.60**	**290.90**	Acres
		0.07	0.12	0.19	30 days cont
		0.11	0.19	0.30	184 days cont
		0.04	0.07	0.11	30 days pro
		0.06	0.10	0.16	184 days pro
	or KLAM 999995 (no well log)	0.07	0.11	0.18	30 days cont
		0.10	0.18	0.28	184 days cont
		0.04	0.06	0.10	30 days pro
		0.06	0.10	0.15	184 days pro
G-12617 G-12440 Newman & Uecker 7/22/1991	KLAM 13462	**525.30**	**0.00**	**525.30**	Acres
		0.20	0.00	0.20	30 days cont
		0.30	0.00	0.30	184 days cont
		0.19	0.00	0.19	30 days pro
		0.29	0.00	0.29	184 days pro
	or KLAM 999997 (no well log)	0.18	0.00	0.18	30 days cont
		0.28	0.00	0.28	184 days cont
		0.18	0.00	0.18	30 days pro
		0.28	0.00	0.28	184 days pro

Table 21 (continued)

Application Permit Applicant Priority	Well	Primary Acres Drawdowns (feet)	Supplemental Acres Drawdowns (feet)	Total Acres Drawdowns (feet)	Comments
G-12746 G-12445 Horsley 12/31/1991	KLAM 13326	**139.00**	**193.20**	**332.20**	Acres
		0.15	0.21	0.36	30 days cont
		0.20	0.28	0.47	184 days cont
		0.08	0.11	0.20	30 days pro
		0.11	0.15	0.26	184 days pro
	or KLAM 10440	0.18	0.25	0.42	30 days cont
		0.23	0.31	0.54	184 days cont
		0.10	0.13	0.23	30 days pro
		0.12	0.17	0.30	184 days pro
G-12735 G-12444 Teague 12/19/1991	KLAM 10352	**35.30**	**120.80**	**156.10**	Acres
		0.04	0.14	0.18	30 days cont
		0.05	0.18	0.23	184 days cont
		0.02	0.08	0.10	30 days pro
		0.03	0.10	0.13	184 days pro
	or KLAM 10357	0.04	0.14	0.18	30 days cont
		0.05	0.18	0.24	184 days cont
		0.02	0.08	0.10	30 days pro
		0.03	0.10	0.13	184 days pro
G-12876 G-12453 Masten 4/15/1992	KLAM 10461	**0.00**	**265.10**	**265.10**	Acres
		0.00	0.33	0.33	30 days cont
		0.00	0.42	0.42	184 days cont
		0.00	0.18	0.18	30 days pro
		0.00	0.23	0.23	184 days pro
G-12955 G-12457 Brock 6/4/1992	KLAM 10421	**91.50**	**316.20**	**407.70**	Acres
		0.09	0.31	0.39	30 days cont
		0.12	0.40	0.52	184 days cont
		0.06	0.19	0.25	30 days pro
		0.07	0.25	0.32	184 days pro
G-12877 G-12454 Masten 4/15/1992	KLAM 10475	**188.80**	**373.50**	**562.30**	Acres
		0.19	0.38	0.57	30 days cont
		0.26	0.51	0.76	184 days cont
		0.10	0.21	0.31	30 days pro
		0.14	0.28	0.42	184 days pro
	or KLAM 10460	0.22	0.44	0.67	30 days cont
		0.29	0.57	0.86	184 days cont
		0.12	0.24	0.37	30 days pro
		0.16	0.31	0.47	184 days pro
G-12518 G-12469 Wells 5/6/1991	KLAM 10242	**40.10**	**0.00**	**40.10**	Acres
		0.06	0.00	0.06	30 days cont
		0.07	0.00	0.07	184 days cont
		0.03	0.00	0.03	30 days pro
		0.04	0.00	0.04	184 days pro
G-12814 G-12449 Manning 3/9/1992	KLAM 10416	**118.90**	**0.00**	**118.90**	Acres
		0.18	0.00	0.18	30 days cont
		0.22	0.00	0.22	184 days cont
		0.10	0.00	0.10	30 days pro
		0.12	0.00	0.12	184 days pro
G-12766 G-12446 Hill 1/24/1992	KLAM 999976 (no well log)	**96.00**	**0.00**	**96.00**	Acres
		0.14	0.00	0.14	30 days cont
		0.18	0.00	0.18	184 days cont
		0.08	0.00	0.08	30 days pro
		0.10	0.00	0.10	184 days pro

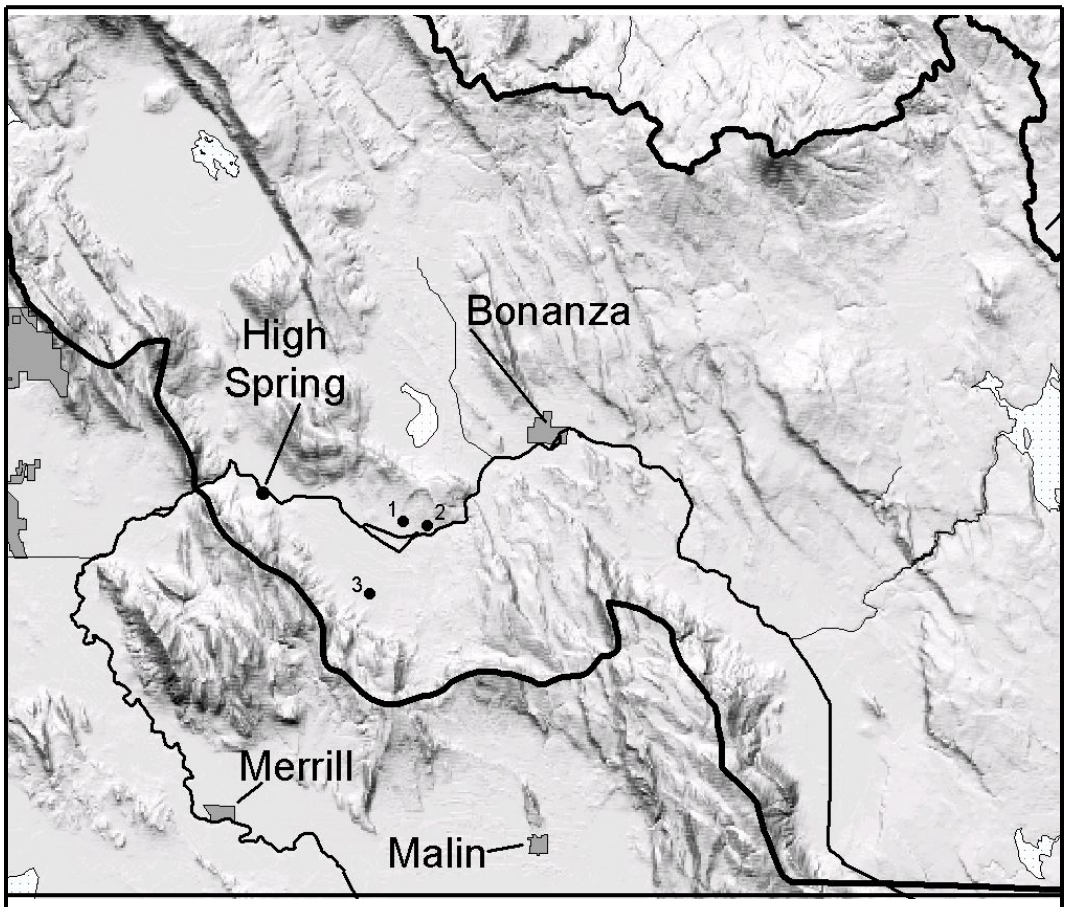
Table 21 (continued)

Application Permit Applicant Priority	Well	Primary Acres Drawdowns (feet)	Supplemental Acres Drawdowns (feet)	Total Acres Drawdowns (feet)	Comments
G-12507 G-12439 Babson 4/26/1991	KLAM 13403	**229.30**	**0.00**	**229.30**	Acres
		0.24	0.00	0.24	30 days cont
		0.32	0.00	0.32	184 days cont
		0.13	0.00	0.13	30 days pro
		0.17	0.00	0.17	184 days pro
G-12732 G-12443 Wiersma 12/12/1991	KLAM 10378	**350.40**	**0.00**	**350.40**	Acres
		0.57	0.00	0.57	30 days cont
		0.70	0.00	0.70	184 days cont
		0.31	0.00	0.31	30 days pro
		0.38	0.00	0.38	184 days pro
G-12768 G-12447 DeJong 2/3/1992	or KLAM 10431	**93.70**	**543.20**	**636.90**	Acres
		0.12	0.69	0.80	30 days cont
		0.15	0.88	1.03	184 days cont
		0.07	0.38	0.44	30 days pro
		0.08	0.48	0.56	184 days pro
	KLAM 10432	0.10	0.56	0.66	30 days cont
		0.13	0.75	0.88	184 days cont
		0.05	0.31	0.36	30 days pro
		0.07	0.41	0.48	184 days pro
G-12874 G-12452 Masten 4/14/1992	KLAM 10498	**68.30**	**180.40**	**248.70**	Acres
		0.07	0.20	0.27	30 days cont
		0.11	0.28	0.38	184 days cont
		0.03	0.08	0.12	30 days pro
		0.05	0.12	0.16	184 days pro
G-12869 G-12451 Babson 4/10/1992	KLAM 51920	**116.10**	**324.20**	**440.30**	Acres
		0.09	0.26	0.35	30 days cont
		0.13	0.37	0.51	184 days cont
		0.05	0.14	0.19	30 days pro
		0.07	0.20	0.28	184 days pro
Totals		**2,451.50**	**3,024.90**	**5,476.40**	Acres
		2.36	**3.06**	**5.42**	30 days cont
		3.12	**4.12**	**7.23**	184 days cont
		1.39	**1.68**	**3.07**	30 days pro
		1.85	**2.26**	**4.11**	184 days pro

Note: the estimated drawdowns for each well are for the river location closest to that well
Note: local basalt ground water is generally separated from the Lost River by sediments
Note: cont means continuous pumping at full rate allowed
Note: pro means pro-rated pumping (total volume allowed/total pumping period allowed)
Note: sum of primary and supplemental values does not always equal total value due to rounding
Note: Theis equation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: aquifer parameters appear to change in the vicinity of Bonanza Big Springs
Note: Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs. KLAM 51922 and KLAM 13353 water level changes

Swan Lake Valley to Poe Valley Sub-Area

The Theis solution was used to calculate potential ground water drawdowns in basalt caused by individually pumping three wells associated with two ADR permits. The well locations are shown in figure 81. Two wells are located in the central portion of the sub-area. The central portion includes south Swan Lake Valley, Pine Flat, and northern Poe Valley. The third well (KLAM 50623) is located in the south Poe Valley compartment. The drawdown calculations are detailed in appendix 42 and summarized in tables 22 and 23.



Site 1 = KLAM 10292
Site 2 = KLAM 10252
Site 3 = KLAM 50623

Figure 81. Location of Swan Lake Valley to Poe Valley sub-area wells subject to ADR permit conditions

Table 22. Summary of calculated potential drawdowns at the Lost River caused by exercising ADR permits in the Swan Lake Valley to Poe Valley sub-area

Application Permit Applicant Priority	Well	Primary Acres Drawdowns (feet)	Supplemental Acres Drawdowns (feet)	Total Acres Drawdowns (feet)	Comments
G-12644 G-12442 Kennedy 8/23/1991	KLAM[1] 10252	**0.00**	**1,483.00**	**1,483.00**	Acres
		0.00	8.17	8.17	30 days cont
		0.00	9.71	9.71	184 days cont
		0.00	4.48	4.48	30 days pro
		0.00	5.32	5.32	184 days pro
	KLAM[1] 10292	0.00	6.93	6.93	30 days cont
		0.00	8.47	8.47	184 days cont
		0.00	3.80	3.80	30 days pro
		0.00	4.64	4.64	184 days pro
G-13019 G-12460 Wells 7/6/1992	KLAM[2] 50623	**0.00**	**272.20**	**272.20**	Acres
		0.00*	9.95*	9.95*	30 days cont
		0.00*	15.72*	15.72*	184 days cont
		0.00*	5.46*	5.46*	30 days pro
		0.00*	8.62*	8.62*	184 days pro
	or KLAM[2] (not drilled)	N.A.	N.A.	N.A.	30 days cont
		N.A.	N.A.	N.A.	184 days cont
		N.A.	N.A.	N.A.	30 days pro
		N.A.	N.A.	N.A.	184 days pro
Totals		**0.00**	**1,755.20**	**1,755.20**	Acres
		N.A.	**N.A.**	**N.A.**	30 days cont
		N.A.	**N.A.**	**N.A.**	184 days cont
		N.A.	**N.A.**	**N.A.**	30 days pro
		N.A.	**N.A.**	**N.A.**	184 days pro

Note: the estimated drawdowns for each well are for the river location closest to that well
Note: local basalt ground water is generally separated from the Lost River by sediments
Note: cont means continuous pumping at full rate allowed
Note: pro means pro-rated pumping (total volume allowed/total pumping period allowed)
Note: sum of primary and supplemental values may not always equal total value due to rounding

* no aquifer test derived parameters for this low transmissivity compartment, used values derived from an analysis of drawdown data at recorder well KLAM 51131

1 = central (main) portion (south Swan Lake Valley, Pine Flat, north Poe Valley)
2 = south Poe Valley compartment

The calculations used different effective basalt transmissivity and storage coefficient values for each sub-area compartment (table 16). The different values reflect different aquifer properties and boundary influences. The effective values for the central) portion of the sub-area are similar to the higher values used for the Bonanza and south Langell Valley sub-areas. The effective values for the south Poe Valley compartment are similar to the low values used for the Lorella sub-area.

Table 23. Summary of calculated potential drawdowns at west Poe Valley springs caused by exercising ADR permits in the Swan Lake Valley to Poe Valley sub-area

Application Permit Applicant Priority	Well	Primary Acres Drawdowns (feet)	Supplemental Acres Drawdowns (feet)	Total Acres Drawdowns (feet)	Comments
G-12644 G-12442 Kennedy 8/23/1991	KLAM[1] 10252	**0.00**	**1,483.00**	**1,483.00**	Acres
		0.00	2.98	2.98	30 days cont
		0.00	4.51	4.51	184 days cont
		0.00	1.64	1.64	30 days pro
		0.00	2.47	2.47	184 days pro
	KLAM[1] 10292	0.00	3.25	3.25	30 days cont
		0.00	4.78	4.78	184 days cont
		0.00	1.78	1.78	30 days pro
		0.00	2.62	2.62	184 days pro
G-13019 G-12460 Wells 7/6/1992	KLAM[2] 50623	**0.00**	**272.20**	**272.20**	Acres
		N.A.*	N.A.*	N.A.*	30 days cont
		N.A.*	N.A.*	N.A.*	184 days cont
		N.A.*	N.A.*	N.A.*	30 days pro
		N.A.*	N.A.*	N.A.*	184 days pro
	or KLAM[2] (not drilled)	N.A.*	N.A.*	N.A.*	30 days cont
		N.A.*	N.A.*	N.A.*	184 days cont
		N.A.*	N.A.*	N.A.*	30 days pro
		N.A.*	N.A.*	N.A.*	184 days pro
Totals		**0.00**	**1,755.20**	**1,755.20**	Acres
		0.00	**3.25**	**3.25**	30 days cont
		0.00	**4.78**	**4.78**	184 days cont
		0.00	**1.78**	**1.78**	30 days pro
		0.00	**2.62**	**2.62**	184 days pro

Note: local basalt ground water is generally separated from the Lost River by saturated sediments
Note: cont means continuous pumping at full rate allowed
Note: pro means pro-rated pumping (total volume allowed/total pumping period allowed)
Note: sum of primary and supplemental values may not always equal total value due to rounding

N.A.* means compartmentalization may limit short-term connections to west Poe Valley springs

1 = central (main) portion (south Swan Lake Valley, Pine Flat, north Poe Valley)
2 = south Poe Valley compartment

Table 22 summarizes the calculated potential drawdown of ground water in basalt at the nearest Lost River reach for each ADR permit well. The individual total drawdowns for pumping continuously 30 and 184 days at the maximum permitted rate ranged from nearly 7.00 ft to less than 10.00 ft for the central portion of the sub-area, and from nearly 10.00 ft to about 15.75 ft for the south Poe Valley compartment. The individual total drawdowns for pro-rated pumping 30 and 184 days ranged from over 3.75 ft to over 5.25 ft for the central portion of the sub-area and from nearly 5.50 ft to over 8.50 ft for the south Poe Valley compartment. No cumulative drawdown is given in table 22 because of compartmentalization and the nearest Lost River reach for each well is a different river location.

Table 23 summarizes the potential drawdown of ground water in basalt at High spring for two wells only. High spring is part of a series of springs located along the Lost River in western Poe Valley. No obvious connection between the third well (KLAM 50623) and High spring was established, and no obvious connection between any of the three wells and Bonanza Big Springs was established. The ADR permit conditions do not address the west Poe Valley springs, but data indicate a direct connection exists between them and basalt ground water in the central portion of the sub-area. Individual total drawdowns for 30 and 184 days of continuous pumping at the maximum permitted rate ranged from nearly 3.00 ft to less than 5.00 ft. Individual total drawdowns for 30 and 184 days of pro-rated pumping ranged from more than 1.50 ft to over 2.50 ft. The cumulative total drawdowns are the same as the maximum individual drawdowns because both wells connected to High spring supply the same water right.

Summary of Drawdown Calculations

The thirty-two ADR ground water permits issued for the eastern Lost River sub-basin included a condition requiring the Oregon Water Resources Department to technically assess the impact of ground water use under each permit upon the flow of Bonanza Big Springs and the stage of the Lost River. According to basic hydrologic principles, any impact to the river stage or spring flow will be proportional to the ground water drawdown at the river or springs caused by pumping. Drawdowns caused by pumping each ADR permit well were calculated using extensive data and the Theis equation, a widely accepted technique.

Hydrogeologic data indicate the most efficient connection between sub-basin ground water in basalt and the Lost River occurs at springs, especially Bonanza Big Springs. Elsewhere, compartmentalization and sedimentary deposits above the basalt appear to limit the rate of water exchange between ground water in the basalt and the river.

Analysis of hydrologic data indicates four sub-areas and twelve compartments in two of the sub-areas exist in the eastern Lost River sub-basin. The data include water levels showing no pumping effects or other short-term stresses propagating between sub-areas and sub-area compartments. The exact cause of the sub-areas and sub-area compartments is poorly understood, but it certainly relates to geologic structure and stratigraphy.

Assessing the potential individual and cumulative ground water drawdown in basalt from pumping each ADR permit well was limited to the closest river site and selected spring sites in the well's sub-area or sub-area compartment. The selected spring sites are Bonanza Big Springs in the Bonanza sub-area, Kilgore Spring in the south Langell Valley sub-area, and High spring in western Poe Valley (central portion of the Swan Lake Valley to Poe Valley sub-area). The ADR permit conditions address Bonanza Big Springs only.

Drawdowns of ground water in basalt were calculated using pro-rated and continuous maximum pumping rates. Pro-rated pumping rates best represent existing ground water irrigation practices in the sub-basin. Drawdowns calculated by using the maximum permitted pumping rate best represent short-term or infrequent, long-term continuous pumping conditions.

Individual drawdown calculations summarized in tables 17 through 23 and detailed in appendices 39 through 42 are useful for sorting impacts upon springs and/or a river reach by magnitude. Larger calculated ground water drawdown in basalt at a spring or river reach imply larger impacts.

The calculated cumulative ground water drawdown in basalt at Kilgore Spring in the south Langell Valley sub-area is summarized at the end of table 18. The total drawdown for 30 and 184 days of continuous pumping at the maximum rate permitted ranged from nearly 3.00 ft to more than 3.50 ft respectively. The total drawdown for 30 and 184 days of pro-rated pumping ranged from nearly 1.75 ft to more than 2.00 ft respectively.

Most of the ADR ground water permits and associated wells are located in the Bonanza sub-area and are directly connected to the Lost River via Bonanza Big Springs. Data indicate the potential negative impact upon the Lost River flow is greatest here.

The calculated cumulative ground water drawdown in basalt at Bonanza Big Springs in the Bonanza sub-area is summarized at the end of table 21. The total drawdown for 30 and 184 days of continuous pumping at the maximum rate permitted ranged from over 5.40 ft to nearly than 7.25 ft respectively. The total drawdown for 30 and 184 days of pro-rated pumping ranged from nearly 3.10 ft to more than 4.10 ft respectively.

Under current management of the Lost River, the calculated total ground water drawdown in basalt by pro-rated pumping of the Bonanza sub-area ADR permit wells is sufficient to terminate Bonanza Big Springs flow (lower the ground water level to or below river stage) in most years. From 1997 through 2002, the ground water level in the basalt at Bonanza Big Springs nearly met the river stage in the summer of 1997 and 2000, and dropped below the river stage in the summer of 2001 and 2002. During those years, the spring-time basalt ground water elevations at Bonanza Big Springs changed from about 4.0 ft to 6.5 ft above the river stage immediately before impoundment occurred at Harpold Dam to about 2.0 ft to 4.5 ft above the river stage immediately after impoundment occurred. The elevation difference range corresponds to dry and wet years respectively.

The calculated cumulative ground water drawdown in basalt at High spring in the central portion of the Swan Lake Valley to Poe Valley sub-area is summarized at the end of table 23. The total drawdown for 30 and 184 days of continuous pumping at the maximum permitted rate ranged from nearly 3.00 ft to less than 5.00 ft respectively. The total drawdown for 30 and 184 days of pro-rated pumping ranged from over 1.50 ft to over 2.50 ft respectively.

Larger ground water drawdowns in basalt were calculated for pumping wells within Lorella sub-area and south Poe Valley compartments due to lower transmissivities and boundary influences. However, existing data indicate compartmentalization and valley sediments should limit the short-term negative impact upon the Lost River.

Investigation Conclusions

General Technical Conclusions

1. Ground water occurs in both basalt and basin fill in the eastern Lost River sub-basin. However, wells with higher yields are generally located within the valleys and produce from basalt. Therefore, this investigation focused primarily upon the various influences affecting the behavior of ground water in basalt including pumping and climatic events.

2. The geology in the sub-basin is complex. However, sufficient hydraulic connection exists between water bearing zones in predominantly basalt units to allow lumping them as undifferentiated basalt. Additionally, sufficient hydraulic connection exists between water bearing zones in predominantly basin fill sedimentary rock and sediment units to allow lumping them as undifferentiated sediments.

3. Ground water in basalt and the overlying basin fill is generally hydraulically interconnected, especially in Langell, Poe, and Yonna Valleys. Evidence includes similar ground water elevations and ground water level trends.

4. In Swan Lake Valley and Pine Flat, ground water in the deeper portion of the basin fill has an efficient (direct) hydraulic connection to ground water in the basalt below. Ground water in the upper portion of the basin fill is either perched above deeper ground water or has a high vertical gradient to deeper ground water. Evidence includes anomalously high ground water elevations at a few wells surrounded by wells showing much lower ground water elevations and different ground water trends.

5. Ground water in basalt generally flows toward the valleys from the surrounding uplands and then flows down valley toward or parallel to the Lost River. Recharge appears to occur locally in both the uplands and valleys. Most discharge occurs at fault-related valley springs within or near the Lost River. Limited discharge occurs through the basin fill and stratigraphically controlled springs above the valley floors.

6. Ground water in basalt is hydraulically connected to the Lost River via springs and diffuse seepage through overlying basin fill.

7. The most efficient interconnection between ground water in sub-basin basalt and the Lost River occurs at fault controlled valley floor springs where basalt is at or near land surface. The greatest ground water discharge from basalt to the Lost River occurs at Bonanza Big Springs and west Poe Valley springs located in or adjacent to the river. Additional discharge occurs at south Langell Valley springs located away from the river.

8. The least efficient interconnection between ground water in sub-basin basalt and the Lost River is through basin fill that overlies the basalt. Ground water discharge to the river occurs as diffuse, low flow, seepage.

9. Both fault and stratigraphically controlled springs exist in the sub-basin. The fault controlled springs generally occur on the valley floors, facilitate ground water discharge from the sub-basin basalt, and have larger and relatively continuous flow. Stratigraphically controlled springs generally occur above the valley floor and have smaller, often intermittent, flow.

10. The occasional hot springs in the sub-basin are fault controlled with water absorbing heat during deep circulation along faults.

11. The sub-basin can be divided into four sub-areas (south Langell Valley, Lorella, Bonanza, and Swan Lake Valley to Poe Valley) based primarily on the behavior of ground water in basalt and in part on geology. At different locations within each sub-area, the ground water response to natural and anthropogenic stress is similar.

12. The Lorella and the Swan Lake Valley to Poe Valley sub-areas can be further divided into compartments based on the behavior of ground water affected by geologic structure.

13. Ground water levels in sub-basin basalt are generally controlled by climate in the long-term and ground water use in the short-term. A distinguishable canal leakage influence occurs in the Lorella sub-area.

14. Pumping ground water from basalt affects ground water levels in both basalt and overlying basin fill.

15. Water level data from 1999 through 2002 indicate the impacts of summer ground water pumping from basalt did not propagate beyond sub-area or compartment boundaries during those years. This does not imply the sub-areas and compartments are hydraulically isolated or that any long-term effects, such as year-to-year declines, from future ground water uses will not propagate to neighboring areas in the long-term.

16. Investigation data indicate springs showing an acute response to seasonal ground water pumping from basalt were located in the same sub-area or compartment as the seasonal ground water use. For example, Bonanza Big Springs responded to summer ground water use in the Bonanza sub-area only. This does not imply that long-term effects from any future ground water uses will not propagate in the long-term to affect springs in neighboring sub-areas or compartments.

17. High basalt transmissivities (exceeding 100,000 ft^2/day) exist in the Bonanza and south Langell Valley sub-areas and the central portion of the Swan Lake Valley to Poe Valley sub-area. These transmissivities facilitate smaller, but very rapid ground water level responses at springs and other locations within the same sub-area or compartment where pumping ground water from basalt occurs. Even though the water level response at a spring is small, the impact upon spring discharge is large given the higher transmissivities and direct connection between the basalt and springs. Most of the ADR permit wells are located in these areas, especially the Bonanza sub-area.

18. Low basalt transmissivities and compartmentalization generally exist in the Lorella sub-area and in south and eastern Poe Valley. These facilitate greater ground water level drawdown when a well pumps from basalt in these areas. Despite the greater water level response, the short-term impact upon surface water is small in these areas. This is due to the lower transmissivities, compartmentalization, and/or thicker basin fill making the interconnection between the basalt and surface water inefficient. Fewer of the ADR permits are located in these areas.

Ground Water Response to Development

19. Ground water use in the sub-basin has increased over the decades. Condition D in the ADR permits requires the Oregon Water Resources Department to determine whether "excessively declining ground water levels" have occurred due to well use. The definition exists in Oregon Administrative Rule OAR 690-08-001 (6).

20. Water level measurements at nine state observation wells (generally from the 1960s through the 1990s) indicate ground water levels in the sub-basin decline and recover seasonally and over multiple years. The seasonal fluctuations correspond to the seasonality of ground water recharge and ground water use. The fluctuation over multiple years corresponds to long-term precipitation trend variations.

21. At eight of the nine state observation wells, water levels during the late 1990s are similar to the initial levels. Over a 40-year period, a possible decline of 1 to 2 ft occurred in south Swan Lake Valley, Yonna Valley, and south Langell Valley, and a possible 3 ft decline occurred near Lorella. These declines are not considered "excessive" as defined by OAR 690-08-001 (6).

22. At the ninth state observation well located in southeast Poe Valley, a 20 ft total decline occurred as two 10 ft steps, first in the 1960s and subsequently in the 1990s. The decline resulted from local aquifer properties and compartmentalization amplifying ground water use impacts during droughts. The decline is notable, a concern, and deserves continued monitoring. However, it is geographically limited and not considered "excessive" as defined by OAR 690-08-001 (6).

23. Under the rule, an "excessive" decline includes water quality deterioration as a result of "ongoing lowering" of the ground water level. Periodic ground water quality deterioration has occurred in the vicinity of Bonanza Big Springs as a result of drought, seasonal ground water use, and management of the Lost River. This situation is not considered an "excessive" decline under OAR 690-08-001 (6) since the deterioration is not related to an "ongoing lowering" of ground water levels.

Potential Impact Upon the Lost River and Bonanza Big Springs

24. Condition A in the ADR permits requires the Oregon Water Resources Department to determine whether the Lost River stage or Bonanza Big Springs flows are not significantly diminished by use of water under each permit.

25. To address condition A, this investigation calculated the potential drawdown of ground water in basalt at the Lost River, Bonanza Big Springs, and other springs due to pumping ground water as allowed by the ADR permits. River and spring sites selected for the drawdown calculations were limited to sites within the same sub-area or compartment as the pumping well.

26. The effect of pumping ground water from basalt upon the Lost River and springs is directly proportional to the amount of ground water drawdown caused by the pumping and the efficiency of the interconnection between the ground water in basalt and surface water.

27. Drawdown from a pumping well at any location is dependent upon the pumping rate, aquifer transmissivity and storage coefficient, distance from the pumping well, and elapsed pumping time. Higher pumping rates, smaller transmissivity, and storage coefficient, shorter distance from the pumping well, and longer elapsed time lead to larger drawdown estimates. Conversely, smaller pumping rates, larger transmissivity and storage coefficient, greater distance from the pumping well, and shorter elapsed time lead to smaller drawdown estimates.

28. The calculated drawdowns indicate pumping an individual well producing ground water from basalt in most Lorella sub-area compartments and in the south Poe Valley compartment yields much greater drawdown than pumping in other areas due to lower transmissivities in these compartments. Despite the greater drawdowns, compartmentalization and the presence of overlying basin fill greatly limit the short-term effect upon the Lost River.

29. Areas where calculations show smaller ground water drawdowns in basalt are also areas with higher transmissivities and better connections to the Lost River via springs. These areas include the south Langell Valley sub-area, the Bonanza sub-area, and the central portion of the Swan Lake Valley to Poe Valley sub-area. In these areas, especially the Bonanza sub-area, ground water pumping has a much greater impact upon surface water despite the smaller drawdowns.

30. The calculated cumulative ground water drawdown in basalt at Bonanza Big Springs in the Bonanza sub-area for 30 and 184 days of continuous pumping at the maximum permitted rate ranged from more than 5.40 ft to nearly 7.25 ft respectively. The total drawdown for 30 and 184 days of pro-rated pumping ranged from nearly 3.10 ft to more than 4.10 ft respectively. The calculations used aquifer test derived effective transmissivity (334,201 ft^2/d) and storage coefficient (0.00096) values for the Bonanza sub-area. These values account for boundary, leakage, or delayed yield influences.

31. The calculated cumulative ground water drawdown in basalt at Kilgore Spring in the south Langell Valley sub-area for 30 and 184 days of continuous pumping at the maximum permitted rate ranged from nearly 3.00 ft to more than 3.50 ft respectively. The total drawdown for 30 and 184 days of pro-rated pumping ranged from nearly 1.75 ft to more than 2.00 ft respectively. The calculations used aquifer test derived effective transmissivity (600,000 ft^2/d) and storage coefficient (0.00025) values for the south Langell Valley sub-area. These values account for boundary, leakage, or delayed yield influences. The ADR permit conditions do not address this spring.

32. The calculated cumulative ground water drawdown in basalt at High spring in the central portion of the Swan Lake Valley to Poe Valley sub-area for 30 and 184 days of continuous pumping at the maximum rate permitted ranged from nearly 3.00 ft to less than 5.00 ft respectively. The total drawdown for 30 and 184 days of pro-rated pumping ranged from over 1.50 ft to over 2.50 ft respectively. The calculations used aquifer test derived effective transmissivity (150,000 ft^2/d) and storage coefficient (0.00040) values for the central portion compartment of the Swan lake Valley to Poe Valley sub-area. These values account for boundary, leakage, or delayed yield influences. The ADR permit conditions do not address this spring.

33. Most of the ADR ground water permit wells are located in the Bonanza sub-area and are directly connected to the Lost River via Bonanza Big Springs. The potential negative impact upon the Lost River flow is greatest here.

34. From 1997 through 2002, the ground water level in the basalt at Bonanza Big Springs nearly met the river stage in the summer of 1997 and 2000, and dropped below the river stage in the summer of 2001 and 2002. During those years, the spring-time basalt ground water elevations at Bonanza Big Springs changed from about 4.0 ft to 6.5 ft above the river stage immediately before impoundment occurred at Harpold Dam to about 2.0 ft to 4.5 ft above the river stage immediately after impoundment occurred. The elevation difference range corresponds to dry and wet years respectively.

35. Under current management of the Lost River, the calculated total ground water drawdown in basalt by pro-rated pumping of the Bonanza sub-area ADR permit wells is sufficient to terminate Bonanza Big Springs flow (lower the ground water level to or below river stage) in most years.

36. Fewer ADR ground water permit wells are located in the central portion of the Swan Lake Valley to Poe Valley sub-area where a direct connection with High spring exists, and the south Langell Valley sub-area where a direct connection with Kilgore Spring exists. In 2001, both springs stopped flowing due the lowering of ground water levels in the basalt caused by drought and increased pumping. The ADR permit conditions do not address these springs.

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Appendix 1. Permited supplemental and primary irrigation water use related to 32 applications received from 1991 to 1993 to appropriate ground water in the Langell, Yonna, and Poe Valleys

Application Number G	Permit Number G	Applicant Last Name	Priority Date	Water Well Driller's Report	Well Location T / R - sec abc	Annual Use (days)	Rate (feet3/sec)	Rate (gallons/min)	Duty (feet/acre)	Area Primary (acres)	Area Supplemental (acres)	Area Total (acres)	Primary Volume (acre-feet)	Supplemental Volume (acre-feet)	Total Volume (acre-feet)
13013	12435	Jeld-Wen	29-Jun-1992	KLAM 10181	T37S/R11.5E-sec 25 baa	184	0.3900	175.04	2.50	31.00	0.00	31.00	77.50	0.00	77.50
13013	12435	Jeld-Wen	29-Jun-1992	KLAM 2373	T37S/R11.5E-sec 25 bda	184	0.4000	179.53	2.50	31.60	0.00	31.60	79.00	0.00	79.00
12618	12441	Haskins	22-Jul-1991	KLAM 12415	T38S/R11.5E-sec 24 cdc	184	6.4390	2,890.02	2.50	17.80	497.30	515.10	44.50	1,243.25	1,287.75
12618	12441	Haskins	same	no report	T38S/R11E-sec 19	same	same	same	same	same	same	same	same	same	same
12769	13178	Ritter	15-Aug-1994	KLAM 12261	T38S/R11E-sec 05 cdd	214	1.4810	664.72	2.50	172.10	26.40	198.50	430.25	66.00	496.25
12769	13178	Ritter	03-Feb-1992	no report	T38S/R11E-sec 08	same	same	same	same	same	same	same	same	same	same
12897	12456	Gorden	30-Apr-1992	KLAM 13458	T39S/R11.5E-sec 01 bba	184	3.6400	1,633.74	2.50	106.30	184.60	290.90	265.75	461.50	727.25
12897	12456	Gorden	same	no report	T38S/R11.5E-35	same	same	same	same	same	same	same	same	same	same
12617	12440	Newman	22-Jul-1991	KLAM 13462	T39S/R11.5E-sec 02 dcc	184	3.6560	1,640.93	2.50	525.30	0.00	525.30	1,313.25	0.00	1,313.25
12617	12440	Uecker	same	no report	T39S/R11.5E-sec 10	same	same	same	same	same	same	same	same	same	same
12644	12442	Kennedy	23-Aug-1991	KLAM 10252	T39S/R11.5E-sec 25 caa	184	18.5400	8,321.33	2.50	0.00	1,483.00	1,483.00	0.00	3,707.50	3,707.50
12644	12442	Kennedy	same	KLAM 10292	T39S/R11.5E-sec 26 dba	same	same	same	same	same	same	same	same	same	same
12746	12445	Horsley	31-Dec-1991	KLAM 13326	T39S/R11E-sec 02 dca	184	4.1600	1,867.14	2.50	139.00	193.20	332.20	347.50	483.00	830.50
12746	12445	Horsley	same	KLAM 10440	t39S/R11E-sec 11bdd	same	same	same	same	same	same	same	same	same	same
12735	12444	Teague	19-Dec-1991	KLAM 10352	T39S/R11E-sec 03 bdb	184	1.9470	873.87	2.50	35.30	120.80	156.10	88.25	302.00	390.25
12735	12444	Teague	same	KLAM 10357	T39S/R11E-sec 03 bdc	same	same	same	same	same	same	same	same	same	same
12876	12453	Masten	15-Apr-1992	KLAM 10461	T39S/R11E-sec 03 dac	184	3.3100	1,485.63	2.50	0.00	265.10	265.10	0.00	662.75	662.75
12955	12457	Brock	04-Jun-1992	KLAM 10421	T39S/R11E-sec 04 adb	184	4.4600	2,001.79	2.50	91.50	316.20	407.70	228.75	790.50	1,019.25
12877	12454	Masten	15-Apr-1992	KLAM 10475	T39S/R11E-sec 08 bad	184	7.0300	3,155.28	2.50	188.80	373.50	562.30	472.00	933.75	1,405.75
12877	12454	Masten	same	KLAM 10460	T39S/R11E-sec 09 bab	same	same	same	same	same	same	same	same	same	same
12518	12469	Wells	06-May-1991	KLAM 10242	T39S/R11E-sec 10 abc	184	0.5000	224.42	2.50	40.10	0.00	40.10	100.25	0.00	100.25
12814	12449	Manning	09-Mar-1992	KLAM 10416	T39S/R11E-sec 10 adc	184	1.4860	666.96	2.50	118.90	0.00	118.90	297.25	0.00	297.25
12766	12446	Hill	24-Jan-1992	no report	T39S/R11E-sec 11	184	1.2000	538.60	2.50	96.00	0.00	96.00	240.00	0.00	240.00
12507	12439	Babson	26-Apr-1991	KLAM 13403	T39S/R11E-sec 13 cba	184	2.8660	1,286.35	2.50	229.30	0.00	229.30	573.25	0.00	573.25
12732	12443	Wiersma	12-Dec-1991	KLAM 10378	T39S/R11E-sec 15 bad	184	4.3800	1,965.88	2.50	350.40	0.00	350.40	876.00	0.00	876.00
12768	12447	DeJong	03-Feb-1992	KLAM 10431	T39S/R11E-sec 16 dac	184	7.9600	3,572.69	2.50	93.70	543.20	636.90	234.25	1,358.00	1,592.25
12768	12447	DeJong	same	KLAM 10432	T39S/R11E-sec 17 dca	same	same	same	same	same	same	same	same	same	same
12874	12452	Masten	14-Apr-1992	KLAM 10498	T39S/R11E-sec 18 cdb	184	4.0100	1,799.81	2.50	68.30	180.40	248.70	170.75	451.00	621.75
12869	12451	Babson	10-Apr-1992	KLAM 51920	T39S/R12E-sec 19 aca	184	5.5000	2,468.57	2.50	116.10	324.20	440.30	290.25	810.50	1,100.75

Appendix 1. Permited supplemental and primary irrigation water use related to 32 applications received from 1991 to 1993 to appropriate ground water in the Langell, Yonna, and Poe Valleys

Application Number G	Permit Number G	Applicant Last Name	Priority Date	Water Well Driller's Report	Well Location T / R - sec abc	Annual Use (days)	Rate (feet3/sec)	Rate (gallons/min)	Duty (feet/acre)	Area Primary (acres)	Area Supplemental (acres)	Area Total (acres)	Primary Volume (acre-feet)	Supplemental Volume (acre-feet)	Total Volume (acre-feet)
12493	12624	Randall	22-Apr-1991	KLAM 13556	T39S/R12E-sec 26 aca	184	3.1300	1,404.84	2.50	5.50	244.50	250.00	13.75	611.25	625.00
13387	12465	DeJong	03-May-1993	KLAM 10526	T39S/R12E-sec 27 bdc	184	4.1740	1,873.42	2.50	57.90	276.00	333.90	144.75	690.00	834.75
13101	12461	Barrett	31-Aug-1992	KLAM 10634	T39S/R12E-sec 34 cac	184	4.8940	2,196.58	2.50	106.50	285.00	391.50	266.25	712.50	978.75
13101	12461	Barrett	same	KLAM 10608	T39S/R12E-sec 34 cad	same	same	same	same	same	same	same	same	same	same
13019	12460	Wells	06-Jul-1992	KLAM 50623	T40S/R11E-sec 03 cda	184	3.4000	1,526.03	2.50	0.00	272.20	272.20	0.00	680.50	680.50
13019	12460	Wells	same	not drilled		same	same	same	same	same	same	same	same	same	same
12772	12448	Gibson	05-Feb-1992	KLAM 10699	T40S/R13E-sec 05 dbd	184	3.1800	1,427.28	2.50	94.40	153.40	247.80	236.00	383.50	619.50
13198	12497	Gallup	25-Nov-1992	KLAM 14864	T40S/R13E-sec 09 bda	184	0.9030	405.29	2.50	72.20	0.00	72.20	180.50	0.00	180.50
12885	12455	Biaggi	20-Apr-1992	KLAM 14873	T40S/R13E-sec 26 aba	184	0.7580	340.21	2.50	62.60	165.00	227.60	156.50	412.50	569.00
13011	12459	Hammerich	29-Jun-1992	KLAM 10641	T40S/R13E-sec 35 aaa	184	13.6150	6,110.83	2.50	108.00	981.20	1,089.20	270.00	2,453.00	2,723.00
13011	12459	Hammerich	same	KLAM 10495	T40S/R13E-sec 35 daa	same	same	same	same	same	same	same	same	same	same
13011	12459	Hammerich	same	KLAM 10764	T41S/R13E-sec 01 add	same	same	same	same	same	same	same	same	same	same
12901	13743	Smith	04-May-1992	KLAM 10458	T40S/R14E-sec 16 bcb	184	2.0000	897.66	2.50	0.00	170.70	170.70	0.00	426.75	426.75
13514	13775	Randall	13-Sep-1993	KLAM 10473	T40S/R14E-sec 32 caa	184	1.0950	491.47	4.56	87.60	0.00	87.60	399.46	0.00	399.46
13184	12463	Balin	13-Nov-1992	KLAM 10748	T41S/R13E-sec 12 caa	184	7.1610	3,214.08	2.50	476.00	96.90	572.90	1,190.00	242.25	1,432.25
13106	12462	Grohs	08-Sep-1992	KLAM 10575	T41S/R13E-sec 13 dac	184	4.4600	2,001.79	2.50	0.00	408.40	408.40	0.00	1,021.00	1,021.00
12972	12458	Balin	05-Jun-1992	KLAM 10642	T41S/R14E-sec 18 bdc	184	3.5000	1,570.91	2.50	77.80	229.30	307.10	194.50	573.25	767.75
						Totals	**135.63**	**60,872.70**		**3,600.00**	**7,790.50**	**11,390.50**	**9,180.46**	**19,476.25**	**28,656.71**
					Primary Use		**42.86**	**(feet3/sec)**							
					Supplemental Use		**92.76**	**(feet3/sec)**							
					Primary Use		**85.02**	**(acre-feet/day)**							
					Supplemental Use		**183.99**	**(acre-feet/day)**							

Appendix 2: Project Wells

Note: Wells are sorted by primary data obtained and location (township/range-section)
Note: Primary Data : R = recorder, M = "monthly" measurements, S = synoptic measurements, G = geologic control, O = other (additional geologic and/or water level control for project maps)
Note: "Monthly" measurements occurred monthly from December 1998 to October 1999, bi-monthly from January 2000 to September 2001, quarterly from January 2002 to project end
Note: "other" data included water well report information and non-project data helpful to control map contouring

Well Use Sequence	Primary Data	Well Report County	Well Report Number	Location Township (South)	Location Range (East)	Location Section	Location Q (160 acre)	Location QQ (40 acre)	Location QQQ (10 acre)	USGS Map Name (scale = 1:24,000)	Address of Well (closest address)	USGS Well ID Leonard & Harris, 1974	OWRD Well ID State Obs Well	OWRD Well ID Gorman, 1994
Recorder Wells														
1	R	KLAM	50318	39	11	10	c	d	d	Bonanza	across from 3152 Main Street			
2	R	KLAM	51922	39	11	10	d	c	b	Bonanza	3121 E. Langell Valley Road			
3	R	KLAM	10252	39	11.5	25	c	a	a	Bonanza	across from 25757 North Poe Valley Road			
4	R	KLAM	51131	39	11.5	35	d	d	a	Bonanza	24999 South Poe Valley Road			
5	R	KLAM	10814	39	12	18	d	c	d	Lorella	East Langell Valley Road			
6	R	KLAM	10813	39	12	19	a	b	d	Lorella	East Langell Valley Road			
7	R	KLAM	10362	40	13	1	b	b	a	Goodlow Mountain	East Langell Valley Road (0.6 mile east of mile post 9/Walker Road).			
8	R	KLAM	10699	40	13	5	d	b	d	Lorella	10440 West Langell Valley Road			
9	R	KLAM	10641	40	13	35	a	a	a	Bryant Mountain	West Langell Valley Road (0.45 mile south of mile post 13)			
10	R	KLAM	10574	41	13	13	d	d	b	Langell Valley	West Langell Valley Road			
"Monthly" Wells														
1	M	KLAM	2277	37	10	20	a	b	c	Whiteline Reservoir	Swan Lake Road			
2	M	KLAM	2288	37	10	29	d	b	b	Whiteline Reservoir	Swan Lake Road	37S/10E-29dbb2	281	
3	M	KLAM	11392	37	11	31	b	b	b	Yonna	11221 Yonna Loop Road			
4	M	KLAM	10336	38	10	5	d	b	c	Whiteline Reservoir	Swan Lake Road			
5	M	KLAM	50493	38	10	16	d	d	c	Whiteline Reservoir	3660 Swan Lake Road			
6	M	KLAM	50934	38	11	6	d	d	a	Yonna	28100 Ritter Road			
7	M	KLAM	11473	38	11	30	d	b	c	Bonanza	Haskins Road (about 0.2 mile north of 1919 Haskins Road)			
8	M	KLAM	50777	38	11.5	10	c	d	a	Swan Lake	6520 Hildebrand Road			
9	M	KLAM	12369	38	11.5	33	b	d	a	Dairy	20990 Hwy 140 E.			
10	M	KLAM	11139	38	11.5	34	b	b	d	Dairy	22177 Hwy 140			
11	M	KLAM	10877	39	10	13	c	c	d	Dairy	15600 S. Poe Valley Road			
12	M	KLAM	10566	39	11	3	a	d	c	Bonanza	Box 25 Bly Mountain Cutoff Road			
13	M	KLAM	10015	39	11	8	a	a	a	Bonanza	29777 Hwy 70			
14	M	KLAM	11168	39	11	9	d	a	d	Bonanza	2918 Carrol Avenue			
15	M	KLAM	13353	39	11	9	a	d	d	Bonanza	2510 Carrol Drive			
16	M	KLAM	10316	39	11	10	c	b	d	Bonanza	2930 Third Street			
17	M	KLAM	15149	39	11	10	c	c	a	Bonanza	31694 Price Street			
18	M	KLAM	11294	39	11	11	c	c	a	Bonanza	3249 E. Langell Valley Road			
19	M	KLAM	13400	39	11	12	d	b	a	Lorella	Mc Cartie Lane (2.1 mile east of Bly Mountain Cutoff Rd.)	39S/11E-12dba		
20	M	KLAM	10258	39	11	19	a	a	c	Bonanza	5353 Burgdorf Road			
21	M	KLAM	11227	39	11	20	c	c	c	Bonanza	5917 Harpold Road			
22	M	KLAM	11003	39	11	30	d	c	c	Bonanza	8200 Harpold Road			
23	M	KLAM	13456	39	11.5	1	a	d	a	Bonanza	750 Burgdorf Road			
24	M	KLAM	11569	39	11.5	6	a	a	d	Dairy	18596 Hwy 140 E			
25	M	KLAM	16807	39	11.5	19	c	b	d	Dairy	17301 S. Poe Valley Road			
26	M	KLAM	13478	39	11.5	20	b	d	b	Dairy	19100 N. Poe Valley Road			
27	M	KLAM	13491	39	11.5	22	d	b	d	Dairy	22777 N. Poe Valley Road	39S/11.5E-22dbd		
28	M	KLAM	10159	39	11.5	35	d	d	c	Bonanza	24550 S. Poe Valley Road			
29	M	KLAM	51920	39	12	19	a	c	a	Lorella	E. Langell Valley Road (3.7 miles east of Bonanza)	39S/12E-19abc1		BON 027
30	M	KLAM	50787	39	12	30	b	d	b	Lorella	7070 Teare Lane			
31	M	KLAM	13582	39	12	32	b	b	b	Lorella	8211 Teare Lane			
32	M	KLAM	52096	39	12	35	a	b	b	Lorella	10057 E. Langell Valley Road			
33	M	KLAM	52204	39	12	35	a	b	b	Lorella	10057 E. Langell Valley Road			
34	M	KLAM	14849	40	13	2	b	a	a	Lorella	9880 E. Langell Valley Road			
35	M	KLAM	14871	40	13	13	d	d	d	Langell Valley	45797 Gift Road	40S/12E-13ddd		
36	M	KLAM	50301	40	13	15	b	d	d	Bryant Mountain	13600 Hricziscse Road			
37	M	KLAM	11204	40	14	7	a	d	b	Langell Valley	E. Langell Valley Road (about 200 ft S of 11883 E Langell Valley Rd.)			
38	M	KLAM	14882	40	14	7	a	b	a	Langell Valley	E. Langell Valley Road (about 0.15 mile N of 11883 E Langell Valley Rd)			
39	M	KLAM	14889	40	14	19	d	a	c	Langell Valley	15666 E. Langell Valley Road			
40	M	KLAM	10575	41	13	13	d	a	c	Langell Valley	W. Langell Valley Road (about 0.4 mile S of mile post 17)			
41	M	KLAM	15129	41	14	6	b	b	b	Langell Valley	Johnson Road at Lost River crossing			

Appendix 2: Project Wells

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Note: "Monthly" measurements occurred monthly from December 1998 to October 1999, bi-monthly from January 2000 to September 2001, quarterly from January 2002 to project end
Note: "other" data included water well report information and non-project data helpful to control map contouring

Well Use Sequence	Primary Data	Well Report County	Well Report Number	Location Township (South)	Location Range (East)	Location Section	Location Q (160 acre)	Location QQ (40 acre)	Location QQQ (10 acre)	USGS Map Name (scale = 1:24,000)	Address of Well (closest address)	USGS Well ID Leonard & Harris, 1974	OWRD Well ID State Obs Well	OWRD Well ID Gorman, 1994
Synoptic Wells														
1	S	KLAM	2259	37	10	8	c	c	c	Whiteline Reservoir	Swan Lake Road (about 1.35 miles north of road mile post 10)	37S/10E-8ccc	308	
2	S	KLAM	2260	37	10	8	b	d	d	Whiteline Reservoir	Swan Lake Road (about 2.25 mile NW of road at mile post 10)			
3	S	KLAM	2262	37	10	8	c	b	c	Whiteline Reservoir	Swan Lake Road (about 1.65 miles north of road)			
4	S	KLAM	2263	37	10	9	d	c	a	Whiteline Reservoir	Swan Lake Road (about 2.1 mile NE of road)	37S/10E-9dcd		
5	S	KLAM	2265	37	10	14	c	d	c	Swan Lake	Swan Lake Road (about 3.5 miles NE of Swan Lake Road)			
6	S	KLAM	2269	37	10	18	a	b	d	Whiteline Reservoir	Swan Lake Road (about 1.35 mile NE of Swan Lake Road)	37S/10E-18aca	309	
7	S	KLAM	10082	37	10	19	a	c	b	Whiteline Reservoir	Swan Lake Road			
8	S	KLAM	50445	37	10	19	c	d	d	Whiteline Reservoir	Swan Lake Road			
9	S	KLAM	2289	37	10	30	b	a	d	Whiteline Reservoir	Swan Lake Road	37S/10E-30abc	311	
10	S	KLAM	2368	37	11.5	15	c	c	c	Swan Lake	Egert Road	37S/11.5E-15ccb		
11	S	KLAM	10080	37	11.5	22	b	d	c	Swan Lake	Egert Road			
12	S	KLAM	10181	37	11.5	25	b	a	a	Yonna	11377 Squaw Flat Road			
13	S	KLAM	2379	37	11.5	36	a	d	d	Yonna	Yonna Loop Road	37S/11.5E-36add	283	
14	S	KLAM	12186	38	10	5	c	b	c	Whiteline Reservoir	Swan Lake Road	38S/10E-5cbc		
15	S	KLAM	12197	38	10	9	c	b	c	Whiteline Reservoir	Swan Lake Road	38S/10E-9cbc		
16	S	KLAM	12203	38	10	13	b	b	c	Swan Lake	Mitchell Road	38S/10E-13bbb1	313	
17	S	KLAM	12209	38	10	16	b	b	b	Whiteline Reservoir	Swan Lake Road	38S/10E-16bbb		
18	S	KLAM	12213	38	10	16	d	d	a	Whiteline Reservoir	3515 Swan Lake Road	38S/10E-16dda		
19	S	KLAM	12217	38	10	22	b	a	a	Swan Lake	Swan Lake Road	38S/10E-22baa	315	
20	S	KLAM	12218	38	10	22	a	d	a	Swan Lake	Swan Lake Road	38S/10E-22ada		
21	S	KLAM	12221	38	10	23	b	d	d	Swan Lake	2505 Swan Lake Road	38S/10E-23bdd	285	
22	S	KLAM	12223	38	10	24	b	c	c	Swan Lake	Mitchell Road			
23	S	KLAM	11454	38	10	25	c	c	d	Dairy	16630 Hwy 140 E			
24	S	KLAM	12224	38	10	25	a	a	b	Dairy	1050 Mitchell Road	38S/10E-25aab1	316	
25	S	KLAM	12226	38	10	25	d	a	b	Dairy	17139 Hwy 140 E	38S/10E-25dab		
26	S	KLAM	12228	38	10	26	b	a	a	Dairy	Swan Lake Road	38S/10E-26bac		
27	S	KLAM	12230	38	10	35	d	d	d	Dairy	Hwy 140 E (road mile = 13.35)			
28	S	KLAM	12261	38	11	5	c	d	d	Yonna	NE of 28600 Hwy 140	38S/11E-5cdd		
29	S	KLAM	12267	38	11	6	b	b	a	Yonna	Yona Drive (about 0.4 mile north of Calahan Drive)	38S/11E-6cbd		
30	S	KLAM	12269	38	11	6	d	d	a	Yonna	28100 Ritter Road	38S/11E-6dda	317	
31	S	KLAM	12273	38	11	7	a	b	d	Yonna	27798 Hwy 140 (between Yonna Drive and Ritter Road)			
32	S	KLAM	12283	38	11	7	d	a	a	Yonna	7680 Happy Hollow Lane	38S/11E-7daa		
33	S	KLAM	12286	38	11	7	c	b	a	Yonna	Yonna Drive (about 300 ft N of Hwy 140)	38S/11E-7cba		
34	S	KLAM	12345	38	11	18	b	b	a	Yonna	7163 Haskins Road	38S/11E-18bba		
35	S	KLAM	12358	38	11	19	d	c	c	Yonna	3311 Haskins Road			
36	S	KLAM	12471	38	11	22	c	d	d	Yonna	3300 Bly Mountain Road (about 0.25 mile west of road)			
37	S	KLAM	12477	38	11	27	d	a	b	Bonanza	Bly Mountain Cutoff Rd (about 0.6 mi S of 3300 Bly Mountain Cutoff Rd)			
38	S	KLAM	12363	38	11	31	a	b	a	Bonanza	1363 Haskins Road	38 S/11E-31aba1		
39	S	KLAM	12380	38	11.5	2	d	c	b	Yonna	8100 Egert Road	38S/11.5E-2dcb		
40	S	KLAM	12382	38	11.5	3	d	b	d	Swan Lake	7504 Hildebrand Road	38S/11.5E-3dbd		
41	S	KLAM	50362	38	11.5	6	c	a	d	Swan Lake	Hwy 140 E (about 5.3 miles north of road)	38S/11.5E-6cad	318	
42	S	KLAM	12385	38	11.5	7	a	d	d	Swan Lake	Hwy 140 E (about 4.3 miles north of Hwy)			
43	S	KLAM	12386	38	11.5	7	d	d	d	Swan Lake	Hwy 140 E (about 4.2 miles from Hwy)	39S/11.5E-7ddd	319	
44	S	KLAM	12389	38	11.5	10	c	a	c	Swan Lake	6520 Hildebrand Road	38S/11.5E-10cac		
45	S	KLAM	12390	38	11.5	11	a	d	a	Yonna	Hildebrand Road and Squaw Flat Road intersection	38S/11.5E-11ada	320	
46	S	KLAM	12391	38	11.5	12	a	b	a	Yonna	Yonna Drive (about 0.45 mile west of road)	38S/11.5E-12aba		
47	S	KLAM	12395	38	11.5	12	c	d	d	Yonna	Squaw Flat Road	38S/11.5E-12cdd		
48	S	KLAM	12398	38	11.5	13	d	c	a	Yonna	Wu Road	38S/11.5E-13dca		
49	S	KLAM	12406	38	11.5	20	c	c	b	Dairy	18429 Hwy 140	38S/11.5E-20ccb		
50	S	KLAM	50341	38	11.5	20	d	c	a	Swan Lake	Hwy 140 E (about 1.8 miles northeast of Hwy)			
51	S	KLAM	10368	38	11.5	23	d	d	d	Yonna	about 0.3 mile north of 2900 Bliss Road			
52	S	KLAM	12411	38	11.5	23	b	d	c	Swan Lake	Hwy 140 (about 0.25 mile north of mile post 21)	38S/11.5E-23bdc		
53	S	KLAM	12413	38	11.5	24	c	b	b	Yonna	Bliss Road	38S/11.5E-24cbb1		
54	S	KLAM	12415	38	11.5	24	c	d	c	Yonna	Bliss Road	38S/11.5E-24cdc		
55	S	KLAM	12416	38	11.5	25	c	b	b	Bonanza	Bliss Road	38S/11.5E-25cbb	324	
56	S	KLAM	12419	38	11.5	28	c	b	c	Dairy	Hwy 140 E (about 2.15 mile NE of Hwy)	38S/11.5E-29dad		
57	S	KLAM	12420	38	11.5	29	a	d	a	Dairy	Hwy 140 E (about 1.3 mile from Hwy)	38S/11.5E-29ada		

Appendix 2: Project Wells

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Note: "Monthly" measurements occurred monthly from December 1998 to October 1999, bi-monthly from January 2000 to September 2001, quarterly from January 2002 to project end
Note: "other" data included water well report information and non-project data helpful to control map contouring

Well Use Sequence	Primary Data	Well Report County	Well Report Number	Location Township (South)	Location Range (East)	Location Section	Location Q (160 acre)	Location QQ (40 acre)	Location QQQ (10 acre)	USGS Map Name (scale = 1:24,000)	Address of Well (closest address)	USGS Well ID Leonard & Harris, 1974	OWRD Well ID State Obs Well	OWRD Well ID Gorman, 1994
58	S	KLAM	12421	38	11.5	30	c	b	b	Dairy	Mitchell Road	38S/11.5E-30cba	325	
59	S	KLAM	12424	38	11.5	30	d	d	d	Dairy	18429 Hwy 140	38S/11.5E-30ddd	326	
60	S	KLAM	12425	38	11.5	30	d	c	c	Dairy	440 Mitchell Road			
61	S	KLAM	50337	38	11.5	30	d	a	c	Dairy	18429 Hwy 140	38S/11.5E-30dac	327	
62	S	KLAM	50446	38	11.5	30	d	c	c	Dairy	767 Mitchell Road			
63	S	KLAM	12429	38	11.5	31	b	c	d	Dairy	17330 Hwy 140	38S/11.5E-31bcd		
64	S	KLAM	12431	38	11.5	32	b	d	d	Dairy	19320 Hwy 140	38S/11.5E-32bdd		
65	S	KLAM	12454	38	11.5	34	c	d	d	Dairy	Horton Road	38S/11.5E-34cdd		
66	S	KLAM	12456	38	11.5	35	b	c	b	Dairy	23448 Hwy 70			
67	S	KLAM	12457	38	11.5	36	b	b	c	Bonanza	Bliss Road	38S/11.5E-36bbc		
68	S	KLAM	12893	39	10	8	d	a	a	Altamont	Hwy 140		283	
69	S	KLAM	13062	39	10	9	a	b	c	Altamont	3114 Pine Grove Road			
70	S	KLAM	13096	39	10	12	b	d	b	Dairy	15808 Hwy 140 E			
71	S	KLAM	13326	39	11	2	d	c	a	Lorella	McCartie Lane (about 0.7 mile north of 34106 McCartie Lane)	39S/11E-2dca		
72	S	KLAM	10352	39	11	3	b	d	b	Bonanza	Bly Mountain Cutoff Road (about 0.65 NW of road)			
73	S	KLAM	10357	39	11	3	b	d	c	Bonanza	Bly Mountain Cutoff Road (about 0.45 W of road)			BON 024
74	S	KLAM	10461	39	11	3	d	a	c	Bonanza	815 Bly Mountain Road			
75	S	KLAM	13331	39	11	3	a	a	b	Bonanza	1130 Bly Mountain Cutoff Road			
76	S	KLAM	13332	39	11	3	a	b	c	Bonanza	1120 Bly Mountain Cutoff Road			
77	S	KLAM	10421	39	11	4	a	d	b	Bonanza	2760 Market (Old Bly Rd, about 1.65 mile northwest of road)			BON 018
78	S	KLAM	10475	39	11	8	b	a	d	Bonanza	28989 Casebeer Road			
79	S	KLAM	10460	39	11	9	b	a	b	Bonanza	Hwy 70 (about 0.2 mile N of Hwy)			
80	S	KLAM	10242	39	11	10	a	b	c	Bonanza	32215 Morine Avenue			
81	S	KLAM	10416	39	11	10	a	d	c	Bonanza	181 Bly Mountain Cutoff Road			BON 025
82	S	KLAM	10395	39	11	11	d	b	b	Bonanza	0.2 mile west of 34106 McCartie Lane			
83	S	KLAM	10440	39	11	11	b	d	d	Bonanza	33833 McCartie Lane			BON 026
84	S	KLAM	13399	39	11	12	b	b	b	Lorella	35429 McCartie Lane (0.45 mile directly north of 34547 McCartie Lane)			
85	S	KLAM	13403	39	11	13	c	b	a	Lorella	Teare Lane (about 0.05 mile south of E. Langell Valley Road)			
86	S	KLAM	13406	39	11	13	b	c	d	Lorella	4096 E. Langell Valley Road			BON 008?
87	S	KLAM	10378	39	11	15	b	a	d	Bonanza	3121 E. Langell Valley Road			
88	S	KLAM	10432	39	11	17	d	c	a	Bonanza	4994 Harpold Rd			
89	S	KLAM	10443	39	11	18	d	d	a	Bonanza	across from 4550 Burgdorf Road			
90	S	KLAM	10498	39	11	18	c	d	b	Bonanza	4550 Burgdorf Road			
91	S	KLAM	13428	39	11	21	a	d	d	Bonanza	West Langell Valley Road	39S/11E-21add		BON 029
92	S	KLAM	13430	39	11	22	b	b	a	Bonanza	West Langell Valley Road	39S/11E-22bba2		BON 028
93	S	KLAM	13553	39	11	24	b	b	c	Lorella	Teare Lane			
94	S	KLAM	13443	39	11	30	d	c	a	Bonanza	7979 Harpold Road			
95	S	KLAM	10448	39	11.5	1	a	a	c	Bonanza	750 Burgdorf Road			
96	S	KLAM	13458	39	11.5	1	b	b	a	Bonanza	Hwy 70 (milepost 2)			
97	S	KLAM	13469	39	11.5	10	a	b	c	Dairy	Horton Rd	39S/11.5E-10abc		
98	S	KLAM	13471	39	11.5	12	a	d	d	Bonanza	2528 Burgdorf Road			
99	S	KLAM	51858	39	11.5	12	a	d	d	Bonanza	2528 Burgdorf Road			
100	S	KLAM	10292	39	11.5	26	d	b	a	Bonanza	North Poe Valley Road			
101	S	KLAM	13498	39	11.5	28	d	d	d	Dairy	20851 S. Poe Valley Road	39S/11.5E-28ddd	290	
102	S	KLAM	11421	39	11.5	32	d	b	b	Dairy	19611 Webber Road			
103	S	KLAM	13519	39	12	7	c	b	a	Lorella	McCartie Lane (about 0.1 mile east of 36210 McCartie Lane)	39S/12E-7cba		
104	S	KLAM	13538	39	12	16	c	a	c	Lorella	about 2.0 mile E & S of 37716 McCartie Lane	39S/12E-16cac		
105	S	KLAM	13608	39	12	16	d	b	a	Lorella	about 2.4 mile E & S of 37716 McCartie Lane			
106	S	KLAM	13548	39	12	21	b	d	b	Lorella	east of 39777 Bunn Way house	39S/12E-21bdb		
107	S	KLAM	13554	39	12	25	a	a	b	Goodlow Mountain	Gerber Road (about 2.15 mile northwest of road)			
108	S	KLAM	13556	39	12	26	a	c	a	Lorella	Gerber Road (about 2.8 northwest of Gerber Road)			
109	S	KLAM	10526	39	12	27	b	d	c	Lorella	Bunn Road (about 0.65 mile SE of 6735 Bunn Road)			
110	S	KLAM	10531	39	12	29	a	d	a	Lorella	east of 7122 E. Langell Valley Road			BON 022
111	S	KLAM	10647	39	12	29	a	c	a	Lorella	7122 E. Langell Valley Road			BON 020
112	S	KLAM	13583	39	12	32	c	d	a	Lorella	9441 Teare Lane			
113	S	KLAM	10467	39	12	34	c	b	a	Lorella	9140 Bunn Road			
114	S	KLAM	10608	39	12	34	c	a	d	Lorella	9747 E. Langell Valley Road			
115	S	KLAM	10634	39	12	34	c	a	c	Lorella	Bunn Road (0.25 mile north of E Langell Valley Road)			
116	S	KLAM	10122	39	12	35	c	c	d	Lorella	across from 9852 E. Langell Valley Road			

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Note: "Monthly" measurements occurred monthly from December 1998 to October 1999, bi-monthly from January 2000 to September 2001, quarterly from January 2002 to project end
Note: "other" data included water well report information and non-project data helpful to control map contouring

Well Use Sequence	Primary Data	Well Report County	Well Report Number	Location Township (South)	Location Range (East)	Location Section	Location Q (160 acre)	Location QQ (40 acre)	Location QQQ (10 acre)	USGS Map Name (scale = 1:24,000)	Address of Well (closest address)	USGS Well ID Leonard & Harris, 1974	OWRD Well ID State Obs Well	OWRD Well ID Gorman, 1994
117	S	KLAM	10175	39	12	35	a	a	b	Lorella	10057 E. Langell Valley Rd (about 1.1 mile NW of road)			
118	S	KLAM	10554	39	12	35	a	a	d	Lorella	10057 E. Langell Valley Road (about 0.85 mile north of road)			
119	S	KLAM	13602	39	13	1	b	c	b	Goodlow Mountain	Gerber Reservoir			
120	S	KLAM	13601	39	13	2	d	d	c	Goodlow Mountain	Gerber Reservoir (heliport area)			
121	S	KLAM	13609	39	13	12	b	c	a	Goodlow Mountain	Gerber Reservoir			
122	S	KLAM	13585	39	13	29	c	c	d	Goodlow Mountain	northeast of 47209 Gerber Road			
123	S	KLAM	13620	39	13	30	d	d	c	Goodlow Mountain	47235 Gerber Road	39S/13E-30dcd		
124	S	KLAM	11380	40	11	1	a	a	b	Malin	9889 Harpold Road			
125	S	KLAM	50623	40	11	3	c	d	a	Dairy	Schaupp Road (west of 23072 Schaupp Road)			
126	S	KLAM	14731	40	11	11	b	a	d	Malin	southeast of 24625 Schaupp Road	40S/11E-11bad	292	BON 030
127	S	KLAM	14735	40	11	12	a	a	c	Malin	13383 Harpold Rd	40S/11E-12aad		
128	S	KLAM	14742	40	11	13	b	d	a	Malin	14784 Harpold Road	40S/11E-13bda1		
129	S	KLAM	14746	40	11	13	b	c	d	Malin	14784 Harpold Road	40S/11E-13bcd		
130	S	KLAM	14754	40	11	25	a	d	d	Malin	Harpold Road			
131	S	KLAM	14796	40	12	6	d	a	b	Bonanza	9453 Harpold Road			
132	S	KLAM	14808	40	12	16	c	b	d	Malin	13383 Harpold Road			
133	S	KLAM	14809	40	12	18	a	a	c	Malin	13383 Harpold Road	40S/12E-18aad		
134	S	KLAM	14812	40	12	19	d	c	a	Malin	16467 Harpold Road			
135	S	KLAM	10675	40	12	30	c	a	d	Malin	17409 Harpold Road			
136	S	KLAM	14829	40	12	30	d	c	b	Malin	off Harpold Road		1162	
137	S	KLAM	15111	40	12	30	d	b	d	Malin	off Harpold Road			
138	S	KLAM	10364	40	13	2	a	a	a	Lorella	near 9962 E. Langell Valley Road			
139	S	KLAM	14864	40	13	9	b	d	a	Bryant Mountain	11234 W. Langell Valley Road			
140	S	KLAM	14873	40	13	26	a	b	a	Bryant Mountain	northwest of 17000 W. Langell Valley Road			
141	S	KLAM	10495	40	13	35	d	a	a	Bryant Mountain	across from 14819 W. Langell Valley Road			
142	S	KLAM	10458	40	14	16	b	c	b	Langell Valley	Boggs Lake (west side)			
143	S	KLAM	14884	40	14	16	a	a	b	Langell Valley	12661 E. Langell Valley Road	40S/14E-16aba		
144	S	KLAM	14891	40	14	19	d	a	c	Langell Valley	15666 E. Langell Valley Road			
145	S	KLAM	10473	40	14	32	c	a	a	Langell Valley	E. Langell Valley Road (about 0.5 mile north of Johnson Road)			
146	S	KLAM	14896	40	14	32	d	c	d	Langell Valley	19109 E. Langell Valley Road			
147	S	KLAM	10764	41	13	1	a	d	d	Langell Valley	Johnson Road (W side of Lost River about 0.5 mile S of Johnson Road)			
148	S	KLAM	10748	41	13	12	c	a	a	Langell Valley	W. Langell Valley Road (about 0.1 mile south of mile post 16)			
149	S	KLAM	15113	41	14	5	d	b	b	Langell Valley	E. Langell Valley Road (about 0.1 mile south of Willow Valley Road)			
150	S	KLAM	15127	41	14	5	a	c	d	Langell Valley	48211 Willow Valley Road			
151	S	KLAM	15130	41	14	8	c	c	a	Langell Valley	E. Langell Valley Road	41S/14E-8cca	295	
152	S	KLAM	15131	41	14	8	a	b	c	Langell Valley	21221 E. Langell Valley Road			
153	S	KLAM	10803	41	14	11	c	b	a	Langell Valley	about 0.05 mile west of 52600 Willow Valley Road			
154	S	KLAM	10642	41	14	18	b	d	c	Langell Valley	East Langell Valley Rd at Malone Dam			

Appendix 2: Project Wells

Note: Wells are sorted by primary data obtained and location (township/range-section)
Note: Primary Data : R = recorder, M = "monthly" measurements, S = synoptic measurements, G = geologic control, O = other (additional geologic and/or water level control for project maps)
Note: "Monthly" measurements occurred monthly from December 1998 to October 1999, bi-monthly from January 2000 to September 2001, quarterly from January 2002 to project end
Note: "other" data included water well report information and non-project data helpful to control map contouring

Well Use Sequence	Primary Data	Well Report County	Well Report Number	Location Township (South)	Location Range (East)	Location Section	Location Q (160 acre)	Location QQ (40 acre)	Location QQQ (10 acre)	USGS Map Name (scale = 1:24,000)	Address of Well (closest address)	USGS Well ID Leonard & Harris, 1974	OWRD Well ID State Obs Well	OWRD Well ID Gorman, 1994
Geology														
1	G	KLAM	2256	37	9	36	a	d	d	Whiteline Reservoir				
2	G	KLAM	2374	37	11	30	c	c	c	Yonna			282	
3	G	KLAM	2340	37	11	31	c	d	d	Yonna				
4	G	KLAM	12361	37	11	31	a	c	c	Yonna				
5	G	KLAM	2373	37	11.5	25	b	d	a	Yonna				
6	G	KLAM	10870	37	11.5	36	a	a	d	Yonna				
7	G	KLAM	11643	38	10	9	c	b	c	Whiteline Reservoir				
8	G	KLAM	12211	38	10	16	d	c	a	Whiteline Reservoir		38S/10E-dcd	314	
9	G	KLAM	12268	38	11	6	c	b	d	Yonna				
10	G	KLAM	12285	38	11	7	b	a	d	Yonna		38S/11E-7bad		
11	G	KLAM	10712	38	11	19	a	b	b	Yonna				
12	G	KLAM	12377	38	11.5	1	b	a	a	Yonna		38S/11.5E-1baa		
13	G	KLAM	12393	38	11.5	12	c	c	a	Yonna		38S/11.5E-12cca1		
14	G	KLAM	12396	38	11.5	13	a	c	a	Yonna		38S/11.5E-13aca	322	
15	G	KLAM	12418	38	11.5	26	a	d	a	Bonanza		38S/11.5E-26ada		
16	G	KLAM	12432	38	11.5	32	d	c	d	Dairy		38S/11.5E-32dcd		
17	G	KLAM	12437	38	11.5	33	d	c	a	Dairy		38S/11.5E-33dca		
18	G	KLAM	10431	39	11	16	d	a	c	Bonanza				
19	G	KLAM	50796	39	11	30	a	b	d	Bonanza	6615 Harpold Road			
20	G	KLAM	13462	39	11.5	2	d	c	c	Bonanza		39S/11.5E-2dcc		
21	G	KLAM	13465	39	11.5	5	b	c	b	Dairy		39S/11.5E-5bca		
22	G	KLAM	13468	39	11.5	6	a	c	a	Dairy		39S/11.5E-6aca		
23	G	KLAM	13472	39	11.5	13	d	a	b	Bonanza		39S/11.5E-13dab		
24	G	KLAM	13490	39	11.5	22	d	a	b	Dairy		39S/11.5E-22dab		
25	G	KLAM	13539	39	12	17	a	a	b	Lorella	about 1.15 mile from 37716 Mc Cartie Lane	39S/12E-17aab		
26	G	KLAM	13578	39	12	31	a	d	d	Lorella	Teare Lane (about 0.75 mile north of W. Langell Valley Road)			
27	G	KLAM	10162	39	13	21	b	c	c	Goodlow Mountain	Gerber Road			
28	G	KLAM	13615	39	13	29	c	d	b	Goodlow Mountain		39S/13E-29cdb		
29	G	KLAM	14714	40	11	1	a	a	a	Bonanza		40S/11E-1aaa		
30	G	KLAM	14736	40	11	12	c	d	d	Malin				
31	G	KLAM	14795	40	12	6	b	c	b	Bonanza				
32	G	KLAM	14802	40	12	7	b	d	b	Malin		40S/12E-7bdb		
33	G	KLAM	10156	40	13	2	a	c	b	Lorella				
34	G	KLAM	14892	40	14	29	c	a	a	Langell Valley	E. Langell Valley Rd (about 0.7 mile south of mile post 15)			
Other														
1	O	KLAM	13427	39	11	20	a	a	d	Bonanza			288	
2	O	KLAM	13435	39	11	26	a	b	d	Lorella			289	
3	O	KLAM	52806	39	11.5	21	a	d	d?	Dairy				
4	O	KLAM	52763	39	11.5	21	a	d	d?	Dairy				
5	O	KLAM	52911	39	11.5	29	a	b	c	Dairy				
6	O	KLAM	52727	39	11.5	29	?	?	?	Dairy				
7	O	KLAM	52289	39	11.5	32	?	?	?	Dairy				
8	O	KLAM	53348	39	12	29	c	d	b	Lorella				
9	O	KLAM	52701	39	12	35	b	d	b	Lorella				
10	O	KLAM	52764	40	11	2	?	?	?	Bonanza				
11	O	KLAM	53581	40	11	2	?	?	?	Bonanza				
12	O	KLAM	52922	40	11	3	c	a	c	Dairy				
13	O	KLAM	52344	40	11	3	b	c	a	Dairy				
14	O	KLAM	53630	40	11	3	?	?	?	Dairy				
15	O	KLAM	52766	40	11	3	d	d	a	Merrill				
16	O	KLAM	52918	40	11	3	?	?	?	Merrill				
17	O	KLAM	53080	40	11	3	?	?	?	Merrill				
18	O	KLAM	53246	40	13	4	?	?	?	Lorella				

Appendix 3. Klamath Falls precipitation in inches from 1921 to 2000

Note: station number = 354506, station name = Klamath Falls
Note: data source = Oregon State Climatologist, 2002
Note: missing data was filled (shaded values) by Oreon Water Resources Department staff using regression of data for nearby stations (Sprague River, Chemult, Crater Lake, and Chiloquin)

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Water Year Total
1921	1.02	3.64	2.58	1.91	1.65	1.15	0.31	1.22	0.48	0.00	0.00	0.06	**14.02**
1922	0.36	2.80	2.00	0.65	2.13	1.90	0.31	1.13	0.59	0.52	0.13	0.40	**12.92**
1923	2.28	1.60	3.55	1.38	0.52	0.04	1.34	0.57	0.41	0.60	0.20	1.46	**13.95**
1924	1.43	0.68	1.22	0.41	1.22	0.47	0.16	0.05	0.29	0.26	0.82	0.20	**7.21**
1925	2.71	1.65	3.04	1.12	2.29	0.97	1.07	1.74	1.57	0.06	0.21	1.97	**18.40**
1926	0.84	1.30	1.12	0.51	1.52	0.11	0.92	0.13	0.00	0.10	0.00	0.06	**6.61**
1927	0.65	7.94	1.29	1.40	2.92	1.02	2.01	1.03	0.41	0.02	0.13	0.59	**19.41**
1928	0.71	3.25	1.98	1.01	0.87	3.40	0.62	0.00	0.45	0.07	0.00	0.36	**12.72**
1929	1.23	1.75	1.89	1.73	0.10	0.57	0.51	0.05	0.23	0.00	0.00	0.00	**8.06**
1930	1.09	0.03	4.25	1.47	1.09	0.87	1.25	0.58	0.13	0.05	0.03	1.43	**12.27**
1931	0.28	1.99	0.27	0.56	0.82	1.10	0.57	0.89	0.43	0.00	0.00	1.13	**8.04**
1932	1.46	1.52	1.02	1.36	0.48	1.46	1.33	2.47	0.10	0.24	0.00	0.00	**11.44**
1933	0.24	1.15	1.01	1.68	0.62	1.05	1.32	1.28	1.02	0.20	0.02	0.06	**9.65**
1934	2.02	0.02	1.72	1.45	0.90	0.78	0.50	0.61	0.54	0.05	0.08	0.28	**8.95**
1935	1.08	3.17	1.03	1.65	0.81	0.28	2.50	0.49	0.25	1.63	0.03	0.15	**13.07**
1936	1.18	0.61	1.67	5.12	2.16	0.50	1.27	1.08	1.11	0.01	0.30	0.28	**15.29**
1937	0.01	0.00	0.80	1.58	2.12	1.33	1.37	0.43	4.01	0.13	0.00	0.34	**12.12**
1938	1.40	3.53	3.17	2.05	2.98	2.95	0.54	0.12	0.34	0.27	0.00	0.37	**17.72**
1939	0.62	1.79	1.02	1.40	1.29	0.89	0.00	0.75	0.15	0.46	0.15	0.50	**9.02**
1940	1.10	0.00	5.30	1.90	3.89	3.37	0.83	0.37	0.26	0.00	0.00	2.29	**19.31**
1941	1.30	0.91	2.00	2.59	2.72	0.41	0.80	1.54	1.31	0.59	2.93	0.50	**17.60**
1942	0.88	1.42	4.02	1.69	1.91	0.14	1.08	1.94	0.07	0.02	0.03	0.00	**13.20**
1943	0.29	4.19	2.73	4.85	1.16	0.81	2.00	0.64	1.11	0.07	0.03	0.39	**18.27**
1944	1.31	0.75	0.70	1.40	0.98	0.85	1.32	0.77	1.81	0.70	0.03	0.35	**10.97**
1945	0.73	2.70	0.77	0.87	1.84	0.92	0.46	4.75	0.21	0.03	0.00	0.17	**13.45**
1946	1.02	2.95	3.30	1.77	1.19	0.96	0.08	1.36	1.31	0.48	0.27	0.30	**14.99**
1947	0.91	2.00	0.83	0.98	0.64	1.16	0.63	1.46	1.94	0.60	0.07	0.53	**11.75**
1948	1.65	0.72	0.94	2.70	1.35	1.98	1.23	1.28	1.59	1.60	1.79	1.28	**18.11**
1949	0.98	1.82	3.31	0.56	1.95	0.50	0.17	1.79	0.44	0.00	0.20	0.30	**12.02**
1950	0.36	0.96	1.08	4.02	0.53	2.49	0.75	0.30	0.92	0.00	0.40	0.17	**11.98**
1951	4.47	1.46	2.62	1.86	1.80	0.57	1.28	0.97	0.00	0.00	0.00	0.38	**15.41**
1952	2.09	1.84	4.92	1.87	2.08	1.32	0.22	0.86	1.94	0.17	0.01	1.41	**18.73**
1953	0.14	0.78	4.46	3.52	1.60	1.15	0.60	1.87	0.75	0.00	0.42	0.53	**15.82**
1954	1.44	2.66	1.79	3.89	0.80	1.23	1.13	0.17	1.27	0.00	0.82	0.17	**15.37**
1955	0.29	1.05	1.54	0.92	0.54	0.73	1.03	0.01	0.65	0.12	0.12	0.52	**7.52**
1956	0.83	3.74	6.42	4.36	2.20	0.41	0.40	1.58	1.08	0.83	0.13	0.81	**22.79**
1957	3.27	0.49	1.61	1.68	1.78	3.47	0.79	1.87	0.08	0.14	0.08	3.06	**18.32**
1958	1.92	2.60	3.40	2.59	2.66	0.80	0.39	1.14	3.09	0.87	0.56	0.55	**20.57**
1959	0.33	0.72	0.76	1.29	0.65	0.61	0.32	0.49	0.65	0.00	1.42	0.84	**8.08**
1960	0.53	0.09	0.42	1.07	2.25	2.83	0.36	1.17	0.00	0.14	0.13	0.28	**9.27**

Appendix 3. Klamath Falls precipitation in inches from 1921 to 2000

Note: station number = 354506, station name = Klamath Falls
Note: data source = Oregon State Climatologist, 2002
Note: missing data was filled (shaded values) by Oreon Water Resources Department staff using regression of data for nearby stations (Sprague River, Chemult, Crater Lake, and Chiloquin)

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Water Year Total
1961	0.59	2.69	1.91	0.66	1.92	1.62	0.20	1.35	0.45	0.00	0.68	0.86	**12.93**
1962	1.76	2.11	2.54	1.33	1.26	1.03	0.23	0.95	0.06	0.07	0.34	0.55	**12.23**
1963	4.55	1.17	1.58	1.21	1.16	0.57	1.78	0.85	1.37	0.02	0.88	0.04	**15.18**
1964	1.25	2.11	0.70	3.83	0.15	0.54	0.25	0.72	1.68	0.34	0.19	0.12	**11.88**
1965	0.23	2.30	8.93	2.23	0.08	0.08	1.62	0.36	1.12	0.00	2.49	0.00	**19.44**
1966	0.05	2.69	1.76	1.15	0.29	0.82	0.48	0.38	0.92	0.47	1.37	0.17	**10.55**
1967	0.24	3.08	3.07	2.32	0.13	1.58	1.44	1.35	1.03	0.00	0.00	0.04	**14.28**
1968	0.83	0.53	1.12	1.73	1.44	0.55	0.17	0.73	0.40	0.04	1.71	0.09	**9.34**
1969	0.84	2.42	1.64	4.12	1.08	0.32	0.45	0.85	1.46	0.09	0.00	0.41	**13.68**
1970	2.06	0.40	4.69	4.85	0.70	1.21	0.29	0.38	0.20	0.14	0.00	0.00	**14.92**
1971	1.66	3.96	1.46	1.81	0.94	2.87	0.50	3.46	0.79	0.02	0.18	0.88	**18.53**
1972	0.75	1.94	1.65	3.67	1.30	2.90	0.62	0.43	0.55	0.00	0.10	0.33	**14.24**
1973	1.52	0.94	1.81	1.17	0.99	0.94	0.16	0.47	0.01	0.20	0.05	0.51	**8.77**
1974	1.82	3.92	2.19	1.44	1.05	2.21	0.92	0.13	0.06	0.60	0.26	0.00	**14.60**
1975	0.53	0.70	1.88	2.14	2.83	2.06	0.65	0.14	0.96	0.88	0.44	0.37	**13.58**
1976	1.70	0.80	1.05	0.94	2.00	0.57	0.11	0.23	0.28	0.31	2.73	0.18	**10.90**
1977	0.14	0.22	0.22	0.85	0.43	0.45	0.09	2.01	1.59	0.07	0.17	2.13	**8.37**
1978	0.41	2.39	3.38	1.21	0.64	2.76	1.71	0.22	0.62	0.12	0.52	0.45	**14.43**
1979	0.00	0.50	0.57	2.45	1.33	0.80	1.39	1.50	0.25	0.21	1.04	0.23	**10.27**
1980	2.94	3.41	1.29	2.50	2.03	0.69	0.61	0.84	0.78	0.03	0.00	0.59	**15.71**
1981	0.50	1.04	1.80	0.77	1.93	1.12	1.02	1.11	0.18	0.01	0.00	0.42	**9.90**
1982	1.26	4.25	5.87	0.98	2.35	1.84	0.65	0.25	1.54	0.65	0.63	0.40	**20.67**
1983	1.34	1.71	3.15	1.07	2.50	2.78	1.44	0.56	0.36	0.51	0.73	0.52	**16.67**
1984	0.78	3.66	5.81	0.23	1.51	1.25	1.10	0.51	0.74	0.40	1.56	0.50	**18.05**
1985	1.94	3.69	1.30	0.14	1.20	0.95	0.29	0.39	0.68	0.95	0.08	2.36	**13.97**
1986	0.87	1.61	0.74	1.87	4.66	1.48	0.18	0.89	0.69	0.11	0.00	2.45	**15.55**
1987	0.50	0.94	0.62	1.50	0.58	1.69	0.16	0.35	0.56	2.41	0.04	0.00	**9.35**
1988	0.06	0.85	4.02	2.35	0.13	0.51	0.98	1.17	1.02	0.00	0.01	0.11	**11.21**
1989	0.00	4.23	1.23	1.61	0.54	3.02	1.66	0.90	0.21	0.10	0.44	1.44	**15.38**
1990	1.10	0.82	0.43	2.93	1.14	1.26	1.37	2.17	0.22	1.44	1.90	0.21	**14.99**
1991	0.32	0.72	0.80	1.20	0.71	2.17	0.86	1.71	0.28	0.25	0.26	0.00	**9.28**
1992	0.52	1.63	1.10	0.65	0.84	0.41	0.96	0.13	1.06	0.18	0.00	0.64	**8.12**
1993	1.59	1.78	2.61	2.98	1.71	2.22	1.73	2.13	1.41	0.01	0.84	0.24	**19.25**
1994	0.66	0.40	1.35	0.56	0.63	0.26	0.42	2.37	0.49	0.00	0.00	0.39	**7.53**
1995	0.16	3.61	0.91	3.73	0.31	3.05	2.62	0.78	1.86	0.09	0.00	0.00	**17.12**
1996	0.01	0.76	5.10	3.24	1.44	1.12	0.91	1.95	1.48	0.11	0.25	0.57	**16.94**
1997	1.14	1.60	4.69	3.12	0.73	0.69	1.35	0.70	0.93	0.69	0.77	0.59	**17.00**
1998	1.33	2.56	0.73	4.31	1.57	2.06	0.45	4.83	0.73	0.03	0.00	0.00	**18.60**
1999	0.00	5.79	1.29	2.87	2.52	0.82	0.70	0.20	0.14	0.00	2.04	0.00	**16.37**
2000	0.49	1.11	0.73	4.82	1.72	1.07	2.30	0.40	0.11	0.33	0.00	0.42	**13.50**

Appendix 3. Klamath Falls precipitation in inches from 1921 to 2000

Note: station number = 354506, station name = Klamath Falls
Note: data source = Oregon State Climatologist, 2002
Note: missing data was filled (shaded values) by Oreon Water Resources Department staff using regression of data for nearby stations (Sprague River, Chemult, Crater Lake, and Chiloquin)

Water Year Statistics													
All Data (1921 to 2000)	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**Water Year**
Max	4.55	7.94	8.93	5.12	4.66	3.47	2.62	4.83	4.01	2.41	2.93	3.06	**22.79**
Ave	1.06	1.92	2.19	1.97	1.39	1.27	0.86	1.02	0.78	0.29	0.43	0.55	**13.72**
Min	0.00	0.00	0.22	0.14	0.08	0.04	0.00	0.00	0.00	0.00	0.00	0.00	**6.61**
90 percentile	2.02	3.70	4.69	3.90	2.50	2.83	1.67	1.96	1.59	0.71	1.43	1.43	**18.61**
75 percentile	1.43	2.69	3.09	2.59	1.94	1.73	1.29	1.35	1.11	0.42	0.53	0.58	**16.74**
50 percentile	0.88	1.64	1.66	1.67	1.24	1.03	0.73	0.85	0.61	0.11	0.13	0.38	**13.82**
25 percentile	0.40	0.80	1.02	1.11	0.71	0.57	0.38	0.39	0.25	0.02	0.00	0.17	**10.81**
10 percentile	0.14	0.48	0.73	0.65	0.48	0.41	0.17	0.14	0.10	0.00	0.00	0.00	**8.35**
30 Year (1971 to 2000)	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**Water Year**
Max	2.94	5.79	5.87	4.82	4.66	3.05	2.62	4.83	1.86	2.41	2.73	2.45	**20.67**
Ave	0.87	2.05	1.99	1.97	1.41	1.53	0.93	1.10	0.69	0.36	0.50	0.56	**13.96**
Min	0.00	0.22	0.22	0.14	0.13	0.26	0.09	0.13	0.01	0.00	0.00	0.00	**7.53**
90 percentile	1.71	3.99	4.73	3.68	2.50	2.87	1.71	2.19	1.49	0.89	1.59	1.51	**18.54**
75 percentile	1.34	3.56	2.51	2.92	1.88	2.20	1.37	1.66	0.95	0.48	0.71	0.59	**16.87**
50 percentile	0.71	1.62	1.33	1.71	1.25	1.26	0.89	0.74	0.65	0.15	0.22	0.41	**14.52**
25 percentile	0.34	0.83	0.83	1.00	0.72	0.81	0.46	0.36	0.26	0.03	0.00	0.19	**10.43**
10 percentile	0.01	0.68	0.62	0.64	0.53	0.50	0.16	0.19	0.14	0.00	0.00	0.00	**8.73**

Appendix 3. Klamath Falls precipitation in inches from 1921 to 2000

Note: station number = 354506, station name = Klamath Falls
Note: data source = Oregon State Climatologist, 2002
Note: missing data was filled (shaded values) by Oreon Water Resources Department staff using regression of data for nearby stations (Sprague River, Chemult, Crater Lake, and Chiloquin)

All Data (1921 to 2000)	Max	Ave	Min	90 percentile	75 percentile	50 percentile	25 percentile	10 percentile
OCT	4.55	1.06	0.00	2.02	1.43	0.88	0.40	0.14
NOV	7.94	1.92	0.00	3.70	2.69	1.64	0.80	0.48
DEC	8.93	2.19	0.22	4.69	3.09	1.66	1.02	0.73
JAN	5.12	1.97	0.14	3.90	2.59	1.67	1.11	0.65
FEB	4.66	1.39	0.08	2.50	1.94	1.24	0.71	0.48
MAR	3.47	1.27	0.04	2.83	1.73	1.03	0.57	0.41
APR	2.62	0.86	0.00	1.67	1.29	0.73	0.38	0.17
MAY	4.83	1.02	0.00	1.96	1.35	0.85	0.39	0.14
JUN	4.01	0.78	0.00	1.59	1.11	0.61	0.25	0.10
JUL	2.41	0.29	0.00	0.71	0.42	0.11	0.02	0.00
AUG	2.93	0.43	0.00	1.43	0.53	0.13	0.00	0.00
SEP	3.06	0.55	0.00	1.43	0.58	0.38	0.17	0.00
Water Year	22.79	13.72	6.61	18.61	16.74	13.82	10.81	8.35

30 Year (1971 to 2000)	Max	Ave	Min	90 percentile	75 percentile	50 percentile	25 percentile	10 percentile
OCT	2.94	0.87	0.00	1.71	1.34	0.71	0.34	0.01
NOV	5.79	2.05	0.22	3.99	3.56	1.62	0.83	0.68
DEC	5.87	1.99	0.22	4.73	2.51	1.33	0.83	0.62
JAN	4.82	1.97	0.14	3.68	2.92	1.71	1.00	0.64
FEB	4.66	1.41	0.13	2.50	1.88	1.25	0.72	0.53
MAR	3.05	1.53	0.26	2.87	2.20	1.26	0.81	0.50
APR	2.62	0.93	0.09	1.71	1.37	0.89	0.46	0.16
MAY	4.83	1.10	0.13	2.19	1.66	0.74	0.36	0.19
JUN	1.86	0.69	0.01	1.49	0.95	0.65	0.26	0.14
JUL	2.41	0.36	0.00	0.89	0.48	0.15	0.03	0.00
AUG	2.73	0.50	0.00	1.59	0.71	0.22	0.00	0.00
SEP	2.45	0.56	0.00	1.51	0.59	0.41	0.19	0.00
Water Year	20.67	13.96	7.53	18.54	16.87	14.52	10.43	8.73

Appendix 4. Klamath Falls average daily maximum, minimum, and average temperatures by month in degrees Fahrenheit from 1971 to 2000

Note: station number = 354506, station name = Klamath Falls
Note: data source = Oregon State Climatologist, 2002
Note: months with no value indicates the month had more than 5 days of missing data

Daily Maximum Temperature (monthly average)

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Water Year Average
1971	62.48	47.77	34.83	40.42	45.39	45.61	57.23	66.32	72.63	86.71	89.00	73.90	**60.19**
1972	60.61	48.53	34.39	36.74	45.66	57.39	56.40	71.58	79.83	88.03	86.13	73.07	**61.53**
1973	63.55	44.80	34.42	36.97	46.14	48.23	61.43	74.81	80.17	88.45	85.90	77.67	**61.88**
1974	63.57	43.60	41.52	37.55	44.27	50.32	57.59	66.97	83.00	83.71	85.71	84.30	**61.84**
1975	67.94	50.27	39.93	37.00	41.11	45.77	50.40	68.87	75.14	85.65	80.77	82.57	**60.45**
1976	59.84	44.64	41.86	42.84	44.59	48.29	55.83	70.71	72.32	85.67	76.55	77.53	**60.06**
1977	67.29	54.66	44.77	32.07	48.93	46.58	63.90	57.84	81.33	84.42	85.77	71.47	**61.59**
1978	63.55	47.41	41.58	43.26	46.04	56.52	53.00	65.06	76.89	84.61	81.85	68.64	**60.70**
1979	69.74	45.63	35.13	35.81	41.96	53.48	56.53	69.58	78.70	85.10	80.87	80.47	**61.08**
1980	64.35	45.17	42.26	41.16	48.10	47.81	60.70	65.73	70.00	85.53	81.48	76.77	**60.76**
1981	64.61	49.60	42.42	43.23	47.18	52.55	61.47	65.00	76.23	84.43	88.97	77.67	**62.78**
1982	58.58	49.03	42.55	36.65	44.39	46.94	54.73	68.84	74.47	82.19	83.63		**58.36**
1983	59.97	43.23	38.00	41.42	44.96	48.32	53.07	69.06	73.14	80.06	83.14	76.41	**59.23**
1984	65.74	44.17	36.45	41.26	45.76	53.52	54.20	67.84	72.97	87.29	85.29	73.70	**60.68**
1985	54.57	42.47	33.10	36.58	43.00	48.39	64.97	68.52	80.41	89.55	83.03	66.83	**59.29**
1986	60.97	39.60	38.84	46.68	47.75	57.23	59.13	68.77	81.13	81.84	89.26	66.27	**61.46**
1987	65.16	49.97	40.71	38.26	46.14	50.84	68.77	71.77	82.97	79.42	86.68	81.37	**63.51**
1988	71.55	49.27	37.77	36.43	48.86	55.48	60.87	67.90	76.27	88.94	87.03	78.73	**63.26**
1989	73.77	44.67	39.00	34.03	36.46	49.35	64.03	66.10	78.57		81.03	75.93	**58.45**
1990	61.90	50.83	43.90	41.26	42.00	53.71	65.20	63.10	77.33	86.90	83.16	79.77	**62.42**
1991	64.84	47.97	34.26	43.23	53.46	47.74	55.37	63.10	72.63	88.26	87.29	83.07	**61.77**
1992	70.00	49.93	41.84	43.32	53.14	59.81	66.86	80.97	81.33	87.26	90.94	79.57	**67.08**
1993	69.16	48.30	34.42	33.71	39.36	52.90	56.47	70.77	73.87	79.19	82.77	80.17	**60.09**
1994	66.87	48.23	40.97	45.16	44.82	60.10	63.70	71.39	79.67	91.45	87.87	81.83	**65.17**
1995	64.00	39.17	37.42	43.06	55.93	51.06	58.50	68.32	74.57	85.03	84.84	81.67	**61.96**
1996	67.23	56.47	43.06	41.03	45.90	56.32	61.83	66.65	79.63	90.94	89.45	76.10	**64.55**
1997	64.65	52.30	42.26	42.61	47.04	58.06	59.33	76.58	75.63	86.39	86.16	78.63	**64.14**
1998	63.13	50.87	40.45	43.58	43.75	52.71	59.07	59.48	75.83	90.32	90.58		**60.89**
1999		44.77	41.06	44.46	40.59	48.46	58.50	67.57	82.90	86.78	86.41	84.58	**62.37**
2000	70.67	55.37	42.81	43.56	50.00	55.94	65.80	73.38	82.56	85.09	88.64	80.33	**66.18**
Average (1971 to 2000)	**64.84**	**47.62**	**39.40**	**40.11**	**45.76**	**51.98**	**59.50**	**68.42**	**77.40**	**85.83**	**85.34**	**77.47**	**61.79**

Appendix 4. Klamath Falls average daily maximum, minimum, and average temperatures by month in degrees Fahrenheit from 1971 to 2000

Note: station number = 354506, station name = Klamath Falls
Note: data source = Oregon State Climatologist, 2002
Note: months with no value indicates the month had more than 5 days of missing data

Daily Minimum Temperature (monthly average)

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Water Year Average
1971	32.48	32.93	21.70	23.10	24.00	24.61	29.73	38.48	42.97	52.52	52.45	37.10	**34.34**
1972	31.16	26.33	16.68	15.74	25.21	30.58	28.97	40.97	47.50	51.72	52.03	39.63	**33.88**
1973	35.84	28.20	14.93	20.80	27.36	26.07	29.63	40.30	43.55	50.45	46.39	41.17	**33.72**
1974	33.80	30.53	28.45	20.00	23.15	28.87	29.79	36.39	47.07	50.58	50.06	46.40	**35.42**
1975	32.97	28.83	23.10	15.06	22.57	27.00	28.27	37.30	43.24	51.81	47.65	48.33	**33.84**
1976	34.61	25.21	26.24	23.97	24.10	23.39	30.10	38.97	41.71	51.50	47.65	46.17	**34.47**
1977	33.87	28.14	17.16	11.52	24.14	25.00	32.34	34.43	50.53	50.16	54.52	43.83	**33.80**
1978	35.84	28.07	26.03	28.23	27.71	32.35	32.20	36.23	45.14	52.87	50.15	42.32	**36.43**
1979	36.42	23.70	17.71	18.10	26.71	30.48	31.17	41.48	44.83	50.48	49.10	44.63	**34.57**
1980	40.77	24.13	25.55	22.97	30.48	27.03	32.77	37.60	41.67	51.50	47.77	43.60	**35.49**
1981	35.65	28.50	24.84	28.35	26.64	29.13	33.77	37.97	45.13	51.40	53.03	44.63	**36.59**
1982	33.74	31.10	29.74	16.71	23.07	27.68	29.23	38.93	48.00	50.13	49.48		**34.35**
1983	35.00	25.23	22.32	25.48	29.64	32.81	30.60	40.23	43.55	47.16	51.59	43.59	**35.60**
1984	35.45	29.07	23.52	22.74	25.83	30.58	31.27	38.74	44.67	56.35	50.61	42.77	**35.97**
1985	33.17	28.80	16.35	17.26	21.71	23.65	34.40	38.35	49.72	57.00	48.39	41.97	**34.23**
1986	32.43	19.70	20.13	30.19	31.36	32.84	32.77	39.71	51.37	49.42	55.81	40.10	**36.32**
1987	35.10	28.83	23.74	21.45	26.04	28.97	34.80	41.73	49.50	47.61	50.47	43.77	**36.00**
1988	39.16	29.17	23.37	15.97	23.10	27.65	35.70	36.39	46.90	55.26	52.00	41.97	**35.55**
1989	37.52	29.67	19.55	13.48	15.14	29.80	36.83	39.03	47.73		48.65	44.50	**32.90**
1990	33.61	24.47	21.42	24.35	19.36	28.97	37.40	37.06	44.77	54.68	51.55	46.43	**35.34**
1991	34.16	25.00	12.84	19.71	28.57	27.06	30.90	36.13	42.43	55.06	50.68	49.23	**34.31**
1992	38.00	30.70	24.68	24.06	29.76	32.35	36.43	47.16	51.07	53.23	52.52	42.53	**38.54**
1993	36.87	27.40	17.68	15.16	18.22	33.26	32.67	41.65	42.53	43.32	48.87	43.93	**33.46**
1994	36.94	20.23	22.65	24.84	23.82	28.94	32.63	41.48	46.10	57.16	46.61	43.50	**35.41**
1995	32.16	23.60	20.55	30.65	29.43	29.06	32.13	42.42	46.13	51.13	47.48	45.90	**35.89**
1996	33.55	34.20	28.58	25.48	27.86	29.13	32.33	37.03	45.87	56.10	50.13	41.90	**36.85**
1997	36.06	30.10	27.81	24.39	26.43	30.45	32.70	42.97	44.83	51.45	51.61	43.73	**36.88**
1998	33.55	32.10	22.00	28.61	28.96	29.77	31.90	36.42	45.20	54.06	51.61		**35.83**
1999		25.46	18.71	23.85	19.06	21.71	29.44	34.13	40.80	43.11	48.78	45.67	**31.88**
2000	35.11	29.58	19.25	25.39	26.38	27.00	30.00	35.08	47.06	45.36	45.53	41.36	**33.93**
Average (1971 to 2000)	**35.00**	**27.63**	**21.91**	**21.92**	**25.19**	**28.54**	**32.10**	**38.83**	**45.72**	**51.47**	**50.11**	**43.60**	**35.06**

Appendix 4. Klamath Falls average daily maximum, minimum, and average temperatures by month in degrees Fahrenheit from 1971 to 2000

Note: station number = 354506, station name = Klamath Falls
Note: data source = Oregon State Climatologist, 2002
Note: months with no value indicates the month had more than 5 days of missing data

Daily Average Temperature (monthly average)

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Water Year Average
1971	47.48	40.35	28.27	31.76	34.70	35.11	43.48	52.40	57.80	69.61	70.73	55.50	**47.27**
1972	45.89	37.43	25.53	26.24	35.43	43.98	42.68	56.27	63.67	69.88	69.08	56.35	**47.70**
1973	49.69	36.50	24.45	28.88	36.75	37.15	45.53	57.67	61.86	69.45	66.15	59.42	**47.79**
1974	48.68	37.07	34.98	28.77	33.58	39.60	43.69	51.68	65.03	67.15	67.89	65.35	**48.62**
1975	50.45	39.55	31.52	26.03	31.84	36.39	39.33	53.08	59.19	68.73	64.21	65.45	**47.15**
1976	47.23	34.74	34.05	33.40	34.34	35.84	42.97	54.84	56.74	68.58	62.10	61.85	**47.22**
1977	50.58	41.40	30.97	21.88	36.54	35.79	47.91	46.02	65.93	67.29	70.15	57.65	**47.68**
1978	49.69	37.74	33.81	35.74	36.88	44.44	42.60	50.65	61.02	68.74	65.96	55.48	**48.56**
1979	53.08	34.67	26.42	26.95	34.34	41.98	43.85	55.53	61.77	67.79	64.98	62.55	**47.83**
1980	52.56	34.65	33.90	32.06	39.29	37.48	46.73	51.67	55.83	68.52	64.63	60.18	**48.13**
1981	50.13	39.05	33.63	35.79	36.91	40.84	47.62	51.48	60.68	67.92	71.00	61.15	**49.68**
1982	46.16	40.07	36.15	26.68	33.73	37.31	41.98	53.62	61.23	66.16	66.40		**46.32**
1983	47.48	34.23	30.16	33.45	37.30	40.56	41.83	54.65	58.34	63.61	67.36	60.00	**47.41**
1984	50.60	36.62	29.98	32.00	35.79	42.05	42.73	53.29	58.82	71.82	67.95	58.23	**48.32**
1985	43.53	35.63	24.73	26.92	32.36	36.02	49.68	53.44	65.07	73.20	65.71	54.40	**46.72**
1986	46.47	29.65	29.48	38.44	39.55	45.03	45.95	54.24	66.25	65.63	72.53	52.78	**48.83**
1987	50.13	39.40	32.23	29.85	36.09	39.90	51.78	56.75	66.23	63.52	68.38	62.57	**49.74**
1988	55.35	39.29	30.73	26.69	35.98	41.56	48.28	52.15	61.58	72.10	69.52	60.35	**49.47**
1989	55.65	37.17	29.27	23.76	25.80	39.45	50.43	52.56	63.15		64.84	60.22	**45.66**
1990	47.76	37.65	32.66	32.81	30.68	41.34	51.30	50.08	61.05	70.79	67.35	63.10	**48.88**
1991	49.50	36.48	23.55	31.47	41.02	37.40	43.13	49.61	57.53	71.66	68.98	66.15	**48.04**
1992	54.00	40.32	33.26	33.69	41.45	46.08	51.70	64.06	66.20	70.24	71.73	61.05	**52.82**
1993	53.02	37.85	26.05	24.44	28.78	43.08	44.57	56.21	58.20	61.26	65.82	62.05	**46.78**
1994	51.90	34.23	31.81	35.00	34.32	44.52	48.17	56.44	62.88	74.31	67.24	62.67	**50.29**
1995	48.08	31.38	28.98	36.85	42.68	40.06	45.32	55.37	60.35	68.08	66.16	63.78	**48.92**
1996	50.39	45.33	35.82	33.26	36.88	42.73	47.08	51.84	62.75	73.52	69.79	59.00	**50.70**
1997	50.35	41.20	35.03	33.50	36.73	44.26	46.02	59.77	60.23	68.92	68.89	61.18	**50.51**
1998	48.34	41.48	31.23	36.10	36.36	41.24	45.48	47.95	60.52	72.19	71.10		**48.36**
1999		35.12	30.72	34.15	29.82	35.46	43.96	50.93	61.85	65.25	67.65	65.12	**47.28**
2000	52.89	42.47	31.03	34.47	38.19	41.47	48.10	54.23	64.81	65.23	66.89	61.04	**50.07**
Average (1971 to 2000)	**49.90**	**37.62**	**30.68**	**31.03**	**35.47**	**40.27**	**45.80**	**53.62**	**61.55**	**68.66**	**67.71**	**60.52**	**48.42**

Appendix 4. Klamath Falls average daily maximum, minimum, and average temperatures by month in degrees Fahrenheit from 1971 to 2000

Note: station number = 354506, station name = Klamath Falls
Note: data source = Oregon State Climatologist, 2002
Note: months with no value indicates the month had more than 5 days of missing data

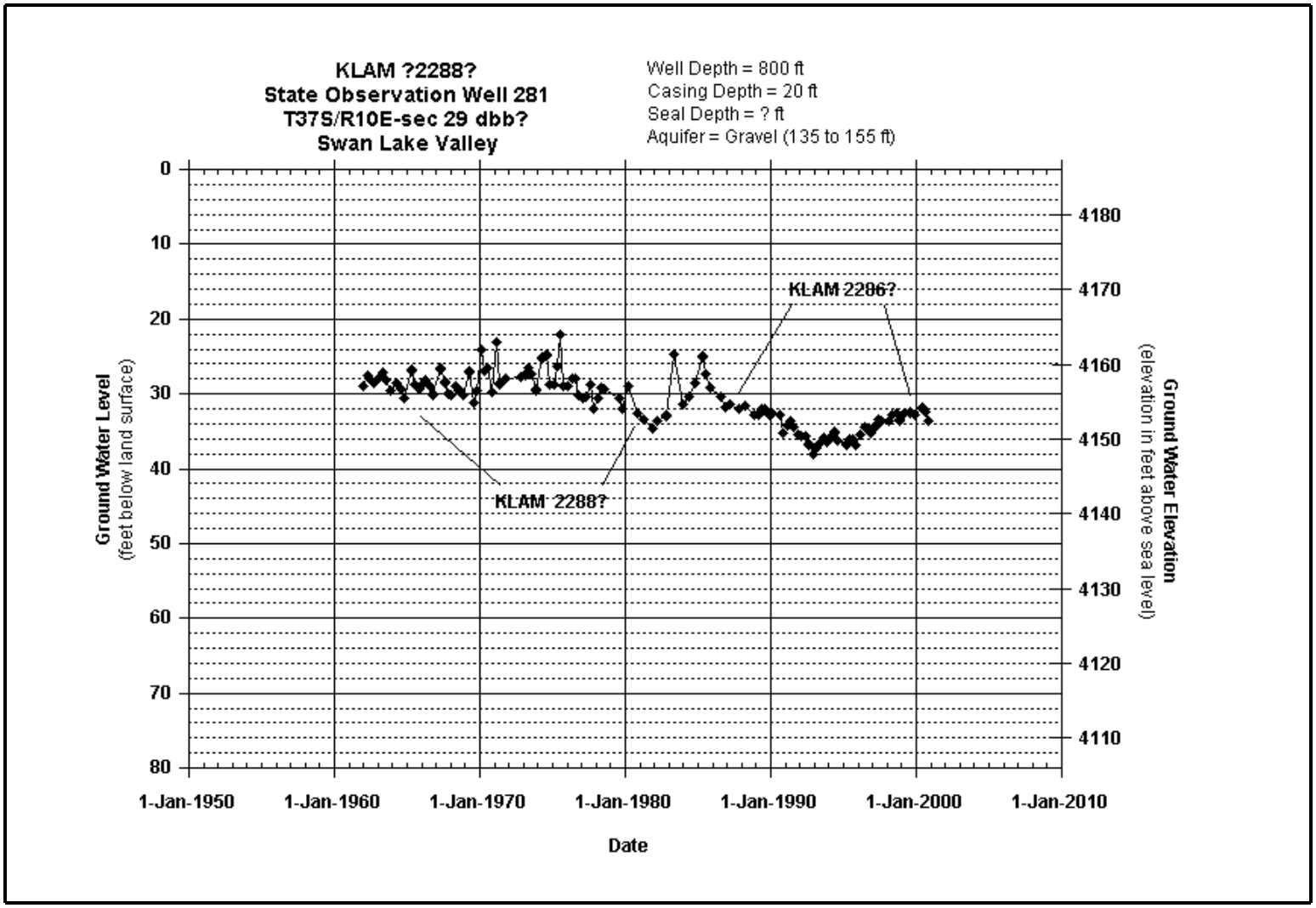
Month	Maximum	Average	Minimum
OCT	64.84	49.90	35.00
NOV	47.62	37.62	27.63
DEC	39.40	30.68	21.91
JAN	40.11	31.03	21.92
FEB	45.76	35.47	25.19
MAR	51.98	40.27	28.54
APR	59.50	45.80	32.10
MAY	68.42	53.62	38.83
JUN	77.40	61.55	45.72
JUL	85.83	68.66	51.47
AUG	85.34	67.71	50.11
SEP	77.47	60.52	43.60

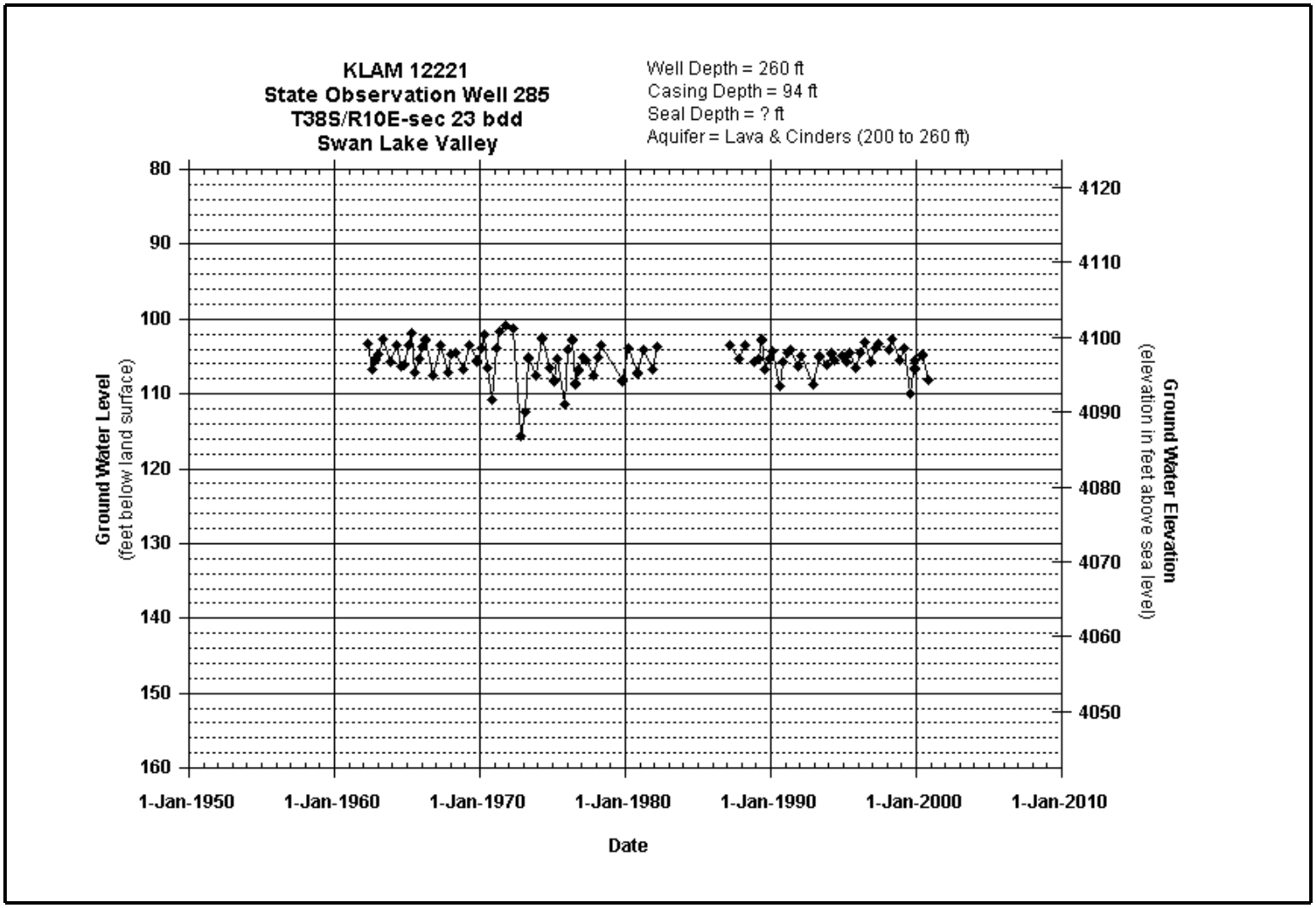
Appendix 5. Number of water wells constructed for different uses by location as noted on water well report. (The number of wells is based upon water well reports for wells filed at Oregon water Resources Department. Not represented are wells with no report filed.)

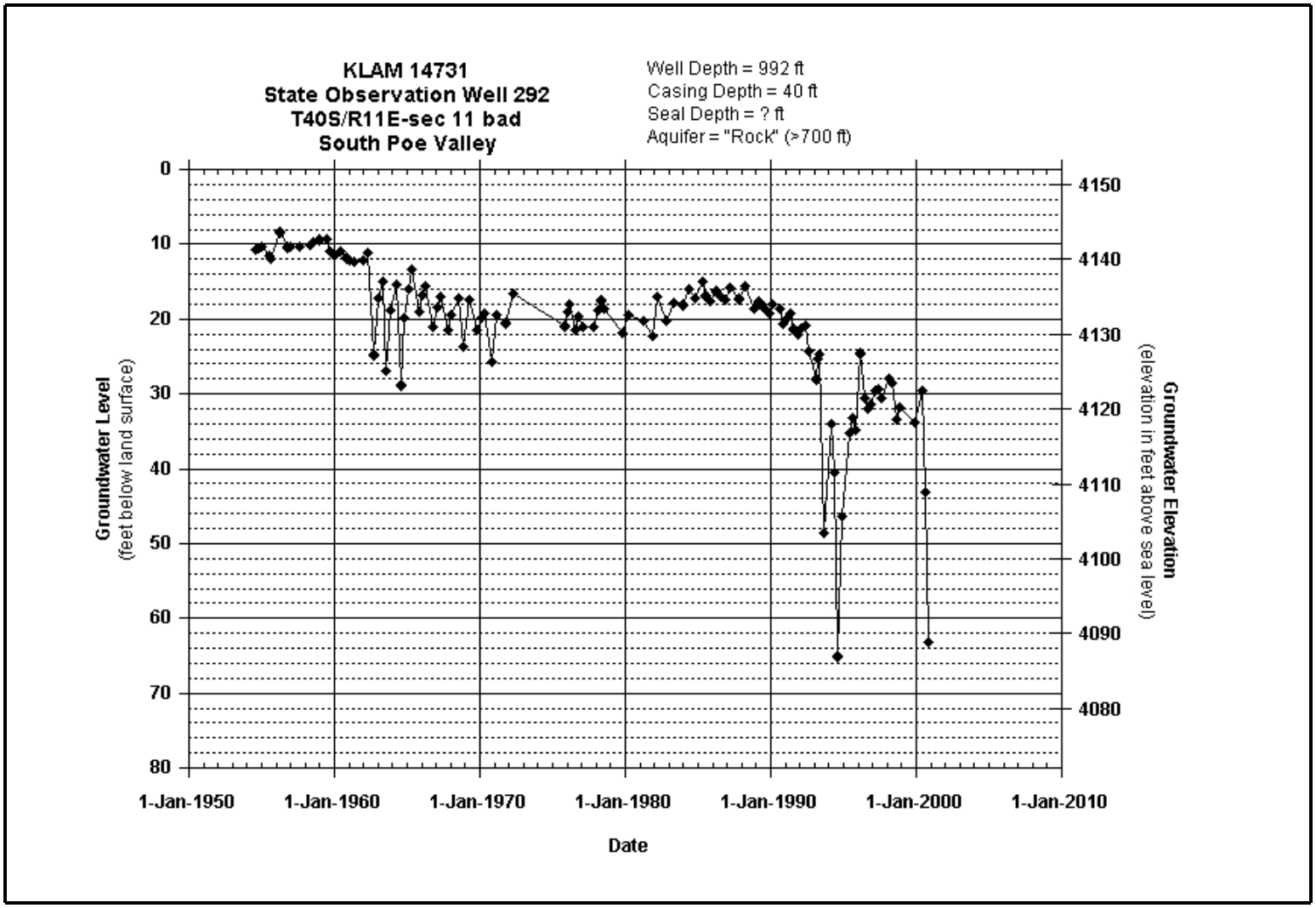
Location		Well Use				
Township	**Range**	**Domestic**	**Irrigation**	**Livestock**	**Other**	**Total**
36 S	7 E	0	0	0	0	0
	8 E	0	0	0	0	0
	9 E	1	0	0	1	2
	10 E	1	0	0	1	2
37 S	9 E	3	3	3	2	11
	10 E	6	13	11	5	35
	11 E	85	4	1	0	90
	11.5 E	0	4	1	1	6
	12 E	3	0	0	0	3
	13 E	0	0	0	0	0
38 S	9 E	8	0	1	1	10
	10 E	18	17	4	10	49
	11 E	235	42	7	13	297
	11.5 E	35	26	2	4	67
	12 E	16	2	0	2	20
	13 E	0	0	0	0	0
	14 E	0	0	0	0	0
	15 E	1	0	0	0	1
39 S	10 E	18	0	1	0	19
	11 E	146	37	6	10	199
	11.5 E	54	18	4	6	82
	12 E	71	26	4	11	112
	13 E	22	3	0	4	29
	14 E	1	0	0	1	2
	15 E	0	0	0	0	0
	16 E	0	0	0	0	0
40 S	11 E	22	13	2	3	40
	12 E	10	6	2	1	19
	13 E	31	10	0	1	42
	14 E	13	8	6	1	28
	14.5 E	0	0	0	0	0
	15 E	0	0	0	0	0
	16 E	0	0	0	0	0
41 S	13 E	3	3	2	0	8
	14 E	3	4	1	1	9
	15 E	1	0	0	0	1
	16 E	3	1	0	0	4
	17 E	0	0	0	0	0
		810	**240**	**58**	**79**	**1187**

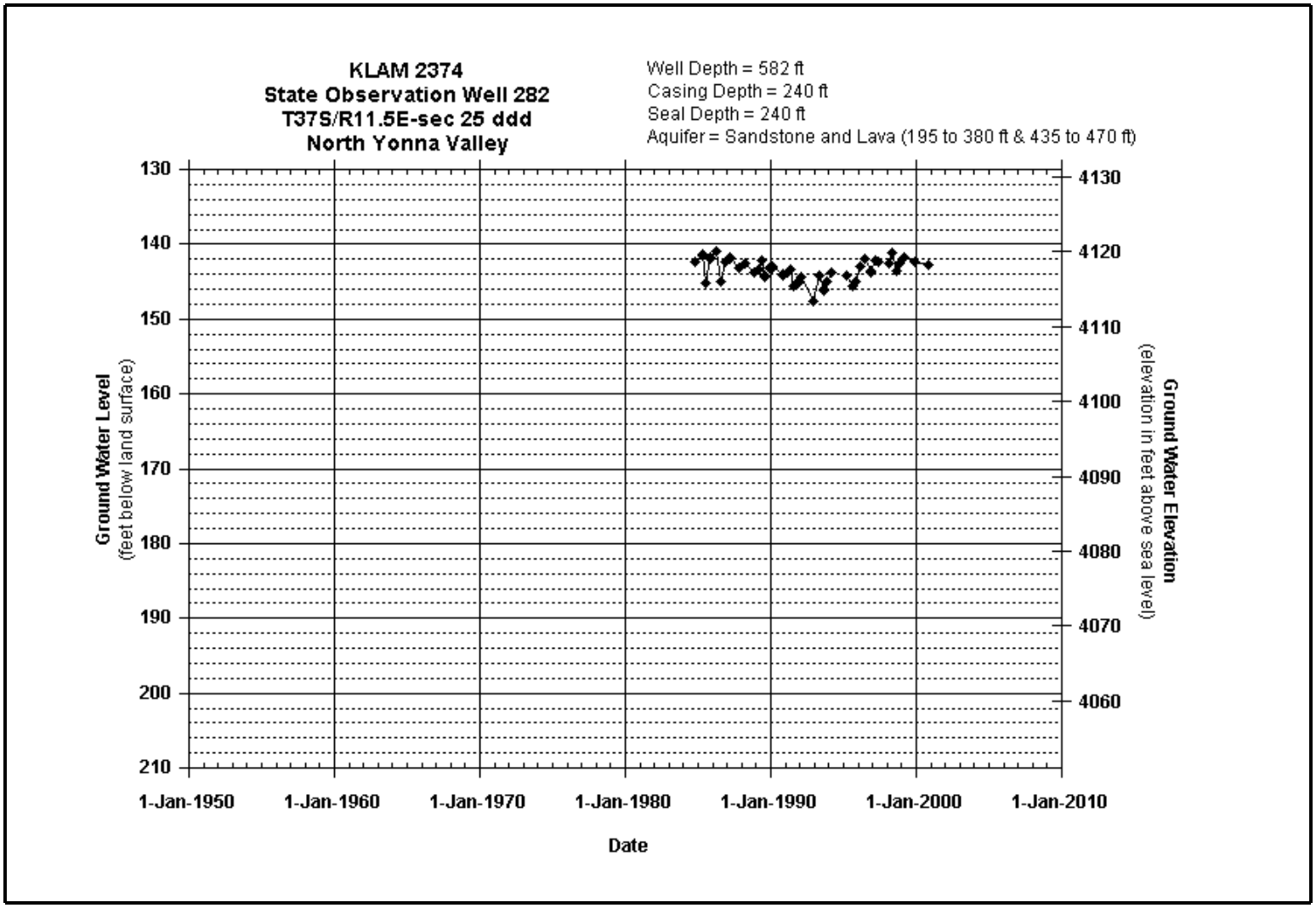
Appendix 6

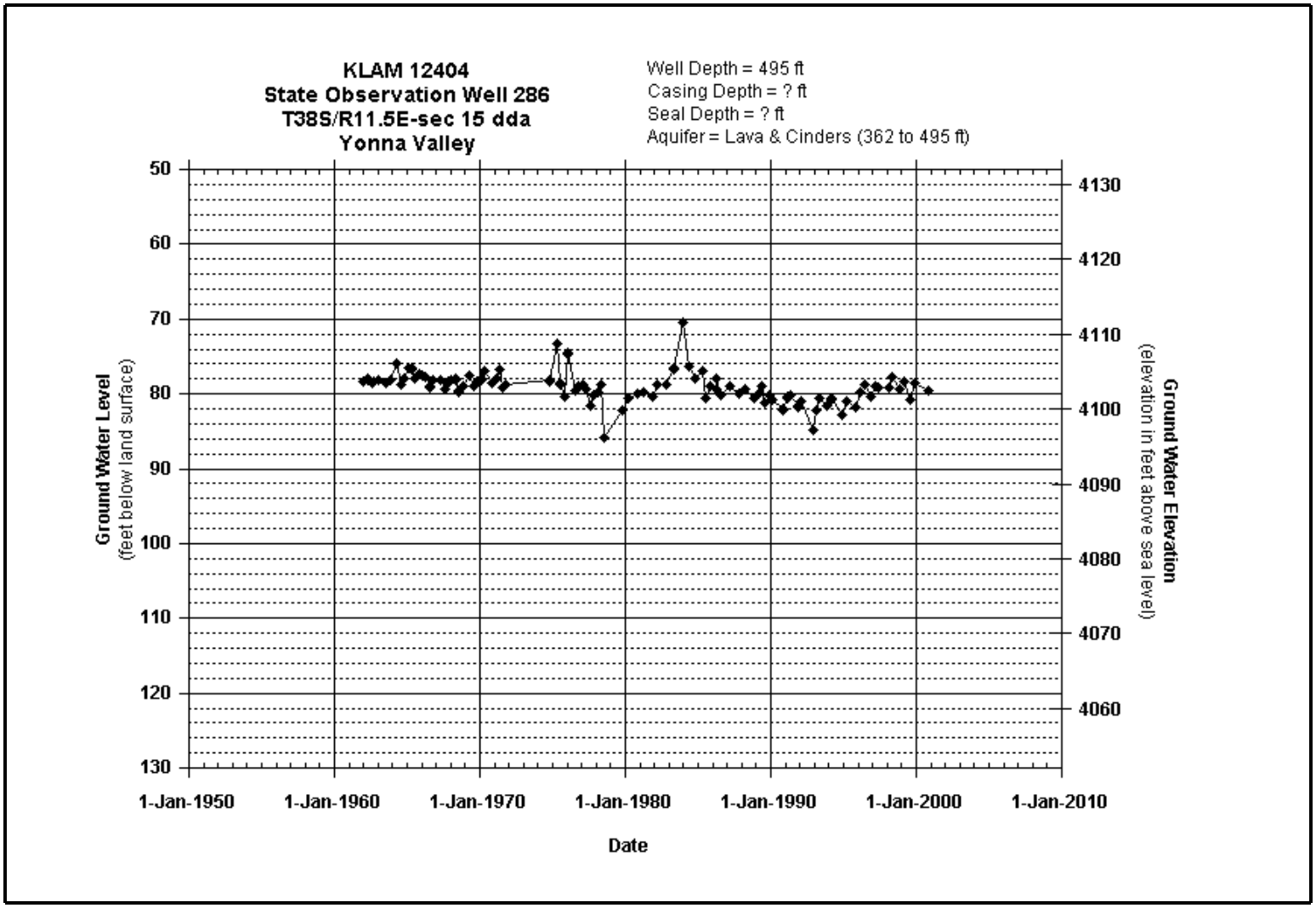
State Observation Well Hydrographs

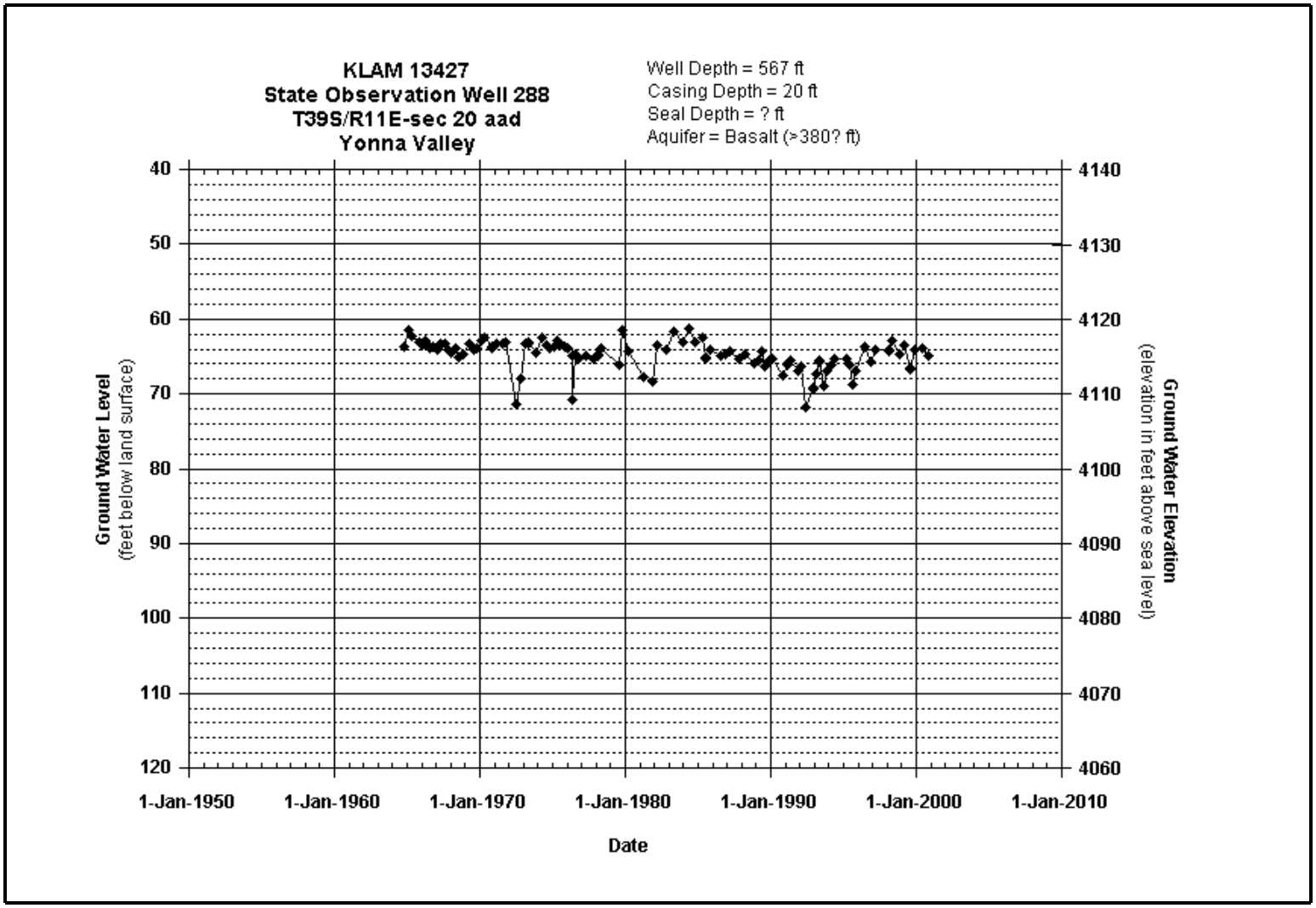

KLAM ?2288?
State Observation Well 281
T37S/R10E-sec 29 dbb?
Swan Lake Valley
Well Depth = 800 ft
Casing Depth = 20 ft
Seal Depth = ? ft
Aquifer = Gravel (135 to 155 ft)
KLAM 2286?
KLAM 2288?
Ground Water Level
(feet below land surface)
Ground Water Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4180
4170
4160
4150
4140
4130
4120
4110
1-Jan-1950
1-Jan-1960
1-Jan-1970
1-Jan-1980
1-Jan-1990
1-Jan-2000
1-Jan-2010
Date

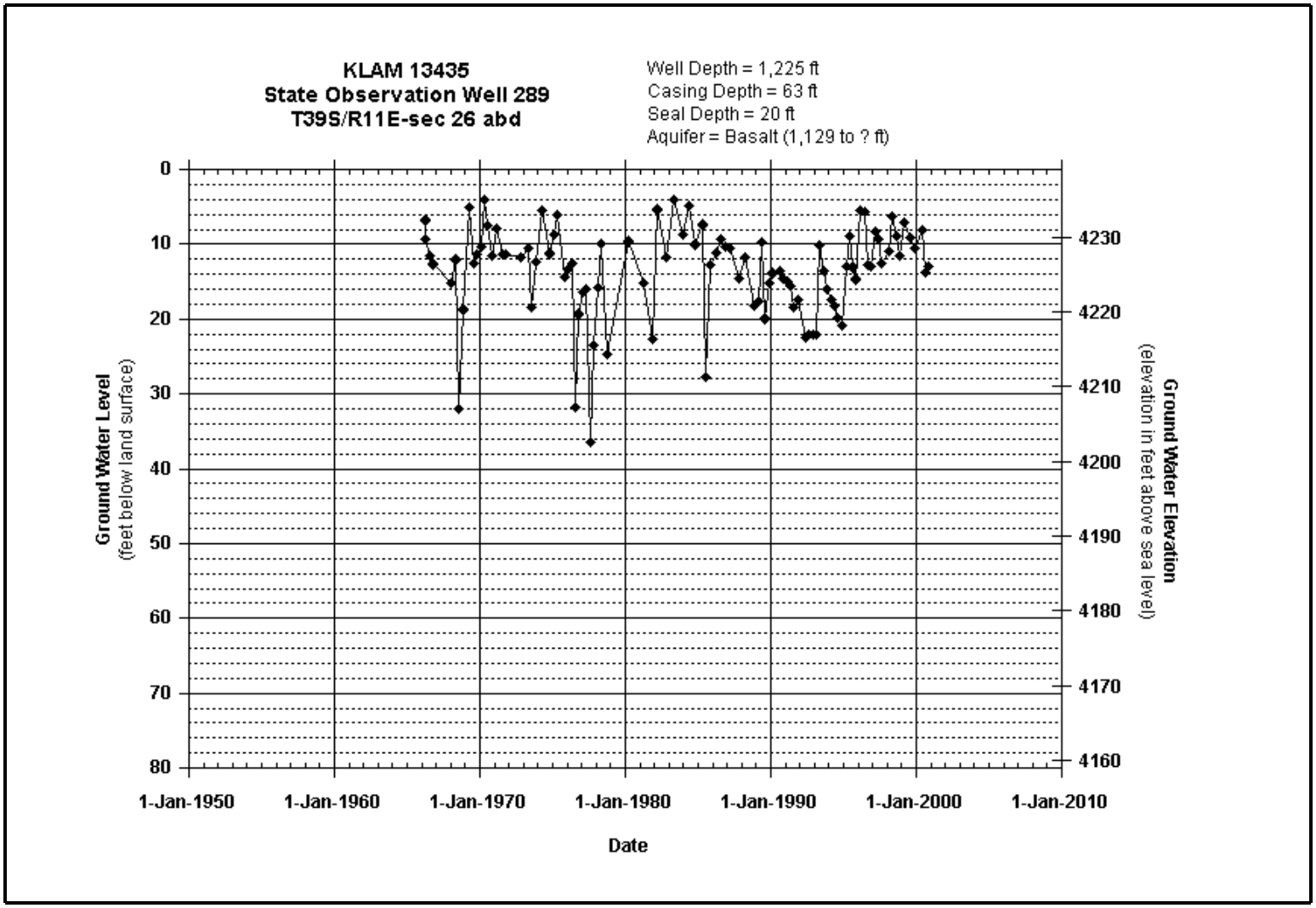

KLAM 12221
State Observation Well 285
T38S/R10E-sec 23 bdd
Swan Lake Valley
Well Depth = 260 ft
Casing Depth = 94 ft
Seal Depth = ? ft
Aquifer = Lava & Cinders (200 to 260 ft)
Ground Water Level
(feet below land surface)
80
90
100
110
120
130
140
150
160
Ground Water Elevation
(elevation in feet above sea level)
4120
4110
4100
4090
4080
4070
4060
4050
1-Jan-1950
1-Jan-1960
1-Jan-1970
1-Jan-1980
1-Jan-1990
1-Jan-2000
1-Jan-2010
Date

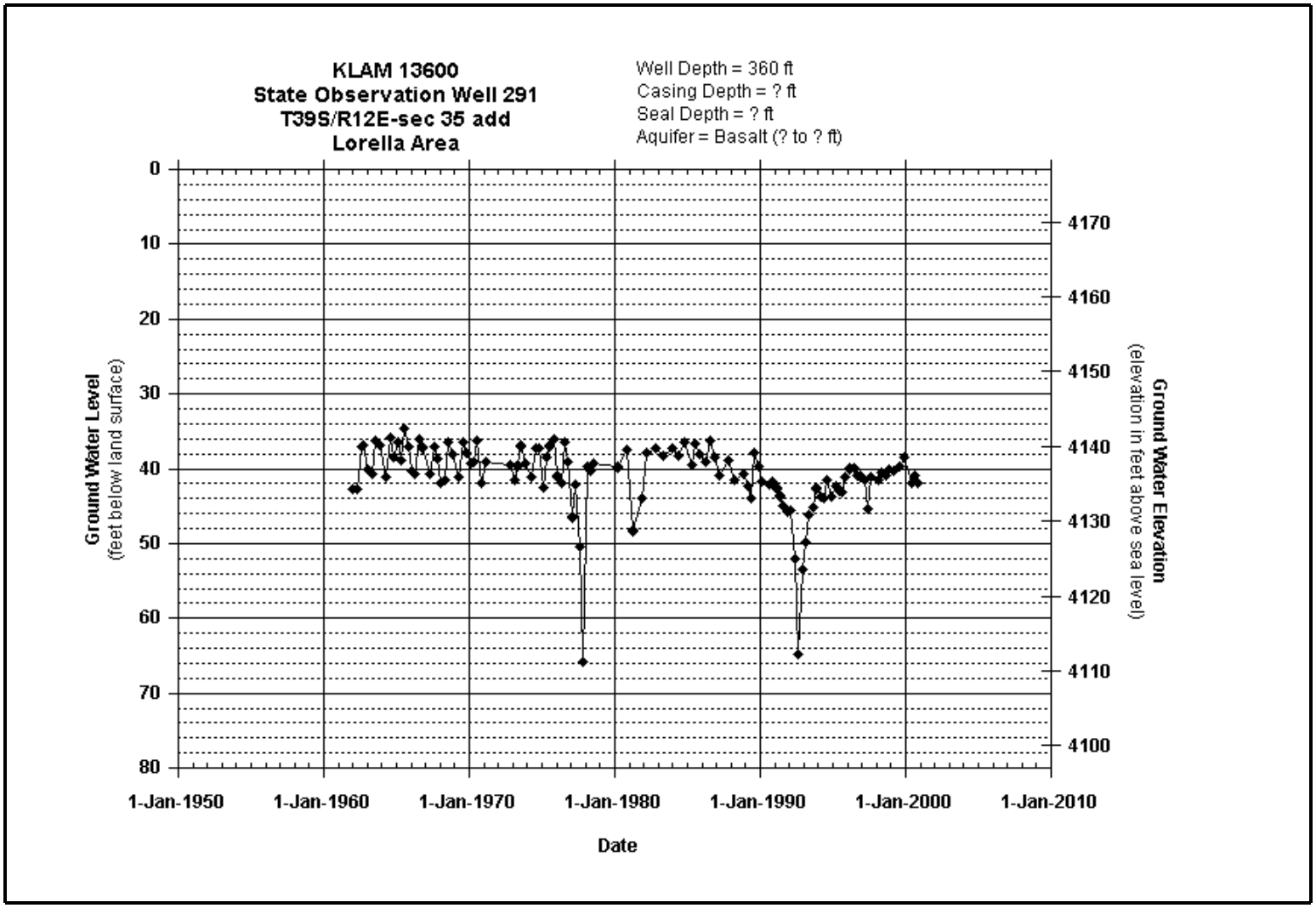

KLAM 14731
State Observation Well 292
T40S/R11E-sec 11 bad
South Poe Valley
Well Depth = 992 ft
Casing Depth = 40 ft
Seal Depth = ? ft
Aquifer = "Rock" (>700 ft)
Groundwater Level
(feet below land surface)
0
10
20
30
40
50
60
70
80
Groundwater Elevation
(elevation in feet above sea level)
4150
4140
4130
4120
4110
4100
4090
4080
1-Jan-1950
1-Jan-1960
1-Jan-1970
1-Jan-1980
1-Jan-1990
1-Jan-2000
1-Jan-2010
Date

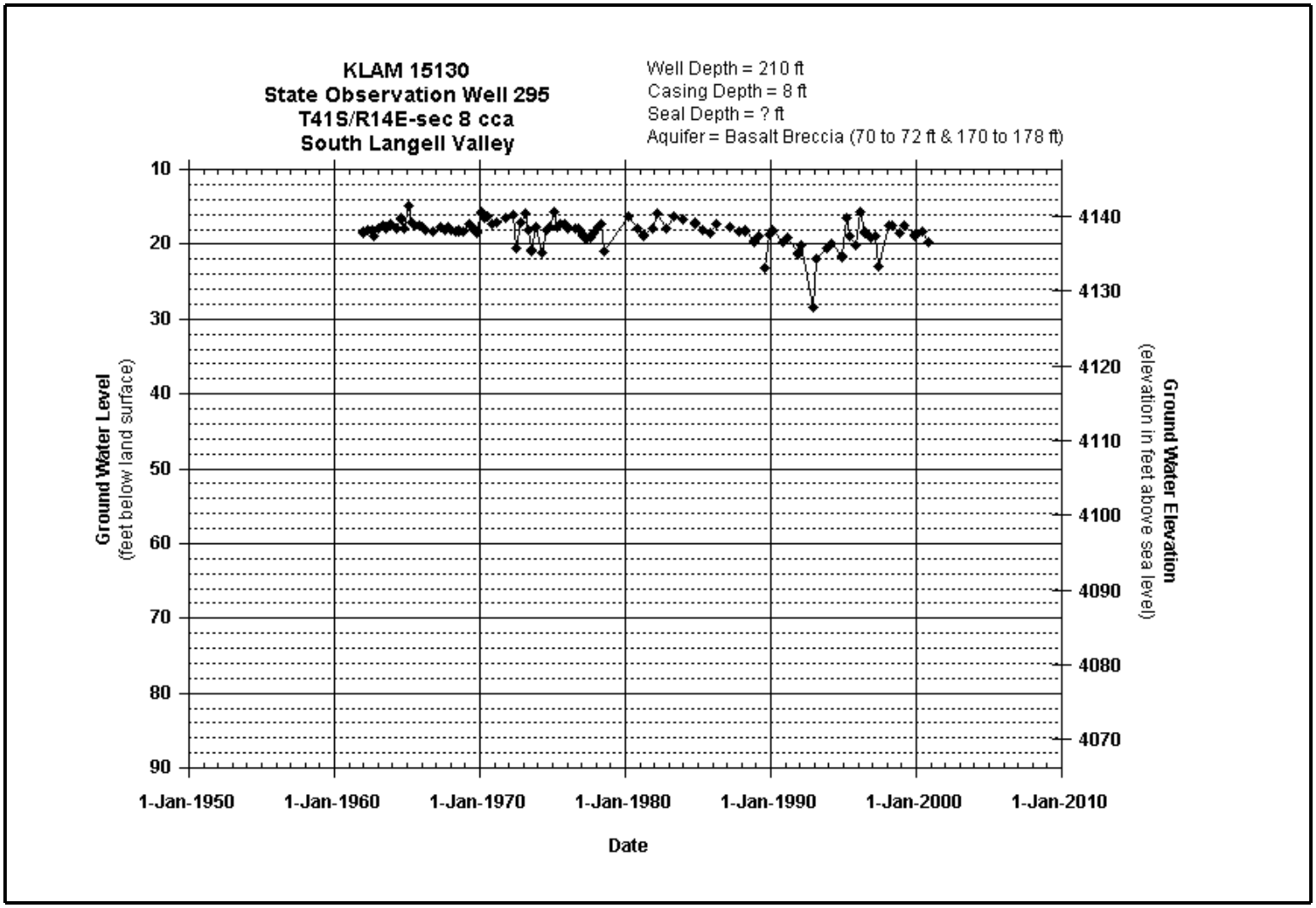

KLAM 2374
State Observation Well 282
T37S/R11.5E-sec 25 ddd
North Yonna Valley
Well Depth = 582 ft
Casing Depth = 240 ft
Seal Depth = 240 ft
Aquifer = Sandstone and Lava (195 to 380 ft & 435 to 470 ft)
Ground Water Level
(feet below land surface)
130
140
150
160
170
180
190
200
210
Ground Water Elevation
(elevation in feet above sea level)
4130
4120
4110
4100
4090
4080
4070
4060
1-Jan-1950
1-Jan-1960
1-Jan-1970
1-Jan-1980
1-Jan-1990
1-Jan-2000
1-Jan-2010
Date


KLAM 12404
State Observation Well 286
T38S/R11.5E-sec 15 dda
Yonna Valley
Well Depth = 495 ft
Casing Depth = ? ft
Seal Depth = ? ft
Aquifer = Lava & Cinders (362 to 495 ft)
Ground Water Level
(feet below land surface)
50
60
70
80
90
100
110
120
130
Ground Water Elevation
(elevation in feet above sea level)
4130
4120
4110
4100
4090
4080
4070
4060
1-Jan-1950
1-Jan-1960
1-Jan-1970
1-Jan-1980
1-Jan-1990
1-Jan-2000
1-Jan-2010
Date


KLAM 13427
State Observation Well 288
T39S/R11E-sec 20 aad
Yonna Valley
Well Depth = 567 ft
Casing Depth = 20 ft
Seal Depth = ? ft
Aquifer = Basalt (>380? ft)
Ground Water Level
(feet below land surface)
40
50
60
70
80
90
100
110
120
Ground Water Elevation
(elevation in feet above sea level)
4140
4130
4120
4110
4100
4090
4080
4070
4060
1-Jan-1950
1-Jan-1960
1-Jan-1970
1-Jan-1980
1-Jan-1990
1-Jan-2000
1-Jan-2010
Date


KLAM 13435
State Observation Well 289
T39S/R11E-sec 26 abd
Well Depth = 1,225 ft
Casing Depth = 63 ft
Seal Depth = 20 ft
Aquifer = Basalt (1,129 to ? ft)
Ground Water Level
(feet below land surface)
0
10
20
30
40
50
60
70
80
Ground Water Elevation
(elevation in feet above sea level)
4230
4220
4210
4200
4190
4180
4170
4160
1-Jan-1950
1-Jan-1960
1-Jan-1970
1-Jan-1980
1-Jan-1990
1-Jan-2000
1-Jan-2010
Date


KLAM 13600
State Observation Well 291
T39S/R12E-sec 35 add
Lorella Area
Well Depth = 360 ft
Casing Depth = ? ft
Seal Depth = ? ft
Aquifer = Basalt (? to ? ft)
Ground Water Level
(feet below land surface)
0
10
20
30
40
50
60
70
80
Ground Water Elevation
(elevation in feet above sea level)
4170
4160
4150
4140
4130
4120
4110
4100
1-Jan-1950
1-Jan-1960
1-Jan-1970
1-Jan-1980
1-Jan-1990
1-Jan-2000
1-Jan-2010
Date


KLAM 15130
State Observation Well 295
T41S/R14E-sec 8 cca
South Langell Valley
Well Depth = 210 ft
Casing Depth = 8 ft
Seal Depth = ? ft
Aquifer = Basalt Breccia (70 to 72 ft & 170 to 178 ft)
Ground Water Level
(feet below land surface)
10
20
30
40
50
60
70
80
90
Ground Water Elevation
(elevation in feet above sea level)
4140
4130
4120
4110
4100
4090
4080
4070
1-Jan-1950
1-Jan-1960
1-Jan-1970
1-Jan-1980
1-Jan-1990
1-Jan-2000
1-Jan-2010
Date

Appendix 7

Summary of Stratigraphic Units Identified in the Eastern Lost River Sub-basin by 1974 to 2004 Investigations

Eastern Lost River Sub-basin Portion of
Ground Water in Selected Areas in the Klamath Basin, Oregon
(from Leonard and Harris, 1974)

Quaternary Deposits

Qal **Alluvium (Holocene and Pleistocene)**
Silt, sand, clay, peat, volcanic ash, pumice, gravel, and slope debris near escarpments
Generally occurs in lowland areas, thin to several hundred feet thick

Qb **Basalt flows (Holocene and Pleistocene)**
Widespread thin flows of gray, vesicular basalt in units 20 to 30 feet thick
Forms rimrock and cap lower slopes around major valleys

QTb **Basalt, breccia, and pyroclastic rocks (Pleistocene and Pliocene)**
Thick sequence of basaltic flows, breccia, and pyroclastic rocks forming upland masses
Can locally interfinger with lacustrine beds of Yonna Formation
Can include flows of other basalt units

QTve **Rocks of volcanic eruptive centers (Pleistocene and Pliocene)**
Eruptive and shallow intrusive rocks of main eruptive centers
Includes basaltic, andesitic, and light colored rocks such as rhyolite and dacite
Main mass and lower slopes of some major mountains as well as small peaks or cones

Tertiary Deposits

Ty **Yonna Formation (Pliocene)**
Stratified siltstone, diatomite, sandstone, pumice, gravel, and tuff
Origin is largely lacustrine
Can locally include welded tuff beds or interbedded thin lava flows
Underlies lowlands and forms lower slopes around valleys

Tbt **Breccia and tuff of volcanic maars (Pliocene)**
Highly dipping resistant beds of tuff and volcanic breccia near volcanic vents
Partly contemporaneous with Yonna Formation

Tb **Lower basalt unit (Pliocene)**
Basaltic flows, tuff, and breccia
Underlies Yonna Formation, but exposed in small areas

Eastern Lost River Sub-basin Portion of the Klamath Falls 1° by 2° Quadrangle (from Sherrod and Pickthorn, 1992)

Quaternary Deposits

Qs **Surficial deposits (Holocene and Pleistocene)**
Fine to coarse grained sediment deposited in channels, flood plains, marshes and lakes

Qf **Alluvial fan and talus deposits (Pleistocene)**
Poorly to well sorted sand and gravel in alluvial fans and talus on some fault escarpments

Qls **Landslide debris (Pleistocene)**
Unsorted chaotic deposits at the foot of step slopes and fault escarpments

QTs **Sedimentary deposits and rocks (Pleistocene and Pliocene)**
Unconsolidated sand and gravel, poorly to moderately indurated sandstone and conglomerate, and diatomite
It includes strata that unconformably overlie continental sedimentary rocks (Miocene and Pliocene)

Tertiary Deposits

Tb_1 **Basalt of Basin and Range unit 1 (Pliocene)**
Aphyric to porphyritic lava flows and minor breccia; chiefly intergranular to subophitic and locally diktytaxitic basalt and lesser amount of intergranular basaltic andesite.
Locally includes interbedded, poorly exposed, poorly indurated sedimentary and pyroclastic volcanic rocks
Tb_1 conformably and unconformably overlies Tb_2
K-Ar age date of 3.68 to 2.80 Ma

Tb_2 **Basalt of Basin and Range unit 2 (Pliocene)**
Aphyric to porphyritic lava flows and minor breccia; chiefly intergranular to subophitic and locally diktytaxitic basalt and lesser amount of intergranular basaltic andesite
Locally includes interbedded, poorly exposed, poorly indurated sedimentary and pyroclastic volcanic rocks
Tb_2 lithologically indistinquishable from Tb_1, separated by geomorphology and structure
K-Ar age date of 6.88 to 3.61 Ma

Tb_3 **Basalt of Basin and Range unit 3 (Miocene)**
Aphyric to porphyritic lava flows and minor breccia; chiefly intergranular to subophitic and locally diktytaxitic basalt and lesser amount of intergranular basaltic andesite
Locally includes interbedded, poorly exposed, poorly indurated sedimentary and pyroclastic volcanic rocks
Flows show extensive alteration of groundmass glass to greenish smectite
K-Ar age date of 5.78 ± 0.12 Ma

Tv **Vent deposits (Pliocene and Miocene)**
Cones and irregular piles of cinder, agglutinate, and minor lava flows and intrusions forming vents for basalt of Basin and Range

Typt **Younger palagonite tuff (Pliocene and Miocene)**
Poorly bedded deposits of palagonized basaltic ash and lapilli and minor interbedded laval flows. Commonly forms discrete circular tuff cones centered around individual vents. Interfingers with and overlies continental sedimentary rocks (Tcs).
Partial equivalent with abandoned Yonna Formation

Tcs **Continental sedimentary rocks (Pliocene and Miocene)**

Thinly bedded to very thick ashy diatomite; thin to medium bedded sandstone, siltstone, and laminated mudstone; conglomerate; and minor tuff and basalt lava flows
Overlies tuff units Tt and interbedded with Tb_3
Partial equivalent with abandoned Yonna Formation

Tst **Tuff and sandstone (Pliocene and Miocene)**

Pale to medium gray lithic tuff and weakly lithified tuffaceous sandstone, some of which probably deposited as lahars
Probably interbedded with Tb_2

Tba **Basaltic andesite and andesite (Pliocene and Miocene)**

Aphyric to porphyritic, intergranular to pilotaxitic lava flows and minor breccia

Tad **Andesite and dacite (Pliocene and Miocene)**

Two-pyroxene andesite and hornblende bearing dacite lava flows and domes

Tr **Rhyolite and rhyodacite (Pliocene? And Miocene)**

Slightly to moderately porphyritic domes; vary from lithoidal to vitrophyric
K-Ar age dates of 6.06 ± 0.09 to 5.15 ± 0.21 Ma

Tt **Tuff and lapilli tuff (Miocene)**

Lithic bearing and pumaceous lapilli tuff, largely of ash flowor hot avalanche origin; also includes thin to medium bedded fine grained tuff, coarse pumicite (air fall), and very thick to thinly bedded pebbly sandstone probably deposited as lahars
Overlies Tb_3
Previously included with abandoned Yonna Formation

Topt **Older palagonite tuff (Miocene)**

Poorly bedded deposits of palagonitized basaltic ash and lapilli
Some vents for Tb_3 and Tv; individual eruptive centers with large masses of palagonite
K-Ar age of 5.52 ± 0.55 Ma

Bonanza Quadrangle Map (Hladky, 2003)

Surficial Deposits

Qal **Alluvium (Holocene)**
Unconsolidated silt, sand, and minor gravel deposited along the Lost River
Thickness generally 1-3 m (3-10 ft)

Qws **Windblown sand (Holocene)**
Brown, well-sorted sand deposited in swales in upland areas
Thickness generally less than 0.3 m (1 ft)

Qaf **Alluvial fan deposits (Holocene and Pleistocene)**
Poorly sorted, unconsolidated, sand, soil, gravel, and boulders
Thickness usually a few meters, but as much as 20 m (60 ft)

Qc **Colluvium (Holocene and Pleistocene)**
Unconsolidated to slightly consolidated, poorly sorted soil and fragments of bedrock
Thickness usually a few meters, but as much as 20 m (60 ft)

Qap **Playa deposits (Holocene and Pleistocene)**
Cream to white, fine silt, mud, and alkali salts
Thickness variable, to about 10 m (30 ft)

Qs **Surficial deposits (Holocene and Pleistocene)**
Unconsolidated very light-gray or white and pale-pinkish-tan or very light-brown silty sand and silty mud
Thickness about 12 m (40 ft)

Volcanic Deposits

Tbjw **Basalt of Johns Waterhole (Pliocene)**
Mottled brown- and gray-weathering, dark-gray to black basalt
$^{40}Ar/^{39}Ar$ 4.65 ± 0.34 Ma
Maximum thickness up to 210 m (700 ft)

Tab **Altered basalt (Pliocene)**
Light-gray to varicolored argillically altered basalt of Johns Waterhole

Tba **Tertiary basaltic andesite (Pliocene)**
Gray- or reddish-brown-weathering, dark-gray fine-grained and seriate basaltic andesite and basalt
$^{40}Ar/^{39}Ar$ age of 4.44 to 3.85 Ma
Maximum thickness about 600 m (2,000 ft)

Tpt **Palagonitic tuff (Pliocene)**
Tan to orangish-brown, poorly consolidated, thinly bedded to massive, fine-grained, palagonitic ash tuff
Maximum thickness about 12 m (40 ft)

Tbag **Tertiary basaltic andesite agglutinate (Pliocene)**
Dark-gray or reddish-brown, dark-gray fine-grained seriate and trachytic basaltic andesite agglutinate
Maximum thickness about 30 m (100 ft)

Tvc **Basaltic andesite cinder deposits (Pliocene)**
Partly consolidated to loose, reddish-brown or reddish-gray lapilli, ash, and minor tuff with sporadic agglutinate bombs
Thicknesses variable, typically less than 30 m (100 ft)

Tvs **Volcanic surge deposits (Pliocene)**
Dark-tan to gray, planar-stratified, poorly sorted, medium-bedded block-and-ash tuff and thinly to massively bedded lapilli-ash tuff
Maximum thickness 210 m (700 ft)

Tms **Mudstone, siltstone, and sandstone (Pliocene and Miocene)**

White to cream-colored mudstone, some stratified olive-green sandstone and siltstone, and massive to hackly pale-pinkish-gray to pale-orange paleosols
between 6.0 and 3.3 Ma
Thickness exceeds 120 m (400 ft)

Ts **Sandstone (Pliocene and Miocene)**

Olive-green, well-sorted, fine-grained volcanic sandstone
Maximum thickness about 30 m (100 ft)

Tm **Diatomaceous and tuffaceous mudstone (Pliocene and Miocene)**

White to cream-colored diatomaceous tuffaceous mudstone
thickness locally in excess of 230 m (750 ft)

Tbu **Basaltic lava, [shown only in cross section] (Miocene)**

Dark-gray to black basaltic lava
>7.3 Ma
6.88 ± 0.60 Ma near Yainax Butte
7.33 ± 0.77 Ma in the adjacent Bryant Mountain quadrangle
8.18 ± 0.12 Ma at Gift Butte
Maximum thickness unknown

Tbot **Tholeiitic olivine basalt (Miocene)**

Medium-gray, fine-grained, diktytaxitic olivine basalt
$^{40}Ar/^{39}Ar$ age of 7.33 ± 0.77 Ma
Thickness in quadrangle about 210 m (700 ft)

Intrusions

Tbd **Basaltic andesite dikes (Pliocene)**

Dark-gray to black fine-grained basalt and basaltic andesite dikes
$^{40}Ar/^{39}Ar$ age of 4.06 ± 0.03 Ma

Dairy Quadrangle Map (Hladky, 2003)

Surficial Deposits

Qal **Alluvium (Holocene)**
Unconsolidated silt, sand, and minor gravel
Thickness generally 1-3 m (3-10 ft)

Qaf **Alluvial fan deposits (Holocene and Pleistocene)**
Poorly sorted, unconsolidated, sand, soil, gravel, and boulders
Thickness typically a few meters but as much as 20 m (60 ft)

Qap **Playa deposits (Holocene and Pleistocene)**
Cream to white, silt, mud, and alkali salts
Thickness variable, to about 10 m (30 ft)

Qc **Colluvium (Holocene and Pleistocene)**
Unconsolidated to slightly consolidated, poorly sorted soil and fragments of bedrock
Thickness typically a few meters, but as much as 20 m (60 ft)

Qs **Lacustrine sediments (Holocene and Pleistocene)**
Unconsolidated very light gray or white and pale-pinkish-tan or very light brown silty sand and silty mud
Thickness about 12 m (40 ft)

Volcanic Deposits

Tba **Tertiary basaltic andesite (Pliocene)**
Gray- or reddish-brown-weathering, dark-gray fine-grained seriate basalt, basaltic andesite, and trachybasaltic andesite
$^{40}Ar/^{39}Ar$ age of 4.44 to 3.85 Ma
Maximum thickness about 600 m (2,000 ft)

Tbag **Tertiary basaltic andesite agglutinate (Pliocene)**
Dark-gray or reddish-brown, fine-grained seriate and trachytic basaltic andesite agglutinate
Maximum thickness about 300 m (1,000 ft)

Tvc **Basaltic andesite cinder deposits (Pliocene)**
Partly consolidated to loose, reddish-brown or reddish-gray lapilli, ash, and minor tuff with sporadic agglutinate bombs
Thicknesses variable, typically less than 30 m (100 ft)

Tvl **Lahar deposits (Pliocene)**
Pale-olive-gray, massive, poorly sorted, unwelded, poorly consolidated basaltic andesitic lithic tuff
Thickness about 30 m (100 ft)

Tvb **Volcanic breccia (Pliocene)**
Tan, yellow, and reddish-brown, welded, highly vesicular basaltic andesitic lithic block-and-ash tuff
Maximum thickness about 100 m (330 ft)

Tvs **Volcanic surge deposits (Pliocene)**
Dark-tan to gray, planar stratified, poorly sorted moderately bedded block-and-ash tuff and thinly to massively bedded lapilli-ash tuff
Maximum thickness 210 m (700 ft)

Tms **Mudstone, siltstone, and sandstone (Pliocene and Miocene)**
White to cream-colored mudstone, some stratified olive-green sandstone and siltstone, and massive to hackly pale-pinkish-gray to pale-orange paleosols
between 6.0 and 3.3 Ma
Thickness exceeds 30 m (100 ft)

Ts **Sandstone (Pliocene and Miocene)**

Olive-green, well-sorted, fine-grained volcanic sandstone
Maximum thickness about 30 m (100 ft)

Tm **Diatomaceous and tuffaceous mudstone (Pliocene and Miocene)**

White to cream-colored diatomaceous tuffaceous mudstone
thickness locally in excess of 230 m (750 ft)

Tbu **Basaltic andesite [shown only in cross sections] (Miocene?)**

Dark-gray to black basaltic lava
6.88 ± 0.60 Ma near Yainax Butte
7.33 ± 0.77 Ma at Bryant Mountain
8.18 ± 0.12 Ma at Gift Butte
Maximum thickness unknown

Intrusions

Tbd **Basaltic andesite dikes (Pliocene)**

Dark-gray to black fine-grained basaltic andesite and basaltic trachyandesite dikes
$^{40}Ar/^{39}Ar$ weighted mean plateau age of 4.06 ± 0.03 Ma at ridge crest south of Olene Hot Springs

Lorella Quadrangle Map (Black, 2004)

Surficial Deposits

Qds **Dredge spoils (Holocene)**
Spoil piles of silt and sand
Thickness ~5m (16 ft)

Qal **Alluvium (Holocene)**
Unconsolidated deposits of silt, sand, and minor gravel
Thickness generally 1-3 m (3-10 ft)

Qws **Windblown sand (Holocene)**
Light brown, well sorted, fine to very fine sand and sandy silt
Thickness generally < 0.3 m (1 ft) but locally reaches 1 m (3.3 ft)

Qls **Landslide deposits (Holocene and Pleistocene)**
Unconsolidated deposits of silt, sand, and boulders
Thickness is highly variable

Qf **Alluvial fan deposits (Holocene and Pleistocene)**
Poorly sorted, unconsolidated, soil, sand, gravel, and boulders
Thickness usually a few meters, but as much as 20 m (65 ft)

Volcanic Units

Tbec **Basalt of East Canal (Pliocene)**
Water-affected basalts generally identical to Unit Tbjw
4.58 ± 0.34 Ma obtained at a Lorella well depth of 27 m (87 ft)
4.36 ± 0.26 Ma obtained at a depth of 10 m (33 ft)
The maximum total thickness of unit Tbec is 37 m (120 ft)

Tbjw **Basalt of Johns Waterhole (Pliocene)**
Mottled brown and gray weathering, dark gray to black olivine basalt
4.58 ± 0.34 Ma, obtained at a depth of 27 m (87 ft)
4.36 ± 0.26 Ma obtained at a depth of 10 m (33 ft)
Maximum thickness on NE side of Dead Indian Hill is 75 m (250 ft)

Tba **Basaltic andesite (Miocene)**
Dark gray- to black-weathering, dark gray basaltic andesite
Ar-Ar date of 4.44 ± 0.04 Ma from a lava flow in town of Bonanza
7.32 ± 0.24 Ma on a basaltic andesite flow on Bryant Mountain
8.18 ± 0.12 Ma
Total thickness exceeds 240 m (800 ft)

Tbc **Basaltic cinder deposits (Pliocene and Miocene)**
Reddish-brown or gray lapilli and ash with occasional agglutinate bombs
Thickness is variable, generally less than 30 m (100 ft)

Tb **Tertiary basalt (Miocene)**
Dark gray- to black-weathering, medium gray olivine basalt
6.88 ± 0.60 Ma on a basalt flow near Yainax Butte
7.24 ± .41 Ma on Sample in north central part quad
On Bryant Mountain the unit is as much as 360 m (1180 ft) thick

Tsb **Basalt and sediments, undivided (Miocene)**
Poorly exposed basalt flows with interbedded sedimentary rocks
thickness of unit Tsb reaches 500 m (1640 ft)

Tbu **Undivided basalt and basaltic andesite (Miocene)**
Undivided basalt (Unit Tb) and basaltic andesite

Sedimentary Units

Ts **Undifferentiated sandstone, siltstone, and mudstone (Pliocene and Miocene)**

Interbedded diatomaceous tuffaceous mudstone, sandstone, and siltstone with occasional interbeds of silicic non-welded ash-flow tuff

between 6.0 and 3.3 Ma

Thickness is highly variable but exceeds 122 m (400 ft)

Langell Valley and Bryant Mountain Quadrangle Maps (Jenks, 2004)

Surficial Deposits

Qmf **Fill (Modern)**
Unconsolidated and unsorted boulders, gravel, sand, silt and soil
Thickness varies, depending upon the height of the dam

Qml **Modern Lake deposits (Modern)**
Unconsolidated and unsorted sands, silts, and clay
Thickness varies, but may reach several tens of meters

Qal **Alluvium (Holocene)**
Unconsolidated stream deposits, including clay, silt, sand, and gravel
Thickness varies up to 3 m

Qc **Colluvium and fan deposits (Holocene)**
Unconsolidated to slightly consolidated, unsorted, soil and rock fragments
Thickness of the materials varies

Qf **Alluvial fan deposits (Holocene)**
Unconsolidated soil and sediments
Thickness up to 30 m.

Qls **Landslide deposits (Quaternary)**
Unconsolidated to slightly consolidated landslide debris
Thickness is highly variable

Qs **Valley floor sediments (Quaternary)**
Unconsolidated, fine-grained sediments, possibly including some peaty deposits
Thickness varies from 0.5 to 10 m

Qgo **Stream gravel deposits (Pleistocene)**
Slightly consolidated sand and gravel deposits
Thickness ranges up to 10 m

Sedimentary Units

QTs/a **Altered fine-grained sediments (Pleistocene or Pliocene)**
Tan to light yellow, cemented, medium to coarse-grained sandstone
Thickness ranges up to 3 m

Tsu **Fine-grained sediments (Pliocene)**
Pinkish tan to dark reddish brown sands and sandy silts, poorly consolidated and uncemented
Maximum exposed thickness ranges up to 5 m

Volcanic Units

QTdh **Basalt of Dog Hollow Reservoir (Pleistocene or Pliocene)**
Gray, weathering to light purple and green mottled appearance, olivine phyric basalt
Thickness may range up to 10 m

QTcr **Basalt of Copeland Reservoir (Pleistocene or Pliocene)**
Gray, weathering to light purple and green mottled appearance, aphyric basalt
Thickness varies, ranging up to 20 m

QTmu **Upper basalt of Miller Creek (Pleistocene or Pliocene)**
Gray to light gray, diktytaxitic, aphyric basalt
Total thickness is approximately 10 m

QTpc **Basalt of Pine Creek (Pleistocene or Pliocene)**
Gray,non-diktytaxitic basalt with rare olivine phenocrysts
Total thickness is approximately 5 m

QTwv **Basalt of Willow Valley (Pleistocene or Pliocene)**
Light gray, diktytaxitic, medium grained, generally aphyric basalt
Flows of this unit are conspicuously numerous and thin (1-2 m)
Total thickness = unknown, but exposures show up to 20 m

QTb **Basalt, undivided (Pleistocene or Pliocene)**
Both thickness and exact extent are unknown

QTml **Lower basalt of Miller Creek (Pleistocene or Pliocene)**
Gray, non-diktytaxtic, basalt
The unit consists of flow-on-flow, flowbanded to massive basalt, with some areas appearing to have interacted with water
Total thickness = unknown, but exposures range up to 10 m

QTtr **Basalt of Three-mile Reservoir (Pleistocene or Pliocene)**
Gray to weathering dark brown aphyric, diktytaxitic basalt
Unit has interacted with water
Total thickness is unknown

QTbl **Basalt of Boggs Lake (Pleistocene or Pliocene)**
Gray, cumulophyric basalt
Appears to be a single flow, with a general thickness of 3-5 m

QTds **Basalt of Dry Spring (Pleistocene or Pliocene)**
Dark gray, aphyric, and possibly aphanitic, basalt
Thin flows, total thickness is unknown

Tgp **Basalt of the gas pipeline (Pliocene)**
Gray to light gray, plagioclase phyric basalt
Thickness relatively thin, with a maximum of 10 m

Tcj **Basalt of Captain Jack Lake (Pliocene)**
Gray to light gray, very diktytaxitic, coarse-grained, seriate basalt with a phenocryst assemblage that ranges from aphyric to glomerocrysts of plagioclase and olivine
Chemistry of this unit shows more Snake River Plain affinities
Thin flows, maximum total thickness is 65 m

Tms **Basalt of Malin substation (Pliocene)**
Gray, olivine-phyric basalt
The unit is thin, up to 8 m

Tmiu **Upper basalt of Mills Creek (Pliocene)**
Gray, glomerophyric, ophitic basalt
Chemically, this unit shows more affinity with Basin and Range type basalts
Thickness ranges up to 25 m

Tpr **Basalt of Pope Reservoir (Pliocene)**
Gray, fine-grained, non-diktytaxitic, aphyric basalt
Thickness of this unit ranges up to 20 m

Tll **Basalt of Long Lake (Pliocene)**
Gray, moderately diktytaxitic, fine-to medium-grained, olivine phyric basalt
Chemistry of the unit has Snake River Plain affinities
Total observed thickness ranges from 5 to 65 m., but base is not exposed

Tlp **Basalt of Lone Pine Reservoir (Pliocene)**
Gray, slightly diktytaxitic, olivine phyric basalt
Chemistry of this unit has Snake River Plain basalt affinities
Ranges from 10-30 m. thick

Thc **Basalt of Hamaker Canyon (Pliocene)**
Medium to light gray, slightly diktytaxitic to not diktytaxitic, olivine phyric basalt
Thickness ranges up to 30 m

Twr **Basalt of Worlow Reservoir (Pliocene)**
Gray, not diktytaxitic, fine-grained, basalt with some olivine phenocrysts
Thickness ranges up to 35 m

Trc **Basalt of Russell Canyon (Pliocene)**
Gray to light gray, not diktytaxitic, aphyric to slightly olivine phyric basalt
Thickness varies from a single flow (5 m), to repeated section up to 75 m

Trt **Basalt of the radio tower (Pliocene)**

Gray to light greenish-gray, not diktytaxitic, coarse-grained, basalt that in some areas is olivine phyric

Thickness ranges up to 20 m

Tst **Basalt of the steel transmission line (Pliocene)**

Gray, not diktytaxitic, olivine phyric basalt

Exposure thicknesses range up to 35 m

Tsr **Basalt of Smith Reservoir (Pliocene)**

Gray, aphyric, diktytaxitic, fine- to medium-grained basalt

Chemically, this unit is more similar to the Basin and Range affinity basalt flows

Total thickness = unknown, but exposures vary up to 35 m

Tgr **Basalt of Grohs Reservoir (Pliocene)**

Gray to light greenish gray, non-diktytaxitic, olivine and pyroxene phyric basalt

Exposures range up to 12 m

Tmil **Lower basalt/basaltic andesite of Mills Creek (Pliocene or Miocene)**

Black to dark gray, basaltic breccia, cinders, and extremely scoriaceous flows

Exposures range from 12-30 m

Tbm **Basaltic andesite of Bryant Mountain (Miocene)**

Dark gray to black, aphanitic, glassy to very fine-grained, basaltic trachyandesite

Subaerial flows, to flows that appear to have interacted with water

Different from other Klamath River Basin calc-alkaline rocks exposed elsewhere

whole rock K-Ar date of 7.32 ±0.24 Ma

Total thickness could be more than 300 m

Tgb **Basaltic andesite of Gift Butte (Miocene?)**

Dark gray to black, aphanitic, glassy to very fine-grained, basaltic trachyandesite

Chemistry very similar to basaltic andesite of Bryant Mtn. (Tbm), which = core of Bryant Mtn. Both units = different from other Klamath River Basin calc-alkaline rocks exposed elsewhere

Total thickness may be as much as 100 m.

Tsb **Basalt, basaltic andesite and sediments, undivided (Pliocene or Miocene)**

Poorly exposed basalt and basaltic andesite flows with interbedded sedimentary materials

Flows appear to have strongly interacted with water

Thickness ranges up to 500 m

Merrill and Malin Quadrangle Maps (Jenks and Madin, 2003)

Surficial Deposits

Qmf **Fill (Modern)**
Unconsolidated and unsorted boulders, gravels, sands, silts, and soil
Thickness is variable, depending upon the height of the dam

Qml **Modern Lake deposits (Modern)**
Unconsolidated and unsorted sand, silt, and clay
Thicknesses are variable, but generally thin

Qal **Alluvium (Holocene)**
Unconsolidated, including clay, silt, sand, and gravel
Deposited by streams and in upland basins
Includes alluvium in the channel and meander belt of the Lost River

Ql **Tule Lake sediments (Holocene)**
Lacustrine sediments deposited within the historic basin of Tule Lake

Qaf **Alluvial fan deposits (Holocene)**
Unconsolidated angular to subrounded gravel, mud, clay and soil
Deposited by debris originating in steep upland ephemeral streams

Qrt **Talus Deposits (Quaternary)**
Unconsolidated angular boulders and blocks of volcanic rock
Deposited by slope processes at the foot of steep fault escarpments and other slopes
May date from earlier Pleistocene glacial periods, when freeze-thaw was more severe

Qls **Landslide deposits (Quaternary)**
Unconsolidated to slightly consolidated chaotic mixtures of angular rock and soil
Rresults from debris flow and slump failures
Possibly the result of seismic events or a wetter climate during the Pleistocene glaciation
Thickness of the debris from each slide is highly variable

Qas **Aeolian and lacustrine sands (Holocene and Quaternary)**
Grey to light-brown, subangular to well-rounded, unconsolidated lithic sand deposits
Fine to very coarse, finely bedded to massive, totally uncemented to barely consolidated
Relatively thick deposits (as much as 65 m thick) adjacent to the Tule Lake valley floor
May have begun as lacustrine beach deposits from prehistoric, higher levels of Tule Lake or of Lake Modoc

Qs **Valley floor sediments (Quaternary)**
Covers Tule Lake valley floor (from the upper historic limit of Tule Lake to the fault-bounded hills)
Unconsolidated, primarily finer-grained (sandy silt) fluvial and lacustrine sediments
May include a significant aeolian component
Contains angular volcanic boulders and gravel near fault escarpments
Thickness up to 8 m

Qoaf **Older Alluvial Fan Deposits (Pleistocene)**
Thin deposits of cobble to boulder gravel
Deposited by upland streams probably during Pleistocene glacial periods
Appear to be remnants of originally extensive alluvial fans or bajadas
Deposits only a few meters thick where well-exposed

Qg **Conglomerate (Pliocene-Pleistocene?)**
Pebble to boulder gravel with a sandy matrix, weakly consolidated
Deposit thickness up to 15 m
Commonly develops patterned ground

Sedimentary Units

Tm **Basin sedimentary rocks (Pliocene and Miocene)**

Tan, white, brown, and grey mudstone
Commonly tuffaceous and diatomaceous, with subordinate claystone and sandstone
Commonly massive, but locally thin bedded when sandstone or siltstone layers present
Some layers contain a significant percentage of unaltered basaltic ash and cinders
Typically described by drillers as "chalk" or "shale"
Age poorly constrained (probable Pliocene age vertebrate fossils reported from irrigation ditch excavations in T40S/R10E-sec 36)
Thicknesses as great as 305 m at well KLAM-10445 in T41S/R12E-sec 23

Tms **Upland sedimentary rocks (Pliocene-Miocene)**

Mudstone, siltstone, claystone and gravel, weakly to strongly consolidated
Includes palagonite and hyaloclastite sands
Predominantly massive tan to white tuffaceous diatomaceous mudstone, with interbeds of volcaniclastic sandstone and siltstone
Thickness typically a few meters to tens of meters but possibly up to 580 m locally

Tms/a **Altered mudstone, siltstone and sandstone deposits (Pliocene or Miocene)**

Cemented, light tan, fine to medium grained, well-rounded sand
Alternating layers of white to gray claystone and siltstone, with some brecciated areas beneath the capping rock of silica cemented sand are
Located in a small area on the north-south ridge in Poe Valley in T40S/R11E- sec. 11
This area has slightly elevated groundwater temperatures (70 to 80° F)
Total thickness of exposed section is up to up to 5 m
Thickness of capping sandstone layer varies up to 1 m thick

Tertiary Volcanic Units

<u>Volcanoclastic Units</u>

Tv **Vent deposits (Pliocene and/or Miocene)**

Proximal palagonitized cinder and breccia deposits and small flows
Located in three areas on the east side of Poe Valley (in T40S/R12E-sec 7 & 18)
Thickness is highly variable

Tvs **Volcanic tuff deposits (Pliocene and/or Miocene)**

Golden brown to orangish brown to black, generally fine-grained palagonitized tuff
Generally massive and grades between fine sand and lapilli in the size of the tuff pieces
Very hard and in many areas it is cemented with calcite between the tuff pieces
Appears horizontal, but a lack of bedding makes difficult judging any post deposition tilt
Occurs on a slightly higher elevation flat on the east side of the Poe Valley
Related to the vent deposits (unit Tv), but no unequivocal relationship to the basalt and basaltic andesite volcanic flows in the area

Tpb **Pillow breccia deposits (Pliocene and/or Miocene)**

Massive, cindery deposits with some glassy pillow pieces or yellow to reddish orange, palagonitized, cindery breccia
Contains subordinate layers of palagonitic, basaltic tuffaceous sands, as well as water affected basalt flows
Includes some isolated and generally less than 2 m thick fine-grained sediment sections
Underlies subaerial Tbe flows
Extensive, covering much of the area south of Buck Butte and west to Adams Point

Basalt Units

Tbcj **Basalt of Captain Jack Lake (Pliocene or Miocene)**

Gray to light gray, very diktytaxitic, coarse-grained basalt with seriate plagioclase
Chemistry shows a Snake River Plain (SROT) affinity (Hart and others, 1984)
Paleomagnetism is consistently strongly reversed.
Ar^{40}/Ar^{39} whole-rock isochron age date of 5.72 ± 0.5 Ma
Maximum thickness is 5 m

Tbe **Basalt of Easy Creek (Pliocene or Miocene)**

Gray, medium to coarse grained, medium to coarsely diktytaxitic basalt
Some of the lower flows of this unit are water affected
Covers much of the western Malin quadrangle, but thins to the east against Buck Butte
Overlies and may be the subaerial equivalent of the basalt of the pillow breccia unit (Tpb)
Chemistry suggests unit is a fairly primitive HAOT with Basin and Range to transitional affinities (Hart and others, 1984)
Throughout its exposure the unit appears to dip gently to the south and southeast
Paleomagnetic measurements of this unit were almost all reversed
Thickness varies from 5-15 m

Tbmf **Basalt of McFall Reservoir (Pliocene or Miocene)**

Gray, medium grained, medium diktytaxitic basalt
Has very rare, large olivine (2-3 mm) and individual plagioclase phenocrysts (2-4 mm)
Covers most of the ridges east of Buck Butte
Paleomagnetic measurements are distinctly normal
Chemistry has Basin and Range-type basalt affinities (Hart and others, 1984)
Thickness is variable, up to 35 m

Tbgr? **Basalt of Grohs Reservoir (?) (Pliocene or Miocene)**

Gray to greenish gray, non-diktytaxitic, basalt
Located along the rim on the south end of Turkey Hill
Flows of the unit have numerous, rounded scoriaceous areas and have flowbanding
A single paleomagnetic reading for this unit was normal (2 of 3 measurements)
Chemistry indicates Basin and Range flow affinities (Hart and others, 1984)
Thickness is variable, up to 5 m

Tbth **Basalt of Turkey Hill (Pliocene or Miocene)**

Gray, extremely diktytaxitic, extremely coarse grained basalt
Covers the top of Turkey Hill and also present in the ridges and fault scarps in the north part of the Tule Lake valley as well as on the uppermost rim of Buck Butte
Some of the lower flows of this unit are noticeably water affected
Chemistry indicates Snake River Plain-type basalt affinities (Hart and others, 1984)
Paleomagnetism is generally reversed
Thickness is variable, up to100 m

Tbma **Basalt of Malin (Pliocene or Miocene)**

Dark gray, very fine-grained to glassy basalt
Flows are rubbly, form hoodoos, has some massive bulbous areas, has some lava "dikes" into the overlying rubble, and includes stretched vesicles and flowbanding
Some flows appear water affected
Separated from the overlying Tbth flows by a sediment thickness that includes massive pinkish tan silt layers as well as layers of thinly bedded fine-grained basalt cinders
Found only on Turkey Hill
Chemistry of the unit is similar to the basalt of Johns Waterhole (unit Tbjw)
Total exposed thickness ranges from 3 to 25 m, but the base of the unit is not exposed

Tbjw **Basalt of Johns Waterhole (Pliocene or Miocene)**

Medium gray, not diktytaxitic, olivine-phyric basalt, with glomercrysts of olivine as well as plagioclase and olivine

Distinguishable by abundant clumps of small olivine phenocrysts (sometimes combined with small plagioclase crystals) and by fine-grained, not diktytaxitic matrix

Flows are massive, but thin, with numerous flows in stair steps on the dip-slope exposures of the ridges, some are flowbanded and others show slight water affected tendencies

Paleomagnetism is strongly reversed

Whole-rock isochron Ar^{40}/Ar^{39} age date is 5.4 ± 0.65 Ma

Thickness of exposures range from 20-100 m, the base is not exposed

Tbu **Basalt, undivided (Pliocene or Miocene)**

Mapped where the basalt exposures are poor

May be several different basalt lithologies, which are the same or different from the other

Thickness and extent are unknown

<u>Older Basaltic Andesite Flows</u>

Ta **Basaltic andesite aa flows (Miocene)**

Red and black, cindery to scoriaceous, breccia and rubble flows

Has appearance and characteristics of aa lava flows

Stack of up to 6 flows with thin sediment layers present between some of the flows

Occurs east end of main Buck Butte ridge and east-facing N-NW rim on west side of Merrill quadrangle

In Poe Valley, overlies baked red sediment above 10 m of fine-grained sediments

Chemistry overlaps basaltic andesite and basaltic trachyandesite

Paleomagnetic measurements are difficult, however readings were somewhat normal

Thickness from 150 to 200 m

Tbab **Basaltic andesite of Buck Butte (Miocene)**

Dark-gray to black, glassy to very fine-grained, basaltic andesite and basaltic trachyandesite flows

Exposed only on Buck Butte

Numerous, thin (2-3 m) subaerial flows generally containing some stretched vesicles

Locally contains a thickness of palagonitic tuff, presumably basaltic andesite

Most of the tuff is massive, but has some finely layered sand and silt rip-ups within a fresh black glassy cinder

Paleomagnetism is generally reversed

Observed thickness is more than 350 m, however the base is not exposed

Tbap **Basaltic andesite of Adams Point**

Dark grey to black, glassy to fine grained basaltic andesite and andesite flows

Most flows are jointed, somewhat platy, pahoehoe style lava with large vesicles elongate parallel to the platiness, except one aa flow with lobes of massive lava in a rubble matrix

Typically weathers brown or purplish brown

Flow thickness typically 10 m thick or greater

Exposed as a series of low hills at the south end of Dodds Hollow

Age is poorly constrained, but likely one of the oldest units in the entire area

Younger Basaltic Andesite Flows

Tba **Undifferentiated basalt and basaltic andesite flows (Pliocene?)**

Grey to black, glassy to medium grained, holocrystalline, porphyritic and seriate basalt and basaltic andesite flows

Generally medium to coarse grain seriate olivine basalts, slightly dixtytaxitic

Vesicles are common, and olivine is visible in most samples

Makes up most of the highlands surrounding Dodds Hollow on the Merrill quadrangle

Commonly water affected, resulting in brown, pelagonite rich lava that weathers easly to grus, and forms slopes with little exposure

Exposures are generally restricted to ridge tops, otherwise found poorly exposed beneath relatively thick colluvial and soil cover

Talus (unit Qrt) and patterned ground are common on surfaces underlain by this unit

Chemistry indicates calc-alkaline basalts or basaltic andesites

Age possibly similar to similar rocks mapped in the Dairy quadrangle dated 3.85 ± 0.06 Ma to 4.44 ± 0.04 Ma (Hladky, In Press)

Thickness is difficult to determine, but likely at least 250 m, the base was not seen,

Appendix 8: Correlation of geologic units identified by previous investigators from 1974 to 2004 and as generalized by this study

Note: DOGAMI quadrangle studies were correlated to USGS regional studies using map overlays and unit description
Note: The geologic unit correlations are partial equivalents at best
Note: Geologic units within quotation marks indicate the geologic time for an equivalent unit is different from time identified by investigator

Geologic Time		USGS Regional Studies		DOGAMI Quadrangle Studies					OWRD
Period	**Epoch**	**Leonard and Harris (1974)**	**Sherrod and Pickthorn (1992)**	**Bonanza Hladky (in press)**	**Dairy Hladky (in press)**	**Lorella Black (in press)**	**Langell Valley Bryant Mtn Jenks (in press)**	**Merrill Malin Jenks and Madin (in press)**	**Generalization of Geologic Units Delineated by others**
Quaternary	Modern	?	?				Qmf	Qmf	**Undifferentiated Sediments**
							Qml	Qml	
	Holocene	?	?					Qrt	
				Qws		Qws			
		Qal	Qs		Qs		Qs	Qs	
				Qal	Qal	Qal	Qal	Qal	
				Qap	Qap				
						Qds			
						Qf			
		"Ty"	"Qf"		Qc				
			"Tcs"	Qaf	Qaf				
		?					Qf	Qaf	
				Qc					
				Qs					
						Qls	Qls	Qls	
								Qas	
	Pleistocene	?	?					Qrt	
								Qg	
		Qal	Qs		Qs		Qs	Qs	
				Qap	Qap				
						Qf			
							QTs/a		
			Qf				Qgo		
		"Ty"			Qc				
			Qls						
			QTs						
			"Tcs"	Qaf	Qaf			Qoaf	
		?		Qc					
				Qs					
						Qls	Qls	Qls	
								Qas	
Tertiary	Pliocene	?	?	Tvc	Tvc	Tbc			
								Qg	
		"Qal"	"Qs"		Tm				
							QTs/a		
		Ty	"Qls"		Tvs				
			QTs						
			?	Tpt					
					Ts				
					Tvl				
			Tcs	Tvs				Tv	
				Tms	Tms			Tms/a	
				Ts		Ts			
				Tm				Tm	
								Tvs	
								Tpb	
								Tms	
		?					Tsu		
		Ty	Typt						
			Tst						
	Miocene	?	?			Tbc			
		"Qal"	"Qs"		Tm				
			Tt						
		"Ty"	?		Ts				
			Tcs					Tv	
				Tms	Tms			Tms/a	
				Ts		Ts			
				Tm				Tm	
								Tvs	
								Tpb	
								Tms	
			Typt						
			Topt						
			Tst						

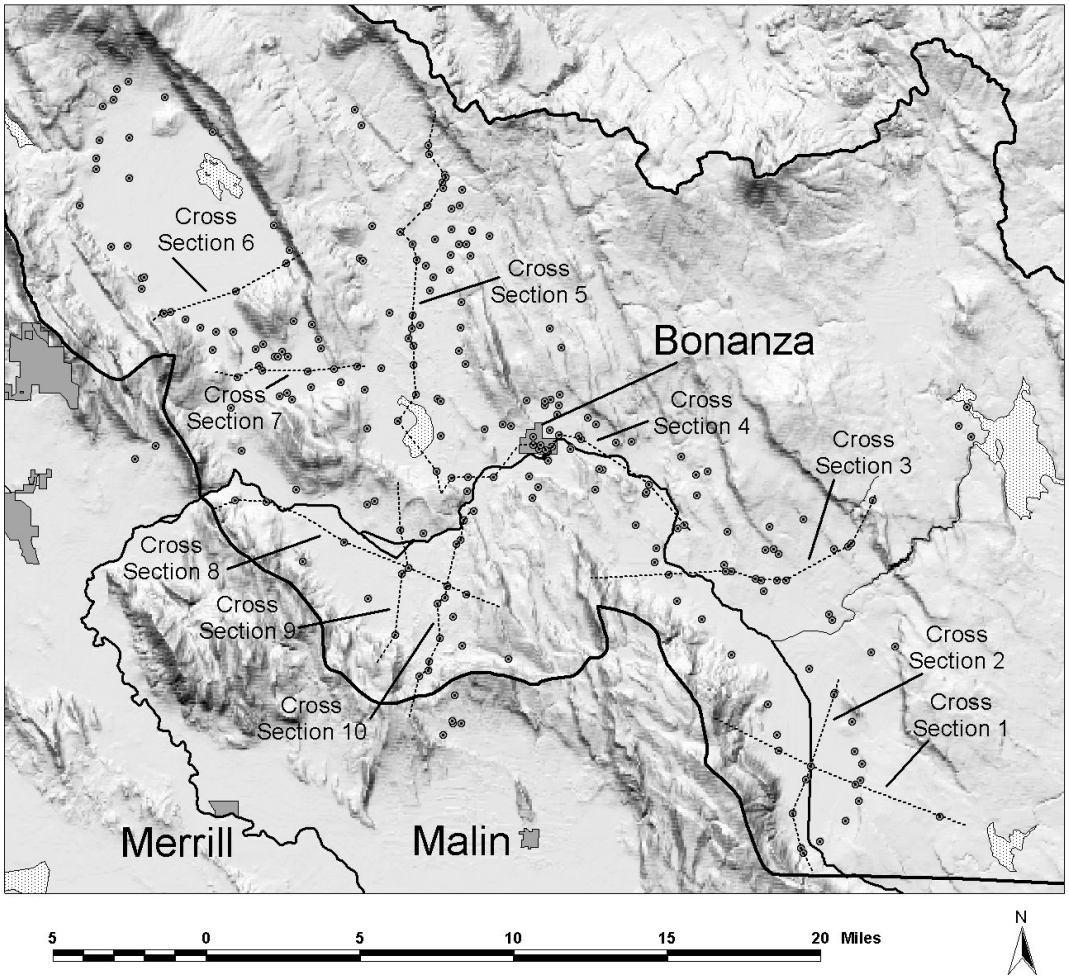
Appendix 8: Correlation of geologic units identified by previous investigators from 1974 to 2004 and as generalized by this study

Note: DOGAMI quadrangle studies were correlated to USGS regional studies using map overlays and unit description
Note: The geologic unit correlations are partial equivalents at best
Note: Geologic units within quotation marks indicate the geologic time for an equivalent unit is different from time identified by investigator

Geologic Time		USGS Regional Studies		DOGAMI Quadrangle Studies					OWRD
Period	**Epoch**	**Leonard and Harris (1974)**	**Sherrod and Pickthorn (1992)**	**Bonanza Hladky (in press)**	**Dairy Hladky (in press)**	**Lorella Black (in press)**	**Langell Valley Bryant Mtn Jenks (in press)**	**Merrill Malin Jenks and Madin (in press)**	**Generalization of Geologic Units Delineated by others**
Quaternary	Holocene	?	?						**Undifferentiated Basalt**
	Pleistocene	Qb	"Tb2"				QTdh		
							QTcr		
							QTpc		
							QTwv		
							QTb		
							QTtr		
			"Tb3"				QTmu		
							QTml		
							QTbl		
Tertiary	Pliocene	QTve	Tv						
			Tad						
			Tr						
			Tb1						
		"Qb"	Tba						
			Tb2		Tbd				
					Tvb				
				Tbag	Tbag				
				Tba					
							QTdh		
							QTcr		
							QTpc		
							QTwv		
							QTb		
							QTtr		
		QTb						Tbjw	
					Tba			Tba	
							Tsb	Tbu	
							Tgp		
							Tcj		
							Tpr		
							Tll		
							Tlp		
							Thc		
							Twr		
							Trc		
							Tst		
							Tsr		
								Tbcj	
								Tbe	
								Tbmf	
								Tbth	
		?					Tms		
							Tmiu		
							Trt		
							Tmil		
								Tbma	
		"Qb"	"Tb3"			Tbjw			
						Tbec			
							QTmu		
							QTml		
							QTbl		
		QTb		Tbjw					
		Tb		Tbd					
		?		Tab					
	Miocene	"Qb"	"Tb2"			Tb			
						Tba			
		"QTb"		Tbot					
						Tsb	Tsb		
							Tbm		
								Tbcj	
								Tbe	
								Tbmf	
								Tbth	
								Tbjw	
								Tbu	
								Ta	
								Tbab	
		?						Tbma	
								Tbap	
							Tmil		
		"Qb"	Tb3				Tgb		
		"Tb"		Tbu	Tbu	Tbu			
		"Qb"	Tba						
		"QTve"	Tv						
			Tad						
			Tr						

Appendix 9

Geologic Cross Sections



Cross Section Lines for the Eastern Lost River Sub-basin

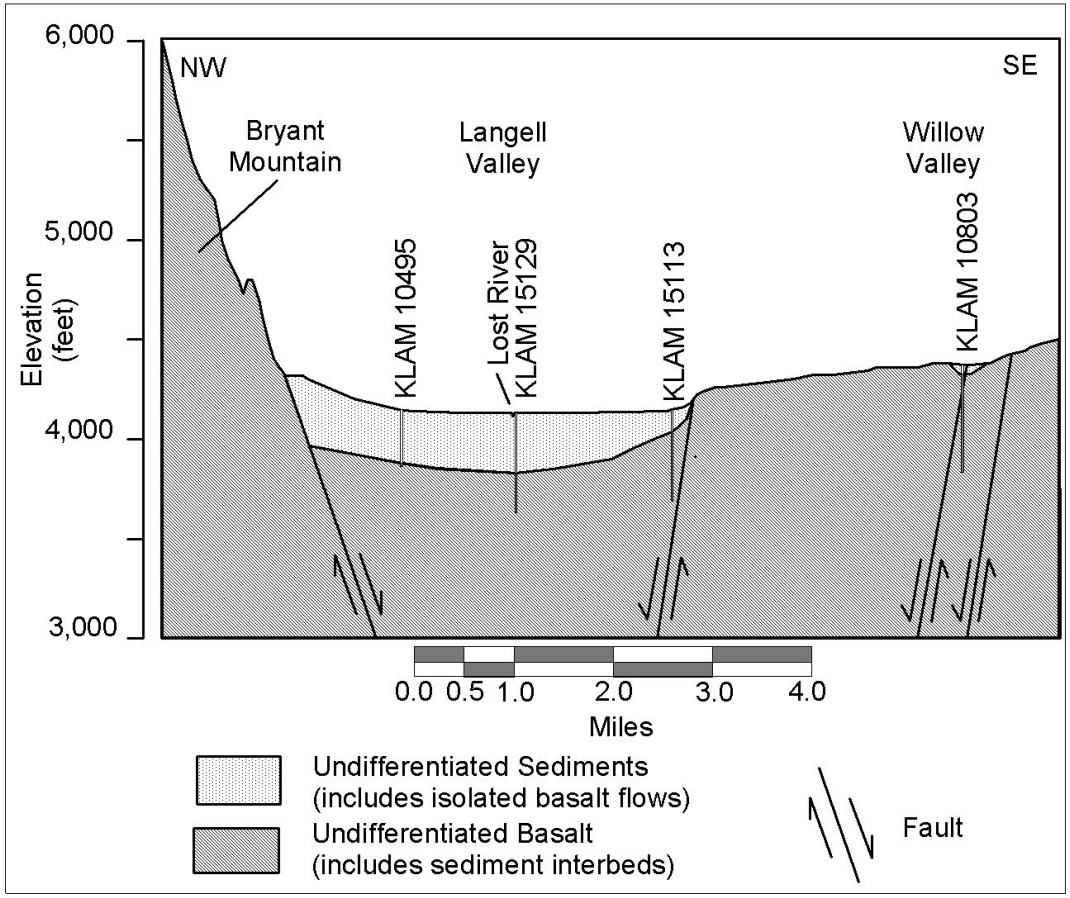
Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon

Oregon Water Resources Department
Salem, Oregon (2004)

Explanation

- **Cross Section Lines**
- **Project Well Sites**
- **Lost River**
- **Miller Creek**
- **City or Town**
- **Sub-basin Boundary**
- **Lake or Reservoir**

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.



Cross Section 1

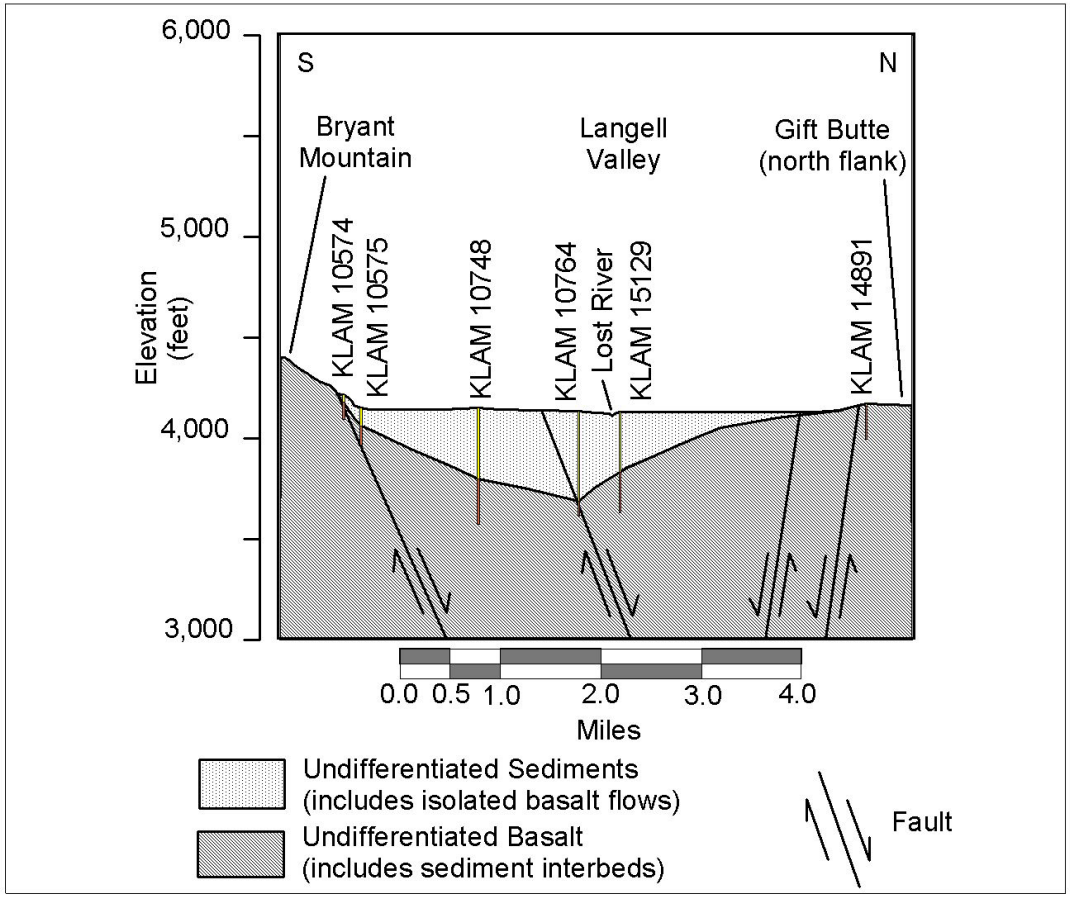
South Langell Valley East-West Cross Section

Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon

Oregon Water Resources Department
Salem, Oregon (2004)

Data for the cross section comes from
OWRD water well reports
Jenks (2004)
Sherrod and Pickthorn (1992)

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.



Cross Section 2

South Langell Valley North-South Cross Section

Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon

Oregon Water Resources Department
Salem, Oregon (2004)

Data for the cross section comes from
OWRD water well reports
Jenks (2004)
Sherrod and Pickthorn (1992)

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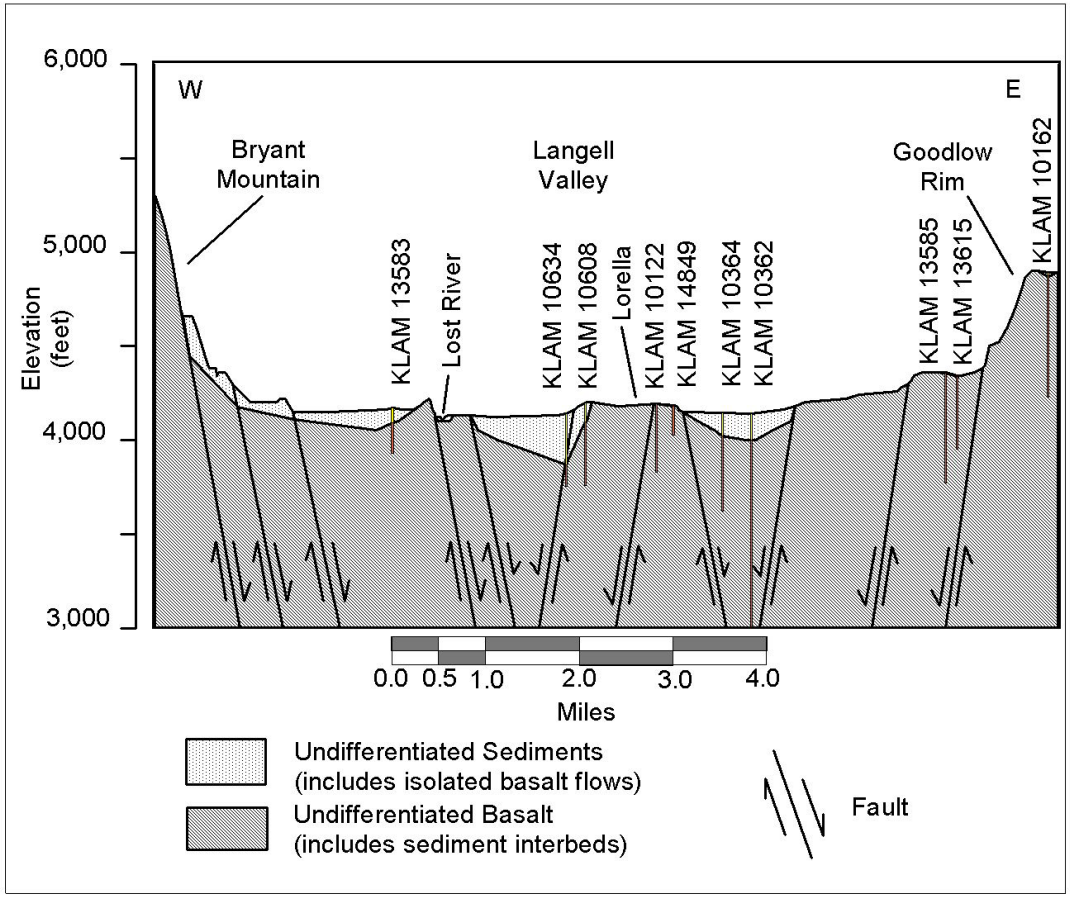

Cross Section 3

Lorella Vicinity Mid-Langell Valley East-West Cross Section

Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon

Oregon Water Resources Department
Salem, Oregon (2004)

Data for the cross section comes from
OWRD water well reports
Black (2004)
Jenks (2004)
Sherrod and Pickthorn (1992)

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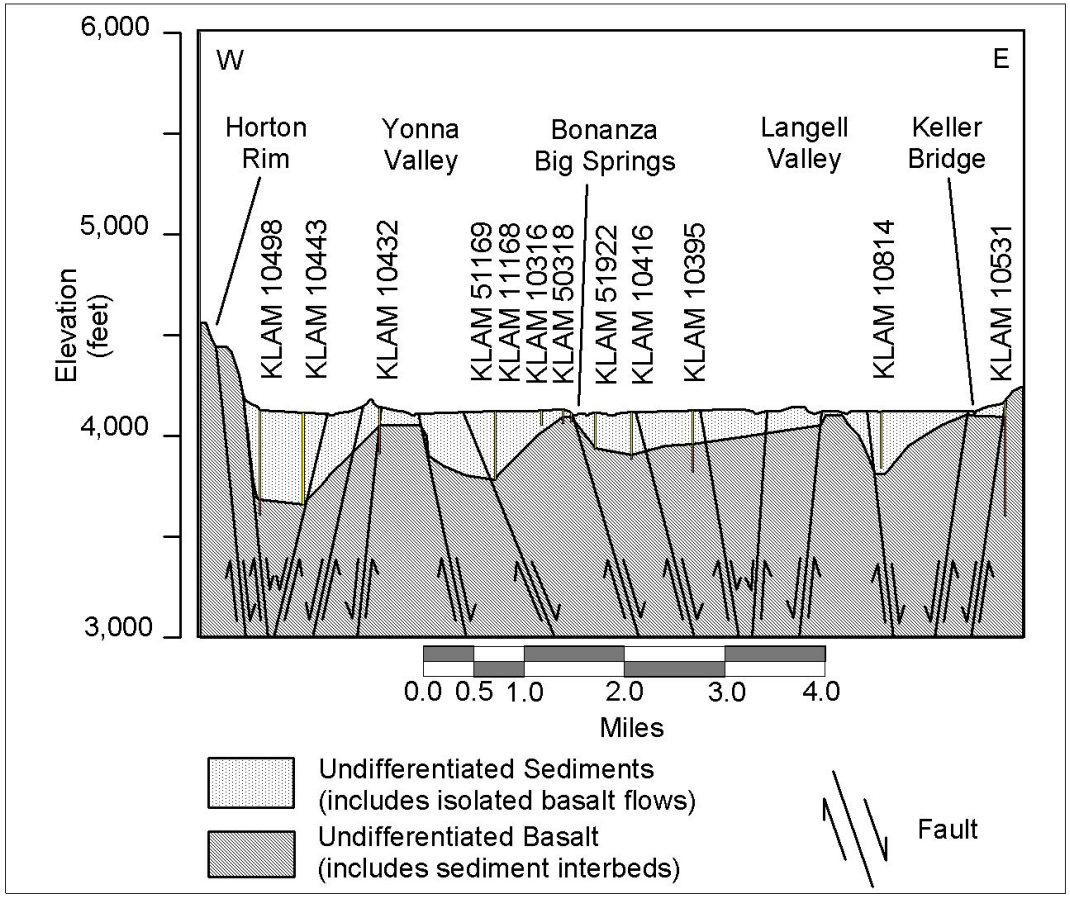


Cross Section 4

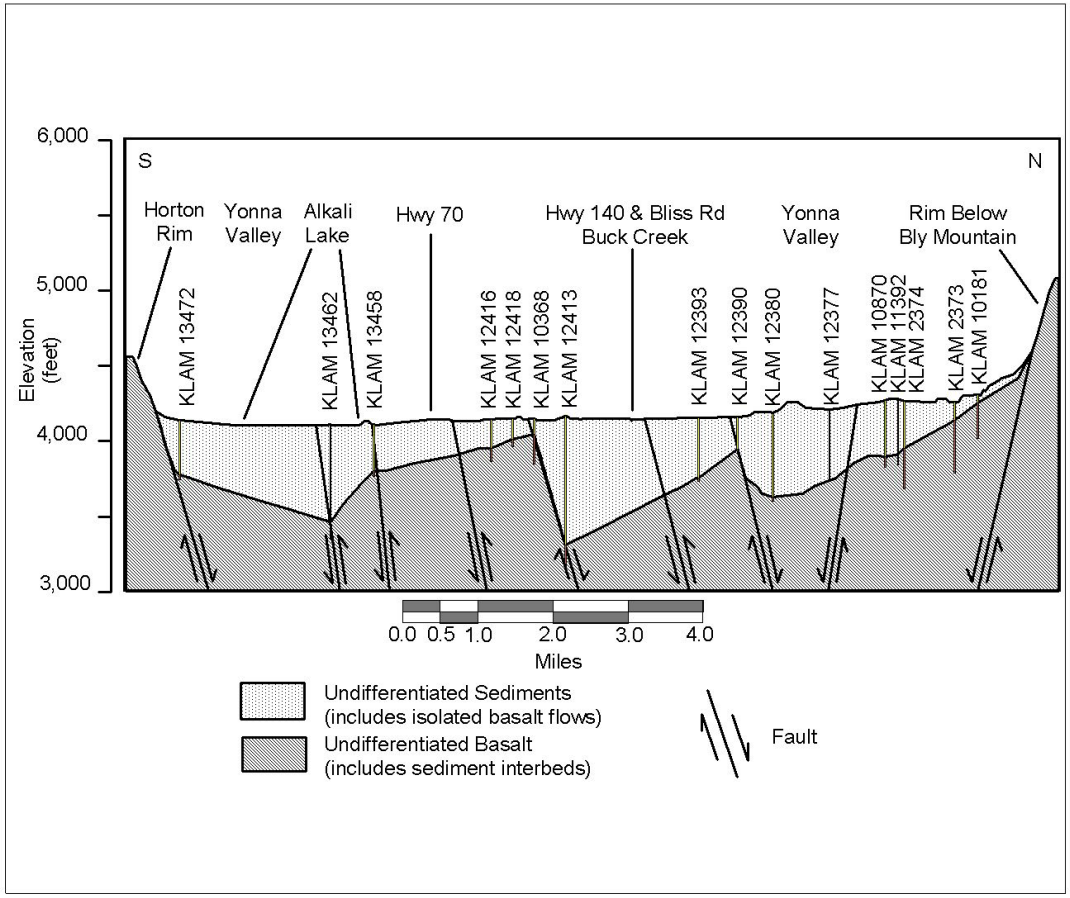
Bonanza Vicinity Yonna and Langell Valleys East-West Cross Section

Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon

Oregon Water Resources Department
Salem, Oregon (2004)

Data for the cross section comes from
OWRD water well reports
Black (2004)
Hladky (2003)
Sherrod and Pickthorn (1992)

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.



Cross Section 5

Bonanza Vicinity
Yonna Valley
North-South Cross Section

Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon

Oregon Water Resources Department
Salem, Oregon (2004)

Data for the cross section comes from
OWRD water well reports
Hladky (2003)
Sherrod and Pickthorn (1992)

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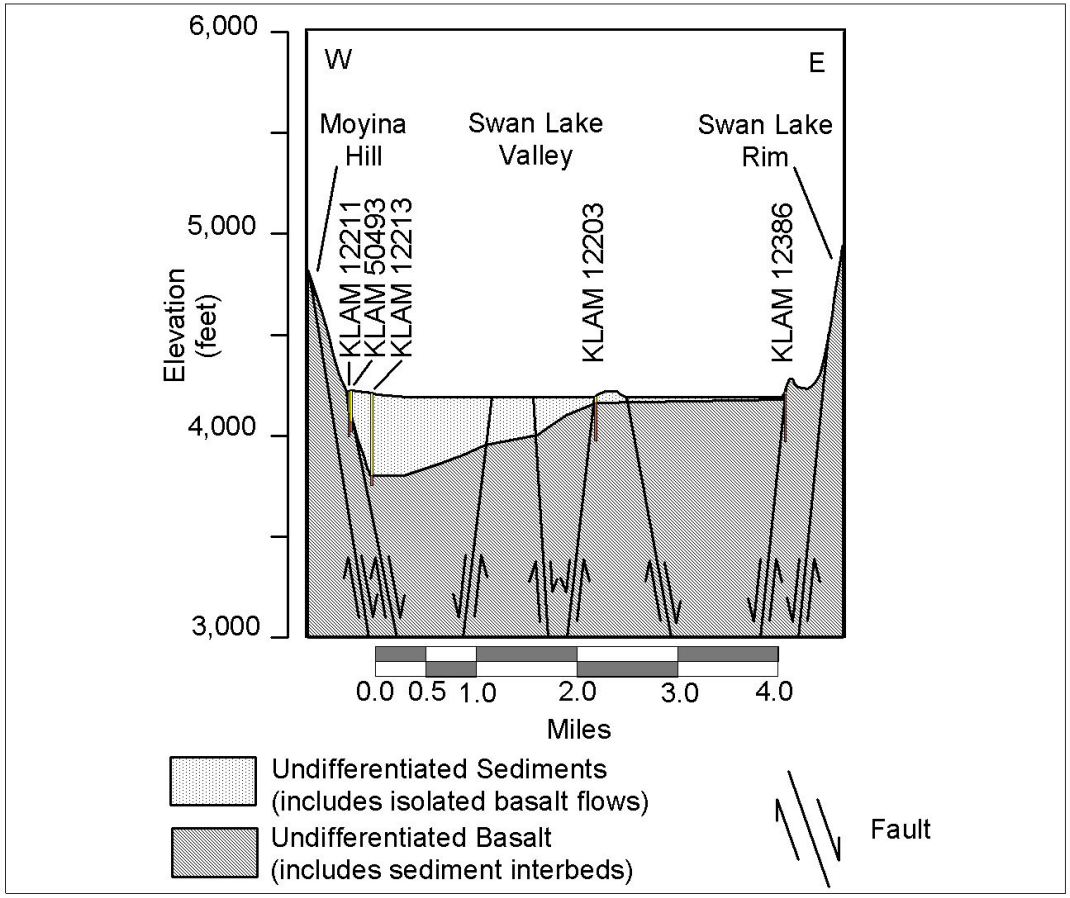

Cross Section 6

South Swan Lake Valley East-West Cross Section

Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon

Oregon Water Resources Department
Salem, Oregon (2004)

Data for the cross section comes from
OWRD water well reports
Hladky (2003)
Sherrod and Pickthorn (1992)

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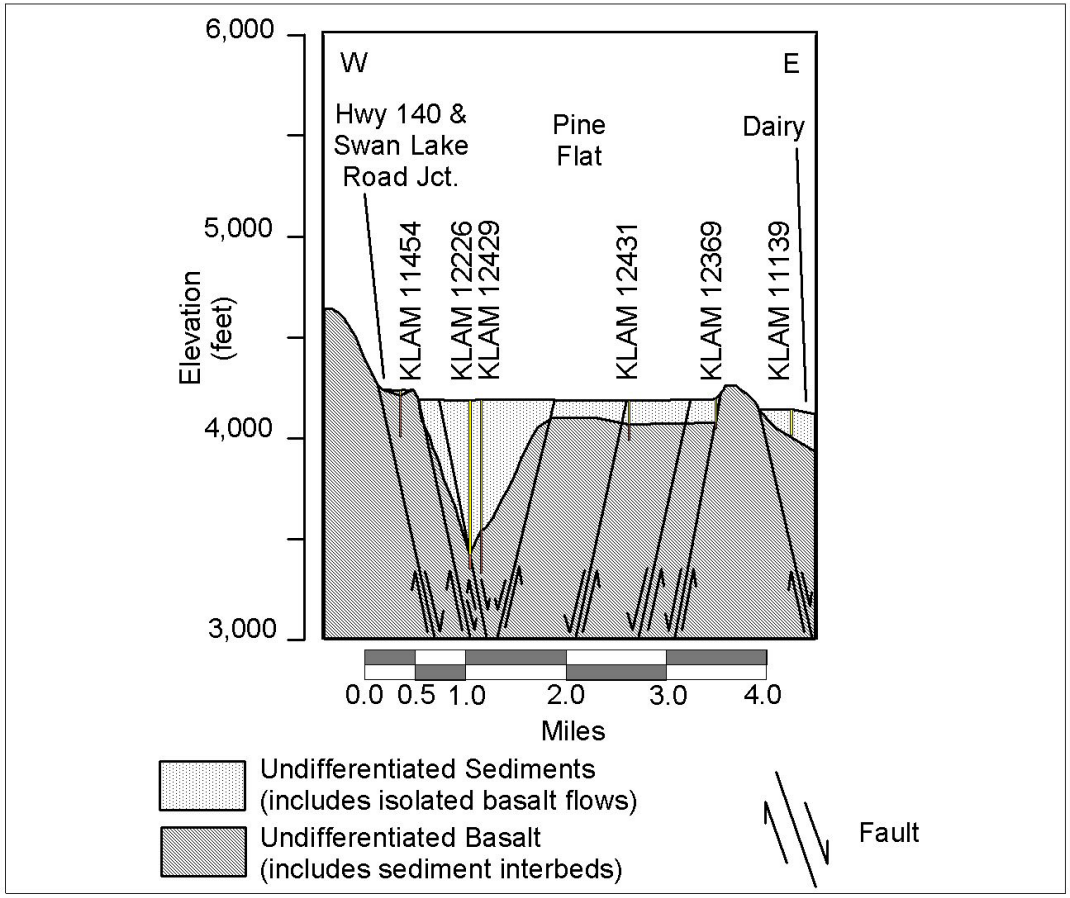

Cross Section 7

Pine Flat East-West Cross Section

Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon

Oregon Water Resources Department
Salem, Oregon (2004)

Data for the cross section comes from
OWRD water well reports
Hladky (2003)
Sherrod and Pickthorn (1992)

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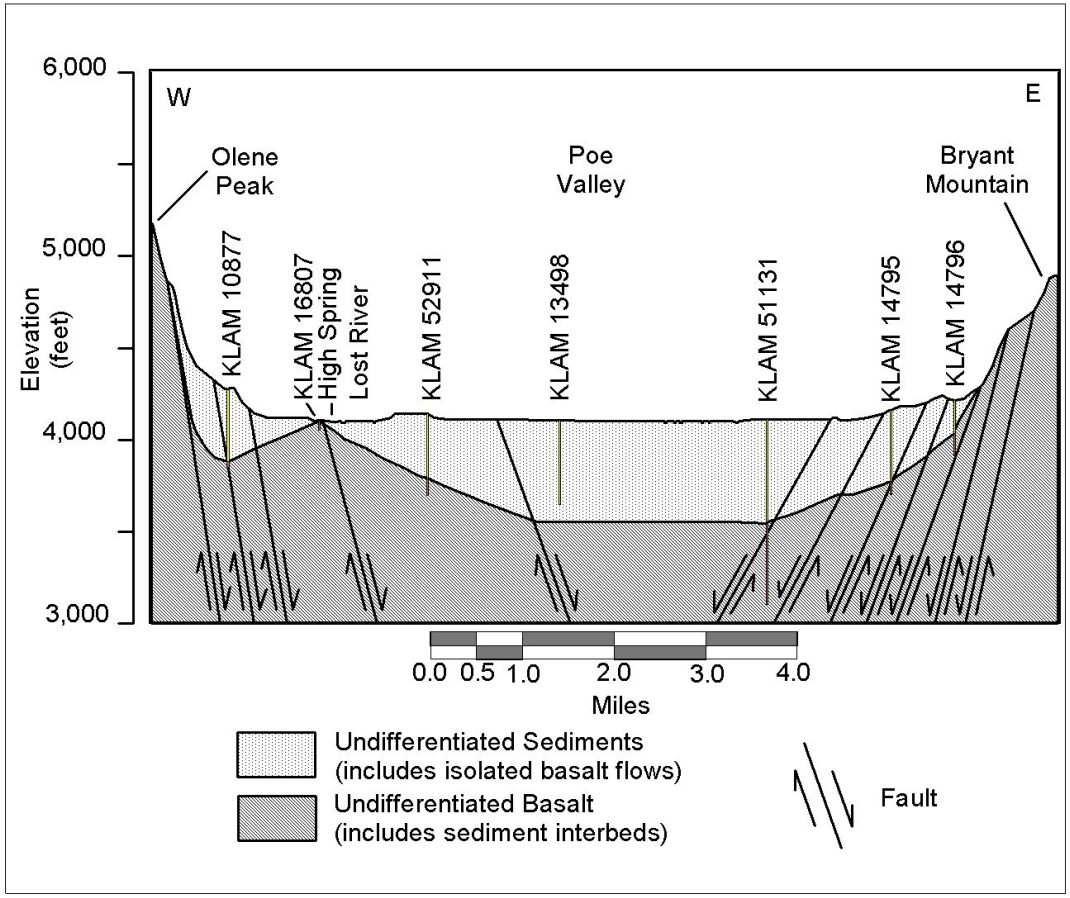

Cross Section 8

Poe Valley East-West Cross Section

Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon

Oregon Water Resources Department
Salem, Oregon (2004)

Data for the cross section comes from
OWRD water well reports
Hladky (2003)
Jenks and Madin (2003)
Sherrod and Pickthorn (1992)

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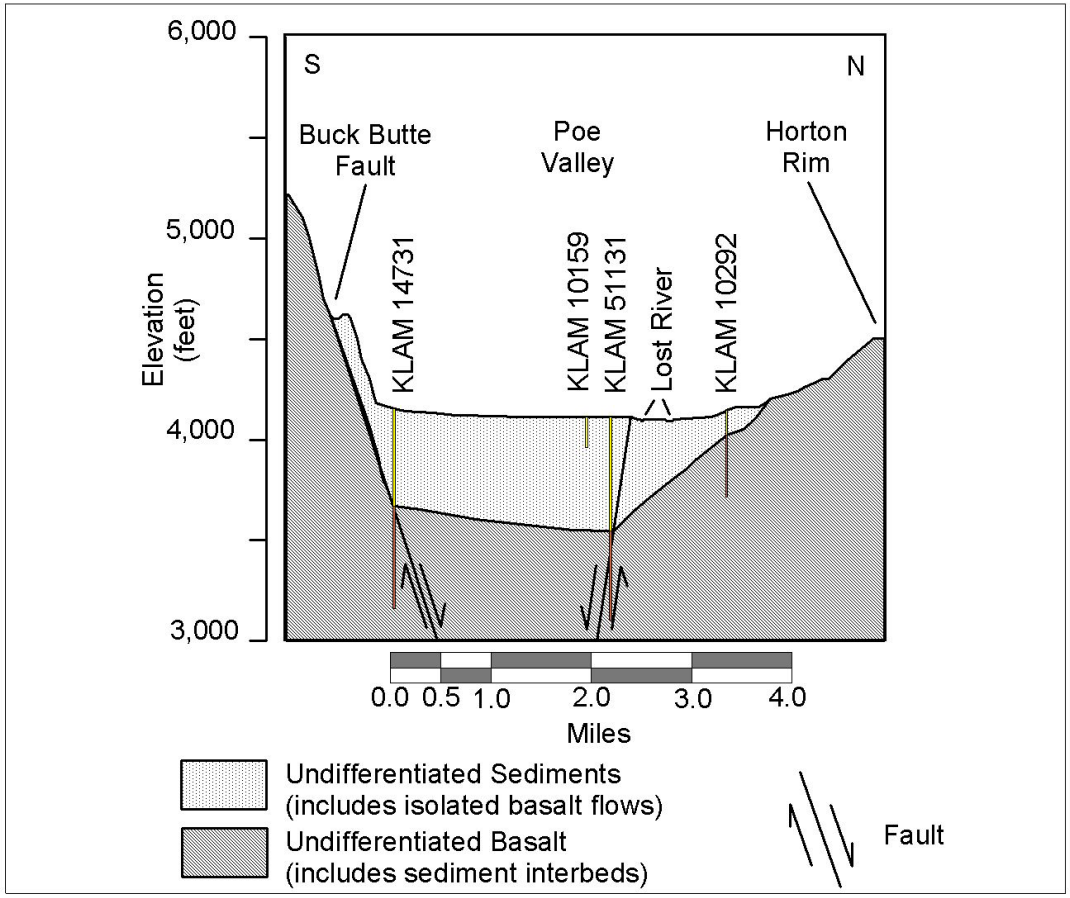

Cross Section 9

Poe Valley North-South Cross Section (east middle-valley)

Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon

Oregon Water Resources Department
Salem, Oregon (2004)

Data for the cross section comes from
OWRD water well reports
Hladky (2003)
Jenks and Madin (2003)
Sherrod and Pickthorn (1992)

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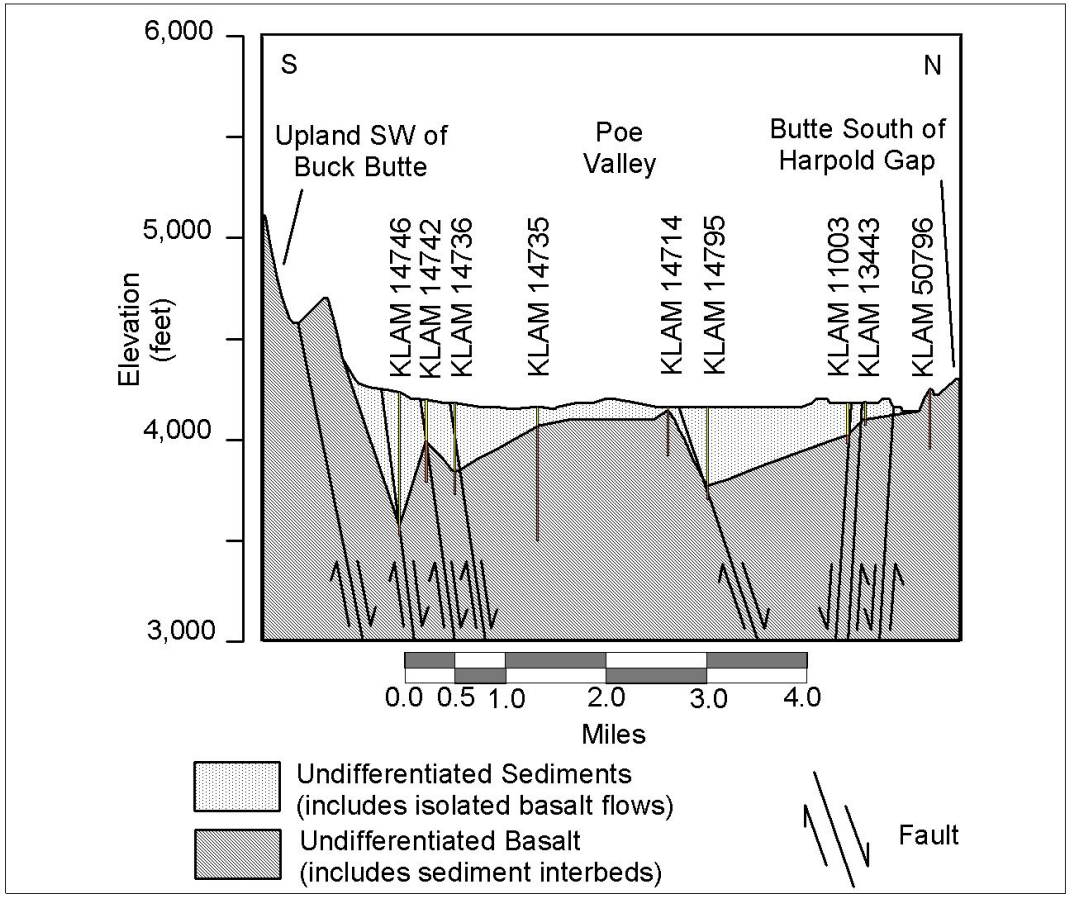

Cross Section 10

Poe Valley North-South Cross Section (east valley)

Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon

Oregon Water Resources Department
Salem, Oregon (2004)

Data for the cross section comes from
OWRD water well reports
Hladky (2003)
Jenks and Madin (2003)
Sherrod and Pickthorn (1992)

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Appendix 10

Hypotheses for Sub-basin Stratigraphy and Structural Development

Introduction

Explaining the geologic history of an area requires understanding the relationship between structure and stratigraphy. Understanding the relationship in the eastern Lost River sub-basin, especially the occurrence of sedimentary units, is improving as more information becomes available. Black (2004) summarized three hypotheses.

Three hypotheses are presented here for two reasons. First, each hypothesis influences interpretations regarding the age of faulting and the geologic history of the sub-basin. Second, researchers, interest groups, and the public need to recognize the hypothesis underlying investigative interpretations made by others.

Hypothesis 1: Yonna Equivalent Sediments Interbedded in the Basalt

Peterson and McIntyre (1970) suggest Yonna equivalent sediment is contemporaneous with the basalt and is interbedded with it. If correct, subsequent faulting raised the area horsts (uplands) sufficiently to bring interbedded sediment within the area horsts to an elevation coincident to the horsts' base. Then, erosion caused the horst escarpments to retreat away from the faults and exposed the sediments in the valleys.

Black identified several problems with this hypothesis. One of them relates to wells greater than 800 feet deep on the horst east of Langell Valley. If hypothesis 1 is correct, the wells should penetrate basalt and encounter an interbed with the same sediments as exposed at the base of the escarpment. They do not.

Hypothesis 2: Yonna Equivalent Sediments Deposited Above all Basalt

A second hypothesis noted by Black (2004) assumes sedimentary deposition occurred after emplacement of the entire basalt section. After faulting occurred, erosion removed the sediments on the horsts and sediments in the valleys remained protected.

Black identified problems with this hypothesis. First, this hypothesis requires erosion removing up to 500 feet of sediment. There is no evidence of a stream network capable of removing that much rock. Additionally, basalt with altered groundmass due to interaction with water armors some of the sedimentary section making it unlikely the entire section would be removed. Second, Black's review of water well reports indicates sediments in the Lorella area thin over several horsts within the Langell Valley graben. That implies faulting occurred before or during sedimentation.

Hypothesis 3: Yonna Equivalent Sediments Deposited After Faulting Began

Black (2004) noted a third hypothesis that sedimentation began after faulting commenced. As faulting progressed and basins deepened, sediments accumulated in the basins, banked against the faults, and were cut by the faults. Additionally, lava erupted along master basin-bounding faults and flowed onto swampy valleys. An argument against this hypothesis is the predominance of fine-grained sediments found near the bounding faults rather than finding a significant component of coarse-grained material eroded from adjoining steep escarpments. Black notes water well reports do show boulders and cobble gravels in the upper parts of the sediments bored, but not through the entire section.

Black reported a counter-argument postulated by Portland State University geology professor Dr. Michael Cummings. As structures begin to develop, surface relief is low and drainages become obstructed leading to sluggish streams, swamps, and lakes. Sediments are typically very fine grained during this stage because the early basin is sediment starved. Relief becomes more prominent as the structure continues to develop. However, the basins do not receive coarse sediment because the catchment areas on the horsts are small and streams developing on the horsts flow down the backslope away from the developing basins. During late basin development stages, the catchment areas on the horsts enlarge sufficiently to deliver limited amounts of coarse-grained material to the basin.

Black accepted this counter-argument and hypothesis (or some minor variation) based upon two evidences in his mapping area. First are the small-scale alluvial fans along Goodlow Rim with limited catchment areas and areal extent of coarse-grained sediments. Second are water wells that encounter coarse-grained sediments limited to the upper portion of the sediments penetrated.

Age of Sub-basin Geologic Structures

Black noted the interpreted age of the sub-basin structures depends upon the stratigraphy-structure hypothesis preferred. Radiometric age dates that help him bracket the onset of faulting included: Sherrod and Pickthorn's (1992) K-Ar date of 6.88 ± 0.60 Ma from a lava flow cut by a westernmost bounding fault near Yainax Butte; and Black (2004) Ar-Ar date of 7.24 ± 0.41 Ma from a Lorella area intracanyon lava flow which would have flowed over a main fault 820 feet downslope had the fault existed during the flow. Other Ar-Ar dates Black considered useful age constraints included 4.62 ± 0.08 Ma from a Lorella area basalt with altered groundmass due to interaction with water; 4.58 ± 0.34 Ma from a basalt interbedded within sediments at 87 feet depth at well KLAM 52096; 5.79 ± 0.12 Ma from basalt at 905 feet depth at well KLAM 52096; and 4.36 ± 0.26 Ma from an ash deposit at the 33 foot depth in a borehole. Black used the last date to constrain the maximum age of an intracanyon lava flow.

Black stated the onset of master Basin and Range faulting in the sub-basin commenced after 4.36 ± 0.26 Ma if hypothesis 2 is correct or about 7 Ma (late Miocene) if hypothesis 3 is correct. He noted the geologic evidence better supports hypothesis 3 and the older faulting commencement date. He suggests the 4 Ma dates may support younger ages for non-master faults that produced low-relief intragraben horsts (small uplands within a valley) capped by basalt with groundmass altered by interaction with water.

Appendix 11: Hydrogeologic Information found on or derived from water well reports

Note: Sub-area S-P-D is Swan lake, Pine Flat, and Dairy
Note: Sub-area Poe is Poe Valley
Note: Sub-area Poe-NP means non-project well in Poe Valley
Note: Sub-area Bonanza is Yonna Valley, Bonanza, and NW Langell Valley
Note: Sub-area Lorella is mid-Langell Valley
Note: Sub-area SLV is south Langell Valley

Note: Use I = irrigation, D = domestic, S = stock, O = observation, U = undetermined
Note: Aquifer abbreviation S = sediment and B = basalt
Note: Used 0.10 feet for drawdown when drawdown on the water well report is 0.00 feet

Sub-Area	Sequence	Well Report County	Well Report Number	Well Use	Aquifer Abbreviate	Water Bearing Zone(s) Identified on Water Well Report	Water Temperature (Fahrenheit)	Capacity (gal/min)	Yield (gal/min)	Drawdown (feet)	Specific Capacity (gpm per ft drawdown)
S-P-D	1	KLAM	2277	D	S	gray clay & coarse sand	56	45.00	45.00	13.00	3.46
S-P-D	2	KLAM	2288	S	S	gravel					
S-P-D	3	KLAM	10336	I	S	sediment portion: pumice		100.00	100.00		
S-P-D	4	KLAM	11139	D	S	black cinder & pumice	46	10.00	10.00	28.00	0.36
S-P-D	5	KLAM	11569	D	S	black sandstone and sand	52	35.00			
						Average	51.33	47.50	51.67		
						Maximum	56.00	100.00	100.00		
						Minumum	46.00	10.00	10.00		
						Median	52.00	40.00	45.00		

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Sub-Area	Sequence	Well Report County	Well Report Number	Well Use	Aquifer Abbreviate	Water Bearing Zone(s) Identified on Water Well Report	Water Temperature (Fahrenheit)	Capacity (gal/min)	Yield (gal/min)	Drawdown (feet)	Specific Capacity (gpm per ft drawdown)
S-P-D	1	KLAM	2259	I	B	black sand, cinders	57	3,000.00	3,000.00	2.00	1,500.00
S-P-D	2	KLAM	2260	I	B	porous lava with black cinders		3,200.00	3,200.00	2.00	1,600.00
S-P-D	3	KLAM	2262	I	B	brown sand & lava		600.00			
S-P-D	4	KLAM	2263	I	B	lava breccia, cinders, broken rock	60	4,750.00	4,750.00	4.00	1,187.50
S-P-D	5	KLAM	2265	I	B	broken lava	56				
S-P-D	6	KLAM	2269	I	B	red cinders		2,500.00	2,500.00	88.00	28.41
S-P-D	7	KLAM	2289	I	B	black cinder and gravel		2,000.00	2,000.00	17.00	117.65
S-P-D	8	KLAM	10082	I	B	cinders, lava, sandstone	48	2,800.00	2,800.00	42.00	66.67
S-P-D	9	KLAM	10336	I	B	basalt portion: broken gray basalt	66	2,000.00	2,000.00	79.00	25.32
S-P-D	10	KLAM	11643	I	B	broken gray basalt, red cinders	58	1,000.00	1,000.00		
S-P-D	11	KLAM	12186	I	B	lava	50	2,150.00	2,150.00	90.00	23.89
S-P-D	12	KLAM	12197	I	B	lava, cinders	56	3,000.00	3,000.00	44.00	68.18
S-P-D	13	KLAM	12203	I	B	red cinders	65	1,600.00	1,600.00	19.00	84.21
S-P-D	14	KLAM	12209	I	B	red and black lavas	58	2,850.00	2,850.00	8.33	342.14
S-P-D	15	KLAM	12211	I	B	porous red, gray lava, red cinders	68	2,650.00	2,650.00	2.00	1,325.00
S-P-D	16	KLAM	12213	I	B	broken lava	58	1,800.00	1,800.00	25.00	72.00
S-P-D	17	KLAM	12217	I	B	lava		2,750.00	2,750.00	7.50	366.67
S-P-D	18	KLAM	12218	I	B	rock?		3,000.00	3,000.00	3.00	1,000.00
S-P-D	19	KLAM	12221	I	B	burnt lava, cinders					
S-P-D	20	KLAM	12223	I	B	honeycomb and broken lava, cinders		1,750.00	1,750.00	181.00	9.67
S-P-D	21	KLAM	12224	I	B	lava boulders and cinders		2,048.00	2,048.00	7.00	292.57
S-P-D	22	KLAM	12226	I	B	black lava	55	1,000.00	1,000.00	9.33	107.18
S-P-D	23	KLAM	12228	I	B	red cinders, black vesicular basalt		2,165.00	2,165.00	2.50	866.00
S-P-D	24	KLAM	12230	I	B	sandstone, basalt	58	2,400.00	2,400.00	11.00	218.18
S-P-D	25	KLAM	12369	D	B	black and brown lava	62	50.00			
S-P-D	26	KLAM	12385	I	B	coarse cinders and boulders	53	2,500.00	2,500.00	4.00	625.00
S-P-D	27	KLAM	12386	I	B	lava					
S-P-D	28	KLAM	12406	I	B	broken lava	58	2,000.00	2,000.00	10.00	200.00
S-P-D	29	KLAM	12419	I	B	porous lava		1,450.00	1,450.00	4.00	362.50
S-P-D	30	KLAM	12420	I	?	?	63	2,660.00	2,660.00	0.67	3,970.15
S-P-D	31	KLAM	12421	I	B	broken lava, cinders					
S-P-D	32	KLAM	12424	I	B	lava, cinders		1,000.00	875.00		
S-P-D	33	KLAM	12425	I	B	broken black lava	63	650.00			
S-P-D	34	KLAM	12429	I	B	black lava	59	2,700.00	2,700.00	39.00	69.23
S-P-D	35	KLAM	12431	I	B	cinders	52	2,000.00	1,400.00	7.00	200.00
S-P-D	36	KLAM	12432	I	B	basalt		2,550.00	3,800.00	28.00	135.71

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Note: Use I = irrigation, D = domestic, S = stock, O = observation, U = undetermined
Note: Aquifer abbreviation S = sediment and B = basalt
Note: Used 0.10 feet for drawdown when drawdown on the water well report is 0.00 feet

Sub-Area	Sequence	Well Report County	Well Report Number	Well Use	Aquifer Abbreviate	Water Bearing Zone(s) Identified on Water Well Report	Water Temperature (Fahrenheit)	Capacity (gal/min)	Yield (gal/min)	Drawdown (feet)	Specific Capacity (gpm per ft drawdown)
S-P-D	37	KLAM	12437	I	B	basalt		1,600.00	1,600.00	1.00	1,600.00
S-P-D	38	KLAM	12454	I	B	broken lava and cinders		2,800.00	2,800.00	3.00	933.33
S-P-D	39	KLAM	13465	I	B	basalt	56	1,800.00	1,800.00	25.00	72.00
S-P-D	40	KLAM	13468	I	B	lava and cinders	62	2,600.00	2,600.00	28.00	92.86
S-P-D	41	KLAM	13469	I	B	broken lava, cinders	55	2,500.00	2,500.00	5.00	500.00
S-P-D	42	KLAM	50337	I	B	broken lava, cinders		1,100.00	950.00		
S-P-D	43	KLAM	50341	I	B	broken brown & gray basalt	56	2,500.00	2,500.00	8.00	312.50
S-P-D	44	KLAM	50362	I	B	lava breccia					
S-P-D	45	KLAM	50445	I	B	cinders	48	1,800.00	1,800.00	53.00	33.96
S-P-D	46	KLAM	50446	D	B	black and brown lava and cinders	62	30.00			
S-P-D	47	KLAM	50493	D	B	black basalt	60	75.00	75.00		
						Average	57.93	2,032.81	2,221.66		541.43
						Maximum	68.00	4,750.00	4,750.00		3,970.15
						Minumum	48.00	30.00	75.00		9.67
						Median	58.00	2,099.00	2,282.50		209.09

Appendix 11: Hydrogeologic Information found on or derived from water well reports

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Note: Use I = irrigation, D = domestic, S = stock, O = observation, U = undetermined
Note: Aquifer abbreviation S = sediment and B = basalt
Note: Used 0.10 feet for drawdown when drawdown on the water well report is 0.00 feet

Sub-Area	Sequence	Well Report County	Well Report Number	Well Use	Aquifer Abbreviate	Water Bearing Zone(s) Identified on Water Well Report	Water Temperature (Fahrenheit)	Capacity (gal/min)	Yield (gal/min)	Drawdown (feet)	Specific Capacity (gpm per ft drawdown)
Poe	1	KLAM	10159	D	S	black sand in blue clay	56	20.00	20.00		
Poe	2	KLAM	11003	D	S	sandstone in claystone	57	20.00	20.00		
Poe	3	KLAM	11421	D	S	coarse sand in green shale	65	15.00	15.00		
Poe	4	KLAM	13478	D	S	shale and sand	52	17.00	17.00		
Poe	5	KLAM	13498	D	S	chalk rock		15.00	15.00		
Poe	6	KLAM	14802	I	S	sandstone and shale	59	950.00	950.00	120.00	7.92
Poe	7	KLAM	51131	I	S	sediment portion: black sand in blue clay portion	78	20.00	20.00		
Poe-NP	8	KLAM	52289	D	S	gravel, black sand	62	60.00	60.00		
Poe-NP	9	KLAM	52763	S	S	35 feet basalt within 610 feet of sediments	68	100.00	100.00		
Poe-NP	10	KLAM	52764	S	S	fractured claystone	65	40.00	40.00	100.00	0.40
						Average	62.44	125.70	125.70		
						Maximum	78.00	950.00	950.00		
						Minumum	52.00	15.00	15.00		
						Median	62.00	20.00	20.00		

Appendix 11: Hydrogeologic Information found on or derived from water well reports

Note: Sub-area S-P-D is Swan lake, Pine Flat, and Dairy
Note: Sub-area Poe is Poe Valley
Note: Sub-area Poe-NP means non-project well in Poe Valley
Note: Sub-area Bonanza is Yonna Valley, Bonanza, and NW Langell Valley
Note: Sub-area Lorella is mid-Langell Valley
Note: Sub-area SLV is south Langell Valley

Note: Use I = irrigation, D = domestic, S = stock, O = observation, U = undetermined
Note: Aquifer abbreviation S = sediment and B = basalt
Note: Used 0.10 feet for drawdown when drawdown on the water well report is 0.00 feet

Sub-Area	Sequence	Well Report County	Well Report Number	Well Use	Aquifer Abbreviate	Water Bearing Zone(s) Identified on Water Well Report	Water Temperature (Fahrenheit)	Capacity (gal/min)	Yield (gal/min)	Drawdown (feet)	Specific Capacity (gpm per ft drawdown)
Poe	1	KLAM	10252	I	B	broken, black basalt	56	300.00	300.00		
Poe	2	KLAM	10292	I	B	hard, bubbly, black basalt, red cinders	56	1,500.00	1,500.00	8.00	187.50
Poe	3	KLAM	10877	D	B	broken, bubbly black, brown lava	73	100.00	100.00		
Poe	4	KLAM	11380	D	B	broken, gray basalt	62	75.00	20.00	28.00	0.71
Poe	5	KLAM	11454	D	B	black lava	65	60.00	60.00		
Poe	6	KLAM	13096	D	B	broken, black lava	58	35.00	35.00	24.00	1.46
Poe	7	KLAM	13443	D	B	porous lava rock	58	40.00	40.00	17.00	2.35
Poe	8	KLAM	13490	I	B	broken lava		800.00	800.00	5.00	160.00
Poe	9	KLAM	13491	D	B	hard brown lava	51	40.00	40.00	0.10	400.00
Poe	10	KLAM	14714	I	B	blue, black lava	61	1,750.00	1,750.00	100.00	17.50
Poe	11	KLAM	14731	I	B	basalt		3.00	70.00	80.00	0.88
Poe	12	KLAM	14735	I	B	broken, creviced lava	73	800.00	800.00	53.00	15.09
Poe	13	KLAM	14736	I	B	brown, gray, bubbly lava	71	900.00	900.00	32.00	28.13
Poe	14	KLAM	14795	I	B	gray and brown lava, sandstone	63	600.00	600.00	115.00	5.22
Poe	15	KLAM	14796	I	B	bubbly, creviced lava, gray clay & shale	59	1,325.00	1,325.00	22.00	60.23
Poe	16	KLAM	14808	I	B	gray lava	57	900.00	900.00	31.00	29.03
Poe	17	KLAM	14809	I	B	basalt		1,300.00	1,300.00		
Poe	18	KLAM	16807	D	B	brown and gray lava	70	50.00	50.00		
Poe	19	KLAM	50623	I	B	black lava	80	3,600.00	3,600.00	62.00	58.06
Poe	20	KLAM	50796	D	B	red and gray rock		24.00	24.00		
Poe	21	KLAM	51131	I	B	basalt portion: black rock	78	200.00	200.00		
Poe-NP	22	KLAM	52727	S	B	black, brown lava	60	500.00	500.00		
Poe-NP	23	KLAM	52766	I	B	fractured basalt	80	3,000.00	3,000.00	80.00	37.50
Poe-NP	24	KLAM	52806	I	B	brown lava	61	1,800.00	1,800.00		
Poe-NP	25	KLAM	52911	I	B	broken, black, brown basalt	63	4,000.00	4,000.00		
Poe-NP	26	KLAM	52918	I	B	fractured basalt	80	2,500.00	2,500.00	100.00	25.00
Poe-NP	27	KLAM	52922	I	B	fractured, gray basalt	84	2,000.00	2,000.00		
Poe-NP	28	KLAM	53080	I	B	fractured basalt	85	2,000.00	2,000.00	410.00	4.88
Poe-NP	29	KLAM	53244	I	B	fractured basalt	82	2,000.00	2,000.00		
Poe-NP	30	KLAM	53581	I	B	fractured basalt	90	800.00	800.00		
Poe-NP	31	KLAM	53630	I	B	fractured basalt	84	2,000.00	2,000.00		
						Average	68.89	1,129.10	1,129.48		60.80
						Maximum	90.00	4,000.00	4,000.00		400.00
						Minumum	51.00	3.00	20.00		0.71
						Median	65.00	800.00	800.00		25.00

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Note: Sub-area S-P-D is Swan lake, Pine Flat, and Dairy
Note: Sub-area Poe is Poe Valley
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Note: Aquifer abbreviation S = sediment and B = basalt
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Sub-Area	Sequence	Well Report County	Well Report Number	Well Use	Aquifer Abbreviate	Water Bearing Zone(s) Identified on Water Well Report	Water Temperature (Fahrenheit)	Capacity (gal/min)	Yield (gal/min)	Drawdown (feet)	Specific Capacity (gpm per ft drawdown)
Bonanza	1	KLAM	10258	D	S	sediment portion: gray shale and clay		10.00	10.00		
Bonanza	2	KLAM	10378	I	S	sediment portion: sand, sandstone, pumice		100.00	100.00		
Bonanza	3	KLAM	10395	I	S	sediment portion: pumice		100.00	100.00		
Bonanza	4	KLAM	10443	I	S	sediment portion: sand in blue clay		10.00	10.00		
Bonanza	5	KLAM	10448	I	S	sediment portion: black sand in blue clay		35.00	35.00		
Bonanza	6	KLAM	10813	O	S	silty sand	60	20.00	20.00		
Bonanza	7	KLAM	10814	O	S	silty sand, gravel	60	200.00	200.00		
Bonanza	8	KLAM	11168	D	S	black sandstone in gray clay	59	48.00	20.00		
Bonanza	9	KLAM	11227	D	S	black sandstone in blue clay	55	35.00	35.00		
Bonanza	10	KLAM	11392	D	S	sediment portion: clay, shale, sandstone		7.00	7.00		
Bonanza	11	KLAM	11473	S	S	gray claystone	64	30.00	30.00	4.50	6.67
Bonanza	12	KLAM	12361	I	S	sediment portion: brown sandstone		5.00	5.00		
Bonanza	13	KLAM	12377	I	S	sandstone, black cinders	51				
Bonanza	14	KLAM	15149	D	S	black sandstone	56	18.00	15.00		
Bonanza	15	KLAM	50318	O	S	sediment portion: brown sandstone		2.00	2.00		
Bonanza	16	KLAM	50777	D	S	hard gray sandstone	56	24.00	24.00		
						Average	57.63	42.93	40.87		
						Maximum	64.00	200.00	200.00		
						Minumum	51.00	2.00	2.00		
						Median	57.50	24.00	20.00		

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Sub-Area	Sequence	Well Report County	Well Report Number	Well Use	Aquifer Abbreviate	Water Bearing Zone(s) Identified on Water Well Report	Water Temperature (Fahrenheit)	Capacity (gal/min)	Yield (gal/min)	Drawdown (feet)	Specific Capacity (gpm per ft drawdown)
Bonanza	1	KLAM	2340	I	B	broken, brown, gray lava	58	2,800.00	2,800.00	7.00	400.00
Bonanza	2	KLAM	2368	I	B	broken lava					
Bonanza	3	KLAM	2373	I	B	brown, black lava	56	1,100.00	1,100.00	7.00	157.14
Bonanza	4	KLAM	2374	I	B	black, brown, red lava, sandstone, cinders		2,400.00	2,400.00	9.00	266.67
Bonanza	5	KLAM	2379	I	B	broken lava		1,800.00	1,800.00		
Bonanza	6	KLAM	10015	D	B	brown, black lava	59	75.00	40.00		
Bonanza	7	KLAM	10080	I	B	crevised rock, sandstone, shale, lava	48	2,100.00	2,100.00	45.00	46.67
Bonanza	8	KLAM	10181	I	B	broken lava	54	1,900.00	1,900.00	1.00	1,900.00
Bonanza	9	KLAM	10242	I	B	sand, pumice, black and brown lava	61	1,000.00	1,000.00		
Bonanza	10	KLAM	10258	D	B	basalt portion: broken, gray basalt	56	40.00	40.00		
Bonanza	11	KLAM	10316	D	B	broken basalt	64	60.00	60.00		
Bonanza	12	KLAM	10352	I	B	broken, bubbly, brown, black basalt	68	1,500.00	1,500.00		
Bonanza	13	KLAM	10357	I	B	broken, bubbly, brown basalt, red cinders	60	600.00	600.00		
Bonanza	14	KLAM	10368	I	B	brown, black rock, red cinders	56	1,000.00	1,000.00		
Bonanza	15	KLAM	10378	I	B	basalt portion black and brown lava	57	2,960.00	1,900.00		
Bonanza	16	KLAM	10395	I	B	basalt portion: blacksandstone, lava	62	1,500.00	800.00		
Bonanza	17	KLAM	10416	I	B	brown, black lava, red cinders	62	2,500.00	2,500.00		
Bonanza	18	KLAM	10421	I	B	black lava	59	3,000.00	2,000.00		
Bonanza	19	KLAM	10431	I	B	broken black, bubbly brown lava	61	4,500.00	4,500.00		
Bonanza	20	KLAM	10432	I	B	fractured, brown and black lava	55	970.00	970.00		
Bonanza	21	KLAM	10443	I	B	basalt portion: black sand-sandstone, grey rock	59	2,000.00	2,000.00		
Bonanza	22	KLAM	10448	I	B	basalt portion: broken, black, brown, gray, red rock	61	850.00	850.00		
Bonanza	18	KLAM	10460	I	B	bubbly red lava, red cinders	60	3,000.00	3,000.00	6.00	500.00
Bonanza	19	KLAM	10461	I	B	broken, brown, black lava, red cinders	65	2,000.00	2,000.00	1.00	2,000.00
Bonanza	20	KLAM	10475	I	B	bubbly, broken, brown, black lava	60	1,300.00	1,300.00	95.00	13.68
Bonanza	21	KLAM	10498	I	B	black lava	63	1,500.00	1,500.00	40.00	37.50
Bonanza	22	KLAM	10566	D	B	brown lava	56	10.00	10.00		
Bonanza	23	KLAM	10712	I	B	black, brown, red lava	56	500.00	500.00		
Bonanza	24	KLAM	10870	I	B	broken, hard, brown lava	56	600.00	600.00		
Bonanza	25	KLAM	11294	D	B	grey, brown and red rock	56	80.00	35.00		
Bonanza	26	KLAM	11392	D	B	basalt portion: red lava and cinders	56	150.00	150.00		
Bonanza	27	KLAM	12261	I	B	broken lava		1,600.00	1,600.00	2.00	800.00
Bonanza	28	KLAM	12267	I	B	broken, blue lava	62	2,300.00	2,300.00	34.00	67.65
Bonanza	29	KLAM	12268	I	B	rock and cinders		1,000.00	1,000.00	15.00	66.67
Bonanza	30	KLAM	12269	I	B	broken lava		3,200.00	3,200.00	4.00	800.00
Bonanza	31	KLAM	12273	D	B	brown lava rock	57	200.00	200.00		

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Sub-Area	Sequence	Well Report County	Well Report Number	Well Use	Aquifer Abbreviate	Water Bearing Zone(s) Identified on Water Well Report	Water Temperature (Fahrenheit)	Capacity (gal/min)	Yield (gal/min)	Drawdown (feet)	Specific Capacity (gpm per ft drawdown)
Bonanza	32	KLAM	12283	I	B	black basalt	56	2,800.00	2,800.00	4.00	700.00
Bonanza	33	KLAM	12285	I	B	broken, black lava		1,400.00	1,400.00	19.00	73.68
Bonanza	34	KLAM	12286	I	B	broken, red lava, red and gray cinders		1,200.00	1,000.00		
Bonanza	35	KLAM	12345	I	B	?	54	2,000.00	2,000.00		
Bonanza	36	KLAM	12358	I	B	broken, brown and gray lava		500.00	500.00		
Bonanza	37	KLAM	12361	I	B	basalt portion: brown, gray, bubbly lava	58	1,500.00	1,500.00	3.00	500.00
Bonanza	38	KLAM	12363	I	B	sandstone, blue and broken lava, red cinders	54	2,800.00	2,800.00	3.00	933.33
Bonanza	39	KLAM	12380	I	B	lava and cinders		1,700.00	3,200.00	93.00	34.41
Bonanza	40	KLAM	12382	I	B	broken, porous lava		1,750.00	2,500.00		
Bonanza	41	KLAM	12389	I	B	lava		3,000.00	3,000.00	29.00	103.45
Bonanza	42	KLAM	12390	I	B	broken, porous lava	55	1,700.00	1,700.00	9.00	188.89
Bonanza	43	KLAM	12391	I	B	broken lava		1,500.00	1,500.00	0.50	3,000.00
Bonanza	44	KLAM	12393	D	B	porous, blocky lava	51	1,200.00	300.00	10.00	30.00
Bonanza	45	KLAM	12395	I	B	lava rock		2,400.00	2,200.00	3.00	733.33
Bonanza	46	KLAM	12396	I	B	lava and broken, red cinders		1,600.00	1,600.00	6.50	246.15
Bonanza	47	KLAM	12398	I	B	broken lava, cinders	52	1,600.00	1,600.00	5.00	320.00
Bonanza	48	KLAM	12411	I	B	porous lava		1,600.00	1,600.00	17.00	94.12
Bonanza	49	KLAM	12413	I	B	lava and cinders		2,000.00	2,000.00	26.00	76.92
Bonanza	50	KLAM	12415	I	B	broken, burnt lava		2,100.00	2,100.00	42.00	50.00
Bonanza	51	KLAM	12416	I	B	lava, cinders		1,600.00	2,500.00	42.00	59.52
Bonanza	52	KLAM	12418	I	B	broken lava and yellow cinders	58	3,000.00	3,000.00	7.00	428.57
Bonanza	53	KLAM	12456	D	B	basalt?					
Bonanza	54	KLAM	12457	I	?	basalt?		1,500.00	1,500.00		
Bonanza	55	KLAM	12471	I	B	creviced gray and brown lava, sand	54	430.00	430.00	0.10	4,300.00
Bonanza	56	KLAM	12477	I	B	black, brown, gray lava, red cinders	68	1,800.00	1,800.00	6.00	300.00
Bonanza	57	KLAM	13326	I	B	rock?	60	1,600.00	1,600.00	76.00	21.05
Bonanza	58	KLAM	13331	I	B	broken, black lava	57	500.00	500.00	3.00	166.67
Bonanza	59	KLAM	13332	I	B	broken, brown, black lava	62	300.00	300.00		
Bonanza	60	KLAM	13353	D	B	brown, red, black lava	58	40.00	35.00		
Bonanza	61	KLAM	13399	I	B	lava	61	1,100.00	1,100.00	35.00	31.43
Bonanza	62	KLAM	13400	I	B	lava		100.00	100.00	0.10	1,000.00
Bonanza	63	KLAM	13403	I	B	red, brown, black lava, red cinders	72	1,900.00	1,900.00	135.00	14.07
Bonanza	64	KLAM	13406	I	B	broken hard gray shale in basalt		200.00	200.00		
Bonanza	65	KLAM	13428	I	?	basalt?		1,000.00	1,000.00	135.00	7.41
Bonanza	66	KLAM	13430	I	B	black rock?		1,150.00	1,150.00	43.00	26.74
Bonanza	67	KLAM	13456	D	B	porous lava		35.00	35.00	?	
Bonanza	68	KLAM	13458	I	B	black and red lava	63	1,500.00	1,500.00	55.00	27.27

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Bonanza	69	KLAM	13462	I	B	burnt lava	62	5,500.00	5,500.00	55.00	100.00
Bonanza	70	KLAM	13471	I	B	broken, black, brown, red, lava	60	950.00	950.00	100.00	9.50
Bonanza	71	KLAM	13472	I	B	broken, soft, brown, red, black lava	58	1,900.00	1,900.00	103.00	18.45
Bonanza	72	KLAM	13519	I	B	lava		1,050.00	1,050.00	16.00	65.63
Bonanza	73	KLAM	13538	I	B	broken lava and red cinders	53	2,100.00	2,100.00	63.00	33.33
Bonanza	74	KLAM	13539	I	B	broken lava		3,000.00	3,000.00	19.00	157.89
Bonanza	75	KLAM	13548	I	B	red cinder	46	2,600.00	2,600.00	9.00	288.89
Bonanza	76	KLAM	13553	I	B	sandstone and basalt	60	1,450.00	1,450.00	49.00	29.59
Bonanza	77	KLAM	13608	I	B	broken and honeycomb lava	64	2,000.00	2,000.00	22.50	88.89
Bonanza	78	KLAM	50318	O	B	basalt portion: lava	61	100.00	50.00		
Bonanza	79	KLAM	50934	D	B	black basalt	57	60.00	60.00		
Bonanza	80	KLAM	51920	I	B	basalt, tuffaceous rocks, basalts, andesites	72	4,000.00	4,000.00	57.00	70.18
Bonanza	81	KLAM	51922	U	B	vesicular basalt?					
						Average	58.75	1,553.13	1,540.54		427.71
						Maximum	72.00	5,500.00	5,500.00		4,300.00
						Minumum	46.00	10.00	10.00		7.41
						Median	58.00	1,500.00	1,500.00		97.06

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Lorella	1	KLAM	10122	I	S	sed portion: black sand, brown and black sandstone		60.00	60.00		
Lorella	2	KLAM	10175	I	S	sediment portion: brown clay		10.00	10.00		
Lorella	3	KLAM	10467	I	S	sediment portion: black sandstone and sand		200.00	200.00		
Lorella	4	KLAM	10526	I	S	sediment portion: brown sandstone in clay		30.00	30.00		
Lorella	5	KLAM	10634	I	S	sediment portion: sandstone, pumice, cinders		145.00	145.00		
Lorella	6	KLAM	10647	D	S	black sandstone and white pumice in blue claystone	60	250.00	250.00		
Lorella	7	KLAM	13582	D	S	sediment portion: brown sandstone		5.00	5.00		
Lorella	8	KLAM	14873	I	S	shale, sandstone, gravel	55	320.00	320.00	91.00	3.52
Lorella	9	KLAM	50301	D	S	black sand in blue claystone	80	60.00	30.00		
Lorella	10	KLAM	50787	D	S	sediment portion: sandstone		10.00	10.00		
Lorella	11	KLAM	52204	O	S	sediment portion: black sandstone and sand		15.00	15.00		
Lorella	12	KLAM	52701	I	S	sediment portion: brown & gray sandstone		70.00	70.00		
						Average	65.00	97.92	95.42		
						Maximum	80.00	320.00	320.00		
						Minumum	55.00	5.00	5.00		
						Median	60.00	60.00	45.00		

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Lorella	1	KLAM	10122	I	B	basalt portion: brown, black lava	61	300.00	300.00		
Lorella	2	KLAM	10156	I	B	pumice in basalt	53	400.00	400.00	150.00	2.67
Lorella	3	KLAM	10175	I	B	basalt portion: broken, brown basalt, sand	54	3,000.00	1,700.00	165.00	10.30
Lorella	4	KLAM	10362	I	B	blue sandstone with basalt	54	300.00	300.00	138.00	2.17
Lorella	5	KLAM	10364	I	B	gray, brown, black basalt, pumice	68	1,900.00	1,900.00	184.00	10.33
Lorella	6	KLAM	10467	I	B	basalt portion: red and black lava, red cinders	64	3,000.00	3,200.00		
Lorella	7	KLAM	10526	I	B	basalt portion: bubbly, black, brown lava	57	1,500.00	1,500.00		
Lorella	8	KLAM	10531	I	B	brown lava	58	300.00	300.00		
Lorella	9	KLAM	10554	I	B	brown, black rock, black sandstone, pumice	55	150.00	150.00		
Lorella	10	KLAM	10608	I	B	black, brown lava	63	450.00	450.00		
Lorella	11	KLAM	10634	I	B	basalt portion: black lava, black cinders	69	2,000.00	2,000.00		
Lorella	12	KLAM	10699	I	B	black lava	74	500.00	500.00		
Lorella	13	KLAM	11204	S	B	black basalt	66	4.00	4.00		
Lorella	14	KLAM	13554	I	B	broken black basalt	56	30.00	30.00		
Lorella	15	KLAM	13555	I	B	broken brown basalt	64	610.00	610.00	27.00	22.59
Lorella	16	KLAM	13578	I	B	broken, brown, blue-gray, red lava	70	1,950.00	1,950.00	57.00	34.21
Lorella	17	KLAM	13582	D	B	basalt portion: black, brown, red lava	61	45.00	45.00		
Lorella	18	KLAM	13583	I	B	broken, blue, brown, gray lava	62	1,100.00	1,100.00		
Lorella	19	KLAM	13585	I	B	black basalt	56	510.00	510.00		
Lorella	20	KLAM	13615	U	B	black, brown, red lava	56	240.00	240.00	130.00	1.85
Lorella	21	KLAM	13620	I	B	broken rock		230.00	230.00		
Lorella	22	KLAM	14849	D	B	brown rock and sand	54	40.00	40.00		
Lorella	23	KLAM	14864	I	B	black, brown basalt	76	650.00	650.00		
Lorella	24	KLAM	14882	S	B	brown, black lava	60	23.00	23.00		
Lorella	25	KLAM	50787	D	B	basalt portion: broken gray rock	58	24.00	24.00		
Lorella	23	KLAM	52096	O	B	brown, black basalt		?	?		
Lorella	24	KLAM	52204	O	B	basalt portion: gray, black basalt		?	?		
Lorella	25	KLAM	52701	I	B	basalt portion: grey & brown basalt, pumice, claystone	57	1,000.00	1,000.00	11.00	90.91
Lorella	26	KLAM	53246	I	B	black, gray basalt, black ash	75	250.00	250.00		
Lorella	27	KLAM	53348	I	B	broken, soft, hard, brown, black, gray, red basalt					
						Average	61.58	759.48	718.74		21.88
						Maximum	76.00	3,000.00	3,200.00		90.91
						Minumum	53.00	4.00	4.00		1.85
						Median	60.50	400.00	400.00		10.31

Appendix 11: Hydrogeologic Information found on or derived from water well reports

Note: Sub-area S-P-D is Swan lake, Pine Flat, and Dairy
Note: Sub-area Poe is Poe Valley
Note: Sub-area Poe-NP means non-project well in Poe Valley
Note: Sub-area Bonanza is Yonna Valley, Bonanza, and NW Langell Valley
Note: Sub-area Lorella is mid-Langell Valley
Note: Sub-area SLV is south Langell Valley

Note: Use I = irrigation, D = domestic, S = stock, O = observation, U = undetermined
Note: Aquifer abbreviation S = sediment and B = basalt
Note: Used 0.10 feet for drawdown when drawdown on the water well report is 0.00 feet

Sub-Area	Sequence	Well Report County	Well Report Number	Well Use	Aquifer Abbreviate	Water Bearing Zone(s) Identified on Water Well Report	Water Temperature (Fahrenheit)	Capacity (gal/min)	Yield (gal/min)	Drawdown (feet)	Specific Capacity (gpm per ft drawdown)
SLV	1	KLAM	10575	I	S	sediment portion: sand in clay		30.00	30.00		
SLV	2	KLAM	10803	D	B	black, brown sandstone	63	335.00	200.00		
SLV	3	KLAM	14871	D	S	coarse sand	60	27.00	27.00	27.00	1.00
SLV	4	KLAM	15129	I	S	sediment portion: black sand in claystone		50.00	50.00		
SLV	5	KLAM	15129	I	S	sediment portion: coarse black sand		200.00	200.00		
						Average	61.50	128.40	101.40		
						Maximum	63.00	335.00	200.00		
						Minumum	60.00	27.00	27.00		
						Median	61.50	50.00	50.00		

Appendix 11: Hydrogeologic Information found on or derived from water well reports

Note: Sub-area S-P-D is Swan lake, Pine Flat, and Dairy
Note: Sub-area Poe is Poe Valley
Note: Sub-area Poe-NP means non-project well in Poe Valley
Note: Sub-area Bonanza is Yonna Valley, Bonanza, and NW Langell Valley
Note: Sub-area Lorella is mid-Langell Valley
Note: Sub-area SLV is south Langell Valley

Note: Use I = irrigation, D = domestic, S = stock, O = observation, U = undetermined
Note: Aquifer abbreviation S = sediment and B = basalt
Note: Used 0.10 feet for drawdown when drawdown on the water well report is 0.00 feet

Sub-Area	Sequence	Well Report County	Well Report Number	Well Use	Aquifer Abbreviate	Water Bearing Zone(s) Identified on Water Well Report	Water Temperature (Fahrenheit)	Capacity (gal/min)	Yield (gal/min)	Drawdown (feet)	Specific Capacity (gpm per ft drawdown)
SLV	1	KLAM	10458	I	B	hard brown rock	60	400.00	400.00		
SLV	2	KLAM	10473	I	B	gray, red, brown rock	67	2,000.00	2,000.00		
SLV	3	KLAM	10495	I	B	broken, bubbly, black, basalt	74	2,200.00	2,200.00	6.00	366.67
SLV	4	KLAM	10574	S	B	black rock	74	20.00	20.00	40.00	0.50
SLV	5	KLAM	10575	I	B	basalt portion: black, brown, gray lava	80	2,000.00	2,000.00		
SLV	6	KLAM	10641	I	B	broken, bubbly, brown lava	66	3,700.00	3,700.00		
SLV	7	KLAM	10642	I	B	brown, black, gray lava, cinders, clay ash	64	1,000.00	1,000.00		
SLV	8	KLAM	10748	I	B	broken, black, brown, gray basalt	67	1,000.00	1,000.00		
SLV	9	KLAM	10764	I	B	broken, bubbly, brown, black basalt	68	1,500.00	1,500.00		
SLV	10	KLAM	14884	I	B	black porous lava	66	1,750.00	1,750.00	37.00	47.30
SLV	11	KLAM	14889	D	B	brown, black lava	68	50.00	50.00	27.00	1.85
SLV	12	KLAM	14891	I	B	brown, black lava	70	1,525.00	1,525.00		
SLV	13	KLAM	14892	S	B	black, brown lava	79	75.00	75.00		
SLV	14	KLAM	14896	I	B	broken lava	74	1,500.00	1,500.00		
SLV	15	KLAM	15113	I	B	brown, black, gray basalt, some broken	61	900.00	900.00		
SLV	16	KLAM	15127	I	B	broken, black, red, gray lava	68	1,600.00	1,600.00		
SLV	17	KLAM	15129	I	B	basalt portion: broken, vessicular, brown, gray, red lava	71	1,500.00	1,500.00		
SLV	18	KLAM	15130	I	B	basalt breccia		1,400.00	1,400.00	60.00	23.33
SLV	19	KLAM	15131	D	B	broken, black, red lava	61	30.00	30.00	0.10	300.00
						Average	68.78	1,271.05	1,271.05		123.27
						Maximum	80.00	3,700.00	3,700.00		366.67
						Minumum	60.00	20.00	20.00		0.50
						Median	68.00	1,500.00	1,500.00		35.32

Appendix 11: Hydrogeologic Information found on or derived from water well reports

Note: Sub-area S-P-D is Swan lake, Pine Flat, and Dairy
Note: Sub-area Poe is Poe Valley
Note: Sub-area Poe-NP means non-project well in Poe Valley
Note: Sub-area Bonanza is Yonna Valley, Bonanza, and NW Langell Valley
Note: Sub-area Lorella is mid-Langell Valley
Note: Sub-area SLV is south Langell Valley

Note: Use I = irrigation, D = domestic, S = stock, O = observation, U = undetermined
Note: Aquifer abbreviation S = sediment and B = basalt
Note: Used 0.10 feet for drawdown when drawdown on the water well report is 0.00 feet

Sub-Area	Sequence	Well Report County	Well Report Number	Well Use	Aquifer Abbreviate	Water Bearing Zone(s) Identified on Water Well Report	Water Temperature (Fahrenheit)	Capacity (gal/min)	Yield (gal/min)	Drawdown (feet)	Specific Capacity (gpm per ft drawdown)
						Overall Sediment Average	59.80	84.96	81.71		
						Overall Sediment Maximum	80.00	950.00	950.00		
						Overall Sediment Minumum	46.00	2.00	2.00		
						Overall Sediment Median	59.00	32.50	30.00		
						Overall Basalt Average	61.99	1,455.18	1,468.98		362.97
						Overall Basalt Maximum	90.00	5,500.00	5,500.00		4,300.00
						Overall Basalt Minumum	46.00	3.00	4.00		0.50
						Overall Basalt Median	60.00	1,500.00	1,500.00		76.92

Appendix 12

Project Recorder and Monthly Well Hydrographs

The project recorder and monthly hydrographs in this appendix are organized by sub-areas as defined in the report text and generally by north to south and/or west to east locations within each sub-area. The order is:

Swan Lake Valley to Poe Valley Sub-area **Page**

North Swan Lake Valley
KLAM 2277……4
KLAM 2288……5

South Swan Lake Valley
KLAM 10336……6
KLAM 50493……7

Pine Flat
KLAM 12369……8
KLAM 11569……9

Dairy
KLAM 11139……10

West and North Poe Valley
KLAM 10877……11
KLAM 16807……12
KLAM 13478……13
KLAM 13491……14
KLAM 10252……15

East Poe Valley
KLAM 11003……16

South Poe Valley
KLAM 51131……17
KLAM 10159……18

Bonanza Sub-area

North Yonna Valley
KLAM 11392……19
KLAM 50934……20
KLAM 50777……21
KLAM 11473……22
KLAM 13456……23

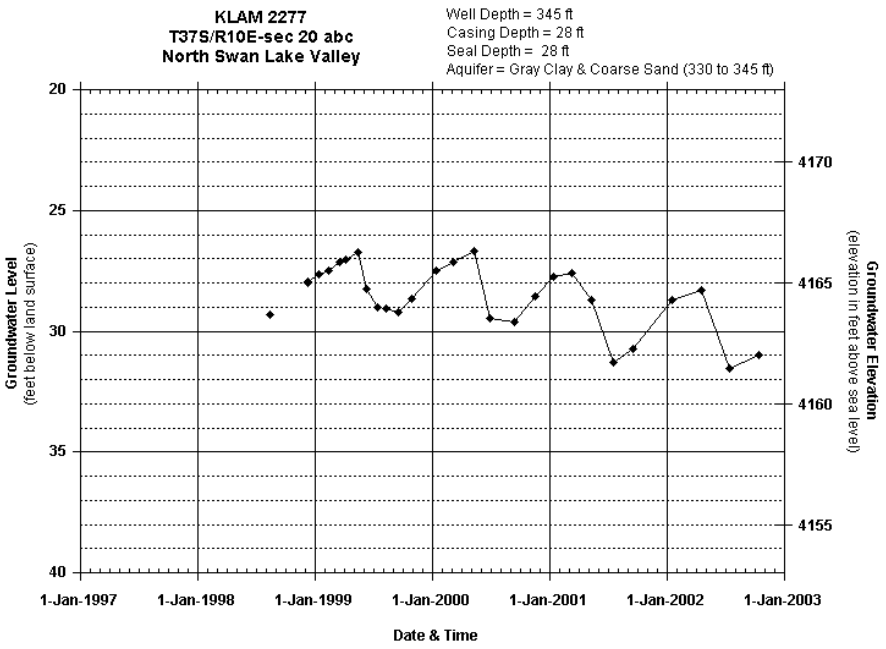
South Yonna Valley
KLAM 10015……24
KLAM 10258……25
KLAM 11227……26

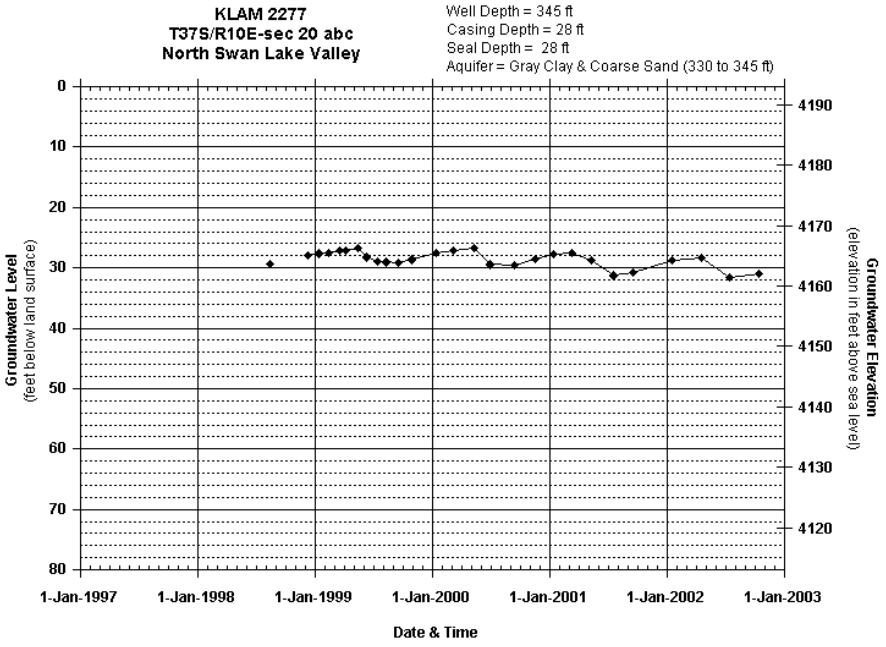
Bonanza
KLAM 13353……27
KLAM 11168……28
KLAM 15149……29
KLAM 10316……30
KLAM 50318……31
KLAM 51922……32 & 33

Northwest Langell Valley
KLAM 10566……..……34
KLAM 11294……..……35
KLAM 13400……..……36
KLAM 51920……..……37
KLAM 10814……..……38
KLAM 10813……..……39

Lorella Sub-area (Mid Langell Valley)
West of the Lost River
KLAM 50787……..……40
KLAM 13582……..……41
KLAM 10699……..……42
KLAM 50301……..……43
Lorella
KLAM 14849……..……44
East of Lorella
KLAM 52204……..……45
KLAM 52096……..……46
KLAM 10362……..……47
KLAM 14882……..……48
KLAM 11204……..……49

South Langell Valley Sub-area
KLAM 14871……..……50
KLAM 14889……..……51
KLAM 10641……..……52
KLAM 15129……..……53
KLAM 10574……..……54
KLAM 10575……..……55


KLAM 2277
T37S/R10E-sec 20 abc
North Swan Lake Valley
Well Depth = 345 ft
Casing Depth = 28 ft
Seal Depth = 28 ft
Aquifer = Gray Clay & Coarse Sand (330 to 345 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
20
25
30
35
40
4170
4165
4160
4155
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time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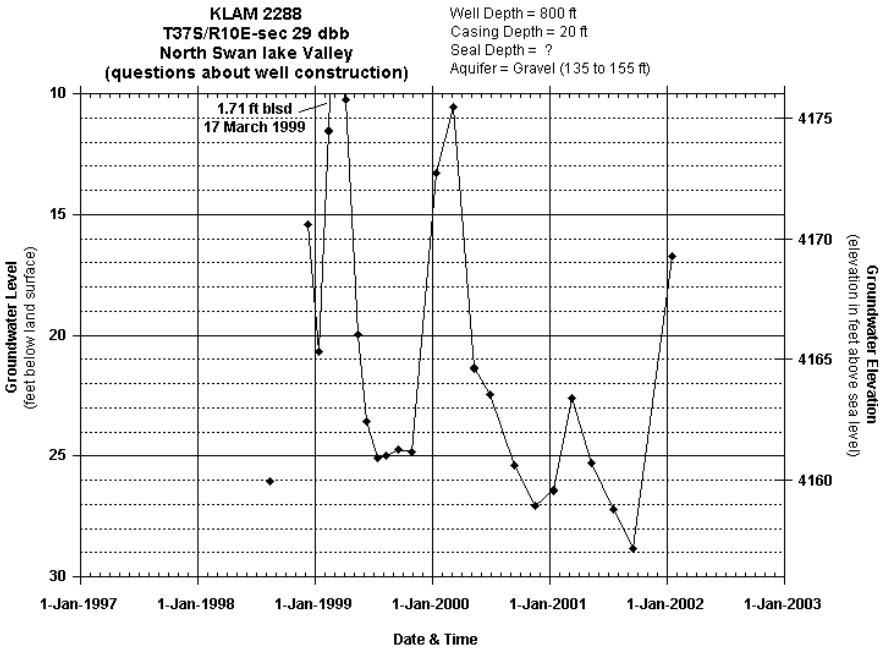
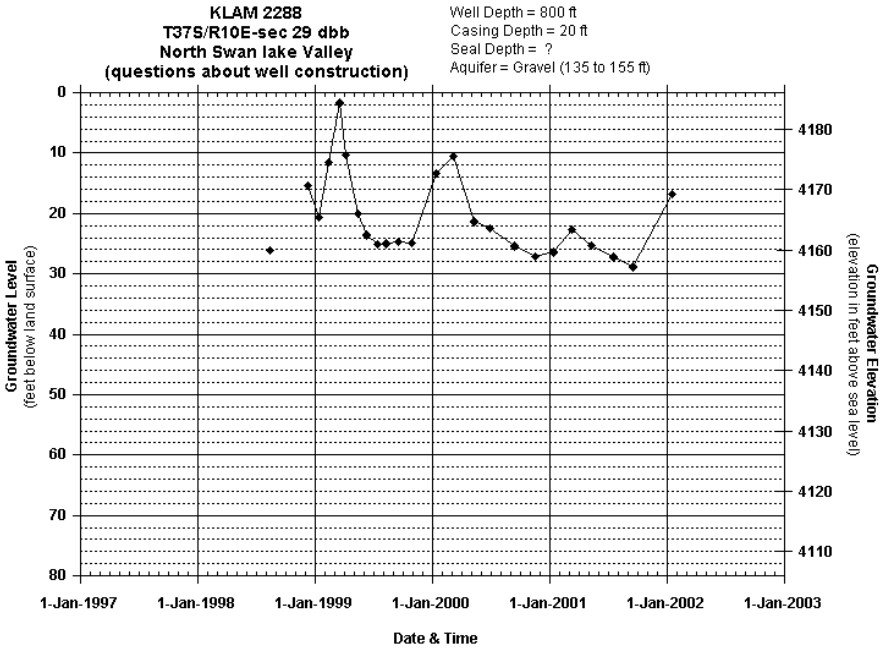
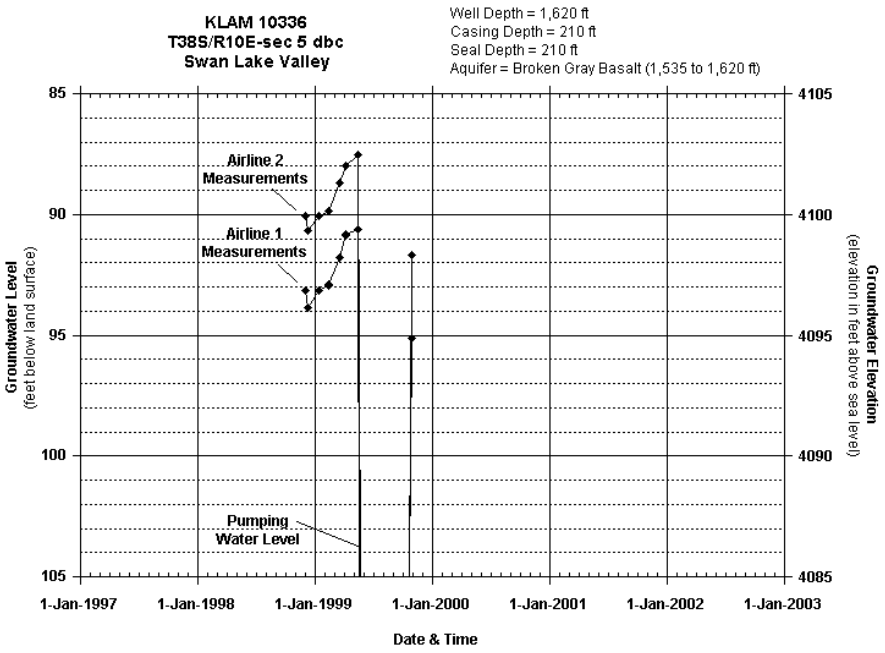
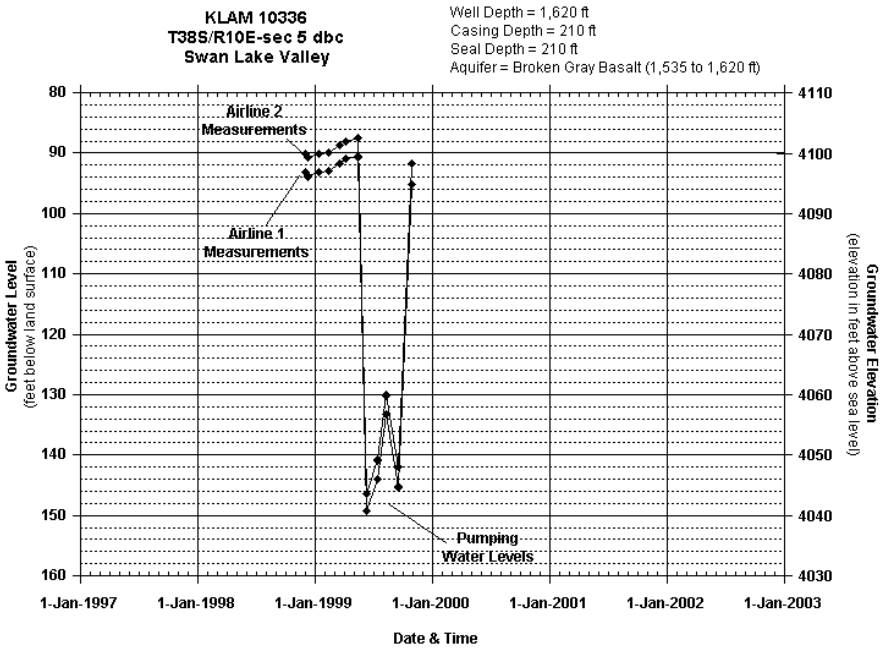
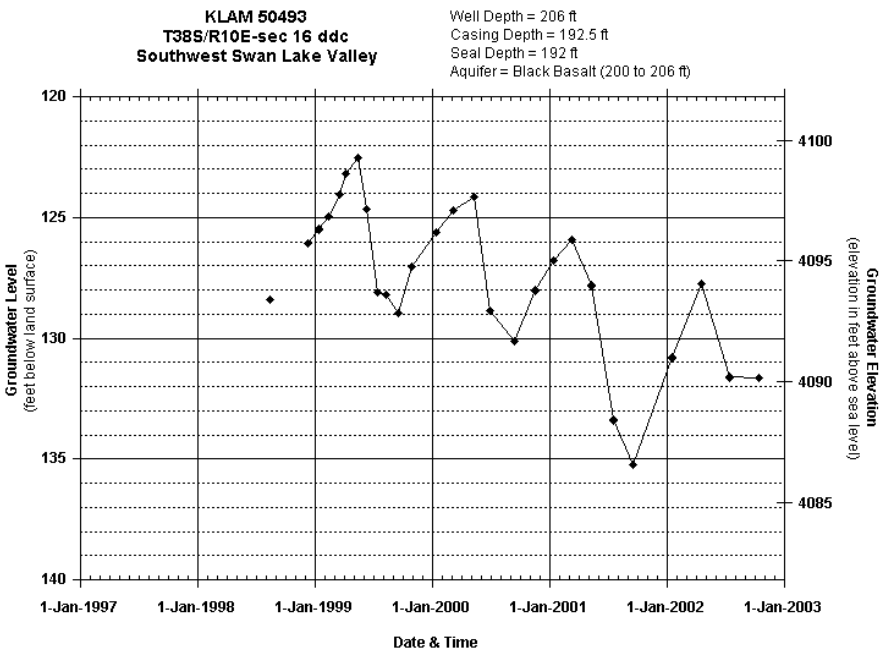
T37S/R10E-sec 20 abc
North Swan Lake Valley
Well Depth = 345 ft
Casing Depth = 28 ft
Seal Depth = 28 ft
Aquifer = Gray Clay & Coarse Sand (330 to 345 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4190
4180
4170
4160
4150
4140
4130
4120
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

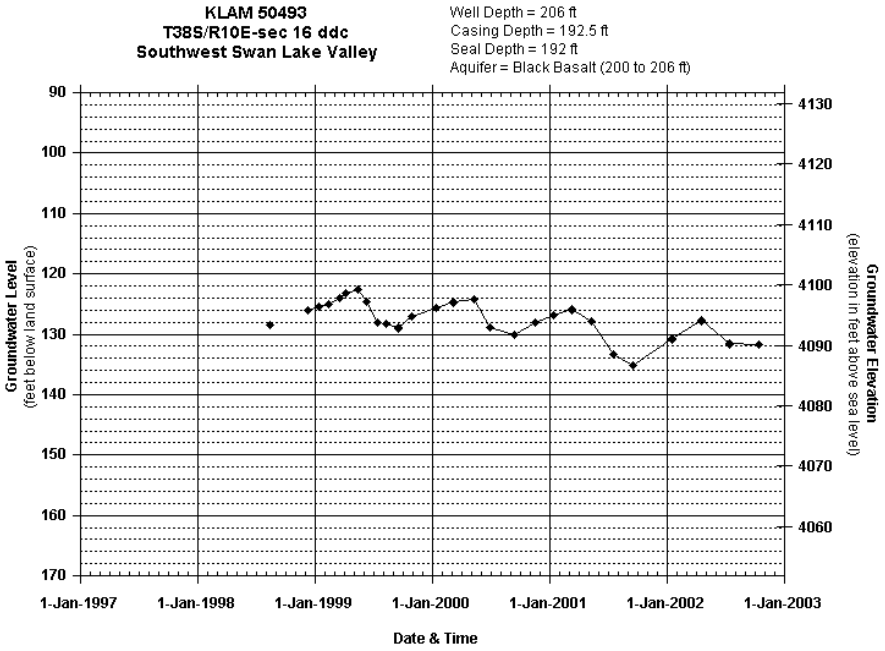

KLAM 2288
T37S/R10E-sec 29 dbb
North Swan lake Valley
(questions about well construction)
Well Depth = 800 ft
Casing Depth = 20 ft
Seal Depth = ?
Aquifer = Gravel (135 to 155 ft)
1.71 ft blsd
17 March 1999
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
10
15
20
25
30
4175
4170
4165
4160
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

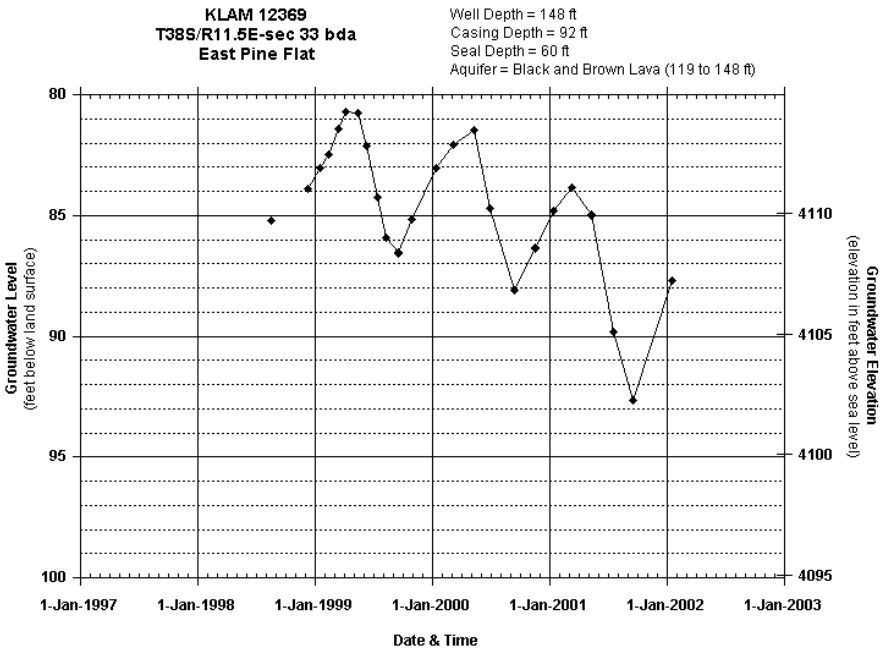

KLAM 2288
T37S/R10E-sec 29 dbb
North Swan lake Valley
(questions about well construction)
Well Depth = 800 ft
Casing Depth = 20 ft
Seal Depth = ?
Aquifer = Gravel (135 to 155 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4180
4170
4160
4150
4140
4130
4120
4110
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

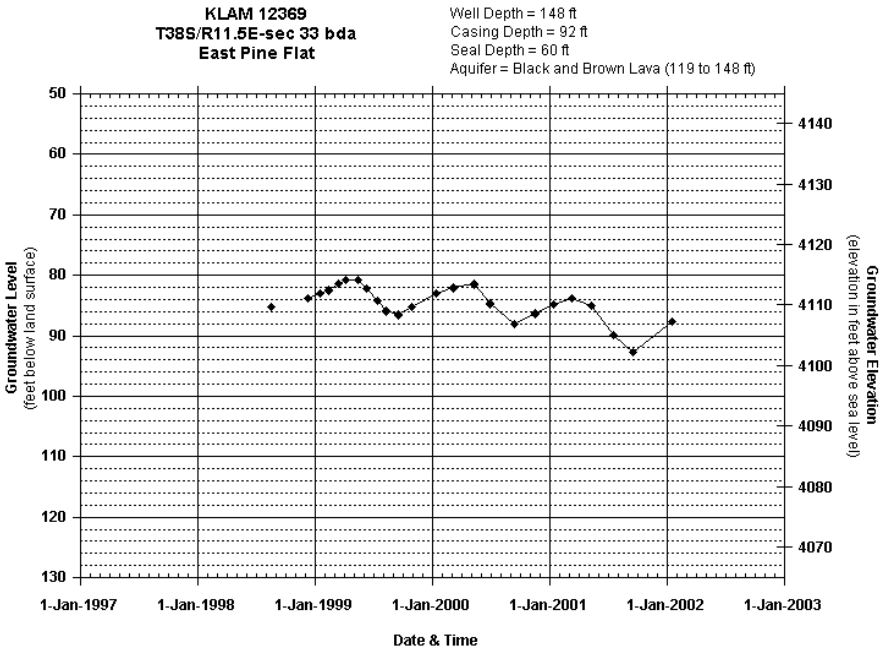

KLAM 10336
T38S/R10E-sec 5 dbc
Swan Lake Valley
Well Depth = 1,620 ft
Casing Depth = 210 ft
Seal Depth = 210 ft
Aquifer = Broken Gray Basalt (1,535 to 1,620 ft)
Airline 2 Measurements
Airline 1 Measurements
Pumping Water Level
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
85
90
95
100
105
4105
4100
4095
4090
4085
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

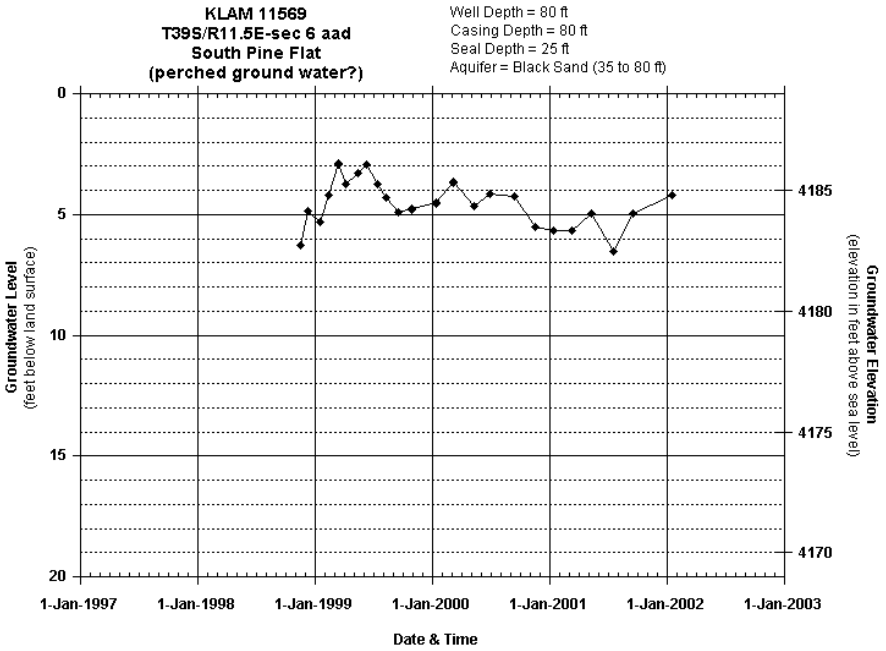

KLAM 10336
T38S/R10E-sec 5 dbc
Swan Lake Valley
Well Depth = 1,620 ft
Casing Depth = 210 ft
Seal Depth = 210 ft
Aquifer = Broken Gray Basalt (1,535 to 1,620 ft)
Airline 2 Measurements
Airline 1 Measurements
Pumping Water Levels
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
80
90
100
110
120
130
140
150
160
4110
4100
4090
4080
4070
4060
4050
4040
4030
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

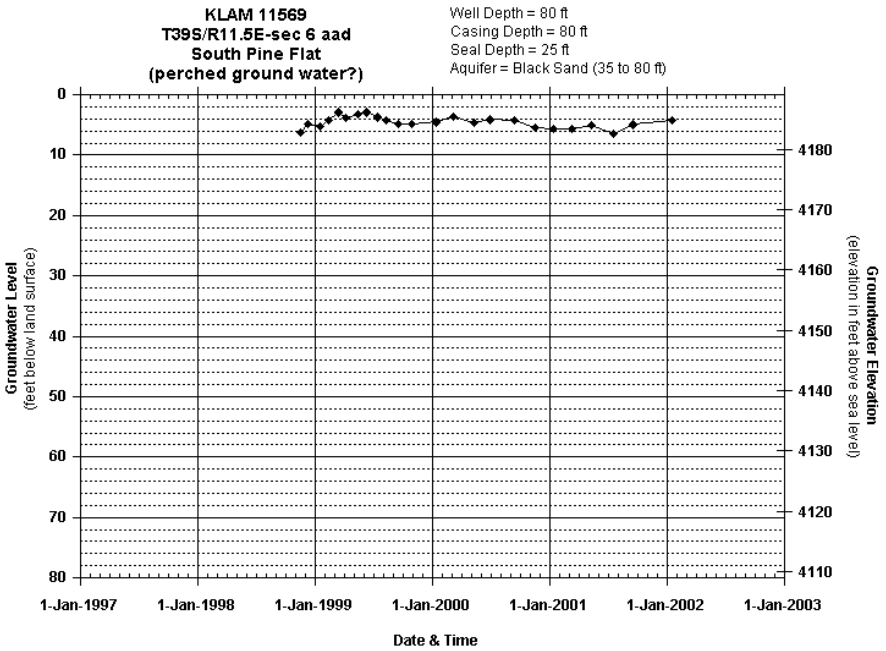

KLAM 50493
T38S/R10E-sec 16 ddc
Southwest Swan Lake Valley
Well Depth = 206 ft
Casing Depth = 192.5 ft
Seal Depth = 192 ft
Aquifer = Black Basalt (200 to 206 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
120
125
130
135
140
4100
4095
4090
4085
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

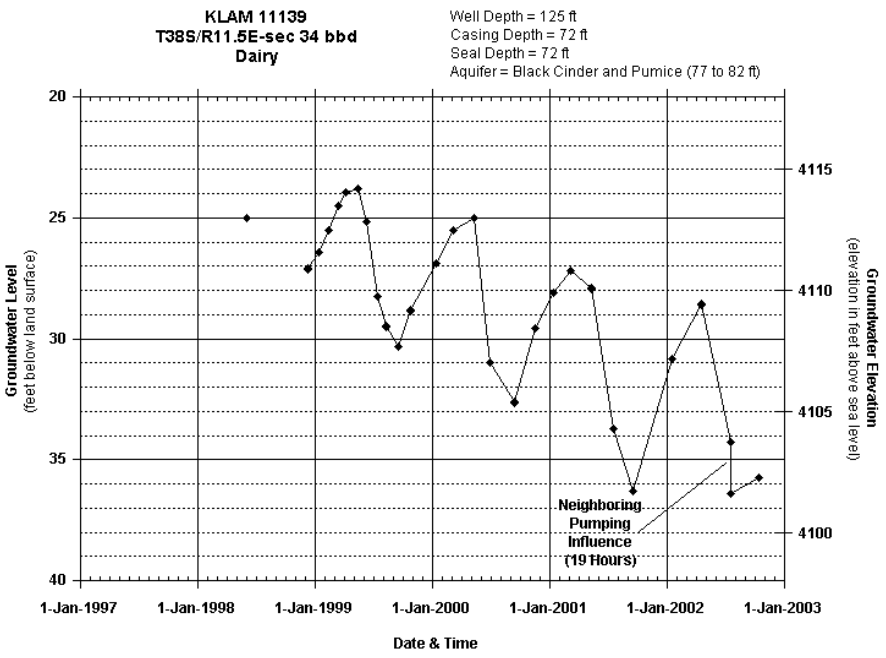

KLAM 50493
T38S/R10E-sec 16 ddc
Southwest Swan Lake Valley
Well Depth = 206 ft
Casing Depth = 192.5 ft
Seal Depth = 192 ft
Aquifer = Black Basalt (200 to 206 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
90
100
110
120
130
140
150
160
170
4130
4120
4110
4100
4090
4080
4070
4060
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

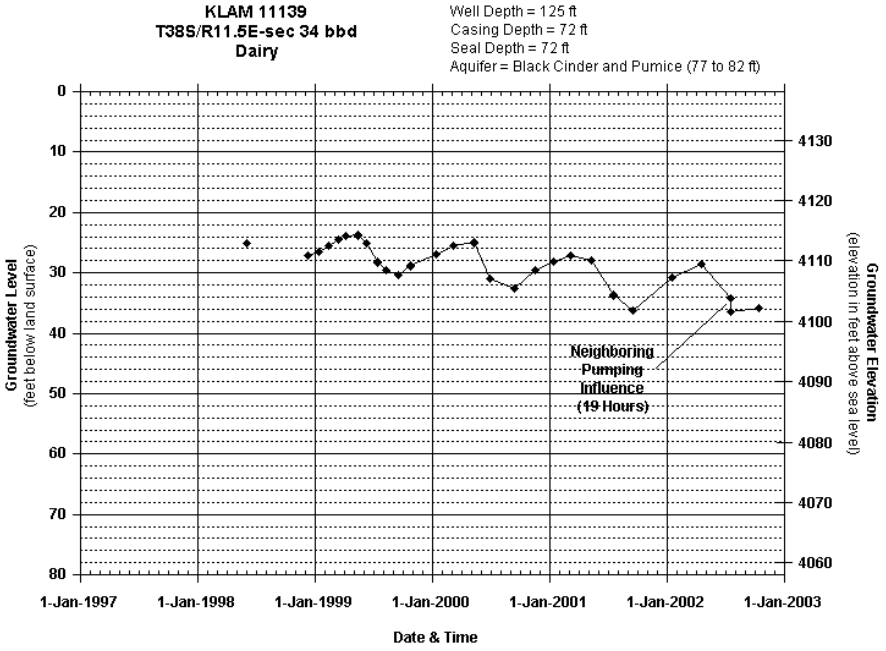

KLAM 12369
T38S/R11.5E-sec 33 bda
East Pine Flat
Well Depth = 148 ft
Casing Depth = 92 ft
Seal Depth = 60 ft
Aquifer = Black and Brown Lava (119 to 148 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
80
85
90
95
100
4110
4105
4100
4095
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

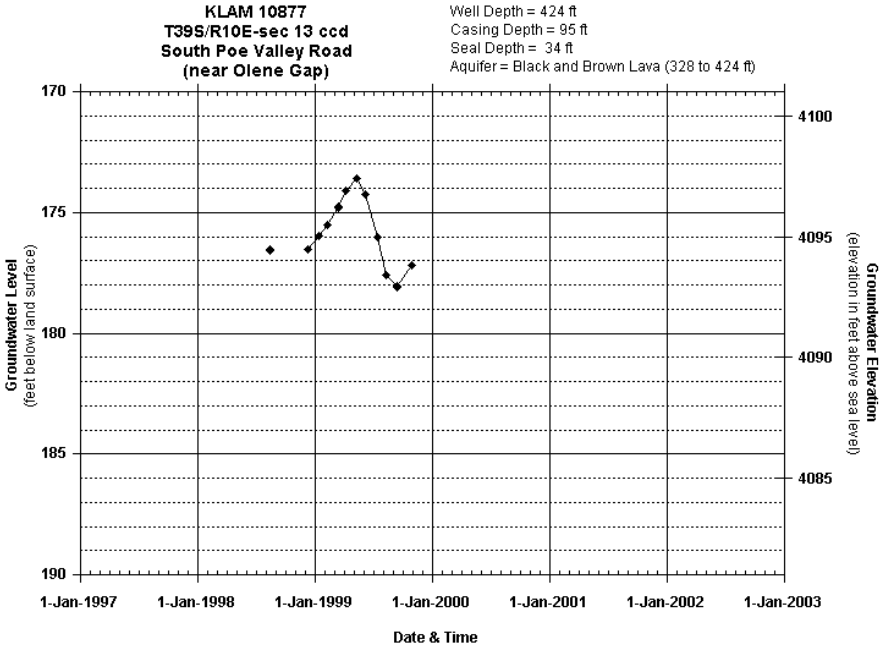

KLAM 12369
T38S/R11.5E-sec 33 bda
East Pine Flat
Well Depth = 148 ft
Casing Depth = 92 ft
Seal Depth = 60 ft
Aquifer = Black and Brown Lava (119 to 148 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
50
60
70
80
90
100
110
120
130
4140
4130
4120
4110
4100
4090
4080
4070
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

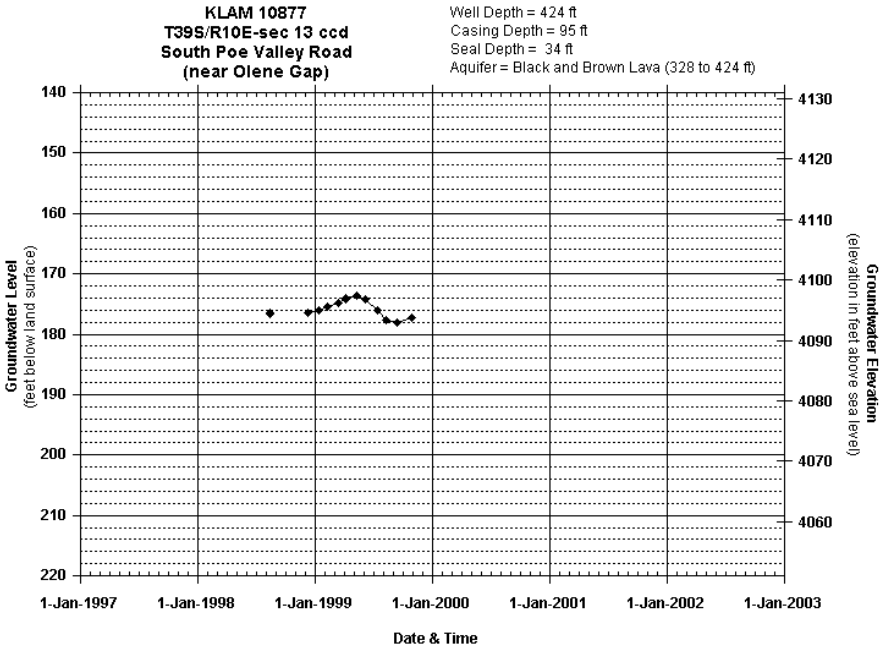

KLAM 11569
T39S/R11.5E-sec 6 aad
South Pine Flat
(perched ground water?)
Well Depth = 80 ft
Casing Depth = 80 ft
Seal Depth = 25 ft
Aquifer = Black Sand (35 to 80 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
5
10
15
20
4185
4180
4175
4170
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

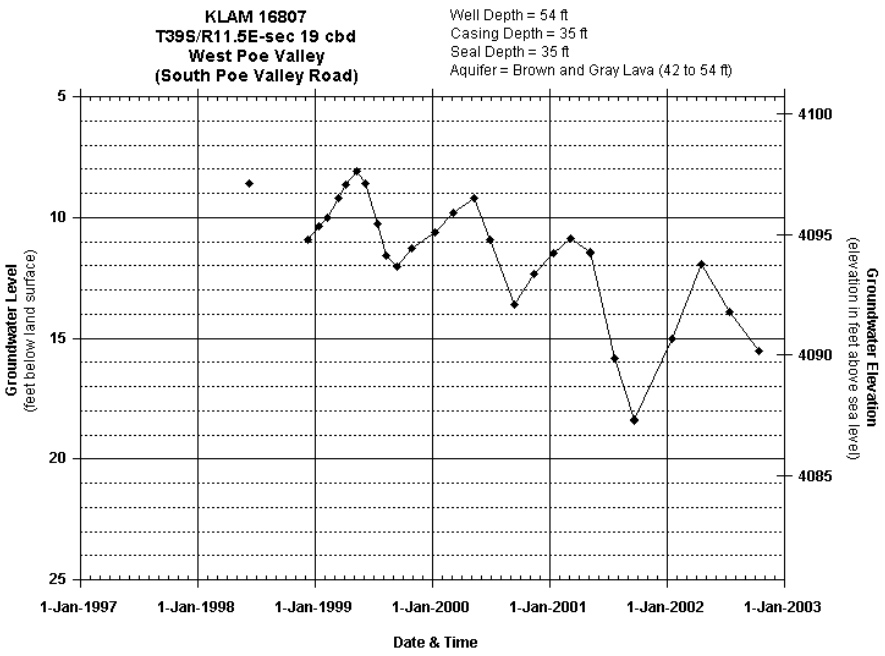

KLAM 11569
T39S/R11.5E-sec 6 aad
South Pine Flat
(perched ground water?)
Well Depth = 80 ft
Casing Depth = 80 ft
Seal Depth = 25 ft
Aquifer = Black Sand (35 to 80 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4180
4170
4160
4150
4140
4130
4120
4110
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

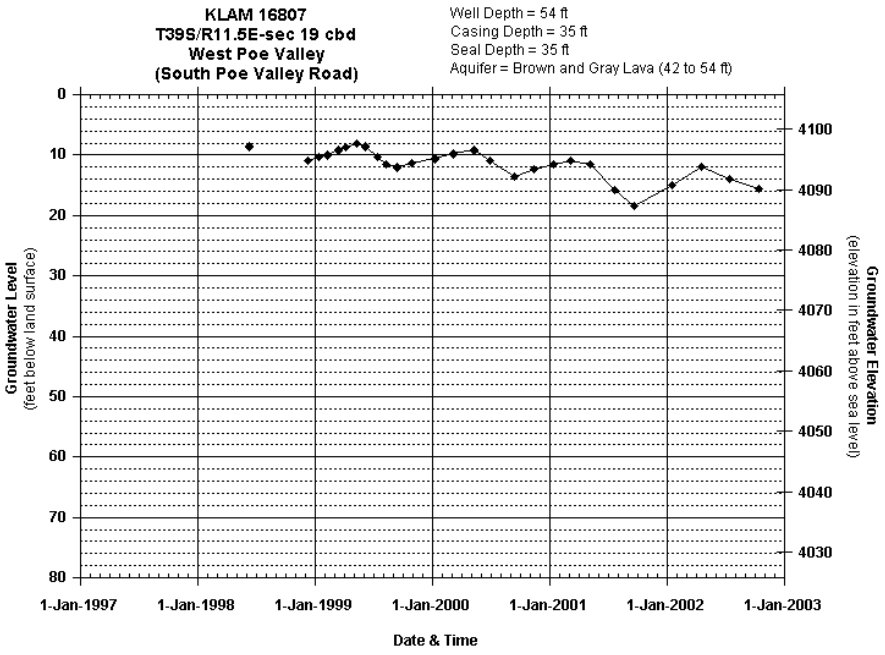

KLAM 11139
T38S/R11.5E-sec 34 bbd
Dairy
Well Depth = 125 ft
Casing Depth = 72 ft
Seal Depth = 72 ft
Aquifer = Black Cinder and Pumice (77 to 82 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
Neighboring
Pumping
Influence
(19 Hours)
Date & Time
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003

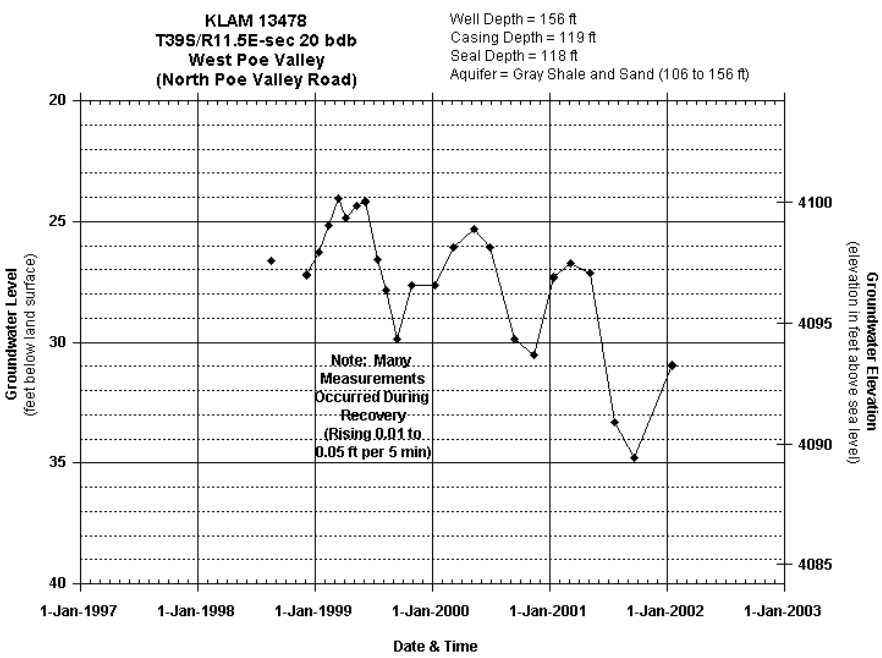

KLAM 11139
T38S/R11.5E-sec 34 bbd
Dairy
Well Depth = 125 ft
Casing Depth = 72 ft
Seal Depth = 72 ft
Aquifer = Black Cinder and Pumice (77 to 82 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
Neighboring
Pumping
Influence
(19 Hours)
Date & Time
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003

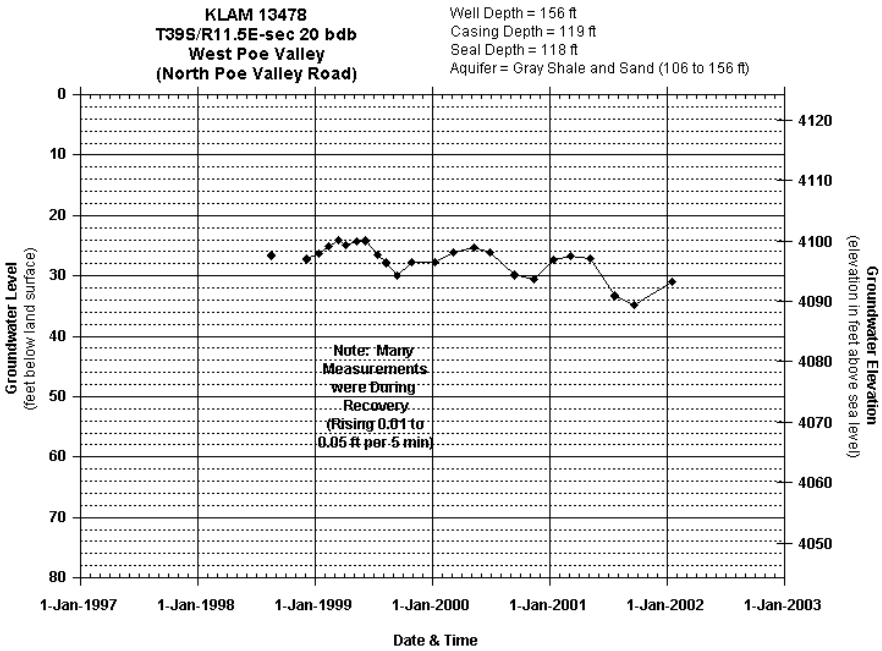

KLAM 10877
T39S/R10E-sec 13 ccd
South Poe Valley Road
(near Olene Gap)
Well Depth = 424 ft
Casing Depth = 95 ft
Seal Depth = 34 ft
Aquifer = Black and Brown Lava (328 to 424 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
170
175
180
185
190
4100
4095
4090
4085
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

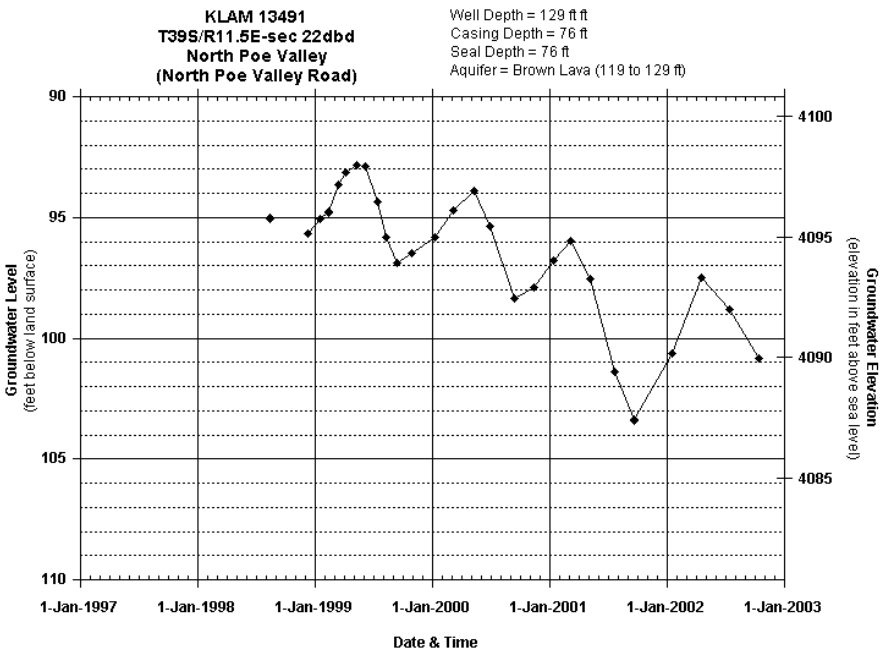

KLAM 10877
T39S/R10E-sec 13 ccd
South Poe Valley Road
(near Olene Gap)
Well Depth = 424 ft
Casing Depth = 95 ft
Seal Depth = 34 ft
Aquifer = Black and Brown Lava (328 to 424 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
140
150
160
170
180
190
200
210
220
4130
4120
4110
4100
4090
4080
4070
4060
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

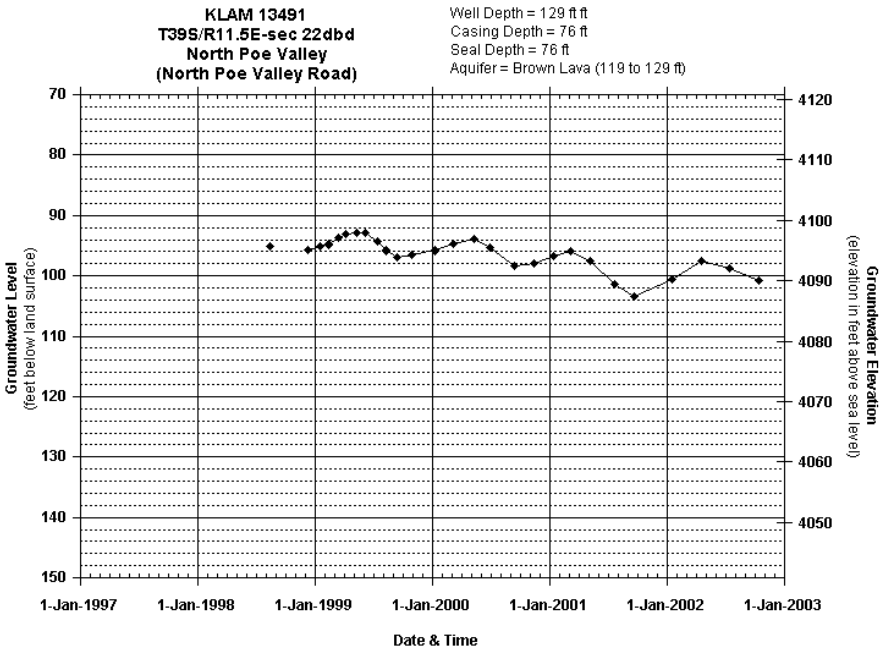

KLAM 16807
T39S/R11.5E-sec 19 cbd
West Poe Valley
(South Poe Valley Road)
Well Depth = 54 ft
Casing Depth = 35 ft
Seal Depth = 35 ft
Aquifer = Brown and Gray Lava (42 to 54 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
5
10
15
20
25
4100
4095
4090
4085
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

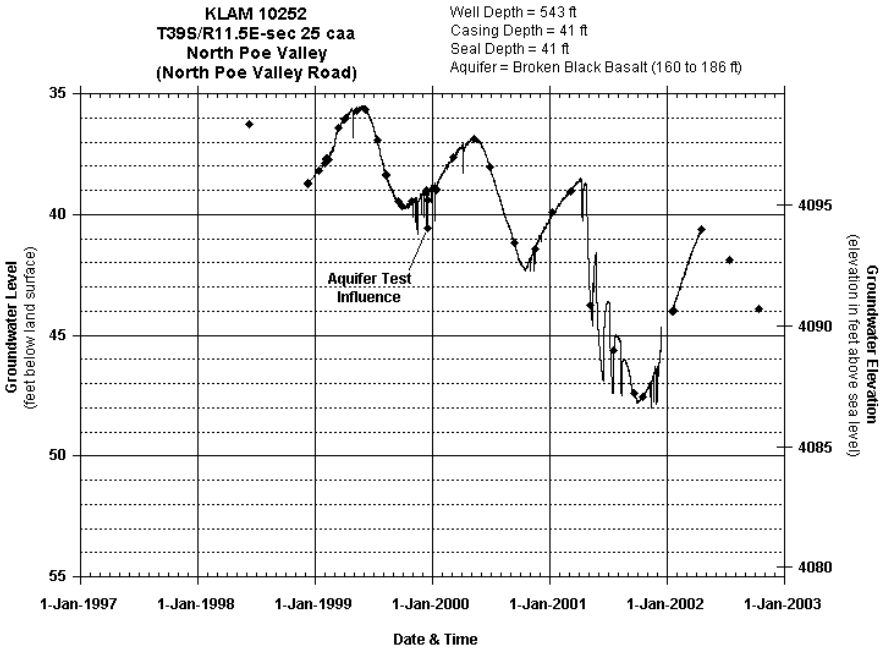

KLAM 16807
T39S/R11.5E-sec 19 cbd
West Poe Valley
(South Poe Valley Road)
Well Depth = 54 ft
Casing Depth = 35 ft
Seal Depth = 35 ft
Aquifer = Brown and Gray Lava (42 to 54 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4100
4090
4080
4070
4060
4050
4040
4030
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

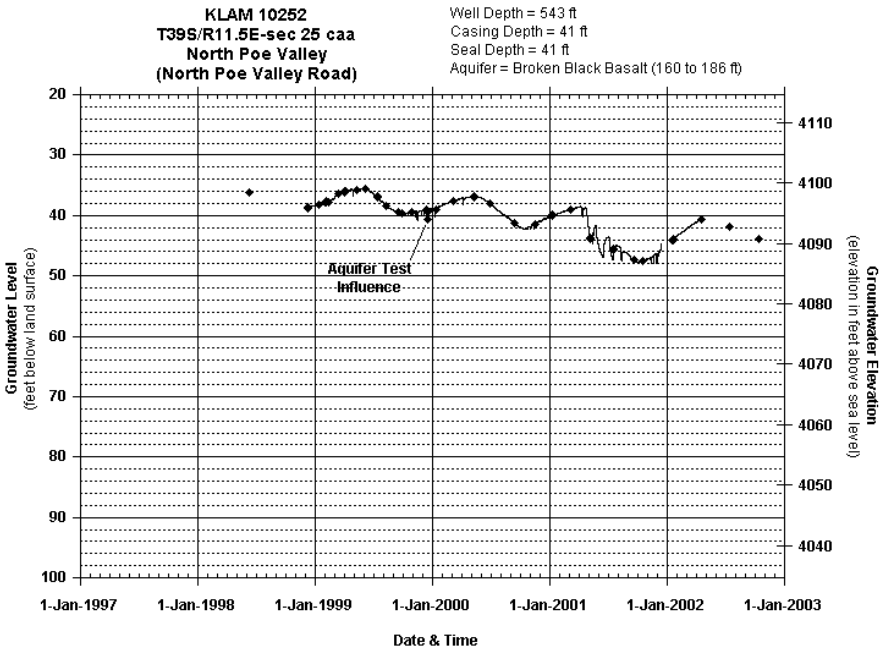

KLAM 13478
T39S/R11.5E-sec 20 bdb
West Poe Valley
(North Poe Valley Road)
Well Depth = 156 ft
Casing Depth = 119 ft
Seal Depth = 118 ft
Aquifer = Gray Shale and Sand (106 to 156 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
Note: Many Measurements Occurred During Recovery (Rising 0.01 to 0.05 ft per 5 min)
20
25
30
35
40
4100
4095
4090
4085
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

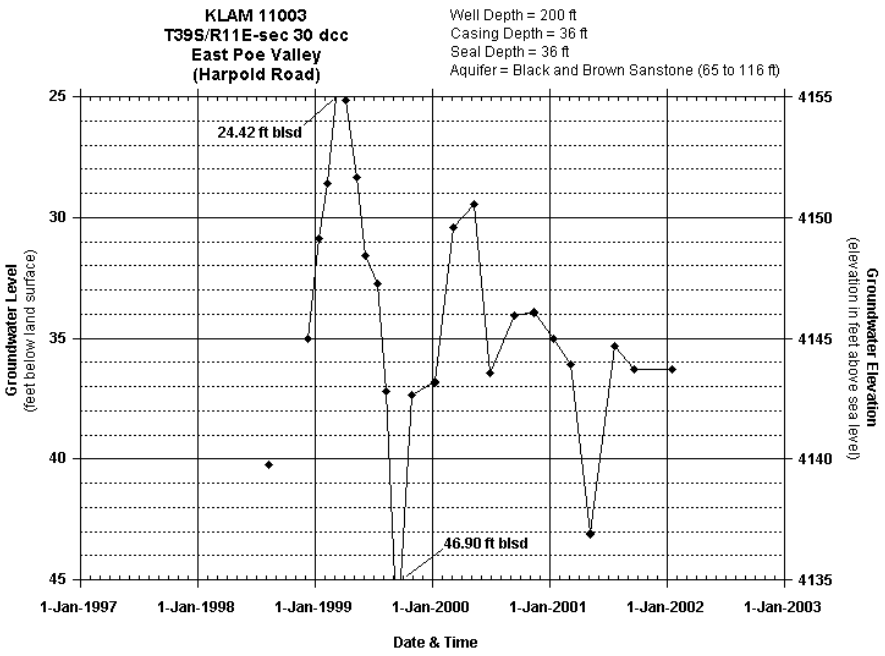

KLAM 13478
T39S/R11.5E-sec 20 bdb
West Poe Valley
(North Poe Valley Road)
Well Depth = 156 ft
Casing Depth = 119 ft
Seal Depth = 118 ft
Aquifer = Gray Shale and Sand (106 to 156 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
Note: Many Measurements were During Recovery (Rising 0.01 to 0.05 ft per 5 min)
0
10
20
30
40
50
60
70
80
4120
4110
4100
4090
4080
4070
4060
4050
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

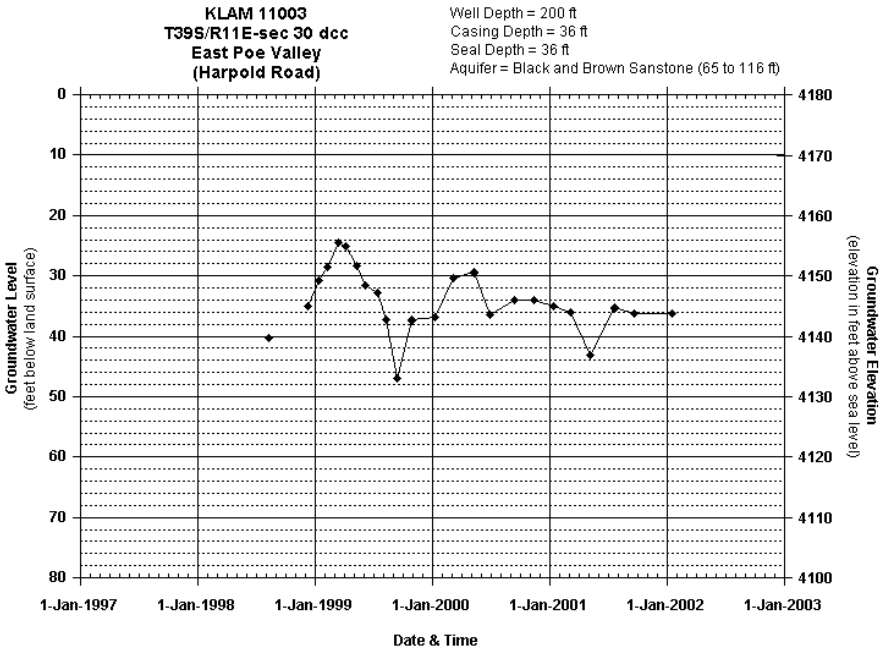

KLAM 13491
T39S/R11.5E-sec 22dbd
North Poe Valley
(North Poe Valley Road)
Well Depth = 129 ft ft
Casing Depth = 76 ft
Seal Depth = 76 ft
Aquifer = Brown Lava (119 to 129 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
90
95
100
105
110
4100
4095
4090
4085
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

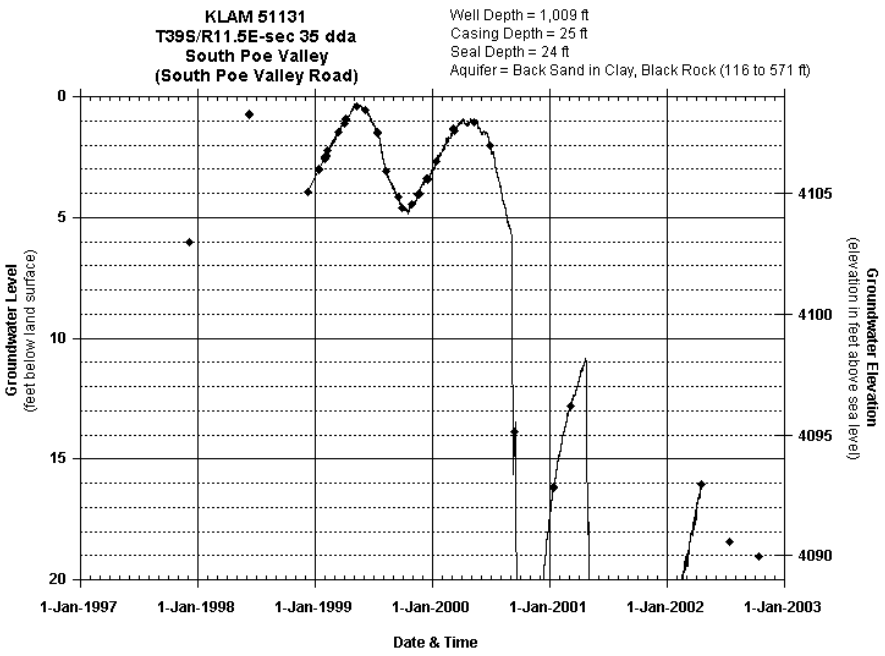

KLAM 13491
T39S/R11.5E-sec 22dbd
North Poe Valley
(North Poe Valley Road)
Well Depth = 129 ft ft
Casing Depth = 76 ft
Seal Depth = 76 ft
Aquifer = Brown Lava (119 to 129 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
70
80
90
100
110
120
130
140
150
4120
4110
4100
4090
4080
4070
4060
4050
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

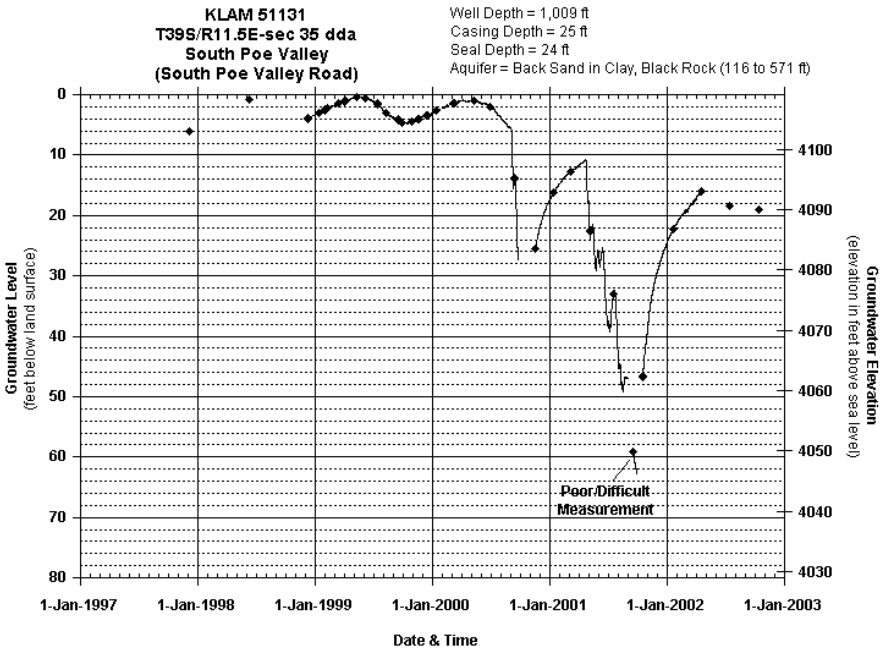

KLAM 10252
T39S/R11.5E-sec 25 caa
North Poe Valley
(North Poe Valley Road)
Well Depth = 543 ft
Casing Depth = 41 ft
Seal Depth = 41 ft
Aquifer = Broken Black Basalt (160 to 186 ft)
Aquifer Test Influence
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
35
40
45
50
55
4095
4090
4085
4080
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

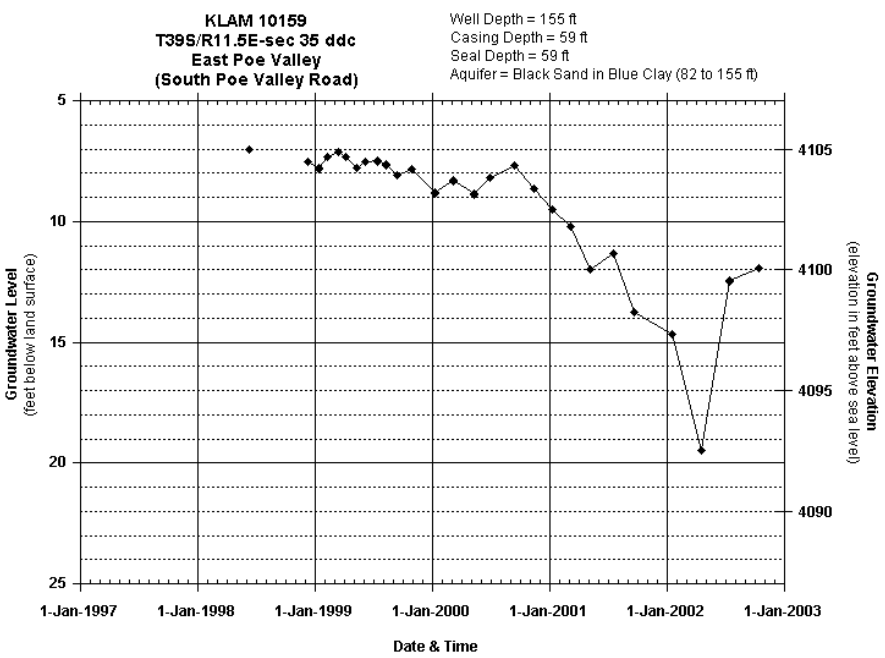

KLAM 10252
T39S/R11.5E-sec 25 caa
North Poe Valley
(North Poe Valley Road)
Well Depth = 543 ft
Casing Depth = 41 ft
Seal Depth = 41 ft
Aquifer = Broken Black Basalt (160 to 186 ft)
Aquifer Test Influence
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
20
30
40
50
60
70
80
90
100
4110
4100
4090
4080
4070
4060
4050
4040
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

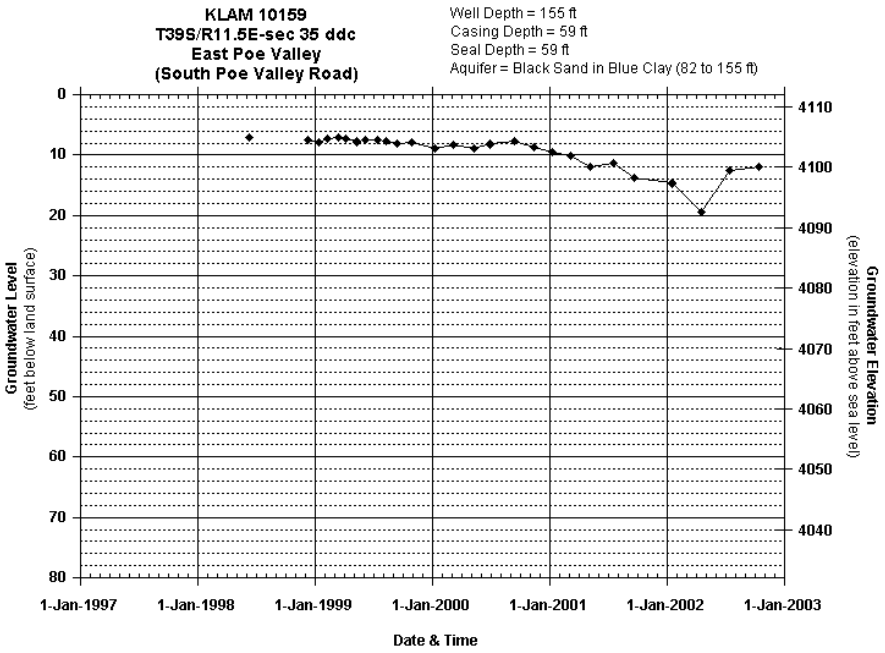

KLAM 11003
T39S/R11E-sec 30 dcc
East Poe Valley
(Harpold Road)
Well Depth = 200 ft
Casing Depth = 36 ft
Seal Depth = 36 ft
Aquifer = Black and Brown Sanstone (65 to 116 ft)
24.42 ft blsd
46.90 ft blsd
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
25
30
35
40
45
4155
4150
4145
4140
4135
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

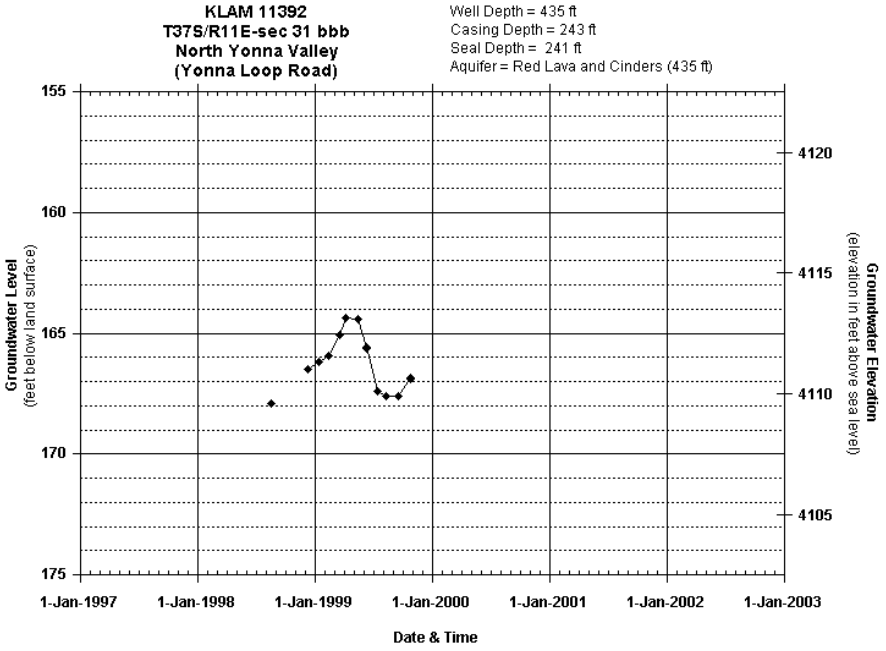

KLAM 11003
T39S/R11E-sec 30 dcc
East Poe Valley
(Harpold Road)
Well Depth = 200 ft
Casing Depth = 36 ft
Seal Depth = 36 ft
Aquifer = Black and Brown Sanstone (65 to 116 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4180
4170
4160
4150
4140
4130
4120
4110
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

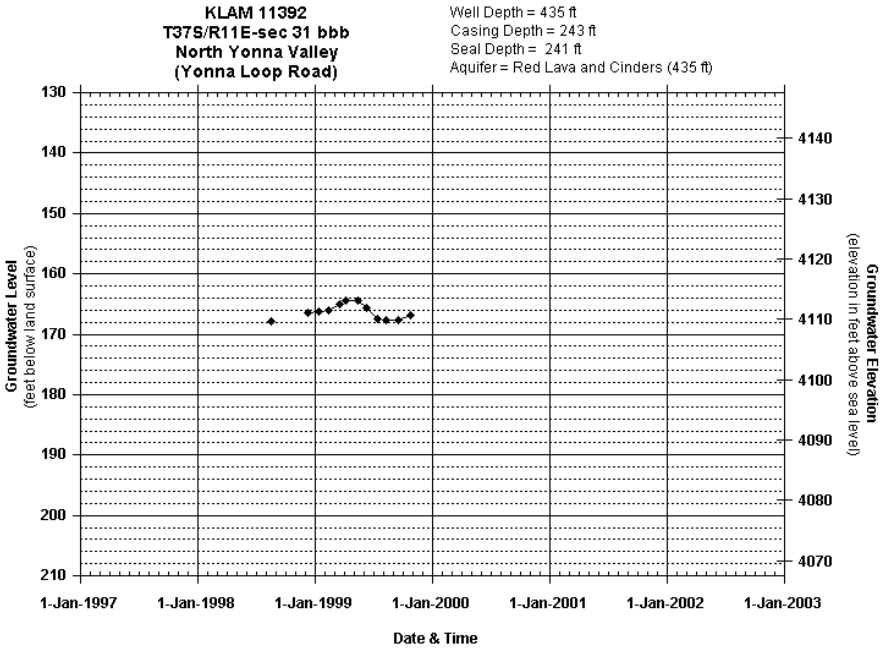

KLAM 51131
T39S/R11.5E-sec 35 dda
South Poe Valley
(South Poe Valley Road)
Well Depth = 1,009 ft
Casing Depth = 25 ft
Seal Depth = 24 ft
Aquifer = Back Sand in Clay, Black Rock (116 to 571 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
5
10
15
20
4105
4100
4095
4090
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

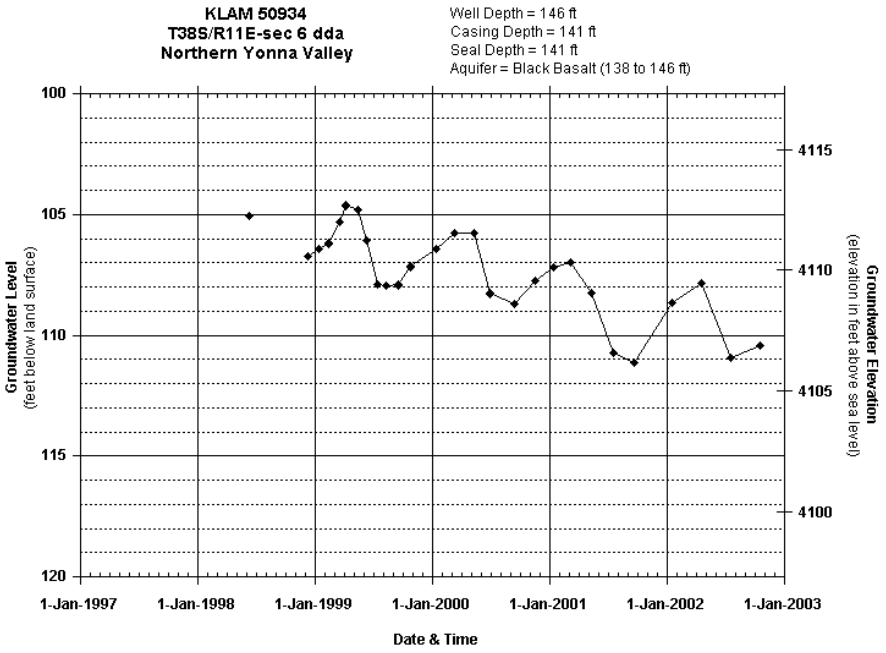

KLAM 51131
T39S/R11.5E-sec 35 dda
South Poe Valley
(South Poe Valley Road)
Well Depth = 1,009 ft
Casing Depth = 25 ft
Seal Depth = 24 ft
Aquifer = Back Sand in Clay, Black Rock (116 to 571 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4100
4090
4080
4070
4060
4050
4040
4030
Poor/Difficult
Measurement
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

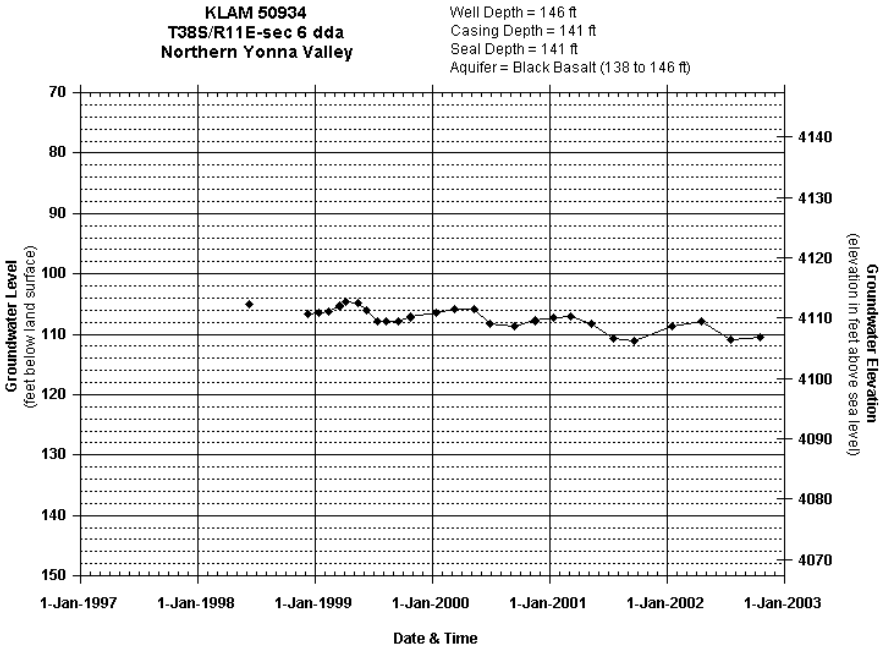

KLAM 10159
T39S/R11.5E-sec 35 ddc
East Poe Valley
(South Poe Valley Road)
Well Depth = 155 ft
Casing Depth = 59 ft
Seal Depth = 59 ft
Aquifer = Black Sand in Blue Clay (82 to 155 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
5
10
15
20
25
4105
4100
4095
4090
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

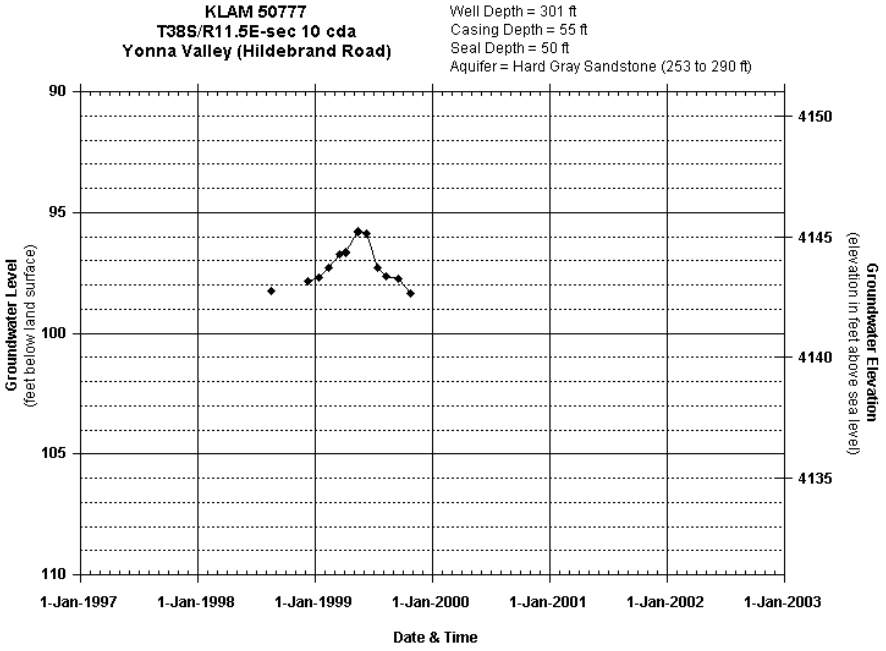

KLAM 10159
T39S/R11.5E-sec 35 ddc
East Poe Valley
(South Poe Valley Road)
Well Depth = 155 ft
Casing Depth = 59 ft
Seal Depth = 59 ft
Aquifer = Black Sand in Blue Clay (82 to 155 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4110
4100
4090
4080
4070
4060
4050
4040
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

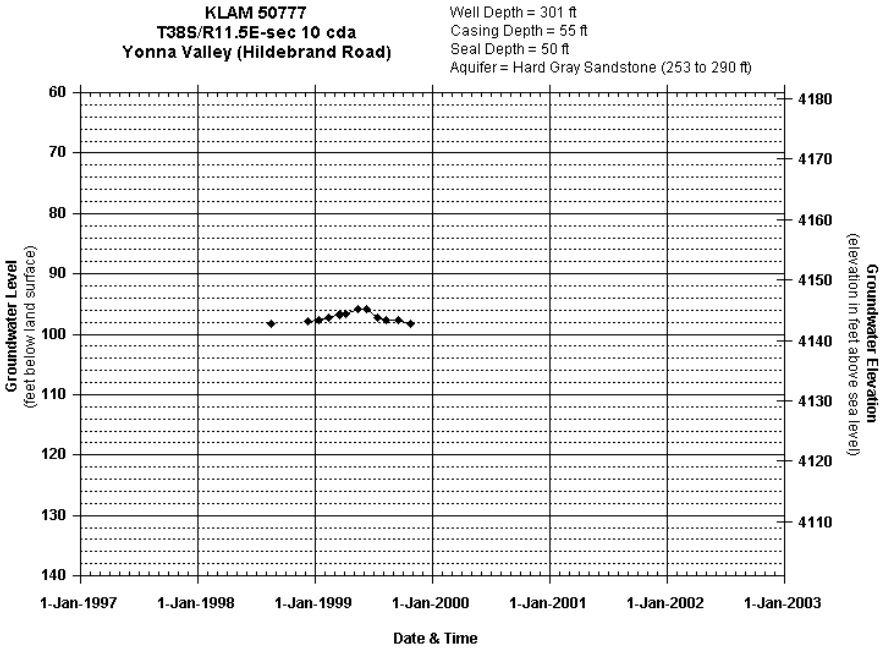

KLAM 11392
T37S/R11E-sec 31 bbb
North Yonna Valley
(Yonna Loop Road)
Well Depth = 435 ft
Casing Depth = 243 ft
Seal Depth = 241 ft
Aquifer = Red Lava and Cinders (435 ft)
Groundwater Level
(feet below land surface)
155
160
165
170
175
Groundwater Elevation
(elevation in feet above sea level)
4120
4115
4110
4105
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

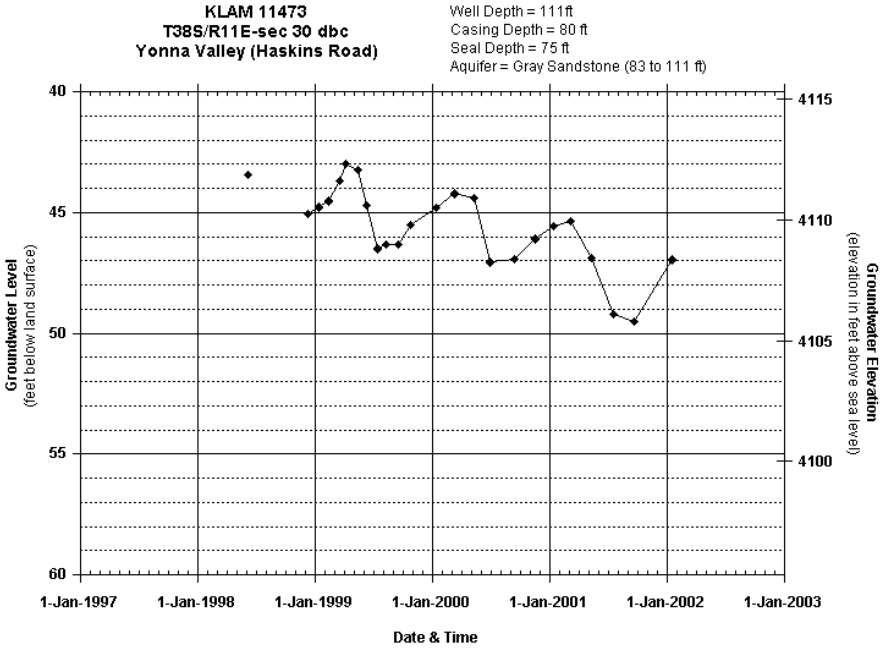

KLAM 11392
T37S/R11E-sec 31 bbb
North Yonna Valley
(Yonna Loop Road)
Well Depth = 435 ft
Casing Depth = 243 ft
Seal Depth = 241 ft
Aquifer = Red Lava and Cinders (435 ft)
Groundwater Level
(feet below land surface)
130
140
150
160
170
180
190
200
210
Groundwater Elevation
(elevation in feet above sea level)
4140
4130
4120
4110
4100
4090
4080
4070
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

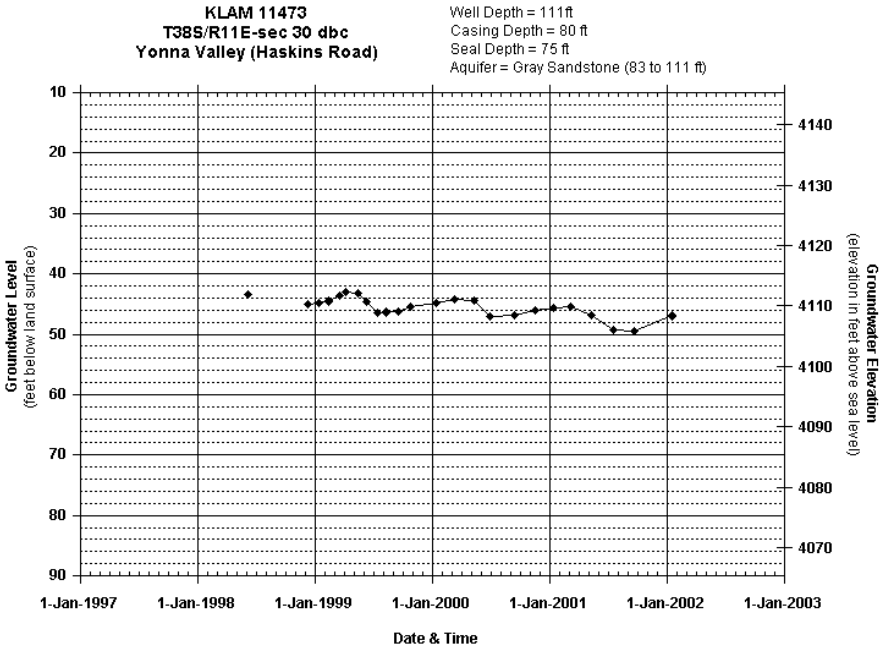

KLAM 50934
T38S/R11E-sec 6 dda
Northern Yonna Valley
Well Depth = 146 ft
Casing Depth = 141 ft
Seal Depth = 141 ft
Aquifer = Black Basalt (138 to 146 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
100
105
110
115
120
4115
4110
4105
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

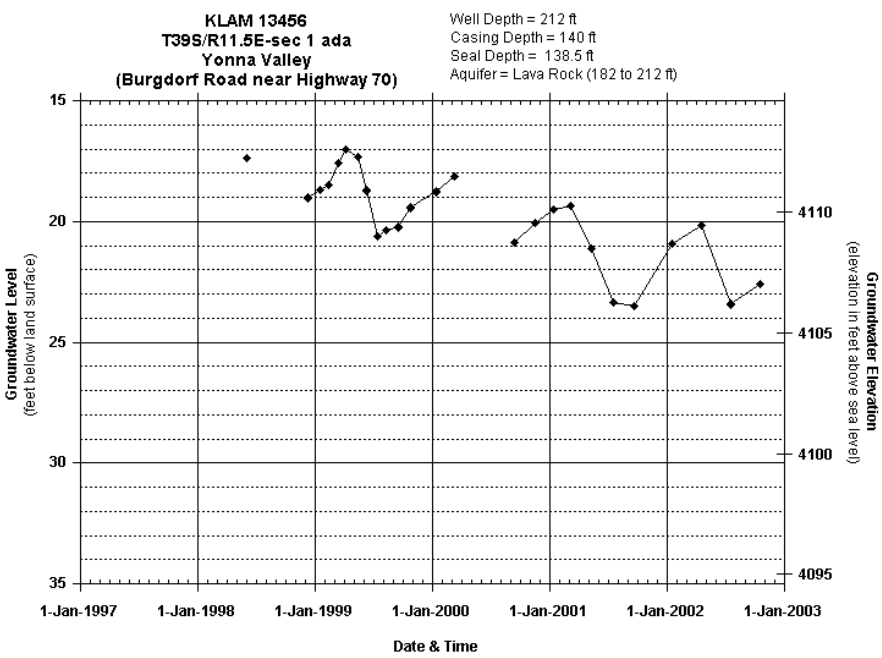

KLAM 50934
T38S/R11E-sec 6 dda
Northern Yonna Valley
Well Depth = 146 ft
Casing Depth = 141 ft
Seal Depth = 141 ft
Aquifer = Black Basalt (138 to 146 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
70
80
90
100
110
120
130
140
150
4140
4130
4120
4110
4100
4090
4080
4070
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

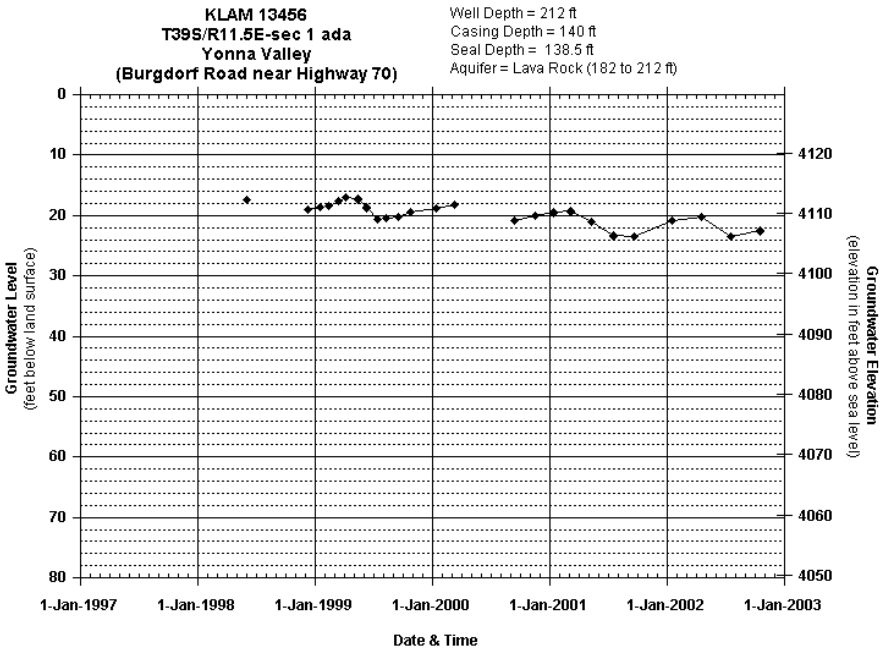

KLAM 50777
T38S/R11.5E-sec 10 cda
Yonna Valley (Hildebrand Road)
Well Depth = 301 ft
Casing Depth = 55 ft
Seal Depth = 50 ft
Aquifer = Hard Gray Sandstone (253 to 290 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
90
95
100
105
110
4150
4145
4140
4135
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

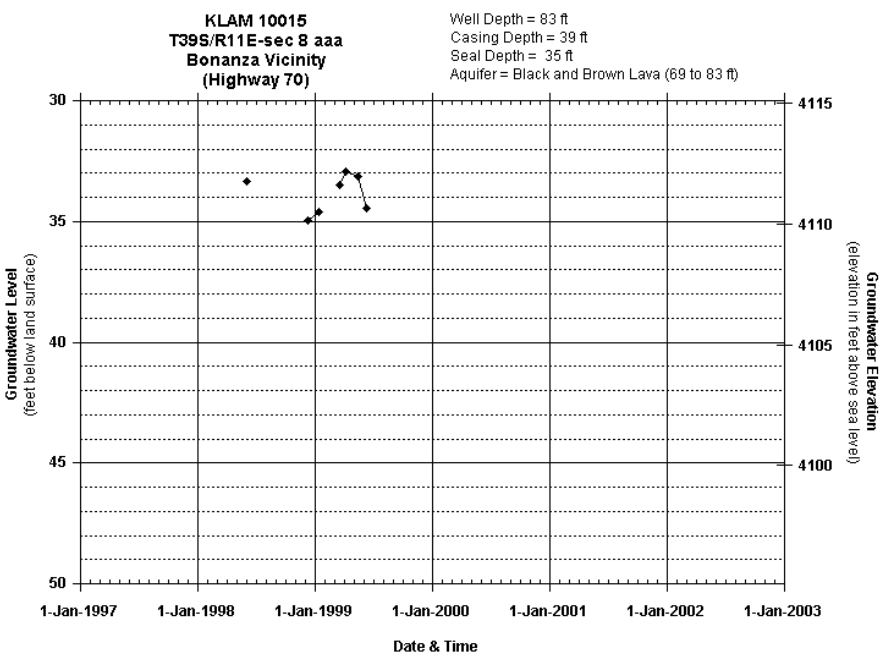

KLAM 50777
T38S/R11.5E-sec 10 cda
Yonna Valley (Hildebrand Road)
Well Depth = 301 ft
Casing Depth = 55 ft
Seal Depth = 50 ft
Aquifer = Hard Gray Sandstone (253 to 290 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
60
70
80
90
100
110
120
130
140
4180
4170
4160
4150
4140
4130
4120
4110
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

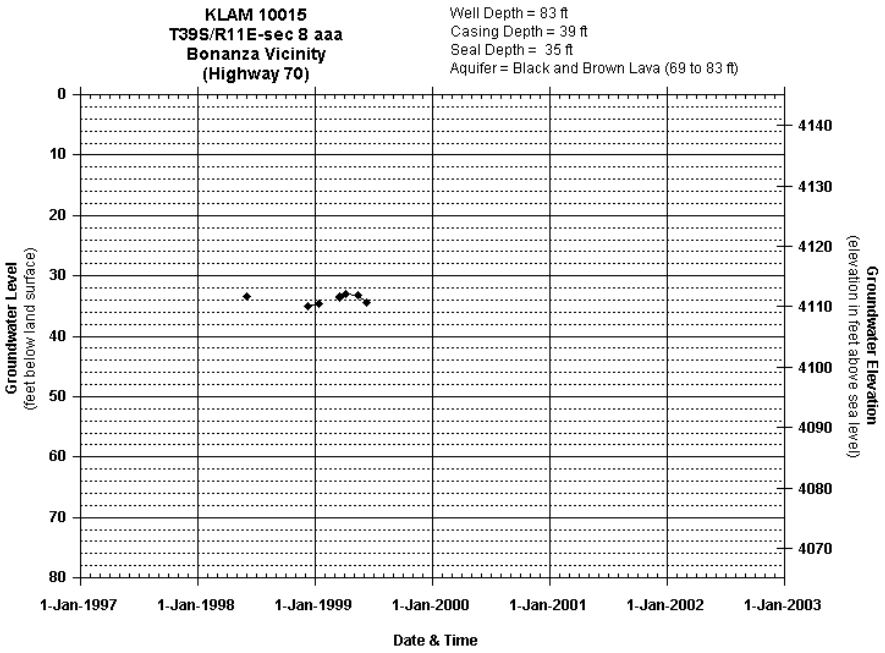

KLAM 11473
T38S/R11E-sec 30 dbc
Yonna Valley (Haskins Road)
Well Depth = 111ft
Casing Depth = 80 ft
Seal Depth = 75 ft
Aquifer = Gray Sandstone (83 to 111 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
40
45
50
55
60
4115
4110
4105
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

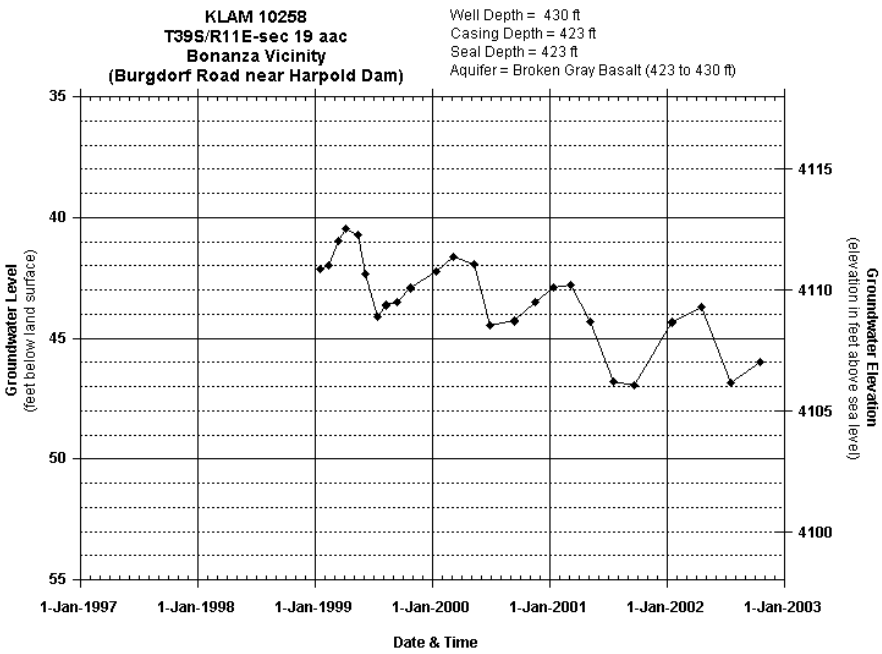

KLAM 11473
T38S/R11E-sec 30 dbc
Yonna Valley (Haskins Road)
Well Depth = 111ft
Casing Depth = 80 ft
Seal Depth = 75 ft
Aquifer = Gray Sandstone (83 to 111 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
10
20
30
40
50
60
70
80
90
4140
4130
4120
4110
4100
4090
4080
4070
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

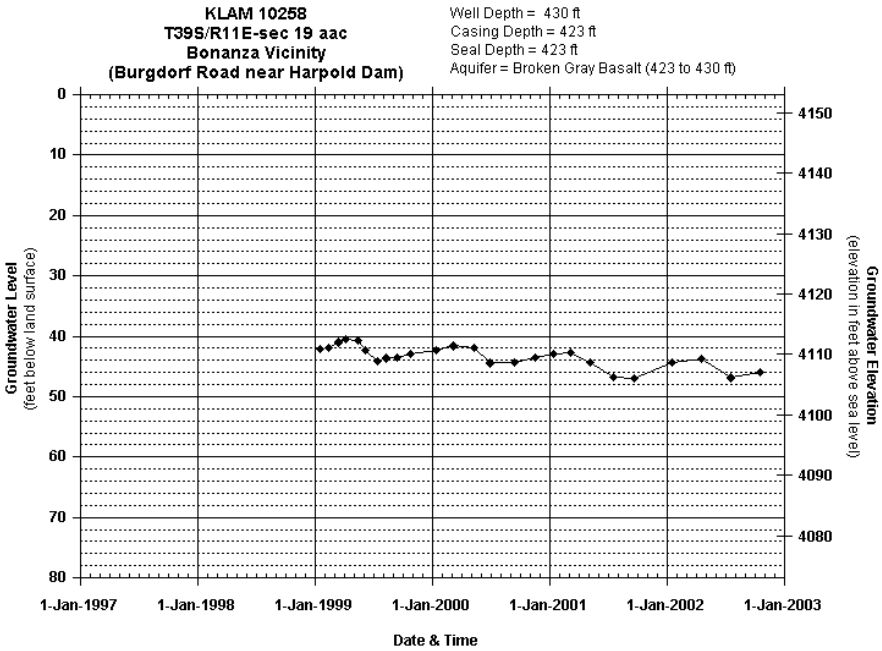

KLAM 13456
T39S/R11.5E-sec 1 ada
Yonna Valley
(Burgdorf Road near Highway 70)
Well Depth = 212 ft
Casing Depth = 140 ft
Seal Depth = 138.5 ft
Aquifer = Lava Rock (182 to 212 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
15
20
25
30
35
4110
4105
4100
4095
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

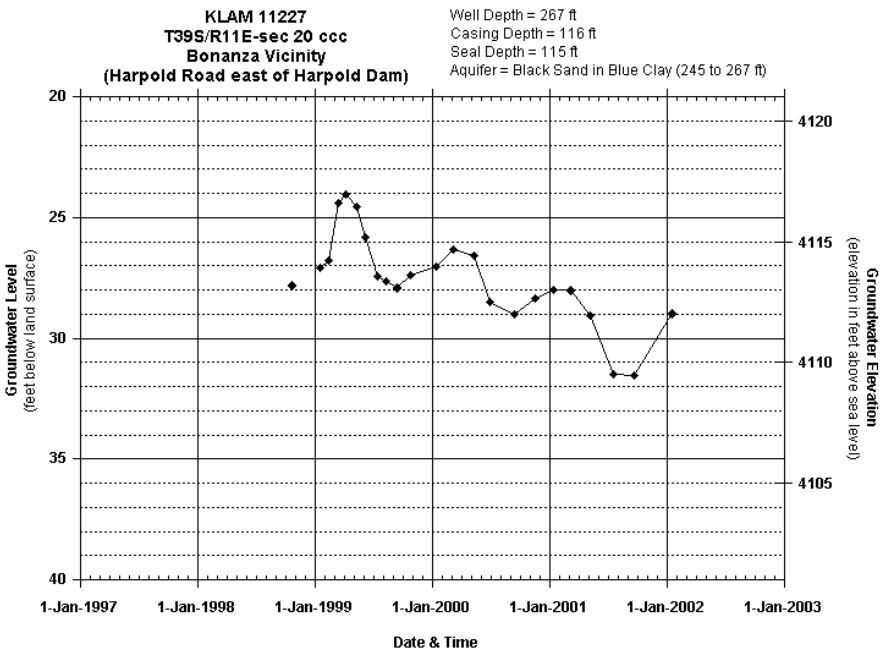

KLAM 13456
T39S/R11.5E-sec 1 ada
Yonna Valley
(Burgdorf Road near Highway 70)
Well Depth = 212 ft
Casing Depth = 140 ft
Seal Depth = 138.5 ft
Aquifer = Lava Rock (182 to 212 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4120
4110
4100
4090
4080
4070
4060
4050
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

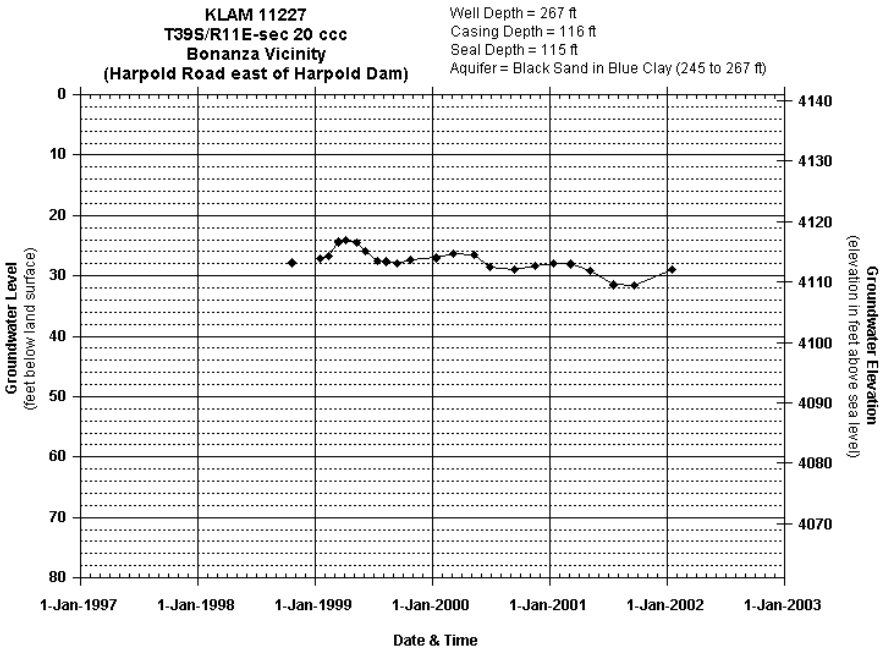

KLAM 10015
T39S/R11E-sec 8 aaa
Bonanza Vicinity
(Highway 70)
Well Depth = 83 ft
Casing Depth = 39 ft
Seal Depth = 35 ft
Aquifer = Black and Brown Lava (69 to 83 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
30
35
40
45
50
4115
4110
4105
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

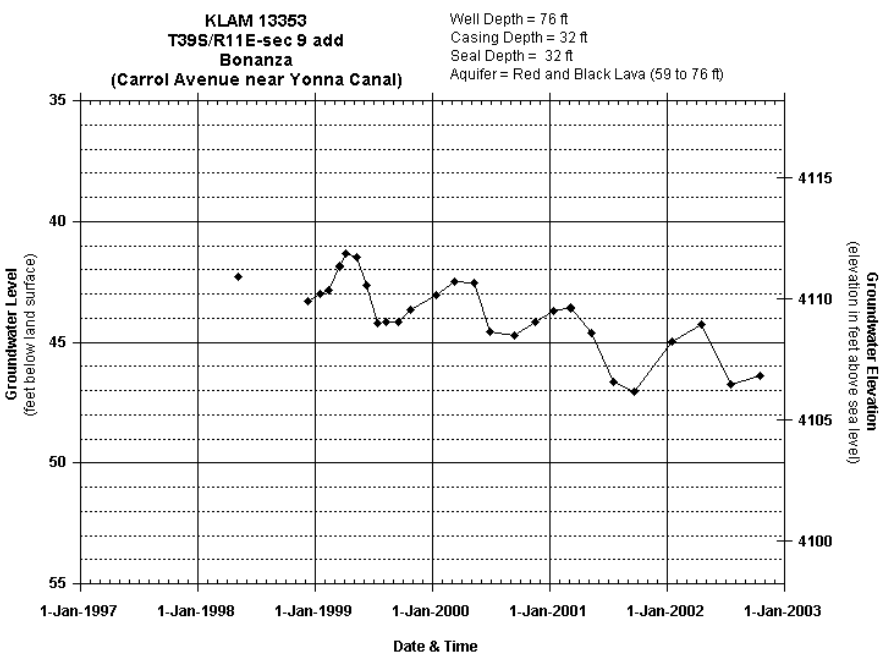

KLAM 10015
T39S/R11E-sec 8 aaa
Bonanza Vicinity
(Highway 70)
Well Depth = 83 ft
Casing Depth = 39 ft
Seal Depth = 35 ft
Aquifer = Black and Brown Lava (69 to 83 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4140
4130
4120
4110
4100
4090
4080
4070
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

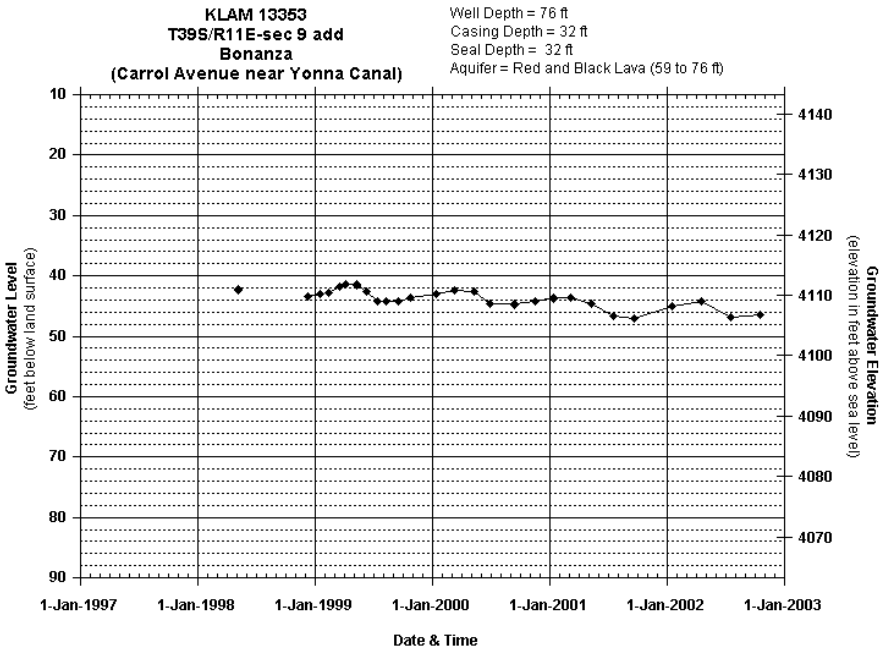

KLAM 10258
T39S/R11E-sec 19 aac
Bonanza Vicinity
(Burgdorf Road near Harpold Dam)
Well Depth = 430 ft
Casing Depth = 423 ft
Seal Depth = 423 ft
Aquifer = Broken Gray Basalt (423 to 430 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
35
40
45
50
55
4115
4110
4105
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

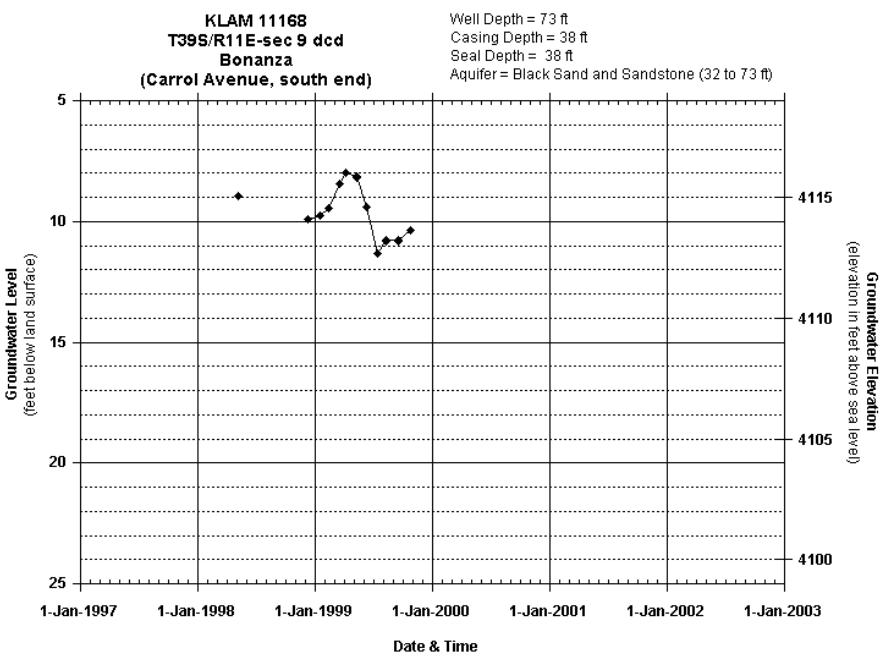

KLAM 10258
T39S/R11E-sec 19 aac
Bonanza Vicinity
(Burgdorf Road near Harpold Dam)
Well Depth = 430 ft
Casing Depth = 423 ft
Seal Depth = 423 ft
Aquifer = Broken Gray Basalt (423 to 430 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4150
4140
4130
4120
4110
4100
4090
4080
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

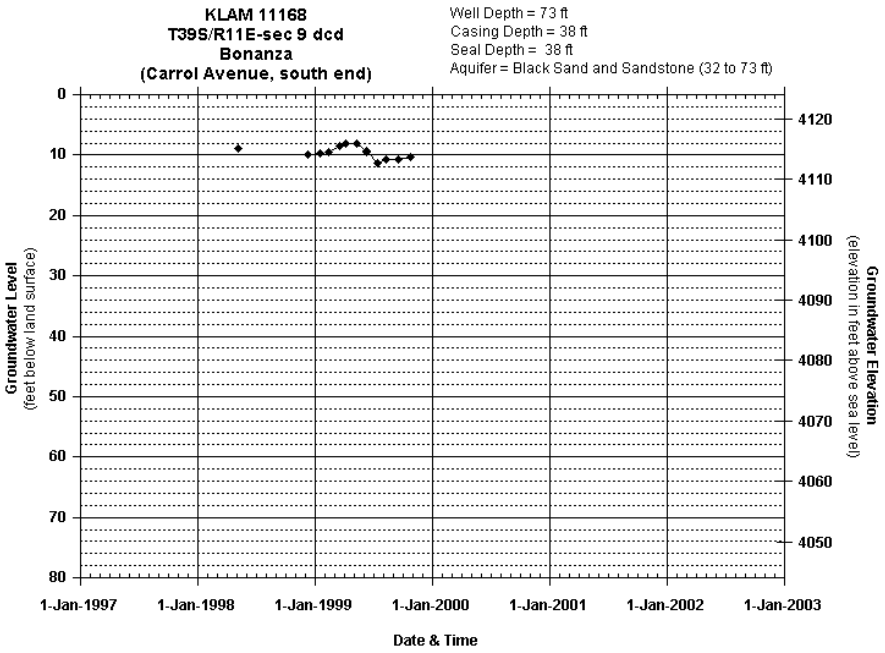

KLAM 11227
T39S/R11E-sec 20 ccc
Bonanza Vicinity
(Harpold Road east of Harpold Dam)
Well Depth = 267 ft
Casing Depth = 116 ft
Seal Depth = 115 ft
Aquifer = Black Sand in Blue Clay (245 to 267 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
20
25
30
35
40
4120
4115
4110
4105
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

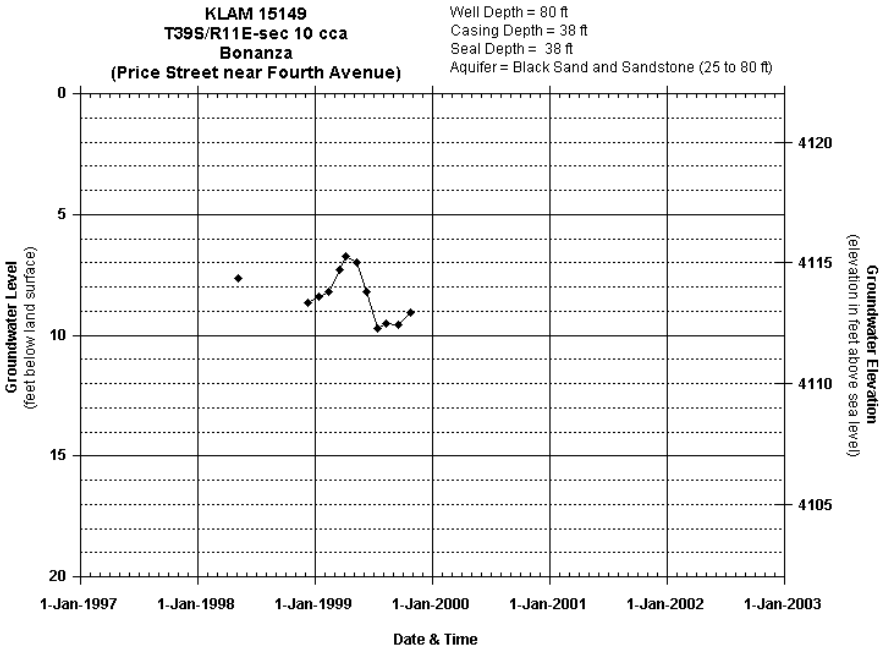

KLAM 11227
T39S/R11E-sec 20 ccc
Bonanza Vicinity
(Harpold Road east of Harpold Dam)
Well Depth = 267 ft
Casing Depth = 116 ft
Seal Depth = 115 ft
Aquifer = Black Sand in Blue Clay (245 to 267 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4140
4130
4120
4110
4100
4090
4080
4070
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

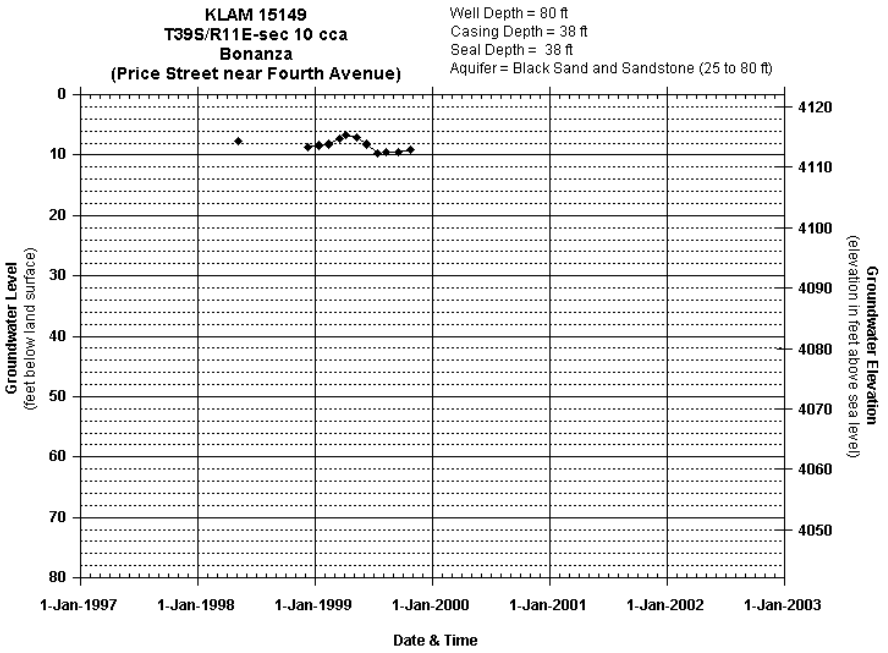

KLAM 13353
T39S/R11E-sec 9 add
Bonanza
(Carrol Avenue near Yonna Canal)
Well Depth = 76 ft
Casing Depth = 32 ft
Seal Depth = 32 ft
Aquifer = Red and Black Lava (59 to 76 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
35
40
45
50
55
4115
4110
4105
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

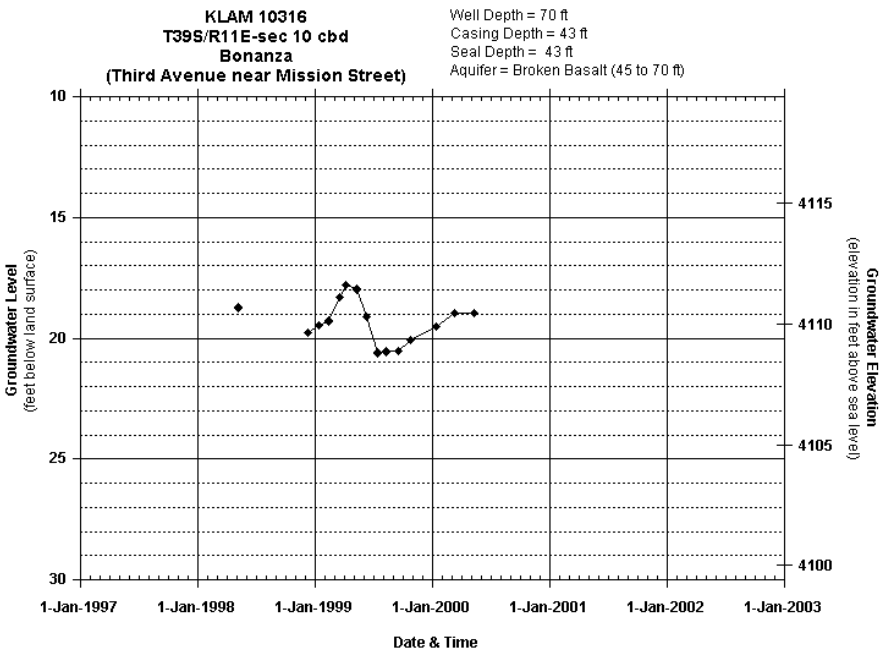

KLAM 13353
T39S/R11E-sec 9 add
Bonanza
(Carrol Avenue near Yonna Canal)
Well Depth = 76 ft
Casing Depth = 32 ft
Seal Depth = 32 ft
Aquifer = Red and Black Lava (59 to 76 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
10
20
30
40
50
60
70
80
90
4140
4130
4120
4110
4100
4090
4080
4070
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

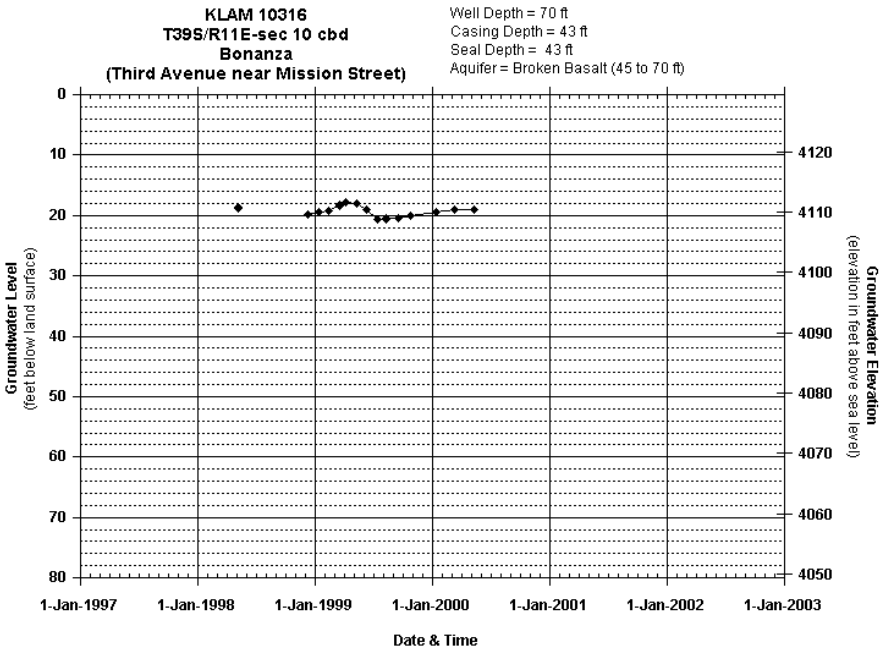

KLAM 11168
T39S/R11E-sec 9 dcd
Bonanza
(Carrol Avenue, south end)
Well Depth = 73 ft
Casing Depth = 38 ft
Seal Depth = 38 ft
Aquifer = Black Sand and Sandstone (32 to 73 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
5
10
15
20
25
4115
4110
4105
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

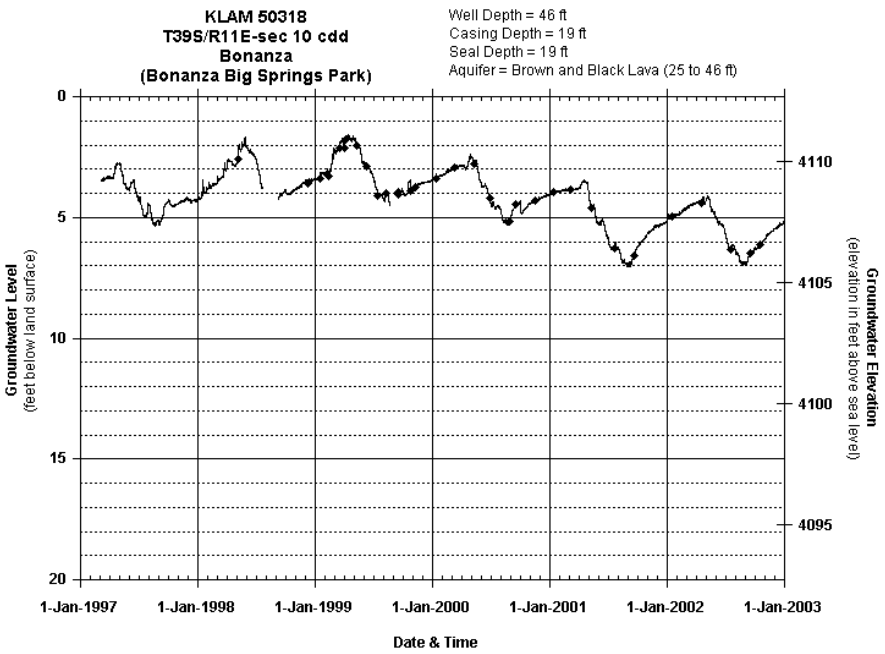

KLAM 11168
T39S/R11E-sec 9 dcd
Bonanza
(Carrol Avenue, south end)
Well Depth = 73 ft
Casing Depth = 38 ft
Seal Depth = 38 ft
Aquifer = Black Sand and Sandstone (32 to 73 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4120
4110
4100
4090
4080
4070
4060
4050
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

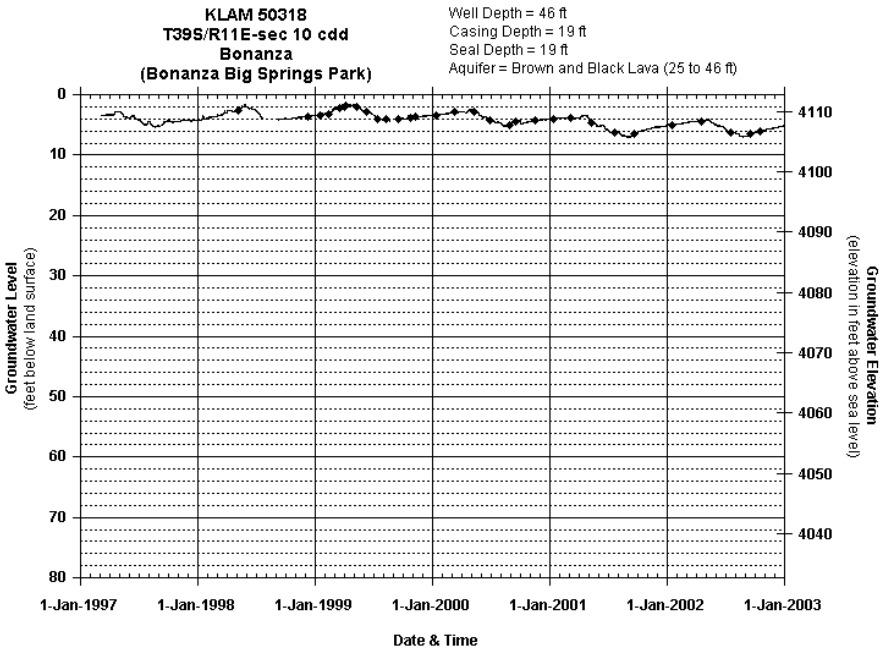

KLAM 15149
T39S/R11E-sec 10 cca
Bonanza
(Price Street near Fourth Avenue)
Well Depth = 80 ft
Casing Depth = 38 ft
Seal Depth = 38 ft
Aquifer = Black Sand and Sandstone (25 to 80 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
5
10
15
20
4120
4115
4110
4105
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

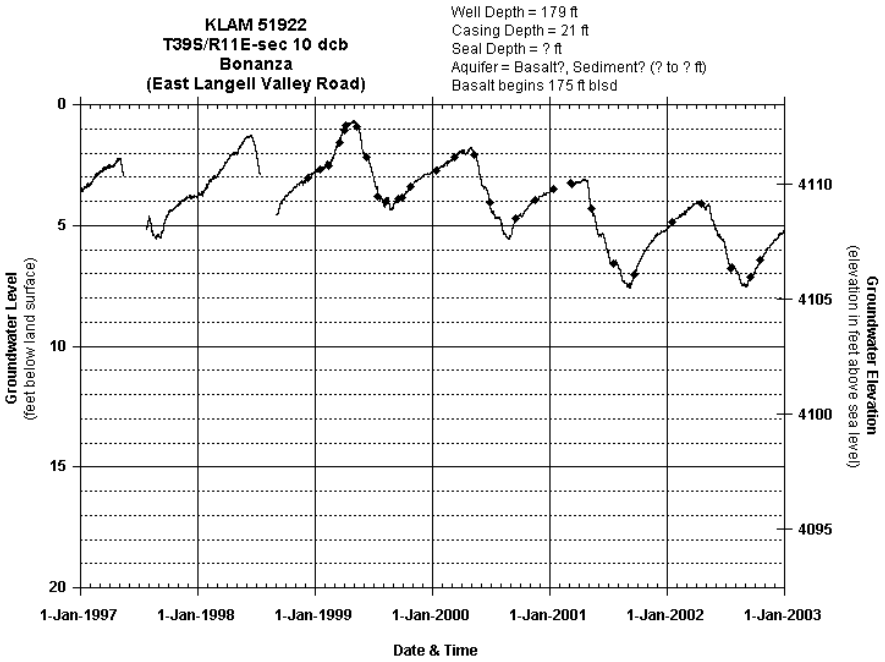

KLAM 15149
T39S/R11E-sec 10 cca
Bonanza
(Price Street near Fourth Avenue)
Well Depth = 80 ft
Casing Depth = 38 ft
Seal Depth = 38 ft
Aquifer = Black Sand and Sandstone (25 to 80 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4120
4110
4100
4090
4080
4070
4060
4050
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

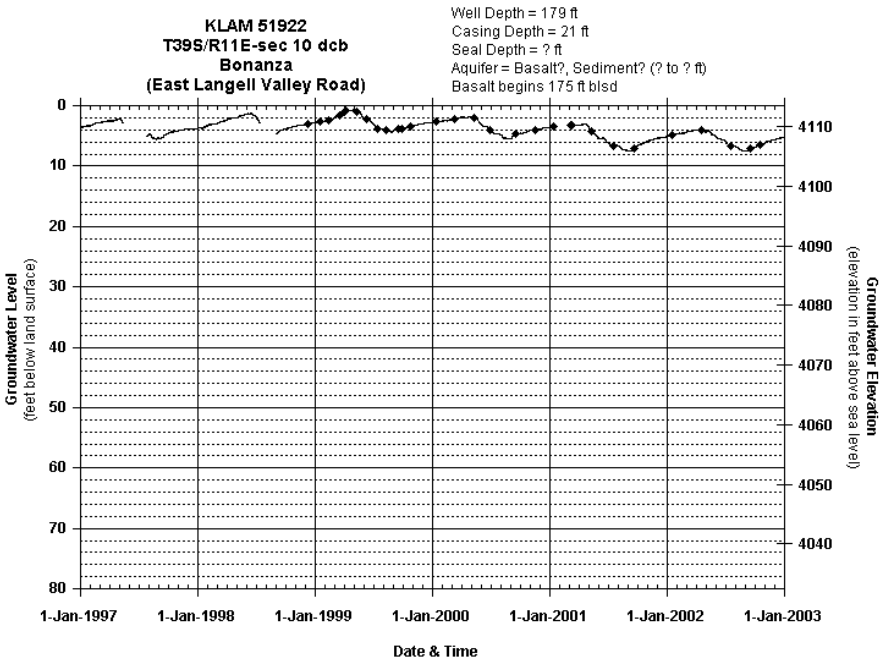

KLAM 10316
T39S/R11E-sec 10 cbd
Bonanza
(Third Avenue near Mission Street)
Well Depth = 70 ft
Casing Depth = 43 ft
Seal Depth = 43 ft
Aquifer = Broken Basalt (45 to 70 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
10
15
20
25
30
4115
4110
4105
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

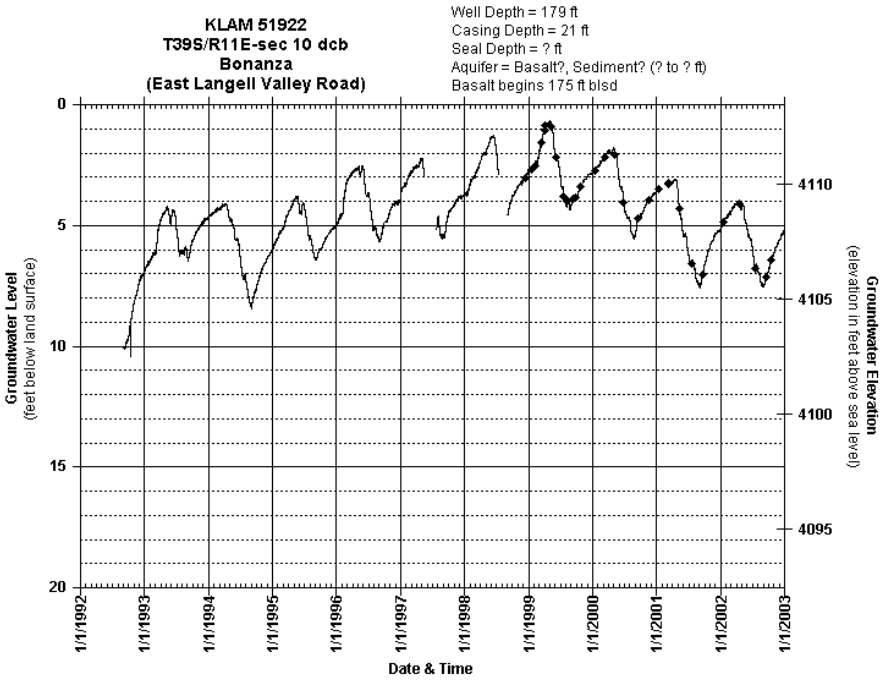

KLAM 10316
T39S/R11E-sec 10 cbd
Bonanza
(Third Avenue near Mission Street)
Well Depth = 70 ft
Casing Depth = 43 ft
Seal Depth = 43 ft
Aquifer = Broken Basalt (45 to 70 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4120
4110
4100
4090
4080
4070
4060
4050
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

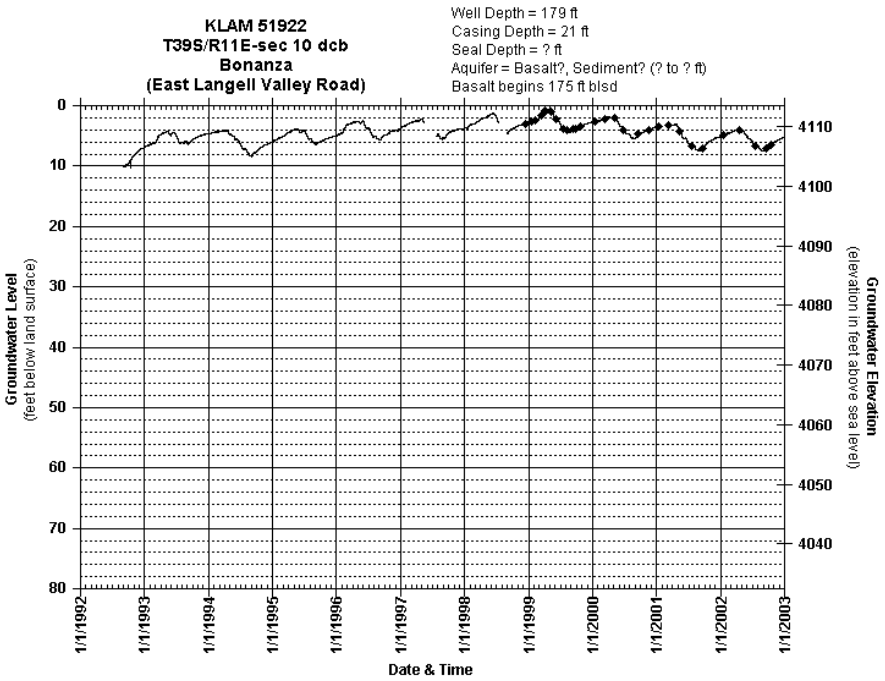

KLAM 50318
T39S/R11E-sec 10 cdd
Bonanza
(Bonanza Big Springs Park)
Well Depth = 46 ft
Casing Depth = 19 ft
Seal Depth = 19 ft
Aquifer = Brown and Black Lava (25 to 46 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
5
10
15
20
4110
4105
4100
4095
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

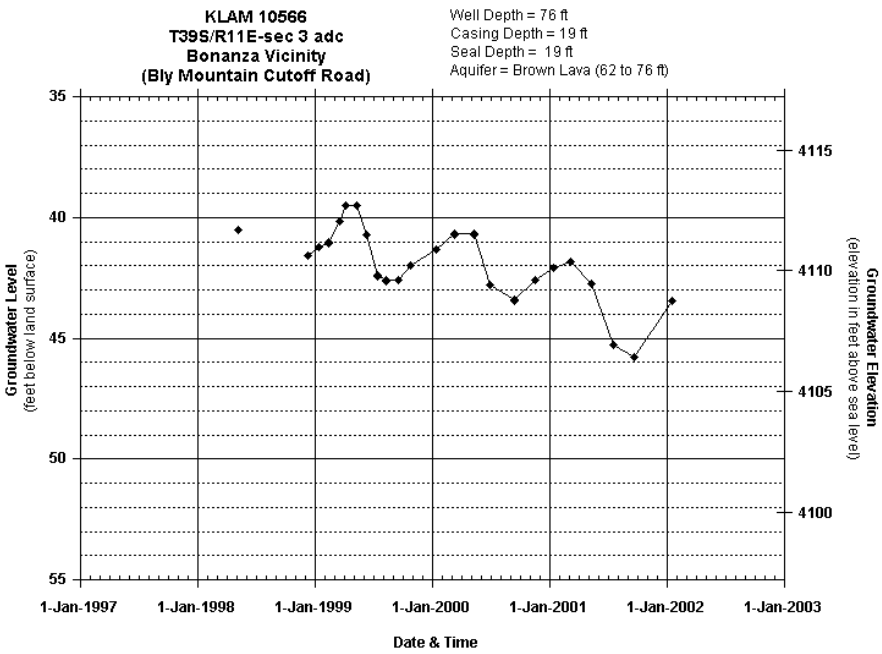

KLAM 50318
T39S/R11E-sec 10 cdd
Bonanza
(Bonanza Big Springs Park)
Well Depth = 46 ft
Casing Depth = 19 ft
Seal Depth = 19 ft
Aquifer = Brown and Black Lava (25 to 46 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4110
4100
4090
4080
4070
4060
4050
4040
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

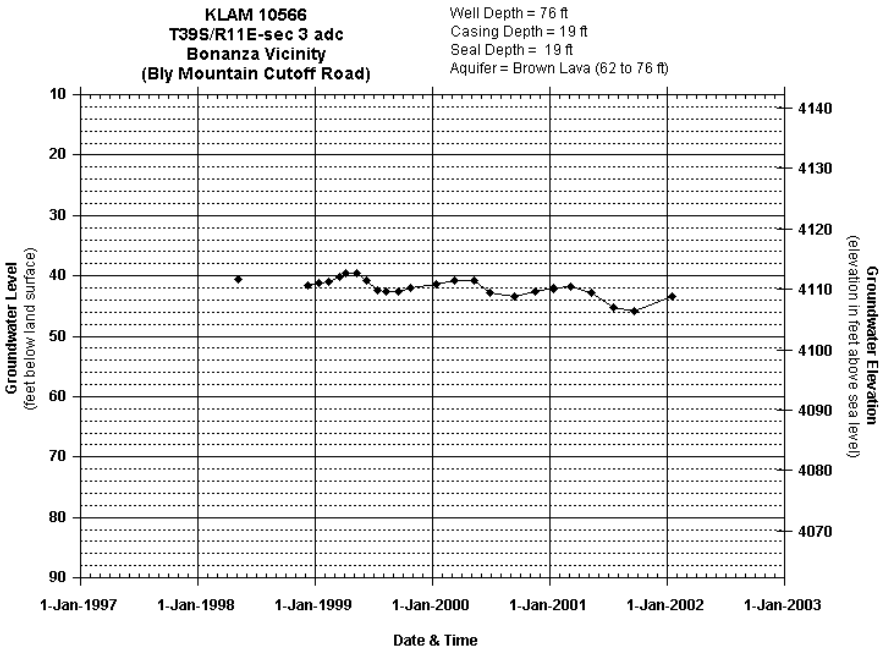

KLAM 51922
T39S/R11E-sec 10 dcb
Bonanza
(East Langell Valley Road)
Well Depth = 179 ft
Casing Depth = 21 ft
Seal Depth = ? ft
Aquifer = Basalt?, Sediment? (? to ? ft)
Basalt begins 175 ft blsd
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
5
10
15
20
4110
4105
4100
4095
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

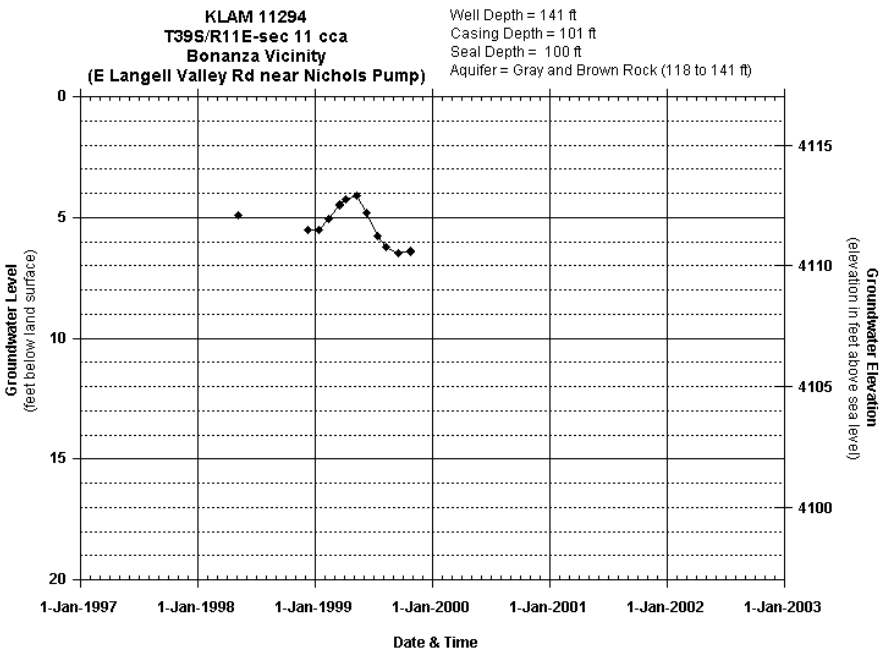

KLAM 51922
T39S/R11E-sec 10 dcb
Bonanza
(East Langell Valley Road)
Well Depth = 179 ft
Casing Depth = 21 ft
Seal Depth = ? ft
Aquifer = Basalt?, Sediment? (? to ? ft)
Basalt begins 175 ft blsd
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4110
4100
4090
4080
4070
4060
4050
4040
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

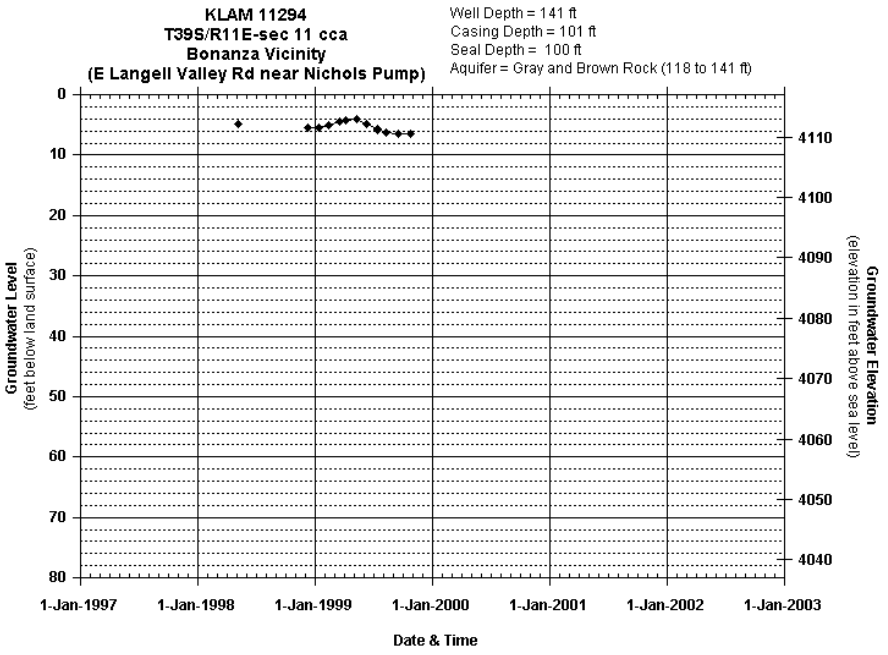

KLAM 51922
T39S/R11E-sec 10 dcb
Bonanza
(East Langell Valley Road)
Well Depth = 179 ft
Casing Depth = 21 ft
Seal Depth = ? ft
Aquifer = Basalt?, Sediment? (? to ? ft)
Basalt begins 175 ft blsd
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
Date & Time

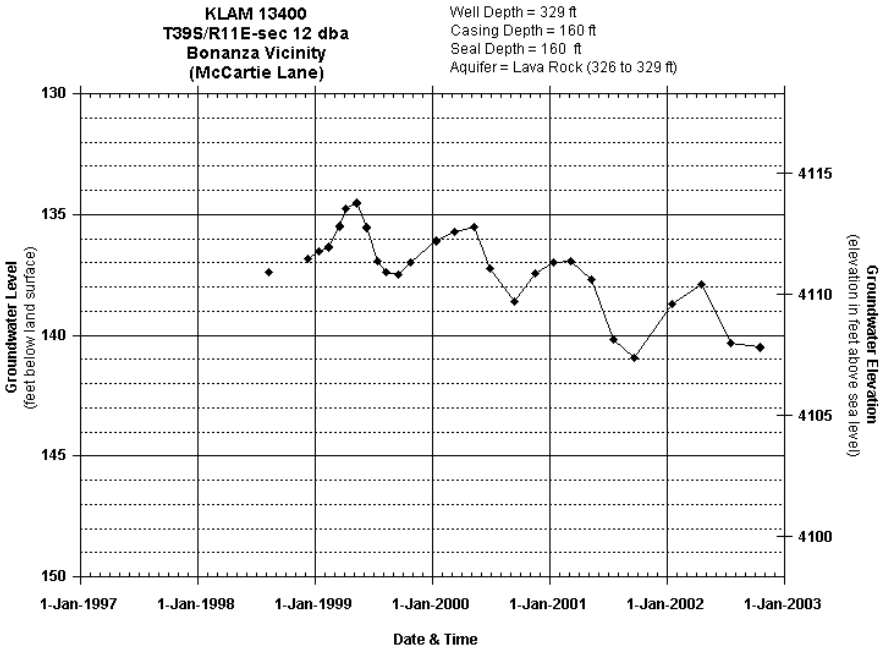

KLAM 51922
T39S/R11E-sec 10 dcb
Bonanza
(East Langell Valley Road)
Well Depth = 179 ft
Casing Depth = 21 ft
Seal Depth = ? ft
Aquifer = Basalt?, Sediment? (? to ? ft)
Basalt begins 175 ft blsd
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
Date & Time

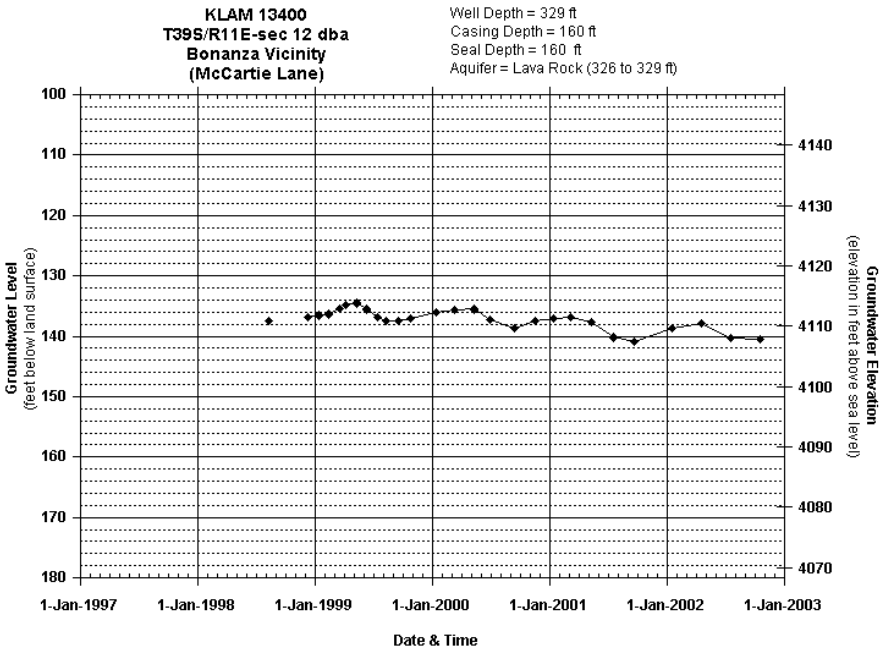

KLAM 10566
T39S/R11E-sec 3 adc
Bonanza Vicinity
(Bly Mountain Cutoff Road)
Well Depth = 76 ft
Casing Depth = 19 ft
Seal Depth = 19 ft
Aquifer = Brown Lava (62 to 76 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
35
40
45
50
55
4115
4110
4105
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

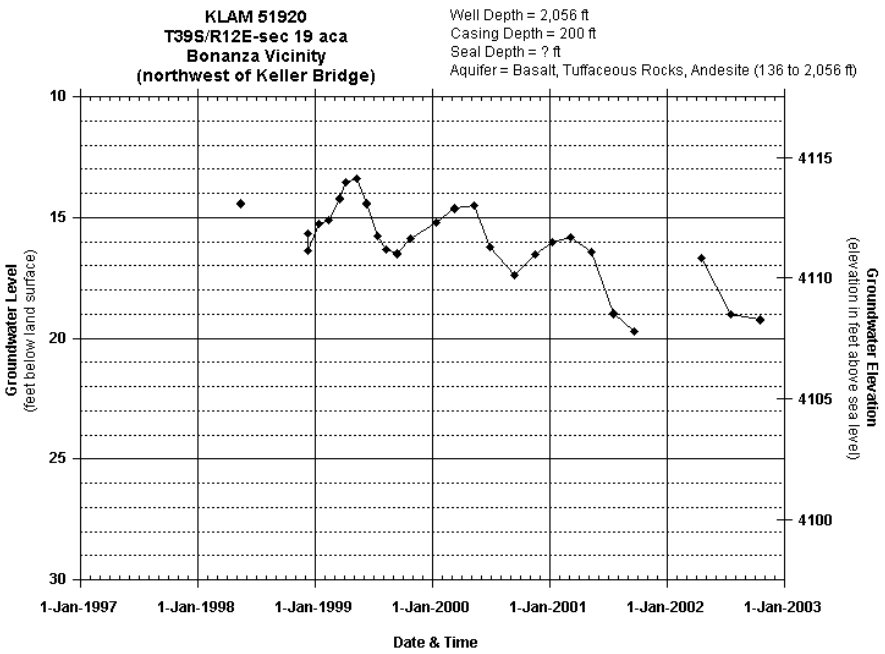

KLAM 10566
T39S/R11E-sec 3 adc
Bonanza Vicinity
(Bly Mountain Cutoff Road)
Well Depth = 76 ft
Casing Depth = 19 ft
Seal Depth = 19 ft
Aquifer = Brown Lava (62 to 76 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
10
20
30
40
50
60
70
80
90
4140
4130
4120
4110
4100
4090
4080
4070
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

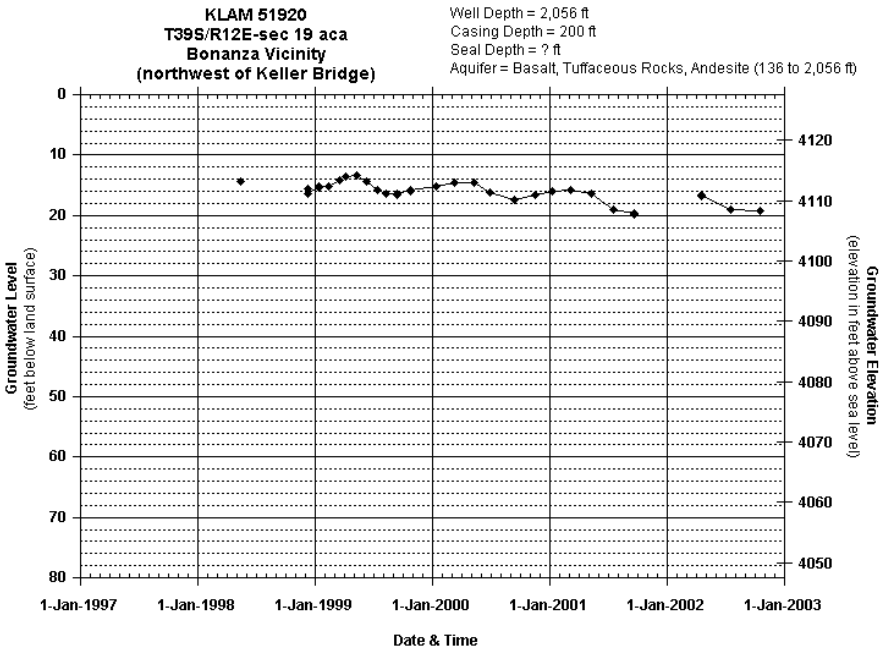

KLAM 11294
T39S/R11E-sec 11 cca
Bonanza Vicinity
(E Langell Valley Rd near Nichols Pump)
Well Depth = 141 ft
Casing Depth = 101 ft
Seal Depth = 100 ft
Aquifer = Gray and Brown Rock (118 to 141 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
5
10
15
20
4115
4110
4105
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

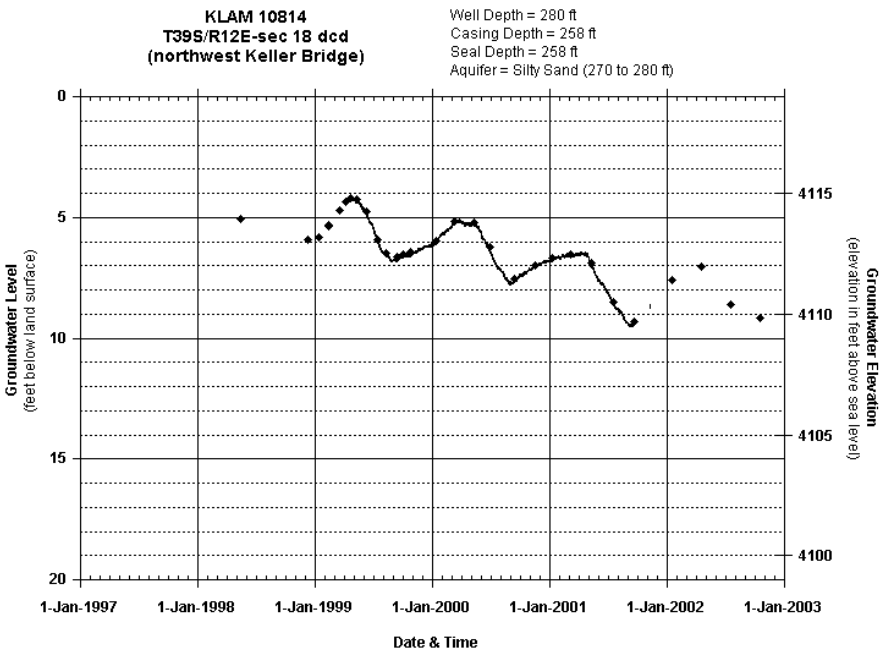

KLAM 11294
T39S/R11E-sec 11 cca
Bonanza Vicinity
(E Langell Valley Rd near Nichols Pump)
Well Depth = 141 ft
Casing Depth = 101 ft
Seal Depth = 100 ft
Aquifer = Gray and Brown Rock (118 to 141 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4110
4100
4090
4080
4070
4060
4050
4040
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

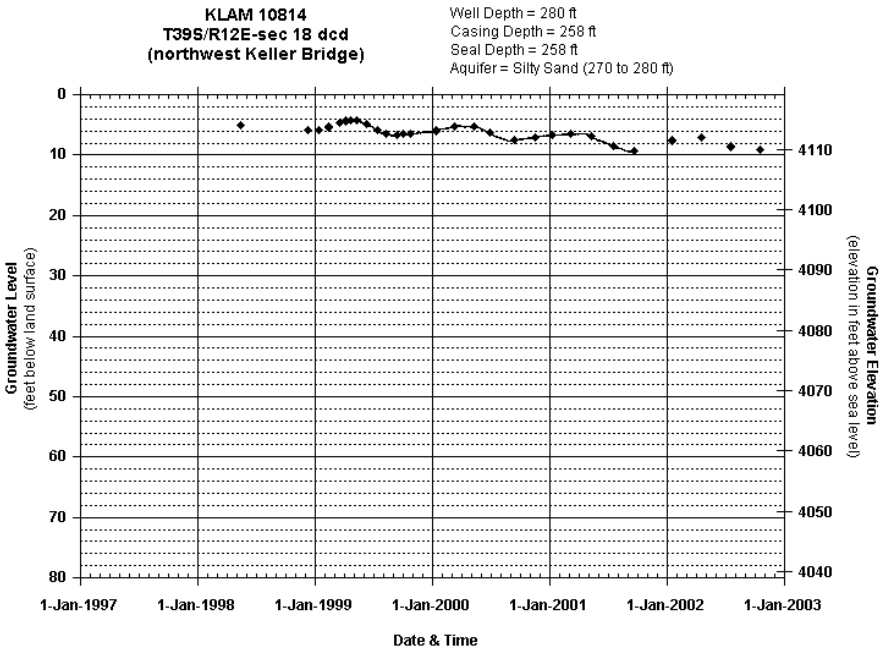

KLAM 13400
T39S/R11E-sec 12 dba
Bonanza Vicinity
(McCartie Lane)
Well Depth = 329 ft
Casing Depth = 160 ft
Seal Depth = 160 ft
Aquifer = Lava Rock (326 to 329 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
130
135
140
145
150
4115
4110
4105
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

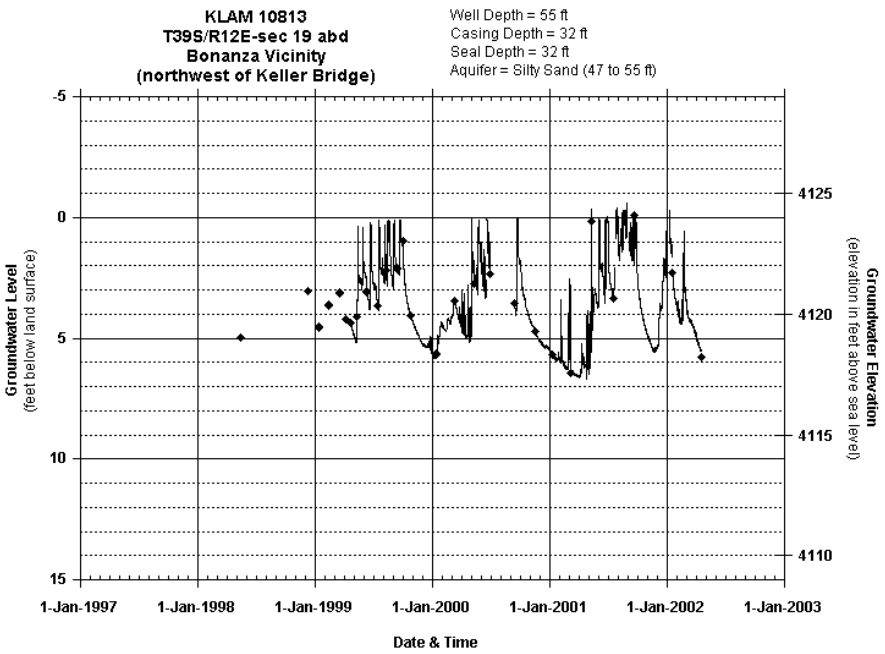

KLAM 13400
T39S/R11E-sec 12 dba
Bonanza Vicinity
(McCartie Lane)
Well Depth = 329 ft
Casing Depth = 160 ft
Seal Depth = 160 ft
Aquifer = Lava Rock (326 to 329 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
100
110
120
130
140
150
160
170
180
4140
4130
4120
4110
4100
4090
4080
4070
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

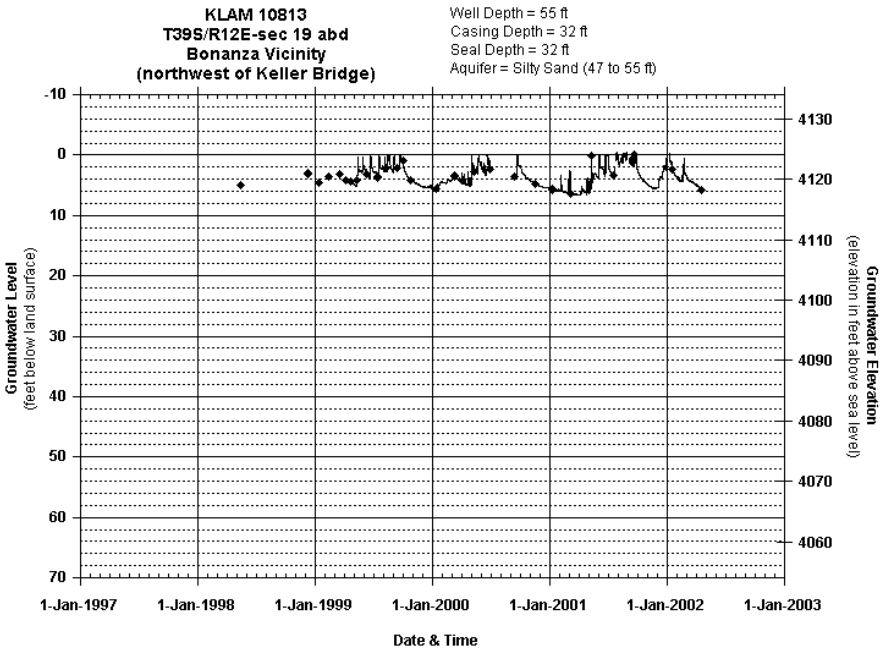

KLAM 51920
T39S/R12E-sec 19 aca
Bonanza Vicinity
(northwest of Keller Bridge)
Well Depth = 2,056 ft
Casing Depth = 200 ft
Seal Depth = ? ft
Aquifer = Basalt, Tuffaceous Rocks, Andesite (136 to 2,056 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
10
15
20
25
30
4115
4110
4105
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

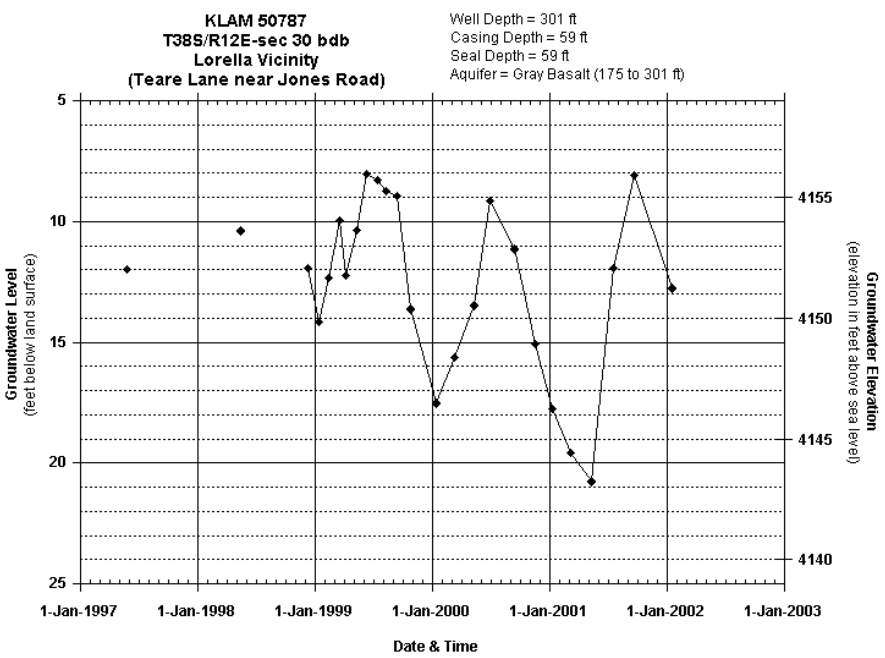

KLAM 51920
T39S/R12E-sec 19 aca
Bonanza Vicinity
(northwest of Keller Bridge)
Well Depth = 2,056 ft
Casing Depth = 200 ft
Seal Depth = ? ft
Aquifer = Basalt, Tuffaceous Rocks, Andesite (136 to 2,056 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4120
4110
4100
4090
4080
4070
4060
4050
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

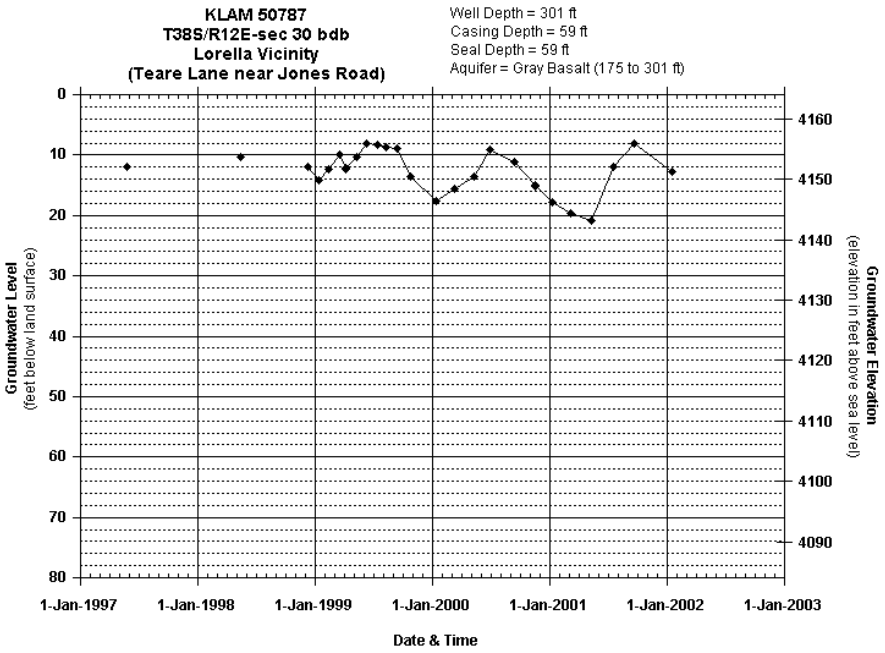

KLAM 10814
T39S/R12E-sec 18 dcd
(northwest Keller Bridge)
Well Depth = 280 ft
Casing Depth = 258 ft
Seal Depth = 258 ft
Aquifer = Silty Sand (270 to 280 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
5
10
15
20
4115
4110
4105
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

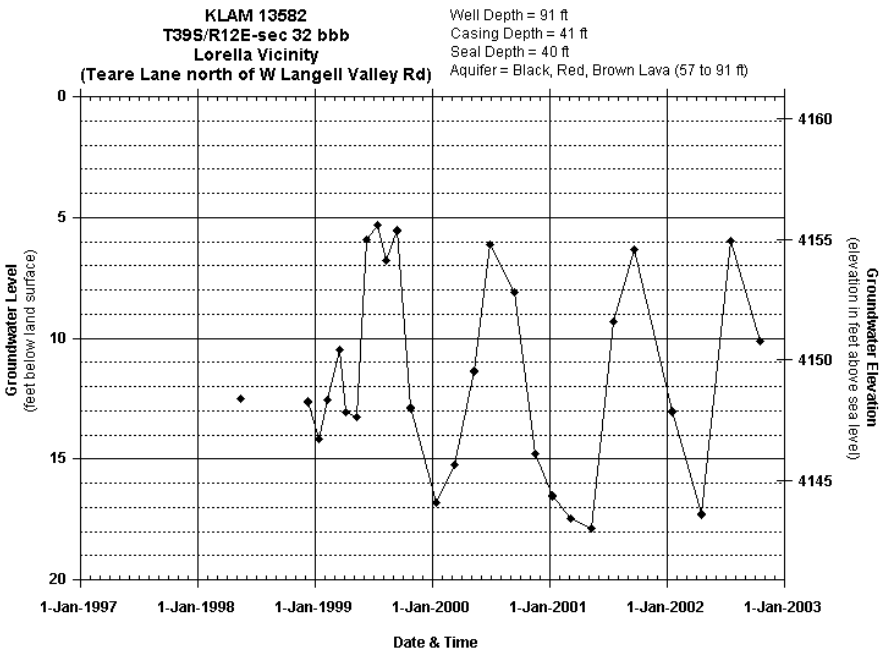

KLAM 10814
T39S/R12E-sec 18 dcd
(northwest Keller Bridge)
Well Depth = 280 ft
Casing Depth = 258 ft
Seal Depth = 258 ft
Aquifer = Silty Sand (270 to 280 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4110
4100
4090
4080
4070
4060
4050
4040
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

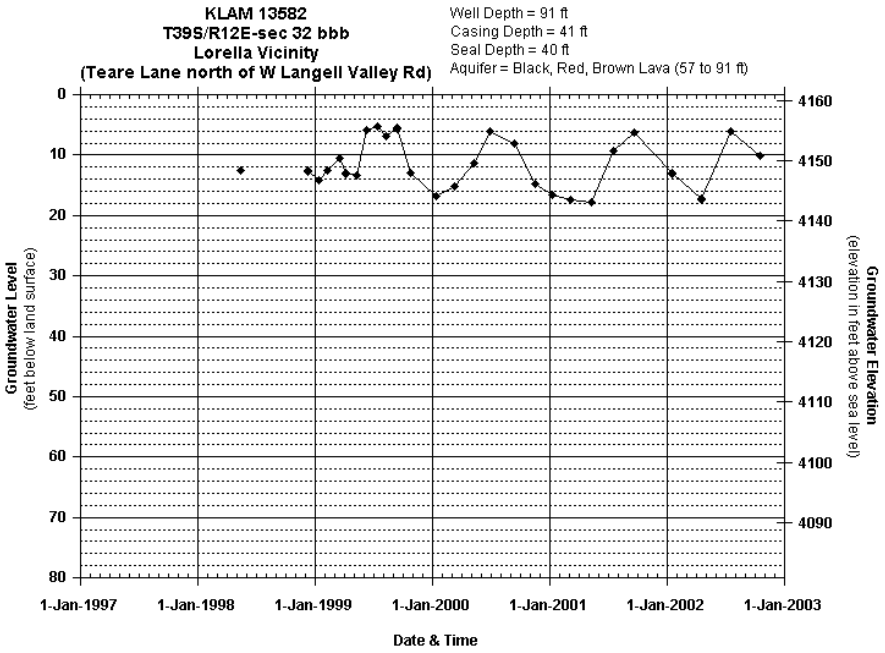

KLAM 10813
T39S/R12E-sec 19 abd
Bonanza Vicinity
(northwest of Keller Bridge)
Well Depth = 55 ft
Casing Depth = 32 ft
Seal Depth = 32 ft
Aquifer = Silty Sand (47 to 55 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
-5
0
5
10
15
4125
4120
4115
4110
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

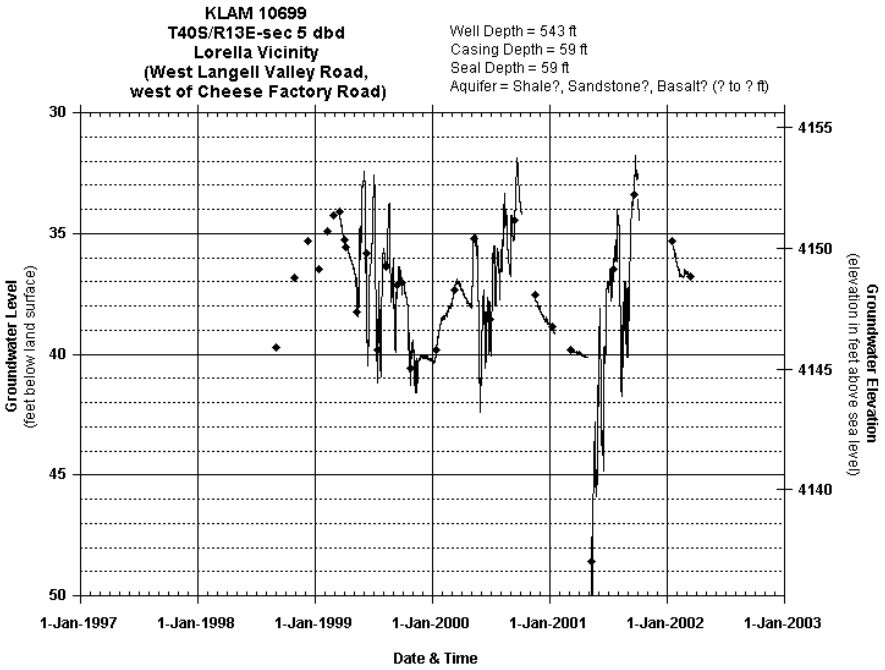

KLAM 10813
T39S/R12E-sec 19 abd
Bonanza Vicinity
(northwest of Keller Bridge)
Well Depth = 55 ft
Casing Depth = 32 ft
Seal Depth = 32 ft
Aquifer = Silty Sand (47 to 55 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
-10
0
10
20
30
40
50
60
70
4130
4120
4110
4100
4090
4080
4070
4060
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

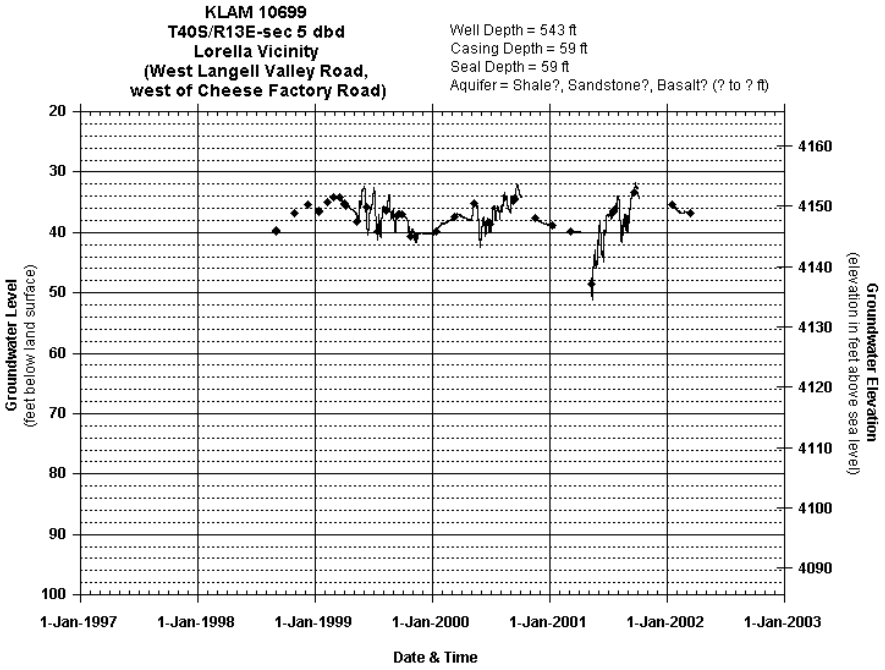

KLAM 50787
T38S/R12E-sec 30 bdb
Lorella Vicinity
(Teare Lane near Jones Road)
Well Depth = 301 ft
Casing Depth = 59 ft
Seal Depth = 59 ft
Aquifer = Gray Basalt (175 to 301 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
5
10
15
20
25
4155
4150
4145
4140
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

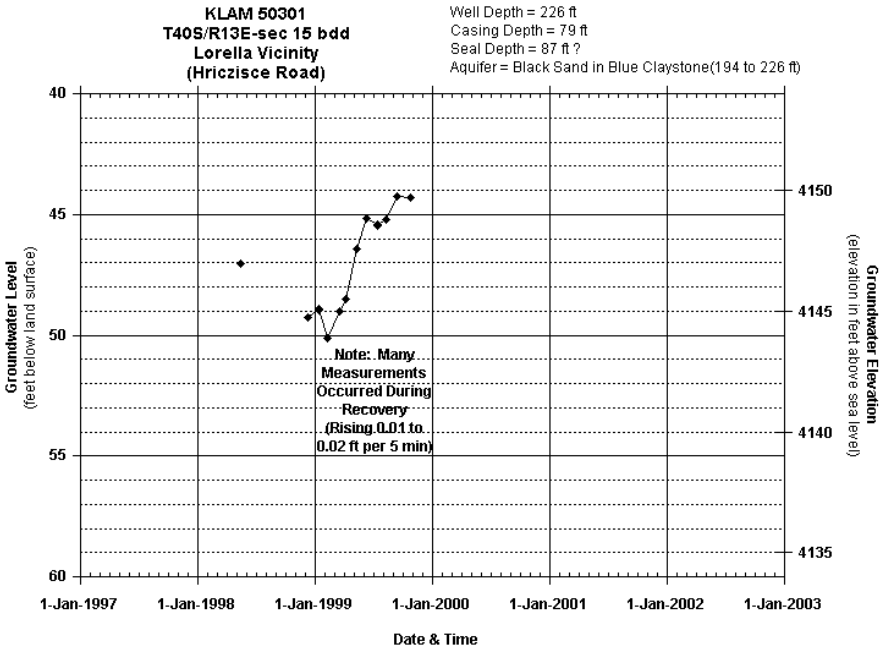

KLAM 50787
T38S/R12E-sec 30 bdb
Lorella Vicinity
(Teare Lane near Jones Road)
Well Depth = 301 ft
Casing Depth = 59 ft
Seal Depth = 59 ft
Aquifer = Gray Basalt (175 to 301 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4160
4150
4140
4130
4120
4110
4100
4090
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

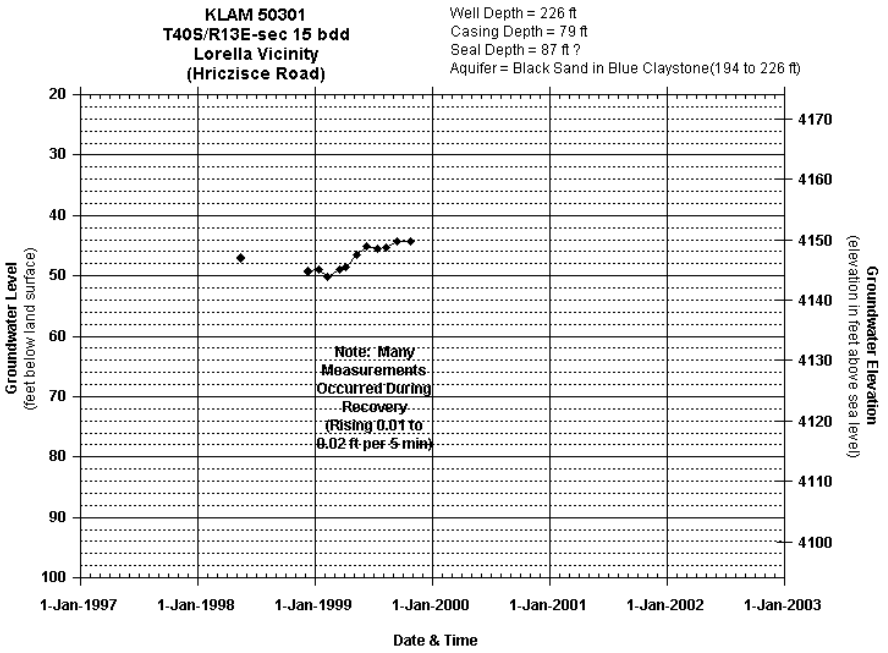

KLAM 13582
T39S/R12E-sec 32 bbb
Lorella Vicinity
(Teare Lane north of W Langell Valley Rd)
Well Depth = 91 ft
Casing Depth = 41 ft
Seal Depth = 40 ft
Aquifer = Black, Red, Brown Lava (57 to 91 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
5
10
15
20
4160
4155
4150
4145
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

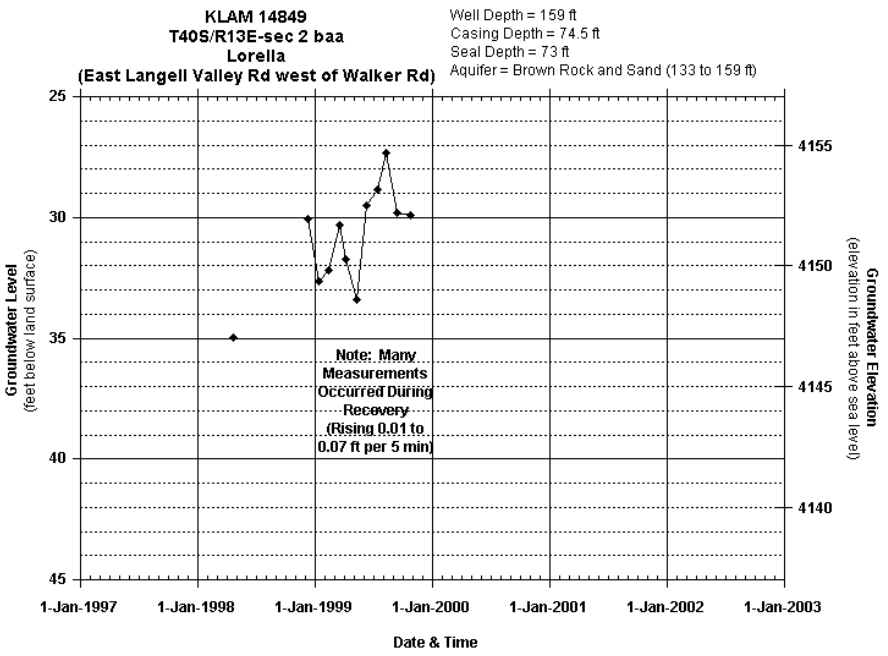

KLAM 13582
T39S/R12E-sec 32 bbb
Lorella Vicinity
(Teare Lane north of W Langell Valley Rd)
Well Depth = 91 ft
Casing Depth = 41 ft
Seal Depth = 40 ft
Aquifer = Black, Red, Brown Lava (57 to 91 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4160
4150
4140
4130
4120
4110
4100
4090
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

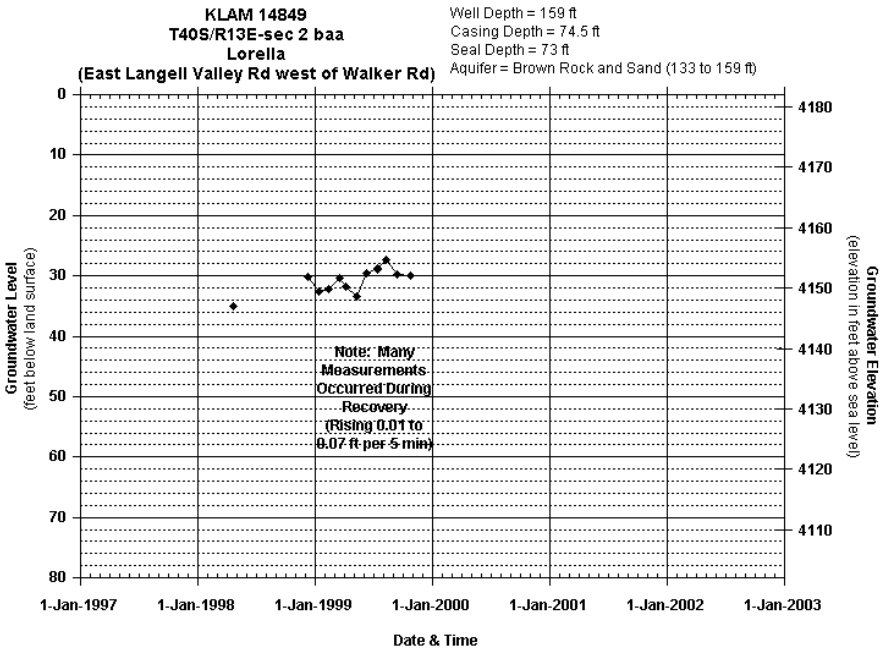

KLAM 10699
T40S/R13E-sec 5 dbd
Lorella Vicinity
(West Langell Valley Road,
west of Cheese Factory Road)
Well Depth = 543 ft
Casing Depth = 59 ft
Seal Depth = 59 ft
Aquifer = Shale?, Sandstone?, Basalt? (? to ? ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
30
35
40
45
50
4155
4150
4145
4140
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

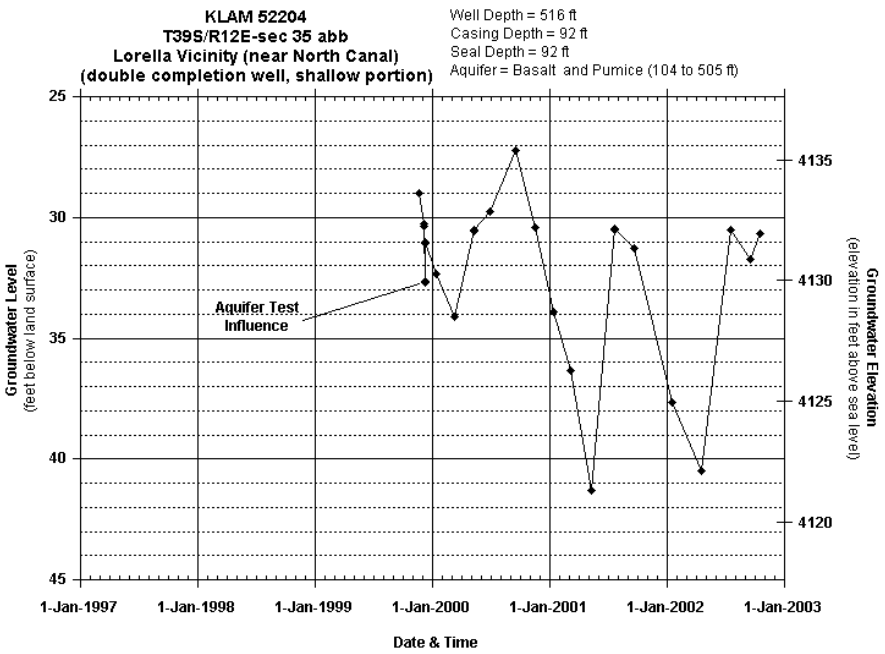

KLAM 10699
T40S/R13E-sec 5 dbd
Lorella Vicinity
(West Langell Valley Road,
west of Cheese Factory Road)
Well Depth = 543 ft
Casing Depth = 59 ft
Seal Depth = 59 ft
Aquifer = Shale?, Sandstone?, Basalt? (? to ? ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
20
30
40
50
60
70
80
90
100
4160
4150
4140
4130
4120
4110
4100
4090
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

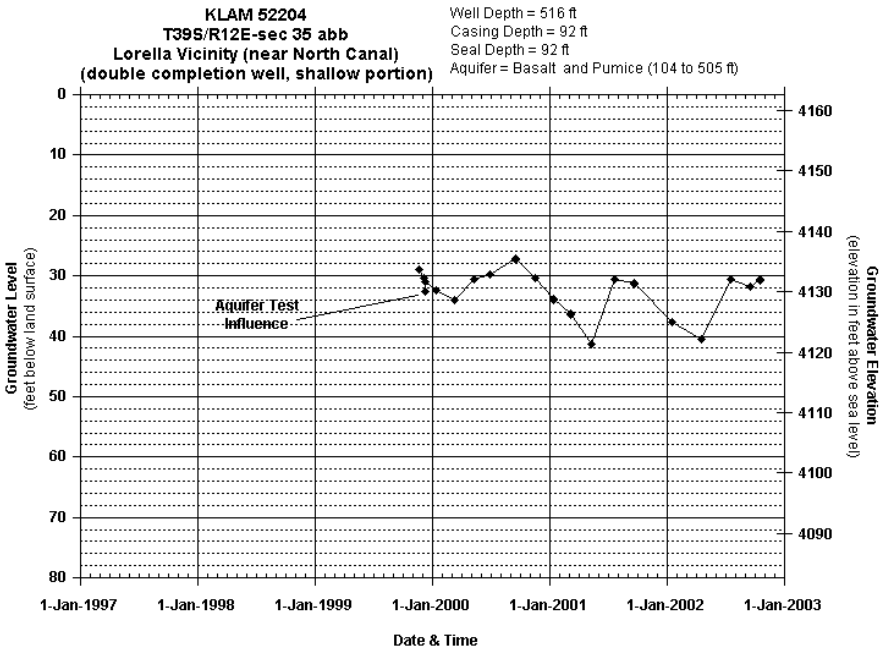

KLAM 50301
T40S/R13E-sec 15 bdd
Lorella Vicinity
(Hriczisce Road)
Well Depth = 226 ft
Casing Depth = 79 ft
Seal Depth = 87 ft ?
Aquifer = Black Sand in Blue Claystone(194 to 226 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
Note: Many Measurements Occurred During Recovery (Rising 0.01 to 0.02 ft per 5 min)
40
45
50
55
60
4150
4145
4140
4135
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

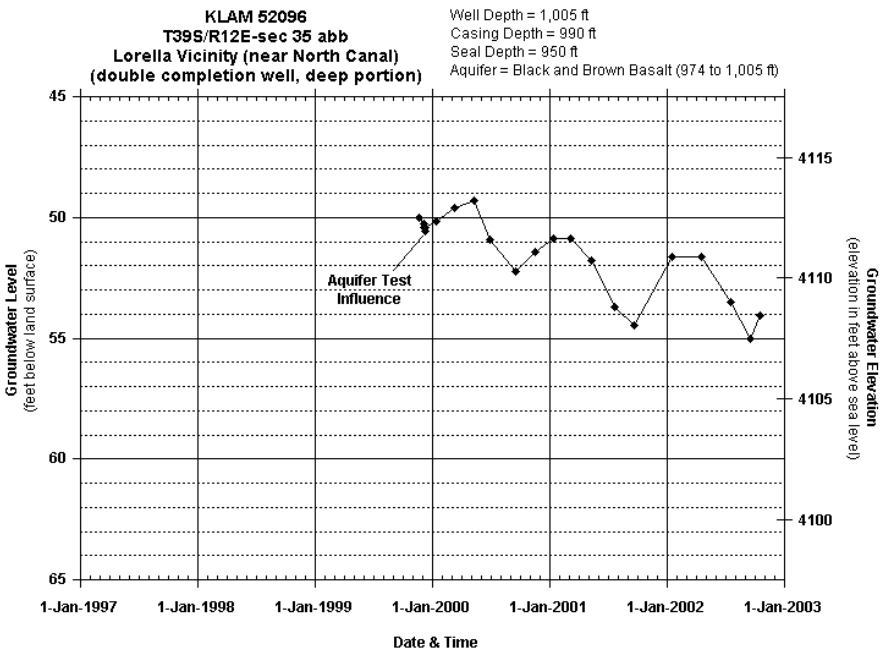

KLAM 50301
T40S/R13E-sec 15 bdd
Lorella Vicinity
(Hriczisce Road)
Well Depth = 226 ft
Casing Depth = 79 ft
Seal Depth = 87 ft ?
Aquifer = Black Sand in Blue Claystone(194 to 226 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
Note: Many Measurements Occurred During Recovery (Rising 0.01 to 0.02 ft per 5 min)
20
30
40
50
60
70
80
90
100
4170
4160
4150
4140
4130
4120
4110
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

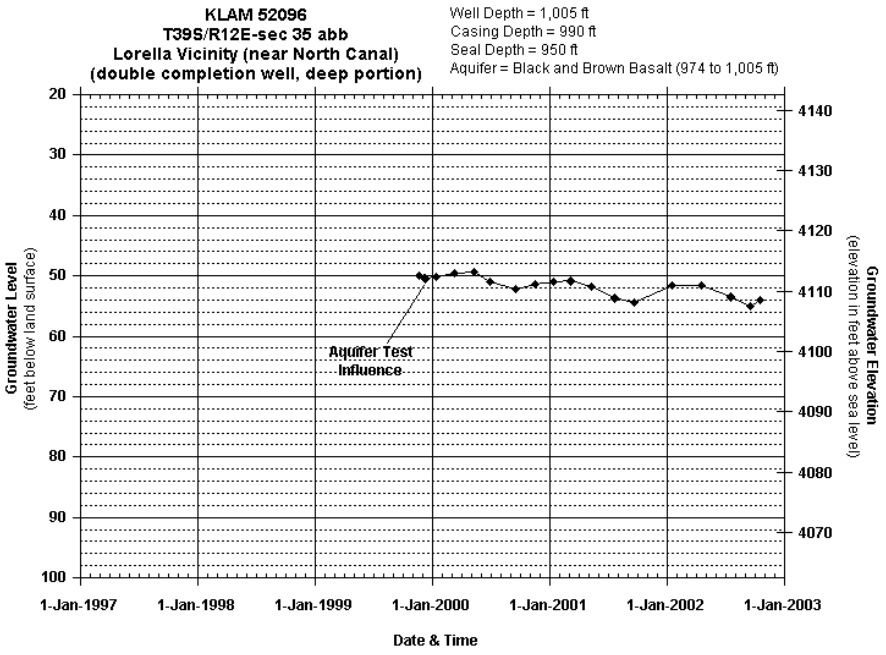

KLAM 14849
T40S/R13E-sec 2 baa
Lorella
(East Langell Valley Rd west of Walker Rd)
Well Depth = 159 ft
Casing Depth = 74.5 ft
Seal Depth = 73 ft
Aquifer = Brown Rock and Sand (133 to 159 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
Note: Many Measurements Occurred During Recovery (Rising 0.01 to 0.07 ft per 5 min)
25
30
35
40
45
4155
4150
4145
4140
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

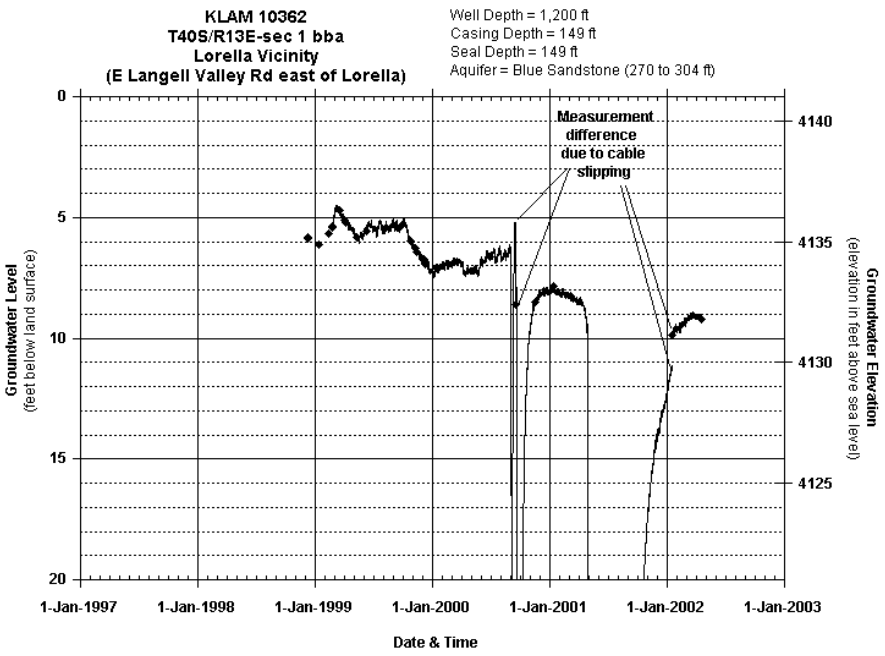

KLAM 14849
T40S/R13E-sec 2 baa
Lorella
(East Langell Valley Rd west of Walker Rd)
Well Depth = 159 ft
Casing Depth = 74.5 ft
Seal Depth = 73 ft
Aquifer = Brown Rock and Sand (133 to 159 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
Note: Many Measurements Occurred During Recovery (Rising 0.01 to 0.07 ft per 5 min)
0
10
20
30
40
50
60
70
80
4180
4170
4160
4150
4140
4130
4120
4110
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

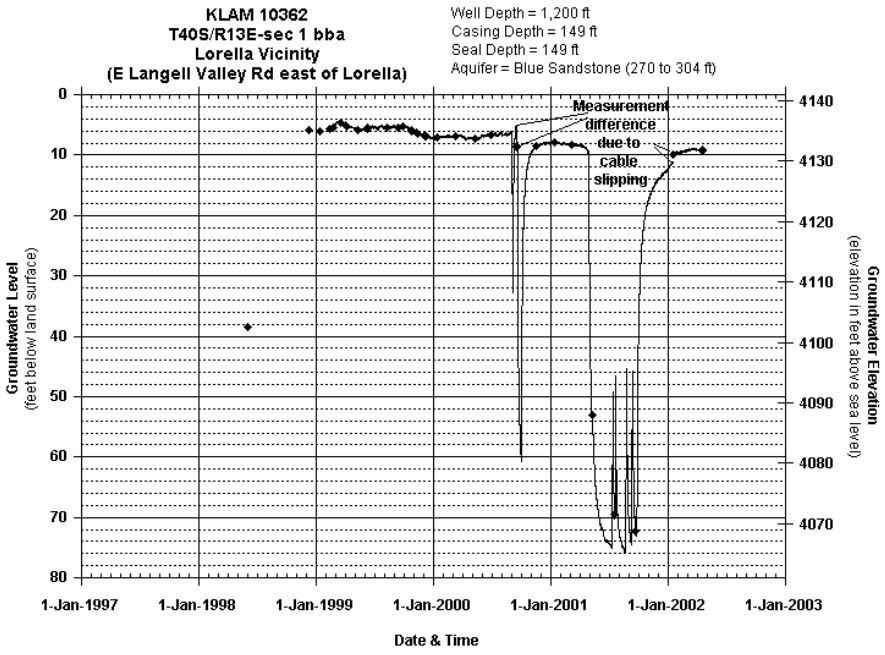

KLAM 52204
T39S/R12E-sec 35 abb
Lorella Vicinity (near North Canal)
(double completion well, shallow portion)
Well Depth = 516 ft
Casing Depth = 92 ft
Seal Depth = 92 ft
Aquifer = Basalt and Pumice (104 to 505 ft)
Aquifer Test Influence
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
25
30
35
40
45
4135
4130
4125
4120
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

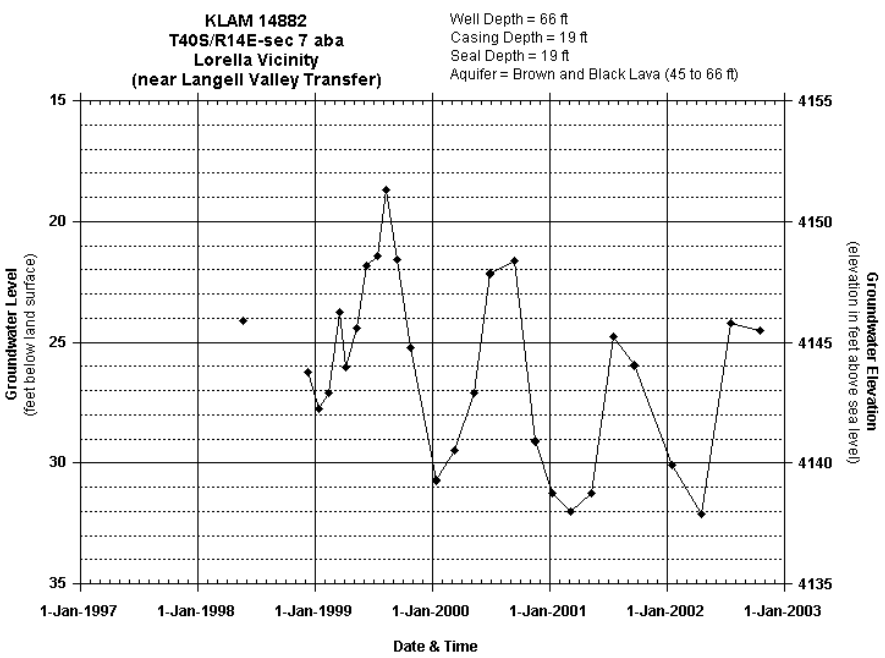

KLAM 52204
T39S/R12E-sec 35 abb
Lorella Vicinity (near North Canal)
(double completion well, shallow portion)
Well Depth = 516 ft
Casing Depth = 92 ft
Seal Depth = 92 ft
Aquifer = Basalt and Pumice (104 to 505 ft)
Aquifer Test Influence
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4160
4150
4140
4130
4120
4110
4100
4090
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

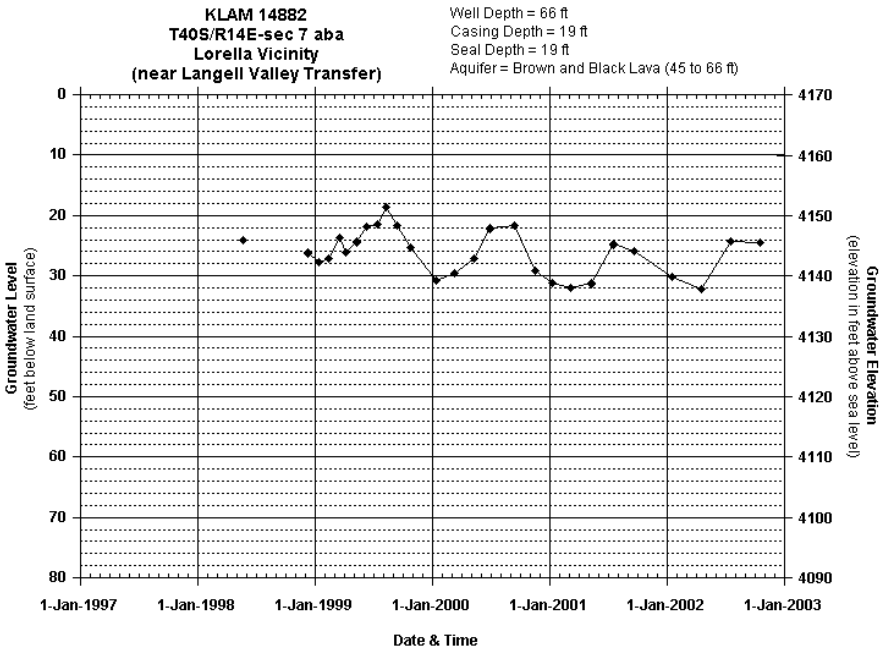

KLAM 52096
T39S/R12E-sec 35 abb
Lorella Vicinity (near North Canal)
(double completion well, deep portion)
Well Depth = 1,005 ft
Casing Depth = 990 ft
Seal Depth = 950 ft
Aquifer = Black and Brown Basalt (974 to 1,005 ft)
Aquifer Test Influence
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
45
50
55
60
65
4115
4110
4105
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

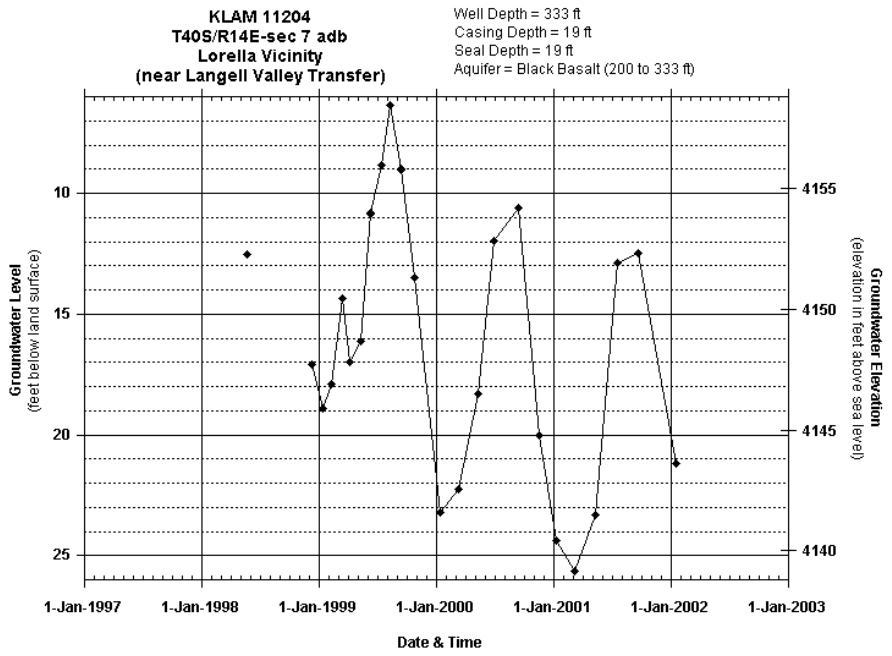

KLAM 52096
T39S/R12E-sec 35 abb
Lorella Vicinity (near North Canal)
(double completion well, deep portion)
Well Depth = 1,005 ft
Casing Depth = 990 ft
Seal Depth = 950 ft
Aquifer = Black and Brown Basalt (974 to 1,005 ft)
Aquifer Test Influence
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
20
30
40
50
60
70
80
90
100
4140
4130
4120
4110
4100
4090
4080
4070
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

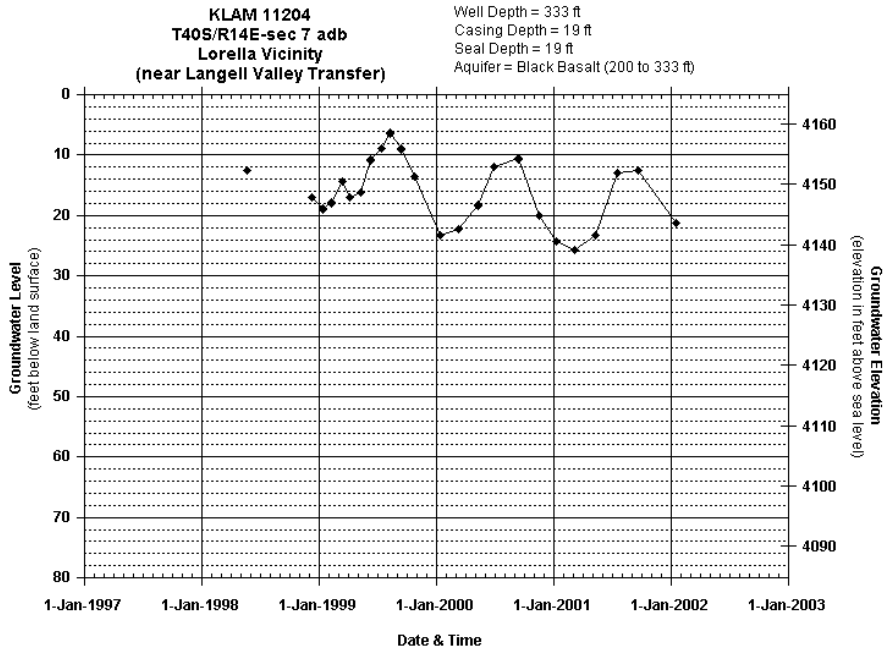

KLAM 10362
T40S/R13E-sec 1 bba
Lorella Vicinity
(E Langell Valley Rd east of Lorella)
Well Depth = 1,200 ft
Casing Depth = 149 ft
Seal Depth = 149 ft
Aquifer = Blue Sandstone (270 to 304 ft)
Measurement difference due to cable slipping
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
5
10
15
20
4140
4135
4130
4125
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

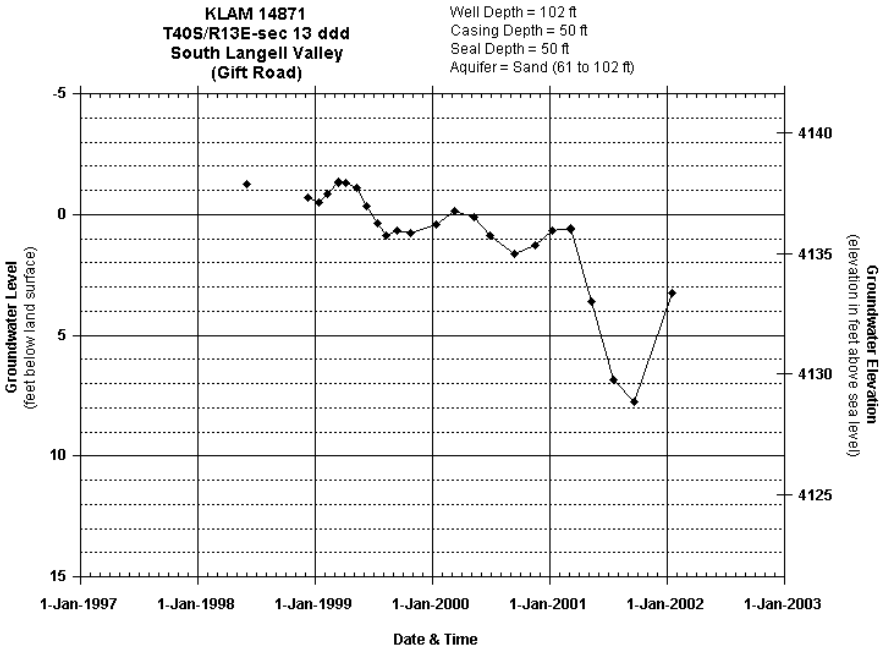

KLAM 10362
T40S/R13E-sec 1 bba
Lorella Vicinity
(E Langell Valley Rd east of Lorella)
Well Depth = 1,200 ft
Casing Depth = 149 ft
Seal Depth = 149 ft
Aquifer = Blue Sandstone (270 to 304 ft)
Measurement difference due to cable slipping
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4140
4130
4120
4110
4100
4090
4080
4070
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

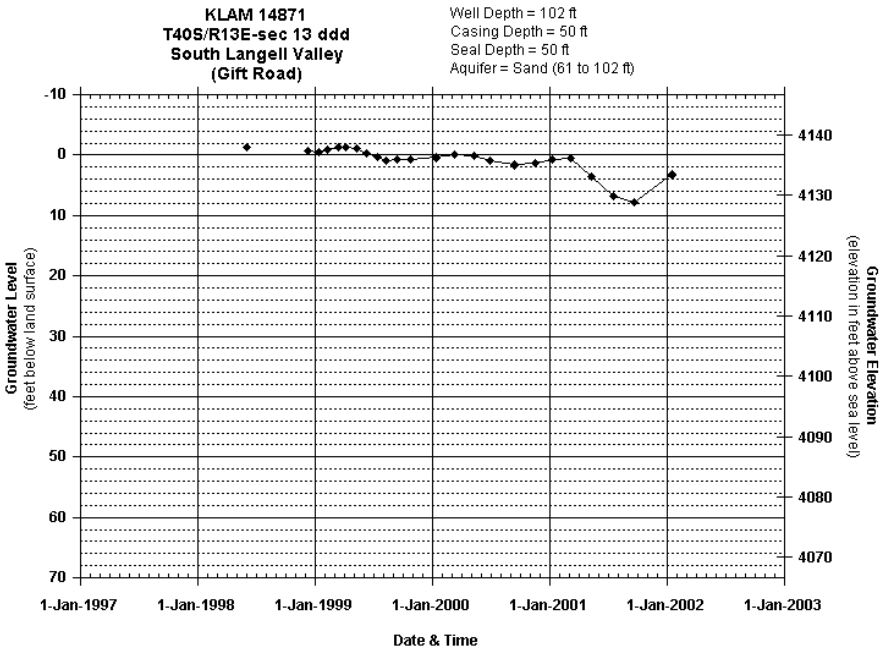

KLAM 14882
T40S/R14E-sec 7 aba
Lorella Vicinity
(near Langell Valley Transfer)
Well Depth = 66 ft
Casing Depth = 19 ft
Seal Depth = 19 ft
Aquifer = Brown and Black Lava (45 to 66 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
15
20
25
30
35
4155
4150
4145
4140
4135
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

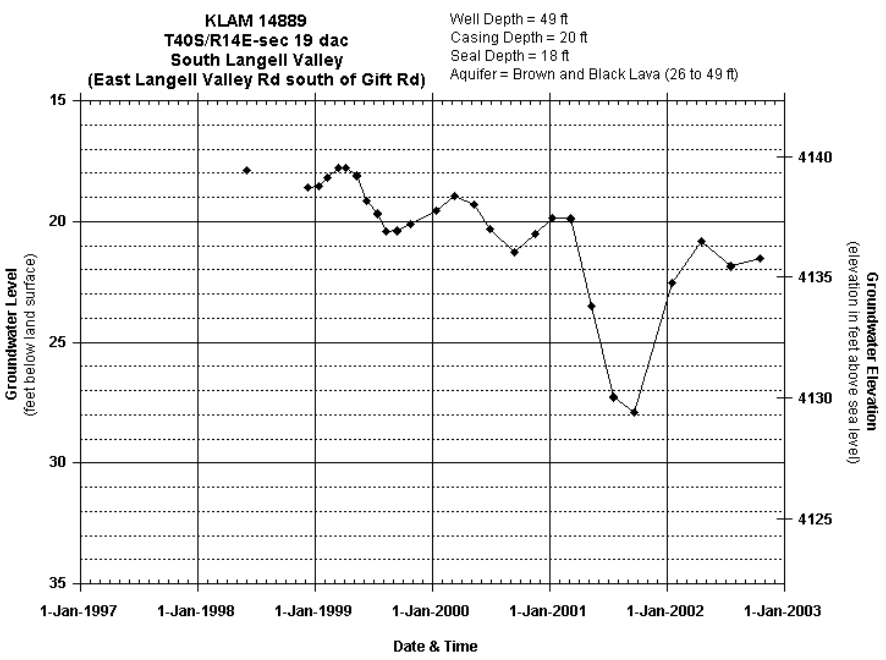

KLAM 14882
T40S/R14E-sec 7 aba
Lorella Vicinity
(near Langell Valley Transfer)
Well Depth = 66 ft
Casing Depth = 19 ft
Seal Depth = 19 ft
Aquifer = Brown and Black Lava (45 to 66 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4170
4160
4150
4140
4130
4120
4110
4100
4090
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

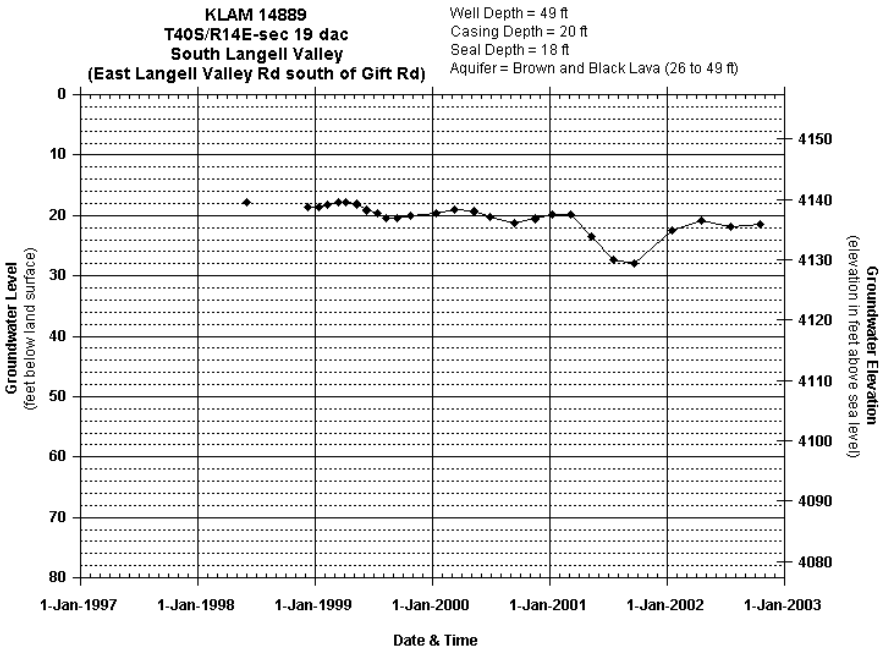

KLAM 11204
T40S/R14E-sec 7 adb
Lorella Vicinity
(near Langell Valley Transfer)
Well Depth = 333 ft
Casing Depth = 19 ft
Seal Depth = 19 ft
Aquifer = Black Basalt (200 to 333 ft)
Groundwater Level
(feet below land surface)
10
15
20
25
Groundwater Elevation
(elevation in feet above sea level)
4155
4150
4145
4140
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

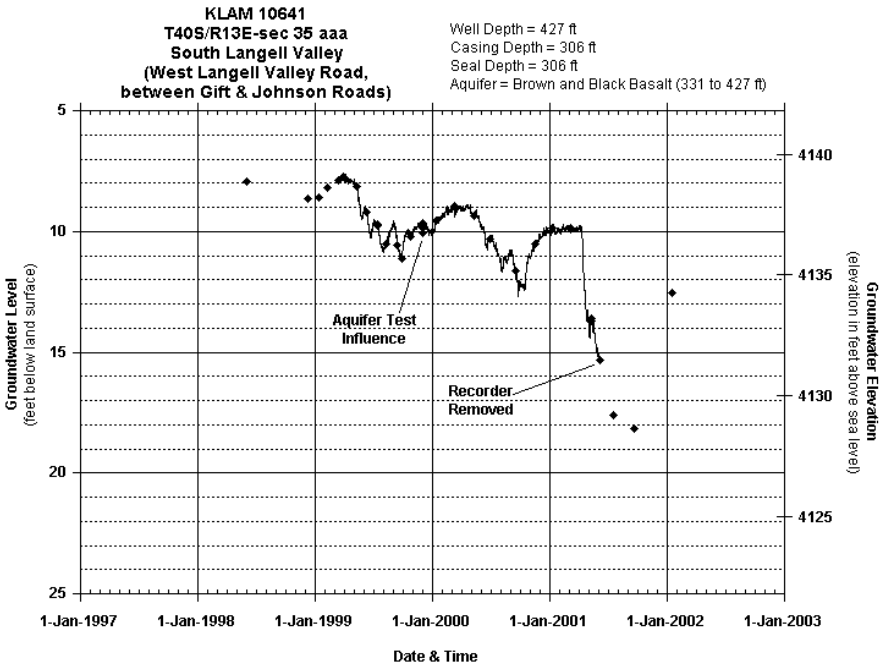

KLAM 11204
T40S/R14E-sec 7 adb
Lorella Vicinity
(near Langell Valley Transfer)
Well Depth = 333 ft
Casing Depth = 19 ft
Seal Depth = 19 ft
Aquifer = Black Basalt (200 to 333 ft)
Groundwater Level
(feet below land surface)
0
10
20
30
40
50
60
70
80
Groundwater Elevation
(elevation in feet above sea level)
4160
4150
4140
4130
4120
4110
4100
4090
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

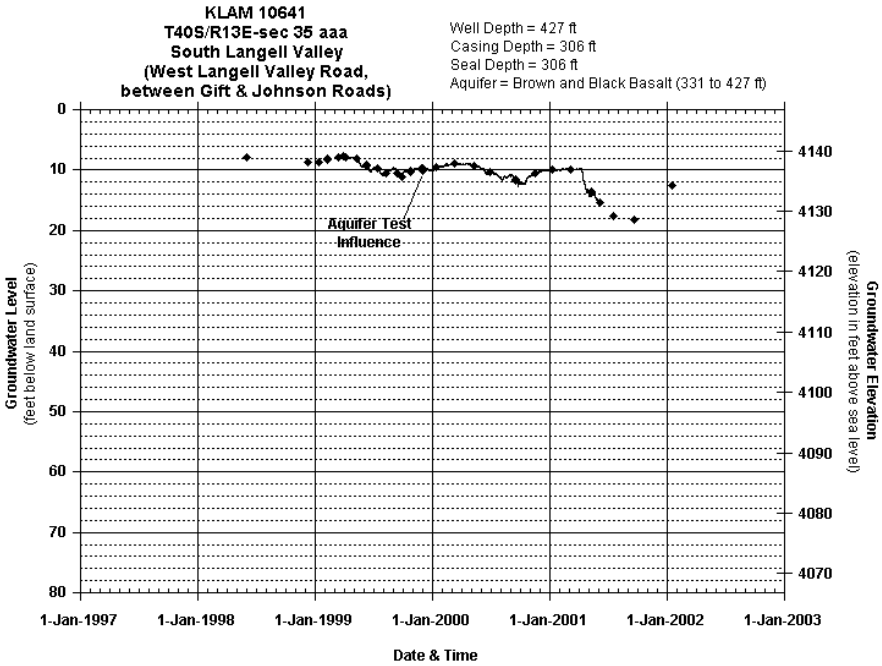

KLAM 14871
T40S/R13E-sec 13 ddd
South Langell Valley
(Gift Road)
Well Depth = 102 ft
Casing Depth = 50 ft
Seal Depth = 50 ft
Aquifer = Sand (61 to 102 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
-5
0
5
10
15
4140
4135
4130
4125
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

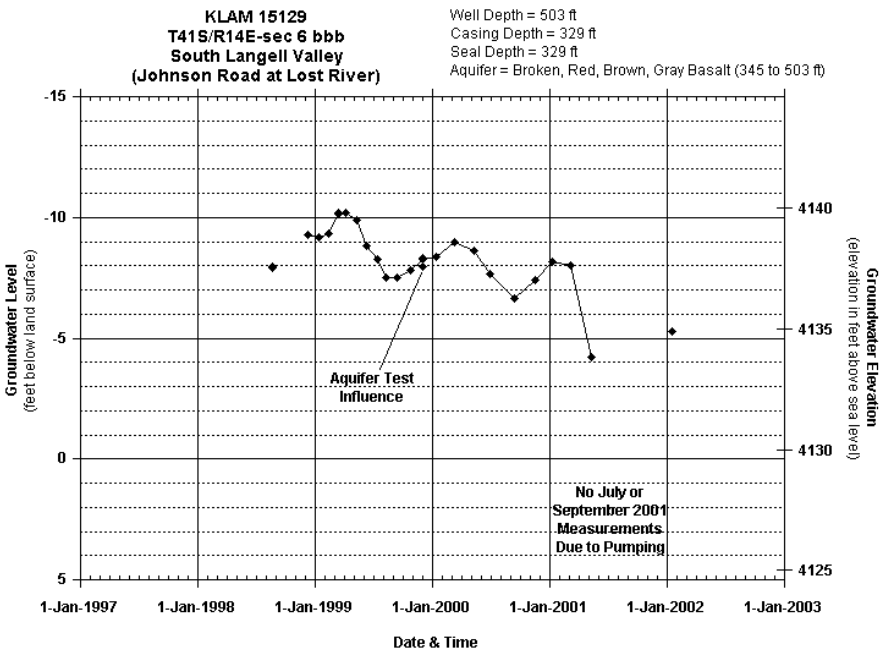

KLAM 14871
T40S/R13E-sec 13 ddd
South Langell Valley
(Gift Road)
Well Depth = 102 ft
Casing Depth = 50 ft
Seal Depth = 50 ft
Aquifer = Sand (61 to 102 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
-10
0
10
20
30
40
50
60
70
4140
4130
4120
4110
4100
4090
4080
4070
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

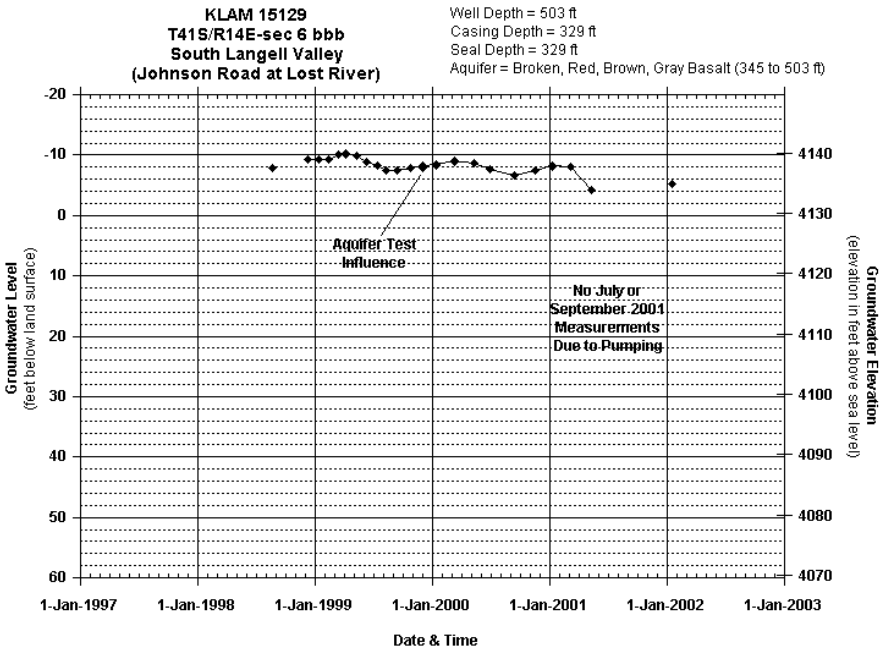

KLAM 14889
T40S/R14E-sec 19 dac
South Langell Valley
(East Langell Valley Rd south of Gift Rd)
Well Depth = 49 ft
Casing Depth = 20 ft
Seal Depth = 18 ft
Aquifer = Brown and Black Lava (26 to 49 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
15
20
25
30
35
4140
4135
4130
4125
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

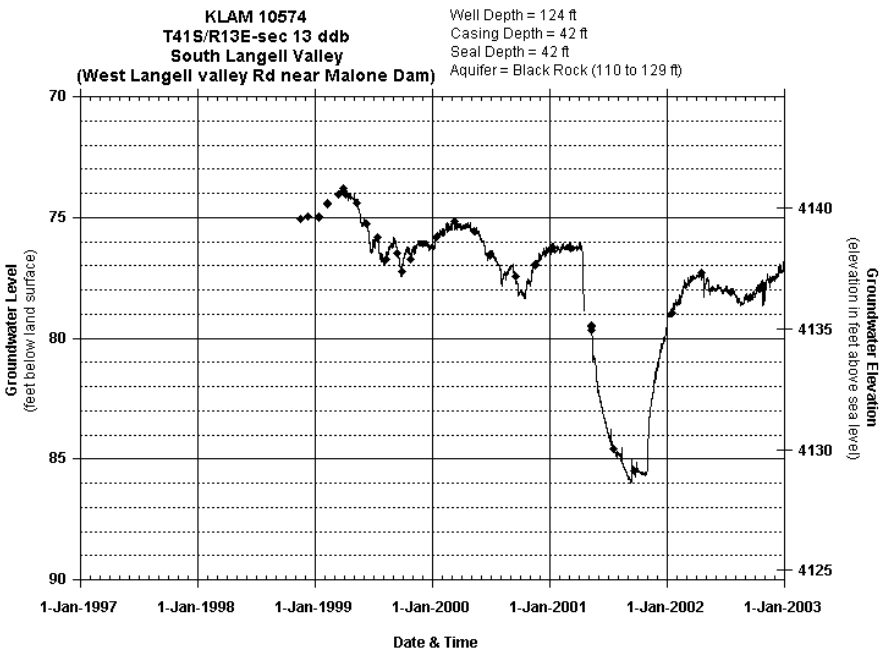

KLAM 14889
T40S/R14E-sec 19 dac
South Langell Valley
(East Langell Valley Rd south of Gift Rd)
Well Depth = 49 ft
Casing Depth = 20 ft
Seal Depth = 18 ft
Aquifer = Brown and Black Lava (26 to 49 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4150
4140
4130
4120
4110
4100
4090
4080
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

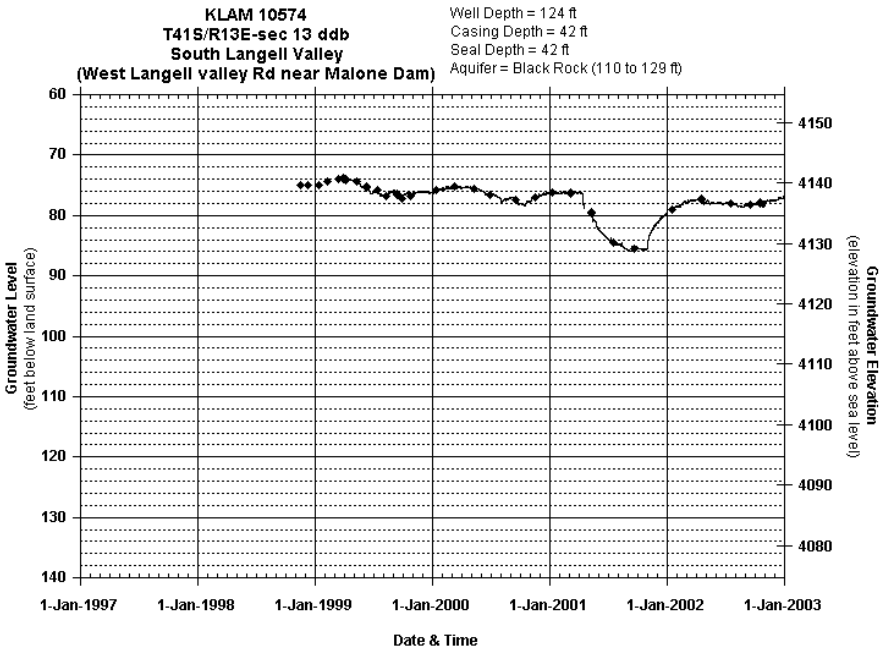

KLAM 10641
T40S/R13E-sec 35 aaa
South Langell Valley
(West Langell Valley Road,
between Gift & Johnson Roads)
Well Depth = 427 ft
Casing Depth = 306 ft
Seal Depth = 306 ft
Aquifer = Brown and Black Basalt (331 to 427 ft)
Aquifer Test Influence
Recorder Removed
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
Date & Time
5
10
15
20
25
4140
4135
4130
4125
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003

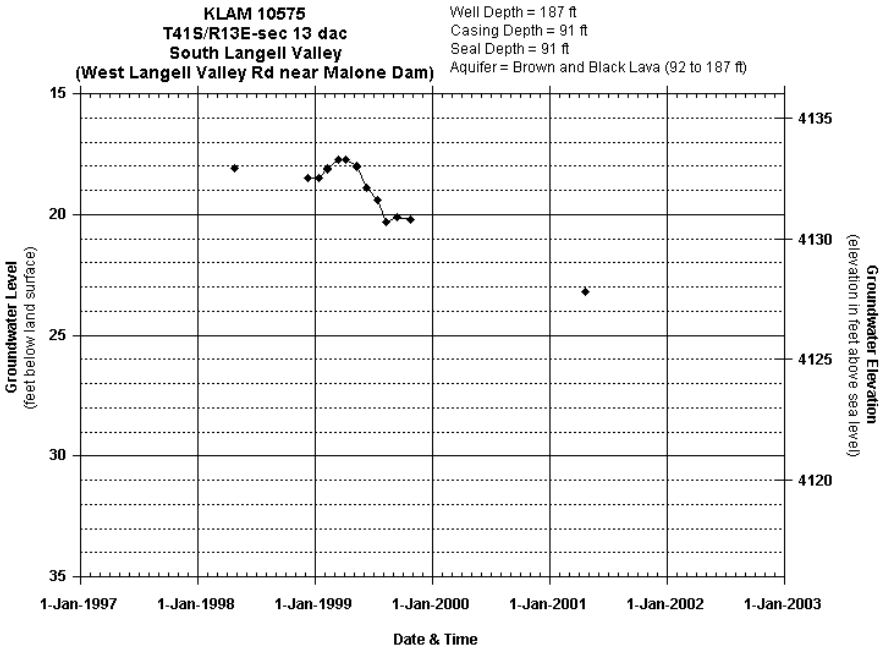

KLAM 10641
T40S/R13E-sec 35 aaa
South Langell Valley
(West Langell Valley Road,
between Gift & Johnson Roads)
Well Depth = 427 ft
Casing Depth = 306 ft
Seal Depth = 306 ft
Aquifer = Brown and Black Basalt (331 to 427 ft)
Aquifer Test Influence
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
Date & Time
0
10
20
30
40
50
60
70
80
4140
4130
4120
4110
4100
4090
4080
4070
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003

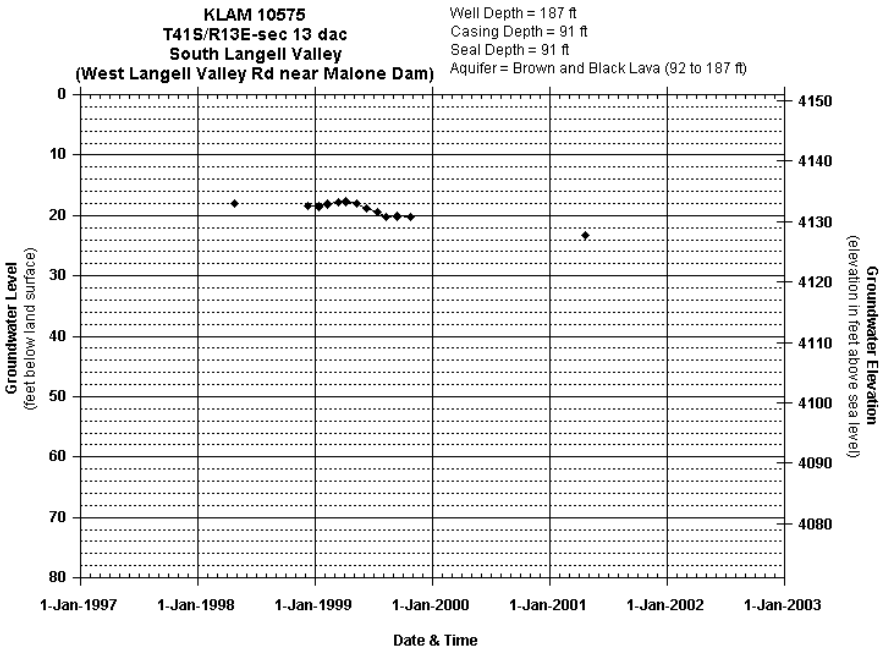

KLAM 15129
T41S/R14E-sec 6 bbb
South Langell Valley
(Johnson Road at Lost River)
Well Depth = 503 ft
Casing Depth = 329 ft
Seal Depth = 329 ft
Aquifer = Broken, Red, Brown, Gray Basalt (345 to 503 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
Aquifer Test Influence
No July or September 2001 Measurements Due to Pumping
Date & Time


KLAM 15129
T41S/R14E-sec 6 bbb
South Langell Valley
(Johnson Road at Lost River)
Well Depth = 503 ft
Casing Depth = 329 ft
Seal Depth = 329 ft
Aquifer = Broken, Red, Brown, Gray Basalt (345 to 503 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
Aquifer Test Influence
No July or September 2001 Measurements Due to Pumping
Date & Time


KLAM 10574
T41S/R13E-sec 13 ddb
South Langell Valley
(West Langell valley Rd near Malone Dam)
Well Depth = 124 ft
Casing Depth = 42 ft
Seal Depth = 42 ft
Aquifer = Black Rock (110 to 129 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
70
75
80
85
90
4140
4135
4130
4125
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time


KLAM 10574
T41S/R13E-sec 13 ddb
South Langell Valley
(West Langell valley Rd near Malone Dam)
Well Depth = 124 ft
Casing Depth = 42 ft
Seal Depth = 42 ft
Aquifer = Black Rock (110 to 129 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
60
70
80
90
100
110
120
130
140
4150
4140
4130
4120
4110
4100
4090
4080
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time


KLAM 10575
T41S/R13E-sec 13 dac
South Langell Valley
(West Langell Valley Rd near Malone Dam)
Well Depth = 187 ft
Casing Depth = 91 ft
Seal Depth = 91 ft
Aquifer = Brown and Black Lava (92 to 187 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
15
20
25
30
35
4135
4130
4125
4120
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time


KLAM 10575
T41S/R13E-sec 13 dac
South Langell Valley
(West Langell Valley Rd near Malone Dam)
Well Depth = 187 ft
Casing Depth = 91 ft
Seal Depth = 91 ft
Aquifer = Brown and Black Lava (92 to 187 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
10
20
30
40
50
60
70
80
4150
4140
4130
4120
4110
4100
4090
4080
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	2259	Devincenzi		USGS	28-Jul-1954		reported			79.60	4,248.00	4,168.40
KLAM	2259	Devincenzi		OWRD-UN	26-Sep-1961		reported			78.65	4,248.00	4,169.35
KLAM	2259	Devincenzi	Harris	USGS	10-Oct-1969		reported			77.96	4,248.00	4,170.04
KLAM	2259	Devencenzi	Harris	USGS	15-Apr-1970		reported			77.20	4,248.00	4,170.80
KLAM	2259	Devincenzi	Harris	USGS	27-Oct-1970		reported			82.01	4,248.00	4,165.99
KLAM	2259	Jespersen-Edgewood Ranch	Miller	OWRD-GW	07-Oct-1998	08:55:00	steel tape	static	S	81.28	4,248.00	4,166.72
KLAM	2259	Jespersen-Edgewood Ranch	Miller	OWRD-GW	07-Oct-1998	08:55:00	calibrated e-tape	static	S	82.79	4,248.00	4,165.21
KLAM	2259	Jespersen-Edgewood Ranch	Glender	OWRD-GW	17-Mar-1999	13:22:00	steel tape	static	S	80.14	4,248.00	4,167.86
KLAM	2259	Jespersen-Edgewood Ranch	Glender	OWRD-GW	26-Oct-1999	09:39:00	steel tape	static and oil	S	82.62	4,248.00	4,165.38
KLAM	2260	Jesperson Edgewood Inc.	Wilson	well-log	23-Feb-1977		reported			118.50	4,289.00	4,170.50
KLAM	2260	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	07-Oct-1998	15:30:00	calibrated e-tape	static	S	125.18	4,289.00	4,163.82
KLAM	2260	Jespersen-Edgewood Ranch	Glender	OWRD-GW	15-Mar-1999	11:10:00	calibrated e-tape	static	S	123.85	4,289.00	4,165.15
KLAM	2260	Jespersen-Edgewood Ranch	Glender	OWRD-GW	26-Oct-1999	10:00:00	calibrated e-tape	static	S	125.23	4,289.00	4,163.77
KLAM	2262	Jesperson Edgewood Inc	Abernethy	well-log	09-Aug-1979		reported			117.00	4,288.00	4,171.00
KLAM	2262	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	07-Oct-1998	13:15:00	calibrated e-tape	static	S	116.69	4,288.00	4,171.31
KLAM	2262	Jespersen-Edgewood Ranch	Gates	OWRD-GW	10-Dec-1998	10:45:00	calibrated e-tape	static	S	115.98	4,288.00	4,172.02
KLAM	2262	Jespersen-Edgewood Ranch	Glender	OWRD-GW	17-Mar-1999	13:40:00	calibrated e-tape	static	S	115.33	4,288.00	4,172.67
KLAM	2262	Jespersen-Edgewood Ranch	Glender	OWRD-GW	26-Oct-1999	09:47:00	calibrated e-tape	static	S	116.81	4,288.00	4,171.19
KLAM	2263	Denvincenzi	Hartley	well-log	15-Oct-1951		reported			45.00	4,218.00	4,173.00
KLAM	2263	Denvincenzi		well-log	04-Sep-1952		reported			45.66	4,218.00	4,172.34
KLAM	2263	Denvincenzi		OWRD-UN	26-Sep-1961		reported			48.00	4,218.00	4,170.00
KLAM	2263	Denvincenzi	Harris	USGS	10-Oct-1969		reported			46.35	4,218.00	4,171.65
KLAM	2263	Denvincenzi		USGS	15-Apr-1970		reported			45.55	4,218.00	4,172.45
KLAM	2263	Denvincenzi		USGS	28-Oct-1970		reported			46.12	4,218.00	4,171.88
KLAM	2263	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	07-Oct-1998	17:20:00	calibrated e-tape	static	S	49.53	4,218.00	4,168.47
KLAM	2263	Jespersen-Edgewood Ranch	Glender	OWRD-GW	15-Mar-1999	10:32:00	calibrated e-tape	static	S	47.95	4,218.00	4,170.05
KLAM	2263	Jespersen-Edgewood Ranch	Glender	OWRD-GW	26-Oct-1999	10:41:00	calibrated e-tape	static	S	49.64	4,218.00	4,168.36
KLAM	2265	Denvincenzi		well-log	17-Nov-1949		reported			54.95	4,214.00	4,159.05
KLAM	2265	Denvincenzi		OWRD-UN	26-Sep-1961		reported			48.00	4,214.00	4,166.00
KLAM	2265	Jespersen-Edgewood Inc.	Storey	well-log	18-Sep-1980		reported			90.00	4,214.00	4,124.00
KLAM	2265	Jespersen-Edgewood Ranch	Miller	OWRD-GW	08-Oct-1998	14:55:00	calibrated e-tape	static	S	91.08	4,214.00	4,122.92
KLAM	2265	Jespersen-Edgewood Ranch	Gates	OWRD-GW	10-Dec-1998	10:15:00	calibrated e-tape	static	S	89.96	4,214.00	4,124.04
KLAM	2265	Jespersen-Edgewood Ranch	Glender	OWRD-GW	17-Mar-1999	09:49:00	steel tape	static	S	88.12	4,214.00	4,125.88
KLAM	2265	Jespersen-Edgewood Ranch	Glender	OWRD-GW	26-Oct-1999	11:14:00	calibrated e-tape	static	S	90.99	4,214.00	4,123.01
KLAM	2269	Marengo		OWRD-UN	26-Sep-1961		reported			78.06	4,256.00	4,177.94
KLAM	2269	Golden	Harris	USGS	10-Oct-1969		reported			80.89	4,256.00	4,175.11
KLAM	2269	Golden		USGS	19-Apr-1970		reported			80.10	4,256.00	4,175.90

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	2269	Golden		USGS	29-Oct-1970		reported			80.37	4,256.00	4,175.63
KLAM	2269	Jespersen-Edgewood Ranch	Miller	OWRD-GW	08-Oct-1998	10:30:00	calibrated e-tape	static	S	85.89	4,256.00	4,170.11
KLAM	2269	Jespersen-Edgewood Ranch	Miller	OWRD-GW	08-Oct-1998	10:30:00	steel tape	static	S	84.45	4,256.00	4,171.55
KLAM	2269	Jespersen-Edgewood Ranch	Glender	OWRD-GW	17-Mar-1999	12:54:00	steel tape	static	S	82.93	4,256.00	4,173.07
KLAM	2269	Jespersen-Edgewood Ranch	Glender	OWRD-GW	26-Oct-1999	09:26:00	steel tape	static	S	84.33	4,256.00	4,171.67
KLAM	2277	Jespersen & Edgewood	DeSpain	well-log	14-Dec-1987		reported			25.00	4,193.00	4,168.00
KLAM	2277	Jespersen & Edgewood	Grondin	OWRD-GW	13-Aug-1998		calibrated e-tape	static	S	29.32	4,193.00	4,163.68
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	10-Dec-1998	09:30:00	calibrated e-tape	static	S	27.97	4,193.00	4,165.03
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	13-Jan-1999	12:35:00	calibrated e-tape	static	S	27.64	4,193.00	4,165.36
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	12-Feb-1999	11:16:00	calibrated e-tape	static	S	27.49	4,193.00	4,165.51
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	17-Mar-1999	17:24:00	calibrated e-tape	static	S	27.14	4,193.00	4,165.86
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	06-Apr-1999	19:00:00	calibrated e-tape	static	S	27.05	4,193.00	4,165.95
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	13-May-1999	11:10:00	calibrated e-tape	idle/static	S	26.73	4,193.00	4,166.27
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	10-Jun-1999	12:10:00	calibrated e-tape	recently pumped	R	28.23	4,193.00	4,164.77
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	14-Jul-1999	18:24:00	calibrated e-tape	idle/static	S	28.99	4,193.00	4,164.01
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	11-Aug-1999	17:23:00	calibrated e-tape	idle	S	29.06	4,193.00	4,163.94
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	15-Sep-1999	14:25:00	calibrated e-tape	idle	S	29.21	4,193.00	4,163.79
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	27-Oct-1999	19:04:00	calibrated e-tape	idle	S	28.64	4,193.00	4,164.36
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	13-Jan-2000	16:35:00	calibrated e-tape	idle	S	27.51	4,193.00	4,165.49
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	07-Mar-2000	09:34:00	calibrated e-tape	idle	S	27.14	4,193.00	4,165.86
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	10-May-2000	14:42:00	calibrated e-tape	idle	S	26.67	4,193.00	4,166.33
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	28-Jun-2000	14:05:00	calibrated e-tape	idle	S	29.45	4,193.00	4,163.55
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	13-Sep-2000	15:03:00	calibrated e-tape	idle	S	29.60	4,193.00	4,163.40
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	16-Nov-2000	13:08:00	calibrated e-tape	idle	S	28.54	4,193.00	4,164.46
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	11-Jan-2001	10:22:00	calibrated e-tape	idle	S	27.74	4,193.00	4,165.26
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	08-Mar-2001	15:53:00	calibrated e-tape	idle	S	27.59	4,193.00	4,165.41
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	10-May-2001	14:58:00	calibrated e-tape	idle	S	28.72	4,193.00	4,164.28
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	16-Jul-2001	16:20:00	calibrated e-tape	idle	S	31.28	4,193.00	4,161.72
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	17-Sep-2001	14:40:00	calibrated e-tape	idle	S	30.72	4,193.00	4,162.28
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	14-Jan-2002	17:47:00	calibrated e-tape	idle	S	28.70	4,193.00	4,164.30
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	17-Apr-2002	15:01:00	calibrated e-tape	idle	S	28.29	4,193.00	4,164.71
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	15-Jul-2002	14:14:00	calibrated e-tape	idle	S	31.55	4,193.00	4,161.45
KLAM	2277	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	14-Oct-2002	14:43:00	calibrated e-tape	idle	S	31.00	4,193.00	4,162.00
KLAM	2288	Devincenzi	USGS	well-log	19-Nov-1949		reported			28.01	4,186.00	4,157.99
KLAM	2288	Jespersen & Edgewood	Grondin	OWRD-GW	13-Aug-1998		calibrated e-tape	static	S	26.04	4,186.00	4,159.96
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	10-Dec-1998	10:00:00	calibrated e-tape	static	S	15.41	4,186.00	4,170.59
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	13-Jan-1999	12:00:00	calibrated e-tape	static	S	20.69	4,186.00	4,165.31
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	12-Feb-1999	10:54:00	calibrated e-tape	static	S	11.54	4,186.00	4,174.46
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	17-Mar-1999	10:54:00	calibrated e-tape	static	S	1.71	4,186.00	4,184.29
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	06-Apr-1999	18:35:00	calibrated e-tape	static	S	10.23	4,186.00	4,175.77

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	13-May-1999	10:45:00	calibrated e-tape	idle/static	S	19.96	4,186.00	4,166.04
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	10-Jun-1999	10:35:00	calibrated e-tape	idle/static	S	23.58	4,186.00	4,162.42
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	14-Jul-1999	17:55:00	calibrated e-tape	idle/static	S	25.07	4,186.00	4,160.93
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	11-Aug-1999	16:53:00	calibrated e-tape	idle	S	25.00	4,186.00	4,161.00
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	15-Sep-1999	14:13:00	calibrated e-tape	idle	S	24.73	4,186.00	4,161.27
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	27-Oct-1999	09:16:00	calibrated e-tape	idle	S	24.84	4,186.00	4,161.16
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	13-Jan-2000	16:16:00	calibrated e-tape	idle	S	13.30	4,186.00	4,172.70
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	07-Mar-2000	09:12:00	calibrated e-tape	idle	S	10.56	4,186.00	4,175.44
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	10-May-2000	14:26:00	calibrated e-tape	idle	S	21.36	4,186.00	4,164.64
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	28-Jun-2000	14:39:00	calibrated e-tape	idle	S	22.46	4,186.00	4,163.54
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	13-Sep-2000	14:48:00	calibrated e-tape	idle	S	25.40	4,186.00	4,160.60
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	16-Nov-2000	12:50:00	calibrated e-tape	idle	S	27.05	4,186.00	4,158.95
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	11-Jan-2001	10:01:00	calibrated e-tape	idle	S	26.43	4,186.00	4,159.57
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	08-Mar-2001	15:35:00	calibrated e-tape	idle	S	22.62	4,186.00	4,163.38
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	10-May-2001	14:35:00	calibrated e-tape	idle	S	25.29	4,186.00	4,160.71
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	16-Jul-2001	15:52:00	calibrated e-tape	idle	S	27.22	4,186.00	4,158.78
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	17-Sep-2001	14:17:00	calibrated e-tape	idle	S	28.85	4,186.00	4,157.15
KLAM	2288	Jespersen-Edgewood Ranch	Grondin	OWRD-GW	14-Jan-2002	17:23:00	calibrated e-tape	idle	S	16.73	4,186.00	4,169.27
KLAM	2289	Coleman		USGS	22-Aug-1949		reported			23.11	4,227.00	4,203.89
KLAM	2289	Coleman		OWRD-GW	27-Sep-1961		reported			19.18	4,227.00	4,207.82
KLAM	2289	Coleman	Harris	USGS	10-Oct-1969		reported			26.93	4,227.00	4,200.07
KLAM	2289	Coleman		USGS	14-Apr-1970		reported			25.40	4,227.00	4,201.60
KLAM	2289	Coleman		USGS	29-Oct-1970		reported			30.22	4,227.00	4,196.78
KLAM	2289	Jeld-Wen Inc.	Miller	OWRD-GW	15-Oct-1998	11:10:00	calibrated e-tape	static	S	53.07	4,227.00	4,173.93
KLAM	2289	Jeld-Wen Inc.	Gates	OWRD-GW	10-Dec-1998	09:45:00	calibrated e-tape	static	S	52.06	4,227.00	4,174.94
KLAM	2289	Jeld-Wen Inc.	Glender	OWRD-GW	15-Mar-1999	15:50:00	calibrated e-tape	static	S	50.77	4,227.00	4,176.23
KLAM	2289	Jeld-Wen Inc.	Glender	OWRD-GW	26-Oct-1999	08:50:00	calibrated e-tape	static	S	54.02	4,227.00	4,172.98
KLAM	2368	Chapman	Harris	USGS	14-Apr-1970		reported			135.48	4,240.00	4,104.52
KLAM	2368	Chapman		USGS	07-Oct-1970		reported			124.36	4,240.00	4,115.64
KLAM	2368	Jeld-Wen Inc.	Grondin	OWRD-GW	28-Oct-1998	09:15:00	airline	static	S	123.60	4,240.00	4,116.40
KLAM	2368	Jeld-Wen Inc.	Norton	OWRD-GW	17-Mar-1999	13:05:00	airline	idle	S	121.87	4,240.00	4,118.13
KLAM	2368	Jeld-Wen Inc.	Grondin	OWRD-GW	27-Oct-1999	11:42:00	airline	idle	S	123.95	4,240.00	4,116.05
KLAM	2379	Schreiner		well-log	15-Aug-1953		reported			154.00	4,272.00	4,118.00
KLAM	2379	Schreiner		USGS	27-Apr-1978		reported			156.00	4,272.00	4,116.00
KLAM	2379	Sierra-Cascade Nursery, Inc.	Grondin	OWRD-GW	26-Oct-1998	15:25:00	steel tape	static	S	156.27	4,272.00	4,115.73
KLAM	2379	Sierra-Cascade Nursery, Inc.	Sparks	OWRD-GW	17-Mar-1999	09:40:00	steel tape	static	S	154.51	4,272.00	4,117.49
KLAM	2379	Sierra-Cascade Nursery, Inc.	Gall	OWRD-GW	27-Oct-1999	09:30:00	steel tape	pumping	F		4,272.00	
KLAM	10015	Freitag	Sevey	well-log	12-Apr-1990		reported			35.00	4,145.10	4,110.10

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Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	10015	Freitag	Grondin	OWRD-GW	03-Jun-1998	12:50:00	calibrated e-tape	static	S	33.34	4,145.10	4,111.76
KLAM	10015	Freitag	Grondin	OWRD-GW	10-Dec-1998	16:45:00	calibrated e-tape	static	S	34.95	4,145.10	4,110.15
KLAM	10015	Freitag	Grondin	OWRD-GW	14-Jan-1999	15:13:00	calibrated e-tape	static	S	34.62	4,145.10	4,110.48
KLAM	10015	Freitag	Grondin	OWRD-GW	11-Feb-1999		no measurement				4,145.10	
KLAM	10015	Freitag	Grondin	OWRD-GW	17-Mar-1999	12:52:00	calibrated e-tape	static	S	33.51	4,145.10	4,111.59
KLAM	10015	Freitag	Grondin	OWRD-GW	07-Apr-1999	11:34:00	calibrated e-tape	static	S	32.93	4,145.10	4,112.17
KLAM	10015	Freitag	Grondin	OWRD-GW	12-May-1999	14:14:00	calibrated e-tape	idle/static	S	33.13	4,145.10	4,111.97
KLAM	10015	Freitag	Grondin	OWRD-GW	09-Jun-1999	14:25:00	calibrated e-tape	idle/static	S	34.47	4,145.10	4,110.63
KLAM	10015	Freitag	Grondin	OWRD-GW	14-Jul-1999			no measurement			4,145.10	
KLAM	10080	Jeld-Wen Inc.	Hill	well-log	05-Mar-1990		reported			119.00	4,229.20	4,110.20
KLAM	10080	Jeld-Wen Inc.	Grondin	OWRD-GW	28-Oct-1998	12:25:00	calibrated e-tape	static	S	118.17	4,229.20	4,111.03
KLAM	10080	Jeld-Wen Inc.	Gates	OWRD-GW	11-Dec-1998	08:45:00	calibrated e-tape	static	S	117.63	4,229.20	4,111.57
KLAM	10080	Jeld-Wen Inc.	Sparks	OWRD-GW	16-Mar-1999	11:35:00	calibrated e-tape	static	S	116.38	4,229.20	4,112.82
KLAM	10080	Jeld-Wen Inc.	Gall	OWRD-GW	26-Oct-1999	11:15:00	calibrated e-tape	idle and oil	S	118.23	4,229.20	4,110.97
KLAM	10082	Jeld-Wen Inc.	Hill	well-log	28-Feb-1989		reported			48.75	4,220.00	4,171.25
KLAM	10082	Jeld-Wen Inc.	Miller	OWRD-GW	15-Oct-1998	09:10:00	calibrated e-tape	static	S	61.27	4,220.00	4,158.73
KLAM	10082	Jeld-Wen Inc.	Gates	OWRD-GW	10-Dec-1998	11:10:00	calibrated e-tape	static	S	58.50	4,220.00	4,161.50
KLAM	10082	Jeld-Wen Inc.	Glender	OWRD-GW	15-Mar-1999	16:05:00	calibrated e-tape	static	S	55.42	4,220.00	4,164.58
KLAM	10082	Jeld-Wen Inc.	Glender	OWRD-GW	26-Oct-1999	09:14:00	calibrated e-tape	static	S	62.31	4,220.00	4,157.69
KLAM	10122	Fore	Sevey	well-log	15-Nov-1990		reported			67.00	4,192.40	4,125.40
KLAM	10122	Fore	Grondin	OWRD-GW	29-Sep-1998	16:40:00	calibrated e-tape	static	S	66.25	4,192.40	4,126.15
KLAM	10122	Fore	Norton	OWRD-GW	16-Mar-1999	15:45:00	calibrated e-tape	idle	S	65.45	4,192.40	4,126.95
KLAM	10122	Fore	Gall	OWRD-GW	25-Oct-1999	09:25:00	calibrated e-tape	static	S	66.60	4,192.40	4,125.80
KLAM	10159	Wells Farms, Inc.	Sevey	well-log	28-Mar-1991		reported			22.00	4,112.00	4,090.00
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	09-Jun-1998	10:42:00	calibrated e-tape	static	S	7.00	4,112.00	4,105.00
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	07-Dec-1998	15:35:00	calibrated e-tape	static	S	7.53	4,112.00	4,104.47
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	11-Jan-1999	15:48:00	calibrated e-tape	static	S	7.81	4,112.00	4,104.19
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	08-Feb-1999	18:35:00	calibrated e-tape	recently pumped	S	7.32	4,112.00	4,104.68
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	15-Mar-1999	10:48:00	calibrated e-tape	static	S	7.14	4,112.00	4,104.86
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	05-Apr-1999	20:03:00	calibrated e-tape	static	S	7.32	4,112.00	4,104.68
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	10-May-1999	20:00:00	calibrated e-tape	static	S	7.78	4,112.00	4,104.22
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	07-Jun-1999	19:50:00	calibrated e-tape	static	S	7.53	4,112.00	4,104.47
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	12-Jul-1999	20:16:00	calibrated e-tape	idle	S	7.50	4,112.00	4,104.50
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	09-Aug-1999	21:01:00	calibrated e-tape	idle	S	7.65	4,112.00	4,104.35
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	13-Sep-1999	20:07:00	calibrated e-tape	idle	S	8.09	4,112.00	4,103.91
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	27-Oct-1999	16:10:00	calibrated e-tape	idle	S	7.85	4,112.00	4,104.15
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	10-Jan-2000	17:51:00	calibrated e-tape	idle	S	8.82	4,112.00	4,103.18
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	06-Mar-2000	19:40:00	calibrated e-tape	idle	S	8.31	4,112.00	4,103.69

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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	08-May-2000	19:50:00	calibrated e-tape	recently pumped	R	8.87	4,112.00	4,103.13
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	26-Jun-2000	19:22:00	calibrated e-tape	idle	S	8.17	4,112.00	4,103.83
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	11-Sep-2000	20:53:00	calibrated e-tape	idle	S	7.67	4,112.00	4,104.33
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	13-Nov-2000	18:10:00	calibrated e-tape	idle	S	8.63	4,112.00	4,103.37
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	09-Jan-2001	18:09:00	calibrated e-tape	recently pumped	R	9.49	4,112.00	4,102.51
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	05-Mar-2001	19:03:00	calibrated e-tape	idle	S	10.19	4,112.00	4,101.81
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	07-May-2001	20:28:00	calibrated e-tape	idle	S	12.00	4,112.00	4,100.00
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	17-Jul-2001	19:53:00	calibrated e-tape	idle	S	11.31	4,112.00	4,100.69
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	19-Sep-2001	21:27:00	calibrated e-tape	idle	S	13.77	4,112.00	4,098.23
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	15-Jan-2002	18:55:00	calibrated e-tape	idle	S	14.67	4,112.00	4,097.33
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	15-Apr-2002	18:09:00	calibrated e-tape	idle	S	19.48	4,112.00	4,092.52
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	15-Jul-2002	17:08:00	calibrated e-tape	idle	S	12.46	4,112.00	4,099.54
KLAM	10159	Wells Farms, Inc.	Grondin	OWRD-GW	14-Oct-2002	18:00:00	calibrated e-tape	idle	S	11.94	4,112.00	4,100.06
KLAM	10175	Cheyne	Chancellor	well-log	16-Apr-1991		reported			98.00	4,213.20	4,115.20
KLAM	10175	Cheyne	Grondin	OWRD-GW	17-Sep-1998	10:45:00	calibrated e-tape	static	S	98.29	4,213.20	4,114.91
KLAM	10175	Cheyne	Norton	OWRD-GW	16-Mar-1999	15:18:00	calibrated e-tape	idle	S	96.79	4,213.20	4,116.41
KLAM	10175	Cheyne	Gall	OWRD-GW	25-Oct-1999	08:50:00	calibrated e-tape	static	S	97.97	4,213.20	4,115.23
KLAM	10181	Jeld-Wen Inc.	Hill	well-log	11-Dec-1990		reported			198.00	4,309.20	4,111.20
KLAM	10181	Jeld-Wen Inc.	Grondin	OWRD-GW	27-Oct-1998	11:42:00	calibrated e-tape	static	S	198.26	4,309.20	4,110.94
KLAM	10181	Jeld-Wen Inc.	Gates	OWRD-GW	11-Dec-1998	10:05:00	calibrated e-tape	static	S	197.68	4,309.20	4,111.52
KLAM	10181	Jeld-Wen Inc.	Sparks	OWRD-GW	16-Mar-1999	10:10:00	calibrated e-tape	static	S	196.57	4,309.20	4,112.63
KLAM	10181	Jeld-Wen Inc.	Gall	OWRD-GW	25-Oct-1999	15:30:00	calibrated e-tape	idle	S	198.59	4,309.20	4,110.61
KLAM	10242	Downing	Sevey	well-log	15-Jul-1991		reported			11.00	4,118.90	4,107.90
KLAM	10242	Wells	Grondin	OWRD-GW	13-Oct-1998	12:50:00	calibrated e-tape	static	S	9.18	4,118.90	4,109.72
KLAM	10242	Wells	Gates	OWRD-GW	09-Dec-1998	14:05:00	calibrated e-tape	static	S	8.58	4,118.90	4,110.32
KLAM	10242	Wells	Gates	OWRD-GW	16-Mar-1999	08:50:00	calibrated e-tape	static	S	7.22	4,118.90	4,111.68
KLAM	10242	Wells	Norton	OWRD-GW	26-Oct-1999	12:50:00	calibrated e-tape	idle	S	8.98	4,118.90	4,109.92
KLAM	10252	Lost River Ranch	Storey	well-log	02-Aug-1991		reported			41.00	4,134.60	4,093.60
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	10-Jun-1998	11:50:00	calibrated e-tape	static	S	36.25	4,134.60	4,098.35
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	08-Dec-1998	09:15:00	calibrated e-tape	static	S	38.72	4,134.60	4,095.88
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	14-Jan-1999	09:45:00	calibrated e-tape	static	S	38.18	4,134.60	4,096.42
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	01-Feb-1999	14:16:00	calibrated e-tape	static	S	37.87	4,134.60	4,096.73
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	01-Feb-1999	14:26:00	calibrated e-tape	static	S	37.87	4,134.60	4,096.73
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	03-Feb-1999	16:45:00	calibrated e-tape	static	S	37.66	4,134.60	4,096.94
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	03-Feb-1999	17:10:00	calibrated e-tape	static	S	37.66	4,134.60	4,096.94
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	04-Feb-1999	10:20:00	calibrated e-tape	static	S	37.75	4,134.60	4,096.85
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	10-Feb-1999	09:56:00	calibrated e-tape	static	S	37.75	4,134.60	4,096.85
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	15-Mar-1999	17:12:00	calibrated e-tape	static	S	36.41	4,134.60	4,098.19

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	01-Apr-1999	14:27:00	calibrated e-tape	static	S	36.08	4,134.60	4,098.52
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	05-Apr-1999	19:18:00	calibrated e-tape	static	S	36.01	4,134.60	4,098.59
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	10-May-1999	18:30:00	calibrated e-tape	static	S	35.72	4,134.60	4,098.88
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	07-Jun-1999	21:27:00	calibrated e-tape	static	S	35.66	4,134.60	4,098.94
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	12-Jul-1999	18:46:00	calibrated e-tape	idle/static	S	36.90	4,134.60	4,097.70
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	09-Aug-1999	20:05:00	calibrated e-tape	idle	S	38.36	4,134.60	4,096.24
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	15-Sep-1999	17:11:00	calibrated e-tape	idle	S	39.46	4,134.60	4,095.14
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	27-Sep-1999	14:47:00	calibrated e-tape	idle	S	39.65	4,134.60	4,094.95
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	27-Oct-1999	13:56:00	calibrated e-tape	idle	S	39.44	4,134.60	4,095.16
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	13-Dec-1999	16:03:00	calibrated e-tape	idle	S	39.04	4,134.60	4,095.56
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	14-Dec-1999	11:00:00	shaft encoder	idle	S	38.99	4,134.60	4,095.61
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	15-Dec-1999	11:00:00	shaft encoder	nearby recently pumped	F	40.57	4,134.60	4,094.03
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	16-Dec-1999	11:00:00	shaft encoder	idle	R	39.42	4,134.60	4,095.18
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	16-Dec-1999	12:33:00	calibrated e-tape	idle	S	39.42	4,134.60	4,095.18
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	12-Jan-2000	15:12:00	calibrated e-tape	idle	S	38.97	4,134.60	4,095.63
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	06-Mar-2000	18:10:00	calibrated e-tape	idle	S	37.63	4,134.60	4,096.97
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	08-May-2000	15:36:00	calibrated e-tape	idle	S	36.88	4,134.60	4,097.72
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	26-Jun-2000	15:19:00	calibrated e-tape	idle	S	38.05	4,134.60	4,096.55
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	13-Sep-2000	15:48:00	calibrated e-tape	idle	S	41.19	4,134.60	4,093.41
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	16-Nov-2000	09:54:00	calibrated e-tape	idle	S	41.43	4,134.60	4,093.17
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	09-Jan-2001	17:06:00	calibrated e-tape	idle	S	39.92	4,134.60	4,094.68
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	05-Mar-2001	17:20:00	calibrated e-tape	idle	S	39.06	4,134.60	4,095.54
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	07-May-2001	19:46:00	calibrated e-tape	idle	S	43.77	4,134.60	4,090.83
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	18-Jul-2001	18:39:00	calibrated e-tape	idle	S	45.62	4,134.60	4,088.98
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	20-Sep-2001	09:17:00	calibrated e-tape	idle	S	47.40	4,134.60	4,087.20
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	15-Oct-2001	14:19:00	calibrated e-tape	idle	S	47.54	4,134.60	4,087.06
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	16-Jan-2002	17:52:00	calibrated e-tape	idle	S	44.00	4,134.60	4,090.60
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	18-Jan-2002	11:45:00	calibrated e-tape	idle	S	43.98	4,134.60	4,090.62
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	15-Apr-2002	17:07:00	calibrated e-tape	idle	S	40.63	4,134.60	4,093.97
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	15-Jul-2002	16:36:00	calibrated e-tape	idle	S	41.87	4,134.60	4,092.73
KLAM	10252	Lost River Ranch	Grondin	OWRD-GW	14-Oct-2002	16:38:00	calibrated e-tape	idle	S	43.91	4,134.60	4,090.69
KLAM	10258	DeJong	DeSpain	well-log	16-Aug-1991		reported			47.00	4,153.00	4,106.00
KLAM	10258	DeJong	Grondin	OWRD-GW	03-Jun-1998		calibrated e-tape	recently pumped	S	36.11	4,153.00	4,116.89
KLAM	10258	DeJong	Grondin	OWRD-GW	10-Dec-1998	17:39:00	calibrated e-tape	appears static	S	34.02	4,153.00	4,118.98
KLAM	10258	DeJong	Grondin	OWRD-GW	14-Jan-1999	16:35:00	calibrated e-tape	static	S	42.14	4,153.00	4,110.86
KLAM	10258	DeJong	Grondin	OWRD-GW	11-Feb-1999	13:10:00	calibrated e-tape	static	S	41.98	4,153.00	4,111.02
KLAM	10258	DeJong	Grondin	OWRD-GW	15-Mar-1999	12:55:00	calibrated e-tape	static	S	40.98	4,153.00	4,112.02
KLAM	10258	DeJong	Grondin	OWRD-GW	05-Apr-1999	14:49:00	calibrated e-tape	static	S	40.48	4,153.00	4,112.52
KLAM	10258	DeJong	Grondin	OWRD-GW	12-May-1999	15:02:00	calibrated e-tape	idle/static	S	40.72	4,153.00	4,112.28
KLAM	10258	DeJong	Grondin	OWRD-GW	07-Jun-1999	20:33:00	calibrated e-tape	static	S	42.32	4,153.00	4,110.68
KLAM	10258	DeJong	Grondin	OWRD-GW	12-Jul-1999	18:17:00	calibrated e-tape	idle	S	44.12	4,153.00	4,108.88

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	10258	DeJong	Grondin	OWRD-GW	09-Aug-1999	19:35:00	calibrated e-tape	idle	S	43.63	4,153.00	4,109.37
KLAM	10258	DeJong	Grondin	OWRD-GW	14-Sep-1999	18:55:00	calibrated e-tape	idle	S	43.49	4,153.00	4,109.51
KLAM	10258	DeJong	Grondin	OWRD-GW	26-Oct-1999	16:48:00	calibrated e-tape	idle	S	42.92	4,153.00	4,110.08
KLAM	10258	DeJong	Grondin	OWRD-GW	12-Jan-2000	14:45:00	calibrated e-tape	idle	S	42.25	4,153.00	4,110.75
KLAM	10258	DeJong	Grondin	OWRD-GW	06-Mar-2000	17:02:00	calibrated e-tape	idle	S	41.61	4,153.00	4,111.39
KLAM	10258	DeJong	Grondin	OWRD-GW	08-May-2000	18:12:00	calibrated e-tape	idle	S	41.93	4,153.00	4,111.07
KLAM	10258	DeJong	Grondin	OWRD-GW	26-Jun-2000	16:37:00	calibrated e-tape	idle	S	44.45	4,153.00	4,108.55
KLAM	10258	DeJong	Grondin	OWRD-GW	11-Sep-2000	16:48:00	calibrated e-tape	idle	S	44.29	4,153.00	4,108.71
KLAM	10258	DeJong	Grondin	OWRD-GW	16-Nov-2000	10:45:00	calibrated e-tape	idle	S	43.52	4,153.00	4,109.48
KLAM	10258	DeJong	Grondin	OWRD-GW	10-Jan-2001	15:50:00	calibrated e-tape	idle	S	42.91	4,153.00	4,110.09
KLAM	10258	DeJong	Grondin	OWRD-GW	05-Mar-2001	16:45:00	calibrated e-tape	idle	S	42.79	4,153.00	4,110.21
KLAM	10258	DeJong	Grondin	OWRD-GW	07-May-2001	17:45:00	calibrated e-tape	idle	S	44.33	4,153.00	4,108.67
KLAM	10258	DeJong	Grondin	OWRD-GW	18-Jul-2001	14:25:00	calibrated e-tape	recently pumped	S	46.80	4,153.00	4,106.20
KLAM	10258	DeJong	Grondin	OWRD-GW	19-Sep-2001	13:26:00	calibrated e-tape	idle	S	46.93	4,153.00	4,106.07
KLAM	10258	DeJong	Grondin	OWRD-GW	16-Jan-2002	13:33:00	calibrated e-tape	idle	S	44.34	4,153.00	4,108.66
KLAM	10258	DeJong	Grondin	OWRD-GW	17-Apr-2002	13:40:00	calibrated e-tape	idle	S	43.69	4,153.00	4,109.31
KLAM	10258	DeJong	Grondin	OWRD-GW	16-Jul-2002	16:25:00	calibrated e-tape	recently pumped	S	46.86	4,153.00	4,106.14
KLAM	10258	DeJong	Grondin	OWRD-GW	16-Oct-2002	11:25:00	calibrated e-tape	idle	S	46.00	4,153.00	4,107.00
KLAM	10292	Lost River Ranch	Storey	well-log	29-Aug-1991		reported			45.00	4,143.00	4,098.00
KLAM	10292	Lost River Ranch	Gates	OWRD-GW	08-Sep-1998	17:00:00	steel tape	static	S	44.26	4,143.00	4,098.74
KLAM	10292	Lost River Ranch	Gates	OWRD-GW	07-Dec-1998	16:00:00	steel tape	static and oil	S	43.99	4,143.00	4,099.01
KLAM	10292	Lost River Ranch	Gates	OWRD-GW	15-Mar-1999	13:45:00	steel tape	static and oil	S	41.77	4,143.00	4,101.23
KLAM	10292	Lost River Ranch	Norton	OWRD-GW	26-Oct-1999	17:00:00	calibrated e-tape	idle and oil	S	44.66	4,143.00	4,098.34
KLAM	10292	Lost River Ranch	Grondin	OWRD-GW	13-Dec-1999	17:00:00	calibrated e-tape	idle and oil	S	44.29	4,143.00	4,098.71
KLAM	10292	Lost River Ranch	Grondin	OWRD-GW	14-Dec-1999	11:00:00	calibrated e-tape	idle and oil	S	44.28	4,143.00	4,098.72
KLAM	10292	Lost River Ranch	Grondin	OWRD-GW	15-Dec-1999	11:00:00	calibrated e-tape	pumping	F	82.73	4,143.00	4,060.27
KLAM	10292	Lost River Ranch	Grondin	OWRD-GW	16-Dec-1999	11:00:00	calibrated e-tape	idle	R	44.73	4,143.00	4,098.27
KLAM	10316	US West	Wright	well-log	01-Sep-1991		reported			21.00	4,129.40	4,108.40
KLAM	10316	PTI	Grondin	OWRD-GW	06-May-1998		calibrated e-tape	recently pumped	S	18.73	4,129.40	4,110.67
KLAM	10316	PTI	Grondin	OWRD-GW	09-Dec-1998	15:40:00	calibrated e-tape	static	S	19.76	4,129.40	4,109.64
KLAM	10316	PTI	Grondin	OWRD-GW	14-Jan-1999	13:13:00	calibrated e-tape	static	S	19.47	4,129.40	4,109.93
KLAM	10316	PTI	Grondin	OWRD-GW	14-Jan-1999	13:13:00	calibrated e-tape	static	S	19.47	4,129.40	4,109.93
KLAM	10316	PTI	Grondin	OWRD-GW	11-Feb-1999	11:50:00	calibrated e-tape	static	S	19.29	4,129.40	4,110.11
KLAM	10316	PTI	Grondin	OWRD-GW	17-Mar-1999	11:09:00	calibrated e-tape	static	S	18.31	4,129.40	4,111.09
KLAM	10316	PTI	Grondin	OWRD-GW	07-Apr-1999	12:19:00	calibrated e-tape	static	S	17.78	4,129.40	4,111.62
KLAM	10316	PTI	Grondin	OWRD-GW	12-May-1999	12:19:00	calibrated e-tape	idle/static	S	17.97	4,129.40	4,111.43
KLAM	10316	PTI	Grondin	OWRD-GW	09-Jun-1999	13:09:00	calibrated e-tape	idle/static	S	19.09	4,129.40	4,110.31
KLAM	10316	PTI	Grondin	OWRD-GW	14-Jul-1999	11:56:00	calibrated e-tape	idle/static	S	20.60	4,129.40	4,108.80
KLAM	10316	PTI	Grondin	OWRD-GW	11-Aug-1999	11:58:00	calibrated e-tape	idle	S	20.55	4,129.40	4,108.85
KLAM	10316	PTI	Grondin	OWRD-GW	16-Sep-1999	11:12:00	calibrated e-tape	idle	S	20.52	4,129.40	4,108.88

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	10316	PTI	Grondin	OWRD-GW	26-Oct-1999	13:37:00	calibrated e-tape	idle	S	20.09	4,129.40	4,109.31
KLAM	10316	PTI	Grondin	OWRD-GW	12-Jan-2000	10:50:00	calibrated e-tape	idle	S	19.50	4,129.40	4,109.90
KLAM	10316	PTI	Grondin	OWRD-GW	09-Mar-2000	10:15:00	calibrated e-tape	idle	S	18.95	4,129.40	4,110.45
KLAM	10316	PTI	Grondin	OWRD-GW	10-May-2000	10:20:00	calibrated e-tape	idle	S	18.95	4,129.40	4,110.45
KLAM	10336	Bar C-L	DeSpain	well-log	16-Oct-1991		reported			96.00	4,190.00	4,094.00
KLAM	10336	Bar C-L	DeSpain	well-log	29-Jul-1994		reported			83.00	4,190.00	4,107.00
KLAM	10336	Lorenz	Grondin	OWRD-GW	02-Dec-1998	10:00:00	airline	static	S	90.07	4,190.00	4,099.93
KLAM	10336	Lorenz	Grondin	OWRD-GW	02-Dec-1998	10:00:00	airline	static	S	93.15	4,190.00	4,096.85
KLAM	10336	Lorenz	Grondin	OWRD-GW	10-Dec-1998	10:25:00	airline	static	S	93.84	4,190.00	4,096.16
KLAM	10336	Lorenz	Grondin	OWRD-GW	10-Dec-1998	10:25:00	airline	static	S	90.65	4,190.00	4,099.35
KLAM	10336	Lorenz	Grondin	OWRD-GW	13-Jan-1999	13:20:00	airline	static	S	93.15	4,190.00	4,096.85
KLAM	10336	Lorenz	Grondin	OWRD-GW	13-Jan-1999	13:20:00	airline	static	S	90.07	4,190.00	4,099.93
KLAM	10336	Lorenz	Grondin	OWRD-GW	12-Feb-1999	10:10:00	airline	static	S	92.92	4,190.00	4,097.08
KLAM	10336	Lorenz	Grondin	OWRD-GW	12-Feb-1999	10:10:00	airline	static	S	89.84	4,190.00	4,100.16
KLAM	10336	Lorenz	Grondin	OWRD-GW	17-Mar-1999	12:00:00	airline	static	S	91.77	4,190.00	4,098.23
KLAM	10336	Lorenz	Grondin	OWRD-GW	17-Mar-1999	12:00:00	airline	static	S	88.69	4,190.00	4,101.31
KLAM	10336	Lorenz	Grondin	OWRD-GW	06-Apr-1999	17:55:00	airline	static	S	88.00	4,190.00	4,102.00
KLAM	10336	Lorenz	Grondin	OWRD-GW	06-Apr-1999	17:55:00	airline	static	S	90.84	4,190.00	4,099.16
KLAM	10336	Lorenz	Grondin	OWRD-GW	13-May-1999	10:05:00	airline	idle/static	S	87.54	4,190.00	4,102.46
KLAM	10336	Lorenz	Grondin	OWRD-GW	13-May-1999	10:05:00	airline	idle/static	S	90.61	4,190.00	4,099.39
KLAM	10336	Lorenz	Grondin	OWRD-GW	10-Jun-1999	10:00:00	airline	pumping	F	149.21	4,190.00	4,040.79
KLAM	10336	Lorenz	Grondin	OWRD-GW	10-Jun-1999	10:00:00	airline	pumping	F	146.37	4,190.00	4,043.63
KLAM	10336	Lorenz	Grondin	OWRD-GW	14-Jul-1999	19:10:00	airline	pumping	F	143.90	4,190.00	4,046.10
KLAM	10336	Lorenz	Grondin	OWRD-GW	14-Jul-1999	19:10:00	airline	pumping	F	140.83	4,190.00	4,049.17
KLAM	10336	Lorenz	Grondin	OWRD-GW	11-Aug-1999	17:50:00	airline	pumping	F	133.29	4,190.00	4,056.71
KLAM	10336	Lorenz	Grondin	OWRD-GW	11-Aug-1999	17:50:00	airline	pumping	F	130.10	4,190.00	4,059.90
KLAM	10336	Lorenz	Grondin	OWRD-GW	15-Sep-1999	13:43:00	airline	pumping	F	145.29	4,190.00	4,044.71
KLAM	10336	Lorenz	Grondin	OWRD-GW	15-Sep-1999	13:43:00	airline	pumping	F	141.98	4,190.00	4,048.02
KLAM	10336	Lorenz	Grondin	OWRD-GW	27-Oct-1999	09:40:00	airline	idle	S	95.11	4,190.00	4,094.89
KLAM	10336	Lorenz	Grondin	OWRD-GW	27-Oct-1999	09:40:00	airline	idle	S	91.69	4,190.00	4,098.31
KLAM	10352	Letsch	Storey	well-log	25-Oct-1991		reported			45.00	4,152.80	4,107.80
KLAM	10352	Teague	Grondin	OWRD-GW	06-Oct-1998	14:25:00	calibrated e-tape	static	S	42.97	4,152.80	4,109.83
KLAM	10352	Teague	Gates	OWRD-GW	17-Mar-1999	15:45:00	calibrated e-tape	static	S	40.79	4,152.80	4,112.01
KLAM	10352	Teague	Norton	OWRD-GW	26-Oct-1999	12:30:00	calibrated e-tape	idle	S	42.74	4,152.80	4,110.06
KLAM	10357	Letsch	Storey	well-log	15-Nov-1991		reported			45.00	4,151.00	4,106.00
KLAM	10357	Teague	Grondin	OWRD-GW	06-Oct-1998	11:40:00	calibrated e-tape	static	S	41.31	4,151.00	4,109.69
KLAM	10357	Teague	Gates	OWRD-GW	17-Mar-1999	15:25:00	calibrated e-tape	static	S	39.11	4,151.00	4,111.89
KLAM	10357	Teague	Norton	OWRD-GW	26-Oct-1999	12:35:00	calibrated e-tape	idle	S	41.08	4,151.00	4,109.92

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	10362	Smith	Chancellor	well-log	29-Jun-1991		reported			12.00	4,141.00	4,129.00
KLAM	10362	Smith	Grondin	OWRD-GW	03-Jun-1998	11:50:00	calibrated e-tape	nearby recently pumped	R	38.39	4,141.00	4,102.61
KLAM	10362	Smith	Grondin	OWRD-GW	08-Dec-1998	15:10:00	calibrated e-tape	static	S	5.84	4,141.00	4,135.16
KLAM	10362	Smith	Grondin	OWRD-GW	12-Jan-1999	16:00:00	calibrated e-tape	static	S	6.13	4,141.00	4,134.87
KLAM	10362	Smith	Grondin	OWRD-GW	10-Feb-1999	13:45:00	calibrated e-tape	static	S	5.67	4,141.00	4,135.33
KLAM	10362	Smith	Grondin	OWRD-GW	24-Feb-1999	14:25:00	calibrated e-tape	static	S	5.39	4,141.00	4,135.61
KLAM	10362	Smith	Grondin	OWRD-GW	24-Feb-1999	14:30:00	calibrated e-tape	static	S	5.39	4,141.00	4,135.61
KLAM	10362	Smith	Grondin	OWRD-GW	16-Mar-1999	16:04:00	calibrated e-tape	static	S	4.69	4,141.00	4,136.31
KLAM	10362	Smith	Grondin	OWRD-GW	01-Apr-1999	08:42:00	calibrated e-tape	static	S	5.12	4,141.00	4,135.88
KLAM	10362	Smith	Grondin	OWRD-GW	06-Apr-1999	09:55:00	calibrated e-tape	static	S	5.19	4,141.00	4,135.81
KLAM	10362	Smith	Grondin	OWRD-GW	11-May-1999	14:43:00	calibrated e-tape	idle	S	5.83	4,141.00	4,135.17
KLAM	10362	Smith	Grondin	OWRD-GW	08-Jun-1999	13:51:00	calibrated e-tape	idle	S	5.55	4,141.00	4,135.45
KLAM	10362	Smith	Grondin	OWRD-GW	10-Aug-1999	13:32:00	calibrated e-tape	idle	S	5.40	4,141.00	4,135.60
KLAM	10362	Smith	Grondin	OWRD-GW	14-Sep-1999	13:15:00	calibrated e-tape	idle	S	5.41	4,141.00	4,135.59
KLAM	10362	Smith	Grondin	OWRD-GW	29-Sep-1999	09:33:00	calibrated e-tape	idle	S	5.30	4,141.00	4,135.70
KLAM	10362	Smith	Grondin	OWRD-GW	25-Oct-1999	09:50:00	calibrated e-tape	idle	S	5.96	4,141.00	4,135.04
KLAM	10362	Smith	Grondin	OWRD-GW	10-Nov-1999	08:30:00	calibrated e-tape	idle	S	6.28	4,141.00	4,134.72
KLAM	10362	Smith	Grondin	OWRD-GW	12-Nov-1999	13:25:00	calibrated e-tape	idle	S	6.43	4,141.00	4,134.57
KLAM	10362	Smith	Grondin	OWRD-GW	06-Dec-1999	16:44:00	calibrated e-tape	idle	S	6.71	4,141.00	4,134.29
KLAM	10362	Smith	Grondin	OWRD-GW	07-Dec-1999	11:00:00	shaft encoder	idle	S	6.78	4,141.00	4,134.22
KLAM	10362	Smith	Grondin	OWRD-GW	08-Dec-1999	11:00:00	shaft encoder	nearby recently pumped	S	6.92	4,141.00	4,134.08
KLAM	10362	Smith	Grondin	OWRD-GW	09-Dec-1999	11:00:00	shaft encoder	idle	S	6.86	4,141.00	4,134.14
KLAM	10362	Smith	Grondin	OWRD-GW	09-Dec-1999	12:14:00	calibrated e-tape	idle	S	6.88	4,141.00	4,134.12
KLAM	10362	Smith	Grondin	OWRD-GW	11-Jan-2000	13:51:00	calibrated e-tape	idle	S	7.08	4,141.00	4,133.92
KLAM	10362	Smith	Grondin	OWRD-GW	08-Mar-2000	14:20:00	calibrated e-tape	idle	S	6.85	4,141.00	4,134.15
KLAM	10362	Smith	Grondin	OWRD-GW	09-May-2000	14:22:00	calibrated e-tape	idle	S	7.20	4,141.00	4,133.80
KLAM	10362	Smith	Grondin	OWRD-GW	27-Jun-2000	13:48:00	calibrated e-tape	idle	S	6.61	4,141.00	4,134.39
KLAM	10362	Smith	Grondin	OWRD-GW	14-Sep-2000	15:29:00	calibrated e-tape	idle	S	8.59	4,141.00	4,132.41
KLAM	10362	Smith	Grondin	OWRD-GW	14-Nov-2000	13:45:00	calibrated e-tape	idle	S	8.52	4,141.00	4,132.48
KLAM	10362	Smith	Grondin	OWRD-GW	10-Jan-2001	12:51:00	calibrated e-tape	idle	S	7.85	4,141.00	4,133.15
KLAM	10362	Smith	Grondin	OWRD-GW	06-Mar-2001	14:30:00	calibrated e-tape	idle	S	8.24	4,141.00	4,132.76
KLAM	10362	Smith	Grondin	OWRD-GW	08-May-2001	19:53:00	calibrated e-tape	idle	S	53.06	4,141.00	4,087.94
KLAM	10362	Smith	Grondin	OWRD-GW	17-Jul-2001	14:16:00	calibrated e-tape	nearby pumping	S	69.51	4,141.00	4,071.49
KLAM	10362	Smith	Grondin	OWRD-GW	21-Sep-2001	09:54:00	calibrated e-tape	idle	S	72.33	4,141.00	4,068.67
KLAM	10362	Smith	Grondin	OWRD-GW	15-Jan-2002	14:47:00	calibrated e-tape	idle	S	9.89	4,141.00	4,131.11
KLAM	10362	Smith	Grondin	OWRD-GW	16-Apr-2002	12:20:00	calibrated e-tape	idle	S	9.19	4,141.00	4,131.81
KLAM	10364	Smith	Wright	well-log	04-Sep-1991		reported			16.00	4,143.80	4,127.80
KLAM	10364	Smith	Gates	OWRD-GW	18-Aug-1998		calibrated e-tape	static	S	8.92	4,143.80	4,134.88
KLAM	10364	Smith	Norton	OWRD-GW	16-Mar-1999	14:00:00	calibrated e-tape	idle	S	7.78	4,143.80	4,136.02
KLAM	10364	Smith	Gall	OWRD-GW	25-Oct-1999	09:15:00	calibrated e-tape	static	S	9.12	4,143.80	4,134.68
KLAM	10364	Smith	Grondin	OWRD-GW	06-Dec-1999	17:20:00	calibrated e-tape	idle	S	9.75	4,143.80	4,134.05

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	10364	Smith	Gates	OWRD-GW	07-Dec-1999	11:00:00	calibrated e-tape	idle	S	9.85	4,143.80	4,133.95
KLAM	10364	Smith	Gates	OWRD-GW	08-Dec-1999	11:00:00	calibrated e-tape	nearby recently pumped	S	10.04	4,143.80	4,133.76
KLAM	10364	Smith	Grondin	OWRD-GW	09-Dec-1999	11:35:00	calibrated e-tape	idle	S	9.94	4,143.80	4,133.86
KLAM	10368	Miller	Sevey	well-log	03-Dec-1991		reported			40.00	4,147.90	4,107.90
KLAM	10368	Miller	Grondin	OWRD-GW	29-Oct-1998	12:50:00	calibrated e-tape	static	S	38.22	4,147.90	4,109.68
KLAM	10368	Miller	Gates	OWRD-GW	09-Dec-1998	16:50:00	calibrated e-tape	static	S	37.78	4,147.90	4,110.12
KLAM	10368	Miller	Sparks	OWRD-GW	15-Mar-1999	11:45:00	calibrated e-tape	static	S	36.14	4,147.90	4,111.76
KLAM	10368	Miller	Gall	OWRD-GW	26-Oct-1999	14:35:00	calibrated e-tape	idle	S	38.31	4,147.90	4,109.59
KLAM	10378	Wiersma	Sevey	well-log	14-Jan-1992		reported			7.00	4,111.50	4,104.50
KLAM	10378	Wiersma	Grondin	OWRD-GW	05-Oct-1998	12:55:00	calibrated e-tape	static	S	3.53	4,111.50	4,107.97
KLAM	10378	Wiersma	Gates	OWRD-GW	09-Dec-1998	11:25:00	steel tape	static	S	2.58	4,111.50	4,108.92
KLAM	10378	Wiersma	Gates	OWRD-GW	16-Mar-1999	11:15:00	calibrated e-tape	static	S	1.25	4,111.50	4,110.25
KLAM	10378	Wiersma	Norton	OWRD-GW	25-Oct-1999	15:07:00	calibrated e-tape	idle	S	2.91	4,111.50	4,108.59
KLAM	10395	Mocridge	Sevey	well-log	05-Feb-1992		reported			16.00	4,124.60	4,108.60
KLAM	10395	Mocridge	Grondin	OWRD-GW	06-Oct-1998	09:35:00	calibrated e-tape	static	S	14.43	4,124.60	4,110.17
KLAM	10395	Mocridge	Gates	OWRD-GW	09-Dec-1998	12:45:00	calibrated e-tape	static	S	13.76	4,124.60	4,110.84
KLAM	10395	Mocridge	Gates	OWRD-GW	16-Mar-1999		calibrated e-tape	static	S	12.34	4,124.60	4,112.26
KLAM	10395	Mocridge	Norton	OWRD-GW	26-Oct-1999	10:47:00	calibrated e-tape	idle	S	14.09	4,124.60	4,110.51
KLAM	10416	Manning	Sevey	well-log	14-Feb-1992		reported			7.00	4,116.10	4,109.10
KLAM	10416	Manning	Grondin	OWRD-GW	20-Oct-1998	12:15:00	calibrated e-tape	static	S	6.25	4,116.10	4,109.85
KLAM	10416	Manning	Gates	OWRD-GW	16-Mar-1999	14:50:00	calibrated e-tape	static	S	4.33	4,116.10	4,111.77
KLAM	10416	Manning	Norton	OWRD-GW	26-Oct-1999	11:10:00	calibrated e-tape	idle	S	6.10	4,116.10	4,110.00
KLAM	10421	Bemmett & Connelly	Sevey	well-log	25-Feb-1992		reported			45.00	4,153.30	4,108.30
KLAM	10421	Brock	Grondin	OWRD-GW	05-Oct-1998	16:10:00	calibrated e-tape	static	S	43.27	4,153.30	4,110.03
KLAM	10421	Brock	Grondin	OWRD-GW	05-Oct-1998	16:10:00	airline	static	S	43.27	4,153.30	4,110.03
KLAM	10421	Brock	Gates	OWRD-GW	16-Mar-1999	16:00:00	calibrated e-tape	static	S	41.10	4,153.30	4,112.20
KLAM	10421	Brock	Norton	OWRD-GW	26-Oct-1999	13:10:00	calibrated e-tape	idle	S	43.03	4,153.30	4,110.27
KLAM	10432	Bonanza View Dairy	Sevey	well-log	03-Mar-1992		reported			29.00	4,138.60	4,109.60
KLAM	10432	Bonanza View Dairy	Grondin	OWRD-GW	14-Oct-1998	09:30:00	calibrated e-tape	static	S	28.67	4,138.60	4,109.93
KLAM	10432	Bonanza View Dairy	Grondin	OWRD-GW	09-Dec-1998	16:30:00	calibrated e-tape	static	S	32.83	4,138.60	4,105.77
KLAM	10432	Bonanza View Dairy	Gates	OWRD-GW	16-Mar-1999	13:10:00	calibrated e-tape	static	S	26.15	4,138.60	4,112.45
KLAM	10432	Bonanza View Dairy	Norton	OWRD-GW	26-Oct-1999	16:30:00	calibrated e-tape	idle	S	28.62	4,138.60	4,109.98
KLAM	10440	Horsley	Storey	well-log	17-Apr-1992		reported			25.00	4,134.00	4,109.00
KLAM	10440	Horsley	Grondin	OWRD-GW	09-Oct-1998	10:25:00	calibrated e-tape	static	S	25.97	4,134.00	4,108.03
KLAM	10440	Horsley	Grondin	OWRD-GW	09-Oct-1998	10:25:00	steel tape	static	S	22.55	4,134.00	4,111.45

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	10440	Horsley	Gates	OWRD-GW	16-Mar-1999	10:40:00	steel tape	static and oil	S	20.41	4,134.00	4,113.59
KLAM	10440	Horsley	Norton	OWRD-GW	26-Oct-1999	11:00:00	steel tape	static	S	22.14	4,134.00	4,111.86
KLAM	10443	Whitlatch	Sevey	well-log	10-Apr-1992		reported			4.00	4,113.10	4,109.10
KLAM	10443	Whitlatch	Grondin	OWRD-GW	20-Oct-1998	09:50:00	calibrated e-tape	static	S	3.19	4,113.10	4,109.91
KLAM	10443	Whitlatch	Gates	OWRD-GW	17-Mar-1999		calibrated e-tape	static	S	1.22	4,113.10	4,111.88
KLAM	10443	Whitlatch	Norton	OWRD-GW	26-Oct-1999	15:15:00	calibrated e-tape	idle	S	2.91	4,113.10	4,110.19
KLAM	10448	Lee	Pinkard	well-log	13-Apr-1992		reported			28.00	4,140.00	4,112.00
KLAM	10448	Lee	Gates	OWRD-GW	06-Oct-1998	15:50:00	calibrated e-tape	static	S	26.84	4,140.00	4,113.16
KLAM	10448	Lee	Sparks	OWRD-GW	15-Mar-1999	10:10:00	calibrated e-tape	static	S	24.59	4,140.00	4,115.41
KLAM	10448	Lee	Gall	OWRD-GW	25-Oct-1999	14:55:00	calibrated e-tape	idle	S	26.51	4,140.00	4,113.49
KLAM	10458	Smith	Wright	well-log	02-May-1992		reported			98.00	4,237.50	4,139.50
KLAM	10458	Smith	Gates	OWRD-GW	18-Aug-1998		steel tape	static	S	98.11	4,237.50	4,139.39
KLAM	10458	Smith	Norton	OWRD-GW	15-Mar-1999	14:24:00	calibrated e-tape	idle	S	95.45	4,237.50	4,142.05
KLAM	10458	Smith	Zwart	OWRD-GW	26-Oct-1999	10:45:00	calibrated e-tape	idle	S	108.22	4,237.50	4,129.28
KLAM	10460	Masten	Storey	well-log	15-May-1992		reported			51.00	4,156.40	4,105.40
KLAM	10460	Masten	Grondin	OWRD-GW	22-Oct-1998	14:18:00	calibrated e-tape	static	S	47.03	4,156.40	4,109.37
KLAM	10460	Masten	Gates	OWRD-GW	15-Mar-1999	17:20:00	calibrated e-tape	static	S	45.12	4,156.40	4,111.28
KLAM	10460	Masten	Norton	OWRD-GW	26-Oct-1999	13:40:00	calibrated e-tape	idle	S	46.97	4,156.40	4,109.43
KLAM	10461	Masten	Storey	well-log	05-May-1992		reported			22.00	4,128.90	4,106.90
KLAM	10461	Masten	Grondin	OWRD-GW	22-Oct-1998	08:40:00	calibrated e-tape	static	S	19.08	4,128.90	4,109.82
KLAM	10461	Masten	Gates	OWRD-GW	16-Mar-1999	14:40:00	calibrated e-tape	static	S	17.10	4,128.90	4,111.80
KLAM	10461	Masten	Norton	OWRD-GW	26-Oct-1999	11:20:00	calibrated e-tape	idle	S	8.93	4,128.90	4,119.97
KLAM	10467	Lee	Sevey	well-log	20-May-1992		reported			24.00	4,139.30	4,115.30
KLAM	10467	Lee	Grondin	OWRD-GW	16-Sep-1998	18:52:00	calibrated e-tape	static	S	12.27	4,139.30	4,127.03
KLAM	10467	Lee	Norton	OWRD-GW	16-Mar-1999	16:25:00	calibrated e-tape	idle	S	12.84	4,139.30	4,126.46
KLAM	10467	Lee	Gall	OWRD-GW	25-Oct-1999	10:00:00	calibrated e-tape	static	S	9.43	4,139.30	4,129.87
KLAM	10473	Circle 5 Ranch	Wright	well-log	06-May-1992		reported			1.00	4,139.00	4,138.00
KLAM	10473	Circle 5 Ranch	Wright	well-log	06-May-1992		reported			1.00	4,139.00	4,138.00
KLAM	10473	Circle 5 Ranch	Grondin	OWRD-GW	15-Sep-1998	11:50:00	calibrated e-tape	static	S	-0.12	4,139.00	4,139.12
KLAM	10473	Circle 5 Ranch	Norton	OWRD-GW	15-Mar-1999	12:56:00	estimated	flowing	F		4,139.00	
KLAM	10473	Circle 5 Ranch	Zwart	OWRD-GW	26-Oct-1999	11:44:00	calibrated e-tape	static	S	-0.25	4,139.00	4,139.25
KLAM	10473	Circle 5 Ranch	Gates	OWRD-GW	18-Apr-2001	15:00:00	calibrated e-tape	idle	S	1.31	4,139.00	4,137.69
KLAM	10475	Masten	Storey	well-log	26-May-1992		reported			39.00	4,143.80	4,104.80
KLAM	10475	Masten	Grondin	OWRD-GW	22-Oct-1998	11:05:00	calibrated e-tape	static	S	34.36	4,143.80	4,109.44

Appendix 13: Ground Water Elevation Measurements

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Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	10475	Masten	Gates	OWRD-GW	09-Dec-1998		calibrated e-tape	static	S	33.81	4,143.80	4,109.99
KLAM	10475	Masten	Gates	OWRD-GW	15-Mar-1999	16:55:00	calibrated e-tape	static	S	32.37	4,143.80	4,111.43
KLAM	10475	Masten	Norton	OWRD-GW	26-Oct-1999	14:54:00	calibrated e-tape	idle	S	34.30	4,143.80	4,109.50
KLAM	10495	Hammerich	Storey	well-log	15-Jun-1992		reported			11.00	4,145.50	4,134.50
KLAM	10495	Hammerich	Grondin	OWRD-GW	19-Aug-1998		unable to measure	unable to measure			4,145.50	
KLAM	10495	Hammerich	Norton	OWRD-GW	15-Mar-1999		calibrated e-tape	idle	S	6.25	4,145.50	4,139.25
KLAM	10495	Hammerich	Zwart	OWRD-GW	26-Oct-1999	13:54:00	steel tape	idle	S	9.04	4,145.50	4,136.46
KLAM	10495	Hammerich	Grondin	OWRD-GW	30-Nov-1999	10:17:00	calibrated e-tape	idle	S	8.53	4,145.50	4,136.97
KLAM	10495	Hammerich	Grondin	OWRD-GW	30-Nov-1999	13:30:00	calibrated e-tape	idle	S	8.47	4,145.50	4,137.03
KLAM	10495	Hammerich	Grondin	OWRD-GW	01-Dec-1999	13:30:00	calibrated e-tape	pumping	F	16.79	4,145.50	4,128.71
KLAM	10495	Hammerich	Grondin	OWRD-GW	02-Dec-1999	13:30:00	calibrated e-tape	idle	S	8.41	4,145.50	4,137.09
KLAM	10498	Masten	Storey	well-log	02-Jun-1992		reported			22.00	4,127.50	4,105.50
KLAM	10498	Masten	Grondin	OWRD-GW	13-Oct-1998	09:10:00	calibrated e-tape	static	S	17.70	4,127.50	4,109.80
KLAM	10498	Masten	Gates	OWRD-GW	17-Mar-1999	09:48:00	calibrated e-tape	static	S	15.61	4,127.50	4,111.89
KLAM	10498	Masten	Norton	OWRD-GW	26-Oct-1999	15:40:00	calibrated e-tape	idle	S	17.59	4,127.50	4,109.91
KLAM	10526	DeJong	Sevey	well-log	13-Jul-1992		reported			86.00	4,195.00	4,109.00
KLAM	10526	DeJong	Grondin	OWRD-GW	01-Oct-1998	10:25:00	calibrated e-tape	static	S	65.03	4,195.00	4,129.97
KLAM	10526	DeJong	Grondin	OWRD-GW	01-Oct-1998	10:45:00	airline	static	S	65.03	4,195.00	4,129.97
KLAM	10526	DeJong	Gates	OWRD-GW	09-Dec-1998	10:15:00	calibrated e-tape	static	S	71.34	4,195.00	4,123.66
KLAM	10526	DeJong	Norton	OWRD-GW	17-Mar-1999	09:18:00	calibrated e-tape	idle	S	71.07	4,195.00	4,123.93
KLAM	10526	DeJong	Norton	OWRD-GW	17-Mar-1999	09:22:00	airline	idle	S	79.91	4,195.00	4,115.09
KLAM	10526	DeJong	Gall	OWRD-GW	25-Oct-1999	10:15:00	calibrated e-tape	static	S	68.11	4,195.00	4,126.89
KLAM	10531	Boersma	Sevey	well-log	29-Jun-1992		reported			65.00	4,170.50	4,105.50
KLAM	10531	Boersma	Grondin	OWRD-GW	12-May-1998		calibrated e-tape	static	S	54.86	4,170.50	4,115.64
KLAM	10531	Boersma	Norton	OWRD-GW	16-Mar-1999	16:40:00	calibrated e-tape	idle	S	53.81	4,170.50	4,116.69
KLAM	10531	Boersma	Norton	OWRD-GW	27-Oct-1999	09:55:00	calibrated e-tape	idle	S	53.67	4,170.50	4,116.83
KLAM	10554	Cheyne	Chancellor	well-log	13-Aug-1992		reported			104.00	4,206.80	4,102.80
KLAM	10554	Cheyne	Grondin	OWRD-GW	17-Sep-1998	10:10:00	calibrated e-tape			91.83	4,206.80	4,114.97
KLAM	10554	Cheyne	Gates	OWRD-GW	08-Dec-1998	14:40:00	calibrated e-tape	static	S	91.73	4,206.80	4,115.07
KLAM	10554	Cheyne	Norton	OWRD-GW	16-Mar-1999	15:30:00	calibrated e-tape	idle	S	90.48	4,206.80	4,116.32
KLAM	10554	Cheyne	Gall	OWRD-GW	25-Oct-1999	08:35:00	calibrated e-tape	static	S	91.56	4,206.80	4,115.24
KLAM	10554	Cheyne	Grondin	OWRD-GW	06-Dec-1999	16:23:00	calibrated e-tape	idle	S	91.44	4,206.80	4,115.36
KLAM	10554	Cheyne	Sparks	OWRD-GW	07-Dec-1999	11:00:00	calibrated e-tape	idle	S	91.47	4,206.80	4,115.33
KLAM	10554	Cheyne	Sparks	OWRD-GW	08-Dec-1999	11:00:00	calibrated e-tape	nearby recently pumped	F	94.11	4,206.80	4,112.69
KLAM	10554	Cheyne	Grondin	OWRD-GW	09-Dec-1999	10:09:00	calibrated e-tape	idle	S	91.86	4,206.80	4,114.94
KLAM	10566	Christian	DeSpain	well-log	08-Aug-1992		reported			60.00	4,152.20	4,092.20

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	10566	Davis	Grondin	OWRD-GW	06-May-1998		calibrated e-tape	recently pumped	S	40.52	4,152.20	4,111.68
KLAM	10566	Davis	Grondin	OWRD-GW	09-Dec-1998	14:20:00	calibrated e-tape	static	S	41.57	4,152.20	4,110.63
KLAM	10566	Davis	Grondin	OWRD-GW	14-Jan-1999	13:36:00	calibrated e-tape	static	S	41.24	4,152.20	4,110.96
KLAM	10566	Davis	Grondin	OWRD-GW	10-Feb-1999	16:35:00	calibrated e-tape	static	S	41.05	4,152.20	4,111.15
KLAM	10566	Davis	Grondin	OWRD-GW	17-Mar-1999	09:32:00	calibrated e-tape	static	S	40.18	4,152.20	4,112.02
KLAM	10566	Davis	Grondin	OWRD-GW	07-Apr-1999	10:06:00	calibrated e-tape	static	S	39.52	4,152.20	4,112.68
KLAM	10566	Davis	Grondin	OWRD-GW	12-May-1999	09:50:00	calibrated e-tape	idle/static	S	39.52	4,152.20	4,112.68
KLAM	10566	Davis	Grondin	OWRD-GW	09-Jun-1999	10:03:00	calibrated e-tape	idle/static	S	40.73	4,152.20	4,111.47
KLAM	10566	Davis	Grondin	OWRD-GW	14-Jul-1999	09:54:00	calibrated e-tape	idle/static	S	42.41	4,152.20	4,109.79
KLAM	10566	Davis	Grondin	OWRD-GW	11-Aug-1999	10:02:00	calibrated e-tape	idle	F	42.62	4,152.20	4,109.58
KLAM	10566	Davis	Grondin	OWRD-GW	16-Sep-1999	19:37:00	calibrated e-tape	idle	S	42.59	4,152.20	4,109.61
KLAM	10566	Davis	Grondin	OWRD-GW	26-Oct-1999	10:18:00	calibrated e-tape	idle	S	42.00	4,152.20	4,110.20
KLAM	10566	Davis	Grondin	OWRD-GW	12-Jan-2000	10:03:00	calibrated e-tape	idle	S	41.32	4,152.20	4,110.88
KLAM	10566	Davis	Grondin	OWRD-GW	09-Mar-2000	09:36:00	calibrated e-tape	idle	S	40.69	4,152.20	4,111.51
KLAM	10566	Davis	Grondin	OWRD-GW	10-May-2000	09:39:00	calibrated e-tape	idle	S	40.69	4,152.20	4,111.51
KLAM	10566	Davis	Grondin	OWRD-GW	28-Jun-2000	09:32:00	calibrated e-tape	recently pumped	S	42.80	4,152.20	4,109.40
KLAM	10566	Davis	Grondin	OWRD-GW	13-Sep-2000	09:58:00	calibrated e-tape	idle	S	43.43	4,152.20	4,108.77
KLAM	10566	Davis	Grondin	OWRD-GW	15-Nov-2000	09:58:00	calibrated e-tape	idle	S	42.58	4,152.20	4,109.62
KLAM	10566	Davis	Grondin	OWRD-GW	10-Jan-2001	09:56:00	calibrated e-tape	idle	S	42.08	4,152.20	4,110.12
KLAM	10566	Davis	Grondin	OWRD-GW	07-Mar-2001	10:42:00	calibrated e-tape	idle	S	41.85	4,152.20	4,110.35
KLAM	10566	Davis	Grondin	OWRD-GW	09-May-2001	10:08:00	calibrated e-tape	idle	S	42.76	4,152.20	4,109.44
KLAM	10566	Davis	Grondin	OWRD-GW	18-Jul-2001	10:54:00	calibrated e-tape	recently pumped	S	45.27	4,152.20	4,106.93
KLAM	10566	Davis	Grondin	OWRD-GW	19-Sep-2001	09:49:00	calibrated e-tape	idle	S	45.78	4,152.20	4,106.42
KLAM	10566	Davis	Grondin	OWRD-GW	16-Jan-2002	10:22:00	calibrated e-tape	idle	S	43.47	4,152.20	4,108.73
KLAM	10574	Grohs Ranch	Sevey	well-log	19-Aug-1992		reported			84.00	4,214.60	4,130.60
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	17-Nov-1998	10:35:00	calibrated e-tape	static	S	75.04	4,214.60	4,139.56
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	08-Dec-1998	10:20:00	calibrated e-tape	static	S	74.94	4,214.60	4,139.66
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	12-Jan-1999	09:50:00	calibrated e-tape	static	S	74.98	4,214.60	4,139.62
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	09-Feb-1999	14:00:00	calibrated e-tape	static	S	74.43	4,214.60	4,140.17
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	16-Mar-1999	08:44:00	calibrated e-tape	static	S	74.03	4,214.60	4,140.57
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	29-Mar-1999	10:49:00	calibrated e-tape	static	S	73.95	4,214.60	4,140.65
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	29-Mar-1999	11:22:00	calibrated e-tape	static	S	73.95	4,214.60	4,140.65
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	29-Mar-1999	15:37:00	calibrated e-tape	static	S	73.92	4,214.60	4,140.68
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	29-Mar-1999	15:57:00	calibrated e-tape	static	S	73.92	4,214.60	4,140.68
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	30-Mar-1999	16:21:00	calibrated e-tape	static	S	73.81	4,214.60	4,140.79
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	06-Apr-1999	12:12:00	calibrated e-tape	static	S	74.06	4,214.60	4,140.54
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	11-May-1999	09:39:00	calibrated e-tape	idle/static	S	74.40	4,214.60	4,140.20
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	08-Jun-1999	09:48:00	calibrated e-tape	static	S	75.27	4,214.60	4,139.33
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	13-Jul-1999	09:42:00	calibrated e-tape	idle/static	S	75.81	4,214.60	4,138.79
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	10-Aug-1999	09:45:00	calibrated e-tape	idle	S	76.72	4,214.60	4,137.88
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	14-Sep-1999	09:48:00	calibrated e-tape	idle	S	76.49	4,214.60	4,138.11

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
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Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	28-Sep-1999	09:38:00	calibrated e-tape	idle	S	77.24	4,214.60	4,137.36
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	25-Oct-1999	18:12:00	calibrated e-tape	idle	S	76.75	4,214.60	4,137.85
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	11-Jan-2000	09:47:00	calibrated e-tape	idle	S	75.82	4,214.60	4,138.78
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	08-Mar-2000	10:22:00	calibrated e-tape	idle	S	75.16	4,214.60	4,139.44
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	09-May-2000	09:40:00	calibrated e-tape	idle	S	75.58	4,214.60	4,139.02
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	27-Jun-2000	09:44:00	calibrated e-tape	idle	S	76.55	4,214.60	4,138.05
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	14-Sep-2000	11:05:00	calibrated e-tape	idle	S	77.45	4,214.60	4,137.15
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	14-Nov-2000	10:09:00	calibrated e-tape	idle	S	76.96	4,214.60	4,137.64
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	09-Jan-2001	09:49:00	calibrated e-tape	idle	S	76.25	4,214.60	4,138.35
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	06-Mar-2001	09:49:00	calibrated e-tape	idle	S	76.28	4,214.60	4,138.32
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	08-May-2001	09:30:00	calibrated e-tape	idle	S	79.68	4,214.60	4,134.92
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	10-May-2001	17:00:00	shaft encoder	idle	S	79.49	4,214.60	4,135.11
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	17-Jul-2001	09:58:00	calibrated e-tape	idle	S	84.57	4,214.60	4,130.03
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	18-Sep-2001	09:47:00	calibrated e-tape	idle	S	85.47	4,214.60	4,129.13
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	15-Jan-2002	10:15:00	calibrated e-tape	idle	S	78.95	4,214.60	4,135.65
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	16-Apr-2002	09:51:00	calibrated e-tape	idle	S	77.29	4,214.60	4,137.31
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	16-Jul-2002	09:41:00	calibrated e-tape	idle	S	78.09	4,214.60	4,136.51
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	16-Sep-2002	14:21:00	calibrated e-tape	idle	S	78.28	4,214.60	4,136.32
KLAM	10574	Grohs Ranch	Grondin	OWRD-GW	15-Oct-2002	09:47:00	calibrated e-tape	idle	S	77.92	4,214.60	4,136.68
KLAM	10575	Grohs Ranch	Sevey	well-log	01-Sep-1992		reported			25.00	4,151.00	4,126.00
KLAM	10575	Grohs Ranch	Grondin	OWRD-GW	23-Apr-1998	14:20:00	calibrated e-tape	static	S	18.09	4,151.00	4,132.91
KLAM	10575	Grohs Ranch	Grondin	OWRD-GW	08-Dec-1998	10:35:00	calibrated e-tape	static	S	19.31	4,151.00	4,131.69
KLAM	10575	Grohs Ranch	Grondin	OWRD-GW	08-Dec-1998	10:50:00	calibrated e-tape	static	S	18.47	4,151.00	4,132.53
KLAM	10575	Grohs Ranch	Grondin	OWRD-GW	12-Jan-1999	10:13:00	calibrated e-tape	static	S	18.50	4,151.00	4,132.50
KLAM	10575	Grohs Ranch	Grondin	OWRD-GW	09-Feb-1999	13:20:00	calibrated e-tape	static	S	18.11	4,151.00	4,132.89
KLAM	10575	Grohs Ranch	Grondin	OWRD-GW	16-Mar-1999	09:06:00	calibrated e-tape	static	S	17.75	4,151.00	4,133.25
KLAM	10575	Grohs Ranch	Grondin	OWRD-GW	06-Apr-1999	12:36:00	calibrated e-tape	static	S	17.72	4,151.00	4,133.28
KLAM	10575	Grohs Ranch	Grondin	OWRD-GW	11-May-1999	10:25:00	calibrated e-tape	idle/static	S	18.01	4,151.00	4,132.99
KLAM	10575	Grohs Ranch	Grondin	OWRD-GW	08-Jun-1999	10:22:00	calibrated e-tape	static	S	18.88	4,151.00	4,132.12
KLAM	10575	Grohs Ranch	Grondin	OWRD-GW	13-Jul-1999	10:20:00	calibrated e-tape	idle	S	19.40	4,151.00	4,131.60
KLAM	10575	Grohs Ranch	Grondin	OWRD-GW	10-Aug-1999	10:18:00	calibrated e-tape	idle	S	20.31	4,151.00	4,130.69
KLAM	10575	Grohs Ranch	Grondin	OWRD-GW	14-Sep-1999	10:24:00	calibrated e-tape	idle	S	20.12	4,151.00	4,130.88
KLAM	10575	Grohs Ranch	Grondin	OWRD-GW	25-Oct-1999	17:47:00	calibrated e-tape	idle	S	20.22	4,151.00	4,130.78
KLAM	10575	Grohs Ranch	Gates	OWRD-GW	19-Apr-2001	15:00:00	calibrated e-tape	idle	S	23.20	4,151.00	4,127.80
KLAM	10608	Barrett Livestock	Sevey	well-log	02-Oct-1992		reported			104.00	4,197.00	4,093.00
KLAM	10608	Barrett Livestock	Grondin	OWRD-GW	01-Sep-1998	09:05:00	calibrated e-tape	static	S	78.82	4,197.00	4,118.18
KLAM	10608	Barrett	Norton	OWRD-GW	16-Mar-1999	16:00:00	calibrated e-tape	idle	S	72.67	4,197.00	4,124.33
KLAM	10608	Barrett	Gall	OWRD-GW	25-Oct-1999	09:35:00	calibrated e-tape	static	S	73.23	4,197.00	4,123.77
KLAM	10634	Barrett Livestock	Hughes	well-log	22-Oct-1992		reported			29.00	4,140.00	4,111.00

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Note: measurements are hand measurements (not recorder data)
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Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	10634	Barrett Livestock	Grondin	OWRD-GW	01-Sep-1998	09:30:00	calibrated e-tape	pumping	F	132.20	4,140.00	4,007.80
KLAM	10634	Barrett	Gates	OWRD-GW	08-Dec-1998	15:45:00	steel tape	static & oil	S	10.42	4,140.00	4,129.58
KLAM	10634	Barrett	Norton	OWRD-GW	16-Mar-1999	16:15:00	calibrated e-tape	idle	S	10.61	4,140.00	4,129.39
KLAM	10634	Barrett	Gall	OWRD-GW	25-Oct-1999	09:55:00	steel tape	static and oil	S	7.13	4,140.00	4,132.87
KLAM	10641	Hammerich	Storey	well-log	17-Nov-1992		reported			16.00	4,146.80	4,130.80
KLAM	10641	Hammerich	Grondin	OWRD-GW	02-Jun-1998	11:50:00	calibrated e-tape	static	S	7.95	4,146.80	4,138.85
KLAM	10641	Hammerich	Grondin	OWRD-GW	08-Dec-1998	14:05:00	calibrated e-tape	static	S	8.66	4,146.80	4,138.14
KLAM	10641	Hammerich	Grondin	OWRD-GW	08-Dec-1998	14:10:00	calibrated e-tape	static	S	8.66	4,146.80	4,138.14
KLAM	10641	Hammerich	Grondin	OWRD-GW	12-Jan-1999	10:45:00	calibrated e-tape	static	S	8.61	4,146.80	4,138.19
KLAM	10641	Hammerich	Grondin	OWRD-GW	09-Feb-1999	12:47:00	calibrated e-tape	static	S	8.18	4,146.80	4,138.62
KLAM	10641	Hammerich	Grondin	OWRD-GW	16-Mar-1999	09:32:00	calibrated e-tape	static	S	7.89	4,146.80	4,138.91
KLAM	10641	Hammerich	Grondin	OWRD-GW	31-Mar-1999	15:05:00	calibrated e-tape	static	S	7.74	4,146.80	4,139.06
KLAM	10641	Hammerich	Grondin	OWRD-GW	31-Mar-1999	15:25:00	calibrated e-tape	static	S	7.74	4,146.80	4,139.06
KLAM	10641	Hammerich	Grondin	OWRD-GW	06-Apr-1999	13:53:00	calibrated e-tape	static	S	7.85	4,146.80	4,138.95
KLAM	10641	Hammerich	Grondin	OWRD-GW	11-May-1999	10:51:00	calibrated e-tape	idle/static	S	8.15	4,146.80	4,138.65
KLAM	10641	Hammerich	Grondin	OWRD-GW	08-Jun-1999	10:46:00	calibrated e-tape	static	S	9.19	4,146.80	4,137.61
KLAM	10641	Hammerich	Grondin	OWRD-GW	13-Jul-1999	11:37:00	calibrated e-tape	idle/static	S	9.73	4,146.80	4,137.07
KLAM	10641	Hammerich	Grondin	OWRD-GW	10-Aug-1999	10:42:00	calibrated e-tape	idle	S	10.50	4,146.80	4,136.30
KLAM	10641	Hammerich	Grondin	OWRD-GW	14-Sep-1999	10:48:00	calibrated e-tape	idle	S	10.57	4,146.80	4,136.23
KLAM	10641	Hammerich	Grondin	OWRD-GW	28-Sep-1999	12:19:00	calibrated e-tape	idle	S	11.12	4,146.80	4,135.68
KLAM	10641	Hammerich	Grondin	OWRD-GW	25-Oct-1999	17:17:00	calibrated e-tape	idle	S	10.22	4,146.80	4,136.58
KLAM	10641	Hammerich	Grondin	OWRD-GW	29-Nov-1999	18:35:00	calibrated e-tape	idle	S	9.73	4,146.80	4,137.07
KLAM	10641	Hammerich	Grondin	OWRD-GW	30-Nov-1999	13:30:00	shaft encoder	idle	S	9.66	4,146.80	4,137.14
KLAM	10641	Hammerich	Grondin	OWRD-GW	01-Dec-1999	13:30:00	shaft encoder	nearby recently pumped	S	10.08	4,146.80	4,136.72
KLAM	10641	Hammerich	Grondin	OWRD-GW	02-Dec-1999	13:30:00	shaft encoder	idle	S	9.72	4,146.80	4,137.08
KLAM	10641	Hammerich	Grondin	OWRD-GW	02-Dec-1999	16:26:00	calibrated e-tape	idle	S	9.81	4,146.80	4,136.99
KLAM	10641	Hammerich	Grondin	OWRD-GW	11-Jan-2000	10:39:00	calibrated e-tape	idle	S	9.55	4,146.80	4,137.25
KLAM	10641	Hammerich	Grondin	OWRD-GW	08-Mar-2000	11:14:00	calibrated e-tape	idle	S	8.97	4,146.80	4,137.83
KLAM	10641	Hammerich	Grondin	OWRD-GW	09-May-2000	10:15:00	calibrated e-tape	idle	S	9.36	4,146.80	4,137.44
KLAM	10641	Hammerich	Grondin	OWRD-GW	27-Jun-2000	10:28:00	calibrated e-tape	idle	S	10.32	4,146.80	4,136.48
KLAM	10641	Hammerich	Grondin	OWRD-GW	14-Sep-2000	13:14:00	calibrated e-tape	nearby pumping	S	11.63	4,146.80	4,135.17
KLAM	10641	Hammerich	Grondin	OWRD-GW	14-Nov-2000	11:05:00	calibrated e-tape	idle	S	10.53	4,146.80	4,136.27
KLAM	10641	Hammerich	Grondin	OWRD-GW	09-Jan-2001	10:37:00	calibrated e-tape	idle	S	9.87	4,146.80	4,136.93
KLAM	10641	Hammerich	Grondin	OWRD-GW	06-Mar-2001	10:50:00	calibrated e-tape	idle	S	9.88	4,146.80	4,136.92
KLAM	10641	Hammerich	Grondin	OWRD-GW	08-May-2001	11:15:00	calibrated e-tape	idle	S	13.70	4,146.80	4,133.10
KLAM	10641	Hammerich	Grondin	OWRD-GW	10-May-2001	17:45:00	shaft encoder	idle	S	13.60	4,146.80	4,133.20
KLAM	10641	Hammerich	Sparks	OWRD-GW	04-Jun-2001	09:45:00	electric tape	idle	S	15.32	4,146.80	4,131.48
KLAM	10641	Hammerich	Grondin	OWRD-GW	17-Jul-2001	11:22:00	calibrated e-tape	idle	S	17.59	4,146.80	4,129.21
KLAM	10641	Hammerich	Grondin	OWRD-GW	18-Sep-2001	11:45:00	calibrated e-tape	idle	S	18.15	4,146.80	4,128.65
KLAM	10641	Hammerich	Grondin	OWRD-GW	15-Jan-2002	11:04:00	calibrated e-tape	idle	S	12.55	4,146.80	4,134.25

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	10642	Balin Ranches	Storey	well-log	23-Oct-1992		reported			15.00	4,145.70	4,130.70
KLAM	10642	Balin Ranch	Grondin	OWRD-GW	20-Aug-1998	11:05:00	calibrated e-tape	static	S	7.17	4,145.70	4,138.53
KLAM	10642	Balin Ranch	Grondin	OWRD-GW	16-Mar-1999	09:20:00	calibrated e-tape	idle	S	5.54	4,145.70	4,140.16
KLAM	10642	Balin Ranch	Grondin	OWRD-GW	26-Oct-1999	12:50:00	calibrated e-tape	idle	S	8.67	4,145.70	4,137.03
KLAM	10647	Boersma	Sevey	well-log	24-Nov-1992		reported			31.00	4,128.00	4,097.00
KLAM	10647	Boersma	Grondin	OWRD-GW	12-May-1998		calibrated e-tape	recently pumped	S	23.71	4,128.00	4,104.29
KLAM	10647	Boersma	Grondin	OWRD-GW	09-Dec-1998	11:35:00	calibrated e-tape	static	S	21.49	4,128.00	4,106.51
KLAM	10647	Boersma	Grondin	OWRD-GW	13-Jan-1999	11:04:00	calibrated e-tape	recently pumped	R	24.24	4,128.00	4,103.76
KLAM	10647	Boersma	Norton	OWRD-GW	15-Mar-1999	17:20:00	calibrated e-tape	recently pumped	F	24.10	4,128.00	4,103.90
KLAM	10647	Boersma	Norton	OWRD-GW	27-Oct-1999	09:41:00	calibrated e-tape	idle	R	22.14	4,128.00	4,105.86
KLAM	10675	Ross	Hartley	well-log	01-Dec-1978		reported			209.00	4,264.00	4,055.00
KLAM	10675	Ross	Gates	OWRD-GW	16-Sep-1998	15:40:00	calibrated e-tape	nearby pumping	S	241.43	4,264.00	4,022.57
KLAM	10675	Ross	Gates	OWRD-GW	15-Mar-1999	15:00:00	calibrated e-tape	static	S	234.74	4,264.00	4,029.26
KLAM	10675	Ross	Gates	OWRD-GW	27-Oct-1999	10:50:00	calibrated e-tape	static	S	240.11	4,264.00	4,023.89
KLAM	10699	Gibson	Storey	well-log	08-Apr-1993		reported			40.00	4,185.60	4,145.60
KLAM	10699	Gibson	Grondin	OWRD-GW	01-Sep-1998	13:45:00	calibrated e-tape	static	S	39.72	4,185.60	4,145.88
KLAM	10699	Gibson	Grondin	OWRD-GW	27-Oct-1998	16:47:00	calibrated e-tape	static	S	36.85	4,185.60	4,148.75
KLAM	10699	Gibson	Grondin	OWRD-GW	08-Dec-1998	16:20:00	calibrated e-tape	static	S	35.31	4,185.60	4,150.29
KLAM	10699	Gibson	Grondin	OWRD-GW	12-Jan-1999	14:30:00	calibrated e-tape	static	S	36.48	4,185.60	4,149.12
KLAM	10699	Gibson	Grondin	OWRD-GW	09-Feb-1999	10:25:00	calibrated e-tape	static	S	34.90	4,185.60	4,150.70
KLAM	10699	Gibson	Grondin	OWRD-GW	25-Feb-1999	15:55:00	calibrated e-tape	static	S	34.24	4,185.60	4,151.36
KLAM	10699	Gibson	Grondin	OWRD-GW	25-Feb-1999	16:11:00	calibrated e-tape	static	S	34.24	4,185.60	4,151.36
KLAM	10699	Gibson	Grondin	OWRD-GW	16-Mar-1999	13:57:00	calibrated e-tape	static	S	34.11	4,185.60	4,151.49
KLAM	10699	Gibson	Grondin	OWRD-GW	01-Apr-1999	10:20:00	calibrated e-tape	static	S	35.27	4,185.60	4,150.33
KLAM	10699	Gibson	Grondin	OWRD-GW	06-Apr-1999	14:50:00	calibrated e-tape	static	S	35.55	4,185.60	4,150.05
KLAM	10699	Gibson	Grondin	OWRD-GW	11-May-1999	17:53:00	calibrated e-tape	idle	S	38.23	4,185.60	4,147.37
KLAM	10699	Gibson	Grondin	OWRD-GW	08-Jun-1999	15:52:00	calibrated e-tape	idle	S	35.82	4,185.60	4,149.78
KLAM	10699	Gibson	Grondin	OWRD-GW	15-Jul-1999	10:00:00	calibrated e-tape	idle/static	S	39.82	4,185.60	4,145.78
KLAM	10699	Gibson	Grondin	OWRD-GW	10-Aug-1999	16:02:00	calibrated e-tape	idle	S	36.35	4,185.60	4,149.25
KLAM	10699	Gibson	Grondin	OWRD-GW	14-Sep-1999	16:37:00	calibrated e-tape	idle	S	37.12	4,185.60	4,148.48
KLAM	10699	Gibson	Grondin	OWRD-GW	28-Sep-1999	14:45:00	calibrated e-tape	idle	S	37.02	4,185.60	4,148.58
KLAM	10699	Gibson	Grondin	OWRD-GW	25-Oct-1999	11:56:00	calibrated e-tape	idle	F	40.58	4,185.60	4,145.02
KLAM	10699	Gibson	Grondin	OWRD-GW	11-Jan-2000	16:25:00	calibrated e-tape	idle	S	39.83	4,185.60	4,145.77
KLAM	10699	Gibson	Grondin	OWRD-GW	08-Mar-2000	16:49:00	calibrated e-tape	idle	S	37.34	4,185.60	4,148.26
KLAM	10699	Gibson	Grondin	OWRD-GW	09-May-2000	16:20:00	calibrated e-tape	idle	S	35.23	4,185.60	4,150.37
KLAM	10699	Gibson	Grondin	OWRD-GW	27-Jun-2000	16:19:00	calibrated e-tape	idle	S	38.57	4,185.60	4,147.03
KLAM	10699	Gibson	Grondin	OWRD-GW	12-Sep-2000	16:50:00	calibrated e-tape	idle	S	34.46	4,185.60	4,151.14
KLAM	10699	Gibson	Grondin	OWRD-GW	14-Nov-2000	15:24:00	calibrated e-tape	idle	S	37.55	4,185.60	4,148.05
KLAM	10699	Gibson	Grondin	OWRD-GW	09-Jan-2001	16:15:00	calibrated e-tape	idle	S	38.87	4,185.60	4,146.73

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	10699	Gibson	Grondin	OWRD-GW	06-Mar-2001	16:53:00	calibrated e-tape	idle	S	39.83	4,185.60	4,145.77
KLAM	10699	Gibson	Grondin	OWRD-GW	08-May-2001	16:52:00	calibrated e-tape	idle	S	48.59	4,185.60	4,137.01
KLAM	10699	Gibson	Grondin	OWRD-GW	17-Jul-2001	15:54:00	calibrated e-tape	idle	S	36.49	4,185.60	4,149.11
KLAM	10699	Gibson	Grondin	OWRD-GW	18-Sep-2001	17:13:00	calibrated e-tape	idle	S	33.37	4,185.60	4,152.23
KLAM	10699	Gibson	Grondin	OWRD-GW	15-Jan-2002	17:19:00	calibrated e-tape	idle	S	35.33	4,185.60	4,150.27
KLAM	10699	Gibson	Gates	OWRD-GW	13-Mar-2002	15:20:00	electric tape	idle	S	36.77	4,185.60	4,148.83
KLAM	10748	Balin Ranches	Storey	well-log	05-May-1993		reported			14.00	4,149.60	4,135.60
KLAM	10748	Balin Ranches	Grondin	OWRD-GW	20-Aug-1998	14:55:00	calibrated e-tape	static	S	11.94	4,149.60	4,137.66
KLAM	10748	Balin Ranch	Gates	OWRD-GW	08-Dec-1998	12:58:00	calibrated e-tape	static	S	11.00	4,149.60	4,138.60
KLAM	10748	Balin Ranch	Norton	OWRD-GW	15-Mar-1999	12:07:00	calibrated e-tape	idle	S	10.08	4,149.60	4,139.52
KLAM	10748	Balin Ranch	Zwart	OWRD-GW	26-Oct-1999	13:30:00	calibrated e-tape	idle	S	12.65	4,149.60	4,136.95
KLAM	10764	Hammerich	Storey	well-log	15-Jun-1993		reported			0.00	4,134.10	4,134.10
KLAM	10764	Hammerich	Grondin	OWRD-GW	19-Aug-1998	12:15:00	steel tape	static	S	-3.11	4,134.10	4,137.21
KLAM	10764	Hammerich	Grondin	OWRD-GW	16-Mar-1999	10:05:00	steel tape	static	S	-4.82	4,134.10	4,138.92
KLAM	10764	Hammerich	Grondin	OWRD-GW	25-Oct-1999	16:48:00	steel tape	static	S	-2.42	4,134.10	4,136.52
KLAM	10803	Allison	Sevey	well-log	27-Jul-1993		reported			236.00	4,372.00	4,136.00
KLAM	10803	Allison	Grondin	OWRD-GW	17-Nov-1998	12:40:00	calibrated e-tape	static	S	227.83	4,372.00	4,144.17
KLAM	10803	Allison	Gates	OWRD-GW	08-Dec-1998	12:20:00	calibrated e-tape	static	S	227.72	4,372.00	4,144.28
KLAM	10803	Allison	Norton	OWRD-GW	15-Mar-1999	10:00:00	calibrated e-tape	idle	S	226.94	4,372.00	4,145.06
KLAM	10803	Allison	Zwart	OWRD-GW	25-Oct-1999	15:15:00	calibrated e-tape	idle	S	228.39	4,372.00	4,143.61
KLAM	10813	Independent Hydro Developers, Inc.	Barry	well-log	05-May-1993	14:00:00	reported	static	S	5.80	4,124.00	4,118.20
KLAM	10813	Independent Hydro Developers, Inc.	Ogilvie	well-log	06-May-1993		reported			7.00	4,124.00	4,117.00
KLAM	10813	Babson	Grondin	OWRD-GW	13-May-1998	11:22:00	calibrated e-tape	static	S	4.95	4,124.00	4,119.05
KLAM	10813	Babson	Grondin	OWRD-GW	11-Dec-1998		calibrated e-tape	static	S	3.04	4,124.00	4,120.96
KLAM	10813	Babson	Grondin	OWRD-GW	13-Jan-1999	10:05:00	calibrated e-tape	static	S	4.54	4,124.00	4,119.46
KLAM	10813	Babson	Grondin	OWRD-GW	12-Feb-1999	15:31:00	calibrated e-tape	static	S	3.63	4,124.00	4,120.37
KLAM	10813	Babson	Norton	OWRD-GW	16-Mar-1999	16:55:00	calibrated e-tape	static	S	3.12	4,124.00	4,120.88
KLAM	10813	Babson	Grondin	OWRD-GW	06-Apr-1999	16:33:00	calibrated e-tape	static	S	4.20	4,124.00	4,119.80
KLAM	10813	Babson	Grondin	OWRD-GW	20-Apr-1999	16:33:00	calibrated e-tape	static	S	4.36	4,124.00	4,119.64
KLAM	10813	Babson	Grondin	OWRD-GW	20-Apr-1999	17:33:00	calibrated e-tape	static	S	4.36	4,124.00	4,119.64
KLAM	10813	Babson	Grondin	OWRD-GW	11-May-1999	19:47:00	calibrated e-tape	idle/static	S	4.09	4,124.00	4,119.91
KLAM	10813	Babson	Grondin	OWRD-GW	08-Jun-1999	17:52:00	calibrated e-tape	idle/static	S	3.07	4,124.00	4,120.93
KLAM	10813	Babson	Grondin	OWRD-GW	15-Jul-1999	13:17:00	calibrated e-tape	idle/static	S	3.67	4,124.00	4,120.33
KLAM	10813	Babson	Grondin	OWRD-GW	10-Aug-1999	17:35:00	calibrated e-tape	idle	S	2.18	4,124.00	4,121.82
KLAM	10813	Babson	Grondin	OWRD-GW	14-Sep-1999	18:05:00	calibrated e-tape	idle	S	2.11	4,124.00	4,121.89
KLAM	10813	Babson	Grondin	OWRD-GW	30-Sep-1999	11:05:00	calibrated e-tape	idle	S	0.98	4,124.00	4,123.02
KLAM	10813	Babson	Grondin	OWRD-GW	26-Oct-1999	09:30:00	calibrated e-tape	idle	S	4.08	4,124.00	4,119.92
KLAM	10813	Babson	Grondin	OWRD-GW	13-Jan-2000	10:57:00	calibrated e-tape	idle	S	5.65	4,124.00	4,118.35

Appendix 13: Ground Water Elevation Measurements

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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	10813	Babson	Grondin	OWRD-GW	09-Mar-2000	12:02:00	calibrated e-tape	idle	S	3.44	4,124.00	4,120.56
KLAM	10813	Babson	Grondin	OWRD-GW	09-May-2000	18:03:00	calibrated e-tape	idle	S	2.76	4,124.00	4,121.24
KLAM	10813	Babson	Grondin	OWRD-GW	27-Jun-2000	18:59:00	calibrated e-tape	idle	S	2.34	4,124.00	4,121.66
KLAM	10813	Babson	Grondin	OWRD-GW	12-Sep-2000	14:14:00	calibrated e-tape	idle	S	3.57	4,124.00	4,120.43
KLAM	10813	Babson	Grondin	OWRD-GW	15-Nov-2000	13:40:00	calibrated e-tape	idle	S	4.72	4,124.00	4,119.28
KLAM	10813	Babson	Grondin	OWRD-GW	09-Jan-2001	14:51:00	calibrated e-tape	idle	S	5.69	4,124.00	4,118.31
KLAM	10813	Babson	Grondin	OWRD-GW	07-Mar-2001	15:02:00	calibrated e-tape	idle	S	6.44	4,124.00	4,117.56
KLAM	10813	Babson	Grondin	OWRD-GW	09-May-2001	16:02:00	calibrated e-tape	idle	S	0.18	4,124.00	4,123.82
KLAM	10813	Babson	Grondin	OWRD-GW	17-Jul-2001	18:11:00	calibrated e-tape	idle	S	3.33	4,124.00	4,120.67
KLAM	10813	Babson	Grondin	OWRD-GW	20-Sep-2001	18:14:00	steel tape	idle	S	-0.09	4,124.00	4,124.09
KLAM	10813	Babson	Grondin	OWRD-GW	17-Jan-2002	10:44:00	calibrated e-tape	idle	S	2.27	4,124.00	4,121.73
KLAM	10813	Babson	Grondin	OWRD-GW	16-Apr-2002	16:41:00	calibrated e-tape	idle	S	5.76	4,124.00	4,118.24
KLAM	10814	Independent Hydro Developers, Inc.	Barry	well-log	05-May-1993	11:00:00	reported	static	S	4.50	4,119.00	4,114.50
KLAM	10814	Independent Hydro Developers, Inc.	Ogilvie	well-log	06-May-1993		reported			110.00	4,119.00	4,009.00
KLAM	10814	Babson	Grondin	OWRD-GW	13-May-1998	11:52:00	calibrated e-tape	static	S	5.07	4,119.00	4,113.93
KLAM	10814	Babson	Grondin	OWRD-GW	09-Dec-1998	10:05:00	calibrated e-tape	static	S	5.93	4,119.00	4,113.07
KLAM	10814	Babson	Grondin	OWRD-GW	13-Jan-1999	09:33:00	calibrated e-tape	static	S	5.80	4,119.00	4,113.20
KLAM	10814	Babson	Grondin	OWRD-GW	10-Feb-1999	10:40:00	calibrated e-tape	static	S	5.34	4,119.00	4,113.66
KLAM	10814	Babson	Grondin	OWRD-GW	16-Mar-1999	17:14:00	calibrated e-tape	static	S	4.71	4,119.00	4,114.29
KLAM	10814	Babson	Grondin	OWRD-GW	06-Apr-1999	16:00:00	calibrated e-tape	static	S	4.33	4,119.00	4,114.67
KLAM	10814	Babson	Grondin	OWRD-GW	21-Apr-1999	10:00:00	calibrated e-tape	static	S	4.19	4,119.00	4,114.81
KLAM	10814	Babson	Grondin	OWRD-GW	11-May-1999	18:50:00	calibrated e-tape	idle/static	S	4.25	4,119.00	4,114.75
KLAM	10814	Babson	Grondin	OWRD-GW	08-Jun-1999	18:32:00	calibrated e-tape	idle/static	S	4.76	4,119.00	4,114.24
KLAM	10814	Babson	Grondin	OWRD-GW	15-Jul-1999	12:28:00	calibrated e-tape	idle/static	S	5.93	4,119.00	4,113.07
KLAM	10814	Babson	Grondin	OWRD-GW	10-Aug-1999	17:11:00	calibrated e-tape	idle	S	6.46	4,119.00	4,112.54
KLAM	10814	Babson	Grondin	OWRD-GW	14-Sep-1999	17:36:00	calibrated e-tape	idle	S	6.64	4,119.00	4,112.36
KLAM	10814	Babson	Grondin	OWRD-GW	30-Sep-1999	09:45:00	calibrated e-tape	idle	S	6.51	4,119.00	4,112.49
KLAM	10814	Babson	Grondin	OWRD-GW	26-Oct-1999	09:06:00	calibrated e-tape	idle	S	6.45	4,119.00	4,112.55
KLAM	10814	Babson	Grondin	OWRD-GW	13-Jan-2000	09:43:00	calibrated e-tape	idle	S	5.97	4,119.00	4,113.03
KLAM	10814	Babson	Grondin	OWRD-GW	08-Mar-2000	17:42:00	calibrated e-tape	idle	S	5.18	4,119.00	4,113.82
KLAM	10814	Babson	Grondin	OWRD-GW	09-May-2000	17:17:00	calibrated e-tape	idle	S	5.22	4,119.00	4,113.78
KLAM	10814	Babson	Grondin	OWRD-GW	27-Jun-2000	18:01:00	calibrated e-tape	idle	S	6.24	4,119.00	4,112.76
KLAM	10814	Babson	Grondin	OWRD-GW	12-Sep-2000	12:36:00	calibrated e-tape	idle	S	7.56	4,119.00	4,111.44
KLAM	10814	Babson	Grondin	OWRD-GW	15-Nov-2000	13:04:00	calibrated e-tape	idle	S	7.00	4,119.00	4,112.00
KLAM	10814	Babson	Grondin	OWRD-GW	09-Jan-2001	14:14:00	calibrated e-tape	idle	S	6.66	4,119.00	4,112.34
KLAM	10814	Babson	Grondin	OWRD-GW	07-Mar-2001	15:58:00	calibrated e-tape	idle	S	6.53	4,119.00	4,112.47
KLAM	10814	Babson	Grondin	OWRD-GW	09-May-2001	14:26:00	calibrated e-tape	idle	S	6.90	4,119.00	4,112.10
KLAM	10814	Babson	Grondin	OWRD-GW	17-Jul-2001	17:15:00	calibrated e-tape	idle	S	8.50	4,119.00	4,110.50
KLAM	10814	Babson	Grondin	OWRD-GW	20-Sep-2001	16:38:00	calibrated e-tape	idle	S	9.32	4,119.00	4,109.68
KLAM	10814	Babson	Grondin	OWRD-GW	17-Jan-2002	09:39:00	calibrated e-tape	idle	S	7.59	4,119.00	4,111.41
KLAM	10814	Babson	Grondin	OWRD-GW	16-Apr-2002	15:38:00	calibrated e-tape	idle	S	7.04	4,119.00	4,111.96

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	10814	Babson	Grondin	OWRD-GW	16-Jul-2002	14:51:00	calibrated e-tape	idle	S	8.60	4,119.00	4,110.40
KLAM	10814	Babson	Grondin	OWRD-GW	15-Oct-2002	14:22:00	calibrated e-tape	idle	S	9.16	4,119.00	4,109.84
KLAM	10877	Loveness	Pinkard	well-log	04-Nov-1993		reported			177.00	4,271.00	4,094.00
KLAM	10877	Loveness	Grondin	OWRD-GW	12-Aug-1998	15:25:00	calibrated e-tape	recently pumped	S	176.55	4,271.00	4,094.45
KLAM	10877	Loveness	Grondin	OWRD-GW	07-Dec-1998	16:45:00	calibrated e-tape	static	S	176.52	4,271.00	4,094.48
KLAM	10877	Loveness	Grondin	OWRD-GW	11-Jan-1999	14:40:00	calibrated e-tape	static	S	175.99	4,271.00	4,095.01
KLAM	10877	Loveness	Grondin	OWRD-GW	08-Feb-1999	15:26:00	calibrated e-tape	recently pumped	S	175.51	4,271.00	4,095.49
KLAM	10877	Loveness	Grondin	OWRD-GW	15-Mar-1999	09:42:00	calibrated e-tape	static	S	174.78	4,271.00	4,096.22
KLAM	10877	Loveness	Grondin	OWRD-GW	05-Apr-1999	13:28:00	calibrated e-tape	static	S	174.10	4,271.00	4,096.90
KLAM	10877	Loveness	Grondin	OWRD-GW	10-May-1999	17:16:00	calibrated e-tape	idle/static	S	173.59	4,271.00	4,097.41
KLAM	10877	Loveness	Grondin	OWRD-GW	07-Jun-1999	18:54:00	calibrated e-tape	static	S	174.25	4,271.00	4,096.75
KLAM	10877	Loveness	Grondin	OWRD-GW	12-Jul-1999	16:28:00	calibrated e-tape	idle/static	S	176.04	4,271.00	4,094.96
KLAM	10877	Loveness	Grondin	OWRD-GW	09-Aug-1999	19:11:00	calibrated e-tape	idle	S	177.61	4,271.00	4,093.39
KLAM	10877	Loveness	Grondin	OWRD-GW	13-Sep-1999	19:10:00	calibrated e-tape	idle	S	178.07	4,271.00	4,092.93
KLAM	10877	Loveness	Grondin	OWRD-GW	27-Oct-1999	15:10:00	calibrated e-tape	idle	S	177.17	4,271.00	4,093.83
KLAM	11003	Long	Pinkard	well-log	20-May-1994		reported			41.00	4,180.00	4,139.00
KLAM	11003	Long	Grondin	OWRD-GW	11-Aug-1998	16:13:00	calibrated e-tape	recently pumped	R	40.24	4,180.00	4,139.76
KLAM	11003	Long	Grondin	OWRD-GW	07-Dec-1998	15:15:00	calibrated e-tape	static	S	35.03	4,180.00	4,144.97
KLAM	11003	Long	Grondin	OWRD-GW	14-Jan-1999	11:00:00	calibrated e-tape	recently pumped	R	30.85	4,180.00	4,149.15
KLAM	11003	Long	Grondin	OWRD-GW	08-Feb-1999	17:29:00	calibrated e-tape	static	S	28.58	4,180.00	4,151.42
KLAM	11003	Long	Grondin	OWRD-GW	15-Mar-1999	11:58:00	calibrated e-tape	static	S	24.42	4,180.00	4,155.58
KLAM	11003	Long	Grondin	OWRD-GW	05-Apr-1999	14:28:00	calibrated e-tape	static	S	25.14	4,180.00	4,154.86
KLAM	11003	Long	Grondin	OWRD-GW	10-May-1999	16:09:00	calibrated e-tape	idle/static	S	28.35	4,180.00	4,151.65
KLAM	11003	Long	Grondin	OWRD-GW	07-Jun-1999	17:45:00	calibrated e-tape	recently pumped	R	31.56	4,180.00	4,148.44
KLAM	11003	Long	Grondin	OWRD-GW	12-Jul-1999	15:41:00	calibrated e-tape	idle/static	S	32.76	4,180.00	4,147.24
KLAM	11003	Long	Grondin	OWRD-GW	09-Aug-1999	18:40:00	calibrated e-tape	recently pumped	R	37.19	4,180.00	4,142.81
KLAM	11003	Long	Grondin	OWRD-GW	13-Sep-1999	16:44:00	calibrated e-tape	recently pumped	R	46.90	4,180.00	4,133.10
KLAM	11003	Long	Grondin	OWRD-GW	27-Oct-1999	12:39:00	calibrated e-tape	idle	S	37.34	4,180.00	4,142.66
KLAM	11003	Long	Grondin	OWRD-GW	10-Jan-2000	17:12:00	calibrated e-tape	recently pumped	R	36.82	4,180.00	4,143.18
KLAM	11003	Long	Grondin	OWRD-GW	06-Mar-2000	16:15:00	calibrated e-tape	idle	S	30.41	4,180.00	4,149.59
KLAM	11003	Long	Grondin	OWRD-GW	08-May-2000	17:30:00	calibrated e-tape	recently pumped	R	29.44	4,180.00	4,150.56
KLAM	11003	Long	Grondin	OWRD-GW	26-Jun-2000	16:08:00	calibrated e-tape	idle	S	36.42	4,180.00	4,143.58
KLAM	11003	Long	Grondin	OWRD-GW	11-Sep-2000	16:24:00	calibrated e-tape	idle	S	34.07	4,180.00	4,145.93
KLAM	11003	Long	Grondin	OWRD-GW	13-Nov-2000	17:57:00	calibrated e-tape	idle	S	33.93	4,180.00	4,146.07
KLAM	11003	Long	Grondin	OWRD-GW	11-Jan-2001	14:15:00	calibrated e-tape	idle	S	35.02	4,180.00	4,144.98
KLAM	11003	Long	Grondin	OWRD-GW	05-Mar-2001	15:34:00	calibrated e-tape	idle	S	36.07	4,180.00	4,143.93
KLAM	11003	Long	Grondin	OWRD-GW	07-May-2001	16:55:00	calibrated e-tape	recently pumped	R	43.10	4,180.00	4,136.90
KLAM	11003	Long	Grondin	OWRD-GW	19-Jul-2001	12:10:00	calibrated e-tape	idle	S	35.32	4,180.00	4,144.68
KLAM	11003	Long	Grondin	OWRD-GW	20-Sep-2001	11:42:00	calibrated e-tape	idle	S	36.27	4,180.00	4,143.73
KLAM	11003	Long	Grondin	OWRD-GW	17-Jan-2002	16:22:00	calibrated e-tape	recently pumped	R	36.28	4,180.00	4,143.72

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	11139	Rice Feed & Supply	DeSpain	well-log	22-Aug-1994		reported			37.00	4,138.00	4,101.00
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	02-Jun-1998	17:35:00	calibrated e-tape	static	S	25.02	4,138.00	4,112.98
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	10-Dec-1998	14:00:00	calibrated e-tape	static	S	27.11	4,138.00	4,110.89
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	13-Jan-1999	17:30:00	calibrated e-tape	static	S	26.44	4,138.00	4,111.56
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	12-Feb-1999	14:14:00	calibrated e-tape	static	S	25.51	4,138.00	4,112.49
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	15-Mar-1999	14:30:00	calibrated e-tape	static	S	24.49	4,138.00	4,113.51
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	05-Apr-1999	16:03:00	calibrated e-tape	static	S	23.96	4,138.00	4,114.04
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	12-May-1999	18:04:00	calibrated e-tape	idle/static	S	23.78	4,138.00	4,114.22
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	09-Jun-1999	18:19:00	calibrated e-tape	idle/static	S	25.15	4,138.00	4,112.85
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	13-Jul-1999	21:01:00	calibrated e-tape	idle/static	S	28.24	4,138.00	4,109.76
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	11-Aug-1999	15:25:00	calibrated e-tape	idle	S	29.49	4,138.00	4,108.51
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	15-Sep-1999	11:41:00	calibrated e-tape	idle	S	30.33	4,138.00	4,107.67
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	26-Oct-1999	16:20:00	calibrated e-tape	idle	S	28.83	4,138.00	4,109.17
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	12-Jan-2000	14:05:00	calibrated e-tape	idle	S	26.87	4,138.00	4,111.13
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	07-Mar-2000	11:30:00	calibrated e-tape	idle	S	25.52	4,138.00	4,112.48
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	10-May-2000	12:31:00	calibrated e-tape	idle	S	24.99	4,138.00	4,113.01
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	28-Jun-2000	12:17:00	calibrated e-tape	idle	S	30.98	4,138.00	4,107.02
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	13-Sep-2000	12:41:00	calibrated e-tape	idle	S	32.63	4,138.00	4,105.37
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	15-Nov-2000	12:16:00	calibrated e-tape	idle	S	29.57	4,138.00	4,108.43
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	10-Jan-2001	12:05:00	calibrated e-tape	idle	S	28.08	4,138.00	4,109.92
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	07-Mar-2001	13:45:00	calibrated e-tape	idle	S	27.20	4,138.00	4,110.80
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	09-May-2001	13:13:00	calibrated e-tape	idle	S	27.92	4,138.00	4,110.08
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	16-Jul-2001	17:15:00	calibrated e-tape	idle	S	33.72	4,138.00	4,104.28
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	17-Sep-2001	16:48:00	calibrated e-tape	idle	S	36.28	4,138.00	4,101.72
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	16-Jan-2002	12:53:00	calibrated e-tape	idle	S	30.84	4,138.00	4,107.16
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	17-Apr-2002	13:00:00	calibrated e-tape	idle	S	28.58	4,138.00	4,109.42
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	16-Jul-2002	17:20:00	calibrated e-tape	recently pumped	F	34.29	4,138.00	4,103.71
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	17-Jul-2002	12:30:00	calibrated e-tape	idle	S	36.40	4,138.00	4,101.60
KLAM	11139	Rice Feed & Supply	Grondin	OWRD-GW	14-Oct-2002	17:18:00	calibrated e-tape	idle	S	35.76	4,138.00	4,102.24
KLAM	11168	CBA Construction Co.	Pinkard	well-log	05-Oct-1994		reported			15.00	4,124.00	4,109.00
KLAM	11168	Ferrier	Grondin	OWRD-GW	05-May-1998	19:17:00	calibrated e-tape	recently pumped	R	8.94	4,124.00	4,115.06
KLAM	11168	Ferrier	Grondin	OWRD-GW	09-Dec-1998	15:10:00	calibrated e-tape	recently pumped	R	9.90	4,124.00	4,114.10
KLAM	11168	Ferrier	Grondin	OWRD-GW	15-Jan-1999	10:30:00	calibrated e-tape	recently pumped	R	9.74	4,124.00	4,114.26
KLAM	11168	Ferrier	Grondin	OWRD-GW	11-Feb-1999	10:50:00	calibrated e-tape	static	S	9.46	4,124.00	4,114.54
KLAM	11168	Ferrier	Grondin	OWRD-GW	17-Mar-1999	10:13:00	calibrated e-tape	static	S	8.44	4,124.00	4,115.56
KLAM	11168	Ferrier	Grondin	OWRD-GW	07-Apr-1999	10:47:00	calibrated e-tape	static	S	8.00	4,124.00	4,116.00
KLAM	11168	Ferrier	Grondin	OWRD-GW	12-May-1999	11:56:00	calibrated e-tape	idle/static	S	8.16	4,124.00	4,115.84
KLAM	11168	Ferrier	Grondin	OWRD-GW	09-Jun-1999	10:54:00	calibrated e-tape	recently pumped	R	9.39	4,124.00	4,114.61
KLAM	11168	Ferrier	Grondin	OWRD-GW	14-Jul-1999	10:20:00	calibrated e-tape	idle	F	11.33	4,124.00	4,112.67
KLAM	11168	Ferrier	Grondin	OWRD-GW	11-Aug-1999	10:32:00	calibrated e-tape	idle	F	10.79	4,124.00	4,113.21

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	11168	Ferrier	Grondin	OWRD-GW	16-Sep-1999	10:18:00	calibrated e-tape	nearby pumping	F	10.79	4,124.00	4,113.21
KLAM	11168	Ferrier	Grondin	OWRD-GW	26-Oct-1999	10:25:00	calibrated e-tape	idle	S	10.37	4,124.00	4,113.63
KLAM	11204	Hammerich	Storey	well-log	01-Nov-1994		reported			74.00	4,164.80	4,090.80
KLAM	11204	Hammerich	Grondin	OWRD-GW	21-May-1998	13:00:00	calibrated e-tape	static	S	12.51	4,164.80	4,152.29
KLAM	11204	Hammerich	Grondin	OWRD-GW	08-Dec-1998	14:40:00	calibrated e-tape	static	S	17.08	4,164.80	4,147.72
KLAM	11204	Hammerich	Grondin	OWRD-GW	12-Jan-1999	12:35:00	calibrated e-tape	static	S	18.91	4,164.80	4,145.89
KLAM	11204	Hammerich	Grondin	OWRD-GW	09-Feb-1999	17:20:00	calibrated e-tape	static	S	17.91	4,164.80	4,146.89
KLAM	11204	Hammerich	Grondin	OWRD-GW	16-Mar-1999	12:03:00	calibrated e-tape	static	S	14.36	4,164.80	4,150.44
KLAM	11204	Hammerich	Grondin	OWRD-GW	06-Apr-1999	10:38:00	calibrated e-tape	static	S	16.97	4,164.80	4,147.83
KLAM	11204	Hammerich	Grondin	OWRD-GW	11-May-1999	13:17:00	calibrated e-tape	idle/static	S	16.12	4,164.80	4,148.68
KLAM	11204	Hammerich	Grondin	OWRD-GW	08-Jun-1999	12:57:00	calibrated e-tape	idle/static	S	10.83	4,164.80	4,153.97
KLAM	11204	Hammerich	Grondin	OWRD-GW	13-Jul-1999	13:43:00	calibrated e-tape	idle/static	S	8.85	4,164.80	4,155.95
KLAM	11204	Hammerich	Grondin	OWRD-GW	10-Aug-1999	12:45:00	calibrated e-tape	idle	S	6.35	4,164.80	4,158.45
KLAM	11204	Hammerich	Grondin	OWRD-GW	14-Sep-1999	15:00:00	calibrated e-tape	idle	S	9.01	4,164.80	4,155.79
KLAM	11204	Hammerich	Grondin	OWRD-GW	25-Oct-1999	08:50:00	calibrated e-tape	idle	S	13.49	4,164.80	4,151.31
KLAM	11204	Hammerich	Grondin	OWRD-GW	11-Jan-2000	12:49:00	calibrated e-tape	idle	S	23.23	4,164.80	4,141.57
KLAM	11204	Hammerich	Grondin	OWRD-GW	08-Mar-2000	13:38:00	calibrated e-tape	idle	S	22.23	4,164.80	4,142.57
KLAM	11204	Hammerich	Grondin	OWRD-GW	09-May-2000	13:34:00	calibrated e-tape	idle	S	18.30	4,164.80	4,146.50
KLAM	11204	Hammerich	Grondin	OWRD-GW	27-Jun-2000	13:03:00	calibrated e-tape	idle	S	11.99	4,164.80	4,152.81
KLAM	11204	Hammerich	Grondin	OWRD-GW	12-Sep-2000	11:25:00	calibrated e-tape	idle	S	10.61	4,164.80	4,154.19
KLAM	11204	Hammerich	Grondin	OWRD-GW	14-Nov-2000	12:59:00	calibrated e-tape	idle	S	20.02	4,164.80	4,144.78
KLAM	11204	Hammerich	Grondin	OWRD-GW	09-Jan-2001	12:45:00	calibrated e-tape	idle	S	24.36	4,164.80	4,140.44
KLAM	11204	Hammerich	Grondin	OWRD-GW	06-Mar-2001	13:44:00	calibrated e-tape	idle	S	25.66	4,164.80	4,139.14
KLAM	11204	Hammerich	Grondin	OWRD-GW	08-May-2001	15:19:00	calibrated e-tape	idle	S	23.30	4,164.80	4,141.50
KLAM	11204	Hammerich	Grondin	OWRD-GW	17-Jul-2001	13:31:00	calibrated e-tape	idle	S	12.87	4,164.80	4,151.93
KLAM	11204	Hammerich	Grondin	OWRD-GW	18-Sep-2001	13:55:00	calibrated e-tape	idle	S	12.48	4,164.80	4,152.32
KLAM	11204	Hammerich	Grondin	OWRD-GW	15-Jan-2002	14:00:00	calibrated e-tape	idle	S	21.20	4,164.80	4,143.60
KLAM	11227	Connelly	Pinkard	well-log	06-Dec-1994		reported			31.00	4,141.00	4,110.00
KLAM	11227	Connelly	Grondin	OWRD-GW	19-Oct-1998	15:20:00	calibrated e-tape	static	S	27.82	4,141.00	4,113.18
KLAM	11227	Connelly	Gates	OWRD-GW	09-Dec-1998	15:15:00	calibrated e-tape	static	S	37.52	4,141.00	4,103.48
KLAM	11227	Connelly	Grondin	OWRD-GW	15-Jan-1999	11:00:00	calibrated e-tape	static	S	27.10	4,141.00	4,113.90
KLAM	11227	Connelly	Grondin	OWRD-GW	11-Feb-1999	13:40:00	calibrated e-tape	static	S	26.79	4,141.00	4,114.21
KLAM	11227	Connelly	Grondin	OWRD-GW	15-Mar-1999	12:32:00	calibrated e-tape	static	S	24.39	4,141.00	4,116.61
KLAM	11227	Connelly	Grondin	OWRD-GW	05-Apr-1999	15:11:00	calibrated e-tape	static	S	24.06	4,141.00	4,116.94
KLAM	11227	Connelly	Grondin	OWRD-GW	10-May-1999	15:47:00	calibrated e-tape	idle	S	24.57	4,141.00	4,116.43
KLAM	11227	Connelly	Grondin	OWRD-GW	07-Jun-1999	20:58:00	calibrated e-tape	static	S	25.83	4,141.00	4,115.17
KLAM	11227	Connelly	Grondin	OWRD-GW	12-Jul-1999	17:48:00	calibrated e-tape	idle	F	27.45	4,141.00	4,113.55
KLAM	11227	Connelly	Grondin	OWRD-GW	09-Aug-1999	19:07:00	calibrated e-tape	idle	S	27.63	4,141.00	4,113.37
KLAM	11227	Connelly	Grondin	OWRD-GW	14-Sep-1999	20:05:00	calibrated e-tape	recently pumped	R	27.92	4,141.00	4,113.08
KLAM	11227	Connelly	Grondin	OWRD-GW	26-Oct-1999	17:09:00	calibrated e-tape	idle	S	27.39	4,141.00	4,113.61

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	11227	Connelly	Grondin	OWRD-GW	11-Jan-2000	17:13:00	calibrated e-tape	idle	S	27.03	4,141.00	4,113.97
KLAM	11227	Connelly	Grondin	OWRD-GW	06-Mar-2000	16:41:00	calibrated e-tape	idle	S	26.31	4,141.00	4,114.69
KLAM	11227	Connelly	Grondin	OWRD-GW	08-May-2000	18:33:00	calibrated e-tape	idle	S	26.58	4,141.00	4,114.42
KLAM	11227	Connelly	Grondin	OWRD-GW	26-Jun-2000	17:02:00	calibrated e-tape	idle	S	28.51	4,141.00	4,112.49
KLAM	11227	Connelly	Grondin	OWRD-GW	11-Sep-2000	17:30:00	calibrated e-tape	recently pumped	S	29.02	4,141.00	4,111.98
KLAM	11227	Connelly	Grondin	OWRD-GW	16-Nov-2000	15:58:00	calibrated e-tape	idle	S	28.36	4,141.00	4,112.64
KLAM	11227	Connelly	Grondin	OWRD-GW	10-Jan-2001	15:22:00	calibrated e-tape	idle	S	28.01	4,141.00	4,112.99
KLAM	11227	Connelly	Grondin	OWRD-GW	05-Mar-2001	16:13:00	calibrated e-tape	idle	S	28.02	4,141.00	4,112.98
KLAM	11227	Connelly	Grondin	OWRD-GW	07-May-2001	17:16:00	calibrated e-tape	idle	S	29.08	4,141.00	4,111.92
KLAM	11227	Connelly	Grondin	OWRD-GW	18-Jul-2001	14:57:00	calibrated e-tape	idle	S	31.47	4,141.00	4,109.53
KLAM	11227	Connelly	Grondin	OWRD-GW	19-Sep-2001	14:55:00	calibrated e-tape	recently pumped	R	31.54	4,141.00	4,109.46
KLAM	11227	Connelly	Grondin	OWRD-GW	16-Jan-2002	14:06:00	calibrated e-tape	idle	S	28.98	4,141.00	4,112.02
KLAM	11294	Quadros	Wright	well-log	18-Apr-1995		reported			8.00	4,117.00	4,109.00
KLAM	11294	Quadros	Wright	well-log	09-Sep-1995		reported			10.00	4,117.00	4,107.00
KLAM	11294	Hartman	Grondin	OWRD-GW	06-May-1998	18:30:00	calibrated e-tape	static	S	4.92	4,117.00	4,112.08
KLAM	11294	Hartman	Grondin	OWRD-GW	09-Dec-1998	16:00:00	cal;ibrated e-tape	static	S	5.50	4,117.00	4,111.50
KLAM	11294	Hartman	Grondin	OWRD-GW	14-Jan-1999	12:59:00	cal;ibrated e-tape	static	S	5.50	4,117.00	4,111.50
KLAM	11294	Hartman	Grondin	OWRD-GW	10-Feb-1999	14:01:00	cal;ibrated e-tape	static	S	5.06	4,117.00	4,111.94
KLAM	11294	Hartman	Grondin	OWRD-GW	17-Mar-1999	09:55:00	cal;ibrated e-tape	static	S	4.48	4,117.00	4,112.52
KLAM	11294	Hartman	Grondin	OWRD-GW	07-Apr-1999	10:27:00	cal;ibrated e-tape	static	S	4.25	4,117.00	4,112.75
KLAM	11294	Hartman	Grondin	OWRD-GW	12-May-1999	10:20:00	cal;ibrated e-tape	idle/static	S	4.11	4,117.00	4,112.89
KLAM	11294	Hartman	Grondin	OWRD-GW	08-Jun-1999	19:15:00	cal;ibrated e-tape	idle/static	S	4.81	4,117.00	4,112.19
KLAM	11294	Hartman	Grondin	OWRD-GW	13-Jul-1999	20:32:00	cal;ibrated e-tape	idle/static	S	5.76	4,117.00	4,111.24
KLAM	11294	Nelson	Grondin	OWRD-GW	10-Aug-1999	18:37:00	cal;ibrated e-tape	idle	S	6.24	4,117.00	4,110.76
KLAM	11294	Nelson	Grondin	OWRD-GW	15-Sep-1999	15:11:00	cal;ibrated e-tape	idle	S	6.46	4,117.00	4,110.54
KLAM	11294	Nelson	Grondin	OWRD-GW	26-Oct-1999	12:06:00	cal;ibrated e-tape	idle	S	6.40	4,117.00	4,110.60
KLAM	11380	Meeker	VanMeter	well-log	01-Jun-1982		reported			40.00	4,169.30	4,129.30
KLAM	11380	Glenn	DeSpain	well-log	27-Jun-1995		reported			45.00	4,169.30	4,124.30
KLAM	11380	Hoppezak	Gates	OWRD-GW	17-Sep-1998	13:45:00	calibrated e-tape	recently pumped	S	57.43	4,169.30	4,111.87
KLAM	11380	Hoppezak	Gates	OWRD-GW	08-Dec-1998	09:50:00	calibrated e-tape	static	S	35.56	4,169.30	4,133.74
KLAM	11380	Hoppezak	Gates	OWRD-GW	15-Mar-1999	10:35:00	calibrated e-tape	static	S	27.58	4,169.30	4,141.72
KLAM	11380	Hoppezak	Gates	OWRD-GW	26-Oct-1999	16:45:00	calibrated e-tape	static	S	38.86	4,169.30	4,130.44
KLAM	11392	Kinney	Storey	well-log	10-Jul-1995		reported			170.00	4,277.50	4,107.50
KLAM	11392	Kinney	Grondin	OWRD-GW	18-Aug-1998	09:35:00	calibrated e-tape	static	S	167.91	4,277.50	4,109.59
KLAM	11392	Kinney	Grondin	OWRD-GW	10-Dec-1998	15:25:00	calibrated e-tape	static	S	166.47	4,277.50	4,111.03
KLAM	11392	Kinney	Grondin	OWRD-GW	13-Jan-1999	15:39:00	calibrated e-tape	static	S	166.19	4,277.50	4,111.31
KLAM	11392	Kinney	Grondin	OWRD-GW	11-Feb-1999	16:21:00	calibrated e-tape	static	S	165.95	4,277.50	4,111.55
KLAM	11392	Kinney	Grondin	OWRD-GW	17-Mar-1999	13:40:00	calibrated e-tape	static	S	165.08	4,277.50	4,112.42
KLAM	11392	Kinney	Grondin	OWRD-GW	07-Apr-1999	14:35:00	calibrated e-tape	static	S	164.38	4,277.50	4,113.12

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	11392	Kinney	Grondin	OWRD-GW	12-May-1999	16:49:00	calibrated e-tape	nearby pumping	S	164.41	4,277.50	4,113.09
KLAM	11392	Kinney	Grondin	OWRD-GW	09-Jun-1999	16:45:00	calibrated e-tape	idle/static	S	165.60	4,277.50	4,111.90
KLAM	11392	Kinney	Grondin	OWRD-GW	14-Jul-1999	16:04:00	calibrated e-tape	recently pumped	S	167.38	4,277.50	4,110.12
KLAM	11392	Kinney	Grondin	OWRD-GW	11-Aug-1999	14:05:00	calibrated e-tape	idle	S	167.59	4,277.50	4,109.91
KLAM	11392	Kinney	Grondin	OWRD-GW	16-Sep-1999		calibrated e-tape	idle	S	167.59	4,277.50	4,109.91
KLAM	11392	Kinney	Grondin	OWRD-GW	26-Oct-1999	15:17:00	calibrated e-tape	idle	S	166.87	4,277.50	4,110.63
KLAM	11421	Johnson	DeSpain	well-log	18-Jul-1995		reported			152.50	4,355.30	4,202.80
KLAM	11421	Anderson	Grondin	OWRD-GW	23-Feb-1999	12:52:00	calibrated e-tape	recently pumped	R	153.47	4,355.30	4,201.83
KLAM	11421	Anderson	Grondin	OWRD-GW	18-Mar-1999	20:30:00	calibrated e-tape	static	S	152.75	4,355.30	4,202.55
KLAM	11421	Anderson	Grondin	OWRD-GW	26-Oct-1999	10:10:00	calibrated e-tape	static	S	156.98	4,355.30	4,198.32
KLAM	11454	Hansen	Sevey	well-log	01-Aug-1995		reported			141.00	4,233.20	4,092.20
KLAM	11454	Hansen	Grondin	OWRD-GW	10-Jun-1998	17:00:00	calibrated e-tape	static	S	134.74	4,233.20	4,098.46
KLAM	11454	Hansen	Grondin	OWRD-GW	10-Dec-1998		calibrated e-tape	Unable to measue			4,233.20	
KLAM	11454	Hansen	Glender	OWRD-GW	15-Mar-1999	12:20:00	calibrated e-tape	static	S	134.55	4,233.20	4,098.65
KLAM	11454	Hansen	Glender	OWRD-GW	25-Oct-1999	13:45:00	calibrated e-tape	static	S	137.78	4,233.20	4,095.42
KLAM	11473	Permenter	DeSpain	well-log	12-Apr-1995		reported			46.50	4,155.30	4,108.80
KLAM	11473	Permenter	Grondin	OWRD-GW	04-Jun-1998	18:25:00	calibrated e-tape	static	S	43.45	4,155.30	4,111.85
KLAM	11473	Permenter	Grondin	OWRD-GW	10-Dec-1998	16:25:00	calibrated e-tape	static	S	45.07	4,155.30	4,110.23
KLAM	11473	Permenter	Grondin	OWRD-GW	13-Jan-1999	17:00:00	calibrated e-tape	static	S	44.78	4,155.30	4,110.52
KLAM	11473	Permenter	Grondin	OWRD-GW	11-Feb-1999	14:54:00	calibrated e-tape	static	S	44.53	4,155.30	4,110.77
KLAM	11473	Permenter	Grondin	OWRD-GW	17-Mar-1999	08:43:00	calibrated e-tape	static	S	43.68	4,155.30	4,111.62
KLAM	11473	Permenter	Grondin	OWRD-GW	07-Apr-1999	13:40:00	calibrated e-tape	static	S	42.99	4,155.30	4,112.31
KLAM	11473	Permenter	Grondin	OWRD-GW	12-May-1999	15:45:00	calibrated e-tape	idle/static	S	43.25	4,155.30	4,112.05
KLAM	11473	Permenter	Grondin	OWRD-GW	09-Jun-1999	15:26:00	calibrated e-tape	recently pumped	S	44.69	4,155.30	4,110.61
KLAM	11473	Permenter	Grondin	OWRD-GW	14-Jul-1999	14:18:00	calibrated e-tape	idle	S	46.50	4,155.30	4,108.80
KLAM	11473	Permenter	Grondin	OWRD-GW	11-Aug-1999	12:48:00	calibrated e-tape	idle	S	46.33	4,155.30	4,108.97
KLAM	11473	Permenter	Grondin	OWRD-GW	16-Sep-1999	12:25:00	calibrated e-tape	idle	S	46.32	4,155.30	4,108.98
KLAM	11473	Permenter	Grondin	OWRD-GW	26-Oct-1999	14:23:00	calibrated e-tape	idle	S	45.50	4,155.30	4,109.80
KLAM	11473	Permenter	Grondin	OWRD-GW	12-Jan-2000	12:59:00	calibrated e-tape	idle	S	44.81	4,155.30	4,110.49
KLAM	11473	Permenter	Grondin	OWRD-GW	09-Mar-2000	13:20:00	calibrated e-tape	idle	S	44.22	4,155.30	4,111.08
KLAM	11473	Permenter	Grondin	OWRD-GW	10-May-2000	11:14:00	calibrated e-tape	idle	S	44.39	4,155.30	4,110.91
KLAM	11473	Riley	Grondin	OWRD-GW	28-Jun-2000	11:18:00	calibrated e-tape	recently pumped	S	47.06	4,155.30	4,108.24
KLAM	11473	Riley	Grondin	OWRD-GW	13-Sep-2000	11:15:00	calibrated e-tape	idle	S	46.92	4,155.30	4,108.38
KLAM	11473	Riley	Grondin	OWRD-GW	15-Nov-2000	11:12:00	calibrated e-tape	idle	S	46.10	4,155.30	4,109.20
KLAM	11473	Riley	Grondin	OWRD-GW	10-Jan-2001	11:05:00	calibrated e-tape	idle	S	45.55	4,155.30	4,109.75
KLAM	11473	Greenhalgh	Grondin	OWRD-GW	07-Mar-2001	12:22:00	calibrated e-tape	idle	S	45.36	4,155.30	4,109.94
KLAM	11473	Greenhalgh	Grondin	OWRD-GW	09-May-2001	11:38:00	calibrated e-tape	idle	S	46.87	4,155.30	4,108.43
KLAM	11473	Greenhalgh	Grondin	OWRD-GW	18-Jul-2001	11:52:00	calibrated e-tape	idle	S	49.19	4,155.30	4,106.11
KLAM	11473	Greenhalgh	Grondin	OWRD-GW	19-Sep-2001	11:12:00	calibrated e-tape	idle	S	49.51	4,155.30	4,105.79

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	11473	Greenhalgh	Grondin	OWRD-GW	16-Jan-2002	11:22:00	calibrated e-tape	idle	S	46.96	4,155.30	4,108.34
KLAM	11569	Hamel	DeSpain	well-log	14-Sep-1995		reported			6.50	4,189.00	4,182.50
KLAM	11569	Hamel	Grondin	OWRD-GW	18-Nov-1998	10:14:00	calibrated e-tape	static	S	6.26	4,189.00	4,182.74
KLAM	11569	Hamel	Grondin	OWRD-GW	10-Dec-1998	13:21:00	calibrated e-tape	static	S	4.86	4,189.00	4,184.14
KLAM	11569	Hamel	Grondin	OWRD-GW	14-Jan-1999	17:54:00	calibrated e-tape	static	S	5.32	4,189.00	4,183.68
KLAM	11569	Hamel	Grondin	OWRD-GW	12-Feb-1999	12:59:00	calibrated e-tape	static	S	4.19	4,189.00	4,184.81
KLAM	11569	Hamel	Grondin	OWRD-GW	15-Mar-1999	15:45:00	calibrated e-tape	static	S	2.91	4,189.00	4,186.09
KLAM	11569	Hamel	Grondin	OWRD-GW	05-Apr-1999	16:51:00	calibrated e-tape	static	S	3.76	4,189.00	4,185.24
KLAM	11569	Hamel	Grondin	OWRD-GW	13-May-1999	12:34:00	calibrated e-tape	idle/static	S	3.29	4,189.00	4,185.71
KLAM	11569	Hamel	Grondin	OWRD-GW	09-Jun-1999	18:46:00	calibrated e-tape	idle/static	S	2.93	4,189.00	4,186.07
KLAM	11569	Hamel	Grondin	OWRD-GW	14-Jul-1999	20:44:00	calibrated e-tape	idle/static	S	3.74	4,189.00	4,185.26
KLAM	11569	Hamel	Grondin	OWRD-GW	11-Aug-1999	18:30:00	calibrated e-tape	idle	S	4.32	4,189.00	4,184.68
KLAM	11569	Hamel	Grondin	OWRD-GW	15-Sep-1999	12:41:00	calibrated e-tape	idle	S	4.89	4,189.00	4,184.11
KLAM	11569	Hamel	Grondin	OWRD-GW	27-Oct-1999	10:38:00	calibrated e-tape	idle	S	4.78	4,189.00	4,184.22
KLAM	11569	Hamel	Grondin	OWRD-GW	13-Jan-2000	14:58:00	calibrated e-tape	idle	S	4.53	4,189.00	4,184.47
KLAM	11569	Hamel	Grondin	OWRD-GW	07-Mar-2000	10:32:00	calibrated e-tape	idle	S	3.67	4,189.00	4,185.33
KLAM	11569	Hamel	Grondin	OWRD-GW	10-May-2000	13:21:00	calibrated e-tape	idle	S	4.66	4,189.00	4,184.34
KLAM	11569	Hamel	Grondin	OWRD-GW	28-Jun-2000	13:37:00	calibrated e-tape	idle	S	4.13	4,189.00	4,184.87
KLAM	11569	Hamel	Grondin	OWRD-GW	13-Sep-2000	13:36:00	calibrated e-tape	idle	S	4.24	4,189.00	4,184.76
KLAM	11569	Hamel	Grondin	OWRD-GW	16-Nov-2000	12:02:00	calibrated e-tape	idle	S	5.50	4,189.00	4,183.50
KLAM	11569	Hamel	Grondin	OWRD-GW	11-Jan-2001	10:51:00	calibrated e-tape	idle	S	5.67	4,189.00	4,183.33
KLAM	11569	Hamel	Grondin	OWRD-GW	08-Mar-2001	14:30:00	calibrated e-tape	idle	S	5.67	4,189.00	4,183.33
KLAM	11569	Hamel	Grondin	OWRD-GW	10-May-2001	12:36:00	calibrated e-tape	idle	S	4.97	4,189.00	4,184.03
KLAM	11569	Hamel	Grondin	OWRD-GW	16-Jul-2001	14:39:00	calibrated e-tape	idle	S	6.54	4,189.00	4,182.46
KLAM	11569	Hamel	Grondin	OWRD-GW	17-Sep-2001	15:13:00	calibrated e-tape	idle	S	4.96	4,189.00	4,184.04
KLAM	11569	Hamel	Grondin	OWRD-GW	14-Jan-2002	16:18:00	calibrated e-tape	idle	S	4.20	4,189.00	4,184.80
KLAM	12186	Liskey	Wilson	well-log	21-Sep-1957		reported			58.00	4,198.00	4,140.00
KLAM	12186	Liskey		OWRD-UN	17-Oct-1957		reported			57.48	4,198.00	4,140.52
KLAM	12186	Liskey		OWRD-UN	04-Jun-1958		reported			41.54	4,198.00	4,156.46
KLAM	12186	Liskey		OWRD-GW	30-Oct-1958		reported			68.00	4,198.00	4,130.00
KLAM	12186	Liskey		OWRD-UN	26-Sep-1961		reported			117.00	4,198.00	4,081.00
KLAM	12186	Liskey		USGS	14-Apr-1970		reported			108.00	4,198.00	4,090.00
KLAM	12186	Liskey		USGS	28-Oct-1970		reported			138.00	4,198.00	4,060.00
KLAM	12186	Liskey		USGS	29-Oct-1970		reported			114.68	4,198.00	4,083.32
KLAM	12186	Lorenz	Miller	OWRD-GW	09-Oct-1998	15:40:00	calibrated e-tape	static	S	171.38	4,198.00	4,026.62
KLAM	12186	Lorenz	Glender	OWRD-GW	15-Mar-1999	15:30:00	calibrated e-tape	static	S	100.72	4,198.00	4,097.28
KLAM	12186	Lorenz	Glender	OWRD-GW	25-Oct-1999	16:55:00	calibrated e-tape	static	S	155.35	4,198.00	4,042.65
KLAM	12197	Rogers and Stacy		USGS	19-Jul-1949		reported			63.45	4,195.10	4,131.65
KLAM	12197	Rogers & Stacy		USGS	14-Apr-1950		reported			63.64	4,195.10	4,131.46

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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	12197	Rogers and Stacy		OWRD-UN	21-Apr-1950		reported			63.73	4,195.10	4,131.37
KLAM	12197	Rogers and Stacy		OWRD-UN	28-Apr-1950		reported			63.83	4,195.10	4,131.27
KLAM	12197	Rogers and Stacy		OWRD-UN	05-May-1950		reported			63.85	4,195.10	4,131.25
KLAM	12197	Rogers and Stacy		OWRD-UN	12-May-1950		reported			63.90	4,195.10	4,131.20
KLAM	12197	Rogers and Stacy		OWRD-UN	19-May-1950		reported			63.95	4,195.10	4,131.15
KLAM	12197	Rogers and Stacy		OWRD-UN	26-May-1950		reported			63.89	4,195.10	4,131.21
KLAM	12197	Rogers and Stacy		OWRD-UN	02-Jun-1950		reported			63.87	4,195.10	4,131.23
KLAM	12197	Rogers and Stacy		OWRD-UN	09-Jun-1950		reported			63.83	4,195.10	4,131.27
KLAM	12197	Rogers and Stacy		OWRD-UN	16-Jun-1950		reported			63.79	4,195.10	4,131.31
KLAM	12197	Rogers and Stacy		OWRD-UN	23-Jun-1950		reported			63.77	4,195.10	4,131.33
KLAM	12197	Rogers and Stacy		OWRD-UN	30-Jun-1950		reported			63.83	4,195.10	4,131.27
KLAM	12197	Rogers and Stacy		OWRD-UN	07-Jul-1950		reported			63.83	4,195.10	4,131.27
KLAM	12197	Rogers and Stacy		OWRD-UN	11-Jul-1950		reported			63.78	4,195.10	4,131.32
KLAM	12197	Rogers and Stacy		OWRD-UN	14-Jul-1950		reported			63.67	4,195.10	4,131.43
KLAM	12197	Rogers and Stacy		OWRD-UN	21-Jul-1950		reported			63.67	4,195.10	4,131.43
KLAM	12197	Rogers and Stacy		OWRD-UN	28-Jul-1950		reported			63.68	4,195.10	4,131.42
KLAM	12197	Rogers and Stacy		OWRD-UN	04-Aug-1950		reported			63.69	4,195.10	4,131.41
KLAM	12197	Rogers and Stacy		OWRD-UN	11-Aug-1950		reported			63.71	4,195.10	4,131.39
KLAM	12197	Rogers and Stacy		OWRD-UN	18-Aug-1950		reported			63.72	4,195.10	4,131.38
KLAM	12197	Rogers and Stacy		OWRD-UN	25-Aug-1950		reported			63.73	4,195.10	4,131.37
KLAM	12197	Rogers and Stacy		OWRD-UN	01-Sep-1950		reported			63.73	4,195.10	4,131.37
KLAM	12197	Rogers and Stacy		OWRD-UN	08-Sep-1950		reported			63.72	4,195.10	4,131.38
KLAM	12197	Rogers and Stacy		OWRD-UN	15-Sep-1950		reported			63.71	4,195.10	4,131.39
KLAM	12197	Rogers and Stacy		OWRD-UN	22-Sep-1950		reported			63.70	4,195.10	4,131.40
KLAM	12197	Rogers and Stacy		OWRD-UN	29-Sep-1950		reported			63.69	4,195.10	4,131.41
KLAM	12197	Rogers and Stacy		OWRD-UN	06-Oct-1950		reported			63.67	4,195.10	4,131.43
KLAM	12197	Rogers and Stacy		OWRD-UN	13-Oct-1950		reported			63.66	4,195.10	4,131.44
KLAM	12197	Rogers and Stacy		OWRD-UN	20-Oct-1950		reported			63.65	4,195.10	4,131.45
KLAM	12197	Rogers and Stacy		OWRD-UN	27-Oct-1950		reported			63.64	4,195.10	4,131.46
KLAM	12197	Rogers and Stacy		OWRD-UN	01-Nov-1950		reported			63.96	4,195.10	4,131.14
KLAM	12197	Rogers and Stacy		OWRD-UN	03-Nov-1950		reported			63.92	4,195.10	4,131.18
KLAM	12197	Rogers and Stacy		OWRD-UN	10-Nov-1950		reported			63.93	4,195.10	4,131.17
KLAM	12197	Rogers and Stacy		OWRD-UN	17-Nov-1950		reported			63.94	4,195.10	4,131.16
KLAM	12197	Rogers and Stacy		OWRD-UN	24-Nov-1950		reported			63.94	4,195.10	4,131.16
KLAM	12197	Rogers and Stacy		OWRD-UN	01-Dec-1950		reported			63.95	4,195.10	4,131.15
KLAM	12197	Rogers and Stacy		OWRD-UN	08-Dec-1950		reported			63.96	4,195.10	4,131.14
KLAM	12197	Rogers and Stacy		OWRD-UN	15-Dec-1950		reported			63.97	4,195.10	4,131.13
KLAM	12197	Rogers and Stacy		OWRD-UN	22-Dec-1950		reported			63.98	4,195.10	4,131.12
KLAM	12197	Rogers and Stacy		OWRD-UN	29-Dec-1950		reported			64.09	4,195.10	4,131.01
KLAM	12197	Rogers and Stacy		OWRD-UN	05-Jan-1951		reported			64.19	4,195.10	4,130.91
KLAM	12197	Rogers and Stacy		OWRD-UN	12-Jan-1951		reported			64.29	4,195.10	4,130.81
KLAM	12197	Rogers and Stacy		OWRD-UN	19-Jan-1951		reported			64.39	4,195.10	4,130.71

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	12197	Rogers and Stacy		OWRD-UN	26-Jan-1951		reported			64.49	4,195.10	4,130.61
KLAM	12197	Rogers and Stacy		OWRD-UN	02-Feb-1951		reported			64.49	4,195.10	4,130.61
KLAM	12197	Rogers and Stacy		OWRD-UN	09-Feb-1951		reported			64.59	4,195.10	4,130.51
KLAM	12197	Rogers and Stacy		OWRD-UN	16-Feb-1951		reported			64.59	4,195.10	4,130.51
KLAM	12197	Rogers and Stacy		OWRD-UN	23-Feb-1951		reported			64.66	4,195.10	4,130.44
KLAM	12197	Rogers and Stacy		OWRD-UN	02-Mar-1951		reported			64.70	4,195.10	4,130.40
KLAM	12197	Rogers and Stacy		OWRD-UN	09-Mar-1951		reported			64.71	4,195.10	4,130.39
KLAM	12197	Rogers and Stacy		OWRD-UN	16-Mar-1951		reported			64.73	4,195.10	4,130.37
KLAM	12197	Rogers and Stacy		OWRD-UN	23-Mar-1951		reported			64.75	4,195.10	4,130.35
KLAM	12197	Rogers and Stacy		OWRD-UN	04-Apr-1951		reported			66.94	4,195.10	4,128.16
KLAM	12197	Rogers and Stacy		OWRD-UN	06-Apr-1951		reported			66.60	4,195.10	4,128.50
KLAM	12197	Rogers and Stacy		OWRD-UN	11-Apr-1951		reported			64.80	4,195.10	4,130.30
KLAM	12197	Rogers and Stacy		OWRD-UN	13-Apr-1951		reported			66.70	4,195.10	4,128.40
KLAM	12197	Rogers and Stacy		OWRD-UN	18-Apr-1951		reported			65.20	4,195.10	4,129.90
KLAM	12197	Rogers and Stacy		OWRD-UN	20-Apr-1951		reported			66.90	4,195.10	4,128.20
KLAM	12197	Rogers and Stacy		OWRD-UN	21-Apr-1951		reported			66.40	4,195.10	4,128.70
KLAM	12197	Rogers and Stacy		OWRD-UN	27-Apr-1951		reported			67.10	4,195.10	4,128.00
KLAM	12197	Rogers and Stacy		OWRD-UN	04-May-1951		reported			64.40	4,195.10	4,130.70
KLAM	12197	Rogers and Stacy		OWRD-UN	01-Jun-1951		reported			66.40	4,195.10	4,128.70
KLAM	12197	Rogers and Stacy		OWRD-UN	08-Jun-1951		reported			66.10	4,195.10	4,129.00
KLAM	12197	Rogers and Stacy		OWRD-UN	15-Jun-1951		reported			66.00	4,195.10	4,129.10
KLAM	12197	Rogers and Stacy		OWRD-UN	22-Jun-1951		reported			65.80	4,195.10	4,129.30
KLAM	12197	Rogers and Stacy		OWRD-UN	29-Jun-1951		reported			65.88	4,195.10	4,129.22
KLAM	12197	Rogers and Stacy		OWRD-UN	06-Jul-1951		reported			65.70	4,195.10	4,129.40
KLAM	12197	Rogers and Stacy		OWRD-UN	13-Jul-1951		reported			65.70	4,195.10	4,129.40
KLAM	12197	Rogers and Stacy		OWRD-UN	20-Jul-1951		reported			65.60	4,195.10	4,129.50
KLAM	12197	Rogers and Stacy		OWRD-UN	27-Jul-1951		reported			65.50	4,195.10	4,129.60
KLAM	12197	Rogers and Stacy		OWRD-UN	06-Sep-1951		reported			64.75	4,195.10	4,130.35
KLAM	12197	Rogers and Stacy		OWRD-UN	04-Jan-1952		reported			96.44	4,195.10	4,098.66
KLAM	12197	Rogers and Stacy		OWRD-UN	22-Apr-1952		reported			94.99	4,195.10	4,100.11
KLAM	12197	Rogers and Stacy	Wilson	well-log	10-May-1958		reported			95.00	4,195.10	4,100.10
KLAM	12197	Dehlinger	Harris	USGS	23-Apr-1970		reported			95.18	4,195.10	4,099.92
KLAM	12197	Dehlinger		USGS	28-Oct-1970		reported			108.50	4,195.10	4,086.60
KLAM	12197	Jespersen-Edgewood Ranch	Miller	OWRD-GW	12-Oct-1998	14:30:00	calibrated e-tape	static	S	90.49	4,195.10	4,104.61
KLAM	12197	Jespersen-Edgewood Ranch	Gates	OWRD-GW	10-Dec-1998	11:40:00	calibrated e-tape	static	S	83.70	4,195.10	4,111.40
KLAM	12197	Jespersen-Edgewood Ranch	Glender	OWRD-GW	15-Mar-1999	15:11:00	calibrated e-tape	static	S	77.48	4,195.10	4,117.62
KLAM	12197	Jespersen-Edgewood Ranch	Glender	OWRD-GW	25-Oct-1999	15:43:00	calibrated e-tape	static	S	84.75	4,195.10	4,110.35
KLAM	12203	Hankins		well-log	21-Jul-1949		reported			77.29	4,194.00	4,116.71
KLAM	12203	Hankins		well-log	19-Nov-1949		reported			79.70	4,194.00	4,114.30
KLAM	12203	Hankins		OWRD-UN	24-Apr-1957		reported			73.55	4,194.00	4,120.45
KLAM	12203	Hankins		OWRD-UN	30-Oct-1957		reported			73.75	4,194.00	4,120.25

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	12203	Nevin Cattle Company	Harris	USGS	11-Oct-1969		reported			79.57	4,194.00	4,114.43
KLAM	12203	Nevin Cattle Company		USGS	15-Apr-1970		reported			76.70	4,194.00	4,117.30
KLAM	12203	Nevin Cattle Company	Harris	USGS	30-Oct-1970		reported			78.75	4,194.00	4,115.25
KLAM	12203	Nevin	Miller	OWRD-GW	10-Oct-1998	11:50:00	calibrated e-tape	static	S	81.71	4,194.00	4,112.29
KLAM	12203	Nevin	Gates	OWRD-GW	10-Dec-1998	13:30:00	calibrated e-tape	static	S	79.97	4,194.00	4,114.03
KLAM	12203	Nevin	Glender	OWRD-GW	16-Mar-1999	09:25:00	calibrated e-tape	static	S	77.71	4,194.00	4,116.29
KLAM	12203	Nevin	Glender	OWRD-GW	26-Oct-1999	14:32:00	calibrated e-tape	static	S	80.98	4,194.00	4,113.02
KLAM	12209	Liskey	Wilson	well-log	25-May-1965		reported			125.00	4,223.20	4,098.20
KLAM	12209	Liskey	Harris	USGS	13-Apr-1970		reported			123.43	4,223.20	4,099.77
KLAM	12209	Liskey		USGS	28-Oct-1970		reported			128.10	4,223.20	4,095.10
KLAM	12209	Wirth	Gates	OWRD-GW	26-Oct-1998	14:24:00	calibrated e-tape	static	S	128.73	4,223.20	4,094.47
KLAM	12209	Wirth	Glender	OWRD-GW	15-Mar-1999	14:32:00	calibrated e-tape	static	S	125.94	4,223.20	4,097.26
KLAM	12209	Wirth	Glender	OWRD-GW	15-Mar-1999	14:32:00	steel tape	static	S	125.40	4,223.20	4,097.80
KLAM	12209	Wirth	Glender	OWRD-GW	25-Oct-1999	15:28:00	calibrated e-tape	static	S	128.84	4,223.20	4,094.36
KLAM	12213	House	Hartley	well-log	15-Feb-1962		reported			111.00	4,209.30	4,098.30
KLAM	12213	House	Harris	USGS	23-Apr-1970		reported			104.73	4,209.30	4,104.57
KLAM	12213	House		USGS	28-Oct-1970		reported			104.65	4,209.30	4,104.65
KLAM	12213	Redfield	DeSpain	well-log	25-May-1993		reported			121.00	4,209.30	4,088.30
KLAM	12213	Redfield	Miller	OWRD-GW	13-Oct-1998	11:25:00	calibrated e-tape	static	S	104.57	4,209.30	4,104.73
KLAM	12213	Redfield	Gates	OWRD-GW	10-Dec-1998	12:05:00	calibrated e-tape	static	S	89.90	4,209.30	4,119.40
KLAM	12213	Redfield	Glender	OWRD-GW	15-Mar-1999	12:00:00	calibrated e-tape	static	S	89.78	4,209.30	4,119.52
KLAM	12213	Redfield	Glender	OWRD-GW	25-Oct-1999	15:20:00	calibrated e-tape	static	S	99.35	4,209.30	4,109.95
KLAM	12217	Hankins		OWRD-UN	23-Apr-1957		reported			106.08	4,205.70	4,099.62
KLAM	12217	Hankins		OWRD-UN	17-Oct-1957		reported			107.05	4,205.70	4,098.65
KLAM	12217	Hankins		OWRD-UN	04-Jun-1958		reported			104.93	4,205.70	4,100.77
KLAM	12217	Hankins		OWRD-UN	30-Oct-1958		reported			106.02	4,205.70	4,099.68
KLAM	12217	Short		USGS	02-Dec-1958		reported			105.90	4,205.70	4,099.80
KLAM	12217	Short		USGS	10-Jun-1959		reported			106.22	4,205.70	4,099.48
KLAM	12217	Hankins		OWRD-UN	26-Sep-1961		reported			109.57	4,205.70	4,096.13
KLAM	12217	Short	Harris	USGS	13-Apr-1970		reported			106.53	4,205.70	4,099.17
KLAM	12217	Short		USGS	28-Oct-1970		reported			109.84	4,205.70	4,095.86
KLAM	12217	Hoyal Farms	Gates	OWRD-GW	22-Oct-1998	10:48:00	calibrated e-tape	static	S	111.43	4,205.70	4,094.27
KLAM	12217	Hoyal Farms	Glender	OWRD-GW	15-Mar-1999	11:43:00	calibrated e-tape	static	S	108.47	4,205.70	4,097.23
KLAM	12217	Hoyal Farms	Glender	OWRD-GW	25-Oct-1999	15:10:00	calibrated e-tape	static	S	111.33	4,205.70	4,094.37
KLAM	12218		Hartley	well-log	20-Jul-1955		reported			109.00	4,196.10	4,087.10
KLAM	12218	Hankins		well-log	11-Sep-1956		reported			105.00	4,196.10	4,091.10
KLAM	12218	Hankins		OWRD-UN	25-Apr-1957		reported			97.06	4,196.10	4,099.04
KLAM	12218	Hankins		OWRD-UN	17-Oct-1957		reported			106.46	4,196.10	4,089.64

Appendix 13: Ground Water Elevation Measurements

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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	12218	Hankins		OWRD-UN	04-Jun-1958		reported			95.78	4,196.10	4,100.32
KLAM	12218	Hankins		OWRD-UN	30-Oct-1958		reported			97.00	4,196.10	4,099.10
KLAM	12218	Hankins		OWRD-UN	26-Sep-1961		reported			109.78	4,196.10	4,086.32
KLAM	12218	Short	Harris	USGS	13-Apr-1970		reported			97.62	4,196.10	4,098.48
KLAM	12218	Short		USGS	28-Oct-1970		reported			100.91	4,196.10	4,095.19
KLAM	12218	Hoyal Farms	Gates	OWRD-GW	22-Oct-1998	09:10:00	calibrated e-tape	static	S	101.68	4,196.10	4,094.42
KLAM	12218	Hoyal Farms	Gates	OWRD-GW	10-Dec-1998	12:25:00	calibrated e-tape	static	S	100.53	4,196.10	4,095.57
KLAM	12218	Hoyal Farms	Glender	OWRD-GW	15-Mar-1999	11:25:00	calibrated e-tape	static	S	98.69	4,196.10	4,097.41
KLAM	12218	Hoyal Farms	Glender	OWRD-GW	25-Oct-1999	15:00:00	calibrated e-tape	static	S	100.97	4,196.10	4,095.13
KLAM	12221	Hankins		OWRD-UN	24-Apr-1957		reported			103.52	4,202.40	4,098.88
KLAM	12221	Hankins		OWRD-UN	17-Oct-1957		reported			112.71	4,202.40	4,089.69
KLAM	12221	Hankins		OWRD-UN	04-Jun-1958		reported			100.85	4,202.40	4,101.55
KLAM	12221	Hankins		OWRD-UN	30-Oct-1958		reported			102.15	4,202.40	4,100.25
KLAM	12221	Hankins		OWRD-UN	26-Sep-1961		reported			106.18	4,202.40	4,096.22
KLAM	12221	Goldbeck	Harris	USGS	10-Oct-1969		reported			106.17	4,202.40	4,096.23
KLAM	12221	Goldbeck	Harris	USGS	13-Apr-1970		reported			102.10	4,202.40	4,100.30
KLAM	12221	Goldbeck		USGS	29-Oct-1970		reported			109.77	4,202.40	4,092.63
KLAM	12221	Golbeck	Gates	OWRD-GW	16-Oct-1998		steel tape	static	S	106.38	4,202.40	4,096.02
KLAM	12221	Golbeck	Glender	OWRD-GW	15-Mar-1999	10:58:00	steel tape	static	S	103.13	4,202.40	4,099.27
KLAM	12221	Golbeck	Glender	OWRD-GW	25-Oct-1999	14:40:00	steel tape	static	S	106.04	4,202.40	4,096.36
KLAM	12221	Golbeck	Glender	OWRD-GW	25-Oct-1999	14:45:00	calibrated e-tape	static	S	107.39	4,202.40	4,095.01
KLAM	12223	Nevin Cattle Company	Enloe	well-log	02-Mar-1982		reported			113.00	4,203.10	4,090.10
KLAM	12223	Nevin	Miller	OWRD-GW	10-Oct-1998	14:20:00	calibrated e-tape	static	S	108.47	4,203.10	4,094.63
KLAM	12223	Nevin	Glender	OWRD-GW	16-Mar-1999	08:50:00	calibrated e-tape	static	S	105.27	4,203.10	4,097.83
KLAM	12223	Nevin	Glender	OWRD-GW	26-Oct-1999	14:49:00	calibrated e-tape	static	S	107.15	4,203.10	4,095.95
KLAM	12224	Mitchell		well-log	15-Sep-1949		reported			83.00	4,194.70	4,111.70
KLAM	12224	Mitchell		USGS	04-Apr-1951		reported			80.70	4,194.70	4,114.00
KLAM	12224	Mitchell		OWRD-UN	24-Apr-1957		reported			79.18	4,194.70	4,115.52
KLAM	12224	Mitchell		OWRD-UN	17-Oct-1957		reported			82.13	4,194.70	4,112.57
KLAM	12224	Mitchell		OWRD-UN	01-May-1958		reported			77.50	4,194.70	4,117.20
KLAM	12224	Mitchell		OWRD-UN	04-Jun-1958		reported			77.95	4,194.70	4,116.75
KLAM	12224	Mitchell		OWRD-UN	30-Oct-1958		reported			79.15	4,194.70	4,115.55
KLAM	12224	Mitchell	Harris	USGS	11-Oct-1969		reported			84.15	4,194.70	4,110.55
KLAM	12224	Mitchell	Harris	USGS	18-Apr-1970		reported			79.72	4,194.70	4,114.98
KLAM	12224	Mitchell		USGS	27-Oct-1970		reported			83.42	4,194.70	4,111.28
KLAM	12224	Mitchell	Gates	OWRD-GW	13-Oct-1998		calibrated e-tape	static	S	85.96	4,194.70	4,108.74
KLAM	12224	Mitchell	Gates	OWRD-GW	10-Dec-1998	13:00:00	calibrated e-tape	static	S	84.24	4,194.70	4,110.46
KLAM	12224	Mitchell	Glender	OWRD-GW	16-Mar-1999		calibrated e-tape	static	S	81.93	4,194.70	4,112.77
KLAM	12224	Mitchell	Glender	OWRD-GW	26-Oct-1999	15:13:00	calibrated e-tape	static	S	85.32	4,194.70	4,109.38

Appendix 13: Ground Water Elevation Measurements

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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	12226	Deyarmie	Storey	well-log	19-Aug-1965		reported			75.50	4,183.00	4,107.50
KLAM	12226	Deyarmie	Harris	USGS	11-Oct-1969		reported			75.78	4,183.00	4,107.22
KLAM	12226	Deyarmie		USGS	18-Apr-1970		reported			68.45	4,183.00	4,114.55
KLAM	12226	Deyarmie	Harris	USGS	27-Oct-1970		reported			75.08	4,183.00	4,107.92
KLAM	12226	Deyarmie	Gates	OWRD-GW	27-Oct-1998	09:30:00	calibrated e-tape	static	S	76.96	4,183.00	4,106.04
KLAM	12226	Deyarmie	Glender	OWRD-GW	16-Mar-1999	16:20:00	steel tape	static	S	73.10	4,183.00	4,109.90
KLAM	12226	Deyarmie	Glender	OWRD-GW	27-Oct-1999		calibrated e-tape	unable to measure			4,183.00	
KLAM	12228			OWRD-UN	15-Jun-1956		reported			125.90	4,224.70	4,098.80
KLAM	12228			OWRD-UN	15-Nov-1956		reported			126.90	4,224.70	4,097.80
KLAM	12228	Liskey	Harris	USGS	10-Oct-1969		reported			129.42	4,224.70	4,095.28
KLAM	12228	Liskey	Harris	USGS	13-Apr-1970		reported			126.09	4,224.70	4,098.61
KLAM	12228	Liskey		USGS	28-Oct-1970		reported			129.46	4,224.70	4,095.24
KLAM	12228	Lorenz	Miller	OWRD-GW	09-Oct-1998	13:00:00	calibrated e-tape	static	S	130.38	4,224.70	4,094.32
KLAM	12228	Lorenz	Glender	OWRD-GW	15-Mar-1999	10:45:00	calibrated e-tape	static	S	130.64	4,224.70	4,094.06
KLAM	12228	Lorenz	Glender	OWRD-GW	25-Oct-1999	14:15:00	calibrated e-tape	static	S	130.05	4,224.70	4,094.65
KLAM	12228	Lorenz	Glender	OWRD-GW	25-Oct-1999	14:20:00	steel tape	static	S	129.42	4,224.70	4,095.28
KLAM	12230	Lorenz	Storey	well-log	23-Jul-1981		reported			45.00	4,148.00	4,103.00
KLAM	12230	Lorenz	Miller	OWRD-GW	09-Oct-1998	10:10:00	calibrated e-tape	static	S	44.00	4,148.00	4,104.00
KLAM	12230	Lorenz	Gates	OWRD-GW	10-Dec-1998	12:50:00	calibrated e-tape	static	S	42.80	4,148.00	4,105.20
KLAM	12230	Lorenz	Glender	OWRD-GW	15-Mar-1999	09:38:00	calibrated e-tape	static	S	40.98	4,148.00	4,107.02
KLAM	12230	Lorenz	Glender	OWRD-GW	26-Oct-1999	08:25:00	calibrated e-tape	static	S	43.53	4,148.00	4,104.47
KLAM	12261	Ritter		USGS	02-Apr-1948		reported			129.38	4,240.90	4,111.52
KLAM	12261	Ritter		USGS	14-Apr-1970		reported			129.90	4,240.90	4,111.00
KLAM	12261	Ritter		USGS	26-Oct-1970		reported			129.17	4,240.90	4,111.73
KLAM	12261	Ritter	Grondin	OWRD-GW	21-Oct-1998	11:54:00	calibrated e-tape	static	S	130.03	4,240.90	4,110.87
KLAM	12261	Ritter	Sparks	OWRD-GW	16-Mar-1999	08:50:00	calibrated e-tape	static	S	128.04	4,240.90	4,112.86
KLAM	12261	Ritter	Gall	OWRD-GW	25-Oct-1999	16:45:00	calibrated e-tape	idle	S	130.16	4,240.90	4,110.74
KLAM	12267	Calahan	Hartley	well-log	07-Mar-1962		reported			116.00	4,227.60	4,111.60
KLAM	12267	Sierra Cascade Nursery, Inc.	Grondin	OWRD-GW	26-Oct-1998	11:16:00	calibrated e-tape	static	S	117.65	4,227.60	4,109.95
KLAM	12267	Sierra Cascade Nursery, Inc.	Gates	OWRD-GW	11-Dec-1998	10:30:00	calibrated e-tape	static	S	116.97	4,227.60	4,110.63
KLAM	12267	Sierra Cascade Nursery, Inc.	Sparks	OWRD-GW	16-Mar-1999	09:25:00	calibrated e-tape	static	S	115.21	4,227.60	4,112.39
KLAM	12267	Sierra Cascade Nursery, Inc.	Gall	OWRD-GW	27-Oct-1999	08:50:00	calibrated e-tape	system at 70 psi	R	117.26	4,227.60	4,110.34
KLAM	12269	Hartzler		well-log	15-Apr-1954		reported			106.00	4,221.00	4,115.00
KLAM	12269	Hartzler		USGS	30-Jul-1954		reported			105.55	4,221.00	4,115.45
KLAM	12269	Hartzler		OWRD-UN	24-Apr-1957		reported			104.70	4,221.00	4,116.30
KLAM	12269	Hartzler		OWRD-UN	17-Oct-1957		reported			105.08	4,221.00	4,115.92

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	12269	Hartzler		OWRD-UN	04-Jun-1958		reported			103.85	4,221.00	4,117.15
KLAM	12269	Hartzler		OWRD-UN	30-Oct-1958		reported			104.20	4,221.00	4,116.80
KLAM	12269	Jendrzejewski		USGS	14-Apr-1970		reported			105.46	4,221.00	4,115.54
KLAM	12269	Jendrzejewski		USGS	27-Oct-1970		reported			106.49	4,221.00	4,114.51
KLAM	12269	Ritter	Grondin	OWRD-GW	21-Oct-1998	09:50:00	calibrated e-tape	static	S	108.35	4,221.00	4,112.65
KLAM	12269	Ritter	Sparks	OWRD-GW	16-Mar-1999	09:10:00	calibrated e-tape	static	S	106.35	4,221.00	4,114.65
KLAM	12269	Ritter	Gall	OWRD-GW	25-Oct-1999	16:30:00	calibrated e-tape	idle	S	108.42	4,221.00	4,112.58
KLAM	12273	Jendzejewski	Wilson	well-log	16-Sep-1977		reported			165.00	4,205.50	4,040.50
KLAM	12273	Jendrzejewski	Grondin	OWRD-GW	04-Jun-1998		calibrated e-tape	static	S	93.13	4,205.50	4,112.37
KLAM	12273	Jendrzejewski	Sparks	OWRD-GW	15-Mar-1999	16:55:00	calibrated e-tape	static	S	81.17	4,205.50	4,124.33
KLAM	12273	Jendrzejewski	Gall	OWRD-GW	25-Oct-1999	17:00:00	calibrated e-tape	idle	S	95.57	4,205.50	4,109.93
KLAM	12283	Weyerhaeuser Company	Storey	well-log	21-Oct-1968		reported			141.00	4,251.00	4,110.00
KLAM	12283	Weyerhaeuser Company	Harris	USGS	09-Oct-1969		reported			139.81	4,251.00	4,111.19
KLAM	12283	Weyerhaeuser Company		USGS	15-Apr-1970		reported			138.90	4,251.00	4,112.10
KLAM	12283	Weyerhaeuser Company		USGS	26-Oct-1970		reported			139.98	4,251.00	4,111.02
KLAM	12283	U.S. Timberlands	Gates	OWRD-GW	28-Oct-1998	09:40:00	calibrated e-tape	static	S	141.23	4,251.00	4,109.77
KLAM	12283	U.S. Timberlands	Sparks	OWRD-GW	16-Mar-1999	08:30:00	calibrated e-tape	static	S	139.40	4,251.00	4,111.60
KLAM	12283	U.S. Timberlands	Gall	OWRD-GW	26-Oct-1999	12:50:00	calibrated e-tape	idle	S	141.47	4,251.00	4,109.53
KLAM	12286	Tofel		USGS	21-Jul-1949		reported			87.64	4,197.40	4,109.76
KLAM	12286	Tofell		USGS	15-Apr-1970		reported			86.02	4,197.40	4,111.38
KLAM	12286	Tofell		USGS	27-Oct-1970		reported			86.58	4,197.40	4,110.82
KLAM	12286	Walker	Gates	OWRD-GW	29-Oct-1998	10:05:00	calibrated e-tape	static	S	87.13	4,197.40	4,110.27
KLAM	12286	Walker	Gates	OWRD-GW	10-Dec-1998	16:05:00	calibrated e-tape	static	S	86.62	4,197.40	4,110.78
KLAM	12286	Walker	Sparks	OWRD-GW	15-Mar-1999		steel tape	static	S	85.18	4,197.40	4,112.22
KLAM	12286	Walker	Gall	OWRD-GW	25-Oct-1999	17:25:00	calibrated e-tape	idle	S	87.29	4,197.40	4,110.11
KLAM	12345	Fyock		well-log	20-Jul-1949		reported			66.24	4,176.40	4,110.16
KLAM	12345	Ritter	Harris	USGS	25-Sep-1969		reported			65.31	4,176.40	4,111.09
KLAM	12345	Ritter		USGS	15-Apr-1970		reported			64.10	4,176.40	4,112.30
KLAM	12345	Ritter		USGS	26-Oct-1970		reported			65.24	4,176.40	4,111.16
KLAM	12345	Hill	Gates	OWRD-GW	27-Oct-1998	13:25:00	calibrated e-tape	static	S	66.33	4,176.40	4,110.07
KLAM	12345	Hill	Sparks	OWRD-GW	15-Mar-1999	16:20:00	calibrated e-tape	static	S	64.44	4,176.40	4,111.96
KLAM	12345	Hill	Gall	OWRD-GW	25-Oct-1999	17:40:00	calibrated e-tape	idle	S	66.50	4,176.40	4,109.90
KLAM	12358	Hammerich	DeSpain	well-log	16-Oct-1989		reported			63.00	4,172.50	4,109.50
KLAM	12358	Hammerich	Gates	OWRD-GW	15-Oct-1998		calibrated e-tape	static	S	62.82	4,172.50	4,109.68
KLAM	12358	Hammerich	Sparks	OWRD-GW	15-Mar-1999	15:40:00	calibrated e-tape	static	S	60.68	4,172.50	4,111.82
KLAM	12358	Hammerich	Gall	OWRD-GW	25-Oct-1999	17:55:00	calibrated e-tape	idle	S	62.76	4,172.50	4,109.74

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	12363	Haskins & Company		USGS	20-Jul-1949		reported			68.68	4,179.00	4,110.32
KLAM	12363	Haskins & Company	Harris	USGS	25-Sep-1969		reported			68.17	4,179.00	4,110.83
KLAM	12363	Haskins & Company		USGS	21-Apr-1970		reported			66.96	4,179.00	4,112.04
KLAM	12363	Haskins & Company		USGS	27-Oct-1970		reported			68.02	4,179.00	4,110.98
KLAM	12363	Permenter	Gates	OWRD-GW	22-Oct-1998	14:30:00	steel tape	static	S	69.12	4,179.00	4,109.88
KLAM	12363	Permenter	Sparks	OWRD-GW	15-Mar-1999	10:50:00	steel tape	static	S	67.18	4,179.00	4,111.82
KLAM	12363	Permenter	Gall	OWRD-GW	25-Oct-1999	18:10:00	steel tape	idle and oil	S	69.15	4,179.00	4,109.85
KLAM	12369	Hamel	Sevey	well-log	14-Nov-1988		reported			89.00	4,194.90	4,105.90
KLAM	12369	Hamel	Grondin	OWRD-GW	18-Aug-1998	17:10:00	calibrated e-tape	static	S	85.22	4,194.90	4,109.68
KLAM	12369	Hamel	Grondin	OWRD-GW	10-Dec-1998	13:42:00	calibrated e-tape	static	S	83.89	4,194.90	4,111.01
KLAM	12369	Hamel	Grondin	OWRD-GW	14-Jan-1999	17:24:00	calibrated e-tape	static	S	83.02	4,194.90	4,111.88
KLAM	12369	Hamel	Grondin	OWRD-GW	12-Feb-1999	13:36:00	calibrated e-tape	static	S	82.49	4,194.90	4,112.41
KLAM	12369	Hamel	Grondin	OWRD-GW	15-Mar-1999	15:04:00	calibrated e-tape	static	S	81.40	4,194.90	4,113.50
KLAM	12369	Hamel	Grondin	OWRD-GW	05-Apr-1999	16:27:00	calibrated e-tape	static	S	80.71	4,194.90	4,114.19
KLAM	12369	Hamel	Grondin	OWRD-GW	13-May-1999	12:09:00	calibrated e-tape	idle/static	S	80.75	4,194.90	4,114.15
KLAM	12369	Hamel	Grondin	OWRD-GW	09-Jun-1999	17:59:00	calibrated e-tape	idle/static	S	82.12	4,194.90	4,112.78
KLAM	12369	Hamel	Grondin	OWRD-GW	14-Jul-1999	20:19:00	calibrated e-tape	idle/static	S	84.26	4,194.90	4,110.64
KLAM	12369	Hamel	Grondin	OWRD-GW	11-Aug-1999	15:52:00	calibrated e-tape	idle	S	85.92	4,194.90	4,108.98
KLAM	12369	Hamel	Grondin	OWRD-GW	15-Sep-1999	12:11:00	calibrated e-tape	idle	S	86.55	4,194.90	4,108.35
KLAM	12369	Hamel	Grondin	OWRD-GW	27-Oct-1999	11:01:00	calibrated e-tape	idle	S	85.17	4,194.90	4,109.73
KLAM	12369	Hamel	Grondin	OWRD-GW	13-Jan-2000	14:33:00	calibrated e-tape	idle	S	83.05	4,194.90	4,111.85
KLAM	12369	Hamel	Grondin	OWRD-GW	07-Mar-2000	11:10:00	calibrated e-tape	idle	S	82.07	4,194.90	4,112.83
KLAM	12369	Hamel	Grondin	OWRD-GW	10-May-2000	12:59:00	calibrated e-tape	idle	S	81.46	4,194.90	4,113.44
KLAM	12369	Hamel	Grondin	OWRD-GW	28-Jun-2000	12:46:00	calibrated e-tape	idle	S	84.72	4,194.90	4,110.18
KLAM	12369	Hamel	Grondin	OWRD-GW	13-Sep-2000	13:08:00	calibrated e-tape	idle	S	88.11	4,194.90	4,106.79
KLAM	12369	Hamel	Grondin	OWRD-GW	16-Nov-2000	11:39:00	calibrated e-tape	idle	S	86.35	4,194.90	4,108.55
KLAM	12369	Hamel	Grondin	OWRD-GW	11-Jan-2001	11:23:00	calibrated e-tape	recently pumped	R	84.80	4,194.90	4,110.10
KLAM	12369	Hamel	Grondin	OWRD-GW	08-Mar-2001	14:09:00	calibrated e-tape	idle	S	83.85	4,194.90	4,111.05
KLAM	12369	Hamel	Grondin	OWRD-GW	10-May-2001	12:09:00	calibrated e-tape	idle	S	84.98	4,194.90	4,109.92
KLAM	12369	Hamel	Grondin	OWRD-GW	16-Jul-2001	14:13:00	calibrated e-tape	idle	S	89.80	4,194.90	4,105.10
KLAM	12369	Hamel	Grondin	OWRD-GW	17-Sep-2001	16:20:00	calibrated e-tape	recently pumped	S	92.65	4,194.90	4,102.25
KLAM	12369	Hamel	Grondin	OWRD-GW	14-Jan-2002	15:15:00	calibrated e-tape	recently pumped	S	87.69	4,194.90	4,107.21
KLAM	12380	Angel	Hartley	well-log	24-Mar-1954		reported			70.00	4,183.50	4,113.50
KLAM	12380	Angel		USGS	27-Jul-1954		reported			71.57	4,183.50	4,111.93
KLAM	12380	Angel		USGS	01-Sep-1969		reported			71.11	4,183.50	4,112.39
KLAM	12380	Angel	Harris	USGS	10-Apr-1970		reported			69.63	4,183.50	4,113.87
KLAM	12380	Angel	Harris	USGS	26-Oct-1970		reported			70.71	4,183.50	4,112.79
KLAM	12380	Angel	Gates	OWRD-GW	14-Oct-1998	10:00:00	calibrated e-tape	static	S	73.89	4,183.50	4,109.61
KLAM	12380	Angel	Gates	OWRD-GW	11-Dec-1998	09:35:00	steel tape	static	S	73.18	4,183.50	4,110.32
KLAM	12380	Angel	Sparks	OWRD-GW	16-Mar-1999	11:05:00	steel tape	static	S	71.86	4,183.50	4,111.64

Appendix 13: Ground Water Elevation Measurements

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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	12380	Angel	Gall	OWRD-GW	26-Oct-1999	10:30:00	steel tape	idle	S	74.77	4,183.50	4,108.73
KLAM	12382	Drew		USGS	19-Jul-1949		reported			70.91	4,183.10	4,112.19
KLAM	12382	Drew	Harris	USGS	26-Oct-1970		reported			70.68	4,183.10	4,112.42
KLAM	12382	Drew	Gates	OWRD-GW	15-Oct-1998	14:05:00	calibrated e-tape	static	S	72.29	4,183.10	4,110.81
KLAM	12382	Drew	Sparks	OWRD-GW	16-Mar-1999	12:15:00	steel tape	static	S	69.96	4,183.10	4,113.14
KLAM	12382	Drew	Gall	OWRD-GW	26-Oct-1999	10:05:00	steel tape	idle	S	78.62	4,183.10	4,104.48
KLAM	12385	Biaggi & Venable	Wellington	well-log	12-Jul-1975		reported			98.00	4,216.00	4,118.00
KLAM	12385	Swan Lkae Ranch	Miller	OWRD-GW	14-Oct-1998	10:50:00	calibrated e-tape	static	S	100.08	4,216.00	4,115.92
KLAM	12385	Swan Lake Ranch	Glender	OWRD-GW	16-Mar-1999	14:00:00	calibrated e-tape	static	S	96.35	4,216.00	4,119.65
KLAM	12385	Swan Lake Ranch	Glender	OWRD-GW	26-Oct-1999		calibrated e-tape	static	S	99.47	4,216.00	4,116.53
KLAM	12386	Hankins		USGS	23-Apr-1952		reported			98.15	4,218.00	4,119.85
KLAM	12386	Hankins		OWRD-UN	30-Oct-1958		reported			91.83	4,218.00	4,126.17
KLAM	12386	Hankins		OWRD-UN	26-Sep-1961		reported			103.53	4,218.00	4,114.47
KLAM	12386	Vic Nevin Cattle Company	Harris	USGS	11-Oct-1969		reported			98.17	4,218.00	4,119.83
KLAM	12386	Vic Nevin Cattle Company		USGS	15-Apr-1970		reported			94.00	4,218.00	4,124.00
KLAM	12386	Vic Nevin Cattle Company	Harris	USGS	30-Oct-1970		reported			97.40	4,218.00	4,120.60
KLAM	12386	Swan Lake Ranch	Miller	OWRD-GW	13-Oct-1998	15:30:00	calibrated e-tape	static	S	99.75	4,218.00	4,118.25
KLAM	12386	Swan Lake Ranch	Gates	OWRD-GW	10-Dec-1998	15:20:00	calibrated e-tape	static	S	98.18	4,218.00	4,119.82
KLAM	12386	Swan Lake Ranch	Glender	OWRD-GW	16-Mar-1999	13:41:00	calibrated e-tape	static	S	95.97	4,218.00	4,122.03
KLAM	12386	Swan Lake Ranch	Glender	OWRD-GW	25-Oct-1999	14:05:00	calibrated e-tape	static	S	99.13	4,218.00	4,118.87
KLAM	12389	Wu	Hartley	well-log	06-Jul-1966		reported			92.00	4,204.50	4,112.50
KLAM	12389	Payne	Gates	OWRD-GW	28-Oct-1998	14:30:00	steel tape	static	S	93.97	4,204.50	4,110.53
KLAM	12389	Payne	Sparks	OWRD-GW	16-Mar-1999	14:25:00	steel tape	static	S	92.00	4,204.50	4,112.50
KLAM	12389	Payne	Gall	OWRD-GW	26-Oct-1999	09:30:00	steel tape	idle and oil	S	93.94	4,204.50	4,110.56
KLAM	12390	Bradley		USGS	01-Apr-1948		reported			45.36	4,158.00	4,112.64
KLAM	12390	Challis		OWRD-UN	24-Apr-1957		reported			42.37	4,158.00	4,115.63
KLAM	12390	Challis		OWRD-UN	17-Oct-1957		reported			43.20	4,158.00	4,114.80
KLAM	12390	Challis		OWRD-UN	04-Jun-1958		reported			39.59	4,158.00	4,118.41
KLAM	12390	Challis		OWRD-UN	30-Oct-1958		reported			41.85	4,158.00	4,116.15
KLAM	12390	Challis		OWRD-UN	27-Sep-1961		reported			44.94	4,158.00	4,113.06
KLAM	12390	Challis		USGS	01-Sep-1969		reported			43.98	4,158.00	4,114.02
KLAM	12390	Challis		USGS	14-Apr-1970		reported			42.17	4,158.00	4,115.83
KLAM	12390	Challis		USGS	22-Sep-1970	17:00:00	reported			43.32	4,158.00	4,114.68
KLAM	12390	Challis		USGS	26-Oct-1970		reported			43.58	4,158.00	4,114.42
KLAM	12390	Walton	Gates	OWRD-GW	14-Oct-1998	13:00:00	calibrated e-tape	static	S	45.47	4,158.00	4,112.53
KLAM	12390	Walton	Sparks	OWRD-GW	16-Mar-1999	10:30:00	steel tape	static	S	43.28	4,158.00	4,114.72
KLAM	12390	Walton	Gall	OWRD-GW	26-Oct-1999	12:00:00	steel tape	idle and oil	S	45.21	4,158.00	4,112.79

Appendix 13: Ground Water Elevation Measurements

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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	12391	Vierra		USGS	03-Apr-1948		reported			64.84	4,182.00	4,117.16
KLAM	12391	Brown		USGS	18-Apr-1970		reported			62.70	4,182.00	4,119.30
KLAM	12391	Brown		USGS	26-Oct-1970		reported			63.89	4,182.00	4,118.11
KLAM	12391	Sierra-Cascade Nursery, Inc.	Grondin	OWRD-GW	23-Oct-1998	11:28:00	calibrated e-tape	static	S	65.21	4,182.00	4,116.79
KLAM	12391	Sierra-Cascade Nursery, Inc.	Sparks	OWRD-GW	16-Mar-1999	13:40:00	steel tape	static	S	63.30	4,182.00	4,118.70
KLAM	12391	Sierra-Cascade Nursery, Inc.	Gall	OWRD-GW	26-Oct-1999		Unable to measure	Unable to measure			4,182.00	
KLAM	12395	Challis		USGS	15-Apr-1970		reported			46.50	4,158.20	4,111.70
KLAM	12395	Challis		USGS	23-Oct-1970		reported			47.58	4,158.20	4,110.62
KLAM	12395	Walker	Gates	OWRD-GW	27-Oct-1998	16:10:00	steel tape	static	S	48.00	4,158.20	4,110.20
KLAM	12395	Walker	Sparks	OWRD-GW	16-Mar-1999	13:00:00	steel tape	static	S	46.15	4,158.20	4,112.05
KLAM	12395	Walker	Gall	OWRD-GW	26-Oct-1999	12:15:00	steel tape	idle and oil	S	48.05	4,158.20	4,110.15
KLAM	12398	Konig		USGS	02-Apr-1948		reported			36.67	4,148.20	4,111.53
KLAM	12398	Pendegraff		USGS	14-Apr-1970		reported			34.48	4,148.20	4,113.72
KLAM	12398	Pendegraff		USGS	26-Oct-1970		reported			35.70	4,148.20	4,112.50
KLAM	12398	Ferrarese	Gates	OWRD-GW	14-Oct-1998	16:30:00	calibrated e-tape	static	S	38.40	4,148.20	4,109.80
KLAM	12398	Ferrarese	Sparks	OWRD-GW	15-Mar-1999	15:25:00	calibrated e-tape	static	S	36.26	4,148.20	4,111.94
KLAM	12398	Ferrarese	Gall	OWRD-GW	26-Oct-1999	13:15:00	calibrated e-tape	idle	S	38.19	4,148.20	4,110.01
KLAM	12406	Moore	Hartley	well-log	06-Nov-1967		reported			180.00	4,289.20	4,109.20
KLAM	12406	Moore		USGS	01-Oct-1969		reported			179.11	4,289.20	4,110.09
KLAM	12406	Moore		USGS	15-Apr-1970		reported			175.70	4,289.20	4,113.50
KLAM	12406	Moore	Harris	USGS	30-Oct-1970		reported			178.02	4,289.20	4,111.18
KLAM	12406	Canevari	Gates	OWRD-GW	08-Oct-1998	10:05:00	calibrated e-tape	static	S	180.47	4,289.20	4,108.73
KLAM	12406	Canevari	Glender	OWRD-GW	16-Mar-1999	13:00:00	calibrated e-tape	static	S	176.26	4,289.20	4,112.94
KLAM	12406	Canevari	Glender	OWRD-GW	26-Oct-1999	12:34:00	calibrated e-tape	static	S	179.70	4,289.20	4,109.50
KLAM	12411	Sewald		USGS	22-Apr-1952		reported			53.12	4,165.50	4,112.38
KLAM	12411	Sewald	Harris	USGS	25-Sep-1969		reported			54.70	4,165.50	4,110.80
KLAM	12411	Sewald		USGS	14-Apr-1970		reported			53.54	4,165.50	4,111.96
KLAM	12411	Sewald	Harris	USGS	26-Oct-1970		reported			54.51	4,165.50	4,110.99
KLAM	12411	Larrick	Gates	OWRD-GW	15-Oct-1998	09:25:00	calibrated e-tape	static	S	56.07	4,165.50	4,109.43
KLAM	12411	Larrick	Gates	OWRD-GW	10-Dec-1998	16:30:00	calibrated e-tape	static	S	55.45	4,165.50	4,110.05
KLAM	12411	Larrick	Sparks	OWRD-GW	16-Mar-1999	14:55:00	calibrated e-tape	static	S	54.07	4,165.50	4,111.43
KLAM	12411	Larrick	Gall	OWRD-GW	26-Oct-1999	09:05:00	calibrated e-tape	idle	S	55.91	4,165.50	4,109.59
KLAM	12413	Schmoe		USGS	19-Jul-1949		reported			53.20	4,163.30	4,110.10
KLAM	12413	Schmoe		USGS	22-Aug-1949		reported			52.83	4,163.30	4,110.47
KLAM	12413	Schmoe		USGS	15-Apr-1950		reported			53.11	4,163.30	4,110.19
KLAM	12413	Schmoe		OWRD-UN	11-Jul-1950		reported			53.22	4,163.30	4,110.08

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	12413	Schmoe		OWRD-UN	04-Apr-1951		reported			52.85	4,163.30	4,110.45
KLAM	12413	Schmoe		OWRD-UN	06-Sep-1951		reported			52.90	4,163.30	4,110.40
KLAM	12413	Schmoe		OWRD-UN	22-Apr-1952		reported			51.97	4,163.30	4,111.33
KLAM	12413	Schmoe		OWRD-UN	29-Apr-1958		reported			51.00	4,163.30	4,112.30
KLAM	12413	Schmoe		USGS	24-Sep-1969		reported			53.22	4,163.30	4,110.08
KLAM	12413	Schmoe		USGS	14-Apr-1970		reported			52.02	4,163.30	4,111.28
KLAM	12413	Schmoe	Harris	USGS	26-Oct-1970		reported			53.08	4,163.30	4,110.22
KLAM	12413	Hammerich	Gates	OWRD-GW	21-Oct-1998	17:35:00	calibrated e-tape	static	S	53.95	4,163.30	4,109.35
KLAM	12413	Hammerich	Sparks	OWRD-GW	15-Mar-1999	15:00:00	calibrated e-tape	static	S	51.93	4,163.30	4,111.37
KLAM	12413	Hammerich	Gall	OWRD-GW	26-Oct-1999	14:10:00	calibrated e-tape	idle	S	53.94	4,163.30	4,109.36
KLAM	12415	Haskins & Company		USGS	20-Jul-1949		reported			37.67	4,151.00	4,113.33
KLAM	12415	Haskins & Company		USGS	24-Sep-1969		reported			40.78	4,151.00	4,110.22
KLAM	12415	Haskins & Company		USGS	14-Apr-1970		reported			39.04	4,151.00	4,111.96
KLAM	12415	Haskins & Company	Harris	USGS	26-Oct-1970		reported			40.07	4,151.00	4,110.93
KLAM	12415	Haskins & Company	Gates	OWRD-GW	29-Oct-1998	13:30:00	steel tape	static	S	39.96	4,151.00	4,111.04
KLAM	12415	Haskins & Company	Sparks	OWRD-GW	15-Mar-1999	12:00:00	steel tape	static	S	38.13	4,151.00	4,112.87
KLAM	12415	Haskins & Company	Gall	OWRD-GW	26-Oct-1999	14:20:00	steel tape	idle and oil	S	39.92	4,151.00	4,111.08
KLAM	12416	Hoeffler		USGS	18-Jul-1949		reported			33.80	4,144.90	4,111.10
KLAM	12416	Hoeffler		USGS	21-Apr-1970		reported			32.70	4,144.90	4,112.20
KLAM	12416	Hoeffler		USGS	27-Oct-1970		reported			33.93	4,144.90	4,110.97
KLAM	12416	Hoeffler	Gates	OWRD-GW	07-Oct-1998	17:10:00	calibrated e-tape	static	S	35.37	4,144.90	4,109.53
KLAM	12416	Hoeffler	Sparks	OWRD-GW	15-Mar-1999	11:25:00	calibrated e-tape	static	S	33.11	4,144.90	4,111.79
KLAM	12416	Hoeffler	Gall	OWRD-GW	26-Oct-1999	15:15:00	calibrated e-tape	idle	S	35.01	4,144.90	4,109.89
KLAM	12419	Barton		well-log	15-Sep-1949		reported			94.00	4,208.00	4,114.00
KLAM	12419	Barton		USGS	22-Apr-1952		reported			97.70	4,208.00	4,110.30
KLAM	12419	Barton	Harris	USGS	11-Oct-1969		reported			102.59	4,208.00	4,105.41
KLAM	12419	Barton		USGS	15-Apr-1970		reported			98.20	4,208.00	4,109.80
KLAM	12419	Barton	Harris	USGS	30-Oct-1970		reported			101.75	4,208.00	4,106.25
KLAM	12419	Callahan	Miller	OWRD-GW	14-Oct-1998	16:00:00	calibrated e-tape	static	S	103.85	4,208.00	4,104.15
KLAM	12419	Swan Lake Ranch	Glender	OWRD-GW	15-Mar-1999	15:00:00	calibrated e-tape	static	S	99.86	4,208.00	4,108.14
KLAM	12419	Swan Lake Ranch	Glender	OWRD-GW	26-Oct-1999	13:07:00	calibrated e-tape	static	S	103.58	4,208.00	4,104.42
KLAM	12420	Hankins		well-log	15-Oct-1950		reported			100.00	4,212.30	4,112.30
KLAM	12420	Hankins		USGS	23-Apr-1952		reported			108.00	4,212.30	4,104.30
KLAM	12420	Hankins	Harris	USGS	11-Oct-1969		reported			102.22	4,212.30	4,110.08
KLAM	12420	Hankins		USGS	15-Apr-1970		reported			97.80	4,212.30	4,114.50
KLAM	12420	Hankins	Harris	USGS	30-Oct-1970		reported			101.44	4,212.30	4,110.86
KLAM	12420	Hankins	Miller	OWRD-GW	13-Oct-1998	09:15:00	calibrated e-tape	static	S	103.88	4,212.30	4,108.42
KLAM	12420	Swan Lake Ranch	Glender	OWRD-GW	16-Mar-1999	14:45:00	calibrated e-tape	static	S	99.78	4,212.30	4,112.52

Appendix 13: Ground Water Elevation Measurements

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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	12420	Swan Lake Ranch	Glender	OWRD-GW	26-Oct-1999	12:55:00	calibrated e-tape	static	S	103.22	4,212.30	4,109.08
KLAM	12421	Hankins		OWRD-UN	24-Apr-1951		reported			93.12	4,210.50	4,117.38
KLAM	12421	Hankins		USGS	23-Apr-1952		reported			94.42	4,210.50	4,116.08
KLAM	12421	Hankins		OWRD-UN	17-Oct-1957		reported			96.06	4,210.50	4,114.44
KLAM	12421	Hankins		OWRD-UN	04-Jun-1958		reported			91.86	4,210.50	4,118.64
KLAM	12421	Hankins		OWRD-UN	30-Oct-1958		reported			93.08	4,210.50	4,117.42
KLAM	12421	Hankins		OWRD-UN	26-Sep-1961		reported			104.40	4,210.50	4,106.10
KLAM	12421	Nevin	Harris	USGS	11-Oct-1969		reported			98.92	4,210.50	4,111.58
KLAM	12421	Nevin		USGS	15-Apr-1970		reported			94.50	4,210.50	4,116.00
KLAM	12421	Nevin		USGS	27-Oct-1970		reported			98.20	4,210.50	4,112.30
KLAM	12421	Nevin	Miller	OWRD-GW	10-Oct-1998	09:30:00	calibrated e-tape	static	S	102.84	4,210.50	4,107.66
KLAM	12421	Nevin	Glender	OWRD-GW	16-Mar-1999	10:55:00	calibrated e-tape	static	S	98.71	4,210.50	4,111.79
KLAM	12421	Nevin	Glender	OWRD-GW	26-Oct-1999	15:00:00	calibrated e-tape	static	S	102.04	4,210.50	4,108.46
KLAM	12424	Hall		USGS	01-Jul-1933		reported			85.00	4,190.50	4,105.50
KLAM	12424	Hall		USGS	01-Mar-1950		reported			77.20	4,190.50	4,113.30
KLAM	12424	Hall		OWRD-UN	25-Apr-1957		reported			74.97	4,190.50	4,115.53
KLAM	12424	Hall		OWRD-UN	26-Sep-1961		reported			87.50	4,190.50	4,103.00
KLAM	12424	Moore	Harris	USGS	01-Oct-1969		reported			80.74	4,190.50	4,109.76
KLAM	12424	Moore		USGS	15-Apr-1970		reported			75.70	4,190.50	4,114.80
KLAM	12424	Canevari	Gates	OWRD-GW	08-Oct-1970	14:35:00	calibrated e-tape	static	S	82.05	4,190.50	4,108.45
KLAM	12424	Moore	Harris	USGS	30-Oct-1970		reported			79.08	4,190.50	4,111.42
KLAM	12424	Canevari	Gates	OWRD-GW	10-Dec-1998	14:40:00	steel tape	static and oil	S	80.03	4,190.50	4,110.47
KLAM	12424	Canevari	Glender	OWRD-GW	16-Mar-1999	11:50:00	steel tape	static and oil	S	77.62	4,190.50	4,112.88
KLAM	12424	Canevari	Glender	OWRD-GW	26-Oct-1999	16:23:00	steel tape	static and oil	S	81.70	4,190.50	4,108.80
KLAM	12425	Kedall	Dorn	well-log	10-Oct-1975		reported			93.00	4,205.90	4,112.90
KLAM	12425	Palm	Gates	OWRD-GW	07-Oct-1998	14:52:00	calibrated e-tape	static	S	97.54	4,205.90	4,108.36
KLAM	12425	Palm	Glender	OWRD-GW	16-Mar-1999	10:10:00	calibrated e-tape	static	S	93.42	4,205.90	4,112.48
KLAM	12425	Palm	Glender	OWRD-GW	26-Oct-1999	15:26:00	calibrated e-tape	static	S	96.71	4,205.90	4,109.19
KLAM	12429	Dilling	Storey	well-log	17-Aug-1966		reported			61.33	4,187.90	4,126.57
KLAM	12429	Dilling	Harris	USGS	11-Oct-1969		reported			77.97	4,187.90	4,109.93
KLAM	12429	Dilling	Harris	USGS	30-Oct-1970		reported			76.96	4,187.90	4,110.94
KLAM	12429	Cook	Gates	OWRD-GW	13-Oct-1998	15:00:00	calibrated e-tape	static	S	79.34	4,187.90	4,108.56
KLAM	12429	Cook	Glender	OWRD-GW	16-Mar-1999	15:55:00	calibrated e-tape	static	S	75.17	4,187.90	4,112.73
KLAM	12429	Cook	Glender	OWRD-GW	27-Oct-1999	09:45:00	calibrated e-tape	static	S	78.60	4,187.90	4,109.30
KLAM	12431	Porterfield		USGS	02-Apr-1948		reported			72.20	4,186.50	4,114.30
KLAM	12431	Porterfield		OWRD-UN	06-Aug-1948		reported			74.47	4,186.50	4,112.03
KLAM	12431	Porterfield		OWRD-UN	22-Aug-1949		reported	pumping	F	83.73	4,186.50	4,102.77

Appendix 13: Ground Water Elevation Measurements

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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	12431	Porterfield		OWRD-UN	14-Apr-1950		reported	pumping	F	83.76	4,186.50	4,102.74
KLAM	12431	Porterfield		OWRD-UN	11-Jul-1950		reported	pumping	F	82.99	4,186.50	4,103.51
KLAM	12431	Porterfield		OWRD-UN	01-Nov-1950		reported			75.38	4,186.50	4,111.12
KLAM	12431	Porterfield		OWRD-UN	05-Apr-1951		reported			74.21	4,186.50	4,112.29
KLAM	12431	Porterfield		OWRD-UN	06-Sep-1951		reported	recharging	R	72.73	4,186.50	4,113.77
KLAM	12431	Porterfield		OWRD-UN	04-Jan-1952		reported			75.17	4,186.50	4,111.33
KLAM	12431	Porterfield		OWRD-UN	19-Jun-1952		reported	pumping	F	80.59	4,186.50	4,105.91
KLAM	12431	Porterfield		OWRD-UN	28-Dec-1952		reported			74.17	4,186.50	4,112.33
KLAM	12431	Porterfield		OWRD-UN	02-Apr-1953		reported			72.76	4,186.50	4,113.74
KLAM	12431	Porterfield		OWRD-UN	21-Jul-1953		reported	recharging	R	74.69	4,186.50	4,111.81
KLAM	12431	Porterfield		OWRD-UN	15-Oct-1953		reported			74.87	4,186.50	4,111.63
KLAM	12431	Porterfield		OWRD-UN	27-Jul-1954		reported			76.14	4,186.50	4,110.36
KLAM	12431	Porterfield		OWRD-UN	17-Dec-1954		reported			74.32	4,186.50	4,112.18
KLAM	12431	Porterfield		OWRD-UN	28-Jun-1955		reported	pumping	F	86.45	4,186.50	4,100.05
KLAM	12431	Porterfield		OWRD-UN	07-Apr-1956		reported			72.20	4,186.50	4,114.30
KLAM	12431	Porterfield		OWRD-UN	21-Dec-1956		reported			73.29	4,186.50	4,113.21
KLAM	12431	Petersen	Harris	USGS	11-Oct-1969		reported			76.48	4,186.50	4,110.02
KLAM	12431	Petersen	Harris	USGS	30-Oct-1970		reported			75.70	4,186.50	4,110.80
KLAM	12431	Purtzer	Gates	OWRD-GW	06-Oct-1998	12:00:00	calibrated e-tape	static	S	80.12	4,186.50	4,106.38
KLAM	12431	Purtzer	Glender	OWRD-GW	16-Mar-1999	15:40:00	steel tape	static and oil	S	76.69	4,186.50	4,109.81
KLAM	12431	Purtzer	Glender	OWRD-GW	27-Oct-1999	09:29:00	steel tape	static and oil	S	77.01	4,186.50	4,109.49
KLAM	12454	Horton		USGS	18-Jul-1949		reported			8.55	4,122.00	4,113.45
KLAM	12454	Horton	Harris	USGS	25-Sep-1969		reported			9.37	4,122.00	4,112.63
KLAM	12454	Horton		USGS	15-Apr-1970		reported			5.50	4,122.00	4,116.50
KLAM	12454	Horton	Harris	USGS	27-Oct-1970		reported			8.81	4,122.00	4,113.19
KLAM	12454	Urback	Gates	OWRD-GW	06-Oct-1998	18:00:00	steel tape	static	S	11.88	4,122.00	4,110.12
KLAM	12454	Urback	Gates	OWRD-GW	09-Dec-1998	16:25:00	steel tape	static and oil	S	9.91	4,122.00	4,112.09
KLAM	12454	Urback	Sparks	OWRD-GW	15-Mar-1999	09:25:00	steel tape	static and oil	S	7.30	4,122.00	4,114.70
KLAM	12454	Urback	Gall	OWRD-GW	26-Oct-1999	08:35:00	steel tape	idle and oil	S	13.25	4,122.00	4,108.75
KLAM	12456	Toffell		USGS	20-Nov-1949		reported			14.82	4,127.80	4,112.98
KLAM	12456	Toffell	Gates	OWRD-GW	26-Oct-1998	17:00:00	calibrated e-tape	static	S	15.02	4,127.80	4,112.78
KLAM	12456	Toffell	Sparks	OWRD-GW	15-Mar-1999	09:45:00	calibrated e-tape	static	S	12.43	4,127.80	4,115.37
KLAM	12456	Toffell	Gall	OWRD-GW	26-Oct-1999	08:55:00	calibrated e-tape	idle	S	13.74	4,127.80	4,114.06
KLAM	12457	Hoefler		USGS	22-Aug-1949		reported			45.66	4,157.00	4,111.34
KLAM	12457	Hoefler	Harris	USGS	10-Apr-1970		reported			46.02	4,157.00	4,110.98
KLAM	12457	Hoefler		USGS	27-Oct-1970		reported			46.98	4,157.00	4,110.02
KLAM	12457	Horsefly Irrigation District	Gates	OWRD-GW	07-Oct-1998	10:50:00	calibrated e-tape	static	S	49.34	4,157.00	4,107.66
KLAM	12457	Horsefly Irrigation District	Gates	OWRD-GW	09-Dec-1998	16:05:00	steel tape	static	S	47.71	4,157.00	4,109.29
KLAM	12457	Horsefly Irrigation District	Sparks	OWRD-GW	15-Mar-1999	11:05:00	steel tape	static	S	46.30	4,157.00	4,110.70

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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	12457	Horsefly Irrigation District	Gall	OWRD-GW	26-Oct-1999	15:00:00	steel tape	idle	S	48.06	4,157.00	4,108.94
KLAM	12471	Cheyne	Baker	well-log	30-Jul-1976		reported			342.00	4,450.70	4,108.70
KLAM	12471	Somers Ranch	Grondin	OWRD-GW	08-Oct-1998	17:05:00	calibrated e-tape	static	S	341.81	4,450.70	4,108.89
KLAM	12471	Somers Ranch	Gates	OWRD-GW	17-Mar-1999	14:30:00	calibrated e-tape	static	S	338.60	4,450.70	4,112.10
KLAM	12471	Somers Ranch	Norton	OWRD-GW	26-Oct-1999		calibrated e-tape	idle	S	341.25	4,450.70	4,109.45
KLAM	12477	Cheyne	VanMeter	well-log	26-Jul-1982		reported			340.00	4,450.40	4,110.40
KLAM	12477	Somers Ranch	Grondin	OWRD-GW	08-Oct-1998	14:15:00	calibrated e-tape	static	S	340.64	4,450.40	4,109.76
KLAM	12477	Somers Ranch	Gates	OWRD-GW	11-Dec-1998	11:50:00	calibrated e-tape	static	S	339.56	4,450.40	4,110.84
KLAM	12477	Somers Ranch	Gates	OWRD-GW	18-Mar-1999	09:30:00	calibrated e-tape	static	S	338.20	4,450.40	4,112.20
KLAM	12477	Somers Ranch	Norton	OWRD-GW	26-Oct-1999	14:08:00	calibrated e-tape	idle	S	340.51	4,450.40	4,109.89
KLAM	12893	Mt Calvary Cemetary	Gates	OWRD-GW	15-Mar-1999	09:00:00	calibrated e-tape	static	S	50.17	4,208.00	4,157.83
KLAM	12893	Mt Calvary Cemetary	Glender	OWRD-GW	25-Oct-1999	16:33:00	calibrated e-tape	static	S	55.41	4,208.00	4,152.59
KLAM	13062	Kurtz	Roberts	well-log	24-Feb-1964		reported			128.00	4,283.00	4,155.00
KLAM	13062	Nichols	Gates	OWRD-GW	20-Nov-1998	09:10:00	calibrated e-tape	recently pumped	R	148.78	4,283.00	4,134.22
KLAM	13062	Nichols	Gates	OWRD-GW	17-Mar-1999	10:20:00	calibrated e-tape	static	S	147.02	4,283.00	4,135.98
KLAM	13062	Nichols	Glender	OWRD-GW	27-Oct-1999	09:05:00	calibrated e-tape	recently pumped	R	148.59	4,283.00	4,134.41
KLAM	13096	Stevenson	Storey	well-log	23-Jul-1968		reported			21.00	4,114.30	4,093.30
KLAM	13096	Cox	Grondin	OWRD-GW	12-Aug-1998	12:40:00	calibrated e-tape	static	S	18.71	4,114.30	4,095.59
KLAM	13096	Cox	Gates	OWRD-GW	10-Dec-1998	08:40:00	calibrated e-tape	static	S	18.51	4,114.30	4,095.79
KLAM	13096	Cox	Gates	OWRD-GW	17-Mar-1999	08:50:00	calibrated e-tape	static	S	16.68	4,114.30	4,097.62
KLAM	13096	Cox	Norton	OWRD-GW	26-Oct-1999	08:12:00	calibrated e-tape	static	S	19.20	4,114.30	4,095.10
KLAM	13326	Horsely	Hartley	well-log	04-Jan-1967		reported			74.00	4,183.40	4,109.40
KLAM	13326	Horsely	Harris	USGS	03-Oct-1969		reported			71.30	4,183.40	4,112.10
KLAM	13326	Horsely	Harris	USGS	14-Apr-1970		reported			70.29	4,183.40	4,113.11
KLAM	13326	Horsely	Harris	USGS	07-Nov-1970		reported			71.16	4,183.40	4,112.24
KLAM	13326	Horsely	Grondin	OWRD-GW	09-Oct-1998	14:00:00	steel tape	static	S	72.19	4,183.40	4,111.21
KLAM	13326	Horsely	Grondin	OWRD-GW	12-Oct-1998	13:55:00	calibrated e-tape	static	S	73.10	4,183.40	4,110.30
KLAM	13326	Horsely	Gates	OWRD-GW	09-Dec-1998	13:15:00	calibrated e-tape	static	S	72.46	4,183.40	4,110.94
KLAM	13326	Horsely	Gates	OWRD-GW	16-Mar-1999	09:30:00	calibrated e-tape	static	S	71.07	4,183.40	4,112.33
KLAM	13326	Horsely	Norton	OWRD-GW	26-Oct-1999	10:30:00	calibrated e-tape	idle	S	72.91	4,183.40	4,110.49
KLAM	13331	Kellison	McClane	well-log	19-May-1970		reported			102.00	4,216.00	4,114.00
KLAM	13331	McMillan	Grondin	OWRD-GW	19-Oct-1998	11:25:00	calibrated e-tape	static	S	105.82	4,216.00	4,110.18
KLAM	13331	McMillan	Gates	OWRD-GW	16-Mar-1999		calibrated e-tape	static	S	103.74	4,216.00	4,112.26
KLAM	13331	McMillan	Norton	OWRD-GW	26-Oct-1999	11:35:00	calibrated e-tape	static	S	105.70	4,216.00	4,110.30

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	13332	Kellison	Woody	well-log	19-Oct-1977		reported			37.00	4,151.00	4,114.00
KLAM	13332	Kellison	Grondin	OWRD-GW	15-Oct-1998	10:15:00	calibrated	static	S	41.16	4,151.00	4,109.84
KLAM	13332	Kellison	Gates	OWRD-GW	16-Mar-1999	15:35:00	calibrated	static	S	39.15	4,151.00	4,111.85
KLAM	13332	Kellison	Norton	OWRD-GW	26-Oct-1999	11:50:00	calibrated	idle	S	41.07	4,151.00	4,109.93
KLAM	13353	Masten	Sevey	well-log	24-Mar-1989		reported			44.00	4,153.20	4,109.20
KLAM	13353	Kelley	Grondin	OWRD-GW	05-May-1998		calibrated e-tape	static	S	42.30	4,153.20	4,110.90
KLAM	13353	Kelley	Grondin	OWRD-GW	09-Dec-1998	14:40:00	calibrated e-tape	static	S	43.32	4,153.20	4,109.88
KLAM	13353	Kelley	Grondin	OWRD-GW	14-Jan-1999	16:05:00	calibrated e-tape	static	S	43.01	4,153.20	4,110.19
KLAM	13353	Kelley	Grondin	OWRD-GW	11-Feb-1999	11:18:00	calibrated e-tape	static	S	42.84	4,153.20	4,110.36
KLAM	13353	Kelley	Grondin	OWRD-GW	17-Mar-1999	10:30:00	calibrated e-tape	static	S	41.86	4,153.20	4,111.34
KLAM	13353	Kelley	Grondin	OWRD-GW	07-Apr-1999	11:09:00	calibrated e-tape	static	S	41.33	4,153.20	4,111.87
KLAM	13353	Kelley	Grondin	OWRD-GW	12-May-1999	10:58:00	calibrated e-tape	idle/static	S	41.49	4,153.20	4,111.71
KLAM	13353	Kelley	Grondin	OWRD-GW	09-Jun-1999	11:26:00	calibrated e-tape	recently pumped	S	42.65	4,153.20	4,110.55
KLAM	13353	Kelley	Grondin	OWRD-GW	14-Jul-1999	11:05:00	calibrated e-tape	recently pumped	S	44.23	4,153.20	4,108.97
KLAM	13353	Kelley	Grondin	OWRD-GW	11-Aug-1999	10:56:00	calibrated e-tape	idle	S	44.18	4,153.20	4,109.02
KLAM	13353	Kelley	Grondin	OWRD-GW	16-Sep-1999	09:58:00	calibrated e-tape	idle	S	44.14	4,153.20	4,109.06
KLAM	13353	Kelley	Grondin	OWRD-GW	26-Oct-1999	10:41:00	calibrated e-tape	idle	S	43.64	4,153.20	4,109.56
KLAM	13353	Kelley	Grondin	OWRD-GW	12-Jan-2000	10:27:00	calibrated e-tape	idle	S	43.06	4,153.20	4,110.14
KLAM	13353	Kelley	Grondin	OWRD-GW	09-Mar-2000	09:55:00	calibrated e-tape	idle	S	42.47	4,153.20	4,110.73
KLAM	13353	Kelley	Grondin	OWRD-GW	10-May-2000	09:58:00	calibrated e-tape	idle	S	42.52	4,153.20	4,110.68
KLAM	13353	Kelley	Grondin	OWRD-GW	28-Jun-2000	10:09:00	calibrated e-tape	recently pumped	S	44.56	4,153.20	4,108.64
KLAM	13353	Kelley	Grondin	OWRD-GW	13-Sep-2000	10:19:00	calibrated e-tape	idle	S	44.72	4,153.20	4,108.48
KLAM	13353	Kelley	Grondin	OWRD-GW	15-Nov-2000	10:22:00	calibrated e-tape	idle	S	44.15	4,153.20	4,109.05
KLAM	13353	Kelley	Grondin	OWRD-GW	10-Jan-2001	10:19:00	calibrated e-tape	idle	S	43.72	4,153.20	4,109.48
KLAM	13353	Kelley	Grondin	OWRD-GW	07-Mar-2001	11:08:00	calibrated e-tape	idle	S	43.58	4,153.20	4,109.62
KLAM	13353	Kelley	Grondin	OWRD-GW	09-May-2001	10:33:00	calibrated e-tape	recently pumped	S	44.61	4,153.20	4,108.59
KLAM	13353	Kelly	Grondin	OWRD-GW	18-Jul-2001	10:29:00	calibrated e-tape	idle	S	46.66	4,153.20	4,106.54
KLAM	13353	Kelly	Grondin	OWRD-GW	19-Sep-2001	10:14:00	calibrated e-tape	idle	S	47.03	4,153.20	4,106.17
KLAM	13353	Kelly	Grondin	OWRD-GW	16-Jan-2002	09:55:00	calibrated e-tape	idle	S	44.97	4,153.20	4,108.23
KLAM	13353	Kelly	Grondin	OWRD-GW	17-Apr-2002	11:25:00	calibrated e-tape	idle	S	44.27	4,153.20	4,108.93
KLAM	13353	Kelly	Grondin	OWRD-GW	17-Jul-2002	11:46:00	calibrated e-tape	idle	S	46.76	4,153.20	4,106.44
KLAM	13353	Kelly	Grondin	OWRD-GW	16-Oct-2002	10:20:00	calibrated e-tape	idle	S	46.40	4,153.20	4,106.80
KLAM	13399	Curtiss	Storey	well-log	20-Apr-1976		reported			87.00	4,195.30	4,108.30
KLAM	13399	Collins	Grondin	OWRD-GW	13-Oct-1998	17:25:00	calibrated e-tape	static	S	85.38	4,195.30	4,109.92
KLAM	13399	Collins	Gates	OWRD-GW	16-Mar-1999	09:50:00	calibrated e-tape	static	S	83.40	4,195.30	4,111.90
KLAM	13399	Collins	Norton	OWRD-GW	26-Oct-1999	10:10:00	calibrated e-tape	idle	S	85.47	4,195.30	4,109.83
KLAM	13400	Kersgard	Hartley	well-log	15-Jan-1965		reported			173.00	4,248.30	4,075.30
KLAM	13400	Davina	Harris	USGS	14-Apr-1970					135.12	4,248.30	4,113.18
KLAM	13400	Davina	Harris	USGS	06-Nov-1970					136.01	4,248.30	4,112.29

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	13400	Molatore	Grondin	OWRD-GW	11-Aug-1998	11:15:00	calibrated e-tape	static	S	137.37	4,248.30	4,110.93
KLAM	13400	Collins	Grondin	OWRD-GW	09-Dec-1998	16:05:00	calibrated e-tape	static	S	136.83	4,248.30	4,111.47
KLAM	13400	Collins	Grondin	OWRD-GW	14-Jan-1999	11:55:00	calibrated e-tape	static	S	136.54	4,248.30	4,111.76
KLAM	13400	Collins	Grondin	OWRD-GW	10-Feb-1999	17:06:00	calibrated e-tape	static	S	136.35	4,248.30	4,111.95
KLAM	13400	Collins	Grondin	OWRD-GW	17-Mar-1999	09:12:00	calibrated e-tape	static	S	135.49	4,248.30	4,112.81
KLAM	13400	Collins	Grondin	OWRD-GW	07-Apr-1999	09:28:00	calibrated e-tape	static	S	134.75	4,248.30	4,113.55
KLAM	13400	Collins	Grondin	OWRD-GW	12-May-1999	09:24:00	calibrated e-tape	idle/static	S	134.53	4,248.30	4,113.77
KLAM	13400	Collins	Grondin	OWRD-GW	09-Jun-1999	09:35:00	calibrated e-tape	idle/static	S	135.54	4,248.30	4,112.76
KLAM	13400	Collins	Grondin	OWRD-GW	14-Jul-1999	09:26:00	calibrated e-tape	idle/static	S	136.92	4,248.30	4,111.38
KLAM	13400	Collins	Grondin	OWRD-GW	11-Aug-1999	09:31:00	calibrated e-tape	idle	S	137.38	4,248.30	4,110.92
KLAM	13400	Collins	Grondin	OWRD-GW	16-Sep-1999	09:14:00	calibrated e-tape	idle	S	137.50	4,248.30	4,110.80
KLAM	13400	Collins	Grondin	OWRD-GW	26-Oct-1999	11:38:00	calibrated e-tape	idle	S	136.97	4,248.30	4,111.33
KLAM	13400	Collins	Grondin	OWRD-GW	12-Jan-2000	09:33:00	calibrated e-tape	idle	S	136.10	4,248.30	4,112.20
KLAM	13400	Collins	Grondin	OWRD-GW	09-Mar-2000	09:14:00	calibrated e-tape	idle	S	135.71	4,248.30	4,112.59
KLAM	13400	Collins	Grondin	OWRD-GW	10-May-2000	09:16:00	calibrated e-tape	idle	S	135.53	4,248.30	4,112.77
KLAM	13400	Collins	Grondin	OWRD-GW	28-Jun-2000	08:59:00	calibrated e-tape	idle	S	137.25	4,248.30	4,111.05
KLAM	13400	Collins	Grondin	OWRD-GW	13-Sep-2000	09:18:00	calibrated e-tape	idle	S	138.60	4,248.30	4,109.70
KLAM	13400	Collins	Grondin	OWRD-GW	15-Nov-2000	09:33:00	calibrated e-tape	idle	S	137.45	4,248.30	4,110.85
KLAM	13400	Collins	Grondin	OWRD-GW	10-Jan-2001	09:32:00	calibrated e-tape	idle	S	136.99	4,248.30	4,111.31
KLAM	13400	Collins	Grondin	OWRD-GW	07-Mar-2001	10:12:00	calibrated e-tape	idle	S	136.92	4,248.30	4,111.38
KLAM	13400	Collins	Grondin	OWRD-GW	09-May-2001	09:22:00	calibrated e-tape	idle	S	137.70	4,248.30	4,110.60
KLAM	13400	Collins	Grondin	OWRD-GW	18-Jul-2001	09:17:00	calibrated e-tape	idle	S	140.19	4,248.30	4,108.11
KLAM	13400	Collins	Grondin	OWRD-GW	19-Sep-2001	09:20:00	calibrated e-tape	idle	S	140.92	4,248.30	4,107.38
KLAM	13400	Collins	Grondin	OWRD-GW	16-Jan-2002	09:25:00	calibrated e-tape	idle	S	138.71	4,248.30	4,109.59
KLAM	13400	Collins	Grondin	OWRD-GW	17-Apr-2002	09:32:00	calibrated e-tape	idle	S	137.89	4,248.30	4,110.41
KLAM	13400	Collins	Grondin	OWRD-GW	17-Jul-2002	09:32:00	calibrated e-tape	idle	S	140.34	4,248.30	4,107.96
KLAM	13400	Collins	Grondin	OWRD-GW	16-Oct-2002	09:47:00	calibrated e-tape	idle	S	140.50	4,248.30	4,107.80
KLAM	13403	Babson	Sevey	well-log	05-May-1981		reported			30.00	4,142.80	4,112.80
KLAM	13403	Babson	Grondin	OWRD-GW	15-Oct-1998	13:20:00	calibrated e-tape	static	S	31.85	4,142.80	4,110.95
KLAM	13403	Babson	Gates	OWRD-GW	08-Dec-1998	16:30:00	calibrated e-tape	static	S	31.35	4,142.80	4,111.45
KLAM	13403	Babson	Gates	OWRD-GW	16-Mar-1999	11:35:00	calibrated e-tape	static	S	29.96	4,142.80	4,112.84
KLAM	13403	Babson	Norton	OWRD-GW	25-Oct-1999	14:15:00	calibrated e-tape	idle	S	31.81	4,142.80	4,110.99
KLAM	13406	Harris	Storey	well-log	07-Sep-1976		reported			48.00	4,158.00	4,110.00
KLAM	13406	Weishaupt	Grondin	OWRD-GW	20-Oct-1998	14:36:00	calibrated e-tape	recently pumped	R	50.82	4,158.00	4,107.18
KLAM	13406	Weishaupt	Gates	OWRD-GW	09-Dec-1998	10:55:00	calibrated e-tape	static	S	40.55	4,158.00	4,117.45
KLAM	13406	Weishaupt	Gates	OWRD-GW	16-Mar-1999	12:00:00	calibrated e-tape	static	S	40.19	4,158.00	4,117.81
KLAM	13406	Weishaupt	Norton	OWRD-GW	25-Oct-1999	14:00:00	calibrated e-tape	recently pumped	S	44.46	4,158.00	4,113.54
KLAM	13428	Sewald		well-log	01-Jul-1951		reported			45.00	4,155.80	4,110.80
KLAM	13428	Sewald	Harris	USGS	06-Oct-1969		reported			44.41	4,155.80	4,111.39

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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	13428	Sewald	Harris	USGS	10-Apr-1970		reported			43.66	4,155.80	4,112.14
KLAM	13428	Sewald		USGS	27-Oct-1970		reported			44.61	4,155.80	4,111.19
KLAM	13428	Bonanza View Dairy	Grondin	OWRD-GW	14-Oct-1998	14:25:00	calibrated e-tape	static	S	45.81	4,155.80	4,109.99
KLAM	13428	Bonanza View Dairy	Gates	OWRD-GW	16-Mar-1999	12:50:00	calibrated e-tape	static	S	43.61	4,155.80	4,112.19
KLAM	13428	Bonanza View Dairy	Norton	OWRD-GW	25-Oct-1999	16:30:00	calibrated e-tape	idle	S	45.58	4,155.80	4,110.22
KLAM	13430	Hunt	Enloe	well-log	28-Feb-1966		reported			52.00	4,163.80	4,111.80
KLAM	13430	Hunt	Harris	USGS	14-Apr-1970		reported			50.47	4,163.80	4,113.33
KLAM	13430	Hunt	Harris	USGS	22-Jul-1970	13:00:00	reported			51.99	4,163.80	4,111.81
KLAM	13430	Hunt	Harris	USGS	22-Jul-1970	17:00:00	reported			52.03	4,163.80	4,111.77
KLAM	13430	Bonanza View Dairy	Grondin	OWRD-GW	14-Oct-1998	12:10:00	calibrated e-tape	nearby pumping	S	53.40	4,163.80	4,110.40
KLAM	13430	Bonanza View Dairy	Gates	OWRD-GW	09-Dec-1998	14:50:00	calibrated e-tape	nearby pumping	S	52.95	4,163.80	4,110.85
KLAM	13430	DeJong	Gates	OWRD-GW	09-Dec-1998	14:50:00	calibrated e-tape	nearby pumping	S	52.95	4,163.80	4,110.85
KLAM	13430	Bonanza View Dairy	Gates	OWRD-GW	16-Mar-1999	12:20:00	calibrated e-tape	nearby pumping	S	51.20	4,163.80	4,112.60
KLAM	13430	Bonanza View Dairy	Norton	OWRD-GW	25-Oct-1999	16:25:00	calibrated e-tape	idle	S	53.17	4,163.80	4,110.63
KLAM	13443	Hughs	Sevey	well-log	09-Aug-1973		reported			38.00	4,185.00	4,147.00
KLAM	13443	Oates	Grondin	OWRD-GW	29-Oct-1998	10:05:00	calibrated e-tape	static	S	33.85	4,185.00	4,151.15
KLAM	13443	Oates	Gates	OWRD-GW	15-Mar-1999	16:36:00	calibrated e-tape	static	S	4.21	4,185.00	4,180.79
KLAM	13443	Oates	Norton	OWRD-GW	26-Oct-1999	16:44:30	calibrated e-tape	idle	R	37.90	4,185.00	4,147.10
KLAM	13456	Lee	Hartley	well-log	14-Sep-1979		reported			22.00	4,129.60	4,107.60
KLAM	13456	Lee	Grondin	OWRD-GW	03-Jun-1998		calibrated e-tape	static	S	17.36	4,129.60	4,112.24
KLAM	13456	Lee	Grondin	OWRD-GW	10-Dec-1998	17:06:00	calibrated e-tape	static	S	19.02	4,129.60	4,110.58
KLAM	13456	Lee	Grondin	OWRD-GW	14-Jan-1999	15:40:00	calibrated e-tape	static	S	18.68	4,129.60	4,110.92
KLAM	13456	Lee	Grondin	OWRD-GW	11-Feb-1999	14:27:00	calibrated e-tape	static	S	18.47	4,129.60	4,111.13
KLAM	13456	Lee	Grondin	OWRD-GW	15-Mar-1999	13:31:00	calibrated e-tape	static	S	17.57	4,129.60	4,112.03
KLAM	13456	Lee	Grondin	OWRD-GW	05-Apr-1999	15:42:00	calibrated e-tape	static	S	17.02	4,129.60	4,112.58
KLAM	13456	Lee	Grondin	OWRD-GW	12-May-1999	15:23:00	calibrated e-tape	idle/static	S	17.31	4,129.60	4,112.29
KLAM	13456	Lee	Grondin	OWRD-GW	09-Jun-1999	14:46:00	calibrated e-tape	idle/static	S	18.72	4,129.60	4,110.88
KLAM	13456	Lee	Grondin	OWRD-GW	14-Jul-1999	13:45:00	calibrated e-tape	recently pumped	S	20.62	4,129.60	4,108.98
KLAM	13456	Lee	Grondin	OWRD-GW	11-Aug-1999	12:26:00	calibrated e-tape	idle	S	20.37	4,129.60	4,109.23
KLAM	13456	Lee	Grondin	OWRD-GW	16-Sep-1999	11:53:00	calibrated e-tape	recently pumped	S	20.24	4,129.60	4,109.36
KLAM	13456	Lee	Grondin	OWRD-GW	26-Oct-1999	14:00:00	calibrated e-tape	idle	S	19.43	4,129.60	4,110.17
KLAM	13456	Lee	Grondin	OWRD-GW	12-Jan-2000	12:35:00	calibrated e-tape	idle	S	18.77	4,129.60	4,110.83
KLAM	13456	Lee	Grondin	OWRD-GW	09-Mar-2000	12:56:00	calibrated e-tape	idle	S	18.14	4,129.60	4,111.46
KLAM	13456	Lee	Grondin	OWRD-GW	10-May-2000		not measured	not measured			4,129.60	
KLAM	13456	Lee	Grondin	OWRD-GW	28-Jun-2000		not measured	not measured			4,129.60	
KLAM	13456	Harley	Grondin	OWRD-GW	13-Sep-2000	10:52:00	calibrated e-tape	idle	S	20.85	4,129.60	4,108.75
KLAM	13456	Harley	Grondin	OWRD-GW	15-Nov-2000	10:48:00	calibrated e-tape	idle	S	20.04	4,129.60	4,109.56
KLAM	13456	Harley	Grondin	OWRD-GW	10-Jan-2001	10:43:00	calibrated e-tape	idle	S	19.52	4,129.60	4,110.08
KLAM	13456	Harley	Grondin	OWRD-GW	07-Mar-2001	11:34:00	calibrated e-tape	idle	S	19.33	4,129.60	4,110.27

Appendix 13: Ground Water Elevation Measurements

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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	13456	Harley	Grondin	OWRD-GW	09-May-2001	11:07:00	calibrated e-tape	idle	S	21.12	4,129.60	4,108.48
KLAM	13456	Harley	Grondin	OWRD-GW	18-Jul-2001	11:23:00	calibrated e-tape	idle	S	23.36	4,129.60	4,106.24
KLAM	13456	Harley	Grondin	OWRD-GW	19-Sep-2001	10:45:00	calibrated e-tape	idle	S	23.49	4,129.60	4,106.11
KLAM	13456	Harley	Grondin	OWRD-GW	16-Jan-2002	10:51:00	calibrated e-tape	idle	S	20.90	4,129.60	4,108.70
KLAM	13456	Harley	Grondin	OWRD-GW	17-Apr-2002	11:56:00	calibrated e-tape	idle	S	20.18	4,129.60	4,109.42
KLAM	13456	Harley	Grondin	OWRD-GW	17-Jul-2002	12:09:00	calibrated e-tape	idle	S	23.43	4,129.60	4,106.17
KLAM	13456	Harley	Grondin	OWRD-GW	16-Oct-2002	10:46:00	calibrated e-tape	idle	S	22.57	4,129.60	4,107.03
KLAM	13458	Ladoveze Brothers	Sevey	well-log	26-Oct-1970		reported			-2.00	4,110.00	4,112.00
KLAM	13458	Gorden	Gates	OWRD-GW	29-Sep-1998	14:40:00	calibrated e-tape	static	S	0.17	4,110.00	4,109.83
KLAM	13458	Gorden	Sparks	OWRD-GW	17-Mar-1999	09:10:00	calibrated e-tape	static	S	-2.16	4,110.00	4,112.16
KLAM	13458	Gorden	Gall	OWRD-GW	26-Oct-1999	15:30:00	calibrated e-tape	idle	S	-0.39	4,110.00	4,110.39
KLAM	13469	Horton		USGS	21-Jul-1949		reported			0.00	4,113.00	4,113.00
KLAM	13469	Horton	Harris	USGS	27-Oct-1970		reported			2.16	4,113.00	4,110.84
KLAM	13469	Horton	Gates	OWRD-GW	13-Oct-1998	09:04:00	calibrated e-tape	static	S	4.38	4,113.00	4,108.62
KLAM	13469	Horton	Sparks	OWRD-GW	17-Mar-1999	08:45:00	calibrated e-tape	static	S	0.22	4,113.00	4,112.78
KLAM	13469	Newman	Gall	OWRD-GW	25-Oct-1999	13:45:00	calibrated e-tape	idle	S	4.35	4,113.00	4,108.65
KLAM	13471	Burgdorf	Wilson	well-log	16-May-1977		reported			20.00	4,135.30	4,115.30
KLAM	13471	Menestrina	Gates	OWRD-GW	30-Sep-1998	15:38:00	calibrated e-tape	static	S	25.53	4,135.30	4,109.77
KLAM	13471	Menestrina	Gates	OWRD-GW	07-Dec-1998	16:25:00	calibrated e-tape	static	S	23.02	4,135.30	4,112.28
KLAM	13471	Menestriana	DeSpain	well-log	10-Feb-1999		reported			24.00	4,135.30	4,111.30
KLAM	13471	Menestrina	Sparks	OWRD-GW	15-Mar-1999	10:25:00	steel tape	static	S	23.43	4,135.30	4,111.87
KLAM	13471	Menestrina	Gall	OWRD-GW	25-Oct-1999	14:30:00	calibrated e-tape	static and oil	S	25.10	4,135.30	4,110.20
KLAM	13478	Roach	Abernethy	well-log	10-Mar-1982		reported			39.00	4,124.20	4,085.20
KLAM	13478	Roach	Gates	OWRD-GW	17-Aug-1998		calibrated e-tape	static	S	26.61	4,124.20	4,097.59
KLAM	13478	Roach	Grondin	OWRD-GW	07-Dec-1998	14:20:00	calibrated e-tape	static	S	27.21	4,124.20	4,096.99
KLAM	13478	Roach	Grondin	OWRD-GW	14-Jan-1999	09:10:00	calibrated e-tape	static	S	26.28	4,124.20	4,097.92
KLAM	13478	Roach	Grondin	OWRD-GW	10-Feb-1999	09:30:00	calibrated e-tape	static	S	25.17	4,124.20	4,099.03
KLAM	13478	Roach	Grondin	OWRD-GW	15-Mar-1999	16:19:00	calibrated e-tape	static	S	24.03	4,124.20	4,100.17
KLAM	13478	Roach	Grondin	OWRD-GW	05-Apr-1999	18:24:00	calibrated e-tape	recently pumped	R	24.85	4,124.20	4,099.35
KLAM	13478	Roach	Grondin	OWRD-GW	10-May-1999	14:47:00	calibrated e-tape	recently pumped	R	24.36	4,124.20	4,099.84
KLAM	13478	Roach	Grondin	OWRD-GW	07-Jun-1999	15:20:00	calibrated e-tape	recently pumped	R	24.17	4,124.20	4,100.03
KLAM	13478	Roach	Grondin	OWRD-GW	12-Jul-1999	14:40:00	calibrated e-tape	idle/static	S	26.58	4,124.20	4,097.62
KLAM	13478	Roach	Grondin	OWRD-GW	09-Aug-1999	16:09:00	calibrated e-tape	recently pumped	R	27.84	4,124.20	4,096.36
KLAM	13478	Roach	Grondin	OWRD-GW	13-Sep-1999	18:40:00	calibrated e-tape	recently pumped	R	29.89	4,124.20	4,094.31
KLAM	13478	Roach	Grondin	OWRD-GW	27-Oct-1999	14:33:00	calibrated e-tape	idle	S	27.66	4,124.20	4,096.54
KLAM	13478	Roach	Grondin	OWRD-GW	10-Jan-2000	15:54:00	calibrated e-tape	recently pumped	R	27.66	4,124.20	4,096.54
KLAM	13478	Roach	Grondin	OWRD-GW	06-Mar-2000	14:45:00	calibrated e-tape	recently pumped	R	26.08	4,124.20	4,098.12
KLAM	13478	Roach	Grondin	OWRD-GW	08-May-2000	14:35:00	calibrated e-tape	static	S	25.32	4,124.20	4,098.88

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	13478	Roach	Grondin	OWRD-GW	26-Jun-2000	14:23:00	calibrated e-tape	idle	S	26.09	4,124.20	4,098.11
KLAM	13478	Roach	Grondin	OWRD-GW	11-Sep-2000	15:25:00	calibrated e-tape	recently pumped	R	29.86	4,124.20	4,094.34
KLAM	13478	Roach	Grondin	OWRD-GW	13-Nov-2000	16:35:00	calibrated e-tape	recently pumped	R	30.54	4,124.20	4,093.66
KLAM	13478	Roach	Grondin	OWRD-GW	10-Jan-2001	17:02:00	calibrated e-tape	idle	S	27.31	4,124.20	4,096.89
KLAM	13478	Roach	Grondin	OWRD-GW	05-Mar-2001	14:13:00	calibrated e-tape	idle	S	26.73	4,124.20	4,097.47
KLAM	13478	Roach	Grondin	OWRD-GW	07-May-2001	13:45:00	calibrated e-tape	idle	S	27.15	4,124.20	4,097.05
KLAM	13478	Roach	Grondin	OWRD-GW	19-Jul-2001	14:08:00	calibrated e-tape	idle	S	33.31	4,124.20	4,090.89
KLAM	13478	Roach	Grondin	OWRD-GW	20-Sep-2001	15:00:00	calibrated e-tape	recently pumped	R	34.79	4,124.20	4,089.41
KLAM	13478	Roach	Grondin	OWRD-GW	17-Jan-2002	16:58:00	calibrated e-tape	idle	S	30.96	4,124.20	4,093.24
KLAM	13491	Longhofer	Hartley	well-log	10-Aug-1964		reported			100.00	4,190.80	4,090.80
KLAM	13491	Longhofer	Harris	USGS	21-Nov-1969		reported			95.47	4,190.80	4,095.33
KLAM	13491	Longhofer	Harris	USGS	04-Nov-1970		reported			95.93	4,190.80	4,094.87
KLAM	13491	Ring	Grondin	OWRD-GW	12-Aug-1998	11:25:00	calibrated e-tape	static	S	95.03	4,190.80	4,095.77
KLAM	13491	Ring	Grondin	OWRD-GW	09-Dec-1998	16:55:00	calibrated e-tape	static	S	95.67	4,190.80	4,095.13
KLAM	13491	Ring	Grondin	OWRD-GW	14-Jan-1999	18:55:00	calibrated e-tape	static	S	95.05	4,190.80	4,095.75
KLAM	13491	Ring	Grondin	OWRD-GW	10-Feb-1999	18:00:00	calibrated e-tape	static	S	94.78	4,190.80	4,096.02
KLAM	13491	Ring	Grondin	OWRD-GW	15-Mar-1999	16:49:00	calibrated e-tape	static	S	93.63	4,190.80	4,097.17
KLAM	13491	Ring	Grondin	OWRD-GW	05-Apr-1999	18:52:00	calibrated e-tape	static	S	93.15	4,190.80	4,097.65
KLAM	13491	Ring	Grondin	OWRD-GW	10-May-1999	18:02:00	calibrated e-tape	recently pumped	S	92.83	4,190.80	4,097.97
KLAM	13491	Ring	Grondin	OWRD-GW	07-Jun-1999	18:06:00	calibrated e-tape	recently pumped	S	92.90	4,190.80	4,097.90
KLAM	13491	Ring	Grondin	OWRD-GW	12-Jul-1999	15:05:00	calibrated e-tape	idle/static	S	94.33	4,190.80	4,096.47
KLAM	13491	Ring	Grondin	OWRD-GW	09-Aug-1999	16:31:00	calibrated e-tape	idle	S	95.80	4,190.80	4,095.00
KLAM	13491	Ring	Grondin	OWRD-GW	13-Sep-1999	14:37:00	calibrated e-tape	idle	S	96.87	4,190.80	4,093.93
KLAM	13491	Ring	Grondin	OWRD-GW	27-Oct-1999	14:16:00	calibrated e-tape	idle	S	96.49	4,190.80	4,094.31
KLAM	13491	Ring	Grondin	OWRD-GW	10-Jan-2000	16:27:00	calibrated e-tape	idle	S	95.81	4,190.80	4,094.99
KLAM	13491	Ring	Grondin	OWRD-GW	06-Mar-2000	15:12:00	calibrated e-tape	idle	S	94.72	4,190.80	4,096.08
KLAM	13491	Ring	Grondin	OWRD-GW	08-May-2000	15:01:00	calibrated e-tape	idle	S	93.91	4,190.80	4,096.89
KLAM	13491	Ring	Grondin	OWRD-GW	26-Jun-2000	14:50:00	calibrated e-tape	idle	S	95.35	4,190.80	4,095.45
KLAM	13491	Ring	Grondin	OWRD-GW	11-Sep-2000	15:51:00	calibrated e-tape	idle	S	98.34	4,190.80	4,092.46
KLAM	13491	Ring	Grondin	OWRD-GW	13-Nov-2000	17:12:00	calibrated e-tape	idle	S	97.88	4,190.80	4,092.92
KLAM	13491	Ring	Grondin	OWRD-GW	11-Jan-2001	14:48:00	calibrated e-tape	idle	S	96.76	4,190.80	4,094.04
KLAM	13491	Ring	Grondin	OWRD-GW	05-Mar-2001	14:39:00	calibrated e-tape	idle	S	95.99	4,190.80	4,094.81
KLAM	13491	Ring	Grondin	OWRD-GW	07-May-2001	14:12:00	calibrated e-tape	idle	S	97.55	4,190.80	4,093.25
KLAM	13491	Ring	Grondin	OWRD-GW	19-Jul-2001	14:40:00	calibrated e-tape	idle	S	101.37	4,190.80	4,089.43
KLAM	13491	Ring	Grondin	OWRD-GW	20-Sep-2001	15:36:00	calibrated e-tape	idle	S	103.39	4,190.80	4,087.41
KLAM	13491	Ring	Grondin	OWRD-GW	17-Jan-2002	17:37:00	calibrated e-tape	idle	S	100.64	4,190.80	4,090.16
KLAM	13491	Ring	Grondin	OWRD-GW	15-Apr-2002	14:34:00	calibrated e-tape	idle	S	97.50	4,190.80	4,093.30
KLAM	13491	Ring	Grondin	OWRD-GW	15-Jul-2002	15:09:00	calibrated e-tape	idle	S	98.81	4,190.80	4,091.99
KLAM	13491	Ring	Grondin	OWRD-GW	14-Oct-2002	15:31:00	calibrated e-tape	idle	S	100.82	4,190.80	4,089.98
KLAM	13498	Tubach		USGS	27-Aug-1954		reported			10.06	4,104.30	4,094.24

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
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Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	13498	Tuback		USGS	28-Oct-1954		reported			9.80	4,104.30	4,094.50
KLAM	13498	Tuback		USGS	17-Dec-1954		reported			9.46	4,104.30	4,094.84
KLAM	13498	Tuback		USGS	18-Feb-1955		reported			9.05	4,104.30	4,095.25
KLAM	13498	Tuback		USGS	28-Jun-1955		reported			8.95	4,104.30	4,095.35
KLAM	13498	Tuback		USGS	25-Aug-1955		reported			6.50	4,104.30	4,097.80
KLAM	13498	Tuback		USGS	07-Apr-1956		reported			8.43	4,104.30	4,095.87
KLAM	13498	Tuback		USGS	10-Oct-1956		reported			11.88	4,104.30	4,092.42
KLAM	13498	Tuback		USGS	20-Dec-1956		reported			8.64	4,104.30	4,095.66
KLAM	13498	Tuback		USGS	24-Jul-1957		reported			11.48	4,104.30	4,092.82
KLAM	13498	Tuback		USGS	16-Apr-1958		reported			8.77	4,104.30	4,095.53
KLAM	13498	Tuback		USGS	05-Aug-1958		reported	pumping		32.19	4,104.30	4,072.11
KLAM	13498	Tuback		USGS	04-Dec-1958		reported			9.10	4,104.30	4,095.20
KLAM	13498	Tuback		USGS	10-Jun-1959		reported	pumping		29.36	4,104.30	4,074.94
KLAM	13498	Tuback		USGS	02-Sep-1959		reported			13.35	4,104.30	4,090.95
KLAM	13498	Tuback		USGS	17-Jan-1960		reported			12.73	4,104.30	4,091.57
KLAM	13498	Tuback		USGS	11-Jun-1960		reported			12.05	4,104.30	4,092.25
KLAM	13498	Tuback		USGS	03-Oct-1960		reported			12.25	4,104.30	4,092.05
KLAM	13498	Tuback		USGS	14-Jan-1961		reported			9.78	4,104.30	4,094.52
KLAM	13498	Tuback		USGS	03-May-1961		reported	pumping		21.40	4,104.30	4,082.90
KLAM	13498	Tuback		USGS	17-Sep-1961		reported			13.90	4,104.30	4,090.40
KLAM	13498	Tuback		OWRD-UN	09-Jan-1962		reported			11.17	4,104.30	4,093.13
KLAM	13498	Smith	Harris	USGS	05-Nov-1969		reported			13.84	4,104.30	4,090.46
KLAM	13498	Smith		USGS	15-Apr-1970		reported			12.50	4,104.30	4,091.80
KLAM	13498	Smith	Harris	USGS	07-Nov-1970		reported			35.68	4,104.30	4,068.62
KLAM	13498	Lost River Ranch	Grondin	OWRD-GW	23-Feb-1999	13:53:00	calibrated e-tape	static	S	10.08	4,104.30	4,094.22
KLAM	13498	Lost River Ranch	Gates	OWRD-GW	15-Mar-1999	09:50:00	calibrated e-tape	static	S	10.35	4,104.30	4,093.95
KLAM	13498	Lost River Ranch	Gates	OWRD-GW	25-Oct-1999	17:45:00	calibrated e-tape	static	S	15.87	4,104.30	4,088.43
KLAM	13519	Haley	Hartley	well-log	14-Mar-1958		reported			84.00	4,196.20	4,112.20
KLAM	13519	Curtis	Harris	USGS	14-Apr-1970		reported			86.22	4,196.20	4,109.98
KLAM	13519	Curtis		USGS	07-Nov-1970		reported			84.50	4,196.20	4,111.70
KLAM	13519	Somers Ranch	Grondin	OWRD-GW	08-Oct-1998	09:55:00	calibrated e-tape	static	S	87.30	4,196.20	4,108.90
KLAM	13519	Somers Ranch	Grondin	OWRD-GW	08-Oct-1998	10:40:00	steel tape	static	S	85.72	4,196.20	4,110.48
KLAM	13519	Somers Ranch	Gates	OWRD-GW	09-Dec-1998	12:10:00	steel tape	static	S	84.93	4,196.20	4,111.27
KLAM	13519	Somers Ranch	Gates	OWRD-GW	09-Dec-1998	12:10:00	calibrated e-tape	static	S	86.42	4,196.20	4,109.78
KLAM	13519	Somers Ranch	Norton	OWRD-GW	17-Mar-1999	10:35:00	calibrated e-tape	idle	S	89.02	4,196.20	4,107.18
KLAM	13519	Somers Ranch	Norton	OWRD-GW	25-Oct-1999	09:45:00	steel tape	idle	S	85.20	4,196.20	4,111.00
KLAM	13538	Williams	Hartley	well-log	10-Apr-1961		reported			72.00	4,204.90	4,132.90
KLAM	13538	Williams	Harris	USGS	14-Apr-1970		reported			92.40	4,204.90	4,112.50
KLAM	13538	Williams		USGS	03-Nov-1970		reported			92.28	4,204.90	4,112.62
KLAM	13538	Somers Ranch	Grondin	OWRD-GW	30-Sep-1998	12:15:00	calibrated e-tape	static	S	90.52	4,204.90	4,114.38

Appendix 13: Ground Water Elevation Measurements

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Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	13538	Somers Ranch	Norton	OWRD-GW	17-Mar-1999	11:04:00	calibrated e-tape	idle	S	87.91	4,204.90	4,116.99
KLAM	13538	Somers Ranch	Norton	OWRD-GW	26-Oct-1999	08:55:00	steel tape	idle	S	90.40	4,204.90	4,114.50
KLAM	13548	Evatt	Hartley	well-log	07-Oct-1969		reported			121.00	4,237.30	4,116.30
KLAM	13548	Evatt		USGS	14-Apr-1970		reported			123.56	4,237.30	4,113.74
KLAM	13548	Evatt		USGS	06-Nov-1970		reported			124.03	4,237.30	4,113.27
KLAM	13548	Black Canyon Ranch	Grondin	OWRD-GW	01-Oct-1998	14:20:00	calibrated e-tape	static	S	126.28	4,237.30	4,111.02
KLAM	13548	Black Canyon Ranch	Gates	OWRD-GW	08-Dec-1998	16:15:00	calibrated e-tape	static	S	125.55	4,237.30	4,111.75
KLAM	13548	Black Canyon Ranch	Norton	OWRD-GW	17-Mar-1999	09:57:00	calibrated e-tape	idle	S	124.15	4,237.30	4,113.15
KLAM	13548	Black Canyon Ranch	Norton	OWRD-GW	25-Oct-1999	15:36:00	calibrated e-tape	idle	S	125.99	4,237.30	4,111.31
KLAM	13553	Rajnus Brothers	VanMeter	well-log	20-Apr-1973		reported			82.00	4,210.00	4,128.00
KLAM	13553	Rajnus	Grondin	OWRD-GW	21-Oct-1998	16:00:00	steel tape	static	S	82.55	4,210.00	4,127.45
KLAM	13553	Rajnus	Grondin	OWRD-GW	18-Mar-1999	14:45:00	calibrated e-tape	static	S	72.65	4,210.00	4,137.35
KLAM	13553	Rajnus	Norton	OWRD-GW	25-Oct-1999	14:42:00	calibrated e-tape	static	S	80.57	4,210.00	4,129.43
KLAM	13554	Circle 5 Ranch	Storey	well-log	20-Sep-1977		reported			185.00	4,364.10	4,179.10
KLAM	13554	Circle 5 Ranch	Grondin	OWRD-GW	16-Sep-1998	14:51:00	calibrated e-tape	static	S	235.47	4,364.10	4,128.63
KLAM	13554	Circle 5 Ranch	Grondin	OWRD-GW	11-Dec-1998	10:28:00	calibrated e-tape	recently pumped	R	242.17	4,364.10	4,121.93
KLAM	13554	Circle 5 Ranch	Norton	OWRD-GW	16-Mar-1999	10:35:00	calibrated e-tape	idle	S	226.06	4,364.10	4,138.04
KLAM	13554	Circle 5 Ranch	Zwart	OWRD-GW	25-Oct-1999	14:11:00	calibrated e-tape	idle	S	227.83	4,364.10	4,136.27
KLAM	13556	Circle 5 Ranch	Storey	well-log	28-May-1974		reported			275.00	4,387.50	4,112.50
KLAM	13556	Circle 5 Ranch	Grondin	OWRD-GW	15-Sep-1998	15:40:00	calibrated e-tape	static	S	275.53	4,387.50	4,111.97
KLAM	13556	Circle 5 Ranch	Norton	OWRD-GW	16-Mar-1999	14:35:00	calibrated e-tape	idle	S	273.75	4,387.50	4,113.75
KLAM	13556	Circle 5 Ranch	Gall	OWRD-GW	25-Oct-1999	11:05:00	calibrated e-tape	static	S	275.43	4,387.50	4,112.07
KLAM	13582	Liston	Sevey	well-log	22-Apr-1988		reported			16.00	4,160.90	4,144.90
KLAM	13582	Timms	Grondin	OWRD-GW	12-May-1998	12:40:00	calibrated e-tape	static	S	12.49	4,160.90	4,148.41
KLAM	13582	Timms	Grondin	OWRD-GW	09-Dec-1998	12:15:00	calibrated e-tape	static	S	12.63	4,160.90	4,148.27
KLAM	13582	Timms	Grondin	OWRD-GW	12-Jan-1999	14:50:00	calibrated e-tape	static	S	14.17	4,160.90	4,146.73
KLAM	13582	Timms	Grondin	OWRD-GW	09-Feb-1999	10:00:00	calibrated e-tape	static	S	12.56	4,160.90	4,148.34
KLAM	13582	Timms	Grondin	OWRD-GW	16-Mar-1999	16:30:00	calibrated e-tape	static	S	10.48	4,160.90	4,150.42
KLAM	13582	Timms	Grondin	OWRD-GW	06-Apr-1999	15:06:00	calibrated e-tape	static	S	13.05	4,160.90	4,147.85
KLAM	13582	Timms	Grondin	OWRD-GW	11-May-1999	16:44:00	calibrated e-tape	idle/static	S	13.27	4,160.90	4,147.63
KLAM	13582	Timms	Grondin	OWRD-GW	08-Jun-1999	15:25:00	calibrated e-tape	idle/static	S	5.93	4,160.90	4,154.97
KLAM	13582	Timms	Grondin	OWRD-GW	13-Jul-1999	15:06:00	calibrated e-tape	recently pumped	S	5.30	4,160.90	4,155.60
KLAM	13582	Timms	Grondin	OWRD-GW	10-Aug-1999	15:39:00	calibrated e-tape	idle	S	6.80	4,160.90	4,154.10
KLAM	13582	Timms	Grondin	OWRD-GW	14-Sep-1999	16:57:00	calibrated e-tape	idle	S	5.54	4,160.90	4,155.36
KLAM	13582	Timms	Grondin	OWRD-GW	25-Oct-1999	14:17:00	calibrated e-tape	idle	S	12.88	4,160.90	4,148.02
KLAM	13582	Timms	Grondin	OWRD-GW	11-Jan-2000	15:59:00	calibrated e-tape	recently pumped	R	16.79	4,160.90	4,144.11
KLAM	13582	Timms	Grondin	OWRD-GW	08-Mar-2000	16:26:00	calibrated e-tape	idle	S	15.23	4,160.90	4,145.67
KLAM	13582	Timms	Grondin	OWRD-GW	09-May-2000	15:58:00	calibrated e-tape	idle	S	11.36	4,160.90	4,149.54

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	13582	Timms	Grondin	OWRD-GW	27-Jun-2000	15:54:00	calibrated e-tape	idle	S	6.11	4,160.90	4,154.79
KLAM	13582	Timms	Grondin	OWRD-GW	12-Sep-2000	16:23:00	calibrated e-tape	idle	S	8.08	4,160.90	4,152.82
KLAM	13582	Timms	Grondin	OWRD-GW	14-Nov-2000	14:27:00	calibrated e-tape	idle	S	14.79	4,160.90	4,146.11
KLAM	13582	Timms	Grondin	OWRD-GW	09-Jan-2001	15:51:00	calibrated e-tape	idle	S	16.53	4,160.90	4,144.37
KLAM	13582	Timms	Grondin	OWRD-GW	06-Mar-2001	16:28:00	calibrated e-tape	idle	S	17.48	4,160.90	4,143.42
KLAM	13582	Peterson	Grondin	OWRD-GW	08-May-2001	16:24:00	calibrated e-tape	idle	S	17.85	4,160.90	4,143.05
KLAM	13582	Peterson	Grondin	OWRD-GW	17-Jul-2001	14:57:00	calibrated e-tape	idle	S	9.33	4,160.90	4,151.57
KLAM	13582	Peterson	Grondin	OWRD-GW	18-Sep-2001	16:43:00	calibrated e-tape	idle	S	6.33	4,160.90	4,154.57
KLAM	13582	Peterson	Grondin	OWRD-GW	15-Jan-2002	16:53:00	calibrated e-tape	idle	S	13.03	4,160.90	4,147.87
KLAM	13582	Peterson	Grondin	OWRD-GW	16-Apr-2002	15:11:00	calibrated e-tape	idle	S	17.29	4,160.90	4,143.61
KLAM	13582	Peterson	Grondin	OWRD-GW	16-Jul-2002	14:02:00	calibrated e-tape	idle	S	5.98	4,160.90	4,154.92
KLAM	13582	Peterson	Grondin	OWRD-GW	15-Oct-2002	13:57:00	calibrated e-tape	idle	S	10.11	4,160.90	4,150.79
KLAM	13583	Liston	Abernathy	well-log	11-Aug-1981		reported			26.00	4,172.00	4,146.00
KLAM	13583	Timms	Grondin	OWRD-GW	28-Oct-1998	15:13:00	calibrated e-tape	static	S	25.41	4,172.00	4,146.59
KLAM	13583	Timms	Norton	OWRD-GW	15-Mar-1999	16:50:00	calibrated e-tape	idle	S	23.10	4,172.00	4,148.90
KLAM	13583	Timms	Norton	OWRD-GW	27-Oct-1999	09:10:00	calibrated e-tape	idle	S	28.23	4,172.00	4,143.77
KLAM	13585	Kent	Storey	well-log	20-Sep-1977		reported			50.00	4,359.00	4,309.00
KLAM	13585	Kent	Grondin	OWRD-GW	29-Sep-1998	10:50:00	calibrated e-tape	static	S	47.21	4,359.00	4,311.79
KLAM	13585	Kent	Norton	OWRD-GW	16-Mar-1999	11:55:00	calibrated e-tape	idle	S	32.73	4,359.00	4,326.27
KLAM	13585	Kent	Norton	OWRD-GW	26-Oct-1999		Unable to measure	Unable to measure			4,359.00	
KLAM	13601	Bureau of Land Management	Majors	well-log	22-Aug-1963		reported			360.00	4,924.00	4,564.00
KLAM	13601	Bureau of Land Management	Grondin	well-log	11-Sep-1998	13:26:00	calibrated e-tape	recently pumped	R	270.38	4,924.00	4,653.62
KLAM	13601	Bureau of Land Management	Norton	well-log	16-Mar-1999	13:30:00	calibrated e-tape	idle	S	231.91	4,924.00	4,692.09
KLAM	13601	Bureau of Land Management	Norton	well-log	27-Oct-1999	10:35:30	calibrated e-tape	idle	R	245.13	4,924.00	4,678.87
KLAM	13602	U.S. Government B.L.M.	Blaylock	well-log	10-Nov-1964		reported			402.00	4,839.00	4,437.00
KLAM	13602	Bureau of Land Management	Grondin	OWRD-GW	11-Sep-1998	10:50:00	calibrated e-tape	static	S	376.91	4,839.00	4,462.09
KLAM	13602	Bureau of Land Management	Norton	OWRD-GW	16-Mar-1999	13:15:00	calibrated e-tape	idle	S	374.20	4,839.00	4,464.80
KLAM	13602	Bureau of Land Management	Norton	OWRD-GW	27-Oct-1999	11:50:00	calibrated e-tape	no measurement			4,839.00	
KLAM	13608	Williams	Hartley	well-log	28-Nov-1978		reported			195.00	4,305.20	4,110.20
KLAM	13608	Williams	Hartley	well-log	22-Jun-1979		reported			194.50	4,305.20	4,110.70
KLAM	13608	Somers Ranch	Grondin	OWRD-GW	30-Sep-1998	15:13:00	calibrated e-tape	pumping	S	195.63	4,305.20	4,109.57
KLAM	13608	Somers Ranch	Grondin	OWRD-GW	30-Sep-1998	15:15:00	airline	pumping	S	194.94	4,305.20	4,110.26
KLAM	13608	Somers Ranch	Norton	OWRD-GW	17-Mar-1999	11:35:00	airline	idle	S	191.02	4,305.20	4,114.18
KLAM	13608	Somers Ranch	Norton	OWRD-GW	17-Mar-1999	11:35:00	calibrated e-tape	idle	S	192.61	4,305.20	4,112.59
KLAM	13608	Somers Ranch	Norton	OWRD-GW	26-Oct-1999		calibrated e-tape	idle	S	194.48	4,305.20	4,110.72
KLAM	13609	U.S. Bureau of Land Management	Grondin	OWRD-GW	10-Sep-1998	15:25:00	calibrated e-tape	static	S	186.97	4,872.00	4,685.03

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	13609	U.S. Bureau of Land Management	Norton	OWRD-GW	16-Mar-1999	12:45:00	calibrated e-tape	idle	S	184.92	4,872.00	4,687.08
KLAM	13609	U.S. Bureau of Land Management	Norton	OWRD-GW	27-Oct-1999	11:00:00	calibrated e-tape	idle	S	183.72	4,872.00	4,688.28
KLAM	13620	Settle	Grondin	OWRD-GW	29-Sep-1998	12:30:00	calibrated e-tape	recently pumped	R	4.86	4,303.00	4,298.14
KLAM	13620	Settle	Norton	OWRD-GW	16-Mar-1999	11:05:00	calibrated e-tape	well flowing	F		4,303.00	
KLAM	13620	Settle	Norton	OWRD-GW	27-Oct-1999	12:30:00	steel tape	idle	S	1.61	4,303.00	4,301.39
KLAM	14731	Schaup		OWRD-UN	21-Aug-1954		reported			10.77	4,152.00	4,141.23
KLAM	14731	Schaup		OWRD-UN	28-Oct-1954		reported			10.57	4,152.00	4,141.43
KLAM	14731	Schaup		OWRD-UN	17-Dec-1954		reported			10.32	4,152.00	4,141.68
KLAM	14731	Schaup		OWRD-UN	18-Feb-1955		reported			11.34	4,152.00	4,140.66
KLAM	14731	Schaup		OWRD-UN	28-Jun-1955		reported			11.53	4,152.00	4,140.47
KLAM	14731	Schaup		OWRD-UN	25-Aug-1955		reported			11.86	4,152.00	4,140.14
KLAM	14731	Schaup		OWRD-UN	07-Apr-1956		reported			8.38	4,152.00	4,143.62
KLAM	14731	Schaup		OWRD-UN	10-Oct-1956		reported			10.40	4,152.00	4,141.60
KLAM	14731	Schaup		OWRD-UN	20-Dec-1956		reported			10.31	4,152.00	4,141.69
KLAM	14731	Schaup		OWRD-UN	24-Jul-1957		reported			10.31	4,152.00	4,141.69
KLAM	14731	Schaup		OWRD-UN	16-Apr-1958		reported			10.14	4,152.00	4,141.86
KLAM	14731	Schaup		OWRD-UN	05-Aug-1958		reported			9.69	4,152.00	4,142.31
KLAM	14731	Schaup		OWRD-UN	04-Dec-1958		reported			9.39	4,152.00	4,142.61
KLAM	14731	Schaup		OWRD-UN	10-Jun-1959		reported			9.36	4,152.00	4,142.64
KLAM	14731	Schaup		OWRD-UN	02-Sep-1959		reported			10.88	4,152.00	4,141.12
KLAM	14731	Schaup		OWRD-UN	18-Jan-1960		reported			11.55	4,152.00	4,140.45
KLAM	14731	Schaup		OWRD-UN	11-Jun-1960		reported			10.92	4,152.00	4,141.08
KLAM	14731	Schaup		OWRD-UN	13-Oct-1960		reported			11.83	4,152.00	4,140.17
KLAM	14731	Schaup		OWRD-UN	14-Jan-1961		reported			12.07	4,152.00	4,139.93
KLAM	14731	Schaup		OWRD-UN	03-May-1961		reported			11.45	4,152.00	4,140.55
KLAM	14731	Schaup		OWRD-UN	17-Sep-1961		reported			12.30	4,152.00	4,139.70
KLAM	14731	Schaup		OWRD-UN	09-Jan-1962		reported			12.09	4,152.00	4,139.91
KLAM	14731	Schaup		OWRD-UN	03-Apr-1962		reported			11.08	4,152.00	4,140.92
KLAM	14731	Schaup		USGS	23-Apr-1970		reported			19.20	4,152.00	4,132.80
KLAM	14731	Schaup		USGS	29-Oct-1970		reported			25.75	4,152.00	4,126.25
KLAM	14731	Latourette	Gates	OWRD-GW	17-Sep-1998	17:15:00	calibrated e-tape	nearby irrigation	S	42.71	4,152.00	4,109.29
KLAM	14731	Lattorette	Gates	OWRD-GW	07-Dec-1998	14:20:00	calibrated e-tape	static	S	31.41	4,152.00	4,120.59
KLAM	14731	Lattorette	Gates	OWRD-GW	15-Mar-1999	12:20:00	calibrated e-tape	static	S	28.03	4,152.00	4,123.97
KLAM	14731	Lattorette	Gates	OWRD-GW	25-Oct-1999	14:30:00	calibrated e-tape	static	S	37.26	4,152.00	4,114.74
KLAM	14735	Rajnus	VanMeter	well-log	27-Feb-1961		reported			-11.54	4,159.00	4,170.54
KLAM	14735	Rajnus	VanMeter	well-log	28-Apr-1964		reported			9.23	4,159.00	4,168.23
KLAM	14735	Rajnus		USGS	18-Apr-1970		reported			7.00	4,159.00	4,166.00
KLAM	14742	Rajnus	Harris	USGS	09-Apr-1970		reported			112.44	4,198.00	4,085.56

Appendix 13: Ground Water Elevation Measurements

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Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	14742	Rajnus		USGS	29-Oct-1970		reported			135.59	4,198.00	4,062.41
KLAM	14742	Chichester	Gates	OWRD-GW	17-Mar-1999	12:30:00	calibrated e-tape	static	S	157.45	4,198.00	4,040.55
KLAM	14742	Chichester	Gates	OWRD-GW	26-Oct-1999	14:00:00	calibrated e-tape	static	S	173.09	4,198.00	4,024.91
KLAM	14746	Rajnus		USGS	23-Jan-1960		reported			107.00	4,233.00	4,126.00
KLAM	14746	Rajnus	Harris	USGS	09-Apr-1970		reported			137.40	4,233.00	4,095.60
KLAM	14746	Rajnus		USGS	29-Oct-1970		reported			164.06	4,233.00	4,068.94
KLAM	14746	Chichester	Gates	OWRD-GW	17-Mar-1999	12:55:00	calibrated e-tape	static	S	183.53	4,233.00	4,049.47
KLAM	14746	Chichester	Gates	OWRD-GW	26-Oct-1999	13:30:00	calibrated e-tape	static	S	203.20	4,233.00	4,029.80
KLAM	14754	Rajnus	VanMeter	well-log	28-Apr-1983		reported			190.00	4,226.00	4,036.00
KLAM	14754	Rajnus	Gates	well-log	18-Mar-1999	14:07:00	calibrated e-tape	static	S	199.76	4,226.00	4,026.24
KLAM	14754	Rajnus	Gates	well-log	25-Oct-1999	15:08:00	calibrated e-tape	static	S	198.08	4,226.00	4,027.92
KLAM	14796	Carner	VanMeter	well-log	28-Mar-1979		reported			62.00	4,211.10	4,149.10
KLAM	14796	Worthington	Gates	OWRD-GW	17-Sep-1998		steel tape	Static	S	87.66	4,211.10	4,123.44
KLAM	14796	Worthington	Gates	OWRD-GW	17-Mar-1999	11:15:00	steel tape	Static and oil	S	72.35	4,211.10	4,138.75
KLAM	14796	Worthington	Gates	OWRD-GW	27-Oct-1999	09:10:00	steel tape	Static and oil	S	84.57	4,211.10	4,126.53
KLAM	14808	Rajnus	VanMeter	well-log	10-Mar-1970		reported			209.00	4,368.80	4,159.80
KLAM	14808	Fischer	Gates	OWRD-GW	17-Mar-1999	14:10:00	calibrated e-tape	static	S	230.07	4,368.80	4,138.73
KLAM	14808	Fischer	Gates	OWRD-GW	26-Oct-1999	11:45:00	calibrated e-tape	static	S	238.71	4,368.80	4,130.09
KLAM	14809	Rajnus		well-log	15-Jan-1950		reported			11.00	4,173.90	4,162.90
KLAM	14809	Rajnus		USGS	02-Oct-1969		reported			2.46	4,173.90	4,171.44
KLAM	14809	Rajnus	Harris	USGS	09-Apr-1970		reported			12.78	4,173.90	4,161.12
KLAM	14809	Rajnus		USGS	09-Apr-1970		reported			20.26	4,173.90	4,153.64
KLAM	14809	Fischer	Gates	OWRD-GW	03-Sep-1998	15:05:00	calibrated e-tape	recently pumped	R	55.25	4,173.90	4,118.65
KLAM	14809	Fischer	Gates	OWRD-GW	07-Dec-1998	14:50:00	calibrated e-tape	static	S	41.79	4,173.90	4,132.11
KLAM	14809	Fischer	Gates	OWRD-GW	15-Mar-1999	11:10:00	calibrated e-tape	static	S	33.67	4,173.90	4,140.23
KLAM	14809	Fischer	Gates	OWRD-GW	26-Oct-1999		calibrated e-tape	static	S	43.91	4,173.90	4,129.99
KLAM	14812	Gaskin	McClane	well-log	10-Feb-1977		reported			413.00	4,465.00	4,052.00
KLAM	14812	Barron	Hughes	well-log	23-Aug-1990		reported			403.00	4,465.00	4,062.00
KLAM	14812	Barron	Gates	well-log	18-Mar-1999	13:10:00	calibrated e-tape	static	S	433.32	4,465.00	4,031.68
KLAM	14812	Barron	Gates	well-log	26-Oct-1999	15:20:00	calibrated e-tape	static	S	439.08	4,465.00	4,025.92
KLAM	14829	Rajnus	VanMeter	well-log	15-Nov-1980		reported			197.00	4,245.00	4,048.00
KLAM	14829	Haught	Gates	OWRD-GW	10-Sep-1998	11:20:00	steel tape	static	S	225.63	4,245.00	4,019.37
KLAM	14829	Haught	Gates	OWRD-GW	15-Mar-1999	15:30:00	calibrated e-tape	static	S	217.61	4,245.00	4,027.39
KLAM	14829	Haught	Gates	OWRD-GW	25-Oct-1999	16:10:00	calibrated e-tape	static	S	223.37	4,245.00	4,021.63

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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	14849	Langell Valley Community Church	Sevey	well-log	07-Jan-1985		reported			33.00	4,182.00	4,149.00
KLAM	14849	Langell Valley Community Church	Grondin	OWRD-GW	22-Apr-1998	16:30:00	calibrated e-tape	recently pumped	R	34.97	4,182.00	4,147.03
KLAM	14849	Langell Valley Community Church	Grondin	OWRD-GW	08-Dec-1998	15:20:00	calibrated e-tape	static	S	30.08	4,182.00	4,151.92
KLAM	14849	Langell Valley Community Church	Grondin	OWRD-GW	12-Jan-1999	16:58:00	calibrated e-tape	recently pumped	R	32.64	4,182.00	4,149.36
KLAM	14849	Langell Valley Community Church	Grondin	OWRD-GW	10-Feb-1999	13:20:00	calibrated e-tape	static	S	32.17	4,182.00	4,149.83
KLAM	14849	Langell Valley Community Church	Grondin	OWRD-GW	16-Mar-1999	15:47:00	calibrated e-tape	recently pumped	R	30.31	4,182.00	4,151.69
KLAM	14849	Langell Valley Community Church	Grondin	OWRD-GW	06-Apr-1999	09:30:00	calibrated e-tape	static	S	31.71	4,182.00	4,150.29
KLAM	14849	Langell Valley Community Church	Grondin	OWRD-GW	11-May-1999	15:25:00	calibrated e-tape	idle	R	33.38	4,182.00	4,148.62
KLAM	14849	Langell Valley Community Church	Grondin	OWRD-GW	08-Jun-1999	14:30:00	calibrated e-tape	idle	R	29.51	4,182.00	4,152.49
KLAM	14849	Langell Valley Community Church	Grondin	OWRD-GW	13-Jul-1999	19:26:00	calibrated e-tape	idle	R	28.86	4,182.00	4,153.14
KLAM	14849	Langell Valley Community Church	Grondin	OWRD-GW	10-Aug-1999	14:10:00	calibrated e-tape	idle	R	27.34	4,182.00	4,154.66
KLAM	14849	Langell Valley Community Church	Grondin	OWRD-GW	14-Sep-1999	14:10:00	calibrated e-tape	recently pumped	R	29.82	4,182.00	4,152.18
KLAM	14849	Langell Valley Community Church	Grondin	OWRD-GW	25-Oct-1999	10:28:00	calibrated e-tape	recently pumped	S	29.92	4,182.00	4,152.08
KLAM	14864	Nelson Ranches	Storey	well-log	21-Oct-1977		reported			57.00	4,205.00	4,148.00
KLAM	14864	Gallup	Grondin	OWRD-GW	20-Aug-1998	18:25:00	calibrated e-tape	recently pumped	R	67.04	4,205.00	4,137.96
KLAM	14864	Gallup	Gates	OWRD-GW	08-Dec-1998	14:05:00	calibrated e-tape	static	S	58.18	4,205.00	4,146.82
KLAM	14864	Gallup	Norton	OWRD-GW	15-Mar-1999	16:15:00	calibrated e-tape	idle	S	55.66	4,205.00	4,149.34
KLAM	14864	Gallup	Zwart	OWRD-GW	26-Oct-1999	09:03:00	calibrated e-tape	idle	S	61.78	4,205.00	4,143.22
KLAM	14871	Welch	VanMeter	well-log	04-Nov-1965		reported			-2.31	4,136.60	4,138.91
KLAM	14871	Welch	Grondin	OWRD-GW	02-Jun-1998	13:00:00	calibrated e-tape	flowing (trickle)	S	-1.24	4,136.60	4,137.84
KLAM	14871	Welch	Grondin	OWRD-GW	08-Dec-1998	13:40:00	calibrated e-tape	static	S	-0.71	4,136.60	4,137.31
KLAM	14871	Welch	Grondin	OWRD-GW	12-Jan-1999	13:30:00	calibrated e-tape	static	S	-0.48	4,136.60	4,137.08
KLAM	14871	Welch	Grondin	OWRD-GW	09-Feb-1999	16:58:00	calibrated e-tape	recently pumped	S	-0.86	4,136.60	4,137.46
KLAM	14871	Welch	Grondin	OWRD-GW	16-Mar-1999	11:43:00	calibrated e-tape	static	S	-1.33	4,136.60	4,137.93
KLAM	14871	Welch	Grondin	OWRD-GW	06-Apr-1999	11:15:00	calibrated e-tape	recently flowing	S	-1.32	4,136.60	4,137.92
KLAM	14871	Welch	Grondin	OWRD-GW	11-May-1999	12:55:00	calibrated e-tape	idle	S	-1.09	4,136.60	4,137.69
KLAM	14871	Welch	Grondin	OWRD-GW	08-Jun-1999	12:33:00	calibrated e-tape	static	S	-0.33	4,136.60	4,136.93
KLAM	14871	Welch	Grondin	OWRD-GW	13-Jul-1999	13:15:00	calibrated e-tape	recently pumped	R	0.37	4,136.60	4,136.23
KLAM	14871	Welch	Grondin	OWRD-GW	10-Aug-1999	12:22:00	calibrated e-tape	idle	S	0.89	4,136.60	4,135.71
KLAM	14871	Welch	Grondin	OWRD-GW	14-Sep-1999	12:32:00	calibrated e-tape	idle	S	0.68	4,136.60	4,135.92
KLAM	14871	Welch	Grondin	OWRD-GW	25-Oct-1999	14:46:00	calibrated e-tape	idle	S	0.78	4,136.60	4,135.82
KLAM	14871	Welch	Grondin	OWRD-GW	11-Jan-2000	12:26:00	calibrated e-tape	idle	S	0.40	4,136.60	4,136.20
KLAM	14871	Welch	Grondin	OWRD-GW	08-Mar-2000	13:12:00	calibrated e-tape	recently pumped	S	-0.14	4,136.60	4,136.74
KLAM	14871	Welch	Grondin	OWRD-GW	09-May-2000	13:05:00	calibrated e-tape	recently pumped	R	0.12	4,136.60	4,136.48
KLAM	14871	Welch	Grondin	OWRD-GW	27-Jun-2000	12:13:00	calibrated e-tape	idle	S	0.88	4,136.60	4,135.72
KLAM	14871	Welch	Grondin	OWRD-GW	12-Sep-2000	11:04:00	calibrated e-tape	recently pumped	R	1.62	4,136.60	4,134.98
KLAM	14871	Welch	Grondin	OWRD-GW	14-Nov-2000	12:36:00	calibrated e-tape	idle	S	1.29	4,136.60	4,135.31
KLAM	14871	Welch	Grondin	OWRD-GW	09-Jan-2001	12:23:00	calibrated e-tape	idle	S	0.66	4,136.60	4,135.94
KLAM	14871	Welch	Grondin	OWRD-GW	06-Mar-2001	13:24:00	calibrated e-tape	idle	S	0.59	4,136.60	4,136.01
KLAM	14871	Welch	Grondin	OWRD-GW	08-May-2001	14:10:00	calibrated e-tape	idle	S	3.61	4,136.60	4,132.99

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	14871	Welch	Grondin	OWRD-GW	17-Jul-2001	12:33:00	calibrated e-tape	idle	S	6.84	4,136.60	4,129.76
KLAM	14871	Welch	Grondin	OWRD-GW	18-Sep-2001	13:09:00	calibrated e-tape	idle	S	7.76	4,136.60	4,128.84
KLAM	14871	Welch	Grondin	OWRD-GW	15-Jan-2002	13:25:00	calibrated e-tape	recently pumped	S	3.26	4,136.60	4,133.34
KLAM	14873	Suty	VanMeter	well-log	30-Apr-1974		reported			36.00	4,180.50	4,144.50
KLAM	14873	Biaggi	Grondin	OWRD-GW	14-Sep-1998	15:30:00	calibrated e-tape	recently pumped	R	44.34	4,180.50	4,136.16
KLAM	14873	Biaggi	Gates	OWRD-GW	08-Dec-1998	13:38:00	calibrated e-tape	static	S	38.53	4,180.50	4,141.97
KLAM	14873	Biaggi	Norton	OWRD-GW	15-Mar-1999		calibrated e-tape	idle	S	37.24	4,180.50	4,143.26
KLAM	14873	Biaggi	Zwart	OWRD-GW	26-Oct-1999	14:20:00	calibrated e-tape	idle	S	39.17	4,180.50	4,141.33
KLAM	14882	Hammerich	Hughes	well-log	04-Nov-1988		reported			27.00	4,170.00	4,143.00
KLAM	14882	Hammerich	Grondin	OWRD-GW	21-May-1998	09:55:00	calibrated e-tape	static	S	24.09	4,170.00	4,145.91
KLAM	14882	Hammerich	Grondin	OWRD-GW	08-Dec-1998	14:55:00	calibrated e-tape	static	S	26.22	4,170.00	4,143.78
KLAM	14882	Hammerich	Grondin	OWRD-GW	12-Jan-1999	12:55:00	calibrated e-tape	static	S	27.75	4,170.00	4,142.25
KLAM	14882	Hammerich	Grondin	OWRD-GW	10-Feb-1999	14:15:00	calibrated e-tape	static	S	27.09	4,170.00	4,142.91
KLAM	14882	Hammerich	Grondin	OWRD-GW	16-Mar-1999	12:22:00	calibrated e-tape	static	S	23.76	4,170.00	4,146.24
KLAM	14882	Hammerich	Grondin	OWRD-GW	06-Apr-1999	10:17:00	calibrated e-tape	static	S	26.03	4,170.00	4,143.97
KLAM	14882	Hammerich	Grondin	OWRD-GW	11-May-1999	15:36:00	calibrated e-tape	static/idle	S	24.40	4,170.00	4,145.60
KLAM	14882	Hammerich	Grondin	OWRD-GW	08-Jun-1999	13:23:00	calibrated e-tape	static/idle	S	21.85	4,170.00	4,148.15
KLAM	14882	Hammerich	Grondin	OWRD-GW	13-Jul-1999	14:03:00	calibrated e-tape	static/idle	S	21.41	4,170.00	4,148.59
KLAM	14882	Hammerich	Grondin	OWRD-GW	10-Aug-1999	13:04:00	calibrated e-tape	idle	S	18.70	4,170.00	4,151.30
KLAM	14882	Hammerich	Grondin	OWRD-GW	14-Sep-1999	14:37:00	calibrated e-tape	idle	S	21.57	4,170.00	4,148.43
KLAM	14882	Hammerich	Grondin	OWRD-GW	25-Oct-1999	09:15:00	calibrated e-tape	idle	S	25.22	4,170.00	4,144.78
KLAM	14882	Hammerich	Grondin	OWRD-GW	11-Jan-2000	13:19:00	calibrated e-tape	idle	S	30.72	4,170.00	4,139.28
KLAM	14882	Hammerich	Grondin	OWRD-GW	08-Mar-2000	14:00:00	calibrated e-tape	idle	S	29.49	4,170.00	4,140.51
KLAM	14882	Hammerich	Grondin	OWRD-GW	09-May-2000	13:54:00	calibrated e-tape	idle	S	27.10	4,170.00	4,142.90
KLAM	14882	Hammerich	Grondin	OWRD-GW	27-Jun-2000	13:25:00	calibrated e-tape	idle	S	22.16	4,170.00	4,147.84
KLAM	14882	Hammerich	Grondin	OWRD-GW	12-Sep-2000	11:48:00	calibrated e-tape	idle	S	21.61	4,170.00	4,148.39
KLAM	14882	Hammerich	Grondin	OWRD-GW	14-Nov-2000	13:22:00	calibrated e-tape	idle	S	29.10	4,170.00	4,140.90
KLAM	14882	Hammerich	Grondin	OWRD-GW	09-Jan-2001	13:09:00	calibrated e-tape	idle	S	31.25	4,170.00	4,138.75
KLAM	14882	Hammerich	Grondin	OWRD-GW	06-Mar-2001	14:04:00	calibrated e-tape	idle	S	32.01	4,170.00	4,137.99
KLAM	14882	Hammerich	Grondin	OWRD-GW	08-May-2001	15:37:00	calibrated e-tape	idle	S	31.27	4,170.00	4,138.73
KLAM	14882	Hammerich	Grondin	OWRD-GW	17-Jul-2001	13:53:00	calibrated e-tape	idle	S	24.78	4,170.00	4,145.22
KLAM	14882	Hammerich	Grondin	OWRD-GW	18-Sep-2001	14:15:00	calibrated e-tape	idle	S	25.96	4,170.00	4,144.04
KLAM	14882	Hammerich	Grondin	OWRD-GW	15-Jan-2002	14:22:00	calibrated e-tape	idle	S	30.10	4,170.00	4,139.90
KLAM	14882	Hammerich	Grondin	OWRD-GW	16-Apr-2002	11:53:00	calibrated e-tape	idle	S	32.11	4,170.00	4,137.89
KLAM	14882	Hammerich	Grondin	OWRD-GW	16-Jul-2002	11:39:00	calibrated e-tape	idle	S	24.22	4,170.00	4,145.78
KLAM	14882	Hammerich	Grondin	OWRD-GW	15-Oct-2002	11:24:00	calibrated e-tape	idle	S	24.51	4,170.00	4,145.49
KLAM	14884	Kilgore	Hartley	well-log	25-Sep-1962		reported			178.00	4,320.00	4,142.00
KLAM	14884	Kilgore	Harris	USGS	17-Apr-1970		reported			176.50	4,320.00	4,143.50
KLAM	14884	Kilgore		USGS	04-Nov-1970		reported			177.00	4,320.00	4,143.00

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	14884	Kurtz	Grondin	OWRD-GW	08-Sep-1998	13:05:00	airline	pumping	F	208.28	4,320.00	4,111.72
KLAM	14884	Kurtz	Norton	OWRD-GW	15-Mar-1999	13:54:00	airline	idle	S	175.41	4,320.00	4,144.59
KLAM	14884	Kurtz	Zwart	OWRD-GW	26-Oct-1999	09:58:00	airline	static	S	178.87	4,320.00	4,141.13
KLAM	14889	Fahsholtz	Sevey	well-log	07-Mar-1980		reported			18.00	4,157.30	4,139.30
KLAM	14889	Hammerich	Grondin	OWRD-GW	02-Jun-1998	14:30:00	calibrated e-tape	static	S	17.88	4,157.30	4,139.42
KLAM	14889	Hammerich	Grondin	OWRD-GW	08-Dec-1998	13:10:00	calibrated e-tape	static	S	18.57	4,157.30	4,138.73
KLAM	14889	Hammerich	Grondin	OWRD-GW	12-Jan-1999	12:11:00	calibrated e-tape	static	S	18.56	4,157.30	4,138.74
KLAM	14889	Hammerich	Grondin	OWRD-GW	09-Feb-1999	15:56:00	calibrated e-tape	static	S	18.18	4,157.30	4,139.12
KLAM	14889	Hammerich	Grondin	OWRD-GW	16-Mar-1999	11:11:00	calibrated e-tape	static	S	17.79	4,157.30	4,139.51
KLAM	14889	Hammerich	Grondin	OWRD-GW	06-Apr-1999	11:40:00	calibrated e-tape	static	S	17.78	4,157.30	4,139.52
KLAM	14889	Hammerich	Grondin	OWRD-GW	11-May-1999	12:36:00	calibrated e-tape	idle/static	S	18.11	4,157.30	4,139.19
KLAM	14889	Hammerich	Grondin	OWRD-GW	08-Jun-1999	12:15:00	calibrated e-tape	static	S	19.13	4,157.30	4,138.17
KLAM	14889	Hammerich	Grondin	OWRD-GW	13-Jul-1999	12:15:00	calibrated e-tape	idle/static	S	19.68	4,157.30	4,137.62
KLAM	14889	Hammerich	Grondin	OWRD-GW	10-Aug-1999	12:05:00	calibrated e-tape	idle	S	20.40	4,157.30	4,136.90
KLAM	14889	Hammerich	Grondin	OWRD-GW	14-Sep-1999	12:17:00	calibrated e-tape	idle	S	20.39	4,157.30	4,136.91
KLAM	14889	Hammerich	Grondin	OWRD-GW	25-Oct-1999	15:22:00	calibrated e-tape	idle	S	20.10	4,157.30	4,137.20
KLAM	14889	Hammerich	Grondin	OWRD-GW	11-Jan-2000	12:07:00	calibrated e-tape	idle	S	19.56	4,157.30	4,137.74
KLAM	14889	Hammerich	Grondin	OWRD-GW	08-Mar-2000	12:39:00	calibrated e-tape	idle	S	18.94	4,157.30	4,138.36
KLAM	14889	Hammerich	Grondin	OWRD-GW	09-May-2000	12:14:00	calibrated e-tape	idle	S	19.31	4,157.30	4,137.99
KLAM	14889	Hammerich	Grondin	OWRD-GW	27-Jun-2000	11:53:00	calibrated e-tape	nearby pumping	S	20.32	4,157.30	4,136.98
KLAM	14889	Hammerich	Grondin	OWRD-GW	12-Sep-2000	10:25:00	calibrated e-tape	nearby pumping	S	21.28	4,157.30	4,136.02
KLAM	14889	Hammerich	Grondin	OWRD-GW	14-Nov-2000	12:15:00	calibrated e-tape	idle	S	20.53	4,157.30	4,136.77
KLAM	14889	Hammerich	Grondin	OWRD-GW	09-Jan-2001	12:04:00	calibrated e-tape	idle	S	19.84	4,157.30	4,137.46
KLAM	14889	Hammerich	Grondin	OWRD-GW	06-Mar-2001	12:30:00	calibrated e-tape	idle	S	19.88	4,157.30	4,137.42
KLAM	14889	Hammerich	Grondin	OWRD-GW	08-May-2001	13:39:00	calibrated e-tape	idle	S	23.49	4,157.30	4,133.81
KLAM	14889	Hammerich	Grondin	OWRD-GW	17-Jul-2001	12:11:00	calibrated e-tape	recently pumped	S	27.27	4,157.30	4,130.03
KLAM	14889	Hammerich	Grondin	OWRD-GW	18-Sep-2001	12:35:00	calibrated e-tape	recently pumped	S	27.90	4,157.30	4,129.40
KLAM	14889	Hammerich	Grondin	OWRD-GW	15-Jan-2002	12:38:00	calibrated e-tape	idle	S	22.53	4,157.30	4,134.77
KLAM	14889	Hammerich	Grondin	OWRD-GW	16-Apr-2002	10:55:00	calibrated e-tape	idle	S	20.83	4,157.30	4,136.47
KLAM	14889	Hammerich	Grondin	OWRD-GW	16-Jul-2002	11:03:00	calibrated e-tape	idle	S	21.86	4,157.30	4,135.44
KLAM	14889	Hammerich	Grondin	OWRD-GW	15-Oct-2002	11:00:00	calibrated e-tape	idle	S	21.51	4,157.30	4,135.79
KLAM	14891	Fahsholtz	Storey	well-log	07-Nov-1977		reported			30.00	4,168.00	4,138.00
KLAM	14891	Hammerich	Gates	OWRD-GW	18-Aug-1998		calibrated e-tape	Static	S	30.99	4,168.00	4,137.01
KLAM	14891	Hammerich	Norton	OWRD-GW	15-Mar-1999	13:25:00	calibrated e-tape	idle	S	29.12	4,168.00	4,138.88
KLAM	14891	Hammerich	Zwart	OWRD-GW	26-Oct-1999	11:20:00	steel tape	idle	S	31.51	4,168.00	4,136.49
KLAM	14896	Lentz	Wilson	well-log	05-Feb-1976		reported			-1.00	4,139.00	4,140.00
KLAM	14896	Lentz	Wilson	well-log	11-Feb-1977		reported			-1.00	4,139.00	4,140.00
KLAM	14896	Lentz	Grondin	OWRD-GW	19-Aug-1998	18:00:00	airline	recently pumped	R	6.93	4,139.00	4,132.07
KLAM	14896	Lentz	Norton	OWRD-GW	15-Mar-1999	12:45:00	estimated	flowing	F		4,139.00	

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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	14896	Lentz	Zwart	OWRD-GW	25-Oct-1999	16:34:00	calibrated e-tape	idle and oil	S	1.37	4,139.00	4,137.63
KLAM	15111	Haught	VanMeter	well-log	24-Mar-1980		reported			191.50	4,243.00	4,051.50
KLAM	15111	Haught	Gates	OWRD-GW	10-Sep-1998	14:30:00	calibrated e-tape	static	S	222.33	4,243.00	4,020.67
KLAM	15111	Haught	Gates	OWRD-GW	15-Mar-1999	15:45:00	calibrated e-tape	static	S	214.12	4,243.00	4,028.88
KLAM	15111	Haught	Gates	OWRD-GW	25-Oct-1999	16:30:00	calibrated e-tape	static	S	219.89	4,243.00	4,023.11
KLAM	15113	Circle 5 Ranch	Storey	well-log	15-Sep-1977		reported			10.50	4,147.30	4,136.80
KLAM	15113	Randall	Chancellor	well-log	31-May-1991		reported			10.00	4,147.30	4,137.30
KLAM	15113	Randall	Grondin	OWRD-GW	15-Sep-1998	09:47:00	calibrated e-tape	off but recovering	R	13.69	4,147.30	4,133.61
KLAM	15113	Circle 5 Ranch	Gates	OWRD-GW	08-Dec-1998	11:30:00	calibrated e-tape	static	S	9.31	4,147.30	4,137.99
KLAM	15113	Circle 5 Ranch	Norton	OWRD-GW	15-Mar-1999	10:45:00	calibrated e-tape	idle	S	8.41	4,147.30	4,138.89
KLAM	15113	Circle 5 Ranch	Zwart	OWRD-GW	25-Oct-1999	15:34:00	calibrated e-tape	idle	S	10.72	4,147.30	4,136.58
KLAM	15113	Circle 5 Ranch	Gates	OWRD-GW	18-Apr-2001	15:00:00	calibrated e-tape	idle	S	12.15	4,147.30	4,135.15
KLAM	15127	Voss	Wilson	well-log	23-Jan-1976		reported			16.00	4,156.30	4,140.30
KLAM	15127	Voss	Grondin	OWRD-GW	08-Sep-1998	15:35:00	calibrated e-tape	pumping	F	35.51	4,156.30	4,120.79
KLAM	15127	Voss	Norton	OWRD-GW	15-Mar-1999	10:25:00	calibrated e-tape	idle	S	28.36	4,156.30	4,127.94
KLAM	15127	Voss	Zwart	OWRD-GW	25-Oct-1999	16:05:00	calibrated e-tape	idle	S	20.62	4,156.30	4,135.68
KLAM	15129	USBR Dept. of Interior Klamath Proj	Abernethy	well-log	24-Feb-1988		reported			-9.80	4,129.60	4,139.40
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	19-Aug-1998	13:20:00	steel tape	static	S	-7.94	4,129.60	4,137.54
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	08-Dec-1998	12:15:00	steel tape	static	S	-9.28	4,129.60	4,138.88
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	12-Jan-1999	11:40:00	steel tape	static	S	-9.20	4,129.60	4,138.80
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	10-Feb-1999	15:04:00	steel tape	static	S	-9.33	4,129.60	4,138.93
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	16-Mar-1999	10:36:00	steel tape	static	S	-10.17	4,129.60	4,139.77
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	06-Apr-1999	13:20:00	steel tape	static	S	-10.21	4,129.60	4,139.81
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	11-May-1999	11:59:00	steel tape	idle	S	-9.89	4,129.60	4,139.49
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	08-Jun-1999	11:35:00	steel tape	recently flowing	S	-8.84	4,129.60	4,138.44
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	13-Jul-1999	11:01:00	steel tape	idle	S	-8.28	4,129.60	4,137.88
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	10-Aug-1999	11:30:00	steel tape	recently flowing	S	-7.53	4,129.60	4,137.13
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	14-Sep-1999	11:43:00	steel tape	recently pumped	R	-7.51	4,129.60	4,137.11
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	14-Sep-1999	11:43:00	steel tape	recently pumped	R	-7.51	4,129.60	4,137.11
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	25-Oct-1999	16:20:00	steel tape	recently pumped	R	-7.83	4,129.60	4,137.43
KLAM	15129	Balin Ranch	Jenks	OWRD-GW	30-Nov-1999	09:36:00	steel tape	recently flowing	R	-8.25	4,129.60	4,137.85
KLAM	15129	Balin Ranch	Jenks	OWRD-GW	30-Nov-1999	11:12:00	steel tape	idle	S	-8.31	4,129.60	4,137.91
KLAM	15129	Balin Ranch	Jenks	OWRD-GW	30-Nov-1999	13:30:00	steel tape	idle	S	-8.34	4,129.60	4,137.94
KLAM	15129	Balin Ranch	Jenks	OWRD-GW	01-Dec-1999	13:30:00	steel tape	nearby recently pumped	S	-7.95	4,129.60	4,137.55
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	02-Dec-1999	13:41:00	steel tape	idle	S	-8.27	4,129.60	4,137.87
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	11-Jan-2000	11:26:00	steel tape	idle	S	-8.38	4,129.60	4,137.98
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	08-Mar-2000	11:58:00	steel tape	idle	S	-8.97	4,129.60	4,138.57
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	09-May-2000	11:07:00	steel tape	idle	S	-8.62	4,129.60	4,138.22

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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	27-Jun-2000	11:16:00	steel tape	idle	S	-7.68	4,129.60	4,137.28
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	12-Sep-2000	09:36:00	steel tape	nearby pumping	S	-6.63	4,129.60	4,136.23
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	14-Nov-2000	11:40:00	steel tape	idle	S	-7.40	4,129.60	4,137.00
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	09-Jan-2001	11:30:00	steel tape	idle	S	-8.16	4,129.60	4,137.76
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	06-Mar-2001	11:52:00	steel tape	idle	S	-8.02	4,129.60	4,137.62
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	08-May-2001	12:13:00	steel tape	idle	S	-4.21	4,129.60	4,133.81
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	17-Jul-2001	11:47:00	no measurement	pumping	F		4,129.60	
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	18-Sep-2001	12:17:00	no measurement	pumping	F		4,129.60	
KLAM	15129	Balin Ranch	Grondin	OWRD-GW	15-Jan-2002	11:40:00	steel tape	idle	S	-5.29	4,129.60	4,134.89
KLAM	15130	Kilgore		USGS	04-Aug-1954		reported			17.06	4,156.20	4,139.14
KLAM	15130	Kilgore		USGS	28-Oct-1954		reported			17.77	4,156.20	4,138.43
KLAM	15130	Kilgore		USGS	17-Dec-1954		reported			17.99	4,156.20	4,138.21
KLAM	15130	Kilgore		USGS	18-Feb-1955		reported			17.66	4,156.20	4,138.54
KLAM	15130	Kilgore		USGS	28-Jun-1955		reported			17.55	4,156.20	4,138.65
KLAM	15130	Kilgore		USGS	25-Aug-1955		reported			18.41	4,156.20	4,137.79
KLAM	15130	Kilgore		USGS	07-Apr-1956		reported			16.42	4,156.20	4,139.78
KLAM	15130	Kilgore		USGS	10-Oct-1956		reported			17.08	4,156.20	4,139.12
KLAM	15130	Kilgore		USGS	21-Dec-1956		reported			17.02	4,156.20	4,139.18
KLAM	15130	Kilgore		USGS	24-Jul-1957		reported			17.76	4,156.20	4,138.44
KLAM	15130	Kilgore		USGS	17-Apr-1958		reported			16.37	4,156.20	4,139.83
KLAM	15130	Kilgore		USGS	05-Aug-1958		reported			17.33	4,156.20	4,138.87
KLAM	15130	Kilgore		USGS	04-Dec-1958		reported			17.07	4,156.20	4,139.13
KLAM	15130	Kilgore		USGS	10-Jun-1959		reported			16.57	4,156.20	4,139.63
KLAM	15130	Kilgore		USGS	02-Sep-1959		reported			16.35	4,156.20	4,139.85
KLAM	15130	Kilgore		USGS	18-Jan-1960		reported			18.14	4,156.20	4,138.06
KLAM	15130	Kilgore		USGS	12-Jun-1960		reported			17.16	4,156.20	4,139.04
KLAM	15130	Kilgore		USGS	13-Oct-1960		reported			17.91	4,156.20	4,138.29
KLAM	15130	Kilgore		USGS	14-Jan-1961		reported			18.45	4,156.20	4,137.75
KLAM	15130	Kilgore		USGS	16-Sep-1961		reported			18.20	4,156.20	4,138.00
KLAM	15130	Kilgore		USGS	09-Jan-1962		reported			18.40	4,156.20	4,137.80
KLAM	15130	Kilgore		USGS	03-Apr-1962		reported			18.09	4,156.20	4,138.11
KLAM	15130	Kilgore	Harris	USGS	08-Oct-1969		reported			17.19	4,156.20	4,139.01
KLAM	15130	Kilgore	Harris	USGS	15-Apr-1970		reported			16.51	4,156.20	4,139.69
KLAM	15130	Kilgore		USGS	04-Nov-1970		reported			17.25	4,156.20	4,138.95
KLAM	15130	Hitt	Grondin	OWRD-GW	02-Sep-1998	16:05:00	calibrated e-tape	static	S	21.59	4,156.20	4,134.61
KLAM	15130	Hitt	Norton	OWRD-GW	16-Mar-1999	09:45:00	calibrated e-tape	idle	S	15.87	4,156.20	4,140.33
KLAM	15130	Hitt	Zwart	OWRD-GW	26-Oct-1999	12:25:00	calibrated e-tape	idle	S	19.47	4,156.20	4,136.73
KLAM	15130	Hitt	Gates	OWRD-GW	19-Apr-2001	12:00:00	calibrated e-tape	idle	S	19.93	4,156.20	4,136.27
KLAM	15131	Kilgore Brothers	Wilson	well-log	26-Nov-1973		reported			13.00	4,154.70	4,141.70
KLAM	15131	Hitt	Grondin	OWRD-GW	14-Sep-1998	12:15:00	calibrated e-tape	static	S	18.04	4,154.70	4,136.66

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	15131	Hitt	Norton	OWRD-GW	15-Mar-1999	10:55:00	calibrated e-tape	idle	S	14.71	4,154.70	4,139.99
KLAM	15131	Hitt	Zwart	OWRD-GW	26-Oct-1999	11:55:00	calibrated e-tape	idle	S	17.06	4,154.70	4,137.64
KLAM	15149	CBA Construction Co.	Pinkard	well-log	19-Oct-1995		reported			11.00	4,122.00	4,111.00
KLAM	15149	Garcia	Grondin	OWRD-GW	05-May-1998		calibrated e-tape	static	S	7.66	4,122.00	4,114.34
KLAM	15149	Garcia	Grondin	OWRD-GW	09-Dec-1998	15:25:00	calibrated e-tape	static	S	8.65	4,122.00	4,113.35
KLAM	15149	Garcia	Grondin	OWRD-GW	14-Jan-1999	14:33:00	calibrated e-tape	static	S	8.40	4,122.00	4,113.60
KLAM	15149	Garcia	Grondin	OWRD-GW	11-Feb-1999	12:35:00	calibrated e-tape	static	S	8.20	4,122.00	4,113.80
KLAM	15149	Garcia	Grondin	OWRD-GW	17-Mar-1999	10:46:00	calibrated e-tape	static	S	7.27	4,122.00	4,114.73
KLAM	15149	Garcia	Grondin	OWRD-GW	07-Apr-1999	11:57:00	calibrated e-tape	static	S	6.75	4,122.00	4,115.25
KLAM	15149	Garcia	Grondin	OWRD-GW	12-May-1999	12:11:00	calibrated e-tape	idle/static	S	7.00	4,122.00	4,115.00
KLAM	15149	Garcia	Grondin	OWRD-GW	09-Jun-1999	12:45:00	calibrated e-tape	recently pumped	R	8.19	4,122.00	4,113.81
KLAM	15149	Garcia	Grondin	OWRD-GW	14-Jul-1999	11:35:00	calibrated e-tape	idle	S	9.72	4,122.00	4,112.28
KLAM	15149	Garcia	Grondin	OWRD-GW	11-Aug-1999	11:40:00	calibrated e-tape	recently pumped	S	9.52	4,122.00	4,112.48
KLAM	15149	Garcia	Grondin	OWRD-GW	16-Sep-1999	10:51:00	calibrated e-tape	idle	S	9.58	4,122.00	4,112.42
KLAM	15149	Garcia	Grondin	OWRD-GW	26-Oct-1999	10:59:00	calibrated e-tape	idle	S	9.08	4,122.00	4,112.92
KLAM	16807	High	Despain	well-log	06-Nov-1993		reported			12.00	4,105.70	4,093.70
KLAM	16807	High	Grondin	OWRD-GW	10-Jun-1998	14:30:00	calibrated e-tape	static	S	8.60	4,105.70	4,097.10
KLAM	16807	High	Grondin	OWRD-GW	07-Dec-1998	16:15:00	calibrated e-tape	static	S	10.90	4,105.70	4,094.80
KLAM	16807	High	Grondin	OWRD-GW	11-Jan-1999	15:20:00	calibrated e-tape	static	S	10.36	4,105.70	4,095.34
KLAM	16807	High	Grondin	OWRD-GW	08-Feb-1999	16:07:00	calibrated e-tape	static	S	10.00	4,105.70	4,095.70
KLAM	16807	High	Grondin	OWRD-GW	15-Mar-1999	10:10:00	calibrated e-tape	static	S	9.20	4,105.70	4,096.50
KLAM	16807	High	Grondin	OWRD-GW	05-Apr-1999	13:56:00	calibrated e-tape	static	S	8.63	4,105.70	4,097.07
KLAM	16807	High	Grondin	OWRD-GW	10-May-1999	16:50:00	calibrated e-tape	idle/static	S	8.09	4,105.70	4,097.61
KLAM	16807	High	Grondin	OWRD-GW	07-Jun-1999	19:22:00	calibrated e-tape	static	S	8.59	4,105.70	4,097.11
KLAM	16807	High	Grondin	OWRD-GW	12-Jul-1999	17:02:00	calibrated e-tape	idle/static	S	10.28	4,105.70	4,095.42
KLAM	16807	High	Grondin	OWRD-GW	09-Aug-1999	17:14:00	calibrated e-tape	idle	S	11.59	4,105.70	4,094.11
KLAM	16807	High	Grondin	OWRD-GW	13-Sep-1999	19:39:00	calibrated e-tape	recently pumped	S	12.03	4,105.70	4,093.67
KLAM	16807	High	Grondin	OWRD-GW	27-Oct-1999	15:35:00	calibrated e-tape	idle	S	11.29	4,105.70	4,094.41
KLAM	16807	High	Grondin	OWRD-GW	10-Jan-2000	18:41:00	calibrated e-tape	idle	S	10.60	4,105.70	4,095.10
KLAM	16807	High	Grondin	OWRD-GW	06-Mar-2000	15:48:00	calibrated e-tape	idle	S	9.80	4,105.70	4,095.90
KLAM	16807	High	Grondin	OWRD-GW	08-May-2000	14:05:00	calibrated e-tape	idle	S	9.21	4,105.70	4,096.49
KLAM	16807	High	Grondin	OWRD-GW	26-Jun-2000	13:25:00	calibrated e-tape	recently pumped	S	10.93	4,105.70	4,094.77
KLAM	16807	High	Grondin	OWRD-GW	11-Sep-2000	13:24:00	calibrated e-tape	idle	S	13.59	4,105.70	4,092.11
KLAM	16807	High	Grondin	OWRD-GW	13-Nov-2000	13:30:00	calibrated e-tape	idle	S	12.33	4,105.70	4,093.37
KLAM	16807	High	Grondin	OWRD-GW	10-Jan-2001	17:39:00	calibrated e-tape	idle	S	11.49	4,105.70	4,094.21
KLAM	16807	High	Grondin	OWRD-GW	05-Mar-2001	13:45:00	calibrated e-tape	idle	S	10.89	4,105.70	4,094.81
KLAM	16807	High	Grondin	OWRD-GW	07-May-2001	13:14:00	calibrated e-tape	idle	S	11.45	4,105.70	4,094.25
KLAM	16807	High	Grondin	OWRD-GW	19-Jul-2001	12:43:00	calibrated e-tape	idle	S	15.85	4,105.70	4,089.85
KLAM	16807	High	Grondin	OWRD-GW	20-Sep-2001	12:20:00	calibrated e-tape	idle	S	18.39	4,105.70	4,087.31
KLAM	16807	High	Grondin	OWRD-GW	14-Jan-2002	19:22:00	calibrated e-tape	idle	S	15.04	4,105.70	4,090.66

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
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Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	16807	High	Grondin	OWRD-GW	15-Apr-2002	13:51:00	calibrated e-tape	idle	S	11.93	4,105.70	4,093.77
KLAM	16807	High	Grondin	OWRD-GW	15-Jul-2002	12:42:00	calibrated e-tape	recently pumped	S	13.92	4,105.70	4,091.78
KLAM	16807	High	Grondin	OWRD-GW	14-Oct-2002	13:04:00	calibrated e-tape	idle	S	15.54	4,105.70	4,090.16
KLAM	50301	Smith	Hughes	well-log	10-Jun-1996		reported			45.00	4,194.00	4,149.00
KLAM	50301	Smith	Grondin	OWRD-GW	13-May-1998	15:30:00	calibrated e-tape	recently pumped	R	47.03	4,194.00	4,146.97
KLAM	50301	Smith	Grondin	OWRD-GW	08-Dec-1998	12:49:00	calibrated e-tape	recently pumped	R	49.26	4,194.00	4,144.74
KLAM	50301	Smith	Grondin	OWRD-GW	12-Jan-1999	14:05:00	calibrated e-tape	static	S	48.93	4,194.00	4,145.07
KLAM	50301	Smith	Grondin	OWRD-GW	09-Feb-1999	12:00:00	calibrated e-tape	recently pumped	R	50.11	4,194.00	4,143.89
KLAM	50301	Smith	Grondin	OWRD-GW	16-Mar-1999	13:22:00	calibrated e-tape	recently pumped	R	49.02	4,194.00	4,144.98
KLAM	50301	Smith	Grondin	OWRD-GW	06-Apr-1999	14:25:00	calibrated e-tape	static	S	48.52	4,194.00	4,145.48
KLAM	50301	Smith	Grondin	OWRD-GW	11-May-1999	17:10:00	calibrated e-tape	idle/static	S	46.44	4,194.00	4,147.56
KLAM	50301	Smith	Grondin	OWRD-GW	08-Jun-1999	16:27:00	calibrated e-tape	idle/static	S	45.17	4,194.00	4,148.83
KLAM	50301	Smith	Grondin	OWRD-GW	13-Jul-1999	18:37:00	calibrated e-tape	recently pumped	R	45.44	4,194.00	4,148.56
KLAM	50301	Smith	Grondin	OWRD-GW	10-Aug-1999	16:32:00	calibrated e-tape	idle	S	45.22	4,194.00	4,148.78
KLAM	50301	Smith	Grondin	OWRD-GW	14-Sep-1999	16:05:00	calibrated e-tape	idle	S	44.23	4,194.00	4,149.77
KLAM	50301	Smith	Grondin	OWRD-GW	25-Oct-1999	11:28:00	calibrated e-tape	recently pumped	R	44.29	4,194.00	4,149.71
KLAM	50318	Big Springs Management Group	Sevey	well-log	17-Jun-1996		reported			3.50	4,112.71	4,109.21
KLAM	50318	Big Springs Mgmt Group	Grondin	OWRD-GW	06-May-1998	15:20:00	calibrated e-tape	static	S	2.56	4,112.71	4,110.15
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	11-Dec-1998	08:28:00	calibrated e-tape	static	S	3.60	4,112.71	4,109.11
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	15-Jan-1999	09:15:00	calibrated e-tape	static	S	3.40	4,112.71	4,109.31
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	11-Feb-1999	09:31:00	calibrated e-tape	static	S	3.27	4,112.71	4,109.44
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	17-Mar-1999	11:46:00	calibrated e-tape	static	S	2.14	4,112.71	4,110.57
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	01-Apr-1999	12:05:00	calibrated e-tape	static	S	2.12	4,112.71	4,110.59
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	07-Apr-1999	12:37:00	calibrated e-tape	static	S	1.76	4,112.71	4,110.95
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	12-May-1999	12:46:00	calibrated e-tape	idle/static	S	2.00	4,112.71	4,110.71
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	09-Jun-1999	13:51:00	calibrated e-tape	idle/static	S	2.91	4,112.71	4,109.80
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	15-Jul-1999	16:00:00	calibrated e-tape	idle/static	S	4.08	4,112.71	4,108.63
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	10-Aug-1999	19:28:00	calibrated e-tape	idle	S	4.01	4,112.71	4,108.70
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	15-Sep-1999	16:26:00	calibrated e-tape	idle	S	3.97	4,112.71	4,108.74
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	16-Sep-1999	18:00:00	calibrated e-tape	idle	S	4.05	4,112.71	4,108.66
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	26-Oct-1999	12:49:00	calibrated e-tape	idle	S	3.89	4,112.71	4,108.82
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	09-Nov-1999	15:50:00	calibrated e-tape	idle	S	3.73	4,112.71	4,108.98
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	12-Jan-2000	11:15:00	calibrated e-tape	idle	S	3.40	4,112.71	4,109.31
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	09-Mar-2000	10:37:00	calibrated e-tape	idle	S	2.92	4,112.71	4,109.79
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	09-May-2000	19:39:00	calibrated e-tape	idle	S	2.80	4,112.71	4,109.91
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	26-Jun-2000	17:33:00	calibrated e-tape	idle	S	4.19	4,112.71	4,108.52
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	28-Aug-2000	15:46:00	calibrated e-tape	idle	S	5.15	4,112.71	4,107.56
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	15-Sep-2000	13:24:00	calibrated e-tape	idle	S	4.48	4,112.71	4,108.23
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	15-Nov-2000	15:15:00	calibrated e-tape	idle	S	4.31	4,112.71	4,108.40
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	11-Jan-2001	13:27:00	calibrated e-tape	idle	S	3.96	4,112.71	4,108.75

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Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	07-Mar-2001	17:53:00	calibrated e-tape	idle	S	3.85	4,112.71	4,108.86
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	10-May-2001	16:15:00	calibrated e-tape	idle	S	4.59	4,112.71	4,108.12
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	19-Jul-2001	15:20:00	calibrated e-tape	idle	S	6.27	4,112.71	4,106.44
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	19-Sep-2001	19:18:00	calibrated e-tape	idle	S	6.57	4,112.71	4,106.14
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	16-Jan-2002	16:20:00	calibrated e-tape	idle	S	4.97	4,112.71	4,107.74
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	17-Apr-2002	10:44:00	calibrated e-tape	idle	S	4.39	4,112.71	4,108.32
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	17-Jul-2002	10:55:00	calibrated e-tape	idle	S	6.35	4,112.71	4,106.36
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	17-Sep-2002	10:16:00	calibrated e-tape	idle	S	6.49	4,112.71	4,106.22
KLAM	50318	City of Bonanza	Grondin	OWRD-GW	15-Oct-2002	16:37:00	calibrated e-tape	idle	S	6.12	4,112.71	4,106.59
KLAM	50337	Hall		USGS	02-Apr-1948		reported			103.43	4,217.60	4,114.17
KLAM	50337	Hall		OWRD-UN	19-Nov-1949		reported			104.84	4,217.60	4,112.76
KLAM	50337	Hall		OWRD-UN	15-Apr-1950		reported			104.12	4,217.60	4,113.48
KLAM	50337	Hall		OWRD-UN	11-Nov-1950		reported			105.61	4,217.60	4,111.99
KLAM	50337	Hall		OWRD-UN	04-Apr-1951		reported			103.80	4,217.60	4,113.80
KLAM	50337	Hall		OWRD-UN	06-Sep-1951		reported		R	106.55	4,217.60	4,111.05
KLAM	50337	Hall		OWRD-UN	04-Jan-1952		reported			104.80	4,217.60	4,112.80
KLAM	50337	Hall		OWRD-UN	22-Apr-1952		reported			102.85	4,217.60	4,114.75
KLAM	50337	Hall		OWRD-UN	11-Jun-1952		reported			103.00	4,217.60	4,114.60
KLAM	50337	Hall		OWRD-UN	04-Sep-1952		reported			105.33	4,217.60	4,112.27
KLAM	50337	Hall		OWRD-UN	28-Dec-1952		reported			103.43	4,217.60	4,114.17
KLAM	50337	Hall		OWRD-UN	02-Apr-1953		reported			102.46	4,217.60	4,115.14
KLAM	50337	Hall		OWRD-UN	21-Jul-1953		reported			117.61	4,217.60	4,099.99
KLAM	50337	Hall		OWRD-UN	15-Oct-1953		reported			104.63	4,217.60	4,112.97
KLAM	50337	Hall		OWRD-UN	19-Apr-1954		reported			102.33	4,217.60	4,115.27
KLAM	50337	Hall		OWRD-UN	15-Sep-1954		reported			105.99	4,217.60	4,111.61
KLAM	50337	Hall		OWRD-UN	17-Dec-1954		reported			104.12	4,217.60	4,113.48
KLAM	50337	Hall		OWRD-UN	18-Feb-1955		reported			103.62	4,217.60	4,113.98
KLAM	50337	Hall		OWRD-UN	28-Jun-1955		reported			107.04	4,217.60	4,110.56
KLAM	50337	Hall		OWRD-UN	25-Aug-1955		reported			108.02	4,217.60	4,109.58
KLAM	50337	Hall		OWRD-UN	07-Apr-1956		reported			101.68	4,217.60	4,115.92
KLAM	50337	Hall		OWRD-UN	11-Oct-1956		reported			103.00	4,217.60	4,114.60
KLAM	50337	Hall		OWRD-UN	21-Dec-1956		reported			102.53	4,217.60	4,115.07
KLAM	50337	Hall		OWRD-UN	25-Apr-1957		reported			102.17	4,217.60	4,115.43
KLAM	50337	Hall		OWRD-UN	24-Jul-1957		reported			104.79	4,217.60	4,112.81
KLAM	50337	Hall		USGS	17-Apr-1958		reported			99.94	4,217.60	4,117.66
KLAM	50337	Hall		USGS	04-Dec-1958		reported			101.47	4,217.60	4,116.13
KLAM	50337	Hall		USGS	02-Sep-1959		reported			106.79	4,217.60	4,110.81
KLAM	50337	Hall		USGS	18-Jan-1960		reported			103.92	4,217.60	4,113.68
KLAM	50337	Hall		USGS	13-Oct-1960		reported			107.16	4,217.60	4,110.44
KLAM	50337	Hall		USGS	14-Jan-1961		reported			105.05	4,217.60	4,112.55
KLAM	50337	Hall		USGS	03-May-1961		reported			104.20	4,217.60	4,113.40

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	50337	Hall		USGS	16-Sep-1961		reported			109.15	4,217.60	4,108.45
KLAM	50337	Hall		OWRD-UN	26-Sep-1961		reported			109.02	4,217.60	4,108.58
KLAM	50337	Hall		USGS	10-Jan-1962		reported			105.70	4,217.60	4,111.90
KLAM	50337	Moore	Harris	USGS	01-Oct-1969		reported			107.52	4,217.60	4,110.08
KLAM	50337	Moore		USGS	15-Apr-1970		reported			103.00	4,217.60	4,114.60
KLAM	50337	Moore		USGS	30-Oct-1970		reported			106.45	4,217.60	4,111.15
KLAM	50337	Canevari	Gates	OWRD-GW	08-Oct-1998	12:55:00	calibrated e-tape	static	S	109.52	4,217.60	4,108.08
KLAM	50337	Canevari	Glender	OWRD-GW	16-Mar-1999	11:20:00	steel tape	static	S	104.54	4,217.60	4,113.06
KLAM	50337	Canevari	Glender	OWRD-GW	26-Oct-1999	16:15:00	steel tape	static and oil	S	108.53	4,217.60	4,109.07
KLAM	50341	Swan Lake Ranch	DeSpain	well-log	20-Jun-1996		reported			116.00	4,224.60	4,108.60
KLAM	50341	Swan Lake Ranch	Miller	OWRD-GW	13-Oct-1998	13:25:00	calibrated e-tape	static	S	116.32	4,224.60	4,108.28
KLAM	50341	Swan Lake Ranch	Gates	OWRD-GW	10-Dec-1998	15:35:00	calibrated e-tape	static	S	114.57	4,224.60	4,110.03
KLAM	50341	Swan Lake Ranch	Glender	OWRD-GW	16-Mar-1999	12:25:00	calibrated e-tape	static	S	112.26	4,224.60	4,112.34
KLAM	50341	Swan Lake Ranch	Glender	OWRD-GW	26-Oct-1999	12:47:00	calibrated e-tape	static	S	116.30	4,224.60	4,108.30
KLAM	50362	Hankins		USGS	23-Apr-1952		reported			89.65	4,215.00	4,125.35
KLAM	50362	Hankins		OWRD-UN	24-Apr-1957		reported			88.96	4,215.00	4,126.04
KLAM	50362	Hankins		OWRD-UN	30-Oct-1958		reported			87.78	4,215.00	4,127.22
KLAM	50362	Hankins		OWRD-UN	26-Sep-1961		reported			96.18	4,215.00	4,118.82
KLAM	50362	Vic Nevin Cattle Company	Harris	USGS	28-Aug-1969		reported			94.18	4,215.00	4,120.82
KLAM	50362	Vic Nevin Cattle Company	Harris	USGS	11-Oct-1969		reported			93.45	4,215.00	4,121.55
KLAM	50362	Vic Nevin Cattle Company	Harris	USGS	15-Apr-1970		reported			89.20	4,215.00	4,125.80
KLAM	50362	Vic Nevin Cattle Company	Harris	USGS	30-Oct-1970		reported			92.76	4,215.00	4,122.24
KLAM	50362	Swan Lkae Ranch	Miller	OWRD-GW	14-Oct-1998	13:00:00	steel tape	static	S	94.45	4,215.00	4,120.55
KLAM	50362	Swan Lkae Ranch	Miller	OWRD-GW	14-Oct-1998	13:00:00	calibrated e-tape	static	S	101.77	4,215.00	4,113.23
KLAM	50362	Swan Lake Ranch	Glender	OWRD-GW	16-Mar-1999	14:15:00	calibrated e-tape	static and oil	S	90.76	4,215.00	4,124.24
KLAM	50362	Swan Lake Ranch	Glender	OWRD-GW	25-Oct-1999	13:40:00	steel tape	static and oil	S	94.33	4,215.00	4,120.67
KLAM	50445	Jeld-Wen Inc.	Hill	well-log	09-Aug-1996		reported			73.00	4,229.00	4,156.00
KLAM	50445	Jeld-Wen Inc.	Miller	OWRD-GW	15-Oct-1998	13:25:00	calibrated e-tape	static	S	74.38	4,229.00	4,154.62
KLAM	50445	Jeld-Wen Inc.	Glender	OWRD-GW	15-Mar-1999	16:50:00	calibrated e-tape	static	S	72.07	4,229.00	4,156.93
KLAM	50445	Jeld-Wen Inc.	Glender	OWRD-GW	26-Oct-1999	09:00:00	calibrated e-tape	static	S	75.30	4,229.00	4,153.70
KLAM	50446	Venable	Pickard	well-log	05-Sep-1996		reported			163.00	4,273.00	4,110.00
KLAM	50446	Venable	Grondin	OWRD-GW	18-Aug-1998	13:00:00	calibrated e-tape	static	S	160.45	4,273.00	4,112.55
KLAM	50446	Venable	Grondin	OWRD-GW	10-Dec-1998	12:50:00	calibrated e-tape	not measured			4,273.00	
KLAM	50446	Venable	Glender	OWRD-GW	16-Mar-1999		calibrated e-tape	not measured			4,273.00	
KLAM	50446	Venable	Glender	OWRD-GW	26-Oct-1999	15:50:00	calibrated e-tape	not measured			4,273.00	
KLAM	50493	Czarapata	Storey	well-log	11-Oct-1996		reported			129.00	4,221.80	4,092.80
KLAM	50493	Czarapata	Grondin	OWRD-GW	13-Aug-1998	14:55:00	calibrated e-tape	nearby pumping	S	128.41	4,221.80	4,093.39

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	50493	Czarapata	Grondin	OWRD-GW	10-Dec-1998	10:55:00	calibrated e-tape	static	S	126.09	4,221.80	4,095.71
KLAM	50493	Czarapata	Grondin	OWRD-GW	13-Jan-1999	13:55:00	calibrated e-tape	static	S	125.49	4,221.80	4,096.31
KLAM	50493	Czarapata	Grondin	OWRD-GW	12-Feb-1999	12:11:00	calibrated e-tape	static	S	124.94	4,221.80	4,096.86
KLAM	50493	Czarapata	Grondin	OWRD-GW	17-Mar-1999	15:32:00	calibrated e-tape	static	S	124.06	4,221.80	4,097.74
KLAM	50493	Czarapata	Grondin	OWRD-GW	07-Apr-1999	16:11:00	calibrated e-tape	static	S	123.19	4,221.80	4,098.61
KLAM	50493	Czarapata	Grondin	OWRD-GW	13-May-1999	11:36:00	calibrated e-tape	idle/static	S	122.53	4,221.80	4,099.27
KLAM	50493	Czarapata	Grondin	OWRD-GW	10-Jun-1999	12:31:00	calibrated e-tape	idle/static	S	124.64	4,221.80	4,097.16
KLAM	50493	Czarapata	Grondin	OWRD-GW	14-Jul-1999	19:42:00	calibrated e-tape	nearby pumping	S	128.08	4,221.80	4,093.72
KLAM	50493	Czarapata	Grondin	OWRD-GW	11-Aug-1999	16:21:00	calibrated e-tape	idle	S	128.18	4,221.80	4,093.62
KLAM	50493	Czarapata	Grondin	OWRD-GW	15-Sep-1999	13:13:00	calibrated e-tape	idle	S	128.96	4,221.80	4,092.84
KLAM	50493	Czarapata	Grondin	OWRD-GW	27-Oct-1999	10:03:00	calibrated e-tape	idle	S	127.02	4,221.80	4,094.78
KLAM	50493	Czarapata	Grondin	OWRD-GW	13-Jan-2000	15:45:00	calibrated e-tape	idle	S	125.60	4,221.80	4,096.20
KLAM	50493	Czarapata	Grondin	OWRD-GW	07-Mar-2000	10:02:00	calibrated e-tape	idle	S	124.72	4,221.80	4,097.08
KLAM	50493	Czarapata	Grondin	OWRD-GW	10-May-2000	14:02:00	calibrated e-tape	idle	S	124.13	4,221.80	4,097.67
KLAM	50493	Czarapata	Grondin	OWRD-GW	28-Jun-2000	14:05:00	calibrated e-tape	nearby pumping	S	128.85	4,221.80	4,092.95
KLAM	50493	Czarapata	Grondin	OWRD-GW	13-Sep-2000	14:21:00	calibrated e-tape	idle	S	130.11	4,221.80	4,091.69
KLAM	50493	Kirsch Family	Grondin	OWRD-GW	16-Nov-2000	13:37:00	calibrated e-tape	idle	S	128.02	4,221.80	4,093.78
KLAM	50493	Kirsch Family	Grondin	OWRD-GW	11-Jan-2001	09:17:00	calibrated e-tape	idle	S	126.77	4,221.80	4,095.03
KLAM	50493	Kirsch	Grondin	OWRD-GW	08-Mar-2001	15:10:00	calibrated e-tape	idle	S	125.94	4,221.80	4,095.86
KLAM	50493	Kirsch	Grondin	OWRD-GW	10-May-2001	13:09:00	calibrated e-tape	idle	S	127.82	4,221.80	4,093.98
KLAM	50493	Kirsch	Grondin	OWRD-GW	16-Jul-2001	15:15:00	calibrated e-tape	idle	S	133.39	4,221.80	4,088.41
KLAM	50493	Kirsch	Grondin	OWRD-GW	17-Sep-2001	13:47:00	calibrated e-tape	idle	S	135.22	4,221.80	4,086.58
KLAM	50493	Kirsch	Grondin	OWRD-GW	14-Jan-2002	16:53:00	calibrated e-tape	idle	S	130.81	4,221.80	4,090.99
KLAM	50493	Kirsch	Grondin	OWRD-GW	17-Apr-2002	14:25:00	calibrated e-tape	idle	S	127.75	4,221.80	4,094.05
KLAM	50493	Kirsch	Grondin	OWRD-GW	15-Jul-2002	13:41:00	calibrated e-tape	idle	S	131.62	4,221.80	4,090.18
KLAM	50493	Kirsch	Grondin	OWRD-GW	14-Oct-2002	14:11:00	calibrated e-tape	idle	S	131.66	4,221.80	4,090.14
KLAM	50623	Wells	Wilson	well-log	26-Jul-1992		reported			5.00	4,119.00	4,114.00
KLAM	50623	Wells	Gates	OWRD-GW	29-Sep-1998	11:30:00	steel tape	static	S	13.77	4,119.00	4,105.23
KLAM	50623	Wells	Gates	OWRD-GW	09-Dec-1998	08:40:00	steel tape	static	S	12.96	4,119.00	4,106.04
KLAM	50623	Wells	Gates	OWRD-GW	15-Mar-1999		calibrated e-tape	static	S	10.47	4,119.00	4,108.53
KLAM	50623	Wells	Gates	OWRD-GW	26-Oct-1999	10:50:00	calibrated e-tape	static	S	14.02	4,119.00	4,104.98
KLAM	50777	Payne	Wright	well-log	22-May-1997		reported			137.00	4,241.00	4,104.00
KLAM	50777	Payne	Grondin	OWRD-GW	17-Aug-1998	12:35:00	calibrated e-tape	static	S	98.23	4,241.00	4,142.77
KLAM	50777	Payne	Grondin	OWRD-GW	10-Dec-1998	14:55:00	calibrated e-tape	static	S	97.83	4,241.00	4,143.17
KLAM	50777	Payne	Grondin	OWRD-GW	13-Jan-1999	14:55:00	calibrated e-tape	static	S	97.69	4,241.00	4,143.31
KLAM	50777	Payne	Grondin	OWRD-GW	11-Feb-1999	17:05:00	calibrated e-tape	static	S	97.30	4,241.00	4,143.70
KLAM	50777	Payne	Grondin	OWRD-GW	17-Mar-1999	14:22:00	calibrated e-tape	static	S	96.75	4,241.00	4,144.25
KLAM	50777	Payne	Grondin	OWRD-GW	07-Apr-1999	15:33:00	calibrated e-tape	static	S	96.65	4,241.00	4,144.35
KLAM	50777	Payne	Grondin	OWRD-GW	12-May-1999	17:34:00	calibrated e-tape	idle/static	S	95.79	4,241.00	4,145.21
KLAM	50777	Payne	Grondin	OWRD-GW	09-Jun-1999	17:28:00	calibrated e-tape	idle/static	S	95.85	4,241.00	4,145.15

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
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Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	50777	Payne	Grondin	OWRD-GW	14-Jul-1999	16:53:00	calibrated e-tape	idle/static	S	97.27	4,241.00	4,143.73
KLAM	50777	Payne	Grondin	OWRD-GW	11-Aug-1999	14:51:00	calibrated e-tape	idle	S	97.66	4,241.00	4,143.34
KLAM	50777	Payne	Grondin	OWRD-GW	16-Sep-1999	14:24:00	calibrated e-tape	idle	S	97.73	4,241.00	4,143.27
KLAM	50777	Payne	Grondin	OWRD-GW	26-Oct-1999	15:54:00	calibrated e-tape	idle	S	98.33	4,241.00	4,142.67
KLAM	50787	Merkely	Wright	well-log	25-May-1997		reported			12.00	4,164.00	4,152.00
KLAM	50787	Merkley	Grondin	OWRD-GW	12-May-1998	10:25:00	calibrated e-tape	recently pumped	S	10.39	4,164.00	4,153.61
KLAM	50787	Merkeley	Grondin	OWRD-GW	09-Dec-1998	12:00:00	calibrated e-tape	static	S	11.92	4,164.00	4,152.08
KLAM	50787	Merkeley	Grondin	OWRD-GW	12-Jan-1999	15:10:00	calibrated e-tape	static	S	14.18	4,164.00	4,149.82
KLAM	50787	Merkeley	Grondin	OWRD-GW	10-Feb-1999	12:45:00	calibrated e-tape	recently pumped	R	12.33	4,164.00	4,151.67
KLAM	50787	Merkeley	Grondin	OWRD-GW	16-Mar-1999	15:13:00	calibrated e-tape	static	S	9.94	4,164.00	4,154.06
KLAM	50787	Merkeley	Grondin	OWRD-GW	06-Apr-1999	15:28:00	calibrated e-tape	static	S	12.22	4,164.00	4,151.78
KLAM	50787	Merkeley	Grondin	OWRD-GW	11-May-1999	16:25:00	calibrated e-tape	idle	R	10.36	4,164.00	4,153.64
KLAM	50787	Merkeley	Grondin	OWRD-GW	08-Jun-1999	14:59:00	calibrated e-tape	idle	S	8.02	4,164.00	4,155.98
KLAM	50787	Merkeley	Grondin	OWRD-GW	13-Jul-1999	16:15:00	calibrated e-tape	idle	S	8.29	4,164.00	4,155.71
KLAM	50787	Merkeley	Grondin	OWRD-GW	10-Aug-1999	15:17:00	calibrated e-tape	idle	S	8.73	4,164.00	4,155.27
KLAM	50787	Merkeley	Grondin	OWRD-GW	14-Sep-1999	15:28:00	calibrated e-tape	idle	S	8.96	4,164.00	4,155.04
KLAM	50787	Merkeley	Grondin	OWRD-GW	25-Oct-1999	13:57:00	calibrated e-tape	idle	S	13.63	4,164.00	4,150.37
KLAM	50787	Merkeley	Grondin	OWRD-GW	11-Jan-2000	15:32:00	calibrated e-tape	idle	S	17.53	4,164.00	4,146.47
KLAM	50787	Merkeley	Grondin	OWRD-GW	08-Mar-2000	16:08:00	calibrated e-tape	recently pumped	S	15.61	4,164.00	4,148.39
KLAM	50787	Merkeley	Grondin	OWRD-GW	09-May-2000	15:38:00	calibrated e-tape	idle/static	S	13.48	4,164.00	4,150.52
KLAM	50787	Merkeley	Grondin	OWRD-GW	27-Jun-2000	15:34:00	calibrated e-tape	idle/static	S	9.13	4,164.00	4,154.87
KLAM	50787	Merkeley	Grondin	OWRD-GW	12-Sep-2000	16:00:00	calibrated e-tape	idle	S	11.15	4,164.00	4,152.85
KLAM	50787	Merkeley	Grondin	OWRD-GW	14-Nov-2000	14:44:00	calibrated e-tape	idle	S	15.06	4,164.00	4,148.94
KLAM	50787	Merkeley	Grondin	OWRD-GW	09-Jan-2001	15:28:00	calibrated e-tape	idle	S	17.76	4,164.00	4,146.24
KLAM	50787	Merkeley	Grondin	OWRD-GW	06-Mar-2001	16:01:00	calibrated e-tape	idle	S	19.58	4,164.00	4,144.42
KLAM	50787	Merkeley	Grondin	OWRD-GW	08-May-2001	16:05:00	calibrated e-tape	idle	S	20.77	4,164.00	4,143.23
KLAM	50787	Merkeley	Grondin	OWRD-GW	17-Jul-2001	15:19:00	calibrated e-tape	idle	S	11.92	4,164.00	4,152.08
KLAM	50787	Merkeley	Grondin	OWRD-GW	18-Sep-2001	16:23:00	calibrated e-tape	idle	S	8.10	4,164.00	4,155.90
KLAM	50787	Merkeley	Grondin	OWRD-GW	15-Jan-2002	16:35:00	calibrated e-tape	recently pumped	S	12.77	4,164.00	4,151.23
KLAM	50796	Smith	Wright	well-log	30-Jun-1997					143.00	4,251.00	4,108.00
KLAM	50796	Smith	Grondin	OWRD-GW	04-Jun-1998	09:50:00	calibrated e-tape	static	S	142.48	4,251.00	4,108.52
KLAM	50796	Smith	Grondin	OWRD-GW	18-Mar-1999		calibrated e-tape	unable to measure			4,251.00	
KLAM	50934	Jendrzejewski	Storey	well-log	09-Nov-1973		reported			106.00	4,217.30	4,111.30
KLAM	50934	Jendrzejewski	Storey	well-log	03-Dec-1974		reported			110.00	4,217.30	4,107.30
KLAM	50934	Ritter	Grondin	OWRD-GW	09-Jun-1998		calibrated e-tape	static	S	105.08	4,217.30	4,112.22
KLAM	50934	Ritter	Grondin	OWRD-GW	10-Dec-1998	16:01:00	calibrated e-tape	static	S	106.71	4,217.30	4,110.59
KLAM	50934	Ritter	Grondin	OWRD-GW	13-Jan-1999	16:27:00	calibrated e-tape	static	S	106.42	4,217.30	4,110.88
KLAM	50934	Ritter	Grondin	OWRD-GW	11-Feb-1999	15:42:00	calibrated e-tape	static	S	106.20	4,217.30	4,111.10
KLAM	50934	Ritter	Grondin	OWRD-GW	17-Mar-1999	14:51:00	calibrated e-tape	static	S	105.31	4,217.30	4,111.99

Appendix 13: Ground Water Elevation Measurements

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Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	50934	Ritter	Grondin	OWRD-GW	07-Apr-1999	14:57:00	calibrated e-tape	static	S	104.63	4,217.30	4,112.67
KLAM	50934	Ritter	Grondin	OWRD-GW	12-May-1999	16:13:00	calibrated e-tape	idle/static	S	104.80	4,217.30	4,112.50
KLAM	50934	Ritter	Grondin	OWRD-GW	09-Jun-1999		calibrated e-tape	idle	S	106.09	4,217.30	4,111.21
KLAM	50934	Ritter	Grondin	OWRD-GW	14-Jul-1999	15:00:00	calibrated e-tape	idle/static	S	107.90	4,217.30	4,109.40
KLAM	50934	Ritter	Grondin	OWRD-GW	11-Aug-1999	13:25:00	calibrated e-tape	idle	S	107.93	4,217.30	4,109.37
KLAM	50934	Ritter	Grondin	OWRD-GW	16-Sep-1999	13:00:00	calibrated e-tape	idle	S	107.92	4,217.30	4,109.38
KLAM	50934	Ritter	Grondin	OWRD-GW	26-Oct-1999	14:48:00	calibrated e-tape	idle	S	107.16	4,217.30	4,110.14
KLAM	50934	Ritter	Grondin	OWRD-GW	12-Jan-2000	13:35:00	calibrated e-tape	idle	S	106.42	4,217.30	4,110.88
KLAM	50934	Ritter	Grondin	OWRD-GW	09-Mar-2000	13:50:00	calibrated e-tape	idle	S	105.78	4,217.30	4,111.52
KLAM	50934	Ritter	Grondin	OWRD-GW	10-May-2000	11:55:00	calibrated e-tape	idle	S	105.77	4,217.30	4,111.53
KLAM	50934	Ritter	Grondin	OWRD-GW	28-Jun-2000	11:49:00	calibrated e-tape	recently pumped	S	108.27	4,217.30	4,109.03
KLAM	50934	Ritter	Grondin	OWRD-GW	13-Sep-2000	11:54:00	calibrated e-tape	idle	S	108.72	4,217.30	4,108.58
KLAM	50934	Ritter	Grondin	OWRD-GW	15-Nov-2000	11:47:00	calibrated e-tape	idle	S	107.74	4,217.30	4,109.56
KLAM	50934	Ritter	Grondin	OWRD-GW	10-Jan-2001	11:35:00	calibrated e-tape	idle	S	107.19	4,217.30	4,110.11
KLAM	50934	Ritter	Grondin	OWRD-GW	07-Mar-2001	13:13:00	calibrated e-tape	idle	S	106.97	4,217.30	4,110.33
KLAM	50934	Ritter	Grondin	OWRD-GW	09-May-2001	12:10:00	calibrated e-tape	recently pumped	S	108.24	4,217.30	4,109.06
KLAM	50934	Ritter	Grondin	OWRD-GW	18-Jul-2001	12:35:00	calibrated e-tape	recently pumped	S	110.75	4,217.30	4,106.55
KLAM	50934	Ritter	Grondin	OWRD-GW	19-Sep-2001	12:40:00	calibrated e-tape	idle	S	111.13	4,217.30	4,106.17
KLAM	50934	Ritter	Grondin	OWRD-GW	16-Jan-2002	12:05:00	calibrated e-tape	idle	S	108.64	4,217.30	4,108.66
KLAM	50934	Ritter	Grondin	OWRD-GW	17-Apr-2002	12:30:00	calibrated e-tape	idle	S	107.86	4,217.30	4,109.44
KLAM	50934	Ritter	Grondin	OWRD-GW	17-Jul-2002	13:20:00	calibrated e-tape	idle	S	110.95	4,217.30	4,106.35
KLAM	50934	Ritter	Grondin	OWRD-GW	16-Oct-2002	12:15:00	calibrated e-tape	idle	S	110.41	4,217.30	4,106.89
KLAM	51131	Kennedy Land Company, LLC	Hughes	well-log	04-Dec-1997		reported			6.00	4,109.00	4,103.00
KLAM	51131	Kennedy Land Company, LCC	Grondin	OWRD-GW	10-Jun-1998	09:00:00	calibrated e-tape	static	S	0.73	4,109.00	4,108.27
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	08-Dec-1998	08:50:00	calibrated e-tape	static	S	3.94	4,109.00	4,105.06
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	11-Jan-1999	16:10:00	calibrated e-tape	static	S	3.01	4,109.00	4,105.99
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	01-Feb-1999	14:50:00	calibrated e-tape	static	S	2.55	4,109.00	4,106.45
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	01-Feb-1999	15:30:00	calibrated e-tape	static	S	2.55	4,109.00	4,106.45
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	02-Feb-1999	15:22:00	calibrated e-tape	static	S	2.49	4,109.00	4,106.51
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	02-Feb-1999	16:22:00	calibrated e-tape	static	S	2.49	4,109.00	4,106.51
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	03-Feb-1999	10:47:00	calibrated e-tape	static	S	2.43	4,109.00	4,106.57
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	08-Feb-1999	17:00:00	calibrated e-tape	static	S	2.23	4,109.00	4,106.77
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	15-Mar-1999	11:21:00	calibrated e-tape	static	S	1.45	4,109.00	4,107.55
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	01-Apr-1999	13:09:00	calibrated e-tape	static	S	1.10	4,109.00	4,107.90
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	05-Apr-1999	19:46:00	calibrated e-tape	static	S	0.93	4,109.00	4,108.07
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	10-May-1999	19:24:00	calibrated e-tape	static	S	0.40	4,109.00	4,108.60
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	07-Jun-1999	20:07:00	calibrated e-tape	static	S	0.57	4,109.00	4,108.43
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	12-Jul-1999	19:41:00	calibrated e-tape	idle	S	1.49	4,109.00	4,107.51
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	09-Aug-1999	20:35:00	calibrated e-tape	idle	S	3.08	4,109.00	4,105.92
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	15-Sep-1999	17:44:00	calibrated e-tape	idle	S	4.14	4,109.00	4,104.86
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	28-Sep-1999	17:09:00	calibrated e-tape	idle	S	4.60	4,109.00	4,104.40

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	27-Oct-1999	15:55:00	calibrated e-tape	idle	S	4.44	4,109.00	4,104.56
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	17-Nov-1999	10:53:00	calibrated e-tape	idle	S	4.03	4,109.00	4,104.97
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	18-Nov-1999	23:20:00	calibrated e-tape	idle	S	4.02	4,109.00	4,104.98
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	13-Dec-1999	15:14:00	calibrated e-tape	idle	S	3.39	4,109.00	4,105.61
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	14-Dec-1999	11:00:00	shaft encoder	idle	S	3.39	4,109.00	4,105.61
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	15-Dec-1999	11:00:00	shaft encoder	nearby recently pumped	S	3.42	4,109.00	4,105.58
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	16-Dec-1999	11:00:00	shaft encoder	idle	S	3.38	4,109.00	4,105.62
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	16-Dec-1999	11:10:00	calibrated e-tape	idle	S	3.38	4,109.00	4,105.62
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	12-Jan-2000	15:59:00	calibrated e-tape	idle	S	2.70	4,109.00	4,106.30
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	06-Mar-2000	19:00:00	calibrated e-tape	idle	S	1.34	4,109.00	4,107.66
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	09-Mar-2000	15:36:00	calibrated e-tape	idle	S	1.41	4,109.00	4,107.59
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	08-May-2000	19:06:00	calibrated e-tape	idle	S	1.05	4,109.00	4,107.95
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	26-Jun-2000	18:50:00	calibrated e-tape	idle	S	2.00	4,109.00	4,107.00
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	13-Sep-2000	17:56:00	calibrated e-tape	idle	S	13.85	4,109.00	4,095.15
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	16-Nov-2000	09:15:00	calibrated e-tape	idle	S	25.54	4,109.00	4,083.46
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	16-Nov-2000	16:35:00	calibrated e-tape	idle	S	25.48	4,109.00	4,083.52
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	10-Jan-2001	16:16:00	calibrated e-tape	idle	S	16.17	4,109.00	4,092.83
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	05-Mar-2001	18:14:00	calibrated e-tape	idle	S	12.81	4,109.00	4,096.19
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	07-May-2001	18:23:00	calibrated e-tape	idle	S	22.55	4,109.00	4,086.45
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	18-Jul-2001	17:26:00	calibrated e-tape	idle	S	33.01	4,109.00	4,075.99
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	17-Sep-2001	21:28:00	calibrated e-tape	idle	S	59.14	4,109.00	4,049.86
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	16-Oct-2001	18:07:00	calibrated e-tape	idle	S	46.65	4,109.00	4,062.35
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	18-Jan-2002	10:00:00	calibrated e-tape	oscillating	R	22.25	4,109.00	4,086.75
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	15-Apr-2002	15:10:00	calibrated e-tape	oscillating	R	16.04	4,109.00	4,092.96
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	15-Jul-2002	16:01:00	calibrated e-tape	idle	R	18.42	4,109.00	4,090.58
KLAM	51131	Kennedy Land Company	Grondin	OWRD-GW	14-Oct-2002	16:00:00	calibrated e-tape	idle	S	19.04	4,109.00	4,089.96
KLAM	51858	Menestrina	Gall	OWRD-GW	25-Oct-1999	14:30:00	steel tape	static and oil	S	25.50	4,135.34	4,109.84
KLAM	51920	Babson	Grondin	OWRD-GW	13-May-1998	09:25:00	calibrated e-tape	static	S	14.43	4,127.50	4,113.07
KLAM	51920	Babson	Grondin	OWRD-GW	09-Dec-1998	09:35:00	calibrated e-tape	static	S	15.65	4,127.50	4,111.85
KLAM	51920	Babson	Grondin	OWRD-GW	09-Dec-1998	09:40:00	steel tape	static	S	16.38	4,127.50	4,111.12
KLAM	51920	Babson	Grondin	OWRD-GW	12-Jan-1999	17:35:00	calibrated e-tape	static	S	15.26	4,127.50	4,112.24
KLAM	51920	Babson	Grondin	OWRD-GW	10-Feb-1999	11:10:00	calibrated e-tape	static	S	15.11	4,127.50	4,112.39
KLAM	51920	Babson	Grondin	OWRD-GW	16-Mar-1999	16:53:00	calibrated e-tape	static	S	14.22	4,127.50	4,113.28
KLAM	51920	Babson	Grondin	OWRD-GW	06-Apr-1999	16:55:00	calibrated e-tape	static	S	13.54	4,127.50	4,113.96
KLAM	51920	Babson	Grondin	OWRD-GW	11-May-1999	20:24:00	calibrated e-tape	idle/static	S	13.38	4,127.50	4,114.12
KLAM	51920	Babson	Grondin	OWRD-GW	08-Jun-1999	17:27:00	calibrated e-tape	idle/static	S	14.43	4,127.50	4,113.07
KLAM	51920	Babson	Grondin	OWRD-GW	13-Jul-1999	20:00:00	calibrated e-tape	idle/static	S	15.76	4,127.50	4,111.74
KLAM	51920	Babson	Grondin	OWRD-GW	10-Aug-1999	18:00:00	calibrated e-tape	idle	S	16.31	4,127.50	4,111.19
KLAM	51920	Babson	Grondin	OWRD-GW	14-Sep-1999	18:29:00	calibrated e-tape	idle	S	16.50	4,127.50	4,111.00
KLAM	51920	Babson	Grondin	OWRD-GW	26-Oct-1999	09:54:00	calibrated e-tape	idle	S	15.88	4,127.50	4,111.62

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	51920	Babson	Grondin	OWRD-GW	13-Jan-2000	12:19:00	calibrated e-tape	idle	S	15.21	4,127.50	4,112.29
KLAM	51920	Babson	Grondin	OWRD-GW	08-Mar-2000	18:20:00	calibrated e-tape	idle	S	14.63	4,127.50	4,112.87
KLAM	51920	Babson	Grondin	OWRD-GW	09-May-2000	18:18:00	calibrated e-tape	idle	S	14.50	4,127.50	4,113.00
KLAM	51920	Babson	Grondin	OWRD-GW	27-Jun-2000	18:40:00	calibrated e-tape	idle	S	16.21	4,127.50	4,111.29
KLAM	51920	Babson	Grondin	OWRD-GW	12-Sep-2000	15:33:00	calibrated e-tape	idle	S	17.37	4,127.50	4,110.13
KLAM	51920	Babson	Grondin	OWRD-GW	15-Nov-2000	14:18:00	calibrated e-tape	idle	S	16.52	4,127.50	4,110.98
KLAM	51920	Babson	Grondin	OWRD-GW	09-Jan-2001	13:49:00	calibrated e-tape	idle	S	16.00	4,127.50	4,111.50
KLAM	51920	Babson	Grondin	OWRD-GW	06-Mar-2001	18:15:00	calibrated e-tape	idle	S	15.83	4,127.50	4,111.67
KLAM	51920	Babson	Grondin	OWRD-GW	09-May-2001	17:18:00	calibrated e-tape	idle	S	16.43	4,127.50	4,111.07
KLAM	51920	Babson	Grondin	OWRD-GW	17-Jul-2001	18:49:00	calibrated e-tape	idle	S	18.98	4,127.50	4,108.52
KLAM	51920	Babson	Grondin	OWRD-GW	18-Sep-2001	19:45:00	calibrated e-tape	idle	S	19.73	4,127.50	4,107.77
KLAM	51920	Babson	Grondin	OWRD-GW	17-Jan-2002	11:30:00		not measured			4,127.50	
KLAM	51920	Babson	Grondin	OWRD-GW	16-Apr-2002	18:07:00		idle	S	16.68	4,127.50	4,110.82
KLAM	51920	Babson	Grondin	OWRD-GW	16-Jul-2002	15:28:00	calibrated e-tape	idle	S	19.00	4,127.50	4,108.50
KLAM	51920	Babson	Grondin	OWRD-GW	15-Oct-2002	14:56:00	calibrated e-tape	idle	S	19.24	4,127.50	4,108.26
KLAM	51922	Wiersma	Grondin	OWRD-GW	11-Dec-1998	08:55:00	calibrated e-tape	static	S	3.03	4,113.46	4,110.43
KLAM	51922	Wiersma	Grondin	OWRD-GW	15-Jan-1999	09:42:00	calibrated e-tape	static	S	2.69	4,113.46	4,110.77
KLAM	51922	Wiersma	Grondin	OWRD-GW	11-Feb-1999	10:27:00	calibrated e-tape	static	S	2.52	4,113.46	4,110.94
KLAM	51922	Wiersma	Grondin	OWRD-GW	17-Mar-1999	11:23:00	calibrated e-tape	static	S	1.56	4,113.46	4,111.90
KLAM	51922	Wiersma	Grondin	OWRD-GW	01-Apr-1999	11:17:00	calibrated e-tape	static	S	1.08	4,113.46	4,112.38
KLAM	51922	Wiersma	Grondin	OWRD-GW	07-Apr-1999	13:01:00	calibrated e-tape	static	S	0.88	4,113.46	4,112.58
KLAM	51922	Wiersma	Grondin	OWRD-GW	12-May-1999	13:21:00	calibrated e-tape	idle/static	S	0.93	4,113.46	4,112.53
KLAM	51922	Wiersma	Grondin	OWRD-GW	09-Jun-1999	13:30:00	calibrated e-tape	idle/static	S	2.16	4,113.46	4,111.30
KLAM	51922	Wiersma	Grondin	OWRD-GW	15-Jul-1999	14:42:00	calibrated e-tape	idle/static	S	3.79	4,113.46	4,109.67
KLAM	51922	Wiersma	Grondin	OWRD-GW	10-Aug-1999	19:06:00	calibrated e-tape	idle	S	3.98	4,113.46	4,109.48
KLAM	51922	Wiersma	Grondin	OWRD-GW	15-Sep-1999	16:05:00	calibrated e-tape	idle	S	3.89	4,113.46	4,109.57
KLAM	51922	Wiersma	Grondin	OWRD-GW	29-Sep-1999	12:19:00	calibrated e-tape	idle	S	3.83	4,113.46	4,109.63
KLAM	51922	Wiersma	Grondin	OWRD-GW	26-Oct-1999	12:32:00	calibrated e-tape	idle	S	3.39	4,113.46	4,110.07
KLAM	51922	Wiersma	Grondin	OWRD-GW	12-Jan-2000	11:55:00	calibrated e-tape	idle	S	2.71	4,113.46	4,110.75
KLAM	51922	Wiersma	Grondin	OWRD-GW	09-Mar-2000	11:10:00	calibrated e-tape	idle	S	2.18	4,113.46	4,111.28
KLAM	51922	Wiersma	Grondin	OWRD-GW	09-May-2000	19:13:00	calibrated e-tape	idle	S	2.10	4,113.46	4,111.36
KLAM	51922	Wiersma	Grondin	OWRD-GW	26-Jun-2000	18:10:00	calibrated e-tape	idle	S	4.06	4,113.46	4,109.40
KLAM	51922	Wiersma	Grondin	OWRD-GW	14-Sep-2000	17:27:00	calibrated e-tape	idle	S	4.72	4,113.46	4,108.74
KLAM	51922	Wiersma	Grondin	OWRD-GW	15-Nov-2000	14:43:00	calibrated e-tape	idle	S	3.96	4,113.46	4,109.50
KLAM	51922	Wiersma	Grondin	OWRD-GW	11-Jan-2001	12:55:00	calibrated e-tape	idle	S	3.47	4,113.46	4,109.99
KLAM	51922	Wiersma	Grondin	OWRD-GW	07-Mar-2001	17:15:00	calibrated e-tape	idle	S	3.25	4,113.46	4,110.21
KLAM	51922	Wiersma	Grondin	OWRD-GW	08-Mar-2001	12:03:00	calibrated e-tape	idle	S	3.27	4,113.46	4,110.19
KLAM	51922	Wiersma	Grondin	OWRD-GW	10-May-2001	15:42:00	calibrated e-tape	idle	S	4.31	4,113.46	4,109.15
KLAM	51922	Wiersma	Grondin	OWRD-GW	18-Jul-2001	13:37:00	calibrated e-tape	idle	S	6.60	4,113.46	4,106.86
KLAM	51922	Wiersma	Grondin	OWRD-GW	21-Sep-2001	12:29:00	calibrated e-tape	idle	S	7.03	4,113.46	4,106.43
KLAM	51922	Wiersma	Grondin	OWRD-GW	16-Jan-2002	15:30:00	calibrated e-tape	idle	S	4.88	4,113.46	4,108.58

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	51922	Wiersma	Grondin	OWRD-GW	17-Apr-2002	10:07:00	calibrated e-tape	idle	S	4.11	4,113.46	4,109.35
KLAM	51922	Wiersma	Grondin	OWRD-GW	17-Jul-2002	10:30:00	calibrated e-tape	idle	S	6.76	4,113.46	4,106.70
KLAM	51922	Wiersma	Grondin	OWRD-GW	17-Sep-2002	16:59:00	calibrated e-tape	idle	S	7.13	4,113.46	4,106.33
KLAM	51922	Wiersma	Grondin	OWRD-GW	15-Oct-2002	15:25:00	calibrated e-tape	idle	S	6.45	4,113.46	4,107.01
KLAM	52096	Cheyne	Schneider	well-log	19-Nov-1999		reported			50.00	4,162.50	4,112.50
KLAM	52096	Cheyne	Grondin	OWRD-GW	06-Dec-1999	15:33:00	calibrated e-tape	idle	S	50.28	4,162.50	4,112.22
KLAM	52096	Cheyne	Norton	OWRD-GW	07-Dec-1999	11:00:00	calibrated e-tape	idle	S	50.41	4,162.50	4,112.09
KLAM	52096	Cheyne	Norton	OWRD-GW	08-Dec-1999	11:02:00	calibrated e-tape	nearby recently pumped	S	50.56	4,162.50	4,111.94
KLAM	52096	Cheyne	Grondin	OWRD-GW	09-Dec-1999	11:02:00	calibrated e-tape	idle	S	50.42	4,162.50	4,112.08
KLAM	52096	Cheyne	Grondin	OWRD-GW	11-Jan-2000	14:36:00	calibrated e-tape	idle	S	50.15	4,162.50	4,112.35
KLAM	52096	Cheyne	Grondin	OWRD-GW	08-Mar-2000	15:09:00	calibrated e-tape	idle	S	49.61	4,162.50	4,112.89
KLAM	52096	Cheyne	Grondin	OWRD-GW	09-May-2000	14:56:00	calibrated e-tape	idle	S	49.30	4,162.50	4,113.20
KLAM	52096	Cheyne	Grondin	OWRD-GW	27-Jun-2000	14:28:00	calibrated e-tape	idle	S	50.94	4,162.50	4,111.56
KLAM	52096	Cheyne	Grondin	OWRD-GW	14-Sep-2000	09:47:00	calibrated e-tape	idle	S	52.25	4,162.50	4,110.25
KLAM	52096	Cheyne	Grondin	OWRD-GW	14-Nov-2000	16:45:00	calibrated e-tape	idle	S	51.44	4,162.50	4,111.06
KLAM	52096	Cheyne	Grondin	OWRD-GW	10-Jan-2001	13:34:00	calibrated e-tape	idle	S	50.89	4,162.50	4,111.61
KLAM	52096	Cheyne	Grondin	OWRD-GW	06-Mar-2001	15:23:00	calibrated e-tape	idle	S	50.86	4,162.50	4,111.64
KLAM	52096	Cheyne	Grondin	OWRD-GW	08-May-2001	18:53:00	calibrated e-tape	idle	S	51.76	4,162.50	4,110.74
KLAM	52096	Cheyne	Grondin	OWRD-GW	19-Jul-2001	10:12:00	calibrated e-tape	idle	S	53.70	4,162.50	4,108.80
KLAM	52096	Cheyne	Grondin	OWRD-GW	18-Sep-2001	14:50:00	calibrated e-tape	idle	S	54.45	4,162.50	4,108.05
KLAM	52096	Cheyne	Grondin	OWRD-GW	17-Jan-2002	12:14:00	calibrated e-tape	idle	S	51.64	4,162.50	4,110.86
KLAM	52096	Cheyne	Grondin	OWRD-GW	16-Apr-2002	13:55:00	calibrated e-tape	idle	S	51.64	4,162.50	4,110.86
KLAM	52096	Cheyne	Grondin	OWRD-GW	16-Jul-2002	12:26:00	calibrated e-tape	idle	S	53.50	4,162.50	4,109.00
KLAM	52096	Cheyne	Grondin	OWRD-GW	16-Sep-2002	18:15:00	calibrated e-tape	idle	S	55.04	4,162.50	4,107.46
KLAM	52096	Cheyne	Grondin	OWRD-GW	15-Oct-2002	12:17:00	calibrated e-tape	idle	S	54.04	4,162.50	4,108.46
KLAM	52204	Cheyne	Schneider	well-log	19-Nov-1999		reported			29.00	4,162.60	4,133.60
KLAM	52204	Cheyne	Grondin	OWRD-GW	06-Dec-1999	15:55:00	calibrated e-tape	idle	S	30.28	4,162.60	4,132.32
KLAM	52204	Cheyne	Grondin	OWRD-GW	07-Dec-1999	11:00:00	calibrated e-tape	idle	S	30.37	4,162.60	4,132.23
KLAM	52204	Cheyne	Norton	OWRD-GW	08-Dec-1999	11:00:00	calibrated e-tape	nearby recently pumped	F	32.67	4,162.60	4,129.93
KLAM	52204	Cheyne	Grondin	OWRD-GW	09-Dec-1999	11:00:00	calibrated e-tape	idle	S	31.05	4,162.60	4,131.55
KLAM	52204	Cheyne	Grondin	OWRD-GW	11-Jan-2000	14:42:00	calibrated e-tape	idle	S	32.32	4,162.60	4,130.28
KLAM	52204	Cheyne	Grondin	OWRD-GW	08-Mar-2000	15:04:00	calibrated e-tape	idle	S	34.09	4,162.60	4,128.51
KLAM	52204	Cheyne	Grondin	OWRD-GW	09-May-2000	15:04:00	calibrated e-tape	idle	S	30.54	4,162.60	4,132.06
KLAM	52204	Cheyne	Grondin	OWRD-GW	27-Jun-2000	14:34:00	calibrated e-tape	idle	S	29.77	4,162.60	4,132.83
KLAM	52204	Cheyne	Grondin	OWRD-GW	14-Sep-2000	09:50:00	calibrated e-tape	idle	S	27.21	4,162.60	4,135.39
KLAM	52204	Cheyne	Grondin	OWRD-GW	14-Nov-2000	16:50:00	calibrated e-tape	idle	S	30.42	4,162.60	4,132.18
KLAM	52204	Cheyne	Grondin	OWRD-GW	10-Jan-2001	13:39:00	calibrated e-tape	idle	S	33.90	4,162.60	4,128.70
KLAM	52204	Cheyne	Grondin	OWRD-GW	06-Mar-2001	15:26:00	calibrated e-tape	idle	S	36.34	4,162.60	4,126.26
KLAM	52204	Cheyne	Grondin	OWRD-GW	08-May-2001	18:49:00	calibrated e-tape	idle	S	41.32	4,162.60	4,121.28
KLAM	52204	Cheyne	Grondin	OWRD-GW	19-Jul-2001	10:17:00	calibrated e-tape	idle	S	30.49	4,162.60	4,132.11

Appendix 13: Ground Water Elevation Measurements

Note: measurements are hand measurements (not recorder data)
Note: includes OWRD, USGS, reported, and other measurements
Note: S = static water level, R = recovering/rising water water level, F = falling water level
Note: blsd means below land surface datum

Well Report County	Well Report Number	Owner Last Name or Organization	Measurer Last Name	Measurement Source	Measure Date	Measure Time (24 hour)	Measure Method	Site Status	Water Level Condition	Water Level (feet blsd)	Land Elevation (feet)	Water Level Elevation (feet)
KLAM	52204	Cheyne	Grondin	OWRD-GW	18-Sep-2001	14:57:00	calibrated e-tape	idle	S	31.26	4,162.60	4,131.34
KLAM	52204	Cheyne	Grondin	OWRD-GW	17-Jan-2002	12:08:00	calibrated e-tape	idle	S	37.66	4,162.60	4,124.94
KLAM	52204	Cheyne	Grondin	OWRD-GW	16-Apr-2002	14:02:00	calibrated e-tape	idle	S	40.47	4,162.60	4,122.13
KLAM	52204	Cheyne	Grondin	OWRD-GW	16-Jul-2002	12:31:00	calibrated e-tape	idle	S	30.53	4,162.60	4,132.07
KLAM	52204	Cheyne	Grondin	OWRD-GW	16-Sep-2002	18:08:00	calibrated e-tape	idle	S	31.72	4,162.60	4,130.88
KLAM	52204	Cheyne	Grondin	OWRD-GW	15-Oct-2002	12:11:00	calibrated e-tape	idle	S	30.66	4,162.60	4,131.94

Appendix 14: Land Elevation for Each Project Well Site

Note: Topographic maps used were USGS 1:24,000 scale (7.5 minute) quadrangle maps with 20-foot contour intervals
Note: GPS elevation survey was conducted from 29 July 2003 to 2 August 2003 by USGS and OWRD staff
Note: GPS equipment and data processing came from the USGS Cascades Volcano Observatory
Note: Time and resource limitations prevented conducting the GPS elevation survey at every project well site

Well Report County	Well Report Number	Land Elevation Topographic Map (feet)	Elevation Accuracy (feet)	Land Elevation GPS Survey (feet)	Elevation Accuracy (feet)	Elevation Difference GPS vs Map (feet)	Comments
KLAM	2256	4,235.00	10.00				
KLAM	2259	4,248.00	10.00				
KLAM	2260	4,289.00	10.00				
KLAM	2262	4,288.00	10.00				
KLAM	2263	4,218.00	10.00				
KLAM	2265	4,214.00	10.00				
KLAM	2269	4,256.00	10.00				
KLAM	2277	4,193.00	10.00	4,193.00	0.10	0.00	used GPS elevation
KLAM	2288	4,186.00	10.00				
KLAM	2289	4,227.00	10.00				
KLAM	2340	4,266.00	10.00				
KLAM	2368	4,240.00	10.00				
KLAM	2373	4,259.00	10.00				
KLAM	2374	4,261.00	10.00				
KLAM	2379	4,272.00	10.00				
KLAM	10015	4,154.00	10.00	4,145.10	0.10	-8.90	used GPS elevation
KLAM	10080	4,232.00	10.00	4,229.20	0.10	-2.80	used GPS elevation
KLAM	10082	4,220.00	10.00				
KLAM	10122	4,189.00	10.00	4,192.40	0.10	3.40	used GPS elevation
KLAM	10156	4,158.00	10.00				
KLAM	10159	4,112.00	10.00				
KLAM	10162	4,891.00	10.00				
KLAM	10175	4,223.00	10.00	4,213.20	0.10	-9.80	used GPS elevation
KLAM	10181	4,303.00	10.00	4,309.20	0.10	6.20	used GPS elevation
KLAM	10242	4,122.00	10.00	4,118.90	0.10	-3.10	used GPS elevation
KLAM	10252	4,133.00	10.00	4,134.60	0.10	1.60	used GPS elevation

Appendix 14: Land Elevation for Each Project Well Site

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Note: GPS elevation survey was conducted from 29 July 2003 to 2 August 2003 by USGS and OWRD staff
Note: GPS equipment and data processing came from the USGS Cascades Volcano Observatory
Note: Time and resource limitations prevented conducting the GPS elevation survey at every project well site

Well Report County	Well Report Number	Land Elevation Topographic Map (feet)	Elevation Accuracy (feet)	Land Elevation GPS Survey (feet)	Elevation Accuracy (feet)	Elevation Difference GPS vs Map (feet)	Comments
KLAM	10258	4,154.00	10.00	4,153.00	0.10	-1.00	used GPS elevation
KLAM	10292	4,143.00	10.00				
KLAM	10316	4,137.00	10.00	4,129.40	0.10	-7.60	used GPS elevation
KLAM	10336	4,190.00	10.00				
KLAM	10352	4,158.00	10.00	4,152.80	0.10	-5.20	used GPS elevation
KLAM	10357	4,160.00	10.00	4,151.00	0.10	-9.00	used GPS elevation
KLAM	10362	4,140.00	10.00	4,141.00	0.10	1.00	used GPS elevation
KLAM	10364	4,148.00	10.00	4,143.80	0.10	-4.20	used GPS elevation
KLAM	10368	4,141.00	10.00	4,147.90	0.10	6.90	used GPS elevation
KLAM	10378	4,112.00	10.00	4,111.50	0.10	-0.50	used GPS elevation
KLAM	10395	4,124.00	10.00	4,124.60	0.10	0.60	used GPS elevation
KLAM	10416	4,116.00	10.00	4,116.10	0.10	0.10	used GPS elevation
KLAM	10421	4,158.00	10.00	4,153.30	0.10	-4.70	used GPS elevation
KLAM	10431	4,137.00	10.00				
KLAM	10432	4,146.00	10.00	4,138.60	0.10	-7.40	used GPS elevation
KLAM	10440	4,134.00	10.00				
KLAM	10443	4,110.00	10.00	4,113.10	0.10	3.10	used GPS elevation
KLAM	10448	4,140.00	10.00				
KLAM	10458	4,231.00	10.00	4,237.50	0.10	6.50	used GPS elevation
KLAM	10460	4,158.00	10.00	4,156.40	0.10	-1.60	used GPS elevation
KLAM	10461	4,130.00	10.00	4,128.90	0.10	-1.10	used GPS elevation
KLAM	10467	4,139.00	10.00	4,139.30	0.10	0.30	used GPS elevation
KLAM	10473	4,139.00	10.00				
KLAM	10475	4,151.00	10.00	4,143.80	0.10	-7.20	used GPS elevation
KLAM	10495	4,149.00	10.00	4,145.50	0.10	-3.50	used GPS elevation
KLAM	10498	4,138.00	10.00	4,127.50	0.10	-10.50	used GPS elevation

Appendix 14: Land Elevation for Each Project Well Site

Note: Topographic maps used were USGS 1:24,000 scale (7.5 minute) quadrangle maps with 20-foot contour intervals
Note: GPS elevation survey was conducted from 29 July 2003 to 2 August 2003 by USGS and OWRD staff
Note: GPS equipment and data processing came from the USGS Cascades Volcano Observatory
Note: Time and resource limitations prevented conducting the GPS elevation survey at every project well site

Well Report County	Well Report Number	Land Elevation Topographic Map (feet)	Elevation Accuracy (feet)	Land Elevation GPS Survey (feet)	Elevation Accuracy (feet)	Elevation Difference GPS vs Map (feet)	Comments
KLAM	10526	4,192.00	10.00	4,195.00	0.10	3.00	used GPS elevation
KLAM	10531	4,174.00	10.00	4,170.50	0.10	-3.50	used GPS elevation
KLAM	10554	4,216.00	10.00	4,206.80	0.10	-9.20	used GPS elevation
KLAM	10566	4,154.00	10.00	4,152.20	0.10	-1.80	used GPS elevation
KLAM	10574	4,210.00	10.00	4,214.60	0.10	4.60	used GPS elevation
KLAM	10575	4,151.00	10.00				
KLAM	10608	4,197.00	10.00				
KLAM	10634	4,140.00	10.00				
KLAM	10641	4,147.00	10.00	4,146.80	0.10	-0.20	used GPS elevation
KLAM	10642	4,143.00	10.00	4,145.70	0.10	2.70	used GPS elevation
KLAM	10647	4,128.00	10.00				
KLAM	10675	4,264.00	10.00				
KLAM	10699	4,185.00	10.00	4,185.60	0.10	0.60	used GPS elevation
KLAM	10712	4,260.00	10.00				
KLAM	10748	4,153.00	10.00	4,149.60	0.10	-3.40	used GPS elevation
KLAM	10764	4,141.00	10.00	4,134.10	0.10	-6.90	used GPS elevation
KLAM	10803	4,372.00	10.00				
KLAM	10813	4,124.00	10.00				
KLAM	10814	4,119.00	10.00				
KLAM	10870	4,271.00	10.00				
KLAM	10877	4,271.00	10.00				
KLAM	11003	4,180.00	10.00				
KLAM	11139	4,139.00	10.00	4,138.00	0.10	-1.00	used GPS elevation
KLAM	11168	4,124.00	10.00				
KLAM	11204	4,170.00	10.00	4,164.80	0.10	-5.20	used GPS elevation
KLAM	11227	4,141.00	10.00				

Appendix 14: Land Elevation for Each Project Well Site

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Note: GPS equipment and data processing came from the USGS Cascades Volcano Observatory
Note: Time and resource limitations prevented conducting the GPS elevation survey at every project well site

Well Report County	Well Report Number	Land Elevation Topographic Map (feet)	Elevation Accuracy (feet)	Land Elevation GPS Survey (feet)	Elevation Accuracy (feet)	Elevation Difference GPS vs Map (feet)	Comments
KLAM	11294	4,117.00	10.00				
KLAM	11380	4,173.00	10.00	4,169.30	0.10	-3.70	used GPS elevation
KLAM	11392	4,280.00	10.00	4,277.50	0.10	-2.50	used GPS elevation
KLAM	11421	4,357.00	10.00	4,355.30	0.10	-1.70	used GPS elevation
KLAM	11454	4,237.00	10.00	4,233.20	0.10	-3.80	used GPS elevation
KLAM	11473	4,156.00	10.00	4,155.30	0.10	-0.70	used GPS elevation
KLAM	11569	4,189.00	10.00				
KLAM	11643	4,199.00	10.00				
KLAM	12186	4,199.00	10.00	4,198.00	0.10	-1.00	used GPS elevation
KLAM	12197	4,189.00	10.00	4,195.10	0.10	6.10	used GPS elevation
KLAM	12203	4,194.00	10.00				
KLAM	12209	4,218.00	10.00	4,223.20	0.10	5.20	used GPS elevation
KLAM	12211	4,219.00	10.00				
KLAM	12213	4,207.00	10.00	4,209.30	0.10	2.30	used GPS elevation
KLAM	12217	4,202.00	10.00	4,205.70	0.10	3.70	used GPS elevation
KLAM	12218	4,199.00	10.00	4,196.10	0.10	-2.90	used GPS elevation
KLAM	12221	4,201.00	10.00	4,202.40	0.10	1.40	used GPS elevation
KLAM	12223	4,189.00	10.00	4,203.10	0.10	14.10	used GPS elevation
KLAM	12224	4,191.00	10.00	4,194.70	0.10	3.70	used GPS elevation
KLAM	12226	4,183.00	10.00				
KLAM	12228	4,219.00	10.00	4,224.70	0.10	5.70	used GPS elevation
KLAM	12230	4,148.00	10.00				
KLAM	12261	4,244.00	10.00	4,240.90	0.10	-3.10	used GPS elevation
KLAM	12267	4,232.00	10.00	4,227.60	0.10	-4.40	used GPS elevation
KLAM	12268	4,198.00	10.00				
KLAM	12269	4,221.00	10.00				

Appendix 14: Land Elevation for Each Project Well Site

Note: Topographic maps used were USGS 1:24,000 scale (7.5 minute) quadrangle maps with 20-foot contour intervals
Note: GPS elevation survey was conducted from 29 July 2003 to 2 August 2003 by USGS and OWRD staff
Note: GPS equipment and data processing came from the USGS Cascades Volcano Observatory
Note: Time and resource limitations prevented conducting the GPS elevation survey at every project well site

Well Report County	Well Report Number	Land Elevation Topographic Map (feet)	Elevation Accuracy (feet)	Land Elevation GPS Survey (feet)	Elevation Accuracy (feet)	Elevation Difference GPS vs Map (feet)	Comments
KLAM	12273	4,208.00	10.00	4,205.50	0.10	-2.50	used GPS elevation
KLAM	12283	4,252.00	10.00	4,251.00	0.10	-1.00	used GPS elevation
KLAM	12285	4,199.00	10.00				
KLAM	12286	4,201.00	10.00	4,197.40	0.10	-3.60	used GPS elevation
KLAM	12345	4,178.00	10.00	4,176.40	0.10	-1.60	used GPS elevation
KLAM	12358	4,171.00	10.00	4,172.50	0.10	1.50	used GPS elevation
KLAM	12361	4,341.00	10.00				
KLAM	12363	4,179.00	10.00				
KLAM	12369	4,197.00	10.00	4,194.90	0.10	-2.10	used GPS elevation
KLAM	12377	4,206.00	10.00				
KLAM	12380	4,188.00	10.00	4,183.50	0.10	-4.50	used GPS elevation
KLAM	12382	4,185.00	10.00	4,183.10	0.10	-1.90	used GPS elevation
KLAM	12385	4,216.00	10.00				
KLAM	12386	4,218.00	10.00				
KLAM	12389	4,208.00	10.00	4,204.50	0.10	-3.50	used GPS elevation
KLAM	12390	4,158.00	10.00				
KLAM	12391	4,182.00	10.00				
KLAM	12393	4,154.00	10.00				
KLAM	12395	4,159.00	10.00	4,158.20	0.10	-0.80	used GPS elevation
KLAM	12396	4,158.00	10.00				
KLAM	12398	4,151.00	10.00	4,148.20	0.10	-2.80	used GPS elevation
KLAM	12406	4,288.00	10.00	4,289.20	0.10	1.20	used GPS elevation
KLAM	12411	4,162.00	10.00	4,165.50	0.10	3.50	used GPS elevation
KLAM	12413	4,165.00	10.00	4,163.30	0.10	-1.70	used GPS elevation
KLAM	12415	4,151.00	10.00				
KLAM	12416	4,146.00	10.00	4,144.90	0.10	-1.10	used GPS elevation

Appendix 14: Land Elevation for Each Project Well Site

Note: Topographic maps used were USGS 1:24,000 scale (7.5 minute) quadrangle maps with 20-foot contour intervals
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Well Report County	Well Report Number	Land Elevation Topographic Map (feet)	Elevation Accuracy (feet)	Land Elevation GPS Survey (feet)	Elevation Accuracy (feet)	Elevation Difference GPS vs Map (feet)	Comments
KLAM	12418	4,150.00	10.00				
KLAM	12419	4,215.00	10.00	4,208.00	0.10	-7.00	used GPS elevation
KLAM	12420	4,211.00	10.00	4,212.30	0.10	1.30	used GPS elevation
KLAM	12421	4,216.00	10.00	4,210.50	0.10	-5.50	used GPS elevation
KLAM	12424	4,191.00	10.00	4,190.50	0.10	-0.50	used GPS elevation
KLAM	12425	4,205.00	10.00	4,205.90	0.10	0.90	used GPS elevation
KLAM	12429	4,185.00	10.00	4,187.90	0.10	2.90	used GPS elevation
KLAM	12431	4,185.00	10.00	4,186.50	0.10	1.50	used GPS elevation
KLAM	12432	4,190.00	10.00				
KLAM	12437	4,234.00	10.00				
KLAM	12454	4,122.00	10.00				
KLAM	12456	4,123.00	10.00	4,127.80	0.10	4.80	used GPS elevation
KLAM	12457	4,157.00	10.00				
KLAM	12471	4,449.00	10.00	4,450.70	0.10	1.70	used GPS elevation
KLAM	12477	4,451.00	10.00	4,450.40	0.10	-0.60	used GPS elevation
KLAM	12893	4,208.00	10.00				
KLAM	13062	4,283.00	10.00				
KLAM	13096	4,119.00	10.00	4,114.30	0.10	-4.70	used GPS elevation
KLAM	13326	4,183.00	10.00	4,183.40	0.10	0.40	used GPS elevation
KLAM	13331	4,215.00	10.00	4,216.00	0.10	1.00	used GPS elevation
KLAM	13332	4,155.00	10.00	4,151.00	0.10	-4.00	used GPS elevation
KLAM	13353	4,159.00	10.00	4,153.20	0.10	-5.80	used GPS elevation
KLAM	13399	4,196.00	10.00	4,195.30	0.10	-0.70	used GPS elevation
KLAM	13400	4,250.00	10.00	4,248.30	0.10	-1.70	used GPS elevation
KLAM	13403	4,149.00	10.00	4,142.80	0.10	-6.20	used GPS elevation
KLAM	13406	4,158.00	10.00				

Appendix 14: Land Elevation for Each Project Well Site

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Well Report County	Well Report Number	Land Elevation Topographic Map (feet)	Elevation Accuracy (feet)	Land Elevation GPS Survey (feet)	Elevation Accuracy (feet)	Elevation Difference GPS vs Map (feet)	Comments
KLAM	13428	4,159.00	10.00	4,155.80	0.10	-3.20	used GPS elevation
KLAM	13430	4,165.00	10.00	4,163.80	0.10	-1.20	used GPS elevation
KLAM	13443	4,185.00	10.00				
KLAM	13456	4,132.00	10.00	4,129.60	0.10	-2.40	used GPS elevation
KLAM	13458	4,107.00	10.00	4,110.00	0.10	3.00	used GPS elevation
KLAM	13462	4,107.00	10.00				change?
KLAM	13465	4,205.00	10.00				
KLAM	13468	4,189.00	10.00				
KLAM	13469	4,119.00	10.00	4,113.00	0.10	-6.00	used GPS elevation
KLAM	13471	4,121.00	10.00	4,135.30	0.10	14.30	used GPS elevation
KLAM	13472	4,138.00	10.00				
KLAM	13478	4,132.00	10.00	4,124.20	0.10	-7.80	used GPS elevation
KLAM	13490	4,205.00	10.00				
KLAM	13491	4,195.00	10.00	4,190.80	0.10	-4.20	used GPS elevation
KLAM	13498	4,105.00	10.00	4,104.30	0.10	-0.70	used GPS elevation
KLAM	13519	4,198.00	10.00	4,196.20	0.10	-1.80	used GPS elevation
KLAM	13538	4,206.00	10.00	4,204.90	0.10	-1.10	used GPS elevation
KLAM	13539	4,210.00	10.00				
KLAM	13548	4,243.00	10.00	4,237.30	0.10	-5.70	used GPS elevation
KLAM	13553	4,210.00	10.00				
KLAM	13554	4,366.00	10.00	4,364.10	0.10	-1.90	used GPS elevation
KLAM	13556	4,386.00	10.00	4,387.50	0.10	1.50	used GPS elevation
KLAM	13578	4,147.00	10.00				
KLAM	13582	4,160.00	10.00	4,160.90	0.10	0.90	used GPS elevation
KLAM	13583	4,172.00	10.00				
KLAM	13585	4,359.00	10.00				

Appendix 14: Land Elevation for Each Project Well Site

Note: Topographic maps used were USGS 1:24,000 scale (7.5 minute) quadrangle maps with 20-foot contour intervals
Note: GPS elevation survey was conducted from 29 July 2003 to 2 August 2003 by USGS and OWRD staff
Note: GPS equipment and data processing came from the USGS Cascades Volcano Observatory
Note: Time and resource limitations prevented conducting the GPS elevation survey at every project well site

Well Report County	Well Report Number	Land Elevation Topographic Map (feet)	Elevation Accuracy (feet)	Land Elevation GPS Survey (feet)	Elevation Accuracy (feet)	Elevation Difference GPS vs Map (feet)	Comments
KLAM	13601	4,924.00	10.00				
KLAM	13602	4,839.00	10.00				
KLAM	13608	4,302.00	10.00	4,305.20	0.10	3.20	used GPS elevation
KLAM	13609	4,872.00	10.00				
KLAM	13615	4,341.00	10.00				
KLAM	13620	4,303.00	10.00				
KLAM	14714	4,158.00	10.00				
KLAM	14731	4,152.00	10.00				
KLAM	14735	4,159.00	10.00				
KLAM	14736	4,179.00	10.00				
KLAM	14742	4,198.00	10.00				
KLAM	14746	4,233.00	10.00				
KLAM	14754	4,226.00	10.00				
KLAM	14795	4,160.00	10.00				
KLAM	14796	4,212.00	10.00	4,211.10	0.10	-0.90	used GPS elevation
KLAM	14802	4,199.00	10.00				
KLAM	14808	4,364.00	10.00	4,368.80	0.10	4.80	used GPS elevation
KLAM	14809	4,179.00	10.00	4,173.90	0.10	-5.10	used GPS elevation
KLAM	14812	4,465.00	10.00				
KLAM	14829	4,245.00	10.00				
KLAM	14849	4,182.00	10.00				
KLAM	14864	4,205.00	10.00				
KLAM	14871	4,137.00	10.00	4,136.60	0.10	-0.40	used GPS elevation
KLAM	14873	4,175.00	10.00	4,180.50	0.10	5.50	used GPS elevation
KLAM	14882	4,167.00	10.00	4,170.00	0.10	3.00	used GPS elevation
KLAM	14884	4,320.00	10.00				

Appendix 14: Land Elevation for Each Project Well Site

Note: Topographic maps used were USGS 1:24,000 scale (7.5 minute) quadrangle maps with 20-foot contour intervals
Note: GPS elevation survey was conducted from 29 July 2003 to 2 August 2003 by USGS and OWRD staff
Note: GPS equipment and data processing came from the USGS Cascades Volcano Observatory
Note: Time and resource limitations prevented conducting the GPS elevation survey at every project well site

Well Report County	Well Report Number	Land Elevation Topographic Map (feet)	Elevation Accuracy (feet)	Land Elevation GPS Survey (feet)	Elevation Accuracy (feet)	Elevation Difference GPS vs Map (feet)	Comments
KLAM	14889	4,159.00	10.00	4,157.30	0.10	-1.70	used GPS elevation
KLAM	14891	4,168.00	10.00				
KLAM	14892	4,177.00	10.00				
KLAM	14896	4,139.00	10.00				
KLAM	15111	4,243.00	10.00				
KLAM	15113	4,146.00	10.00	4,147.30	0.10	1.30	used GPS elevation
KLAM	15127	4,155.00	10.00	4,156.30	0.10	1.30	used GPS elevation
KLAM	15129	4,139.00	10.00	4,129.60	0.10	-9.40	used GPS elevation
KLAM	15130	4,151.00	10.00	4,156.20	0.10	5.20	used GPS elevation
KLAM	15131	4,160.00	10.00	4,154.70	0.10	-5.30	used GPS elevation
KLAM	15149	4,122.00	10.00				
KLAM	16807	4,101.00	10.00	4,105.70	0.10	4.70	used GPS elevation
KLAM	50301	4,194.00	10.00				
KLAM	50318	4,112.00	10.00	4,112.71	0.10	0.71	OIT land survey used
KLAM	50337	4,215.00	10.00	4,217.60	0.10	2.60	used GPS elevation
KLAM	50341	4,245.00	10.00	4,224.60	0.10	-20.40	used GPS elevation
KLAM	50362	4,215.00	10.00				
KLAM	50445	4,229.00	10.00				
KLAM	50446	4,273.00	10.00				
KLAM	50493	4,220.00	10.00	4,221.80	0.10	1.80	used GPS elevation
KLAM	50623	4,120.00	10.00	4,119.00	0.10	-1.00	used GPS elevation
KLAM	50777	4,241.00	10.00				
KLAM	50787	4,164.00	10.00				
KLAM	50796	4,251.00	10.00				
KLAM	50934	4,221.00	10.00	4,217.30	0.10	-3.70	used GPS elevation
KLAM	51131	4,112.00	10.00	4,109.00	0.10	-3.00	used GPS elevation

Appendix 14: Land Elevation for Each Project Well Site

Note: Topographic maps used were USGS 1:24,000 scale (7.5 minute) quadrangle maps with 20-foot contour intervals
Note: GPS elevation survey was conducted from 29 July 2003 to 2 August 2003 by USGS and OWRD staff
Note: GPS equipment and data processing came from the USGS Cascades Volcano Observatory
Note: Time and resource limitations prevented conducting the GPS elevation survey at every project well site

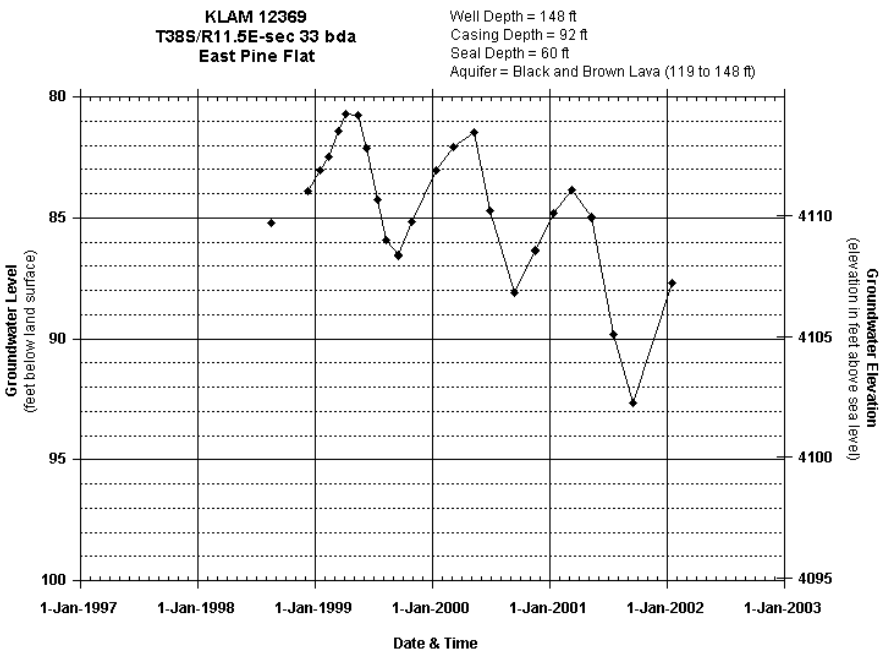
Well Report County	Well Report Number	Land Elevation Topographic Map (feet)	Elevation Accuracy (feet)	Land Elevation GPS Survey (feet)	Elevation Accuracy (feet)	Elevation Difference GPS vs Map (feet)	Comments
KLAM	51920	4,127.00	10.00	4,127.50	0.10	0.50	used GPS elevation
KLAM	51922	4,113.00	10.00	4,113.46	0.10	0.46	OWRD land survey used
KLAM	52096	4,163.00	10.00	4,162.50	0.10	-0.50	used GPS elevation
KLAM	52204	4,163.00	10.00	4,162.60	0.10	-0.40	used GPS elevation
				Maximum Difference (feet)		**20.40**	
				Minimum Difference (feet)		**0.00**	
				Average Difference (feet)		**3.48**	
				Median Difference (feet)		**2.90**	
				Standard Deviation (feet)		**3.15**	

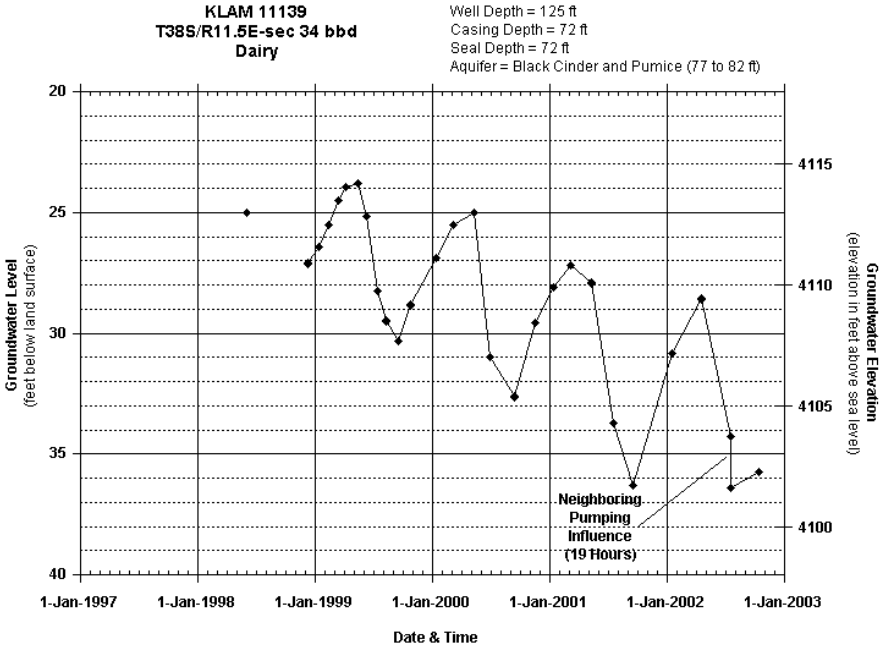
Appendix 15

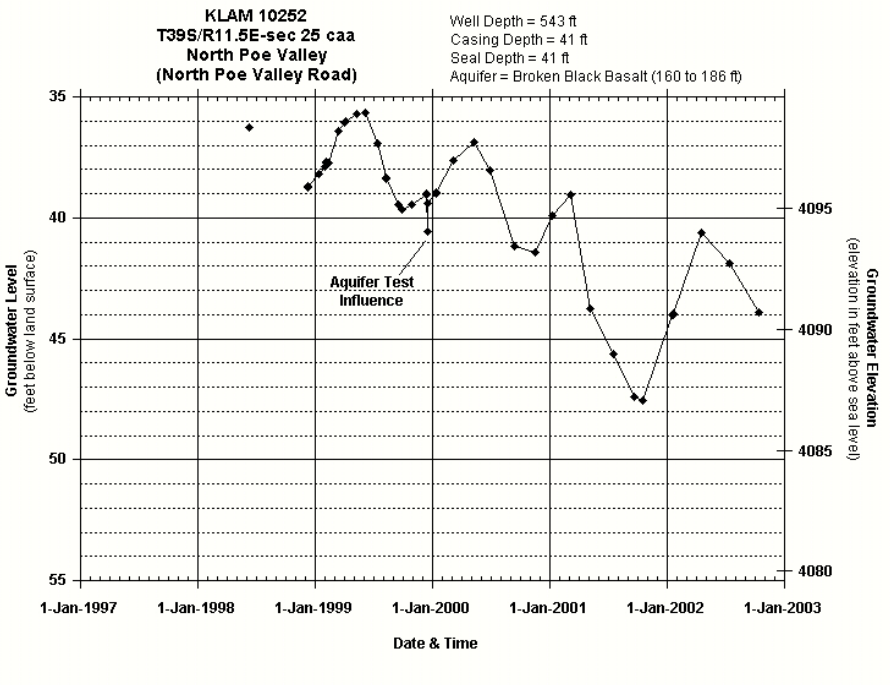
Hydrographs Comparing Water Level Fluctuations in Basalt and Basin Fill Sedimentary Deposits

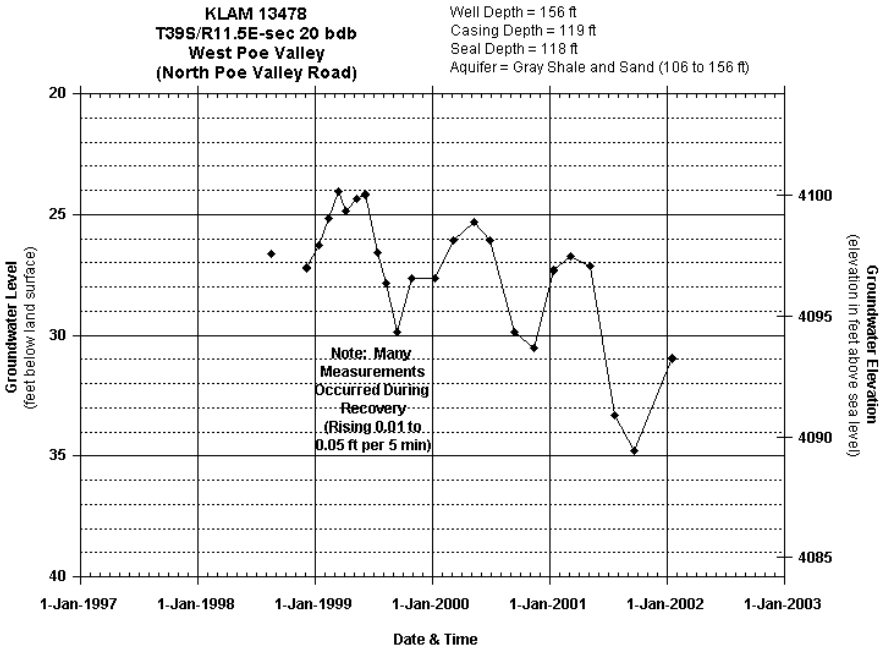
In many parts of the study area, ground water in basalt is efficiently hydraulically connected to ground water in thin overlying sediments or to ground water in the deeper portion of overlying sediments where they are thick. Areas having an efficient connection include Poe, Yonna, and Langell Valleys excluding Lorella. Evidence of an efficient basalt-sediment ground water hydraulic connection includes similar ground water elevations and similar responses to stress.

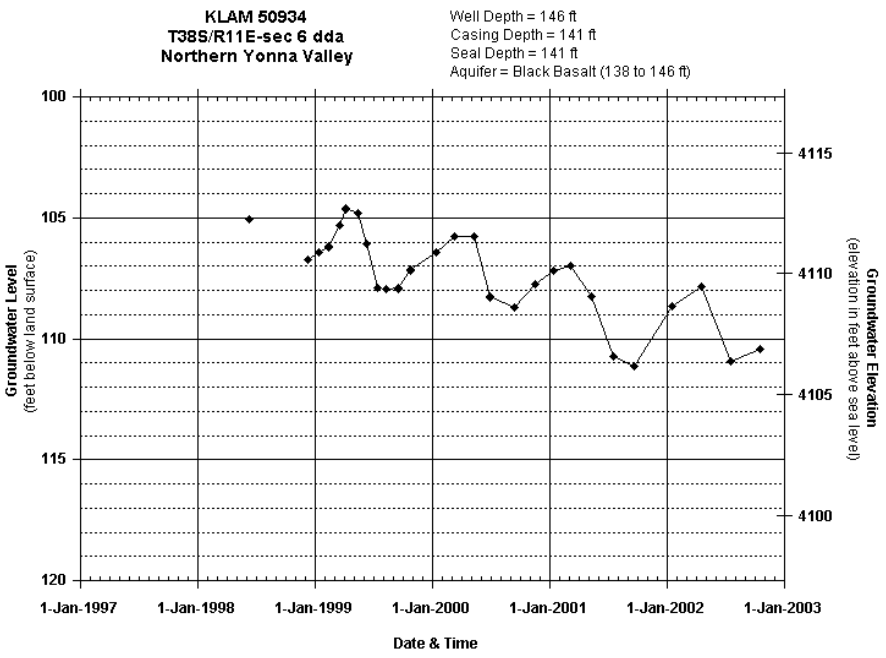
The following pages provide examples that pair hydrographs of basalt and sediment ground water elevation fluctuations in the same geographic area. The pairs represent Pine Flat-Dairy, northern Poe Valley, Yonna Valley, northwest Langell Valley, and south Langell valley.

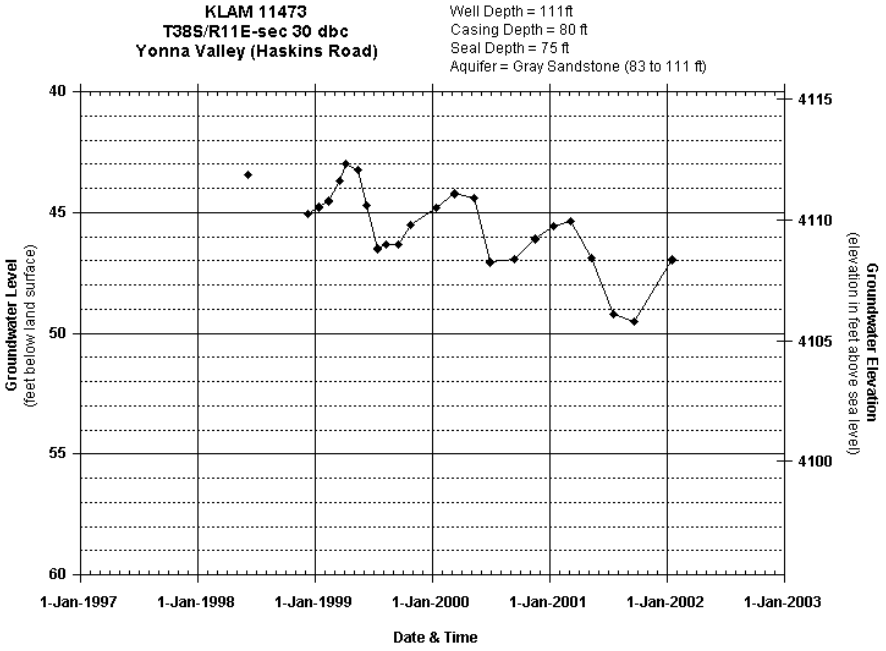

KLAM 12369
T38S/R11.5E-sec 33 bda
East Pine Flat
Well Depth = 148 ft
Casing Depth = 92 ft
Seal Depth = 60 ft
Aquifer = Black and Brown Lava (119 to 148 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
80
85
90
95
100
4110
4105
4100
4095
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

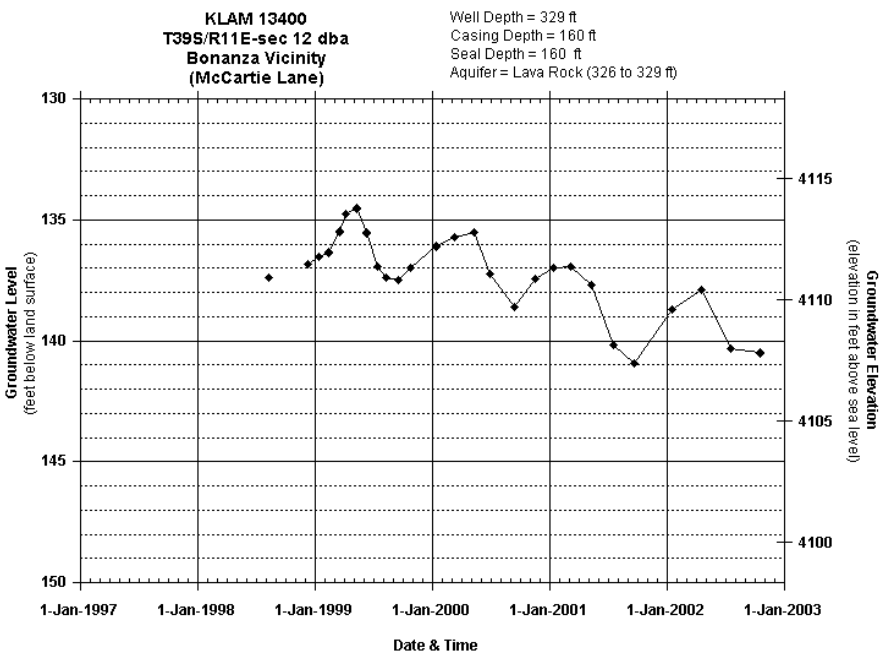

KLAM 11139
T38S/R11.5E-sec 34 bbd
Dairy
Well Depth = 125 ft
Casing Depth = 72 ft
Seal Depth = 72 ft
Aquifer = Black Cinder and Pumice (77 to 82 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
20
25
30
35
40
4115
4110
4105
4100
Neighboring
Pumping
Influence
(19 Hours)
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

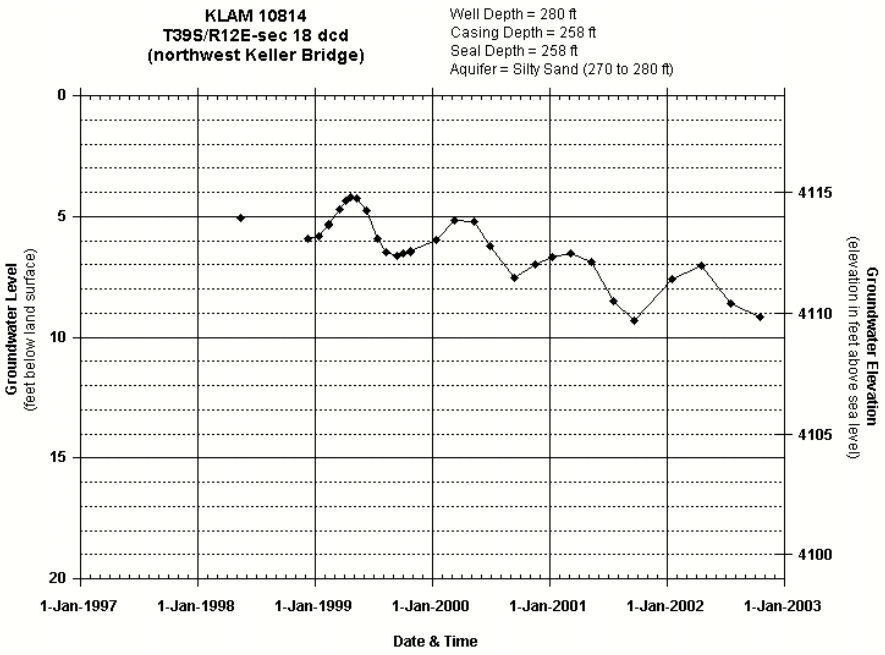

KLAM 10252
T39S/R11.5E-sec 25 caa
North Poe Valley
(North Poe Valley Road)
Well Depth = 543 ft
Casing Depth = 41 ft
Seal Depth = 41 ft
Aquifer = Broken Black Basalt (160 to 186 ft)
Aquifer Test Influence
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
35
40
45
50
55
4095
4090
4085
4080
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

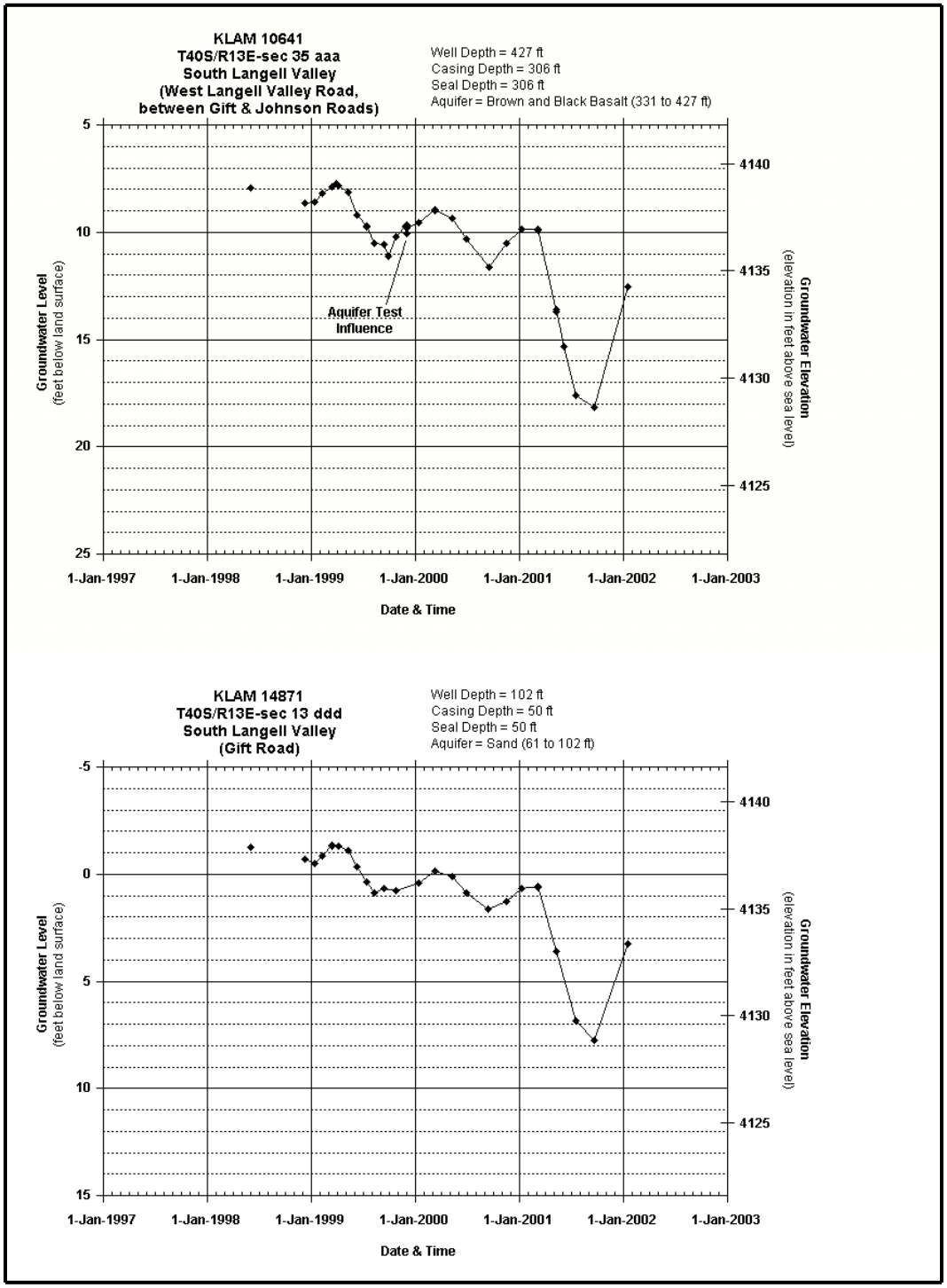

KLAM 13478
T39S/R11.5E-sec 20 bdb
West Poe Valley
(North Poe Valley Road)
Well Depth = 156 ft
Casing Depth = 119 ft
Seal Depth = 118 ft
Aquifer = Gray Shale and Sand (106 to 156 ft)
Note: Many Measurements Occurred During Recovery (Rising 0.01 to 0.05 ft per 5 min)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
20
25
30
35
40
4100
4095
4090
4085
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time


KLAM 50934
T38S/R11E-sec 6 dda
Northern Yonna Valley
Well Depth = 146 ft
Casing Depth = 141 ft
Seal Depth = 141 ft
Aquifer = Black Basalt (138 to 146 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
100
105
110
115
120
4115
4110
4105
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time


KLAM 11473
T38S/R11E-sec 30 dbc
Yonna Valley (Haskins Road)
Well Depth = 111ft
Casing Depth = 80 ft
Seal Depth = 75 ft
Aquifer = Gray Sandstone (83 to 111 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
40
45
50
55
60
4115
4110
4105
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time


KLAM 13400
T39S/R11E-sec 12 dba
Bonanza Vicinity
(McCartie Lane)
Well Depth = 329 ft
Casing Depth = 160 ft
Seal Depth = 160 ft
Aquifer = Lava Rock (326 to 329 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
130
135
140
145
150
4115
4110
4105
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time


KLAM 10814
T39S/R12E-sec 18 dcd
(northwest Keller Bridge)
Well Depth = 280 ft
Casing Depth = 258 ft
Seal Depth = 258 ft
Aquifer = Silty Sand (270 to 280 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
0
5
10
15
20
4115
4110
4105
4100
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time


KLAM 10641
T40S/R13E-sec 35 aaa
South Langell Valley
(West Langell Valley Road,
between Gift & Johnson Roads)
Well Depth = 427 ft
Casing Depth = 306 ft
Seal Depth = 306 ft
Aquifer = Brown and Black Basalt (331 to 427 ft)
Aquifer Test
Influence
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
5
10
15
20
25
4140
4135
4130
4125
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time
KLAM 14871
T40S/R13E-sec 13 ddd
South Langell Valley
(Gift Road)
Well Depth = 102 ft
Casing Depth = 50 ft
Seal Depth = 50 ft
Aquifer = Sand (61 to 102 ft)
Groundwater Level
(feet below land surface)
Groundwater Elevation
(elevation in feet above sea level)
-5
0
5
10
15
4140
4135
4130
4125
1-Jan-1997
1-Jan-1998
1-Jan-1999
1-Jan-2000
1-Jan-2001
1-Jan-2002
1-Jan-2003
Date & Time

.

Appendix 16: Project Surface Water Sites

Note: sites used in December 1997 seepage run

OWRD Site Prefix	OWRD Site Number	Township	South	Range	East	Section	QQQ	Description
Lost River								
OWRD Site Prefix	OWRD Site Number	Township	South	Range	East	Section	QQQ	Description
LR-	1	41	S	14	E	18	cdd	Lost River below Malone Dam (Langell Valley)
LR-	2	40	S	13	E	36	ddd	Lost River at Johnson Road (Langell Valley)
LR-	3	40	S	13	E	25	aaa	Lost River west of Gift Butte where the river flow turns from north to northwest (Langell Valley)
LR-	4	40	S	13	E	13	cdd	Lost River at Gift Road (Langell Valley)
LR-	5	40	S	13	E	10	add	Lost River at Cheese Factory Rd. (Langell Valley)
LR-	6	39	S	12	E	29	aba	Lost River above Keller Bridge (Langell Valley)
LR-	7	39	S	11	E	10	dba	Lost River at east boundary of the Town of Bonanza (Langell Valley)
LR-	8	39	S	11	E	16	aaa	Lost River at the Harpold Rd. Bridge south of the Town of Bonanza (Yonna Valley)
LR-	9	39	S	11	E	19	dca	Lost River at Harpold Dam bridge connecting N. Poe Valley Rd. to Harpold Rd. (gap between Yonna and Poe Valleys)
LR-	10	39	S	11.5	E	35	abb	Lost River (north branch) at Kennedy Land Company private road bridge and diversion structure (Poe Valley)
LR-	11	39	S	11.5	E	35	add	Lost River (south branch) at Kennedy Land Company private road bridge and diversion structure (Poe Valley)
LR-	12	39	S	11.5	E	21	cdb	Lost River at Kirsch Ranch private road timber bridge (Poe Valley)
LR-	13	39	S	10	E	14	aad	Lost River below Stevenson Park (Poe Valley)
LR-	14	39	S	10	E	14	ccb	Lost River at Olene Gap bridge connecting Hwy 140 to S. Poe Valley Rd.
Bonanza Big Springs								
OWRD Site Prefix	OWRD Site Number	Township	South	Range	East	Section	QQQ	Description
BS-	1	39	S	11	E	10	cda	Lost River (west branch) at new diversion structure above Bonanza Big Springs
BS-	2-A	39	S	11	E	10	cda	Lost River (west branch) at old diversion structure below Bonanza Big Springs
BS-	2-B	39	S	11	E	10	cdd	Lost River (west branch) about 200 ft. below old diversion structure below Bonanza Big Springs (alternate to BS-2A, added during Dec. 1997 seepage run)
BS-	3	39	S	11	E	10	cda	Bonanza Big Springs discharge channel about 100 ft. above confluence with Lost River (added during Dec. 1997 seepage run)

Appendix 16: Project Surface Water Sites

Note: sites used in December 1997 seepage run

OWRD Site Prefix	OWRD Site Number	Township	South	Range	East	Section	QQQ	Description
Diversions/Tributaries								
OWRD Site Prefix	OWRD Site Number	Township	South	Range	East	Section	QQQ	Description
DT-	1	41	S	14	E	18	cdd	West Lateral Canal along concrete section below dam headgate
DT-	2	41	S	14	E	18	dcc	East Lateral Canal between dam headgate and East Langell Valley Rd.
DT-	3	41	S	14	E	18	cbb	drainage from east follwing fenceline to Lost River
DT-	4	41	S	14	E	18	bcc	drainage on west side of river which runs from south and turns east to Lost River
DT-	5	41	S	13	E	13	ada	culvert on west side of river draining a marsh area
DT-	6	41	S	13	E	12	dad	culvert on west side of river
DT-	7	41	S	13	E	12	aaa	culvert on west side of river located at the SW corner of a timber bridge
DT-	8	41	S	13	E	1	dad	culvert on west side of river
DT-	9	41	S	13	E	1	add	culvert on west side of river (note: u-shaped pond on opposite/east side of river)
DT-	10	41	S	13	E	1	aaa	culvert on west side of river located at the SW corner of Johnson Rd. bridge
DT-	11	41	S	14	E	6	bbb	culvert on east side of river located at the SE corner of Johnson Rd. bridge
DT-	12	40	S	14	E	31	ccc	culvert on east side of river located at the NE corner of Johnson Rd. bridge
DT-	13	40	S	14	E	31	ccb	culvert on east side of river which receives drainage from east
DT-	14	40	S	13	E	36	daa	culvert on west side of river
DT-	15	40	S	14	E	31	bbb	culvert on east side of river (note: can not see at river, can see inlet in field)
DT-	16	40	S	14	E	30	cbc	culvert on east side of river
DT-	17	40	S	14	E	30	cbb	culvert on east side of river at the SE corner of a timber bridge between Johnson Rd. and Gift Rd. (drains large ditch)
DT-	18	40	S	13	E	25	daa	culvert on west side of river at the SW corner of a timber bridge between Johnson Rd. and Gift Rd. (drains large ditch)
DT-	19	40	S	13	E	24	ddd	culvert on east side of river (drains a ditch)
DT-	20	40	S	13	E	24	ddd	culvert on west side of river (drains a ditch)
DT-	21	40	S	13	E	24	dac	culvert on west side of river (drains a ditch)
DT-	22	40	S	13	E	24	dac	culvert on east side of river (drains a ditch, note: culvert very difficult to see at river)
DT-	23	40	S	13	E	24	acd	culvert on east side of river (drains a ditch)
DT-	24	40	S	13	E	24	acd	culvert on west side of river (drains a ditch)
DT-	25	40	S	13	E	24	abc	culvert on west side of river (drains a field)
DT-	26	40	S	13	E	24	baa	culvert on west side of river at the SW corner of Gift Rd. bridge (drains a ditch)
DT-	27	40	S	13	E	24	baa	culvert on east side of river at the SE corner of Gift Rd.bridge (drains a ditch)
DT-	28	40	S	13	E	13	cdd	culvert on west side of river at the NW corner of Gift Rd. bridge (drains a ditch)
DT-	29	40	S	13	E	13	cdd	culvert on east side of river at the NE corner of Gift Rd. bridge (drains a ditch)
DT-	30	40	S	13	E	13	cdc	culvert on west side of river
DT-	31	40	S	13	E	13	cdb	culvert on east side of river (drains a field)
DT-	32	40	S	13	E	13	cdb	culvert on east side of river (drains a major ditch)
DT-	33	40	S	13	E	13	cbd	culvert on west side of river
DT-	34	40	S	13	E	13	bcc	culvert on west side of river (drains a ditch)
DT-	35	40	S	13	E	13	bcc	culvert on east side of river
DT-	36	40	S	13	E	14	add	culvert on west side of river
DT-	37	40	S	13	E	14	aab	culvert on east side of river and south of river confluence with Miller Creek
DT-	38	40	S	13	E	14	aba	culvert on west side of river and SW on river confluence with Miller Creek
DT-	39	40	S	13	E	11	dcd	Miller Creek which drains from east to Lost River
DT-	40	40	S	13	E	11	dcd	culvert on west side of river (drains a field)
DT-	41	40	S	13	E	11	dcd	culvert on east side of river (drains a meandering ditch)
DT-	42	40	S	13	E	11	dcb	culvert on west/south side of river (drains a ditch running from south to north)
DT-	43	40	S	13	E	11	cda	culvert on east/north side of river (drains field)
DT-	44	40	S	13	E	11	cda	black pipe/culvert on west/south side of river (drains field)
DT-	45	40	S	13	E	11	cdb	culvert on west/south side of river (drains a ditch running from west to east)
DT-	46	40	S	13	E	11	cbb	culvert on east/north side of river (drains field swale)

Appendix 16: Project Surface Water Sites

Note: sites used in December 1997 seepage run

OWRD Site Prefix	OWRD Site Number	Township	South	Range	East	Section	QQQ	Description
DT-	47	40	S	13	E	10	daa	culvert on east side of river at the SE corner of Cheese Factory Rd. bridge (drains a ditch)
DT-	48	40	S	13	E	10	daa	culvert on west side of river at the SW corner of Cheese Factory Rd. bridge
DT-	49	40	S	13	E	10	add	culvert on east side of river at the NE corner of Cheese Factory Rd. bridge (drains a ditch)
DT-	50	40	S	13	E	10	adc	ditch on west side of river (ditch runs from south to north then turns east to river)
DT-	51	40	S	13	E	10	adb	culvert on west side of river (drains a large ditch)
DT-	52	40	S	13	E	10	adb	culvert on east side of river (drains a major ditch)
DT-	53	40	S	13	E	10	abd	culvert on west side of river (drains a major ditch)
DT-	54	40	S	13	E	10	abd	culvert on west side of river
DT-	55	40	S	13	E	10	aba	culvert on west/south side of river
DT-	56	40	S	13	E	10	aab	culvert on east/north side of river
DT-	57	40	S	13	E	3	dcd	culvert on north side of river (drains a major ditch)
DT-	58	40	S	13	E	3	cdc	ditch on north side of river
DT-	59	40	S	13	E	3	ccd	culvert/field drain on south side of river
DT-	60	40	S	13	E	3	cca	culvert/field drain on south side of river
DT-	61	40	S	13	E	3	ccb	ditch on south side of river (ditch runs from south to north)
DT-	62	40	S	13	E	4	daa	ditch on west/south side of river
DT-	63	40	S	13	E	4	daa	ditch on wesr/south side of river (ditch runs from SW to NE)
DT-	64	40	S	13	E	4	dab	culvert on west side of river (drains an E-W ditch)
DT-	65	40	S	13	E	4	daa	ditch on east side of river
DT-	66	40	S	13	E	4	adb	pump station on west side of river
DT-	67	39	S	12	E	33	dcc	culvert on north side of river
DT-	68	39	S	12	E	33	dcc	rusted pipe/field drain on south side of river and east of private timber bridge
DT-	69	39	S	12	E	33	cdd	ditch on south side of river (ditch runs from south to north)
DT-	70	39	S	12	E	33	cdd	major ditch on north side of river
DT-	71	39	S	12	E	33	cdd	ditch on south side of river
DT-	72	39	S	12	E	33	cdc	ditch on north side of river (ditch runs from north to south)
DT-	73	39	S	12	E	33	ccd	culvert on north side of river (drains a small ditch)
DT-	74	39	S	12	E	33	ccc	ditch on south side of river
DT-	75	39	S	12	E	33	ccc	ditch on south/west side of river
DT-	76	39	S	12	E	32	dda	ditch on south/west side of river (ditch runs from Se to NW then turns to river)
DT-	77	39	S	12	E	32	dac	spillway at pump station on south/west side of river (spillway drains a ditch)
DT-	78	39	S	12	E	32	dab	drainage on north side of river at levee breach
DT-	79	39	S	12	E	32	dbb	drainage on north side of river
DT-	80	39	S	12	E	32	caa	ditch on south side of river
DT-	81	39	S	12	E	32	caa	ditch on south side of river (drains an impoundment)
DT-	82	39	S	12	E	32	cab	ditch on west/south side of river
DT-	83	39	S	12	E	32	bdb	ditch on east side of river (ditch runs from east to west)
DT-	84	39	S	12	E	32	bbd	erosional drainage on west side of river (drains a ditch located upslope, springs adjacent to site)
DT-	85	39	S	12	E	32	bab	pump station on west side of river
DT-	86	39	S	12	E	29	cad	ditch on east side of river (ditch drains pasture)
DT-	87	39	S	12	E	29	caa	culvert on west side of river (drains a large ditch)
DT-	88	39	S	12	E	29	abc	ditch on east side of river
DT-	89	39	S	12	E	29	aba	ditch on east side of river at the SE corner of Keller Bridge (drains a ditch)
DT-	90	39	S	12	E	29	aba	culvert on west side of river at the SW corner of Keller Bridge (drains a ditch)
DT-	91	39	S	12	E	29	aba	culvert on east side of river at the NE corner of Keller Bridge (drains a ditch)
DT-	92	39	S	12	E	29	aba	ditch on east side of river and north of Keller Bridge
DT-	93	39	S	12	E	20	dca	large ditch on east/north side of river (ditch runs from NE to SW)
DT-	94	39	S	12	E	20	dbb	culvert on west side of river (drains a drainage and pond)
DT-	95	39	S	12	E	20	caa	ditch on west side of river (pump station on north side of ditch)

Appendix 16: Project Surface Water Sites

Note: sites used in December 1997 seepage run

OWRD Site Prefix	OWRD Site Number	Township	South	Range	East	Section	QQQ	Description
DT-	96	39	S	12	E	20	bbd	ditch on south side of river
DT-	97	39	S	12	E	20	bbb	culvert on south/west side of river
DT-	98	39	S	12	E	20	bbb	drain pipe on south/west side of river
DT-	99	39	S	12	E	20	bbb	small erosional ditch on north/east side of river
DT-	100	39	S	12	E	20	bbb	large ditch on south/west side of river (ditch runs from south to north)
DT-	101	39	S	12	E	17	ccc	large ditch on north/east side of river (ditch runs from north to south)
DT-	102	39	S	12	E	18	ddd	field drain pipe on north/east side of river
DT-	103	39	S	12	E	18	ddb	field drain pipe on north/east side of river
DT-	104	39	S	12	E	18	dac	major ditch on north/east side of river and small island (ditch runs from north to south)
DT-	105	39	S	12	E	18	dca	ditch on south/west side of river and small island
DT-	106	39	S	12	E	18	cad	ditch on north side of river (ditch runs from north to south)
DT-	107	39	S	12	E	18	cac	small ditch on north side of river (east of metal pump house with inlet)
DT-	108	39	S	12	E	18	cbd	ditch on north/east side of river
DT-	109	39	S	12	E	18	cbc	large ditch on south/west sdie of river (ditch runs from SE to NW and turns north to river)
DT-	110	39	S	11	E	13	ada	ditch on west sdie of river (ditch runs from south to north parallel to river then turns east to river)
DT-	111	39	S	11	E	13	aad	ditch on west sdie of river (discharge area is a large v-shaped area)
DT-	112	39	S	11	E	13	aab	drainage on south/west side of river (drainage splits just before river)
DT-	113	39	S	11	E	13	aab	Irwin's Pump Station on south side of river
DT-	114	39	S	11	E	13	aba	Big Springs Pump Station and adjacent ditch on north side of river
DT-	115	39	S	11	E	13	aba	field drain pipe on south side of river
DT-	116	39	S	11	E	13	baa	ditch on south side of river
DT-	117	39	S	11	E	13	bab	field drain on north side of river
DT-	118	39	S	11	E	13	bba	field drain on south side of river
DT-	119	39	S	11	E	13	bba	culvert/field drain on north side of river
DT-	120	39	S	11	E	13	bbb	culvert/field drain on south side of river
DT-	121	39	S	11	E	12	ccc	ditch on north side of river (ditch runs from north to south)
DT-	122	39	S	11	E	11	ddd	culvert/field drain on south side of river
DT-	122-A	39	S	11	E	11	ddc	culvert/field drain on north side of river about 250 ft. above DT-123 (added during Dec. 1997 seepage run)
DT-	123	39	S	11	E	11	ddc	pump station and possible ditch outlet on north side of river
DT-	124	39	S	11	E	11	dcd	pump station and spring on south side of river
DT-	125	39	S	11	E	11	cca	Nichol's Pump Station on south/west side of river
DT-	126	39	S	11	E	10	dab	large culvert below a smaller culvert below McCartie Lane (drains to north side of river)
DT-	127	39	S	11	E	10	dab	drainage on the south side of river
DT-	128	39	S	11	E	10	dab	culvert below McCartie Lane (drains to north side of river)
DT-	129	39	S	11	E	10	caa	culvert draining to river inlet for Horsefly Irrigation District pump station (inlet is on west side of river)
DT-	130	39	S	11	E	10	dcc	ditch on east side of east branch of river at Bonanza
DT-	131	39	S	11	E	15	baa	concrete pond outlet on east side of east branch of river at Bonanza (pond is spring fed)
DT-	132	39	S	11	E	15	baa	concrete pond outlet on east side of east branch of river at Bonanza (pond is spring fed, discharges to river via a submerged culvert)
DT-	133	39	S	11	E	15	bad	ditch on east/south side of east branch of river at Bonanza
DT-	134	39	S	11	E	15	bbb	large drainage south of river at SE corner of Harpold Rd. Bridge south of Boanaza
DT-	135	39	S	11	E	15	bbb	drainage on north side of river at NE corner of Harpold Rd. Bridge south of Bonanza
DT-	136	39	S	11	E	16	aaa	drainage on north side of river at NW corner of Harpold Bridge south of Bonanza
DT-	161	39	S	11	E	16	aab	ditch on south side of river
DT-	137	39	S	11	E	16	aba	drainage on north side of river and on west side of Bonanza sewage treatment facility
DT-	138	39	S	11	E	16	abd	field drain on north side of river (white PVC pipe draining a red sump)
DT-	139	39	S	11	E	16	acb	ditch on south side of river (pump station at site)
DT-	140	39	S	11	E	16	bdc	small culvert on north side of river (discharges water from buried field drains)
DT-	141	39	S	11	E	16	bcc	ditch on north side of river (ditch runs from north to south)
DT-	142	39	S	11	E	17	aac	ditch draining to "Dairy Pump" inlet on north side of river (ditch runs from east to west)

Appendix 16: Project Surface Water Sites

Note: sites used in December 1997 seepage run

OWRD Site Prefix	OWRD Site Number	Township	South	Range	East	Section	QQQ	Description
DT-	143	39	S	11	E	17	aac	drain pipe draining to "Dairy Pump" inlet on north side of river
DT-	144	39	S	11	E	18	aab	Buck Creek at Burgdorf Rd. bridge (creek drains to north side of river)
DT-	164	39	S	11	E	17	caa	pump inlet on south side of river
DT-	145	39	S	11	E	18	dac	ditch/canal at Burgdorf Rd. (drains? to north side of river)
DT-	146	39	S	11	E	19	aac	ditch/canal at Burgdorf Rd. (fed by pump at inlet on north side of river)
DT-	147	39	S	11	E	20	bdb	Wright Creek at Harpold Rd. (near PGT Bonanza Compression Station No. 14, drains to south/east side of river)
DT-	148	39	S	11	E	20	cbb	small tributary at Harpold Rd. (drains to south/east side of river)
DT-	149	39	S	11	E	30	dbc	concrete culvert at Harpold Rd. (drains a small tributary to south/east side of river)
DT-	162	39	S	11.5	E	25	dad	multiple erosoional drainages west of inlet on south side of river
DT-	150	39	S	11	E	30	ccb	culvert/field drain discharging to inlet on south side of river
DT-	163	39	S	11	E	30	ccb	pump at south end of river inlet on south side of river (seepage occurs along inlet banks)
DT-	151	39	S	11.5	E	25	cda	small irrigation pump at NE corner of river inlet on north side of river
DT-	152	39	S	11.5	E	25	cda	culvert/field drain at NW corner of river inlet on north side of river
DT-	153	39	S	11.5	E	25	cad	ditch fed by 2 turbines at north end of river inlet on north side of river
DT-	154	39	S	11.5	E	25	ccc	ditch on south/east side of river (ditch runs from east to west after running from south to north)
DT-	155	39	S	11.5	E	35	aab	culvert on north/west side of river
DT-	156	39	S	11.5	E	35	aab	pump station , house, and suspended discharge pipes where the river splits around a large Poe Valley island
DT-	157	39	S	11.5	E	35	aba	culvert on south side of river's north branch (culvert drains a small ditch)
DT-	158	39	S	11.5	E	35	add	culvert on south side of river's south branch (culvert drains a ditch)
DT-	159	39	S	11.5	E	35	add	culvert and ditch on south side of river (south branch)
DT-	160	39	S	11.5	E	35	dcd	culvert and ditch at S. Poe Valley Rd. (drains to south side of river's south branch)
DT-	165	39	S	11.5	E	35	dcb	ditch on south side of river (south branch)
DT-	166	39	S	11.5	E	35	cda	ditch on south side of river (south branch)
DT-	167	39	S	11.5	E	35	cac	ditch on south side of river (south branch)
DT-	168	39	S	11.5	E	35	cbb	ditch on south/west side of river (south branch)
DT-	169	39	S	11.5	E	34	aac	ditch on west side of river (south branch)
DT-	170	39	S	11.5	E	35	abb	culvert/field drain on north side of river (north branch)
DT-	171	39	S	11.5	E	35	baa	culvert/field drain on north side of river (north branch)
DT-	172	39	S	11.5	E	35	baa	culvert/field drain on north side of river (north branch)
DT-	173	39	S	11.5	E	35	bab	culvert/field drain on north side of river (north branch)
DT-	174	39	S	11.5	E	26	ccd	culvert/field drain on north side of river (north branch)
DT-	175	39	S	11.5	E	26	ccc	culvert/field drain on north side of river (north branch)
DT-	176	39	S	11.5	E	26	ccc	ditch on north side of river (north branch of river, ditch runs from north to south, pipe at end of ditch)
DT-	177	39	S	11.5	E	27	cad	ditch on north side of river and small islands
DT-	178	39	S	11.5	E	27	cac	pipe/field drain on north side of river and small islands
DT-	179	39	S	11.5	E	27	cac	ditch on south side of river and small islands
DT-	180	39	S	11.5	E	27	bcc	ditch on south/west side of river
DT-	181	39	S	11.5	E	27	bcc	ditch on south/west side of river and east of timber bridge
DT-	182	39	S	11.5	E	28	add	ditch on north/east side of river
DT-	183	39	S	11.5	E	28	aac	ditch on south/west side of river
DT-	184	39	S	11.5	E	28	aac	pipe/field drain on south side of river
DT-	185	39	S	11.5	E	21	dcd	inlet and pump on east/north side of river
DT-	186	39	S	11.5	E	21	dcb	old river channel and pump on east/north side of river
DT-	187	39	S	11.5	E	21	dcb	ditch on south/west side of river
DT-	188	39	S	11.5	E	21	cdb	ditch on south side of river at SE corner of private timber bridge
DT-	189	39	S	11.5	E	21	cdb	pipe/field drain on south side of river
DT-	190	39	S	11.5	E	21	ccb	pipe/field drain on south side of river
DT-	190-B	39	S	11.5	E	21	ccb	field drain on south side of river about half way between DT-190 and DT-191 (added during Dec. 1997 seepage run)
DT-	191	39	S	11.5	E	21	ccb	pipe/field drain on south side of river

Appendix 16: Project Surface Water Sites

Note: sites used in December 1997 seepage run

OWRD Site Prefix	OWRD Site Number	Township	South	Range	East	Section	QQQ	Description
DT-	192	39	S	11.5	E	20	dda	pipe/field drain on south side of river
DT-	193	39	S	11.5	E	20	dda	ditch on south side of river (ditch runs from south to north)
DT-	194	39	S	11.5	E	20	dda	pipe/field drain on south side of river
DT-	195	39	S	11.5	E	20	dca	pipe/field drain on south side of river
DT-	196	39	S	11.5	E	20	dca	pipe/field drain on south side of river
DT-	197	39	S	11.5	E	20	dcb	culvert/field drain on south side of river
DT-	198	39	S	11.5	E	20	dcb	old river channel north side of river (discharge from old channel to river via culvert)
DT-	199	39	S	11.5	E	20	dcb	ditch on south side of river (ditch runs from SE to NW)
DT-	200	39	S	11.5	E	20	cad	ditch and oxbow draining to north side of river
DT-	201	39	S	11.5	E	20	cac	ditch and oxbow draining to north side of river
DT-	202	39	S	11.5	E	20	cbd	ditch and oxbow draining to north side of river
DT-	203	39	S	11.5	E	20	cca	ditch on south/east side of river
DT-	203-B	39	S	11.5	E	20	ccd	small ditch on south/east side of river about 150 ft east of DT-204 (added during Dec. 1997 seepage run)
DT-	204	39	S	11.5	E	20	ccd	pump station on south side of river
DT-	204-B	39	S	11.5	E	19	ddd	small ditch on south side of river (added during Dec. 1997 seepage run)
DT-	205	39	S	11.5	E	19	ddd	concrete drain and outlet on north side of river
DT-	206	39	S	11.5	E	19	ddd	ditch with culvert on south side of river (culvert at ditch crossing)
DT-	207	39	S	11.5	E	19	ddc	outlet on south/west side of river (drains a spring)
DT-	207-B	39	S	11.5	E	19	dcb	culvert/field drain on south/west side of river (added during Dec. 1997 seepage run)
DT-	207-C	39	S	11.5	E	19	cad	ditch on south/west side of river (added during Dec. 1997 seepage run)
DT-	207-D	39	S	11.5	E	19	cab	ditch draining pond on south/west side of river (added during Dec. 1997 seepage run)
DT-	207-E	39	S	11.5	E	19	cbb	ditch draining pond on south/west side of river (added during Dec. 1997 seepage run)
DT-	207-F	39	S	10	E	13	dad	ditch draining oxbow (spring fed?) on south/west side of river (added during Dec. 1997 seepage run)
DT-	207-G	39	S	10	E	13	add	ditch draining oxbow (spring fed?) on south/west side of river (added during Dec. 1997 seepage run)
DT-	207-H	39	S	11.5	E	19	dcd	several small springs on south side of river between DT-207 and DT-208 (added during Dec. 1997 seepage run)
DT-	208	39	S	11.5	E	19	dcd	pump station on north/east side of river
DT-	209	39	S	10	E	13	dad	outlet on north/east side of river (drains a ditch and marsh)
DT-	210	39	S	10	E	13	daa	outlet with submerged culvert on north/east side of river (drains marsh)
DT-	211	39	S	10	E	13	add	outlet on north/east side of river (drains oxbow fed by two ditches)
DT-	212	39	S	10	E	13	bda	ditch on south/west side of river
DT-	213	39	S	10	E	13	bda	pump station and drainage at oxbow on north/east side of river
DT-	214	39	S	10	E	13	bdb	outlet for tributary fed oxbow on west/south side of river
DT-	215	39	S	10	E	13	bac	ditch on east/north side of river
DT-	216	39	S	10	E	12	ccd	ersional ditch on east/north side of river
DT-	217	39	S	10	E	12	ccd	ditch on east/north side of river (drainage from Pine Flat)
DT-	218	39	S	10	E	12	ccd	pump station on north side of river (north of Stevenson Park)
DT-	219	39	S	10	E	12	ccc	pump station on north side of river (north of Stevenson Park)
DT-	220	39	S	10	E	14	aad	ditch and two road drains which drain to north/west side of river below Stevenson Park (ditch fed by Hwy 140 road drains)
DT-	221	39	S	10	E	14	cbd	culvert on north side of river at Olene Gap
DT-	222	39	S	10	E	14	cbd	concrete discharge box on north side of river at Olene Gap
DT-	223	39	S	10	E	14	cbc	culvert on north side of river at Olene Gap
DT-	224	39	S	10	E	14	ccb	E Canal on north side of river at Olene Gap
DT-	225	39	S	10	E	14	ccc	F Canal on south side of river at Olene Gap

Appendix 17: Lost River Seepage Run Data

Note: seepage run occurred in December 1997

				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Date**	**Celcius**	**Fahrenheit**	**Bottle**	**u-S/cm**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Rating**
Lost River Summary																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
LR-	1	river	01-Dec-1997	3.9	39.0	DP-336	202	7.250							7.250	poor
LR-	2	river	01-Dec-1997	----	----	DP-862	310	11.100							11.100	poor
LR-	3	river	01-Dec-1997	4.4	40.0	DP-1262	357	15.400							15.400	poor
LR-	3	river	02-Dec-1997	----	----	none	----	11.550							11.550	poor
LR-	4	river	02-Dec-1997	----	----	DP-1256	361	14.070							14.070	good
LR-	5	river	02-Dec-1997	3.5	38.3	DP-1245	386	22.950							22.950	good
LR-	6	river	02-Dec-1997	3.0	37.4	none	----	30.440							30.440	good
LR-	6	river	03-Dec-1997	----	----	DP-1253	449	24.840							24.840	----
LR-	7	river	03-Dec-1997	1.0	33.8	DP-1581	467	33.720							33.720	good
LR-	8	river	03-Dec-1997	10.0	50.0	DP-1245	285	94.350							94.350	poor
LR-	9	river	03-Dec-1997	7.0	44.6	unmarked	335	97.630							97.630	fair
LR-	9	river	05-Dec-1997	----	----	none	----	97.630							97.630	----
LR-	10	river	04-Dec-1997	7.0	44.6	DP-343	352	86.710							86.710	good
LR-	11	river	04-Dec-1997	6.0	42.8	DP-17	355	15.490							15.490	good
LR-	12	river	05-Dec-1997	5.6	42.0	DP-867	396	107.510							107.510	good
LR-	13	river	05-Dec-1997	6.1	43.0	DP-583	380	136.570							136.570	good
LR-	14	river	05-Dec-1997	6.1	43.0	DP-996	390	106.320							106.320	good
Bonanza Big Springs Summary																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
BS-	1	river	03-Dec-1997	1.0	33.8	DP-1027	470	5.540							5.540	fair
BS-	2-A	river	03-Dec-1997	13.0	55.4	DP-862	237	26.440							26.440	poor
BS-	2-B	river	03-Dec-1997	----	----	none	----	33.970							33.970	good
BS-	3	spring	03-Dec-1997	----	----	DP-1131	165	----							0.000	----
					Spring Flow (BS-2B - BS-1)			28.430								

Appendix 17: Lost River Seepage Run Data

Note: seepage run occurred in December 1997

				Field Water Temp		**Conductivity**		**Flow ft3/sec**								**Meaurement**
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Date**	**Celcius**	**Fahrenheit**	**Bottle**	**u-S/cm**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Rating**
LR-1 (Malone Dam) to LR-2 (Johnson Road)																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
LR-	1	river	01-Dec-1997	3.9	39.0	DP-336	202	7.250								poor
DT-	1	canal	01-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	2	canal	01-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	3	ditch	01-Dec-1997	----	----	DP-1095	424			0.004					0.004	----
DT-	4	ditch	01-Dec-1997	0.5	32.9	DT-640	522			0.003					0.003	----
DT-	5	culvert	01-Dec-1997	4.0	39.2	DP-1611	397				0.210				0.210	----
DT-	6	culvert	01-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	7	culvert	01-Dec-1997	----	----	DP-1303	320				0.344				0.344	----
DT-	8	culvert	01-Dec-1997	----	----	DP-1776	311				0.159				0.159	----
DT-	9	culvert	01-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	10	culvert	01-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	11	culvert	01-Dec-1997	4.0	39.2	DP-1808	506				3.180				3.180	----
LR-	2	river	01-Dec-1997	----	----	DP-862	310	11.100								poor
					Total (inflow-outflow)				0.000	0.007	3.893	0.000	0.000	0.000	3.900	
					River Gain (+)/Loss(-)			3.850								
					Unaccounted Gain (+)/Loss(-)			-0.050								

Appendix 17: Lost River Seepage Run Data

Note: seepage run occurred in December 1997

				Field Water Temp		**Conductivity**		**Flow ft3/sec**								**Meaurement**
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Date**	**Celcius**	**Fahrenheit**	**Bottle**	**u-S/cm**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Rating**
LR-2 (Johnson Road) to LR-3 (West of Gift Butte)																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
LR-	2	river	01-Dec-1997	----	----	DP-862	310	11.100								poor
DT-	12	culvert	01-Dec-1997	3.3	38.0	DP-1760	575				0.810				0.810	fair
DT-	13	culvert	01-Dec-1997	3.9	39.0	DP-62	459				0.003				0.003	----
DT-	14	culvert	01-Dec-1997	4.4	40.0	DP-272	457				0.420				0.420	----
DT-	15	culvert	01-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	16	culvert	02-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	17	culvert	02-Dec-1997	----	----	DP-867	607				0.760				0.760	fair
DT-	18	culvert	01-Dec-1997	2.2	36.0	DP-1142	823				0.150				0.150	----
LR-	3	river	01-Dec-1997	4.4	40.0	DP-1262	357	15.400								poor
					Total (inflow-outflow)				0.000	0.000	2.143	0.000	0.000	0.000	2.143	
					River Gain (+)/Loss(-)			4.300								
					Unaccounted Gain (+)/Loss(-)			2.157								
Duplicate Measurements/Samples: LR-2 (Johnson Road) to LR-3 (West of Gift Butte)																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
DT-	17	culvert	01-Dec-1997	3.9	39.0	DP-867	603				0.691				0.691	fair

Appendix 17: Lost River Seepage Run Data

Note: seepage run occurred in December 1997

				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Date**	**Celcius**	**Fahrenheit**	**Bottle**	**u-S/cm**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Rating**
LR-3 (West of Gift Butte) to LR-4 (Gift Road)																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
LR-	3	river	02-Dec-1997	----	----	none	----	11.550								poor
DT-	19	culvert	02-Dec-1997	----	----	DP-1760	303				1.510				1.510	----
DT-	20	culvert	01-Dec-1997	4.4	40.0	DP-850	513				0.395				0.395	----
DT-	21	culvert	02-Dec-1997	0.0	32.0	DP-996	457				0.377				0.377	----
DT-	22	culvert	02-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	23	culvert	02-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	24	culvert	01-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	25	culvert	02-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	26	culvert	02-Dec-1997	0.0	32.0	DP-501	781				0.174				0.174	----
DT-	27	culvert	02-Dec-1997	----	----	none	----				0.000				0.000	----
LR-	4	river	02-Dec-1997	----	----	DP-1256	361	14.070								good
					Total (inflow-outflow)				0.000	0.000	2.456	0.000	0.000	0.000	2.456	
					River Gain (+)/Loss(-)			2.520								
					Unaccounted Gain (+)/Loss(-)			0.064								
Duplicate Measurements/Samples: LR-3 (West of Gift Butte) to LR-4 (Gift Road)																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
DT-	19	culvert	01-Dec-1997	5.6	42.0	DP-846	307				0.999				0.999	----
DT-	22	culvert	01-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	23	culvert	01-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	27	culvert	01-Dec-1997	----	----	none	----				0.000				0.000	----

Appendix 17: Lost River Seepage Run Data

Note: seepage run occurred in December 1997

				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Date**	**Celcius**	**Fahrenheit**	**Bottle**	**u-S/cm**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Rating**
LR-4 (Gift Road) to LR-5 (Cheese Factory Road)																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
LR-	4	river	02-Dec-1997	----	----	DP-1256	361	14.070								good
DT-	28	culvert	02-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	29	culvert	02-Dec-1997	----	----	DP-1058	793				0.011				0.011	excellent
DT-	30	culvert	02-Dec-1997	2.8	37.0	DP-899	247				0.002				0.002	----
DT-	31	culvert	02-Dec-1997	----	----	DP-1095	151				0.008				0.008	excellent
DT-	32	culvert	02-Dec-1997	----	----	DP-1776	307				0.035				0.035	fair
DT-	33	culvert	02-Dec-1997	3.9	39.0	DP-1202	240				0.001				0.001	----
DT-	34	culvert	02-Dec-1997	0.6	33.0	DP-1660	824				0.078				0.078	----
DT-	35	culvert	02-Dec-1997	----	----	DP-897	158				0.029				0.029	good
DT-	36	culvert	02-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	37	culvert	02-Dec-1997	----	----	DP-901	144				0.005				0.005	----
DT-	38	culvert	02-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	39	tributary	02-Dec-1997	----	----	DP-1611	267							6.030	6.030	good
DT-	40	field drain	02-Dec-1997	2.2	36.0	DP-1601	285					0.010			0.010	----
DT-	41	culvert	02-Dec-1997	3.9	39.0	DP-1264	603				1.360				1.360	----
DT-	42	culvert	02-Dec-1997	2.8	37.0	DP-1146	565				0.420				0.420	----
DT-	43	field drain	02-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	44	field drain	02-Dec-1997	4.7	40.5	DP-3	186					0.004			0.004	----
DT-	45	ditch	02-Dec-1997	1.7	35.0	DP-1625	191			0.005					0.005	----
DT-	46	culvert	02-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	47	culvert	02-Dec-1997	0.6	33.0	DP-583	455				0.041				0.041	----
DT-	48	culvert	02-Dec-1997	4.2	39.5	DP-1000	611				0.108				0.108	----
LR-	5	river	02-Dec-1997	3.5	38.3	DP-1245	386	22.950								good
					Total (inflow-outflow)				0.000	0.005	2.098	0.014	0.000	6.030	8.147	
					River Gain (+)/Loss(-)			8.880								
					Unaccounted Gain (+)/Loss(-)			0.733								
Duplicate Measurements/Samples: LR-4 (Gift Road) to LR-5 (Cheese Factory Road)																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
DT-	29	culvert	01-Dec-1997	1.1	34.0	DP-966	686				0.018				0.018	----

Appendix 17: Lost River Seepage Run Data

Note: seepage run occurred in December 1997

				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Date**	**Celcius**	**Fahrenheit**	**Bottle**	**u-S/cm**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Rating**
LR-5 (Cheese Factory Road) to LR-6 (Near Keller Bridge)																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
LR-	5	river	02-Dec-1997	3.5	38.3	DP-1245	386	22.950								good
DT-	49	culvert	02-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	50	ditch	02-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	51	culvert	02-Dec-1997	2.8	37.0	DP-1121	620				0.058				0.058	----
DT-	52	culvert	02-Dec-1997	1.1	34.0	DP-1808	563				0.360				0.360	----
DT-	53	culvert	02-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	54	culvert	02-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	55	culvert	02-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	56	culvert	02-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	57	culvert	02-Dec-1997	4.5	40.1	DP-336	601				0.265				0.265	----
DT-	58	ditch	02-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	59	field drain	02-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	60	field drain	02-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	61	ditch	02-Dec-1997	4.5	40.1	DP-850	861			0.320					0.320	----
DT-	62	ditch	02-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	63	ditch	02-Dec-1997	1.1	34.0	DP-584	565			0.035					0.035	----
DT-	64	culvert	02-Dec-1997	1.1	34.0	DP-1253	808				0.017				0.017	----
DT-	65	ditch	02-Dec-1997	1.1	34.0	DP-1152	630			0.290					0.290	----
DT-	66	pump	02-Dec-1997	----	----	none	----		0.000						0.000	----
DT-	67	culvert	02-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	68	field drain	02-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	69	ditch	02-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	70	ditch	02-Dec-1997	2.0	35.6	DT-640	637			0.206					0.206	----
DT-	71	ditch	02-Dec-1997	5.6	42.0	DP-1294	608			0.257					0.257	----
DT-	72	ditch	02-Dec-1997	4.4	40.0	DP-812	619			0.088					0.088	----
DT-	73	culvert	02-Dec-1997	----	----	DP-1004	376				0.004				0.004	----
DT-	74	ditch	02-Dec-1997	5.0	41.0	DP-1151	746			0.013					0.013	----
DT-	75	ditch	02-Dec-1997	6.0	42.8	DP-1142	731			0.011					0.011	----
DT-	76	ditch	02-Dec-1997	5.6	42.0	DP-1723	394			0.052					0.052	----
DT-	77	ditch	02-Dec-1997	1.0	33.8	DP-846	602			0.090					0.090	----
DT-	78	ditch	02-Dec-1997	5.0	41.0	unknown	----			0.070					0.070	----
DT-	79	ditch	02-Dec-1997	4.4	40.0	DP-1774	441			0.065					0.065	----
DT-	80	ditch	02-Dec-1997	9.5	49.1	DP-1746	481						0.046		0.046	----
DT-	81	ditch	02-Dec-1997	6.1	43.0	DP-1208	437			0.008					0.008	----
DT-	82	ditch	02-Dec-1997	4.0	39.2	DP-966	822			1.890					1.890	----
DT-	83	ditch	02-Dec-1997	3.3	38.0	DP-964	699			0.013					0.013	----
DT-	84	ditch	02-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	85	pump	02-Dec-1997	----	----	none	----		0.000						0.000	----
DT-	86	ditch	02-Dec-1997	4.4	40.0	DP-1598	569			0.106					0.106	----
DT-	87	culvert	02-Dec-1997	3.3	38.0	DP-937	814				0.046				0.046	----
DT-	88	ditch	02-Dec-1997	----	----	DP-539	798			0.013					0.013	----
LR-	6	river	02-Dec-1997	3.0	37.4	none	----	30.440								good
					Total (inflow-outflow)				0.000	3.527	0.750	0.000	0.046	0.000	4.323	
					River Gain (+)/Loss(-)			7.490								
					Unaccounted Gain (+)/Loss(-)			3.167								

Appendix 17: Lost River Seepage Run Data

Note: seepage run occurred in December 1997

				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Date**	**Celcius**	**Fahrenheit**	**Bottle**	**u-S/cm**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Rating**
LR-6 (Near Keller Bridge) to LR-7 (Bonanza East Boundary)																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
LR-	6	river	03-Dec-1997	----	----	DP-1253	449	24.840								----
DT-	89	ditch	03-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	90	culvert	03-Dec-1997	4.4	40.0	DP-1004	579				0.007				0.007	----
DT-	91	culvert	03-Dec-1997	0.6	33.0	DP-1808	609				0.003				0.003	----
DT-	92	ditch	03-Dec-1997	3.3	38.0	DP-1121	493			0.003					0.003	----
DT-	93	ditch	03-Dec-1997	----	----	DP-1167	736			0.004					0.004	----
DT-	94	culvert	03-Dec-1997	5.0	41.0	DP-336	535				0.034				0.034	----
DT-	95	ditch	03-Dec-1997	0.6	33.0	DP-1041	693			0.004					0.004	----
DT-	96	ditch	03-Dec-1997	1.7	35.0	DP-1208	896			0.004					0.004	----
DT-	97	culvert	03-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	98	field drain	03-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	99	ditch	03-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	100	ditch	03-Dec-1997	1.1	34.0	DP-1294	779			0.362					0.362	----
DT-	101	ditch	03-Dec-1997	0.0	32.0	DP-850	584			0.052					0.052	----
DT-	102	field drain	03-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	103	field drain	03-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	104	ditch	03-Dec-1997	2.8	37.0	DP-937	712			0.097					0.097	----
DT-	105	ditch	03-Dec-1997	2.0	35.6	DT-640	1,034			0.026					0.026	----
DT-	106	ditch	03-Dec-1997	2.8	37.0	DP-1746	775			0.053					0.053	----
DT-	107	ditch	03-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	108	ditch	03-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	109	ditch	03-Dec-1997	3.9	39.0	DP-966	603			0.046					0.046	----
DT-	110	ditch	03-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	111	ditch	03-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	112	ditch	03-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	113	pump	03-Dec-1997	----	----	none	----		0.000						0.000	----
DT-	114	pump/ditch	03-Dec-1997	----	----	DP-1152	504			0.002					0.002	----
DT-	115	field drain	03-Dec-1997	10.0	50.0	DP-964	645					0.012			0.012	----
DT-	116	ditch	03-Dec-1997	8.0	46.4	DP-812	874			0.058					0.058	----
DT-	117	field drain	03-Dec-1997	10.0	50.0	DP-1537	688					0.010			0.010	----
DT-	118	field drain	03-Dec-1997	10.0	50.0	DP-60	1,576					0.008			0.008	----
DT-	119	field drain	03-Dec-1997	10.6	51.0	DP-539	790					0.021			0.021	----
DT-	120	field drain	03-Dec-1997	10.0	50.0	DP-1626	1,343					0.020			0.020	----
DT-	121	ditch	03-Dec-1997	8.0	46.4	DP-1774	647			0.119					0.119	----
DT-	122	field drain	03-Dec-1997	10.0	50.0	DP-1730	1,308					0.015			0.015	----
DT-	122-A	field drain	03-Dec-1997	10.0	50.0	DP-1303	950					0.043			0.043	----
DT-	123	ditch	03-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	124	spring	03-Dec-1997	9.0	48.2	DP-1151	1,258						0.014		0.014	----
DT-	125	pump	03-Dec-1997	----	----	none	----		0.000						0.000	----
DT-	126	culvert	03-Dec-1997	6.7	44.0	DP-1794	963				0.109				0.109	----
DT-	127	ditch	03-Dec-1997	0.0	32.0	DP-62	639			0.008					0.008	----
DT-	128	culvert	03-Dec-1997	3.9	39.0	DP-983	1,017				0.046				0.046	----
LR-	7	river	03-Dec-1997	1.0	33.8	DP-1581	467	33.720								good
					Total (inflow-outflow)				0.000	0.838	0.199	0.129	0.014	0.000	1.180	
					River Gain (+)/Loss(-)			8.880								
					Unaccounted Gain (+)/Loss(-)			7.700								

Appendix 17: Lost River Seepage Run Data

Note: seepage run occurred in December 1997

				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Date**	**Celcius**	**Fahrenheit**	**Bottle**	**u-S/cm**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Rating**
LR-7 (Bonanza East Boundary) to LR-8 (Bonanza Harpold Rd Bridge)																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
LR-	7	river	03-Dec-1997	1.0	33.8	DP-1581	467	33.720								good
DT-	129	culvert	03-Dec-1997	0.6	33.0	DP-841	950				0.273				0.273	----
DT-	130	ditch	03-Dec-1997	3.3	38.0	DP-901	1,000			0.070					0.070	good
DT-	131	spring	03-Dec-1997	----	----	DP-583	172						0.001		0.001	----
DT-	132	spring	03-Dec-1997	6.9	44.5	DP-1760	179						6.330		6.330	excellent
DT-	133	ditch	03-Dec-1997	----	----	DP-867	934			0.180					0.180	fair
BS-	2B - 1	spring	03-Dec-1997	13.0	55.4	DP-1131	165						28.430		28.430	----
DT-	134	ditch	03-Dec-1997	----	----	DP-501	1,361			0.035					0.035	----
DT-	135	ditch	03-Dec-1997	----	----	none	----			0.000					0.000	----
LR-	8	river	03-Dec-1997	10.0	50.0	DP-1245	285	94.350								poor
					Total (inflow-outflow)				0.000	0.285	0.273	0.000	34.761	0.000	35.319	
					River Gain (+)/Loss(-)			60.630								
					Unaccounted Gain (+)/Loss(-)			25.311								
Bonanza Big Springs Summary																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
BS-	1	river	03-Dec-1997	1.0	33.8	DP-1027	470	5.540							5.540	fair
BS-	2-A	river	03-Dec-1997	13.0	55.4	DP-862	237	26.440							26.440	poor
BS-	2-B	river	03-Dec-1997	----	----	none	----	33.970							33.970	good
BS-	3	spring	03-Dec-1997	----	----	DP-1131	165								0.000	----
					Spring Flow (BS-2B - BS-1)			28.430								

Appendix 17: Lost River Seepage Run Data

Note: seepage run occurred in December 1997

				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Date**	**Celcius**	**Fahrenheit**	**Bottle**	**u-S/cm**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Rating**
LR-8 (Bonanza Harpold Rd Bridge) to LR-9 (Bridge at Harpold Dam)																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
LR-	8	river	03-Dec-1997	10.0	50.0	DP-1245	285	94.350								poor
DT-	136	ditch	03-Dec-1997	2.8	37.0	DP-3	916			0.039					0.039	----
DT-	161	ditch	03-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	137	ditch	03-Dec-1997	3.9	39.0	DP-1601	841			0.017					0.017	----
DT-	138	field drain	03-Dec-1997	10.3	50.5	DP-1000	1,314					0.100			0.100	----
DT-	139	ditch	03-Dec-1997	----	----	DP-1625	1,914			0.084					0.084	----
DT-	140	culvert	03-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	141	ditch	03-Dec-1997	5.0	41.0	DP-1058	1,015			0.700					0.700	poor
DT-	142	ditch	03-Dec-1997	8.9	48.0	DP-868	514			0.014					0.014	----
DT-	143	culvert	03-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	144	tributary	03-Dec-1997	2.8	37.0	DP-1304	791							5.940	5.940	good
DT-	164	inlet	03-Dec-1997	14.4	58.0	DP-1146	234						0.620		0.620	good
DT-	145	ditch	03-Dec-1997	5.0	41.0	DP-1747	1,877			0.320					0.320	poor
DT-	146	ditch	03-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	147	tributary	03-Dec-1997	----	----	none	----							0.000	0.000	----
DT-	148	tributary	03-Dec-1997	----	----	none	----							0.000	0.000	----
LR-	9	river	03-Dec-1997	7.0	44.6	unmarked	335	97.630								fair
					Total (inflow-outflow)				0.000	1.174	0.000	0.100	0.620	5.940	7.834	
					River Gain (+)/Loss(-)			3.280								
					Unaccounted Gain (+)/Loss(-)			-4.554								

Appendix 17: Lost River Seepage Run Data

Note: seepage run occurred in December 1997

				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Date**	**Celcius**	**Fahrenheit**	**Bottle**	**u-S/cm**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Rating**
LR-9 (Bridge at Harpold Dam) to LR-10 and LR-11 (Lost River Ranch Bridges)																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
LR-	9	river	05-Dec-1997	----	----	none	----	97.630								----
DT-	149	tributary	05-Dec-1997	----	----	none	----							0.000	0.000	----
DT-	162	ditch	05-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	150	field drain	05-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	163	pump	05-Dec-1997	----	----	none	----		0.000						0.000	----
DT-	151	pump	05-Dec-1997	----	----	none	----		0.000						0.000	----
DT-	152	field drain	05-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	153	ditch	05-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	154	ditch	05-Dec-1997	1.1	34.0	DP-983	557			0.002					0.002	----
DT-	155	culvert	05-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	156	pump	05-Dec-1997	----	----	none	----		0.000						0.000	----
DT-	157	culvert	05-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	158	culvert	05-Dec-1997	----	----	none	----				0.000				0.000	----
LR-	10	river	04-Dec-1997	7.0	44.6	DP-343	352	86.710								good
LR-	11	river	04-Dec-1997	6.0	42.8	DP-17	355	15.490								good
					Total (inflow-outflow)				0.000	0.002	0.000	0.000	0.000	0.000	0.002	
					River Gain (+)/Loss(-)			4.570								
					Unaccounted Gain (+)/Loss(-)			4.568								

Appendix 17: Lost River Seepage Run Data

Note: seepage run occurred in December 1997

				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Date**	**Celcius**	**Fahrenheit**	**Bottle**	**u-S/cm**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Rating**
LR-10 and LR-11 (Lost River Ranch Bridges) to LR-12 (Kirsch Ranch Bridge)																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
LR-	10	river	04-Dec-1997	7.0	44.6	DP-343	352	86.710								good
LR-	11	river	04-Dec-1997	6.0	42.8	DP-17	355	15.490								good
DT-	159	culvert	04-Dec-1997	4.0	39.2	DP-1794	1,198				0.830				0.830	----
DT-	160	culvert	04-Dec-1997	7.2	45.0	DP-1626	1,299				0.448				0.448	----
DT-	165	ditch	04-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	166	ditch	04-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	167	ditch	04-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	168	ditch	04-Dec-1997	5.5	41.9	DP-983	857			2.717					2.717	----
DT-	169	ditch	04-Dec-1997	6.0	42.8	DP-1746	645			0.188					0.188	----
DT-	170	field drain	04-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	171	field drain	04-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	172	field drain	04-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	173	field drain	04-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	174	field drain	04-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	175	field drain	04-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	176	ditch	04-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	177	ditch	04-Dec-1997	5.0	41.0	DP-1004	996			0.770					0.770	----
DT-	178	field drain	04-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	179	ditch	04-Dec-1997	3.3	38.0	DP-1152	1,325			0.080					0.080	----
DT-	180	ditch	04-Dec-1997	6.1	43.0	DP-1041	589			0.570					0.570	----
DT-	181	ditch	04-Dec-1997	4.5	40.1	DP-1704	814			0.200					0.200	poor
DT-	182	ditch	04-Dec-1997	6.7	44.0	DP-640	1,018			0.103					0.103	----
DT-	183	ditch	04-Dec-1997	8.9	48.0	DP-964	810			0.159					0.159	----
DT-	184	field drain	04-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	185	pump	04-Dec-1997	----	----	none	----		0.000						0.000	----
DT-	186	tributary	04-Dec-1997	----	----	none	----							0.000	0.000	----
DT-	187	ditch	04-Dec-1997	8.9	48.0	DP-1730	776			0.029					0.029	----
DT-	188	ditch	04-Dec-1997	----	----	none	----			0.000					0.000	----
LR-	12	river	05-Dec-1997	5.6	42.0	DP-867	396	107.510								good
					Total (inflow-outflow)				0.000	4.816	1.278	0.000	0.000	0.000	6.094	
					River Gain (+)/Loss(-)			5.310								
					Unaccounted Gain (+)/Loss(-)			-0.784								

Appendix 17: Lost River Seepage Run Data

Note: seepage run occurred in December 1997

				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Date**	**Celcius**	**Fahrenheit**	**Bottle**	**u-S/cm**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Rating**
LR-12 (Kirsch Ranch Bridge) to LR-13 (Stevenson Park Area)																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
LR-	12	river	05-Dec-1997	5.6	42.0	DP-867	396	107.510								----
DT-	189	field drain	04-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	190	field drain	04-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	190-B	field drain	04-Dec-1997	----	----	DP-583	898					0.027			0.027	----
DT-	191	field drain	04-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	192	field drain	04-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	193	ditch	04-Dec-1997	4.4	40.0	DP-1027	626			0.062					0.062	----
DT-	194	field drain	04-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	195	field drain	04-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	196	field drain	04-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	197	field drain	04-Dec-1997	----	----	none	----					0.000			0.000	----
DT-	198	tributary	04-Dec-1997	3.9	39.0	DP-1760	520							0.445	0.445	----
DT-	199	ditch	04-Dec-1997	7.5	45.5	DP-1660	763			0.340					0.340	fair
DT-	200	ditch	04-Dec-1997	2.5	36.5	DP-1202	506			0.014					0.014	----
DT-	201	ditch	04-Dec-1997	7.2	45.0	DP-501	639			0.143					0.143	----
DT-	202	ditch	04-Dec-1997	6.1	43.0	DP-1058	740			0.152					0.152	----
DT-	203	ditch	04-Dec-1997	3.9	39.0	DP-1581	431			0.058					0.058	excellent
DT-	203-B	ditch	04-Dec-1997	1.1	34.0	DP-868	600			0.001					0.001	good
DT-	204	pump	04-Dec-1997	7.8	46.0	DP-1146	285		0.000				0.001		0.001	good
DT-	204-B	ditch	04-Dec-1997	----	----	none	----			0.000					0.000	good
DT-	205	culvert	04-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	206	ditch	04-Dec-1997	6.1	43.0	DP-3	325			0.021					0.021	----
DT-	207	spring	04-Dec-1997	15.6	60.0	DP-901	202						0.307		0.307	good
DT-	207-B	field drain	04-Dec-1997	3.9	39.0	DP-996	220					0.107			0.107	excellent
DT-	207-C	ditch	04-Dec-1997	5.6	42.0	DP-899	222			0.006					0.006	excellent
DT-	207-D	ditch	04-Dec-1997	10.6	51.0	DP-1745	209			0.136					0.136	----
DT-	207-E	ditch	04-Dec-1997	6.1	43.0	DP-1601	285			0.023					0.023	----
DT-	207-F	ditch	04-Dec-1997	7.2	45.0	none	----			0.001					0.001	----
DT-	207-G	ditch	04-Dec-1997	----	----	none	----			0.003					0.003	----
DT-	207-H	spring	04-Dec-1997	18.3	65.0	DP-1131	209						----		0.000	----
DT-	208	pump	04-Dec-1997	----	----	none	----		0.000						0.000	----
DT-	209	ditch	04-Dec-1997	7.8	46.0	DP-5	405			0.014					0.014	----
DT-	210	culvert	04-Dec-1997	6.9	44.5	DP-1764	366				0.005				0.005	----
DT-	211	ditch	04-Dec-1997	7.2	45.0	DP-1531	613			0.610					0.610	poor
DT-	212	ditch	04-Dec-1997	16.1	61.0	DP-841	227			5.250					5.250	good
DT-	213	pump	04-Dec-1997	----	----	none	----		0.000						0.000	----
DT-	214	tributary	04-Dec-1997	14.4	58.0	DP-1256	228							0.890	0.890	good
DT-	215	ditch	04-Dec-1997	6.1	43.0	DP-1272	944			0.039					0.039	----
DT-	216	ditch	04-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	217	ditch	04-Dec-1997	7.2	45.0	DP-867	594			0.720					0.720	----
DT-	218	pump	04-Dec-1997	----	----	none	----		0.000						0.000	----
DT-	219	pump	04-Dec-1997	----	----	none	----		0.000						0.000	----
LR-	13	river	05-Dec-1997	6.1	43.0	DP-583	380	136.570								----
					Total (inflow-outflow)				0.000	7.593	0.005	0.134	0.308	1.335	9.375	
					River Gain (+)/Loss(-)			29.060								
					Unaccounted Gain (+)/Loss(-)			19.685								

Appendix 17: Lost River Seepage Run Data

Note: seepage run occurred in December 1997

				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Date**	**Celcius**	**Fahrenheit**	**Bottle**	**u-S/cm**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Rating**
Duplicate Measurements/Samples: LR-12 (Kirsch Ranch Bridge) to LR-13 (Stevenson Park Area)																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
DT-	207-H	spring	04-Dec-1997	18.3	65.0	DP-1000	206						----		0.000	----

Appendix 17: Lost River Seepage Run Data

Note: seepage run occurred in December 1997

				Field Water Temp		**Conductivity**		**Flow ft3/sec**								**Meaurement**
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Date**	**Celcius**	**Fahrenheit**	**Bottle**	**u-S/cm**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Rating**
LR-13 (Stevenson Park Area) to LR-14 (Olene Gap Bridge)																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
LR-	13	river	05-Dec-1997	6.1	43.0	DP-583	380	136.570								good
DT-	220	ditch	05-Dec-1997	----	----	none	----			0.000					0.000	----
DT-	221	culvert	05-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	222	culvert	05-Dec-1997	2.8	37.0	DP-1058	704				0.290				0.290	fair
DT-	223	culvert	05-Dec-1997	----	----	none	----				0.000				0.000	----
DT-	225	canal	05-Dec-1997	----	----	none	----			0.000					0.000	----
LR-	14	river	05-Dec-1997	6.1	43.0	DP-996	390	106.320								good
					Total (inflow-outflow)				0.000	0.000	0.290	0.000	0.000	0.000	0.290	
					River Gain (+)/Loss(-)			-30.250								
					Unaccounted Gain (+)/Loss(-)			-30.540								
Duplicate Measurements/Samples: LR-13 (Stevenson Park Area) to LR-14 (Olene Gap Bridge)																
				Field Water Temp		Conductivity		Flow ft3/sec								Meaurement
OWRD Site Prefix	OWRD Site Number	Flow Site	Date	Celcius	Fahrenheit	Bottle	u-S/cm	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Rating
DT-	224	canal	05-Dec-1997	2.8	37.0	DP-1256	704			0.320					0.320	poor

Appendix 18: Lost River Seepage Run Conductivity Analysis

Note: seepage run occurred in December 1997

			Field Water Temp		**Flow ft3/sec**								**Conductivity**		**Flow Weighted**
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Celcius**	**Fahrenheit**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Bottle**	**u-S/cm**	**Conductivity [(cfs)(uS/cm)]**
Lost River Summary															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
LR-	1	river	3.9	39.0	7.250							7.250	DP-336	202	1,464.50
LR-	2	river	----	----	11.100							11.100	DP-862	310	3,441.00
LR-	3	river	4.4	40.0	15.400							15.400	DP-1262	357	5,497.80
LR-	3	river	----	----	11.550							11.550	none	----	
LR-	4	river	----	----	14.070							14.070	DP-1256	361	5,079.27
LR-	5	river	3.5	38.3	22.950							22.950	DP-1245	386	8,858.70
LR-	6	river	3.0	37.4	30.440							30.440	none	----	
LR-	6	river	----	----	24.840							24.840	DP-1253	449	11,153.16
LR-	7	river	1.0	33.8	33.720							33.720	DP-1581	467	15,747.24
LR-	8	river	10.0	50.0	94.350							94.350	DP-1245	285	26,889.75
LR-	9	river	7.0	44.6	97.630							97.630	unmarked	335	32,706.05
LR-	9	river	----	----	97.630							97.630	none	----	
LR-	10	river	7.0	44.6	86.710							86.710	DP-343	352	30,521.92
LR-	11	river	6.0	42.8	15.490							15.490	DP-17	355	5,498.95
LR-	12	river	5.6	42.0	107.510							107.510	DP-867	396	42,573.96
LR-	13	river	6.1	43.0	136.570							136.570	DP-583	380	51,896.60
LR-	14	river	6.1	43.0	106.320							106.320	DP-996	390	41,464.80
Bonanza Big Springs Summary															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
BS-	1	river	1.0	33.8	5.540							5.540	DP-1027	470	2,603.80
BS-	2-A	river	13.0	55.4	26.440							26.440	DP-862	237	6,266.28
BS-	2-B	river	----	----	33.970							33.970	none	----	
BS-	3	spring	----	----	----							0.000	DP-1131	165	
		Spring Flow (BS-2B - BS-1)			28.430										

Appendix 18: Lost River Seepage Run Conductivity Analysis

Note: seepage run occurred in December 1997

			Field Water Temp		**Flow ft3/sec**								**Conductivity**		**Flow Weighted**
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Celcius**	**Fahrenheit**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Bottle**	**u-S/cm**	**Conductivity [(cfs)(uS/cm)]**
LR-1 (Malone Dam) to LR-2 (Johnson Road)															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
LR-	1	river	3.9	39.0	7.250								DP-336	202	
DT-	1	canal	----	----			0.000					0.000	none	----	0.00
DT-	2	canal	----	----			0.000					0.000	none	----	0.00
DT-	3	ditch	----	----			0.004					0.004	DP-1095	424	1.59
DT-	4	ditch	0.5	32.9			0.003					0.003	DT-640	522	1.74
DT-	5	culvert	4.0	39.2				0.210				0.210	DP-1611	397	83.37
DT-	6	culvert	----	----				0.000				0.000	none	----	0.00
DT-	7	culvert	----	----				0.344				0.344	DP-1303	320	110.08
DT-	8	culvert	----	----				0.159				0.159	DP-1776	311	49.45
DT-	9	culvert	----	----				0.000				0.000	none	----	0.00
DT-	10	culvert	----	----				0.000				0.000	none	----	0.00
DT-	11	culvert	4.0	39.2				3.180				3.180	DP-1808	506	1,609.08
LR-	2	river	----	----	11.100								DP-862	310	
		Total (inflow-outflow)				0.000	0.007	3.893	0.000	0.000	0.000	3.900			1,855.31
		River Gain (+)/Loss(-)			3.850										1,976.50
		Unaccounted Gain (+)/Loss(-)			-0.050										121.19
		River Gain Conductivity Adjustment Needed for River to Meet Down Stream Conductivity												31	

Appendix 18: Lost River Seepage Run Conductivity Analysis

Note: seepage run occurred in December 1997

			Field Water Temp		**Flow ft3/sec**								**Conductivity**		**Flow Weighted**
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Celcius**	**Fahrenheit**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Bottle**	**u-S/cm**	**Conductivity [(cfs)(uS/cm)]**
LR-2 (Johnson Road) to LR-3 (West of Gift Butte)															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
LR-	2	river	----	----	11.100								DP-862	310	
DT-	12	culvert	3.3	38.0				0.810				0.810	DP-1760	575	465.75
DT-	13	culvert	3.9	39.0				0.003				0.003	DP-62	459	1.43
DT-	14	culvert	4.4	40.0				0.420				0.420	DP-272	457	191.94
DT-	15	culvert	----	----				0.000				0.000	none	----	0.00
DT-	16	culvert	----	----				0.000				0.000	none	----	0.00
DT-	17	culvert	----	----				0.760				0.760	DP-867	607	461.32
DT-	18	culvert	2.2	36.0				0.150				0.150	DP-1142	823	123.45
LR-	3	river	4.4	40.0	15.400								DP-1262	357	
		Total (inflow-outflow)				0.000	0.000	2.143	0.000	0.000	0.000	2.143			1,243.89
		River Gain (+)/Loss(-)			4.300										2,056.80
		Unaccounted Gain (+)/Loss(-)			2.157										812.91
		Unaccounted River Gain Conductivity Needed for River to Meet Down Stream Conductivity												377	
Duplicate Measurements/Samples: LR-2 (Johnson Road) to LR-3 (West of Gift Butte)															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
DT-	17	culvert	3.9	39.0				0.691				0.691	DP-867	603	416.67

Appendix 18: Lost River Seepage Run Conductivity Analysis

Note: seepage run occurred in December 1997

			Field Water Temp		**Flow ft3/sec**								**Conductivity**		**Flow Weighted**
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Celcius**	**Fahrenheit**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Bottle**	**u-S/cm**	**Conductivity [(cfs)(uS/cm)]**
LR-3 (West of Gift Butte) to LR-4 (Gift Road)															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
LR-	3	river	----	----	11.550								DP-1262	357	
DT-	19	culvert	----	----				1.510				1.510	DP-1760	303	457.53
DT-	20	culvert	4.4	40.0				0.395				0.395	DP-850	513	202.64
DT-	21	culvert	0.0	32.0				0.377				0.377	DP-996	457	172.29
DT-	22	culvert	----	----				0.000				0.000	none	----	0.00
DT-	23	culvert	----	----				0.000				0.000	none	----	0.00
DT-	24	culvert	----	----				0.000				0.000	none	----	0.00
DT-	25	culvert	----	----				0.000				0.000	none	----	0.00
DT-	26	culvert	0.0	32.0				0.174				0.174	DP-501	781	135.89
DT-	27	culvert	----	----				0.000				0.000	none	----	0.00
LR-	4	river	----	----	14.070								DP-1256	361	
		Total (inflow-outflow)				0.000	0.000	2.456	0.000	0.000	0.000	2.456			968.35
		River Gain (+)/Loss(-)			2.520										955.92
		Unaccounted Gain (+)/Loss(-)			0.064										-12.43
		River Gain Conductivity Adjustment Needed for River to Meet Down Stream Conductivity												-5	
Duplicate Measurements/Samples: LR-3 (West of Gift Butte) to LR-4 (Gift Road)															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
DT-	19	culvert	5.6	42.0				0.999				0.999	DP-846	307	306.69
DT-	22	culvert	----	----				0.000				0.000	none	----	0.00
DT-	23	culvert	----	----				0.000				0.000	none	----	0.00
DT-	27	culvert	----	----				0.000				0.000	none	----	0.00

Appendix 18: Lost River Seepage Run Conductivity Analysis

Note: seepage run occurred in December 1997

			Field Water Temp		**Flow ft3/sec**								**Conductivity**		**Flow Weighted**
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Celcius**	**Fahrenheit**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Bottle**	**u-S/cm**	**Conductivity [(cfs)(uS/cm)]**
LR-4 (Gift Road) to LR-5 (Cheese Factory Road)															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
LR-	4	river	----	----	14.070								DP-1256	361	
DT-	28	culvert	----	----				0.000				0.000	none	----	0.00
DT-	29	culvert	----	----				0.011				0.011	DP-1058	793	8.72
DT-	30	culvert	2.8	37.0				0.002				0.002	DP-899	247	0.49
DT-	31	culvert	----	----				0.008				0.008	DP-1095	151	1.21
DT-	32	culvert	----	----				0.035				0.035	DP-1776	307	10.75
DT-	33	culvert	3.9	39.0				0.001				0.001	DP-1202	240	0.24
DT-	34	culvert	0.6	33.0				0.078				0.078	DP-1660	824	64.19
DT-	35	culvert	----	----				0.029				0.029	DP-897	158	4.58
DT-	36	culvert	----	----				0.000				0.000	none	----	0.00
DT-	37	culvert	----	----				0.005				0.005	DP-901	144	0.72
DT-	38	culvert	----	----				0.000				0.000	none	----	0.00
DT-	39	tributary	----	----							6.030	6.030	DP-1611	267	1,610.01
DT-	40	field drain	2.2	36.0					0.010			0.010	DP-1601	285	2.85
DT-	41	culvert	3.9	39.0				1.360				1.360	DP-1264	603	820.08
DT-	42	culvert	2.8	37.0				0.420				0.420	DP-1146	565	237.30
DT-	43	field drain	----	----					0.000			0.000	none	----	0.00
DT-	44	field drain	4.7	40.5					0.004			0.004	DP-3	186	0.74
DT-	45	ditch	1.7	35.0			0.005					0.005	DP-1625	191	0.96
DT-	46	culvert	----	----				0.000				0.000	none	----	0.00
DT-	47	culvert	0.6	33.0				0.041				0.041	DP-583	455	18.66
DT-	48	culvert	4.2	39.5				0.108				0.108	DP-1000	611	65.99
LR-	5	river	3.5	38.3	22.950								DP-1245	386	
		Total (inflow-outflow)				0.000	0.005	2.098	0.014	0.000	6.030	8.147			2,847.48
		River Gain (+)/Loss(-)			8.880										3,779.43
		Unaccounted Gain (+)/Loss(-)			0.733										931.95
		Unaccounted River Gain Conductivity Needed for River to Meet Down Stream Conductivity												1,271	
Duplicate Measurements/Samples: LR-4 (Gift Road) to LR-5 (Cheese Factory Road)															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
DT-	29	culvert	1.1	34.0				0.018				0.018	DP-966	686	12.35

Appendix 18: Lost River Seepage Run Conductivity Analysis

Note: seepage run occurred in December 1997

			Field Water Temp		**Flow ft3/sec**								**Conductivity**		**Flow Weighted**
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Celcius**	**Fahrenheit**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Bottle**	**u-S/cm**	**Conductivity [(cfs)(uS/cm)]**
LR-5 (Cheese Factory Road) to LR-6 (Near Keller Bridge)															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
LR-	5	river	3.5	38.3	22.950								DP-1245	386	
DT-	49	culvert	----	----				0.000				0.000	none	----	0.00
DT-	50	ditch	----	----			0.000					0.000	none	----	0.00
DT-	51	culvert	2.8	37.0				0.058				0.058	DP-1121	620	35.96
DT-	52	culvert	1.1	34.0				0.360				0.360	DP-1808	563	202.68
DT-	53	culvert	----	----				0.000				0.000	none	----	0.00
DT-	54	culvert	----	----				0.000				0.000	none	----	0.00
DT-	55	culvert	----	----				0.000				0.000	none	----	0.00
DT-	56	culvert	----	----				0.000				0.000	none	----	0.00
DT-	57	culvert	4.5	40.1				0.265				0.265	DP-336	601	159.27
DT-	58	ditch	----	----			0.000					0.000	none	----	0.00
DT-	59	field drain	----	----					0.000			0.000	none	----	0.00
DT-	60	field drain	----	----					0.000			0.000	none	----	0.00
DT-	61	ditch	4.5	40.1			0.320					0.320	DP-850	861	275.52
DT-	62	ditch	----	----			0.000					0.000	none	----	0.00
DT-	63	ditch	1.1	34.0			0.035					0.035	DP-584	565	19.78
DT-	64	culvert	1.1	34.0				0.017				0.017	DP-1253	808	13.74
DT-	65	ditch	1.1	34.0			0.290					0.290	DP-1152	630	182.70
DT-	66	pump	----	----		0.000						0.000	none	----	0.00
DT-	67	culvert	----	----				0.000				0.000	none	----	0.00
DT-	68	field drain	----	----					0.000			0.000	none	----	0.00
DT-	69	ditch	----	----			0.000					0.000	none	----	0.00
DT-	70	ditch	2.0	35.6			0.206					0.206	DT-640	637	131.22
DT-	71	ditch	5.6	42.0			0.257					0.257	DP-1294	608	156.26
DT-	72	ditch	4.4	40.0			0.088					0.088	DP-812	619	54.47
DT-	73	culvert	----	----				0.004				0.004	DP-1004	376	1.50
DT-	74	ditch	5.0	41.0			0.013					0.013	DP-1151	746	9.70
DT-	75	ditch	6.0	42.8			0.011					0.011	DP-1142	731	8.04
DT-	76	ditch	5.6	42.0			0.052					0.052	DP-1723	394	20.49
DT-	77	ditch	1.0	33.8			0.090					0.090	DP-846	602	54.18
DT-	78	ditch	5.0	41.0			0.070					0.070	unknown	----	0.00
DT-	79	ditch	4.4	40.0			0.065					0.065	DP-1774	441	28.67
DT-	80	ditch	9.5	49.1						0.046		0.046	DP-1746	481	22.13
DT-	81	ditch	6.1	43.0			0.008					0.008	DP-1208	437	3.50
DT-	82	ditch	4.0	39.2			1.890					1.890	DP-966	822	1,553.58
DT-	83	ditch	3.3	38.0			0.013					0.013	DP-964	699	9.09

Appendix 18: Lost River Seepage Run Conductivity Analysis

Note: seepage run occurred in December 1997

			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Celcius**	**Fahrenheit**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Bottle**	**u-S/cm**	**Conductivity [(cfs)(uS/cm)]**
DT-	84	ditch	----	----			0.000					0.000	none	----	0.00
DT-	85	pump	----	----		0.000						0.000	none	----	0.00
DT-	86	ditch	4.4	40.0			0.106					0.106	DP-1598	569	60.31
DT-	87	culvert	3.3	38.0				0.046				0.046	DP-937	814	37.44
DT-	88	ditch	----	----			0.013					0.013	DP-539	798	10.37
LR-	6	river	3.0	37.4	30.440								DP-1253	449	
		Total (inflow-outflow)				0.000	3.527	0.750	0.000	0.046	0.000	4.323			3,050.58
		River Gain (+)/Loss(-)			7.490										4,808.86
		Unaccounted Gain (+)/Loss(-)			3.167										1,758.28
		Unaccounted River Gain Conductivity Needed for River to Meet Down Stream Conductivity												555	

Appendix 18: Lost River Seepage Run Conductivity Analysis

Note: seepage run occurred in December 1997

			Field Water Temp		**Flow ft3/sec**								**Conductivity**		**Flow Weighted**
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Celcius**	**Fahrenheit**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Bottle**	**u-S/cm**	**Conductivity [(cfs)(uS/cm)]**
LR-6 (Near Keller Bridge) to LR-7 (Bonanza East Boundary)															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
LR-	6	river	----	----	24.840								DP-1253	449	
DT-	89	ditch	----	----			0.000					0.000	none	----	0.00
DT-	90	culvert	4.4	40.0				0.007				0.007	DP-1004	579	4.05
DT-	91	culvert	0.6	33.0				0.003				0.003	DP-1808	609	1.83
DT-	92	ditch	3.3	38.0			0.003					0.003	DP-1121	493	1.48
DT-	93	ditch	----	----			0.004					0.004	DP-1167	736	2.94
DT-	94	culvert	5.0	41.0				0.034				0.034	DP-336	535	18.19
DT-	95	ditch	0.6	33.0			0.004					0.004	DP-1041	693	2.77
DT-	96	ditch	1.7	35.0			0.004					0.004	DP-1208	896	3.58
DT-	97	culvert	----	----				0.000				0.000	none	----	0.00
DT-	98	field drain	----	----					0.000			0.000	none	----	0.00
DT-	99	ditch	----	----			0.000					0.000	none	----	0.00
DT-	100	ditch	1.1	34.0			0.362					0.362	DP-1294	779	282.00
DT-	101	ditch	0.0	32.0			0.052					0.052	DP-850	584	30.37
DT-	102	field drain	----	----					0.000			0.000	none	----	0.00
DT-	103	field drain	----	----					0.000			0.000	none	----	0.00
DT-	104	ditch	2.8	37.0			0.097					0.097	DP-937	712	69.06
DT-	105	ditch	2.0	35.6			0.026					0.026	DT-640	1,034	26.88
DT-	106	ditch	2.8	37.0			0.053					0.053	DP-1746	775	41.08
DT-	107	ditch	----	----			0.000					0.000	none	----	0.00
DT-	108	ditch	----	----			0.000					0.000	none	----	0.00
DT-	109	ditch	3.9	39.0			0.046					0.046	DP-966	603	27.74
DT-	110	ditch	----	----			0.000					0.000	none	----	0.00
DT-	111	ditch	----	----			0.000					0.000	none	----	0.00
DT-	112	ditch	----	----			0.000					0.000	none	----	0.00
DT-	113	pump	----	----		0.000						0.000	none	----	0.00
DT-	114	pump/ditch	----	----			0.002					0.002	DP-1152	504	1.01
DT-	115	field drain	10.0	50.0					0.012			0.012	DP-964	645	7.74
DT-	116	ditch	8.0	46.4			0.058					0.058	DP-812	874	50.69
DT-	117	field drain	10.0	50.0					0.010			0.010	DP-1537	688	6.88
DT-	118	field drain	10.0	50.0					0.008			0.008	DP-60	1,576	12.61
DT-	119	field drain	10.6	51.0					0.021			0.021	DP-539	790	16.59
DT-	120	field drain	10.0	50.0					0.020			0.020	DP-1626	1,343	26.86
DT-	121	ditch	8.0	46.4			0.119					0.119	DP-1774	647	76.99
DT-	122	field drain	10.0	50.0					0.015			0.015	DP-1730	1,308	19.62
DT-	122-A	field drain	10.0	50.0					0.043			0.043	DP-1303	950	40.85

Appendix 18: Lost River Seepage Run Conductivity Analysis

Note: seepage run occurred in December 1997

			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Celcius**	**Fahrenheit**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Bottle**	**u-S/cm**	**Conductivity [(cfs)(uS/cm)]**
DT-	123	ditch	----	----			0.000					0.000	none	----	0.00
DT-	124	spring	9.0	48.2						0.014		0.014	DP-1151	1,258	17.61
DT-	125	pump	----	----		0.000						0.000	none	----	0.00
DT-	126	culvert	6.7	44.0				0.109				0.109	DP-1794	963	104.97
DT-	127	ditch	0.0	32.0			0.008					0.008	DP-62	639	5.11
DT-	128	culvert	3.9	39.0				0.046				0.046	DP-983	1,017	46.78
LR-	7	river	1.0	33.8	33.720								DP-1581	467	
		Total (inflow-outflow)				0.000	0.838	0.199	0.129	0.014	0.000	1.180			946.29
		River Gain (+)/Loss(-)			8.880										4,594.08
		Unaccounted Gain (+)/Loss(-)			7.700										3,647.79
		Unaccounted River Gain Conductivity Needed for River to Meet Down Stream Conductivity												474	

Appendix 18: Lost River Seepage Run Conductivity Analysis

Note: seepage run occurred in December 1997

			Field Water Temp		**Flow ft3/sec**								**Conductivity**		**Flow Weighted**
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Celcius**	**Fahrenheit**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Bottle**	**u-S/cm**	**Conductivity [(cfs)(uS/cm)]**
LR-7 (Bonanza East Boundary) to LR-8 (Bonanza Harpold Rd Bridge)															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
LR-	7	river	1.0	33.8	33.720								DP-1581	467	
DT-	129	culvert	0.6	33.0				0.273				0.273	DP-841	950	259.35
DT-	130	ditch	3.3	38.0			0.070					0.070	DP-901	1,000	70.00
DT-	131	spring	----	----						0.001		0.001	DP-583	172	0.17
DT-	132	spring	6.9	44.5						6.330		6.330	DP-1760	179	1,133.07
DT-	133	ditch	----	----			0.180					0.180	DP-867	934	168.12
BS-	2B - 1	spring	13.0	55.4						28.430		28.430	DP-1131	165	4,690.95
DT-	134	ditch	----	----			0.035					0.035	DP-501	1,361	47.64
DT-	135	ditch	----	----			0.000					0.000	none	----	0.00
LR-	8	river	10.0	50.0	94.350								DP-1245	285	
		Total (inflow-outflow)				0.000	0.285	0.273	0.000	34.761	0.000	35.319			6,369.30
		River Gain (+)/Loss(-)			60.630										11,142.51
		Unaccounted Gain (+)/Loss(-)			25.311										4,773.21
		Unaccounted River Gain Conductivity Needed for River to Meet Down Stream Conductivity												189	
Bonanza Big Springs Summary															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
BS-	1	river	1.0	33.8	5.540							5.540	DP-1027	470	2,603.80
BS-	2-A	river	13.0	55.4	26.440							26.440	DP-862	237	6,266.28
BS-	2-B	river	----	----	33.970							33.970	none	----	0.00
BS-	3	spring	----	----								0.000	DP-1131	165	
		Spring Flow (BS-2B - BS-1)			28.430										

Appendix 18: Lost River Seepage Run Conductivity Analysis

Note: seepage run occurred in December 1997

			Field Water Temp		**Flow ft3/sec**								**Conductivity**		**Flow Weighted**
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Celcius**	**Fahrenheit**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Bottle**	**u-S/cm**	**Conductivity [(cfs)(uS/cm)]**
LR-8 (Bonanza Harpold Rd Bridge) to LR-9 (Bridge at Harpold Dam)															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
LR-	8	river	10.0	50.0	94.350								DP-1245	285	
DT-	136	ditch	2.8	37.0			0.039					0.039	DP-3	916	35.72
DT-	161	ditch	----	----			0.000					0.000	none	----	0.00
DT-	137	ditch	3.9	39.0			0.017					0.017	DP-1601	841	14.30
DT-	138	field drain	10.3	50.5					0.100			0.100	DP-1000	1,314	131.40
DT-	139	ditch	----	----			0.084					0.084	DP-1625	1,914	160.78
DT-	140	culvert	----	----				0.000				0.000	none	----	0.00
DT-	141	ditch	5.0	41.0			0.700					0.700	DP-1058	1,015	710.50
DT-	142	ditch	8.9	48.0			0.014					0.014	DP-868	514	7.20
DT-	143	culvert	----	----				0.000				0.000	none	----	0.00
DT-	144	tributary	2.8	37.0							5.940	5.940	DP-1304	791	4,698.54
DT-	164	inlet	14.4	58.0						0.620		0.620	DP-1146	234	145.08
DT-	145	ditch	5.0	41.0			0.320					0.320	DP-1747	1,877	600.64
DT-	146	ditch	----	----			0.000					0.000	none	----	0.00
DT-	147	tributary	----	----							0.000	0.000	none	----	0.00
DT-	148	tributary	----	----							0.000	0.000	none	----	0.00
LR-	9	river	7.0	44.6	97.630								unmarked	335	
		Total (inflow-outflow)				0.000	1.174	0.000	0.100	0.620	5.940	7.834			6,504.15
		River Gain (+)/Loss(-)			3.280										5,816.30
		Unaccounted Gain (+)/Loss(-)			-4.554										-687.85
		Unaccounted River Loss Conductivity Needed for River to Meet Down Stream Conductivity												151	

Appendix 18: Lost River Seepage Run Conductivity Analysis

Note: seepage run occurred in December 1997

			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Celcius**	**Fahrenheit**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Bottle**	**u-S/cm**	**Conductivity [(cfs)(uS/cm)]**
LR-9 (Bridge at Harpold Dam) to LR-10 and LR-11 (Lost River Ranch Bridges)															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
LR-	9	river	----	----	97.630								unmarked	335	
DT-	149	tributary	----	----							0.000	0.000	none	----	0.00
DT-	162	ditch	----	----			0.000					0.000	none	----	0.00
DT-	150	field drain	----	----					0.000			0.000	none	----	0.00
DT-	163	pump	----	----		0.000						0.000	none	----	0.00
DT-	151	pump	----	----		0.000						0.000	none	----	0.00
DT-	152	field drain	----	----					0.000			0.000	none	----	0.00
DT-	153	ditch	----	----			0.000					0.000	none	----	0.00
DT-	154	ditch	1.1	34.0			0.002					0.002	DP-983	557	1.11
DT-	155	culvert	----	----				0.000				0.000	none	----	0.00
DT-	156	pump	----	----		0.000						0.000	none	----	0.00
DT-	157	culvert	----	----				0.000				0.000	none	----	0.00
DT-	158	culvert	----	----				0.000				0.000	none	----	0.00
LR-	10	river	7.0	44.6	86.710								DP-343	352	
LR-	11	river	6.0	42.8	15.490								DP-17	355	
		Total (inflow-outflow)				0.000	0.002	0.000	0.000	0.000	0.000	0.002			1.11
		River Gain (+)/Loss(-)			4.570										3,314.82
		Unaccounted Gain (+)/Loss(-)			4.568										3,313.71
		Unaccounted River Gain Conductivity Needed for River to Meet Down Stream Conductivity												725	

Appendix 18: Lost River Seepage Run Conductivity Analysis

Note: seepage run occurred in December 1997

			Field Water Temp		**Flow ft3/sec**								**Conductivity**		**Flow Weighted**
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Celcius**	**Fahrenheit**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Bottle**	**u-S/cm**	**Conductivity [(cfs)(uS/cm)]**
LR-10 and LR-11 (Lost River Ranch Bridges) to LR-12 (Kirsch Ranch Bridge)															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
LR-	10	river	7.0	44.6	86.710								DP-343	352	
LR-	11	river	6.0	42.8	15.490								DP-17	355	
DT-	159	culvert	4.0	39.2				0.830				0.830	DP-1794	1,198	994.34
DT-	160	culvert	7.2	45.0				0.448				0.448	DP-1626	1,299	581.95
DT-	165	ditch	----	----			0.000					0.000	none	----	0.00
DT-	166	ditch	----	----			0.000					0.000	none	----	0.00
DT-	167	ditch	----	----			0.000					0.000	none	----	0.00
DT-	168	ditch	5.5	41.9			2.717					2.717	DP-983	857	2,328.47
DT-	169	ditch	6.0	42.8			0.188					0.188	DP-1746	645	121.26
DT-	170	field drain	----	----					0.000			0.000	none	----	0.00
DT-	171	field drain	----	----					0.000			0.000	none	----	0.00
DT-	172	field drain	----	----					0.000			0.000	none	----	0.00
DT-	173	field drain	----	----					0.000			0.000	none	----	0.00
DT-	174	field drain	----	----					0.000			0.000	none	----	0.00
DT-	175	field drain	----	----					0.000			0.000	none	----	0.00
DT-	176	ditch	----	----			0.000					0.000	none	----	0.00
DT-	177	ditch	5.0	41.0			0.770					0.770	DP-1004	996	766.92
DT-	178	field drain	----	----					0.000			0.000	none	----	0.00
DT-	179	ditch	3.3	38.0			0.080					0.080	DP-1152	1,325	106.00
DT-	180	ditch	6.1	43.0			0.570					0.570	DP-1041	589	335.73
DT-	181	ditch	4.5	40.1			0.200					0.200	DP-1704	814	162.80
DT-	182	ditch	6.7	44.0			0.103					0.103	DP-640	1,018	104.85
DT-	183	ditch	8.9	48.0			0.159					0.159	DP-964	810	128.79
DT-	184	field drain	----	----					0.000			0.000	none	----	0.00
DT-	185	pump	----	----		0.000						0.000	none	----	0.00
DT-	186	tributary	----	----							0.000	0.000	none	----	0.00
DT-	187	ditch	8.9	48.0			0.029					0.029	DP-1730	776	22.50
DT-	188	ditch	----	----			0.000					0.000	none	----	0.00
LR-	12	river	5.6	42.0	107.510								DP-867	396	
		Total (inflow-outflow)				0.000	4.816	1.278	0.000	0.000	0.000	6.094			5,653.62
		River Gain (+)/Loss(-)			5.310										6,553.09
		Unaccounted Gain (+)/Loss(-)			-0.784										899.47
		Unaccounted River Loss Conductivity Needed for River to Meet Down Stream Conductivity												-1,147	

Appendix 18: Lost River Seepage Run Conductivity Analysis

Note: seepage run occurred in December 1997

			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Celcius**	**Fahrenheit**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Bottle**	**u-S/cm**	**Conductivity [(cfs)(uS/cm)]**
LR-12 (Kirsch Ranch Bridge) to LR-13 (Stevenson Park Area)															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
LR-	12	river	5.6	42.0	107.510								DP-867	396	
DT-	189	field drain	----	----					0.000			0.000	none	----	0.00
DT-	190	field drain	----	----					0.000			0.000	none	----	0.00
DT-	190-B	field drain	----	----					0.027			0.027	DP-583	898	24.25
DT-	191	field drain	----	----					0.000			0.000	none	----	0.00
DT-	192	field drain	----	----					0.000			0.000	none	----	0.00
DT-	193	ditch	4.4	40.0			0.062					0.062	DP-1027	626	38.81
DT-	194	field drain	----	----					0.000			0.000	none	----	0.00
DT-	195	field drain	----	----					0.000			0.000	none	----	0.00
DT-	196	field drain	----	----					0.000			0.000	none	----	0.00
DT-	197	field drain	----	----					0.000			0.000	none	----	0.00
DT-	198	tributary	3.9	39.0							0.445	0.445	DP-1760	520	231.40
DT-	199	ditch	7.5	45.5			0.340					0.340	DP-1660	763	259.42
DT-	200	ditch	2.5	36.5			0.014					0.014	DP-1202	506	7.08
DT-	201	ditch	7.2	45.0			0.143					0.143	DP-501	639	91.38
DT-	202	ditch	6.1	43.0			0.152					0.152	DP-1058	740	112.48
DT-	203	ditch	3.9	39.0			0.058					0.058	DP-1581	431	25.00
DT-	203-B	ditch	1.1	34.0			0.001					0.001	DP-868	600	0.60
DT-	204	pump	7.8	46.0		0.000				0.001		0.001	DP-1146	285	0.29
DT-	204-B	ditch	----	----			0.000					0.000	none	----	0.00
DT-	205	culvert	----	----				0.000				0.000	none	----	0.00
DT-	206	ditch	6.1	43.0			0.021					0.021	DP-3	325	6.83
DT-	207	spring	15.6	60.0						0.307		0.307	DP-901	202	62.01
DT-	207-B	field drain	3.9	39.0					0.107			0.107	DP-996	220	23.54
DT-	207-C	ditch	5.6	42.0			0.006					0.006	DP-899	222	1.33
DT-	207-D	ditch	10.6	51.0			0.136					0.136	DP-1745	209	28.42
DT-	207-E	ditch	6.1	43.0			0.023					0.023	DP-1601	285	6.56
DT-	207-F	ditch	7.2	45.0			0.001					0.001	none	----	0.00
DT-	207-G	ditch	----	----			0.003					0.003	none	----	0.00
DT-	207-H	spring	18.3	65.0						----		0.000	DP-1131	209	0.00
DT-	208	pump	----	----		0.000						0.000	none	----	0.00
DT-	209	ditch	7.8	46.0			0.014					0.014	DP-5	405	5.67
DT-	210	culvert	6.9	44.5				0.005				0.005	DP-1764	366	1.83
DT-	211	ditch	7.2	45.0			0.610					0.610	DP-1531	613	373.93
DT-	212	ditch	16.1	61.0			5.250					5.250	DP-841	227	1,191.75
DT-	213	pump	----	----		0.000						0.000	none	----	0.00
DT-	214	tributary	14.4	58.0							0.890	0.890	DP-1256	228	202.92
DT-	215	ditch	6.1	43.0			0.039					0.039	DP-1272	944	36.82

Appendix 18: Lost River Seepage Run Conductivity Analysis

Note: seepage run occurred in December 1997

			Field Water Temp		**Flow ft3/sec**								**Conductivity**		**Flow Weighted**
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Celcius**	**Fahrenheit**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Bottle**	**u-S/cm**	**Conductivity [(cfs)(uS/cm)]**
DT-	216	ditch	----	----			0.000					0.000	none	----	0.00
DT-	217	ditch	7.2	45.0			0.720					0.720	DP-867	594	427.68
DT-	218	pump	----	----		0.000						0.000	none	----	0.00
DT-	219	pump	----	----		0.000						0.000	none	----	0.00
LR-	13	river	6.1	43.0	136.570								DP-583	380	
		Total (inflow-outflow)				0.000	7.593	0.005	0.134	0.308	1.335	9.375			3,159.99
		River Gain (+)/Loss(-)			29.060										9,322.64
		Unaccounted Gain (+)/Loss(-)			19.685										6,162.65
		Unaccounted River Gain Conductivity Needed for River to Meet Down Stream Conductivity												313	
Duplicate Measurements/Samples: LR-12 (Kirsch Ranch Bridge) to LR-13 (Stevenson Park Area)															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
DT-	207-H	spring	18.3	65.0						----		0.000	DP-1000	206	0.00

Appendix 18: Lost River Seepage Run Conductivity Analysis

Note: seepage run occurred in December 1997

			Field Water Temp		**Flow ft3/sec**								**Conductivity**		**Flow Weighted**
OWRD Site Prefix	**OWRD Site Number**	**Flow Site**	**Celcius**	**Fahrenheit**	**River**	**Pump**	**Canal/Ditch**	**Culvert**	**Field Drain**	**Spring**	**Tributary**	**Total**	**Bottle**	**u-S/cm**	**Conductivity [(cfs)(uS/cm)]**
LR-13 (Stevenson Park Area) to LR-14 (Olene Gap Bridge)															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
LR-	13	river	6.1	43.0	136.570								DP-583	380	
DT-	220	ditch	----	----			0.000					0.000	none	----	0.00
DT-	221	culvert	----	----				0.000				0.000	none	----	0.00
DT-	222	culvert	2.8	37.0				0.290				0.290	DP-1058	704	204.16
DT-	223	culvert	----	----				0.000				0.000	none	----	0.00
DT-	225	canal	----	----			0.000					0.000	none	----	0.00
LR-	14	river	6.1	43.0	106.320								DP-996	390	
		Total (inflow-outflow)				0.000	0.000	0.290	0.000	0.000	0.000	0.290			204.16
		River Gain (+)/Loss(-)			-30.250										-10,431.80
		Unaccounted Gain (+)/Loss(-)			-30.540										-10,635.96
		Unaccounted River Loss Conductivity Needed for River to Meet Down Stream Conductivity												348	
Duplicate Measurements/Samples: LR-13 (Stevenson Park Area) to LR-14 (Olene Gap Bridge)															
			Field Water Temp		Flow ft3/sec								Conductivity		Flow Weighted
OWRD Site Prefix	OWRD Site Number	Flow Site	Celcius	Fahrenheit	River	Pump	Canal/Ditch	Culvert	Field Drain	Spring	Tributary	Total	Bottle	u-S/cm	Conductivity [(cfs)(uS/cm)]
DT-	224	canal	2.8	37.0			0.320					0.320	DP-1256	704	225.28

Appendix 19: USGS Lost River Seepage Run Data

Note: Measurements occurred in November 1950, January-February 1966, and November 1970

Flow Site	Location	Flow (ft3/sec)		Unmeasured River Gain/Loss		Temperature	Comment
		River	Tributary	Reach (ft3/sec)	Total (ft3/sec)	(Fahrenheit)	
1950 Measurements							
Nov 22, 1950							
Lost River	T39S/R12E-sec 18	32.00				46.0	300 feet above Irwin pump station, about 3 miles above Bonanza Big Springs
Bonanza Big Springs							
Buck Creek	T39S/R11E-sec 6		1.40				creek discharge to river
Lost River	T39S/R11E-sec19	118.00		84.60	84.60	50.0	250 feet below Harpold Dam

Appendix 19: USGS Lost River Seepage Run Data

Note: Measurements occurred in November 1950, January-February 1966, and November 1970

Flow Site	Location	Flow (ft3/sec)		Unmeasured River Gain/Loss		Temperature	Comment
		River	Tributary	Reach (ft3/sec)	Total (ft3/sec)	(Fahrenheit)	
1966 Measurements							
Jan 1 to Feb 3, 1966							
Lost River	Malone Dam	0.82					
West Canal	Malone Dam		0.00				
East Malone Lateral			0.00				
Drain			0.00				left bank, 0.8 miles below Malone Dam
Drain			0.00				right bank, 1.7 miles below Malone Dam
Drain			0.00				left bank, 1.7 miles below Malone Dam
Drain			0.05				left bank, 2.2 miles below Malone Dam, flow estimated
Drain			0.00				left bank, 2.8 miles below Malone Dam
Drain			3.55				right bank, 3.2 miles below Malone Dam
Drain			0.00				left bank, 3.2 miles below Malone Dam
Drain			0.00				right bank, 3.3 miles below Malone Dam
Drain			0.00				right bank, 3.6 miles below Malone Dam
Drain			0.00				left bank, 3.8 miles below Malone Dam
Drain			0.00				left bank, 4.3 miles below Malone Dam
Drain			0.00				left bank, 4.75 miles below Malone Dam
Drain			1.24				right bank, 4.75 miles below Malone Dam
Drain			0.00				right bank, 4.8 miles below Malone Dam
Drain			0.00				right bank, 5.3 miles below Malone Dam
Drain			0.00				left bank, 5.35 miles below Malone Dam
Drain			0.00				left bank, 2.05 miles above Miller Creek
Drain			0.00				right bank, 2.0 miles above Miller Creek
Drain			0.05				right bank, 1.8 miles above Miller Creek
Drain			0.00				left bank, 1.7 miles above Miller Creek
Drain			0.00				left bank, 1.45 miles above Miller Creek
Drain			0.00				right bank, 1.45 miles above Miller Creek
Drain			0.00				right bank, 1.4 miles above Miller Creek
Drain			0.00				left bank, 1.4 miles above Miller Creek
Drain			0.00				left bank, 1.25 miles above Miller Creek
Drain			0.00				right bank, 1.2 miles above Miller Creek
Drain			0.08				right bank, 1.1 miles above Miller Creek
Drain			0.00				left bank, 1.0 miles above Miller Creek
Miller Creek			5.92				
Drain			2.06				right bank, 0.1 mile below Miller Creek
Drain			0.00				right bank, 0.35 mile below Miller Creek
Drain			0.00				right bank, at Hot Springs Road Bridge
Drain			0.00				right bank, 0.7 miles below Hot Springs Road Bridge
Drain			0.04				left bank, 1.3 miles below Hot Springs Road Bridge
Drain			0.10				left bank, 2.3 miles below Hot Springs Road Bridge, flow estimated

Appendix 19: USGS Lost River Seepage Run Data

Note: Measurements occurred in November 1950, January-February 1966, and November 1970

Flow Site	Location	Flow (ft3/sec)		Unmeasured River Gain/Loss		Temperature	Comment
		River	Tributary	Reach (ft3/sec)	Total (ft3/sec)	(Fahrenheit)	
Drain			0.16				right bank, 2.7 miles below Hot Springs Road Bridge
Drain			0.43				left bank, 2.05 miles above Keller Bridge
Drain			1.22				left bank, 1.33 miles above Keller Bridge
Drain			0.50				left bank, 0.4 miles above Keller Bridge, flow estimated
Lost River	Keller Bridge	23.30		7.08	7.08		daily mean
Drain			0.12				left bank, 0.65 miles below Keller Bridge
Drain			0.59				left bank, 1.4 miles below Keller Bridge
Drain			0.28				right bank, 1.85 miles below Keller Bridge
Rocky Canyon Creek			0.66				
Drain			0.22				right bank, 0.3 miles below Rocky Canyon Creek
Lost River	above Bonanza Springs	23.80		-1.37	5.71		section 13, NE quarter
Seepage			0.33				right bank, 0.1 miles above upper Bonanza Bridge
Drain			0.10				left bank, at lower Bonanza Bridge, flow estimated
Drain			0.33				left bank, 0.6 miles below Bonanza Bridge, flow estimated
Drain			0.10				right bank, 0.25 miles below Bonanza Bridge, flow estimated
Buck Creek			0.25				1.7 miles below Bonanza Bridge, flow estimated
Drain			0.55				right bank, 1.0 miles above harpold Dam
Drain			0.00				left bank, 0.7 miles above harpold Dam
Drain			0.25				left bank, 0.3 miles above Harpold Dam, flow estimated
Lost River	Harpold Dam	111.00		85.29	91.00		
Drain			0.00				left bank, 2.4 miles below Harpold Dam
Drain			2.28				left bank, 3.0 miles below Harpold dam
Drain			0.33				left bank, 3.4 mile below Harpold Dam, flow estimated
Drain			0.00				left bank, 3.6 miles below Harpold Dam
Drain			0.00				left bank, 3.65 miles below Harpold Dam
Drain			1.42				left bank, 4.2 miles below Harpold Dam
Drain			2.50				left bank, 4.7 miles below Harpold Dam, flow estimated
Drain			0.67				right bank, 5.5 miles below Harpold Dam
Drain			0.39				left bank, 5.9 miles below Harpold Dam
Drain			0.13				left bank, 6.0 miles below Harpold Dam
Drain			0.05				right bank, 6.5 miles below Harpold Dam, flow estimated
Drain			0.13				left bank, 6.4 miles below Harpold Dam
Drain			0.00				left bank, 6.5 miles below Harpold Dam
Drain			0.05				left bank, 6.6 miles below Harpold Dam, flow estimated
Drain			0.06				left bank, 7.1 miles below Harpold Dam
Drain			0.10				right bank, 7.4 miles below Harpold Dam, flow estimated
Drain			0.10				right bank, 7.4 miles below Harpold Dam, flow estimated
Drain			0.10				right bank, 7.4 miles below Harpold Dam, flow estimated
Drain			0.45				left bank, 7.5 miles below Harpold Dam
Drain			0.11				right bank, 7.7 miles below Harpold Dam
Drain			0.10				left bank, 7.9 miles below Harpold Dam
Drain			0.10				right bank, 7.9 miles below Harpold Dam, flow estimated

Appendix 19: USGS Lost River Seepage Run Data

Note: Measurements occurred in November 1950, January-February 1966, and November 1970

Flow Site	Location	Flow (ft3/sec)		Unmeasured River Gain/Loss		Temperature	Comment
		River	Tributary	Reach (ft3/sec)	Total (ft3/sec)	(Fahrenheit)	
Drain			0.04				left bank, 2.8 miles above Olene Bridge
Drain			0.24				right bank, 2.8 miles above Olene Bridge
Taylor High Spring			8.61				spring, 2.0 miles above Olene Bridge
Drain			0.05				right bank, 1.9 miles above Olene Bridge
Drain			0.17				right bank, 1.6 miles above Olene Bridge
Lost River	below Olene Bridge	139.00		9.82	100.82		

Appendix 19: USGS Lost River Seepage Run Data

Note: Measurements occurred in November 1950, January-February 1966, and November 1970

Flow Site	Location	Flow (ft3/sec)		Unmeasured River Gain/Loss		Temperature	Comment
		River	Tributary	Reach (ft3/sec)	Total (ft3/sec)	(Fahrenheit)	
1970 Measurements							
Nov 5 & 6 1970							
Lost River	above Bonanza Springs	29.10					300 feet upstream of Irwin's pump and 2.5 miles east of Bonanza
Buck Creek			1.84				downstream side of blacktop road, 0.8 mile above mouth, 2.5 miles west of Bonanza
other tributary inflow			2.50				estimated
Lost River	Harpold Dam	109.00		75.56	75.56		350 feet downstream of dam and 3.3 miles SW of Bonanza
Lost River	above Olene Gap	140.00		31.00	106.56		T39S/R10E-sec 13, 0.5 miles upstream of Stevenson Park, 1.9 miles NE of Olene

Appendix 20: Bonanza Big Springs historical discharge measurements

Note: data are miscellaneous measurements

Date	Flow Above Springs (ft3/sec)	Buck Creek &/or Other (ft3/sec)	Flow Below Springs (ft3/sec)	Difference (ft3/sec)	Data Source	Comments
07-Feb-1918				84.40	USBOR	
03-Feb-1919				98.60	USBOR	
04-Nov-1925				67.00	USBOR	
13-Apr-1948				105.00	USBOR	doubtful, irrigation season
22-Nov-1950	32.00	1.41	118.00	84.59	USGS	
22-Oct-1953				100.00	USGS	
22-Oct-1954	38.50		143.00	104.50	USGS	USGS Water Supply Paper 1345
27-Oct-1954				85.70	USBOR	
06-Nov-1954				89.60	?	115 cfs USGS
07-Nov-1955				81.50	USGS & USBOR	
23-Oct-1957				107.00	USGS	doubtful, weather & runoff?
30-Oct-1958	264.00	0.80	383.00	118.20	USGS	USGS Water Supply Paper 1635
12-Nov-1959				95.30	USBOR	
25-Jan-1961	18.91	3.10	99.00	76.99	USGS	
07-Dec-1961	17.90	7.80	105.00	79.30	USGS	
03-Feb-1966	23.80	1.91	111.00	85.29	USGS	USGS seepage run
06-Nov-1970	29.10	4.34	109.00	75.56	USGS	USGS seepage run
07-Apr-1980	32.30		125.00	92.70	OWRD	
03-Apr-1981	208.00		286.00	78.00	OWRD	
07-Jan-1992	11.00		49.00	38.00	OWRD	
01-Dec-1999	33.72	0.56	94.35	60.07	OWRD	OWRD seepage run
13-Dec-2001	32.20	3.00	90.40	55.20	OWRD	

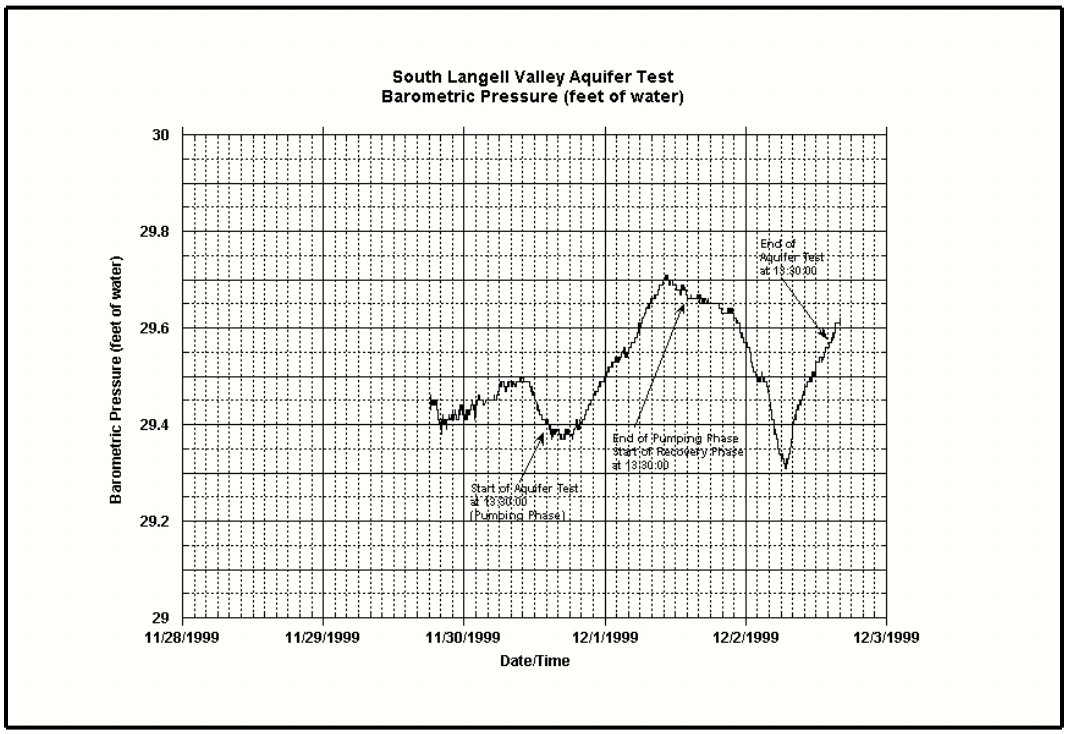
Appendix 21

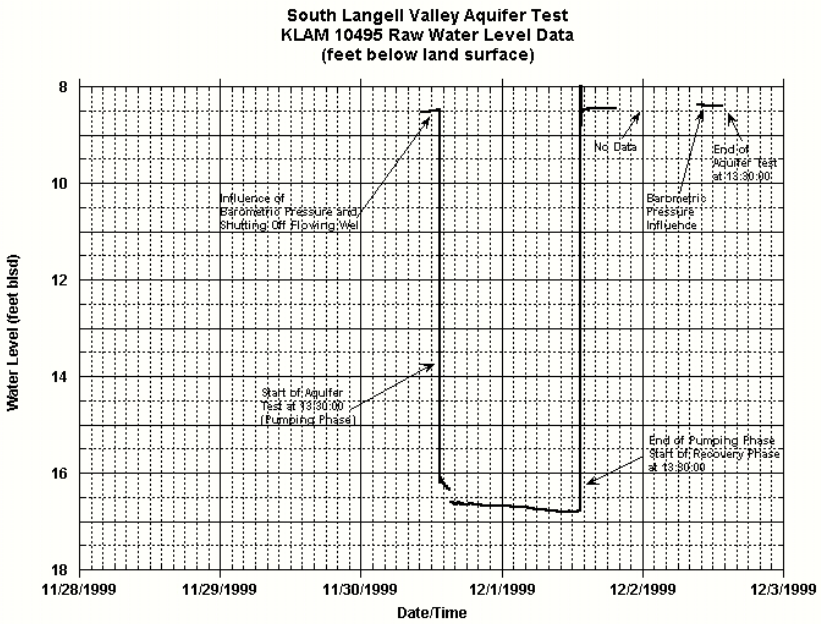
South Langell Valley 1999 OWRD Aquifer Test Graphs

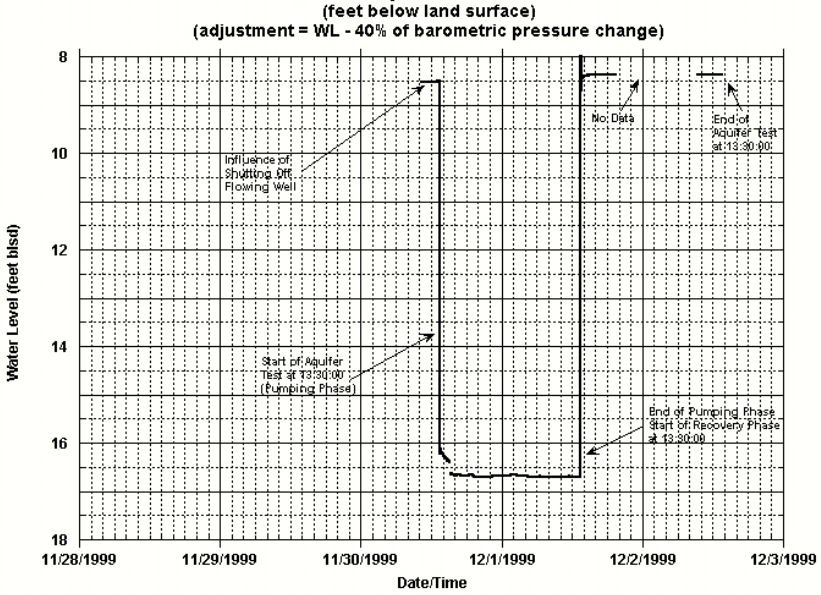
The following graphs plot data from an aquifer test conducted by OWRD and DOGAMI staff in south Langell Valley from November 29 to December 2, 1999. The test included pumping a basalt well (KLAM 10495) at an average of 2,034 gal/min at and measuring ground water levels at the pumping well and three neighboring wells prior to the test, during the 24-hour pumping period, and during a 24-hour recovery period. Ground water level measurements included hand measurements at the pumping well, 1-minute recorder measurements at basalt well KLAM 10641, hand measurements at basalt well KLAM 15129, and hand measurements at a sedimentary deposit domestic well (no water well report) about 50 ft from the pumping well.

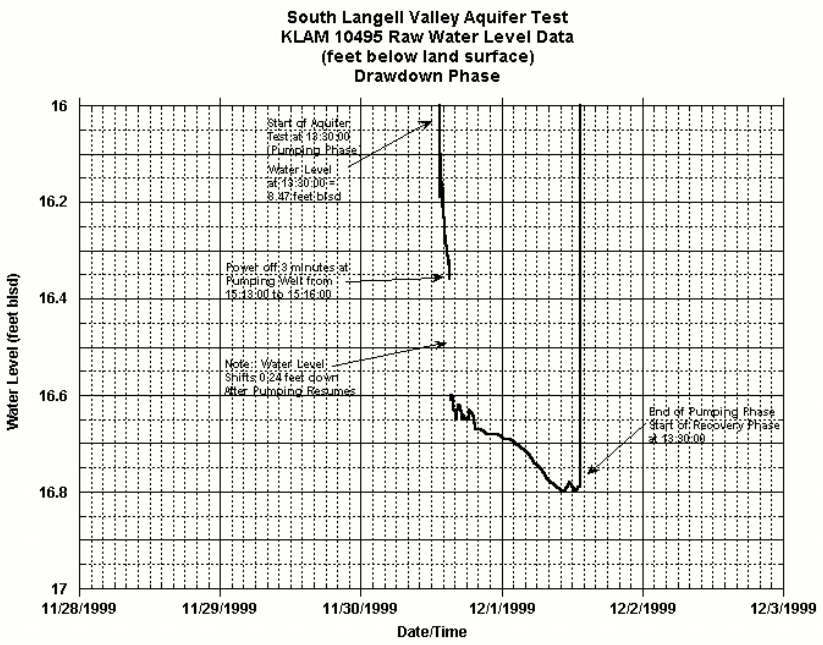
Barometric pressure change during the aquifer test influenced the water levels measured. The barometric pressure changes equaled about 0.4 ft of water level change (see barometric pressure graph below). This made it necessary to adjust the raw data with a percentage of the barometric pressure change (30 to 50 percent). Thus, the following water level graphs pair raw and adjusted data graphs.

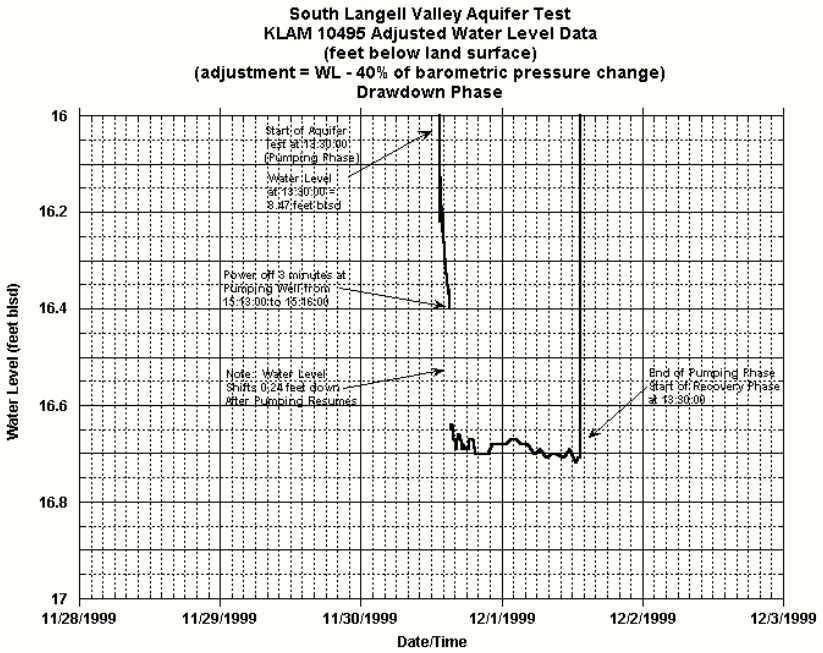
A 3-minute power outage occurred during the test. This appears as an immediate spike in the drawdown data for KLAM 10641 and KLAM 15129. Coincidently, the water level data shifted more than 0.2 ft downward after the outage at KLAM 10495 (possibly human error). This made necessary an additional correction of the data related to that well. The data were corrected by subtracting the post-outage shift from the post-outage drawdown data.

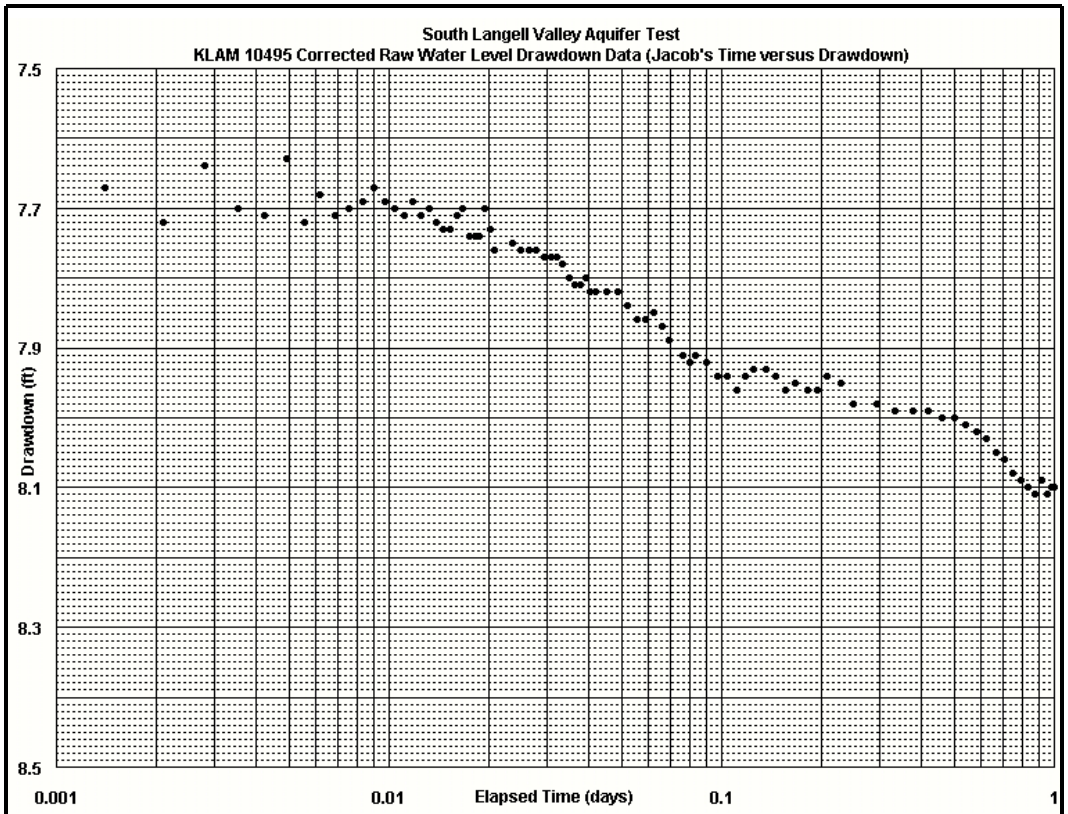


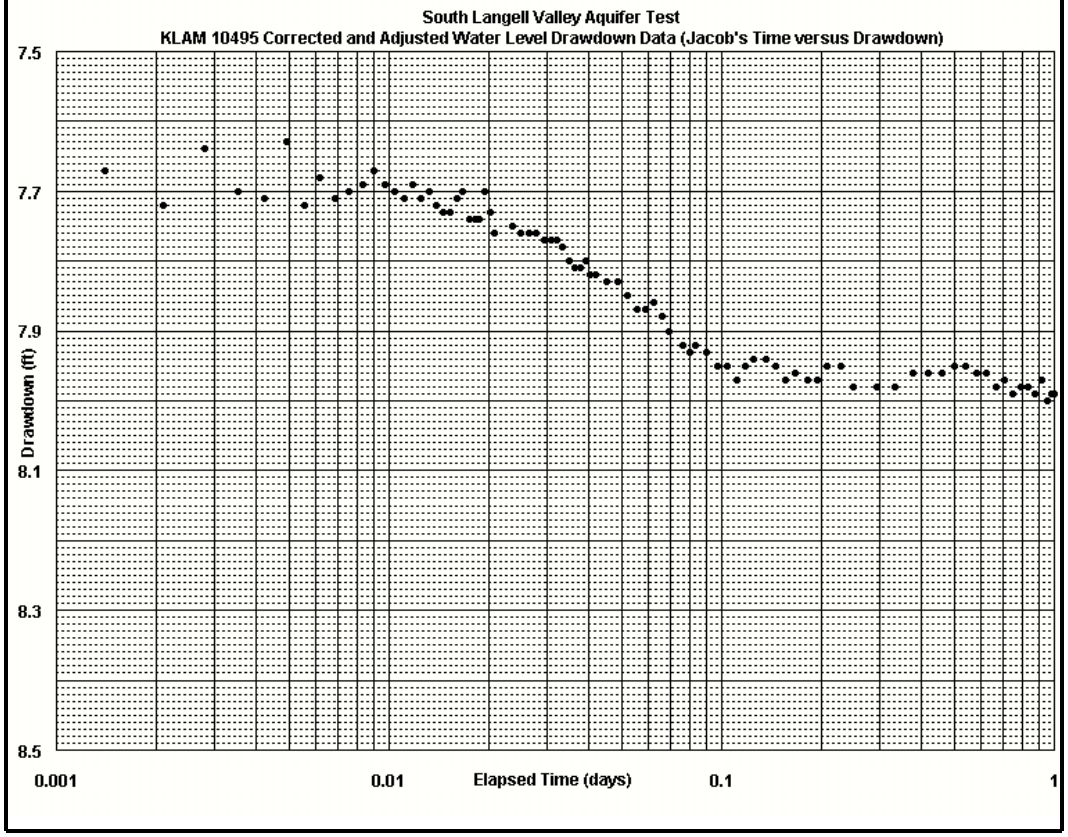

South Langell Valley Aquifer Test
KLAM 10495 Raw Water Level Data
(feet below land surface)
Water Level (feet blsd)
8
10
12
14
16
18
11/28/1999
11/29/1999
11/30/1999
12/1/1999
12/2/1999
12/3/1999
Date/Time
Influence of Barometric Pressure and Shutting Off Flowing Well
No Data
End of Aquifer Test at 13:30:00
Barbometric Pressure Influence
Start of Aquifer Test at 13:30:00 (Pumping Phase)
End of Pumping Phase Start of Recovery Phase at 13:30:00

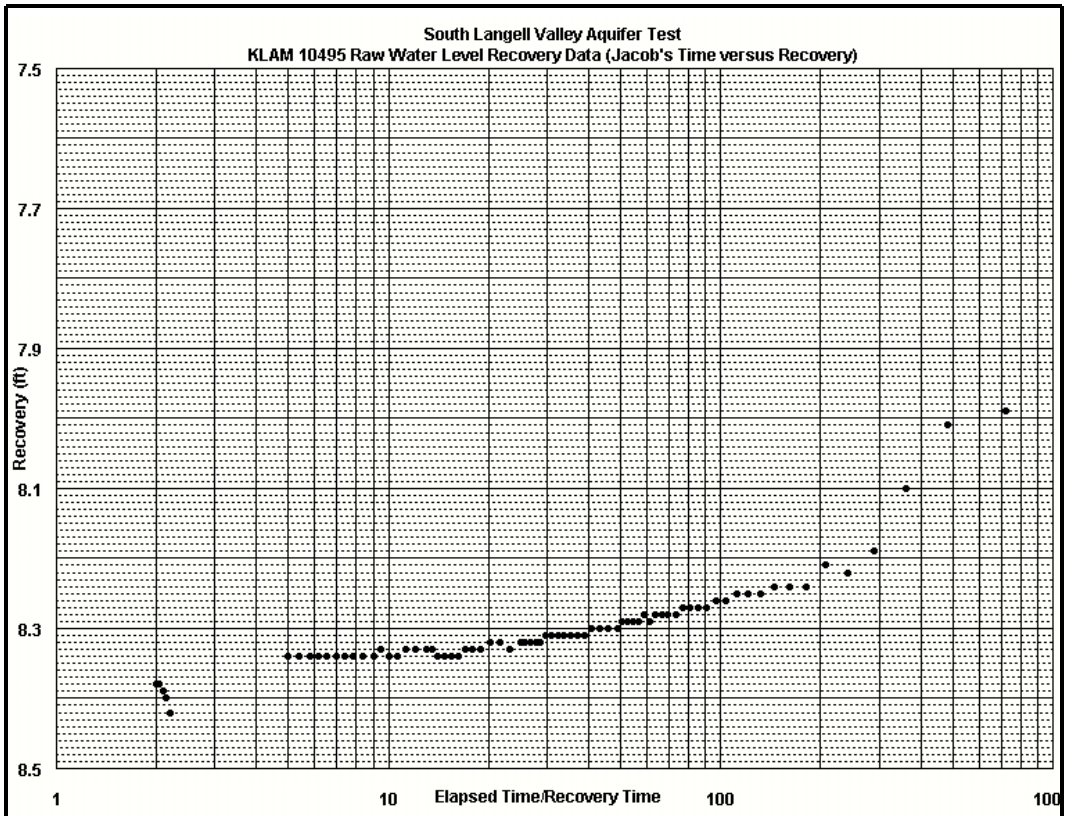

South Langell Valley Aquifer Test
KLAM 10495 Adjusted Water Level Data
(feet below land surface)
(adjustment = WL - 40% of barometric pressure change)
Water Level (feet blsd)
8
10
12
14
16
18
11/28/1999
11/29/1999
11/30/1999
12/1/1999
12/2/1999
12/3/1999
Date/Time
Influence of Shutting Off Flowing Well
No Data
End of Aquifer Test at 13:30:00
Start of Aquifer Test at 13:30:00 (Pumping Phase)
End of Pumping Phase Start of Recovery Phase at 13:30:00

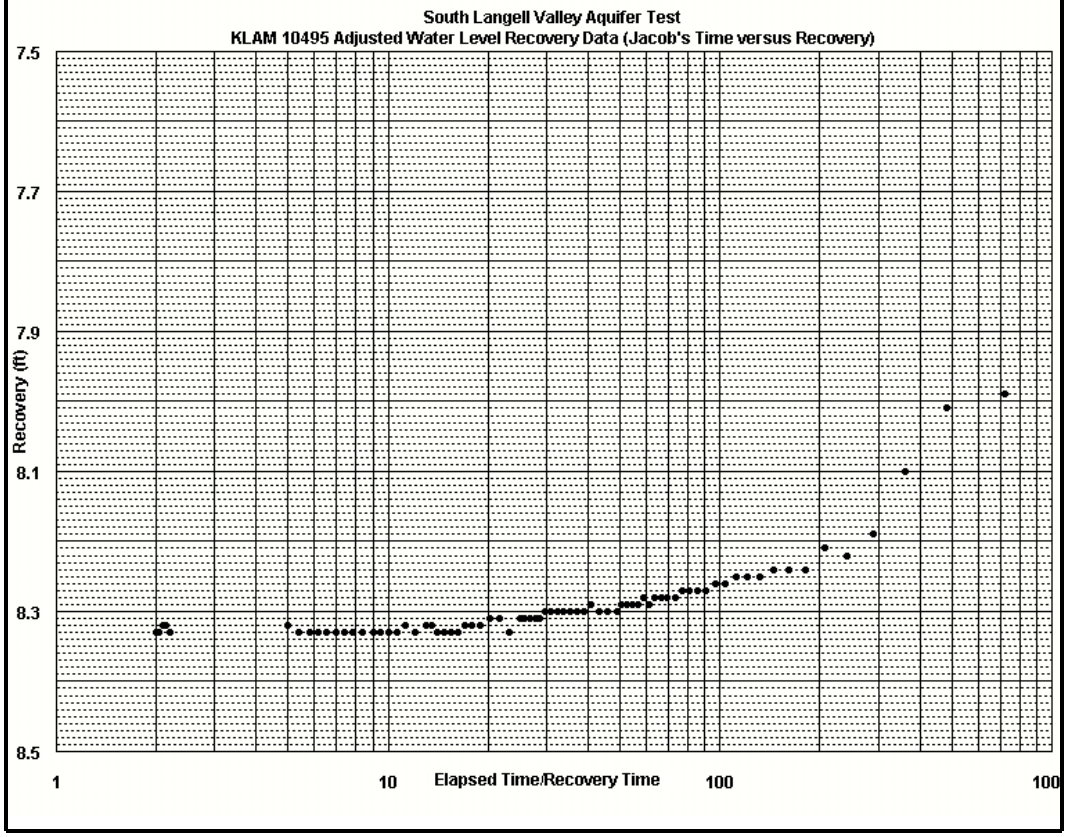

South Langell Valley Aquifer Test
KLAM 10495 Raw Water Level Data
(feet below land surface)
Drawdown Phase
Start of Aquifer Test at 13:30:00 (Pumping Phase)
Water Level at 13:30:00 = 8.47 feet blsd
Power off 3 minutes at Pumping Well from 15:13:00 to 15:16:00
Note: Water Level Shifts 0.24 feet down After Pumping Resumes
End of Pumping Phase Start of Recovery Phase at 13:30:00
Water Level (feet blsd)
16
16.2
16.4
16.6
16.8
17
11/28/1999
11/29/1999
11/30/1999
12/1/1999
12/2/1999
12/3/1999
Date/Time

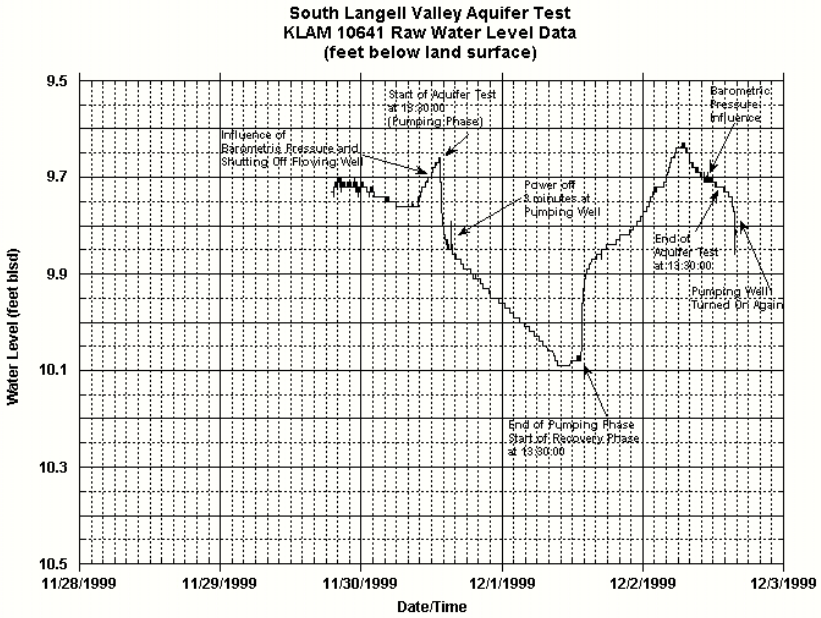

South Langell Valley Aquifer Test
KLAM 10495 Adjusted Water Level Data
(feet below land surface)
(adjustment = WL - 40% of barometric pressure change)
Drawdown Phase
Start of Aquifer Test at 13:30:00 (Pumping Phase)
Water Level at 13:30:00 = 8.47 feet blsd
Power off 3 minutes at Pumping Well from 15:13:00 to 15:16:00
Note: Water Level Shifts 0.24 feet down After Pumping Resumes
End of Pumping Phase Start of Recovery Phase at 13:30:00
Water Level (feet blsd)
16
16.2
16.4
16.6
16.8
17
11/28/1999
11/29/1999
11/30/1999
12/1/1999
12/2/1999
12/3/1999
Date/Time

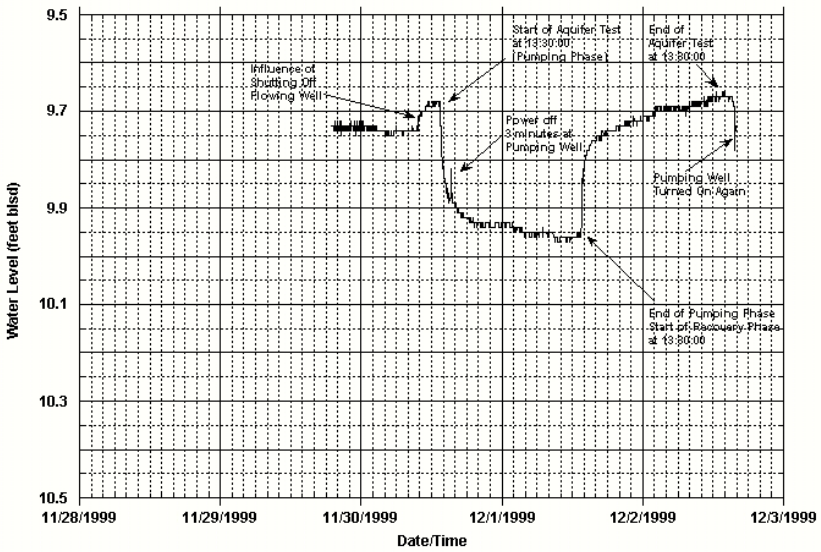

South Langell Valley Aquifer Test
KLAM 10495 Corrected Raw Water Level Drawdown Data (Jacob's Time versus Drawdown)
7.5
7.7
7.9
8.1
8.3
8.5
Drawdown (ft)
0.001
0.01
Elapsed Time (days)
0.1
1

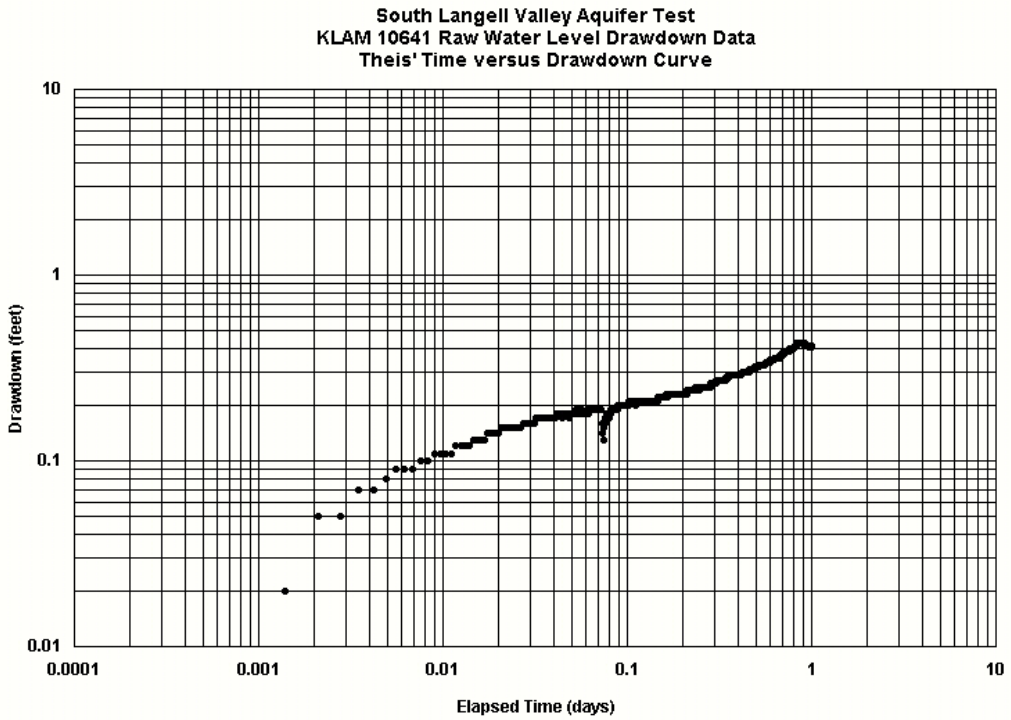

South Langell Valley Aquifer Test
KLAM 10495 Corrected and Adjusted Water Level Drawdown Data (Jacob's Time versus Drawdown)
7.5
7.7
7.9
8.1
8.3
8.5
Drawdown (ft)
0.001
0.01
Elapsed Time (days)
0.1
1

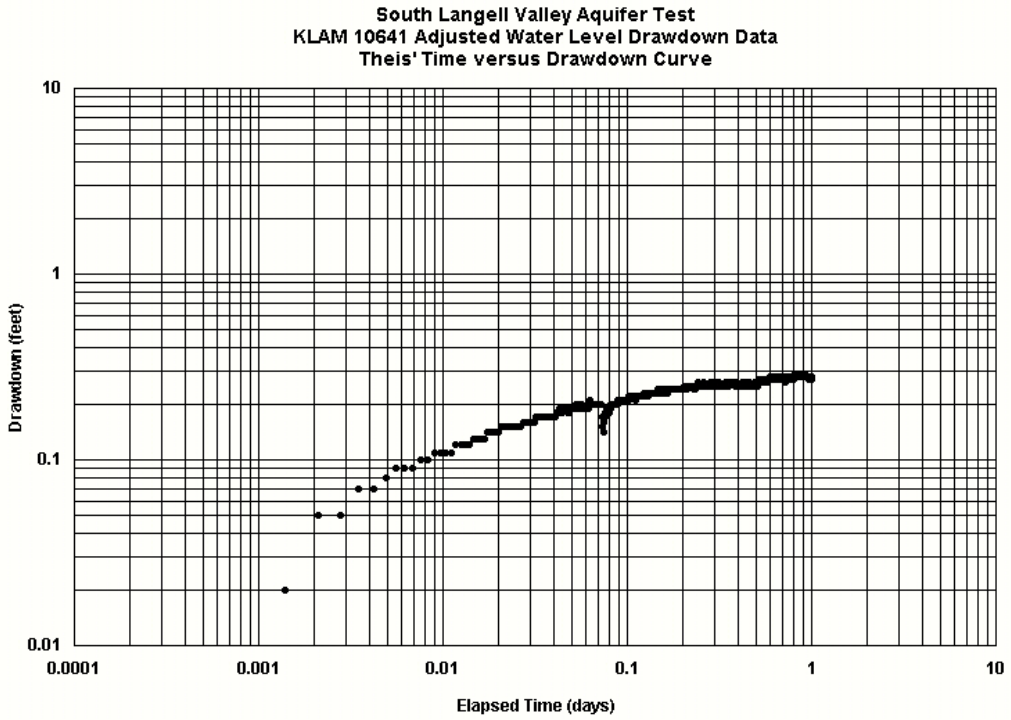

South Langell Valley Aquifer Test
KLAM 10495 Raw Water Level Recovery Data (Jacob's Time versus Recovery)
Recovery (ft)
7.5
7.7
7.9
8.1
8.3
8.5
1
10
Elapsed Time/Recovery Time
100
100

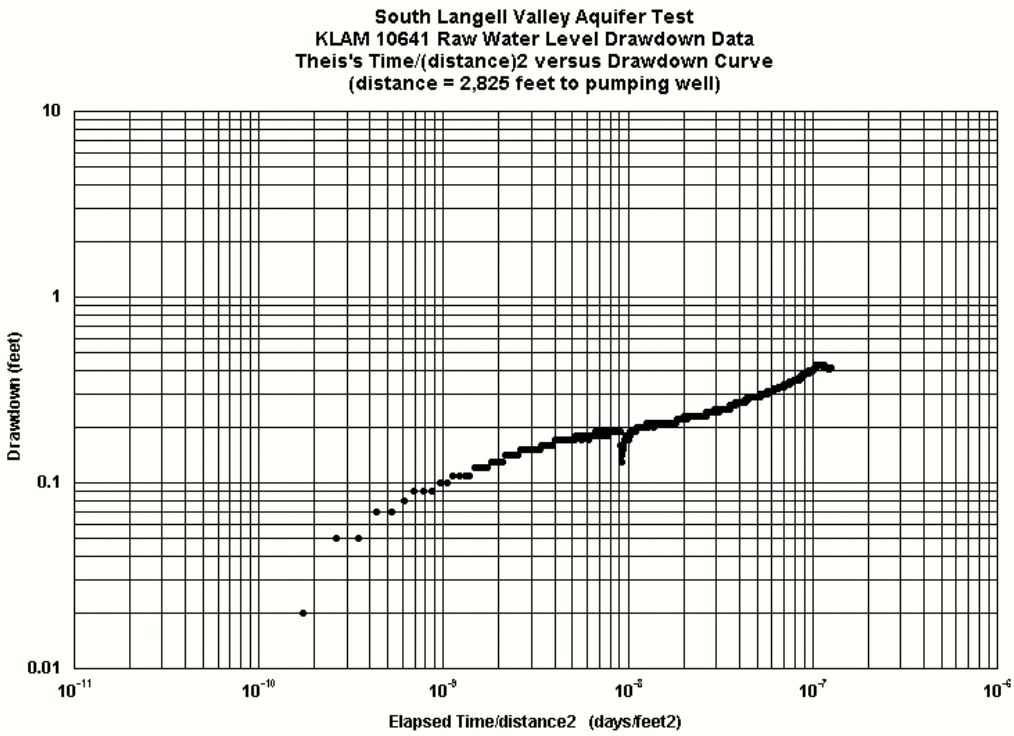

South Langell Valley Aquifer Test
KLAM 10495 Adjusted Water Level Recovery Data (Jacob's Time versus Recovery)
Recovery (ft)
7.5
7.7
7.9
8.1
8.3
8.5
1
10
Elapsed Time/Recovery Time
100
100

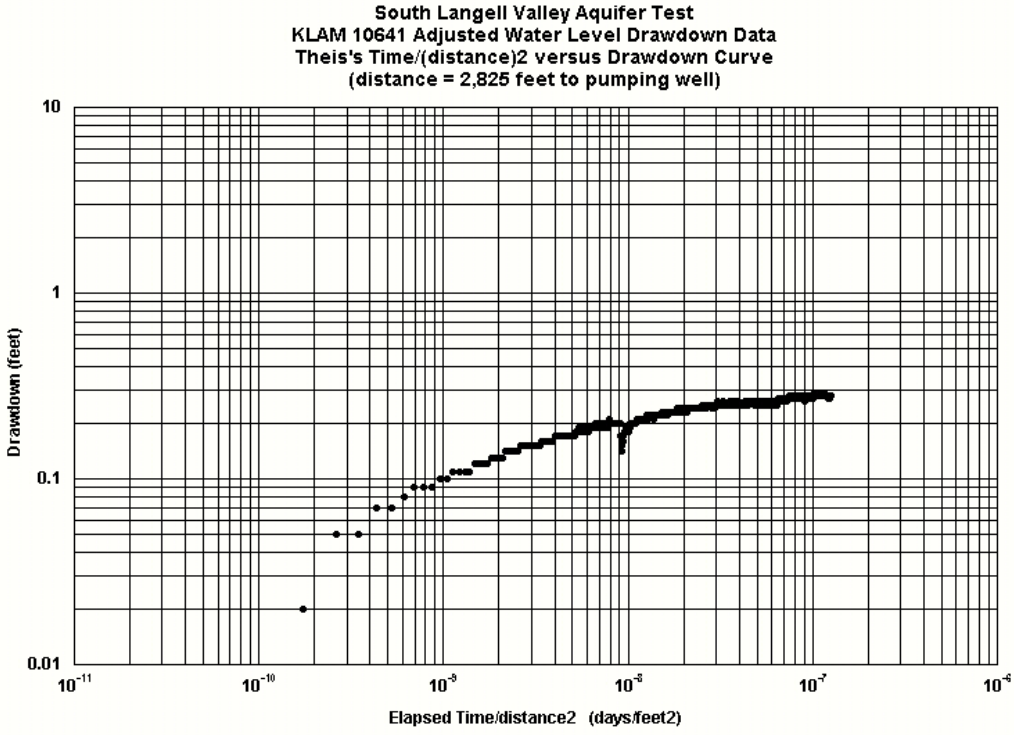

South Langell Valley Aquifer Test
KLAM 10641 Raw Water Level Data
(feet below land surface)
Water Level (feet blsd)
9.5
9.7
9.9
10.1
10.3
10.5
11/28/1999
11/29/1999
11/30/1999
12/1/1999
12/2/1999
12/3/1999
Date/Time
Start of Aquifer Test at 13:30:00 (Pumping Phase)
Influence of Barometric Pressure and Shutting Off Flowing Well
Power off 3 minutes at Pumping Well
Barometric Pressure Influence
End of Aquifer Test at 13:30:00
Pumping Well Turned On Again
End of Pumping Phase Start of Recovery Phase at 13:30:00

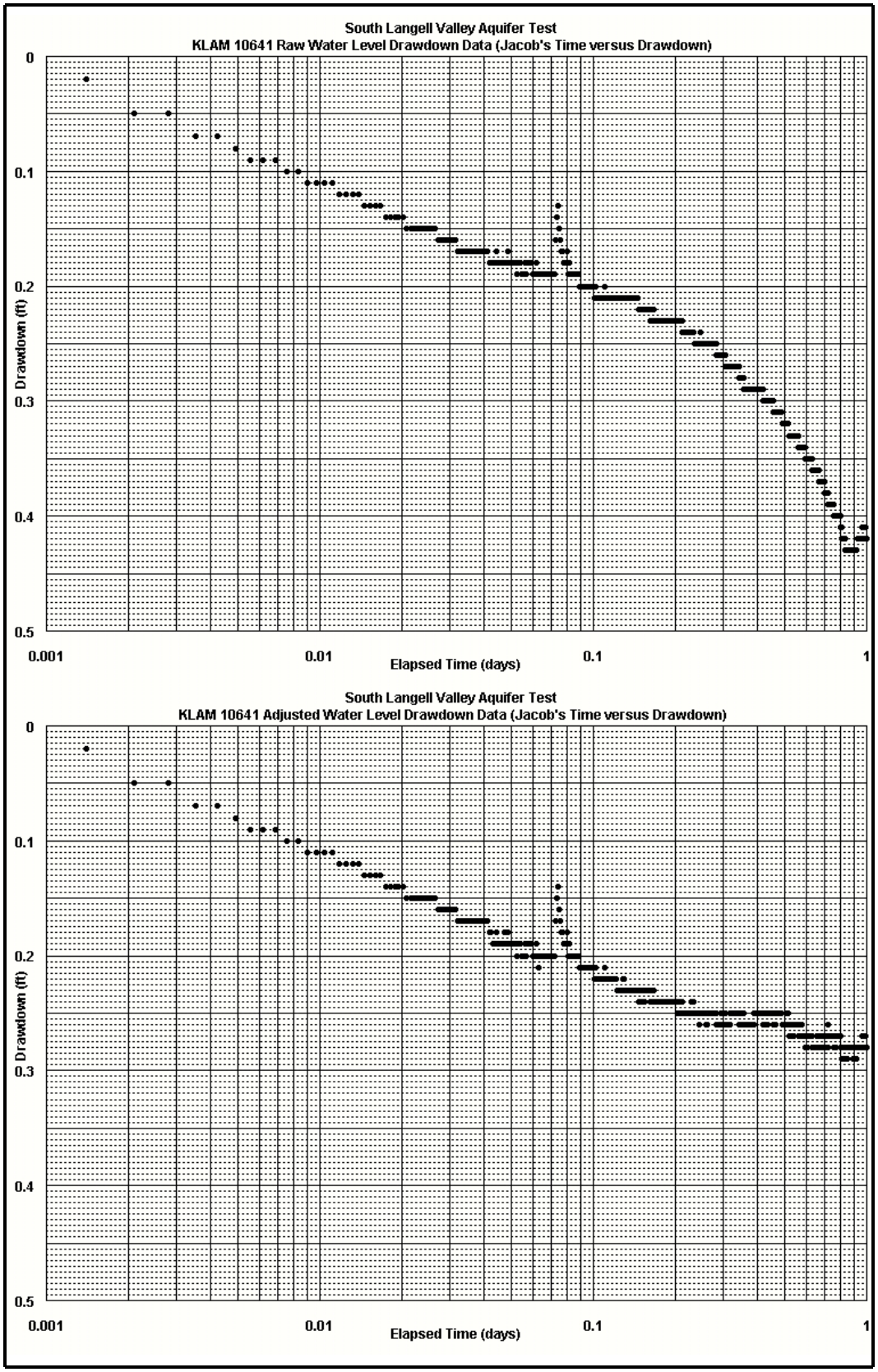

South Langell Valley Aquifer Test
KLAM 10641 Adjusted Water Level Data
(feet below land surface)
(adjustment = WL - 50% of barometric pressure change)
Water Level (feet blsd)
9.5
9.7
9.9
10.1
10.3
10.5
11/28/1999
11/29/1999
11/30/1999
12/1/1999
12/2/1999
12/3/1999
Date/Time
Start of Aquifer Test at 13:30:00 (Pumping Phase)
End of Aquifer Test at 13:30:00
Influence of Shutting Off Flowing Well
Power off 3 minutes at Pumping Well
Pumping Well Turned On Again
End of Pumping Phase Start of Recovery Phase at 13:30:00

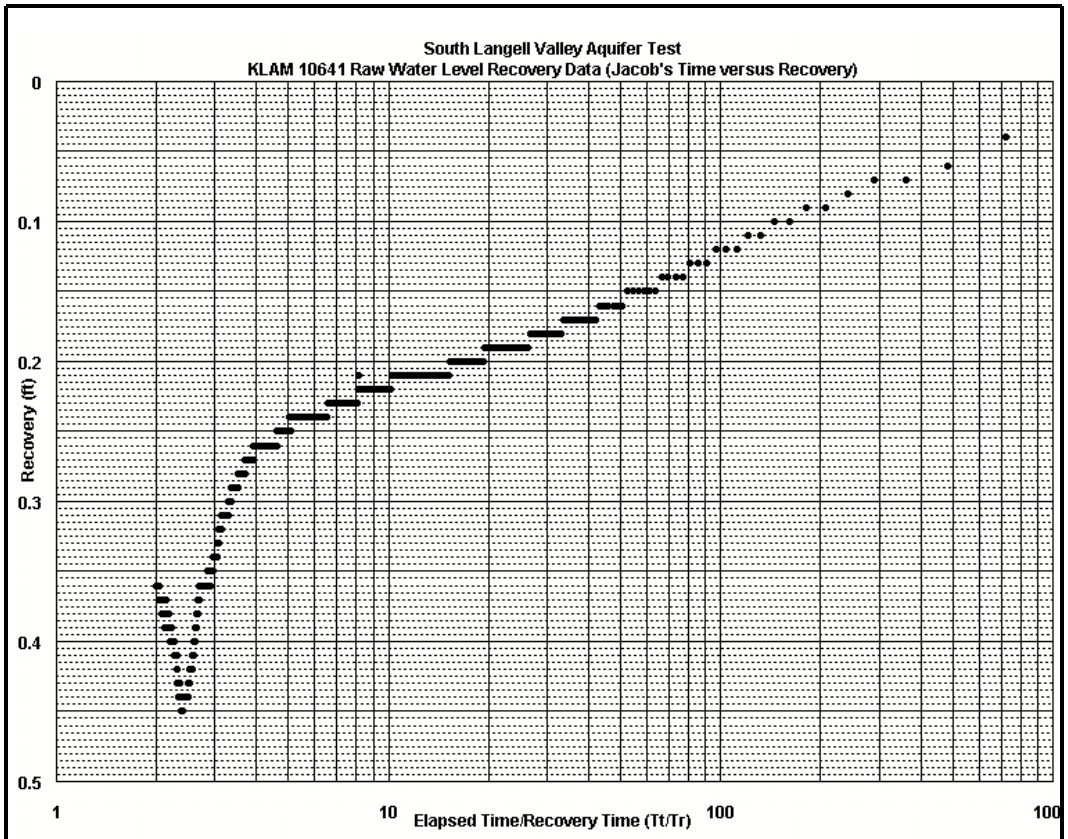

South Langell Valley Aquifer Test
KLAM 10641 Raw Water Level Drawdown Data
Theis' Time versus Drawdown Curve
Drawdown (feet)
10
1
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
Elapsed Time (days)

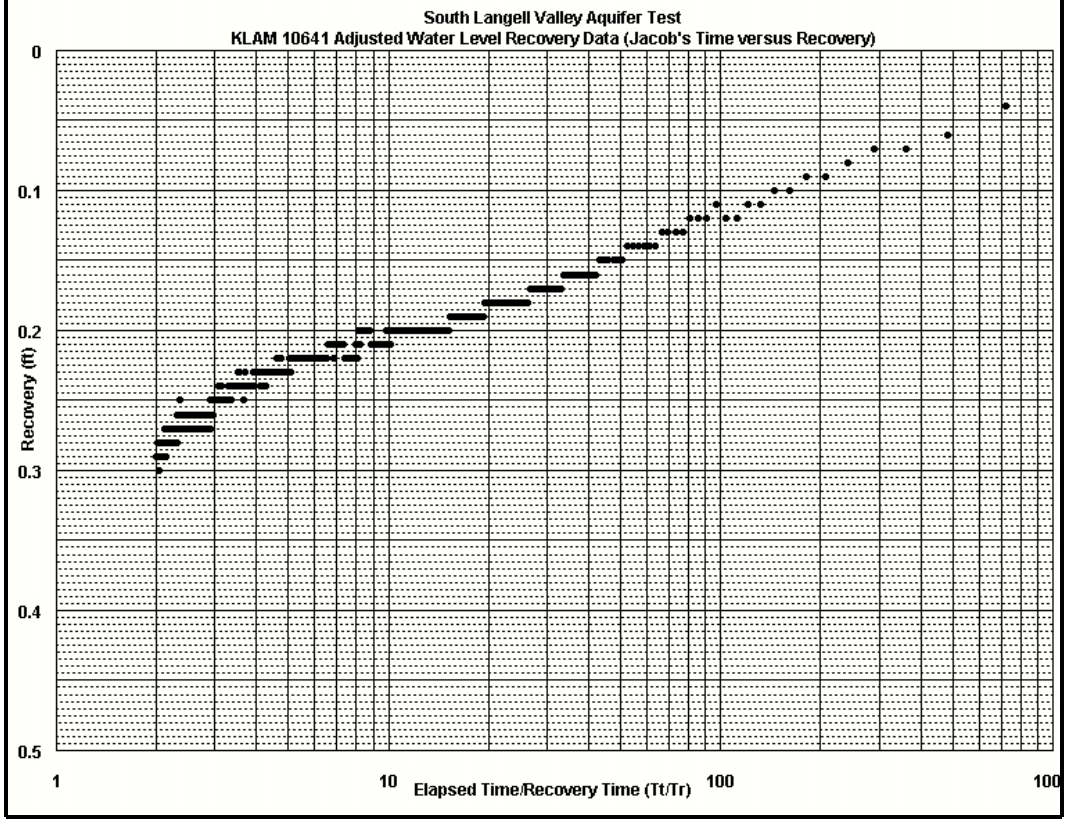

South Langell Valley Aquifer Test
KLAM 10641 Adjusted Water Level Drawdown Data
Theis' Time versus Drawdown Curve
Drawdown (feet)
10
1
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
Elapsed Time (days)

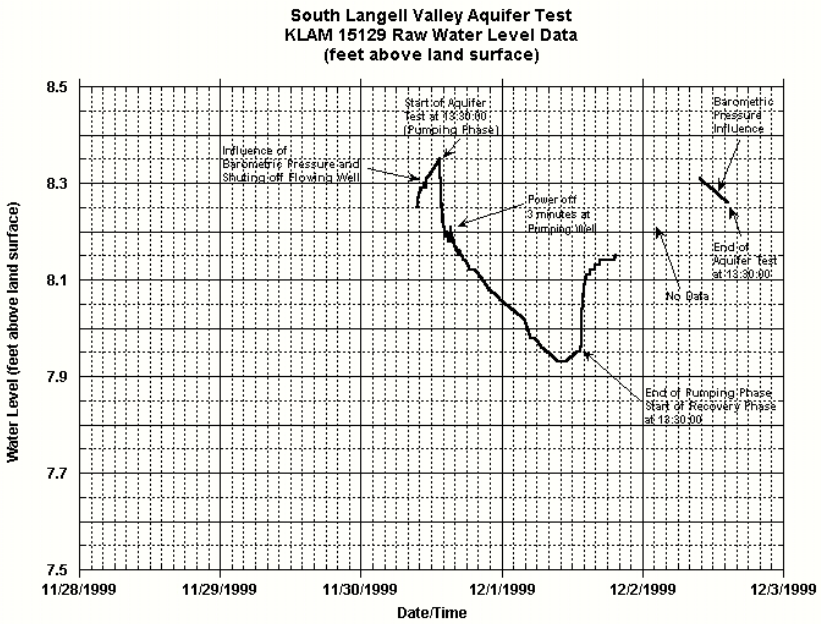

South Langell Valley Aquifer Test
KLAM 10641 Raw Water Level Drawdown Data
Theis's Time/(distance)2 versus Drawdown Curve
(distance = 2,825 feet to pumping well)
Drawdown (feet)
10
1
0.1
0.01
10^{-11}
10^{-10}
10^{-9}
10^{-8}
10^{-7}
10^{-6}
Elapsed Time/distance2 (days/feet2)

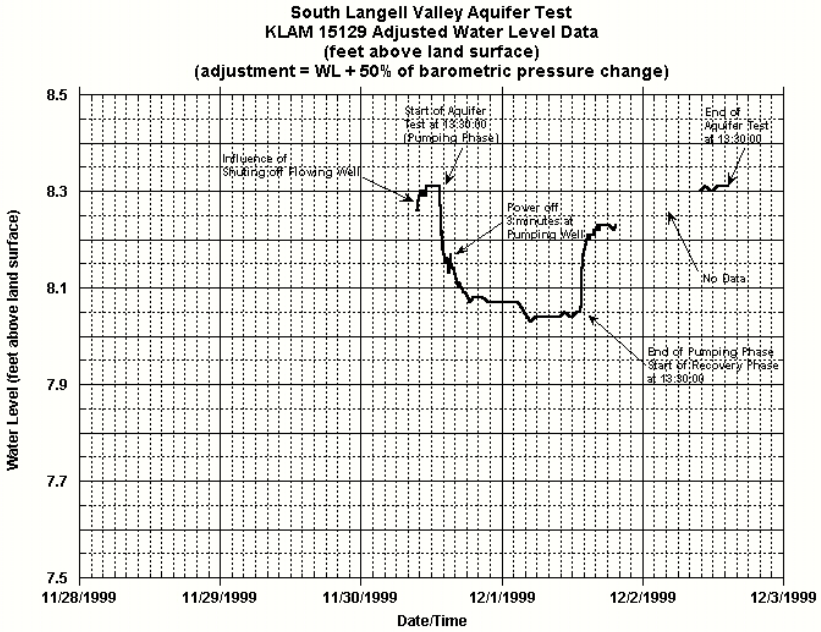

South Langell Valley Aquifer Test
KLAM 10641 Adjusted Water Level Drawdown Data
Theis's Time/(distance)2 versus Drawdown Curve
(distance = 2,825 feet to pumping well)
Drawdown (feet)
10
1
0.1
0.01
10^{-11}
10^{-10}
10^{-9}
10^{-8}
10^{-7}
10^{-6}
Elapsed Time/distance2 (days/feet2)

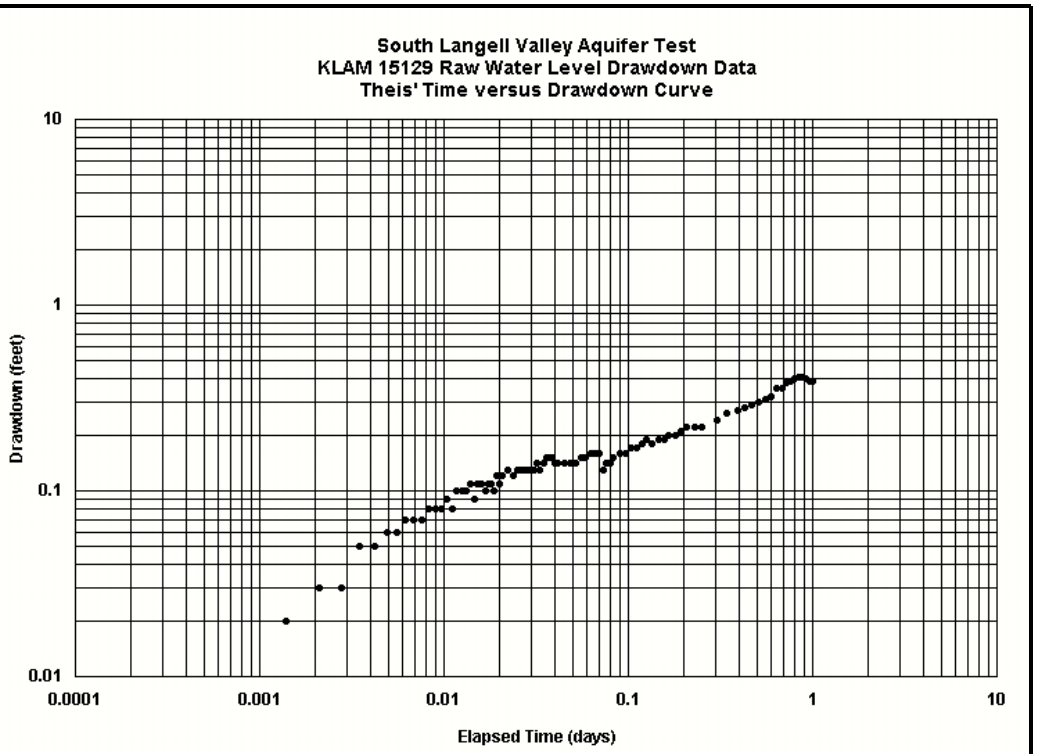

South Langell Valley Aquifer Test
KLAM 10641 Raw Water Level Drawdown Data (Jacob's Time versus Drawdown)
Drawdown (ft)
0
0.1
0.2
0.3
0.4
0.5
0.001
0.01
0.1
1
Elapsed Time (days)
South Langell Valley Aquifer Test
KLAM 10641 Adjusted Water Level Drawdown Data (Jacob's Time versus Drawdown)
Drawdown (ft)
0
0.1
0.2
0.3
0.4
0.5
0.001
0.01
0.1
1
Elapsed Time (days)

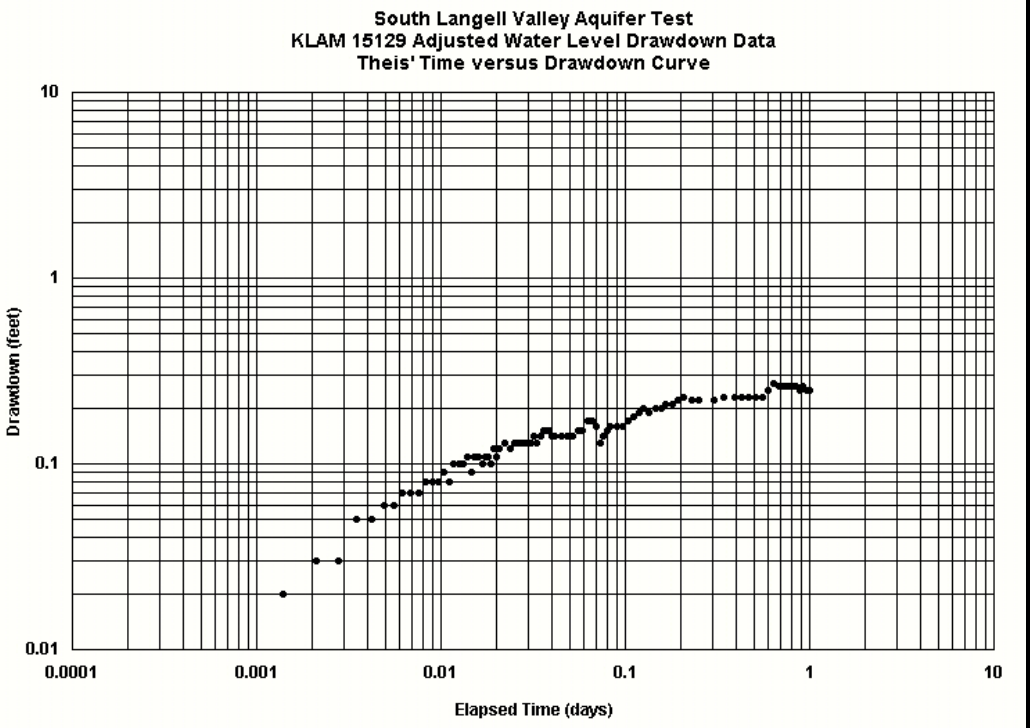

South Langell Valley Aquifer Test
KLAM 10641 Raw Water Level Recovery Data (Jacob's Time versus Recovery)
Recovery (ft)
0
0.1
0.2
0.3
0.4
0.5
1
10
100
1000
Elapsed Time/Recovery Time (Tt/Tr)

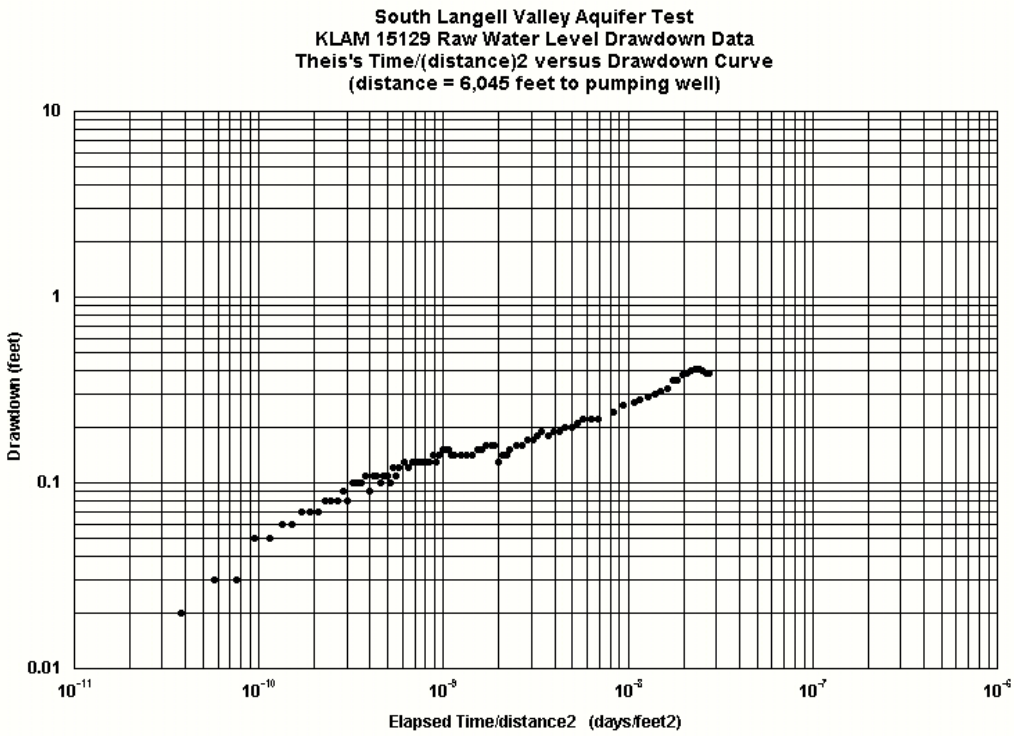

South Langell Valley Aquifer Test
KLAM 10641 Adjusted Water Level Recovery Data (Jacob's Time versus Recovery)
Recovery (ft)
0
0.1
0.2
0.3
0.4
0.5
1
10
100
1000
Elapsed Time/Recovery Time (Tt/Tr)

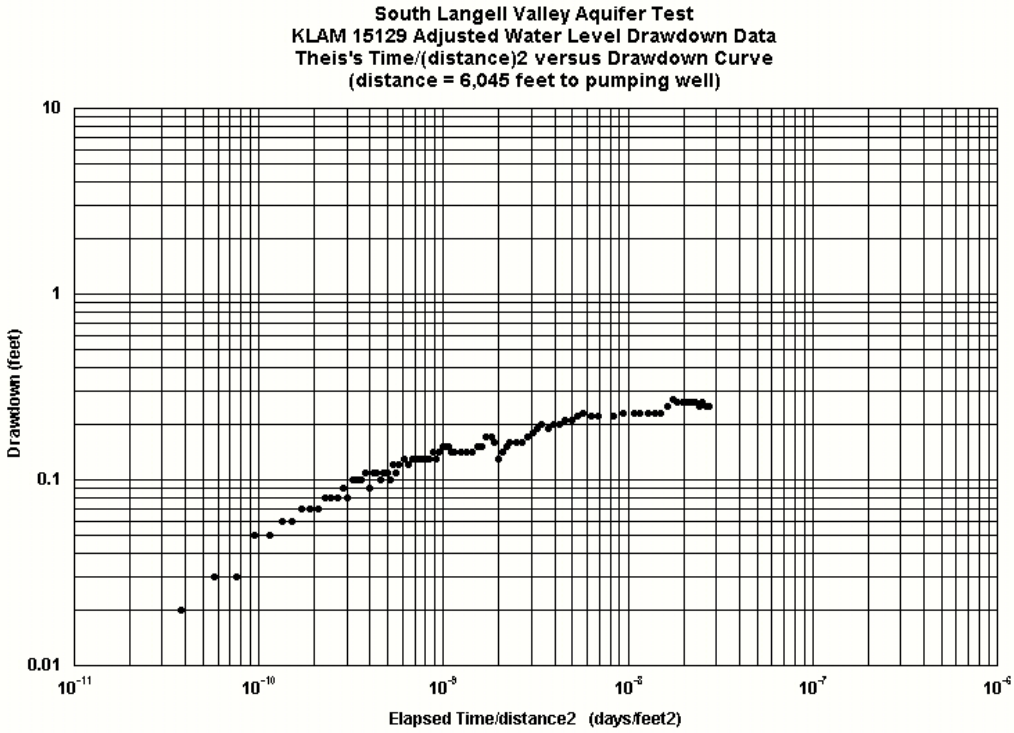

South Langell Valley Aquifer Test
KLAM 15129 Raw Water Level Data
(feet above land surface)
Water Level (feet above land surface)
8.5
8.3
8.1
7.9
7.7
7.5
11/28/1999
11/29/1999
11/30/1999
12/1/1999
12/2/1999
12/3/1999
Date/Time
Start of Aquifer Test at 13:30:00 (Pumping Phase)
Influence of Barometric Pressure and Shutting off Flowing Well
Power off 3 minutes at Pumping Well
Barometric Pressure Influence
End of Aquifer Test at 13:30:00
No Data
End of Pumping Phase Start of Recovery Phase at 13:30:00

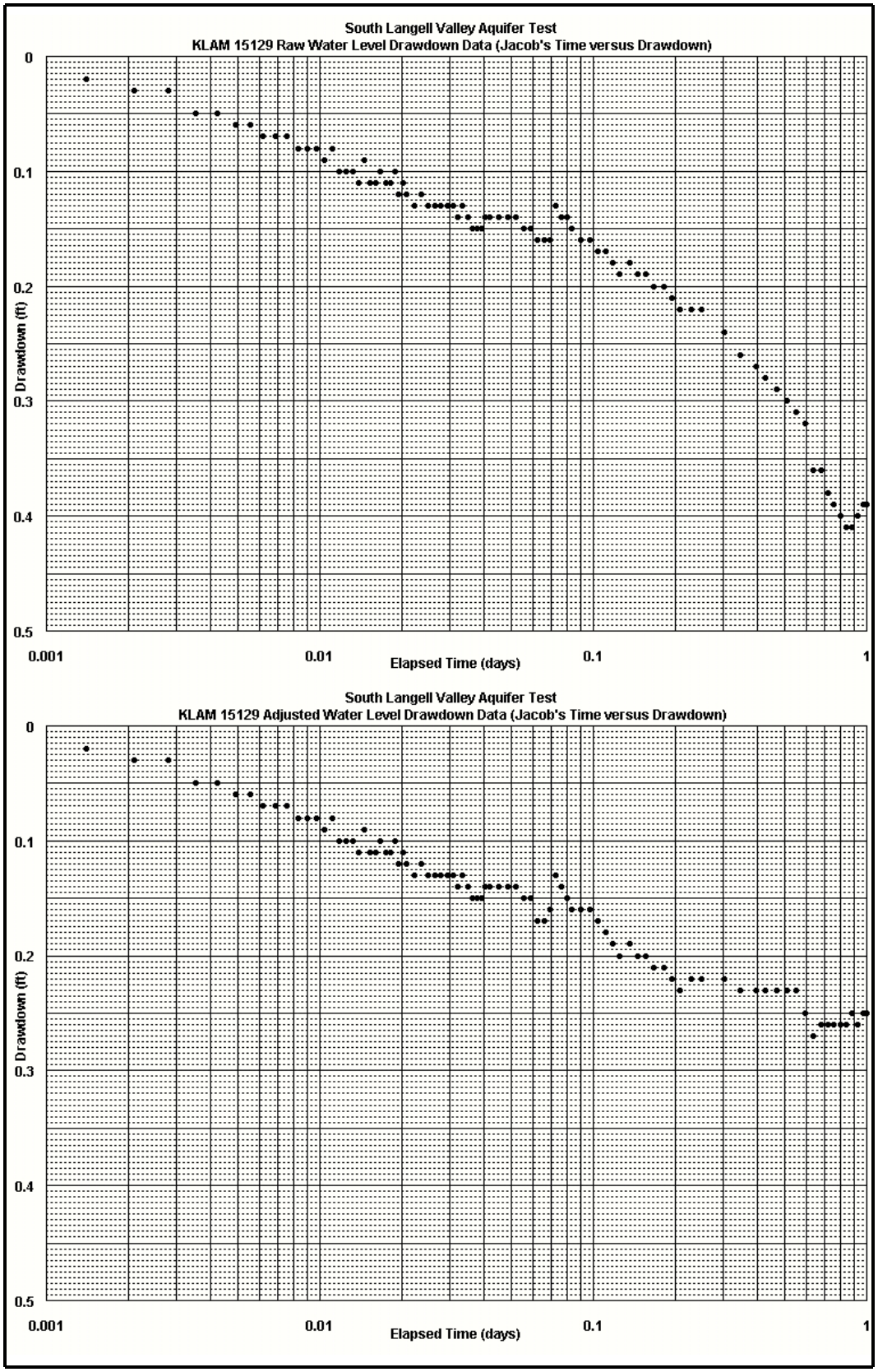

South Langell Valley Aquifer Test
KLAM 15129 Adjusted Water Level Data
(feet above land surface)
(adjustment = WL + 50% of barometric pressure change)
Water Level (feet above land surface)
8.5
8.3
8.1
7.9
7.7
7.5
11/28/1999
11/29/1999
11/30/1999
12/1/1999
12/2/1999
12/3/1999
Date/Time
Start of Aquifer Test at 13:30:00 (Pumping Phase)
Influence of Shutting off Flowing Well
Power off 3 minutes at Pumping Well
End of Aquifer Test at 13:30:00
No Data
End of Pumping Phase Start of Recovery Phase at 13:30:00

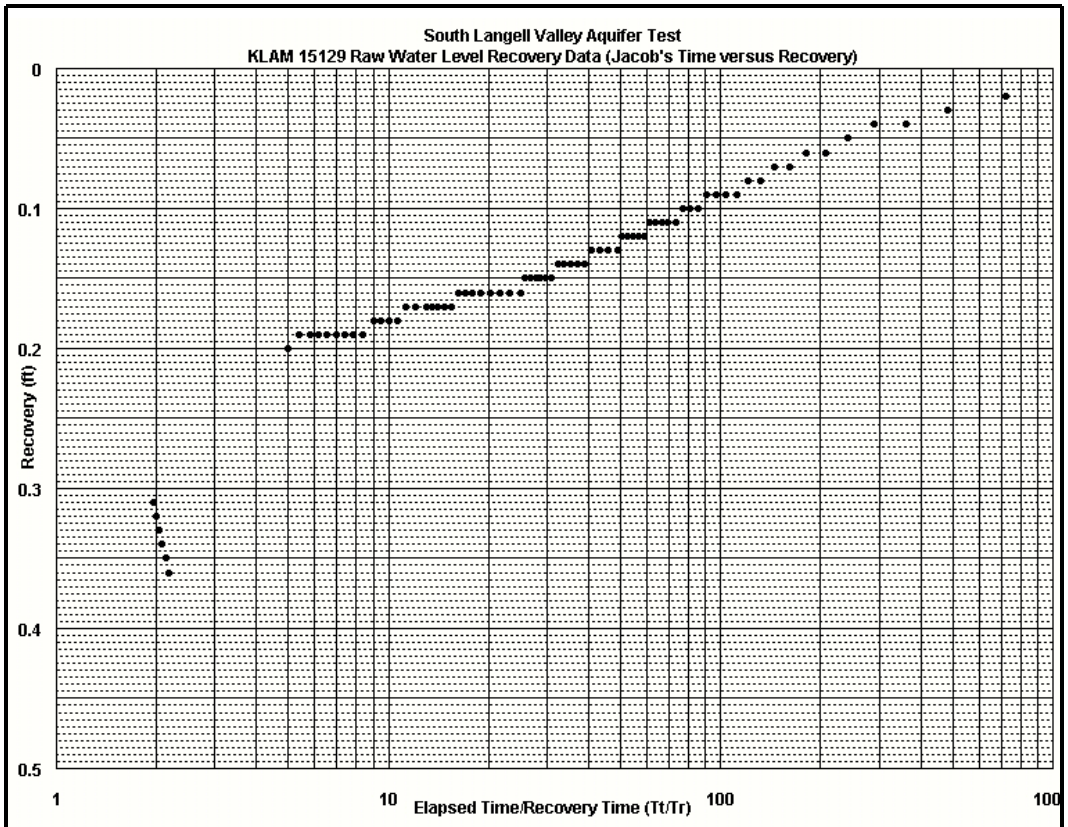

South Langell Valley Aquifer Test
KLAM 15129 Raw Water Level Drawdown Data
Theis' Time versus Drawdown Curve
Drawdown (feet)
10
1
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
Elapsed Time (days)

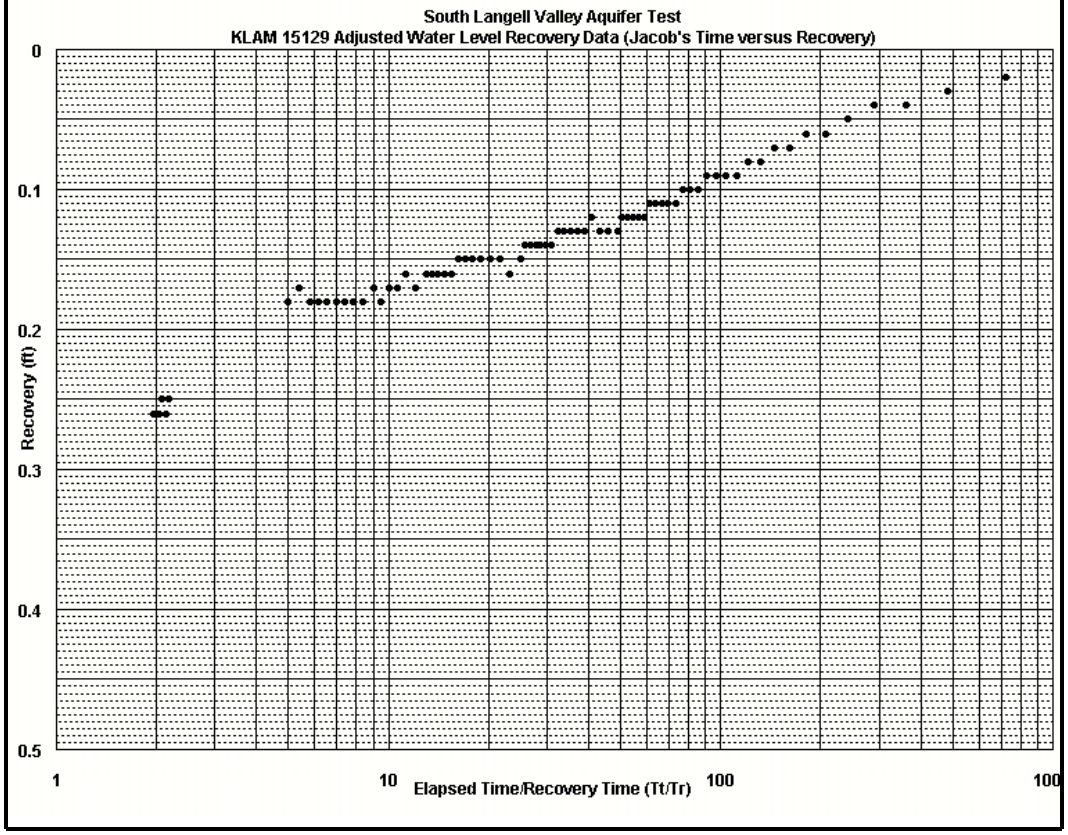

South Langell Valley Aquifer Test
KLAM 15129 Adjusted Water Level Drawdown Data
Theis' Time versus Drawdown Curve
Drawdown (feet)
10
1
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
Elapsed Time (days)

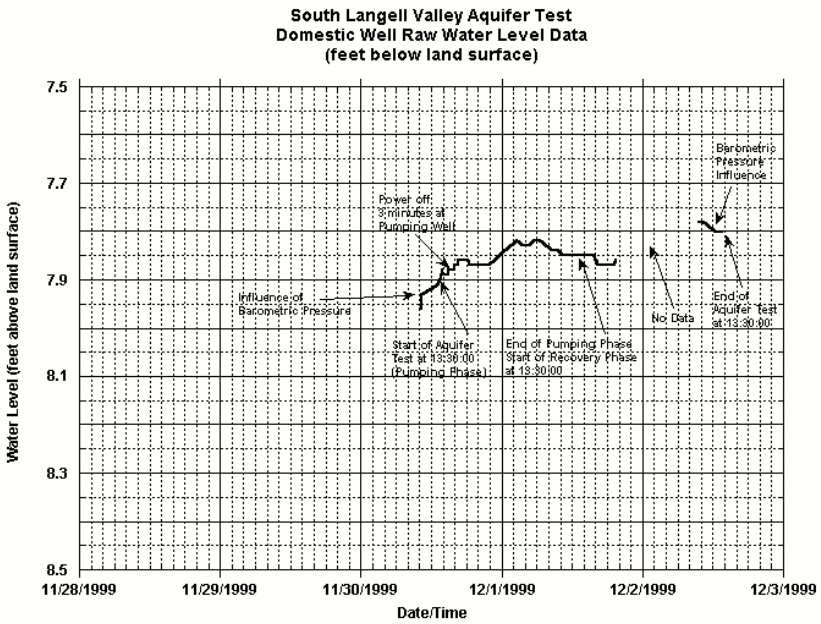

South Langell Valley Aquifer Test
KLAM 15129 Raw Water Level Drawdown Data
Theis's Time/(distance)2 versus Drawdown Curve
(distance = 6,045 feet to pumping well)
Drawdown (feet)
10
1
0.1
0.01
10-11
10-10
10-9
10-8
10-7
10-6
Elapsed Time/distance2 (days/feet2)

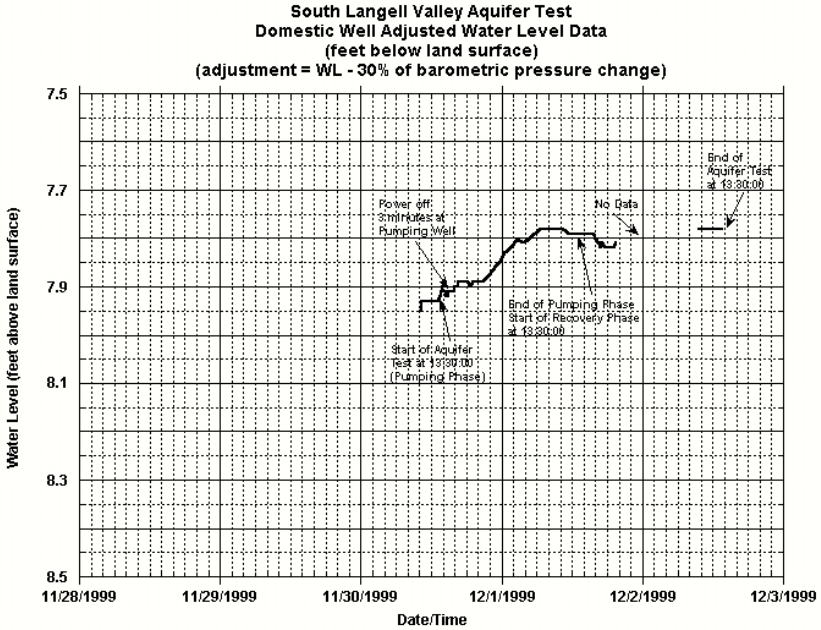

South Langell Valley Aquifer Test
KLAM 15129 Adjusted Water Level Drawdown Data
Theis's Time/(distance)2 versus Drawdown Curve
(distance = 6,045 feet to pumping well)
Drawdown (feet)
10
1
0.1
0.01
10-11
10-10
10-9
10-8
10-7
10-6
Elapsed Time/distance2 (days/feet2)


South Langell Valley Aquifer Test
KLAM 15129 Raw Water Level Drawdown Data (Jacob's Time versus Drawdown)
Drawdown (ft)
0
0.1
0.2
0.3
0.4
0.5
0.001
0.01
0.1
1
Elapsed Time (days)
South Langell Valley Aquifer Test
KLAM 15129 Adjusted Water Level Drawdown Data (Jacob's Time versus Drawdown)
Drawdown (ft)
0
0.1
0.2
0.3
0.4
0.5
0.001
0.01
0.1
1
Elapsed Time (days)


South Langell Valley Aquifer Test
KLAM 15129 Raw Water Level Recovery Data (Jacob's Time versus Recovery)
Recovery (ft)
0
0.1
0.2
0.3
0.4
0.5
1
10
100
100
Elapsed Time/Recovery Time (Tt/Tr)


South Langell Valley Aquifer Test
KLAM 15129 Adjusted Water Level Recovery Data (Jacob's Time versus Recovery)
Recovery (ft)
0
0.1
0.2
0.3
0.4
0.5
1
10
100
100
Elapsed Time/Recovery Time (Tt/Tr)


South Langell Valley Aquifer Test
Domestic Well Raw Water Level Data
(feet below land surface)
Water Level (feet above land surface)
7.5
7.7
7.9
8.1
8.3
8.5
11/28/1999
11/29/1999
11/30/1999
12/1/1999
12/2/1999
12/3/1999
Date/Time
Barometric Pressure Influence
Power off 3 minutes at Pumping Well
Influence of Barometric Pressure
Start of Aquifer Test at 13:30:00 (Pumping Phase)
End of Pumping Phase Start of Recovery Phase at 13:30:00
No Data
End of Aquifer Test at 13:30:00


South Langell Valley Aquifer Test
Domestic Well Adjusted Water Level Data
(feet below land surface)
(adjustment = WL - 30% of barometric pressure change)
Water Level (feet above land surface)
7.5
7.7
7.9
8.1
8.3
8.5
11/28/1999
11/29/1999
11/30/1999
12/1/1999
12/2/1999
12/3/1999
Date/Time
End of Aquifer Test at 13:30:00
Power off 3 minutes at Pumping Well
No Data
End of Pumping Phase Start of Recovery Phase at 13:30:00
Start of Aquifer Test at 13:30:00 (Pumping Phase)

Appendix 22: South Langell Valley 1999 OWRD aquifer test, pumping well data (KLAM 10495)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Pumping Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: KLAM 10495
Measuring Point: angle pipe
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Corrected data relates to a data shift after a power outage

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Corrected Drawdown (feet s)	Residual Drawdown (feet) (s)
30-Nov-1999 06:00:00												
30-Nov-1999 10:17:00	9.24	0.71	8.53	Pre-test Measurement	-193.00	-0.1340						
30-Nov-1999 13:06:00	9.19	0.71	8.48	Pre-test Measurement	-24.00	-0.0167						
30-Nov-1999 13:23:00	9.18	0.71	8.47	Pre-test Measurement	-7.00	-0.0049						
30-Nov-1999 13:25:00	9.18	0.71	8.47	Pre-test Measurement	-5.00	-0.0035						
30-Nov-1999 13:30:00	9.18	0.71	8.47	**Start Test, Pumping Brgins**	0.00	0.0000				0.00	0.00	
30-Nov-1999 13:31:00	16.33	0.71	15.62		1.00	0.0007				7.15	7.15	
30-Nov-1999 13:32:00	16.85	0.71	16.14		2.00	0.0014				7.67	7.67	
30-Nov-1999 13:33:00	16.90	0.71	16.19		3.00	0.0021				7.72	7.72	
30-Nov-1999 13:34:00	16.82	0.71	16.11		4.00	0.0028				7.64	7.64	
30-Nov-1999 13:35:00	16.88	0.71	16.17		5.00	0.0035				7.70	7.70	
30-Nov-1999 13:36:00	16.89	0.71	16.18		6.00	0.0042				7.71	7.71	
30-Nov-1999 13:37:00	16.81	0.71	16.10		7.00	0.0049				7.63	7.63	
30-Nov-1999 13:38:00	16.90	0.71	16.19		8.00	0.0056				7.72	7.72	
30-Nov-1999 13:39:00	16.86	0.71	16.15		9.00	0.0062				7.68	7.68	
30-Nov-1999 13:40:00	16.89	0.71	16.18		10.00	0.0069				7.71	7.71	
30-Nov-1999 13:41:00	16.88	0.71	16.17		11.00	0.0076				7.70	7.70	
30-Nov-1999 13:42:00	16.87	0.71	16.16		12.00	0.0083				7.69	7.69	
30-Nov-1999 13:43:00	16.85	0.71	16.14		13.00	0.0090				7.67	7.67	
30-Nov-1999 13:44:00	16.87	0.71	16.16		14.00	0.0097				7.69	7.69	
30-Nov-1999 13:45:00	16.88	0.71	16.17		15.00	0.0104				7.70	7.70	
30-Nov-1999 13:46:00	16.89	0.71	16.18		16.00	0.0111				7.71	7.71	
30-Nov-1999 13:47:00	16.87	0.71	16.16		17.00	0.0118				7.69	7.69	
30-Nov-1999 13:48:00	16.89	0.71	16.18		18.00	0.0125				7.71	7.71	
30-Nov-1999 13:49:00	16.88	0.71	16.17		19.00	0.0132				7.70	7.70	
30-Nov-1999 13:50:00	16.90	0.71	16.19		20.00	0.0139				7.72	7.72	
30-Nov-1999 13:51:00	16.91	0.71	16.20		21.00	0.0146				7.73	7.73	
30-Nov-1999 13:52:00	16.91	0.71	16.20		22.00	0.0153				7.73	7.73	
30-Nov-1999 13:53:00	16.89	0.71	16.18		23.00	0.0160				7.71	7.71	
30-Nov-1999 13:54:00	16.88	0.71	16.17	Gale/strong wind	24.00	0.0167				7.70	7.70	
30-Nov-1999 13:55:00	16.92	0.71	16.21	since start of test	25.00	0.0174				7.74	7.74	
30-Nov-1999 13:56:00	16.92	0.71	16.21		26.00	0.0181				7.74	7.74	
30-Nov-1999 13:57:00	16.92	0.71	16.21		27.00	0.0187				7.74	7.74	
30-Nov-1999 13:58:00	16.88	0.71	16.17		28.00	0.0194				7.70	7.70	

Appendix 22: South Langell Valley 1999 OWRD aquifer test, pumping well data (KLAM 10495)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Pumping Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: KLAM 10495
Measuring Point: angle pipe
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Corrected data relates to a data shift after a power outage

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Corrected Drawdown (feet s)	Residual Drawdown (feet) (s)
30-Nov-1999 13:59:00	16.91	0.71	16.20		29.00	0.0201				7.73	7.73	
30-Nov-1999 14:00:00	16.94	0.71	16.23	Discharge to ditch overflowing	30.00	0.0208				7.76	7.76	
30-Nov-1999 14:02:00				Opened canal headgate	32.00	0.0222						
30-Nov-1999 14:04:00	16.93	0.71	16.22	Think about possible recharge	34.00	0.0236				7.75	7.75	
30-Nov-1999 14:06:00	16.94	0.71	16.23		36.00	0.0250				7.76	7.76	
30-Nov-1999 14:08:00	16.94	0.71	16.23		38.00	0.0264				7.76	7.76	
30-Nov-1999 14:10:00	16.94	0.71	16.23		40.00	0.0278				7.76	7.76	
30-Nov-1999 14:12:00	16.95	0.71	16.24		42.00	0.0292				7.77	7.77	
30-Nov-1999 14:14:00	16.95	0.71	16.24		44.00	0.0306				7.77	7.77	
30-Nov-1999 14:16:00	16.95	0.71	16.24		46.00	0.0319				7.77	7.77	
30-Nov-1999 14:18:00	16.96	0.71	16.25		48.00	0.0333				7.78	7.78	
30-Nov-1999 14:20:00	16.98	0.71	16.27		50.00	0.0347				7.80	7.80	
30-Nov-1999 14:22:00	16.99	0.71	16.28		52.00	0.0361				7.81	7.81	
30-Nov-1999 14:24:00	16.99	0.71	16.28		54.00	0.0375				7.81	7.81	
30-Nov-1999 14:26:00	16.98	0.71	16.27	windy, but lower velocity	56.00	0.0389				7.80	7.80	
30-Nov-1999 14:28:00	17.00	0.71	16.29		58.00	0.0403				7.82	7.82	
30-Nov-1999 14:30:00	17.00	0.71	16.29		60.00	0.0417				7.82	7.82	
30-Nov-1999 14:35:00	17.00	0.71	16.29		65.00	0.0451				7.82	7.82	
30-Nov-1999 14:40:00	17.00	0.71	16.29		70.00	0.0486				7.82	7.82	
30-Nov-1999 14:45:00	17.02	0.71	16.31		75.00	0.0521				7.84	7.84	
30-Nov-1999 14:50:00	17.04	0.71	16.33		80.00	0.0556				7.86	7.86	
30-Nov-1999 14:55:00	17.04	0.71	16.33		85.00	0.0590				7.86	7.86	
30-Nov-1999 15:00:00	17.03	0.71	16.32		90.00	0.0625				7.85	7.85	
30-Nov-1999 15:05:00	17.05	0.71	16.34		95.00	0.0660				7.87	7.87	
30-Nov-1999 15:10:00	17.07	0.71	16.36	15:13:00 power off/pump stops	100.00	0.0694				7.89	7.89	
30-Nov-1999 15:15:00				15:16:00 power on/pump on	105.00	0.0729						
30-Nov-1999 15:20:00	17.31	0.71	16.60		110.00	0.0764				8.13	7.91	
30-Nov-1999 15:25:00	17.32	0.71	16.61		115.00	0.0799				8.14	7.92	
30-Nov-1999 15:30:00	17.31	0.71	16.60	at 15:3:00 power = 52 kwh	120.00	0.0833				8.13	7.91	
30-Nov-1999 15:40:00	17.32	0.71	16.61		130.00	0.0903				8.14	7.92	
30-Nov-1999 15:50:00	17.34	0.71	16.63	at 15:44:00 flow rate = 2,033 gpm	140.00	0.0972				8.16	7.94	
30-Nov-1999 16:00:00	17.34	0.71	16.63		150.00	0.1042				8.16	7.94	
30-Nov-1999 16:10:00	17.36	0.71	16.65	at 16:11:00 power = 70 kwh	160.00	0.1111				8.18	7.96	
30-Nov-1999 16:20:00	17.34	0.71	16.63		170.00	0.1181				8.16	7.94	

Appendix 22: South Langell Valley 1999 OWRD aquifer test, pumping well data (KLAM 10495)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Pumping Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: KLAM 10495
Measuring Point: angle pipe
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Corrected data relates to a data shift after a power outage

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Corrected Drawdown (feet s)	Residual Drawdown (feet) (s)
30-Nov-1999 16:30:00	17.33	0.71	16.62	at 16:33:00 flow rate = 1,982 gpm	180.00	0.1250				8.15	7.93	
30-Nov-1999 16:45:00	17.33	0.71	16.62		195.00	0.1354				8.15	7.93	
30-Nov-1999 17:00:00	17.34	0.71	16.63	at 17:01:00 power = 92 kwh	210.00	0.1458				8.16	7.94	
30-Nov-1999 17:15:00	17.36	0.71	16.65	at 17:15:00 flow = 2,095 gpm	225.00	0.1562				8.18	7.96	
30-Nov-1999 17:30:00	17.35	0.71	16.64	17:33:00 power = 106 kwh, less wind	240.00	0.1667				8.17	7.95	
30-Nov-1999 17:50:00	17.36	0.71	16.65		260.00	0.1806				8.18	7.96	
30-Nov-1999 18:10:00	17.36	0.71	16.65	2,172 gpm	280.00	0.1944				8.18	7.96	
30-Nov-1999 18:30:00	17.34	0.71	16.63	2,172 gpm, 132 kwh	300.00	0.2083				8.16	7.94	
30-Nov-1999 19:00:00	17.35	0.71	16.64	2,106 gpm	330.00	0.2292				8.17	7.95	
30-Nov-1999 19:30:00	17.38	0.71	16.67	2,137 gpm, 159 kwh, snowing	360.00	0.2500				8.20	7.98	
30-Nov-1999 20:30:00	17.38	0.71	16.67	2,058 gpm, 185 kwh, stars	420.00	0.2917				8.20	7.98	
30-Nov-1999 21:30:00	17.39	0.71	16.68	2,145 gpm, 212 kwh, stars, calm	480.00	0.3333				8.21	7.99	
30-Nov-1999 22:30:00	17.39	0.71	16.68	247 kwh, snowing	540.00	0.3750				8.21	7.99	
30-Nov-1999 23:30:00	17.39	0.71	16.68	2,151 gpm, 265 kwh, snowing	600.00	0.4167				8.21	7.99	
01-Dec-1999 00:30:00	17.40	0.71	16.69	2,096 gpm, 291 kwh, stars	660.00	0.4583				8.22	8.00	
01-Dec-1999 01:30:00	17.40	0.71	16.69	2,053 gpm, 318 kwh, snow	720.00	0.5000				8.22	8.00	
01-Dec-1999 02:30:00	17.41	0.71	16.70	2,071gpm, 345 kwh	780.00	0.5417				8.23	8.01	
01-Dec-1999 03:30:00	17.42	0.71	16.71	2,054 gpm, 371 kwh	840.00	0.5833				8.24	8.02	
01-Dec-1999 04:30:00	17.43	0.71	16.72	2,081 gpm, 398 kwh	900.00	0.6250				8.25	8.03	
01-Dec-1999 05:30:00	17.45	0.71	16.74	2,136 gpm, 424 kwh	960.00	0.6667				8.27	8.05	
01-Dec-1999 06:30:00	17.46	0.71	16.75	2,172 gpm, 451 kwh	1,020.00	0.7083				8.28	8.06	
01-Dec-1999 07:30:00	17.48	0.71	16.77	2,070 gpm, 477 kwh	1,080.00	0.7500				8.30	8.08	
01-Dec-1999 08:30:00	17.49	0.71	16.78	2,047 gpm, 504 kwh	1,140.00	0.7917				8.31	8.09	
01-Dec-1999 09:30:00	17.50	0.71	16.79	1,980 gpm, 530 kwh	1,200.00	0.8333				8.32	8.10	
01-Dec-1999 10:30:00	17.51	0.71	16.80	1,988 gpm, 556 kwh	1,260.00	0.8750				8.33	8.11	
01-Dec-1999 11:30:00	17.49	0.71	16.78	2,007 gpm, 584 kwh	1,320.00	0.9167				8.31	8.09	
01-Dec-1999 12:30:00	17.51	0.71	16.80	2,106 gpm, 610 kwh	1,380.00	0.9583				8.33	8.11	
01-Dec-1999 13:00:00	17.50	0.71	16.79	623 kwh	1,410.00	0.9792				8.32	8.10	
01-Dec-1999 13:15:00	17.50	0.71	16.79	629 kwh	1,425.00	0.9896				8.32	8.10	
01-Dec-1999 13:30:00	17.50	0.71	16.79	**End Pumping, Start Recovery**	1,440.00	1.0000	0.00	0.0000		8.32	8.10	0.00
01-Dec-1999 13:31:00	8.56	0.71	7.85		1,441.00	1.0007	1.00	0.0007	1,441.0092			8.94
01-Dec-1999 13:32:00	9.51	0.71	8.80		1,442.00	1.0014	2.00	0.0014	721.0046			7.99
01-Dec-1999 13:33:00	9.49	0.71	8.78		1,443.00	1.0021	3.00	0.0021	481.0031			8.01
01-Dec-1999 13:34:00	9.40	0.71	8.69		1,444.00	1.0028	4.00	0.0028	361.0023			8.10

Appendix 22: South Langell Valley 1999 OWRD aquifer test, pumping well data (KLAM 10495)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Pumping Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: KLAM 10495
Measuring Point: angle pipe
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Corrected data relates to a data shift after a power outage

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Corrected Drawdown (feet s)	Residual Drawdown (feet) (s)
01-Dec-1999 13:35:00	9.31	0.71	8.60		1,445.00	1.0035	5.00	0.0035	289.0018			8.19
01-Dec-1999 13:36:00	9.28	0.71	8.57		1,446.00	1.0042	6.00	0.0042	241.0015			8.22
01-Dec-1999 13:37:00	9.29	0.71	8.58		1,447.00	1.0049	7.00	0.0049	206.7156			8.21
01-Dec-1999 13:38:00	9.26	0.71	8.55		1,448.00	1.0056	8.00	0.0056	181.0012			8.24
01-Dec-1999 13:39:00	9.26	0.71	8.55		1,449.00	1.0062	9.00	0.0062	161.0010			8.24
01-Dec-1999 13:40:00	9.26	0.71	8.55		1,450.00	1.0069	10.00	0.0069	145.0009			8.24
01-Dec-1999 13:41:00	9.25	0.71	8.54		1,451.00	1.0076	11.00	0.0076	131.9099			8.25
01-Dec-1999 13:42:00	9.25	0.71	8.54		1,452.00	1.0083	12.00	0.0083	121.0008			8.25
01-Dec-1999 13:43:00	9.25	0.71	8.54		1,453.00	1.0090	13.00	0.0090	111.7699			8.25
01-Dec-1999 13:44:00	9.24	0.71	8.53		1,454.00	1.0097	14.00	0.0097	103.8578			8.26
01-Dec-1999 13:45:00	9.24	0.71	8.53		1,455.00	1.0104	15.00	0.0104	97.0006			8.26
01-Dec-1999 13:46:00	9.23	0.71	8.52		1,456.00	1.0111	16.00	0.0111	91.0006			8.27
01-Dec-1999 13:47:00	9.23	0.71	8.52		1,457.00	1.0118	17.00	0.0118	85.7064			8.27
01-Dec-1999 13:48:00	9.23	0.71	8.52		1,458.00	1.0125	18.00	0.0125	81.0005			8.27
01-Dec-1999 13:49:00	9.23	0.71	8.52		1,459.00	1.0132	19.00	0.0132	76.7900			8.27
01-Dec-1999 13:50:00	9.22	0.71	8.51		1,460.00	1.0139	20.00	0.0139	73.0005			8.28
01-Dec-1999 13:51:00	9.22	0.71	8.51		1,461.00	1.0146	21.00	0.0146	69.5719			8.28
01-Dec-1999 13:52:00	9.22	0.71	8.51		1,462.00	1.0153	22.00	0.0153	66.4550			8.28
01-Dec-1999 13:53:00	9.22	0.71	8.51		1,463.00	1.0160	23.00	0.0160	63.6091			8.28
01-Dec-1999 13:54:00	9.21	0.71	8.50		1,464.00	1.0167	24.00	0.0167	61.0004			8.29
01-Dec-1999 13:55:00	9.22	0.71	8.51		1,465.00	1.0174	25.00	0.0174	58.6004			8.28
01-Dec-1999 13:56:00	9.21	0.71	8.50		1,466.00	1.0181	26.00	0.0181	56.3850			8.29
01-Dec-1999 13:57:00	9.21	0.71	8.50		1,467.00	1.0187	27.00	0.0187	54.3337			8.29
01-Dec-1999 13:58:00	9.21	0.71	8.50		1,468.00	1.0194	28.00	0.0194	52.4289			8.29
01-Dec-1999 13:59:00	9.21	0.71	8.50		1,469.00	1.0201	29.00	0.0201	50.6555			8.29
01-Dec-1999 14:00:00	9.20	0.71	8.49		1,470.00	1.0208	30.00	0.0208	49.0003			8.30
01-Dec-1999 14:02:00	9.20	0.71	8.49		1,472.00	1.0222	32.00	0.0222	46.0003			8.30
01-Dec-1999 14:04:00	9.20	0.71	8.49		1,474.00	1.0236	34.00	0.0236	43.3532			8.30
01-Dec-1999 14:06:00	9.20	0.71	8.49		1,476.00	1.0250	36.00	0.0250	41.0003			8.30
01-Dec-1999 14:08:00	9.19	0.71	8.48		1,478.00	1.0264	38.00	0.0264	38.8950			8.31
01-Dec-1999 14:10:00	9.19	0.71	8.48		1,480.00	1.0278	40.00	0.0278	37.0002			8.31
01-Dec-1999 14:12:00	9.19	0.71	8.48		1,482.00	1.0292	42.00	0.0292	35.2859			8.31
01-Dec-1999 14:14:00	9.19	0.71	8.48		1,484.00	1.0306	44.00	0.0306	33.7275			8.31
01-Dec-1999 14:16:00	9.19	0.71	8.48		1,486.00	1.0319	46.00	0.0319	32.3045			8.31

Appendix 22: South Langell Valley 1999 OWRD aquifer test, pumping well data (KLAM 10495)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Pumping Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: KLAM 10495
Measuring Point: angle pipe
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Corrected data relates to a data shift after a power outage

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Corrected Drawdown (feet s)	Residual Drawdown (feet) (s)
01-Dec-1999 14:18:00	9.19	0.71	8.48		1,488.00	1.0333	48.00	0.0333	31.0002			8.31
01-Dec-1999 14:20:00	9.19	0.71	8.48		1,490.00	1.0347	50.00	0.0347	29.8002			8.31
01-Dec-1999 14:22:00	9.18	0.71	8.47		1,492.00	1.0361	52.00	0.0361	28.6925			8.32
01-Dec-1999 14:24:00	9.18	0.71	8.47		1,494.00	1.0375	54.00	0.0375	27.6668			8.32
01-Dec-1999 14:26:00	9.18	0.71	8.47		1,496.00	1.0389	56.00	0.0389	26.7145			8.32
01-Dec-1999 14:28:00	9.18	0.71	8.47		1,498.00	1.0403	58.00	0.0403	25.8277			8.32
01-Dec-1999 14:30:00	9.18	0.71	8.47		1,500.00	1.0417	60.00	0.0417	25.0002			8.32
01-Dec-1999 14:35:00	9.17	0.71	8.46		1,505.00	1.0451	65.00	0.0451	23.1540			8.33
01-Dec-1999 14:40:00	9.18	0.71	8.47		1,510.00	1.0486	70.00	0.0486	21.5716			8.32
01-Dec-1999 14:45:00	9.18	0.71	8.47		1,515.00	1.0521	75.00	0.0521	20.2001			8.32
01-Dec-1999 14:50:00	9.17	0.71	8.46		1,520.00	1.0556	80.00	0.0556	19.0001			8.33
01-Dec-1999 14:55:00	9.17	0.71	8.46		1,525.00	1.0590	85.00	0.0590	17.9413			8.33
01-Dec-1999 15:00:00	9.17	0.71	8.46		1,530.00	1.0625	90.00	0.0625	17.0001			8.33
01-Dec-1999 15:05:00	9.16	0.71	8.45		1,535.00	1.0660	95.00	0.0660	16.1580			8.34
01-Dec-1999 15:10:00	9.16	0.71	8.45		1,540.00	1.0694	100.00	0.0694	15.4001			8.34
01-Dec-1999 15:15:00	9.16	0.71	8.45		1,545.00	1.0729	105.00	0.0729	14.7144			8.34
01-Dec-1999 15:20:00	9.16	0.71	8.45		1,550.00	1.0764	110.00	0.0764	14.0910			8.34
01-Dec-1999 15:25:00	9.17	0.71	8.46		1,555.00	1.0799	115.00	0.0799	13.5218			8.33
01-Dec-1999 15:30:00	9.17	0.71	8.46		1,560.00	1.0833	120.00	0.0833	13.0001			8.33
01-Dec-1999 15:40:00	9.17	0.71	8.46		1,570.00	1.0903	130.00	0.0903	12.0770			8.33
01-Dec-1999 15:50:00	9.17	0.71	8.46		1,580.00	1.0972	140.00	0.0972	11.2858			8.33
01-Dec-1999 16:00:00	9.16	0.71	8.45		1,590.00	1.1042	150.00	0.1042	10.6001			8.34
01-Dec-1999 16:10:00	9.16	0.71	8.45		1,600.00	1.1111	160.00	0.1111	10.0001			8.34
01-Dec-1999 16:20:00	9.17	0.71	8.46		1,610.00	1.1181	170.00	0.1181	9.4706			8.33
01-Dec-1999 16:30:00	9.16	0.71	8.45		1,620.00	1.1250	180.00	0.1250	9.0001			8.34
01-Dec-1999 16:45:00	9.16	0.71	8.45		1,635.00	1.1354	195.00	0.1354	8.3847			8.34
01-Dec-1999 17:00:00	9.16	0.71	8.45		1,650.00	1.1458	210.00	0.1458	7.8572			8.34
01-Dec-1999 17:15:00	9.16	0.71	8.45		1,665.00	1.1562	225.00	0.1562	7.4000			8.34
01-Dec-1999 17:30:00	9.16	0.71	8.45		1,680.00	1.1667	240.00	0.1667	7.0000			8.34
01-Dec-1999 17:50:00	9.16	0.71	8.45		1,700.00	1.1806	260.00	0.1806	6.5385			8.34
01-Dec-1999 18:10:00	9.16	0.71	8.45		1,720.00	1.1944	280.00	0.1944	6.1429			8.34
01-Dec-1999 18:30:00	9.16	0.71	8.45		1,740.00	1.2083	300.00	0.2083	5.8000			8.34
01-Dec-1999 19:00:00	9.16	0.71	8.45		1,770.00	1.2292	330.00	0.2292	5.3637			8.34
01-Dec-1999 19:30:00	9.16	0.71	8.45		1,800.00	1.2500	360.00	0.2500	5.0000			8.34

Appendix 22: South Langell Valley 1999 OWRD aquifer test, pumping well data (KLAM 10495)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Pumping Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: KLAM 10495
Measuring Point: angle pipe
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Corrected data relates to a data shift after a power outage

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Corrected Drawdown (feet s)	Residual Drawdown (feet) (s)
01-Dec-1999 20:30:00				Retired for night due to	1,860.00	1.2917	420.00	0.2917	4.4286			
01-Dec-1999 21:30:00				little water level change	1,920.00	1.3333	480.00	0.3333	4.0000			
01-Dec-1999 22:30:00				and exhaustion	1,980.00	1.3750	540.00	0.3750	3.6667			
01-Dec-1999 23:30:00					2,040.00	1.4167	600.00	0.4167	3.4000			
02-Dec-1999 00:30:00					2,100.00	1.4583	660.00	0.4583	3.1818			
02-Dec-1999 01:30:00					2,160.00	1.5000	720.00	0.5000	3.0000			
02-Dec-1999 02:30:00					2,220.00	1.5417	780.00	0.5417	2.8462			
02-Dec-1999 03:30:00					2,280.00	1.5833	840.00	0.5833	2.7143			
02-Dec-1999 04:30:00					2,340.00	1.6250	900.00	0.6250	2.6000			
02-Dec-1999 05:30:00					2,400.00	1.6667	960.00	0.6667	2.5000			
02-Dec-1999 06:30:00					2,460.00	1.7083	1,020.00	0.7083	2.4118			
02-Dec-1999 07:30:00					2,520.00	1.7500	1,080.00	0.7500	2.3333			
02-Dec-1999 08:30:00					2,580.00	1.7917	1,140.00	0.7917	2.2632			
02-Dec-1999 09:30:00	9.08	0.71	8.37		2,640.00	1.8333	1,200.00	0.8333	2.2000			8.42
02-Dec-1999 10:30:00	9.10	0.71	8.39		2,700.00	1.8750	1,260.00	0.8750	2.1429			8.40
02-Dec-1999 11:30:00	9.11	0.71	8.40		2,760.00	1.9167	1,320.00	0.9167	2.0909			8.39
02-Dec-1999 12:30:00	9.12	0.71	8.41		2,820.00	1.9583	1,380.00	0.9583	2.0435			8.38
02-Dec-1999 13:30:00	9.12	0.71	8.41	**End of Test**	2,880.00	2.0000	1,440.00	1.0000	2.0000			8.38

Appendix 22: South Langell Valley 1999 OWRD aquifer test, pumping well data (KLAM 10495)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Pumping Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: KLAM 10495
Measuring Point: angle pipe
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Corrected data relates to a data shift after a poer outage

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 40% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Drawdown (Adjusted & Corrected) (feet)	Residual Drawdown (Adjusted) (feet)
30-Nov-1999 06:00:00	880.98	29.48	2.16	0.07							
30-Nov-1999 10:17:00	881.46	29.49	2.64	0.09	0.06	0.6792	0.02	8.52			
30-Nov-1999 13:06:00	879.30	29.42	0.48	0.02	0.01	0.6226	-0.06	8.50			
30-Nov-1999 13:23:00	878.82	29.41	0.00	0.00	0.00		-0.07	8.50			
30-Nov-1999 13:25:00	878.82	29.41	0.00	0.00	0.00		-0.07	8.50			
30-Nov-1999 13:30:00	878.82	29.41	0.00	0.00	0.00		-0.07	8.50	0.00	0.00	
30-Nov-1999 13:31:00	878.82	29.41	0.00	0.00			-0.07	15.65	7.15	7.15	
30-Nov-1999 13:32:00	878.82	29.41	0.00	0.00			-0.07	16.17	7.67	7.67	
30-Nov-1999 13:33:00	878.82	29.41	0.00	0.00			-0.07	16.22	7.72	7.72	
30-Nov-1999 13:34:00	878.82	29.41	0.00	0.00			-0.07	16.14	7.64	7.64	
30-Nov-1999 13:35:00	878.82	29.41	0.00	0.00			-0.07	16.20	7.70	7.70	
30-Nov-1999 13:36:00	878.82	29.41	0.00	0.00			-0.07	16.21	7.71	7.71	
30-Nov-1999 13:37:00	878.82	29.41	0.00	0.00			-0.07	16.13	7.63	7.63	
30-Nov-1999 13:38:00	878.82	29.41	0.00	0.00			-0.07	16.22	7.72	7.72	
30-Nov-1999 13:39:00	878.82	29.41	0.00	0.00			-0.07	16.18	7.68	7.68	
30-Nov-1999 13:40:00	878.82	29.41	0.00	0.00			-0.07	16.21	7.71	7.71	
30-Nov-1999 13:41:00	878.82	29.41	0.00	0.00			-0.07	16.20	7.70	7.70	
30-Nov-1999 13:42:00	878.82	29.41	0.00	0.00			-0.07	16.19	7.69	7.69	
30-Nov-1999 13:43:00	878.82	29.41	0.00	0.00			-0.07	16.17	7.67	7.67	
30-Nov-1999 13:44:00	878.82	29.41	0.00	0.00			-0.07	16.19	7.69	7.69	
30-Nov-1999 13:45:00	878.82	29.41	0.00	0.00			-0.07	16.20	7.70	7.70	
30-Nov-1999 13:46:00	878.82	29.41	0.00	0.00			-0.07	16.21	7.71	7.71	
30-Nov-1999 13:47:00	878.82	29.41	0.00	0.00			-0.07	16.19	7.69	7.69	
30-Nov-1999 13:48:00	878.82	29.41	0.00	0.00			-0.07	16.21	7.71	7.71	
30-Nov-1999 13:49:00	878.58	29.40	-0.24	-0.01			-0.08	16.20	7.70	7.70	
30-Nov-1999 13:50:00	878.58	29.40	-0.24	-0.01			-0.08	16.22	7.72	7.72	
30-Nov-1999 13:51:00	878.82	29.41	0.00	0.00			-0.07	16.23	7.73	7.73	
30-Nov-1999 13:52:00	878.58	29.40	-0.24	-0.01			-0.08	16.23	7.73	7.73	
30-Nov-1999 13:53:00	878.82	29.41	0.00	0.00			-0.07	16.21	7.71	7.71	
30-Nov-1999 13:54:00	878.82	29.41	0.00	0.00			-0.07	16.20	7.70	7.70	
30-Nov-1999 13:55:00	878.82	29.41	0.00	0.00			-0.07	16.24	7.74	7.74	
30-Nov-1999 13:56:00	878.82	29.41	0.00	0.00			-0.07	16.24	7.74	7.74	
30-Nov-1999 13:57:00	878.82	29.41	0.00	0.00			-0.07	16.24	7.74	7.74	
30-Nov-1999 13:58:00	878.82	29.41	0.00	0.00			-0.07	16.20	7.70	7.70	

Appendix 22: South Langell Valley 1999 OWRD aquifer test, pumping well data (KLAM 10495)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Pumping Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: KLAM 10495
Measuring Point: angle pipe
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Corrected data relates to a data shift after a poer outage

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 40% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Drawdown (Adjusted & Corrected) (feet)	Residual Drawdown (Adjusted) (feet)
30-Nov-1999 13:59:00	878.82	29.41	0.00	0.00			-0.07	16.23	7.73	7.73	
30-Nov-1999 14:00:00	878.82	29.41	0.00	0.00			-0.07	16.26	7.76	7.76	
30-Nov-1999 14:02:00	878.82	29.41	0.00	0.00			-0.07				
30-Nov-1999 14:04:00	878.58	29.40	-0.24	-0.01			-0.08	16.25	7.75	7.75	
30-Nov-1999 14:06:00	878.58	29.40	-0.24	-0.01			-0.08	16.26	7.76	7.76	
30-Nov-1999 14:08:00	878.58	29.40	-0.24	-0.01			-0.08	16.26	7.76	7.76	
30-Nov-1999 14:10:00	878.58	29.40	-0.24	-0.01			-0.08	16.26	7.76	7.76	
30-Nov-1999 14:12:00	878.82	29.41	0.00	0.00			-0.07	16.27	7.77	7.77	
30-Nov-1999 14:14:00	878.82	29.41	0.00	0.00			-0.07	16.27	7.77	7.77	
30-Nov-1999 14:16:00	878.82	29.41	0.00	0.00			-0.07	16.27	7.77	7.77	
30-Nov-1999 14:18:00	878.58	29.40	-0.24	-0.01			-0.08	16.28	7.78	7.78	
30-Nov-1999 14:20:00	878.58	29.40	-0.24	-0.01			-0.08	16.30	7.80	7.80	
30-Nov-1999 14:22:00	878.58	29.40	-0.24	-0.01			-0.08	16.31	7.81	7.81	
30-Nov-1999 14:24:00	878.58	29.40	-0.24	-0.01			-0.08	16.31	7.81	7.81	
30-Nov-1999 14:26:00	878.58	29.40	-0.24	-0.01			-0.08	16.30	7.80	7.80	
30-Nov-1999 14:28:00	878.58	29.40	-0.24	-0.01			-0.08	16.32	7.82	7.82	
30-Nov-1999 14:30:00	878.58	29.40	-0.24	-0.01			-0.08	16.32	7.82	7.82	
30-Nov-1999 14:35:00	878.35	29.39	-0.47	-0.02			-0.09	16.33	7.83	7.83	
30-Nov-1999 14:40:00	878.35	29.39	-0.47	-0.02			-0.09	16.33	7.83	7.83	
30-Nov-1999 14:45:00	878.35	29.39	-0.47	-0.02			-0.09	16.35	7.85	7.85	
30-Nov-1999 14:50:00	878.35	29.39	-0.47	-0.02			-0.09	16.37	7.87	7.87	
30-Nov-1999 14:55:00	878.35	29.39	-0.47	-0.02			-0.09	16.37	7.87	7.87	
30-Nov-1999 15:00:00	878.11	29.38	-0.71	-0.02			-0.10	16.36	7.86	7.86	
30-Nov-1999 15:05:00	878.11	29.38	-0.71	-0.02			-0.10	16.38	7.88	7.88	
30-Nov-1999 15:10:00	878.35	29.39	-0.47	-0.02			-0.09	16.40	7.90	7.90	
30-Nov-1999 15:15:00	878.35	29.39	-0.47	-0.02			-0.09				
30-Nov-1999 15:20:00	878.35	29.39	-0.47	-0.02			-0.09	16.64	8.14	7.92	
30-Nov-1999 15:25:00	878.11	29.38	-0.71	-0.02			-0.10	16.65	8.15	7.93	
30-Nov-1999 15:30:00	878.11	29.38	-0.71	-0.02			-0.10	16.64	8.14	7.92	
30-Nov-1999 15:40:00	878.35	29.39	-0.47	-0.02			-0.09	16.65	8.15	7.93	
30-Nov-1999 15:50:00	878.35	29.39	-0.47	-0.02			-0.09	16.67	8.17	7.95	
30-Nov-1999 16:00:00	878.35	29.39	-0.47	-0.02			-0.09	16.67	8.17	7.95	
30-Nov-1999 16:10:00	878.11	29.38	-0.71	-0.02			-0.10	16.69	8.19	7.97	
30-Nov-1999 16:20:00	878.11	29.38	-0.71	-0.02			-0.10	16.67	8.17	7.95	

Appendix 22: South Langell Valley 1999 OWRD aquifer test, pumping well data (KLAM 10495)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Pumping Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: KLAM 10495
Measuring Point: angle pipe
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Corrected data relates to a data shift after a poer outage

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 40% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Drawdown (Adjusted & Corrected) (feet)	Residual Drawdown (Adjusted) (feet)
30-Nov-1999 16:30:00	877.87	29.37	-0.95	-0.03			-0.10	16.66	8.16	7.94	
30-Nov-1999 16:45:00	877.87	29.37	-0.95	-0.03			-0.10	16.66	8.16	7.94	
30-Nov-1999 17:00:00	877.87	29.37	-0.95	-0.03			-0.10	16.67	8.17	7.95	
30-Nov-1999 17:15:00	878.11	29.38	-0.71	-0.02			-0.10	16.69	8.19	7.97	
30-Nov-1999 17:30:00	878.11	29.38	-0.71	-0.02			-0.10	16.68	8.18	7.96	
30-Nov-1999 17:50:00	878.11	29.38	-0.71	-0.02			-0.10	16.69	8.19	7.97	
30-Nov-1999 18:10:00	878.11	29.38	-0.71	-0.02			-0.10	16.69	8.19	7.97	
30-Nov-1999 18:30:00	878.11	29.38	-0.71	-0.02			-0.10	16.67	8.17	7.95	
30-Nov-1999 19:00:00	878.58	29.40	-0.24	-0.01			-0.08	16.67	8.17	7.95	
30-Nov-1999 19:30:00	878.58	29.40	-0.24	-0.01			-0.08	16.70	8.20	7.98	
30-Nov-1999 20:30:00	879.06	29.41	0.24	0.01			-0.06	16.70	8.20	7.98	
30-Nov-1999 21:30:00	879.78	29.44	0.96	0.03			-0.04	16.70	8.20	7.98	
30-Nov-1999 22:30:00	880.74	29.47	1.92	0.06			-0.01	16.68	8.18	7.96	
30-Nov-1999 23:30:00	881.22	29.49	2.40	0.08			0.01	16.68	8.18	7.96	
01-Dec-1999 00:30:00	881.94	29.51	3.12	0.10			0.03	16.68	8.18	7.96	
01-Dec-1999 01:30:00	882.41	29.53	3.59	0.12			0.05	16.67	8.17	7.95	
01-Dec-1999 02:30:00	882.89	29.54	4.07	0.14			0.06	16.67	8.17	7.95	
01-Dec-1999 03:30:00	883.13	29.55	4.31	0.14			0.07	16.68	8.18	7.96	
01-Dec-1999 04:30:00	883.61	29.57	4.79	0.16			0.09	16.68	8.18	7.96	
01-Dec-1999 05:30:00	884.33	29.59	5.51	0.18			0.11	16.70	8.20	7.98	
01-Dec-1999 06:30:00	885.29	29.62	6.47	0.22			0.14	16.69	8.19	7.97	
01-Dec-1999 07:30:00	885.77	29.64	6.95	0.23			0.16	16.71	8.21	7.99	
01-Dec-1999 08:30:00	886.72	29.67	7.90	0.26			0.19	16.70	8.20	7.98	
01-Dec-1999 09:30:00	887.44	29.69	8.62	0.29			0.22	16.70	8.20	7.98	
01-Dec-1999 10:30:00	887.68	29.70	8.86	0.30			0.22	16.71	8.21	7.99	
01-Dec-1999 11:30:00	887.68	29.70	8.86	0.30			0.22	16.69	8.19	7.97	
01-Dec-1999 12:30:00	886.96	29.68	8.14	0.27			0.20	16.72	8.22	8.00	
01-Dec-1999 13:00:00	886.96	29.68	8.14	0.27			0.20	16.71	8.21	7.99	
01-Dec-1999 13:15:00	887.20	29.69	8.38	0.28			0.21	16.71	8.21	7.99	
01-Dec-1999 13:30:00	887.20	29.69	8.38	0.28			0.21	16.71	8.21	7.99	0.00
01-Dec-1999 13:31:00	887.20	29.69	8.38	0.28			0.21	7.77			8.94
01-Dec-1999 13:32:00	886.96	29.68	8.14	0.27			0.20	8.72			7.99
01-Dec-1999 13:33:00	886.96	29.68	8.14	0.27			0.20	8.70			8.01
01-Dec-1999 13:34:00	886.96	29.68	8.14	0.27			0.20	8.61			8.10

Appendix 22: South Langell Valley 1999 OWRD aquifer test, pumping well data (KLAM 10495)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Pumping Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: KLAM 10495
Measuring Point: angle pipe
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Corrected data relates to a data shift after a poer outage

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 40% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Drawdown (Adjusted & Corrected) (feet)	Residual Drawdown (Adjusted) (feet)
01-Dec-1999 13:35:00	886.96	29.68	8.14	0.27			0.20	8.52			8.19
01-Dec-1999 13:36:00	886.96	29.68	8.14	0.27			0.20	8.49			8.22
01-Dec-1999 13:37:00	886.96	29.68	8.14	0.27			0.20	8.50			8.21
01-Dec-1999 13:38:00	886.96	29.68	8.14	0.27			0.20	8.47			8.24
01-Dec-1999 13:39:00	886.96	29.68	8.14	0.27			0.20	8.47			8.24
01-Dec-1999 13:40:00	886.96	29.68	8.14	0.27			0.20	8.47			8.24
01-Dec-1999 13:41:00	886.96	29.68	8.14	0.27			0.20	8.46			8.25
01-Dec-1999 13:42:00	886.96	29.68	8.14	0.27			0.20	8.46			8.25
01-Dec-1999 13:43:00	886.96	29.68	8.14	0.27			0.20	8.46			8.25
01-Dec-1999 13:44:00	886.96	29.68	8.14	0.27			0.20	8.45			8.26
01-Dec-1999 13:45:00	886.72	29.67	7.90	0.26			0.19	8.45			8.26
01-Dec-1999 13:46:00	886.72	29.67	7.90	0.26			0.19	8.44			8.27
01-Dec-1999 13:47:00	886.72	29.67	7.90	0.26			0.19	8.44			8.27
01-Dec-1999 13:48:00	886.72	29.67	7.90	0.26			0.19	8.44			8.27
01-Dec-1999 13:49:00	886.72	29.67	7.90	0.26			0.19	8.44			8.27
01-Dec-1999 13:50:00	886.72	29.67	7.90	0.26			0.19	8.43			8.28
01-Dec-1999 13:51:00	886.72	29.67	7.90	0.26			0.19	8.43			8.28
01-Dec-1999 13:52:00	886.72	29.67	7.90	0.26			0.19	8.43			8.28
01-Dec-1999 13:53:00	886.72	29.67	7.90	0.26			0.19	8.43			8.28
01-Dec-1999 13:54:00	886.72	29.67	7.90	0.26			0.19	8.42			8.29
01-Dec-1999 13:55:00	886.72	29.67	7.90	0.26			0.19	8.43			8.28
01-Dec-1999 13:56:00	886.72	29.67	7.90	0.26			0.19	8.42			8.29
01-Dec-1999 13:57:00	886.72	29.67	7.90	0.26			0.19	8.42			8.29
01-Dec-1999 13:58:00	886.72	29.67	7.90	0.26			0.19	8.42			8.29
01-Dec-1999 13:59:00	886.72	29.67	7.90	0.26			0.19	8.42			8.29
01-Dec-1999 14:00:00	886.72	29.67	7.90	0.26			0.19	8.41			8.30
01-Dec-1999 14:02:00	886.72	29.67	7.90	0.26			0.19	8.41			8.30
01-Dec-1999 14:04:00	886.72	29.67	7.90	0.26			0.19	8.41			8.30
01-Dec-1999 14:06:00	886.48	29.66	7.66	0.26			0.18	8.42			8.29
01-Dec-1999 14:08:00	886.48	29.66	7.66	0.26			0.18	8.41			8.30
01-Dec-1999 14:10:00	886.48	29.66	7.66	0.26			0.18	8.41			8.30
01-Dec-1999 14:12:00	886.48	29.66	7.66	0.26			0.18	8.41			8.30
01-Dec-1999 14:14:00	886.48	29.66	7.66	0.26			0.18	8.41			8.30
01-Dec-1999 14:16:00	886.48	29.66	7.66	0.26			0.18	8.41			8.30

Appendix 22: South Langell Valley 1999 OWRD aquifer test, pumping well data (KLAM 10495)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Pumping Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: KLAM 10495
Measuring Point: angle pipe
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Corrected data relates to a data shift after a poer outage

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 40% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Drawdown (Adjusted & Corrected) (feet)	Residual Drawdown (Adjusted) (feet)
01-Dec-1999 14:18:00	886.48	29.66	7.66	0.26			0.18	8.41			8.30
01-Dec-1999 14:20:00	886.48	29.66	7.66	0.26			0.18	8.41			8.30
01-Dec-1999 14:22:00	886.48	29.66	7.66	0.26			0.18	8.40			8.31
01-Dec-1999 14:24:00	886.48	29.66	7.66	0.26			0.18	8.40			8.31
01-Dec-1999 14:26:00	886.48	29.66	7.66	0.26			0.18	8.40			8.31
01-Dec-1999 14:28:00	886.48	29.66	7.66	0.26			0.18	8.40			8.31
01-Dec-1999 14:30:00	886.48	29.66	7.66	0.26			0.18	8.40			8.31
01-Dec-1999 14:35:00	886.72	29.67	7.90	0.26			0.19	8.38			8.33
01-Dec-1999 14:40:00	886.48	29.66	7.66	0.26			0.18	8.40			8.31
01-Dec-1999 14:45:00	886.48	29.66	7.66	0.26			0.18	8.40			8.31
01-Dec-1999 14:50:00	886.48	29.66	7.66	0.26			0.18	8.39			8.32
01-Dec-1999 14:55:00	886.48	29.66	7.66	0.26			0.18	8.39			8.32
01-Dec-1999 15:00:00	886.48	29.66	7.66	0.26			0.18	8.39			8.32
01-Dec-1999 15:05:00	886.48	29.66	7.66	0.26			0.18	8.38			8.33
01-Dec-1999 15:10:00	886.48	29.66	7.66	0.26			0.18	8.38			8.33
01-Dec-1999 15:15:00	886.48	29.66	7.66	0.26			0.18	8.38			8.33
01-Dec-1999 15:20:00	886.48	29.66	7.66	0.26			0.18	8.38			8.33
01-Dec-1999 15:25:00	886.48	29.66	7.66	0.26			0.18	8.39			8.32
01-Dec-1999 15:30:00	886.48	29.66	7.66	0.26			0.18	8.39			8.32
01-Dec-1999 15:40:00	886.72	29.67	7.90	0.26			0.19	8.38			8.33
01-Dec-1999 15:50:00	886.48	29.66	7.66	0.26			0.18	8.39			8.32
01-Dec-1999 16:00:00	886.48	29.66	7.66	0.26			0.18	8.38			8.33
01-Dec-1999 16:10:00	886.48	29.66	7.66	0.26			0.18	8.38			8.33
01-Dec-1999 16:20:00	886.72	29.67	7.90	0.26			0.19	8.38			8.33
01-Dec-1999 16:30:00	886.48	29.66	7.66	0.26			0.18	8.38			8.33
01-Dec-1999 16:45:00	886.24	29.65	7.42	0.25			0.18	8.38			8.33
01-Dec-1999 17:00:00	886.48	29.66	7.66	0.26			0.18	8.38			8.33
01-Dec-1999 17:15:00	886.48	29.66	7.66	0.26			0.18	8.38			8.33
01-Dec-1999 17:30:00	886.24	29.65	7.42	0.25			0.18	8.38			8.33
01-Dec-1999 17:50:00	886.24	29.65	7.42	0.25			0.18	8.38			8.33
01-Dec-1999 18:10:00	886.24	29.65	7.42	0.25			0.18	8.38			8.33
01-Dec-1999 18:30:00	886.24	29.65	7.42	0.25			0.18	8.38			8.33
01-Dec-1999 19:00:00	886.01	29.65	7.19	0.24			0.17	8.38			8.33
01-Dec-1999 19:30:00	885.77	29.64	6.95	0.23			0.16	8.39			8.32

Appendix 22: South Langell Valley 1999 OWRD aquifer test, pumping well data (KLAM 10495)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Pumping Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: KLAM 10495
Measuring Point: angle pipe
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Corrected data relates to a data shift after a poer outage

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 40% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Drawdown (Adjusted & Corrected) (feet)	Residual Drawdown (Adjusted) (feet)
01-Dec-1999 20:30:00	885.53	29.63	6.71	0.22			0.15				
01-Dec-1999 21:30:00	885.53	29.63	6.71	0.22			0.15				
01-Dec-1999 22:30:00	885.05	29.61	6.23	0.21			0.14				
01-Dec-1999 23:30:00	884.09	29.58	5.27	0.18			0.10				
02-Dec-1999 00:30:00	883.37	29.56	4.55	0.15			0.08				
02-Dec-1999 01:30:00	881.94	29.51	3.12	0.10			0.03				
02-Dec-1999 02:30:00	881.46	29.49	2.64	0.09			0.02				
02-Dec-1999 03:30:00	881.46	29.49	2.64	0.09			0.02				
02-Dec-1999 04:30:00	879.06	29.41	0.24	0.01			-0.06				
02-Dec-1999 05:30:00	877.39	29.36	-1.43	-0.05	**WL Difference**		-0.12				
02-Dec-1999 06:30:00	877.39	29.36	-1.43	-0.05	**from 12/02/99**		-0.12				
02-Dec-1999 07:30:00	876.91	29.34	-1.91	-0.06	**at 09:30:00**		-0.14				
02-Dec-1999 08:30:00	879.30	29.42	0.48	0.02	**(feet water)**		-0.06				
02-Dec-1999 09:30:00	880.02	29.45	0.00	0.00	0.00		-0.03	8.38			8.33
02-Dec-1999 10:30:00	881.22	29.49	1.20	0.04	0.02	0.4981	0.01	8.39			8.32
02-Dec-1999 11:30:00	881.94	29.51	1.92	0.06	0.03	0.4670	0.03	8.39			8.32
02-Dec-1999 12:30:00	882.89	29.54	2.87	0.10	0.04	0.4165	0.06	8.38			8.33
02-Dec-1999 13:30:00	883.13	29.55	3.11	0.10	0.04	0.3844	0.07	8.38			8.33

Appendix 23: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 10641)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35aaa
OWRD Well Log ID Number: KLAM 10641
Measuring Point: top of recorder shelf
Measuring Tool: UNIDATA shaft encoder and data logger
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Recorder measurements were at 1 minute intervals
Note: Representative data presented here

Distance to Pumping Well: 2,825 feet
Owner Well Name/Number: unused irrigation well
Measuring Pt. = 0.93 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
29-Nov-1999 18:50:00			9.73	Recorder Reading	-1,120.00	-0.78					
29-Nov-1999 19:00:00			9.73	Recorder Reading	-1,110.00	-0.77					
29-Nov-1999 20:00:00			9.72	Recorder Reading	-1,050.00	-0.73					
29-Nov-1999 21:00:00			9.72	Recorder Reading	-990.00	-0.69					
29-Nov-1999 22:00:00			9.72	Recorder Reading	-930.00	-0.65					
29-Nov-1999 23:00:00			9.71	Recorder Reading	-870.00	-0.60					
30-Nov-1999 00:00:00			9.71	Recorder Reading	-810.00	-0.56					
30-Nov-1999 01:00:00			9.73	Recorder Reading	-750.00	-0.52					
30-Nov-1999 02:00:00			9.73	Recorder Reading	-690.00	-0.48					
30-Nov-1999 03:00:00			9.74	Recorder Reading	-630.00	-0.44					
30-Nov-1999 04:00:00			9.74	Recorder Reading	-570.00	-0.40					
30-Nov-1999 05:00:00			9.75	Recorder Reading	-510.00	-0.35					
30-Nov-1999 06:00:00			9.76	Recorder Reading	-450.00	-0.31					
30-Nov-1999 07:00:00			9.76	Recorder Reading	-390.00	-0.27					
30-Nov-1999 08:00:00			9.76	Recorder Reading	-330.00	-0.23					
30-Nov-1999 09:00:00			9.76	Recorder Reading	-270.00	-0.19					
30-Nov-1999 10:00:00			9.74	Recorder Reading	-210.00	-0.15					
30-Nov-1999 11:00:00			9.72	Recorder Reading	-150.00	-0.10					
30-Nov-1999 12:00:00			9.69	Recorder Reading	-90.00	-0.06					
30-Nov-1999 13:00:00			9.67	Recorder Reading	-30.00	-0.02					
30-Nov-1999 13:10:00			9.67	Recorder Reading	-20.00	-0.01					
30-Nov-1999 13:20:00			9.66	Recorder Reading	-10.00	-0.01					
30-Nov-1999 13:30:00			9.66	**Start of Test, Pumping Starts**	0.00	0.00				0.00	
30-Nov-1999 13:31:00			9.66	Recorder Reading	1.00	0.00				0.00	
30-Nov-1999 13:32:00			9.68	Recorder Reading	2.00	0.00				0.02	
30-Nov-1999 13:33:00			9.71	Recorder Reading	3.00	0.00				0.05	
30-Nov-1999 13:34:00			9.71	Recorder Reading	4.00	0.00				0.05	
30-Nov-1999 13:35:00			9.73	Recorder Reading	5.00	0.00				0.07	
30-Nov-1999 13:36:00			9.73	Recorder Reading	6.00	0.00				0.07	
30-Nov-1999 13:37:00			9.74	Recorder Reading	7.00	0.00				0.08	
30-Nov-1999 13:38:00			9.75	Recorder Reading	8.00	0.01				0.09	
30-Nov-1999 13:39:00			9.75	Recorder Reading	9.00	0.01				0.09	

Appendix 23: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 10641)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35aaa
OWRD Well Log ID Number: KLAM 10641
Measuring Point: top of recorder shelf
Measuring Tool: UNIDATA shaft encoder and data logger
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Recorder measurements were at 1 minute intervals
Note: Representative data presented here

Distance to Pumping Well: 2,825 feet
Owner Well Name/Number: unused irrigation well
Measuring Pt. = 0.93 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
30-Nov-1999 13:40:00			9.75	Recorder Reading	10.00	0.01				0.09	
30-Nov-1999 13:41:00			9.76	Recorder Reading	11.00	0.01				0.10	
30-Nov-1999 13:42:00			9.76	Recorder Reading	12.00	0.01				0.10	
30-Nov-1999 13:43:00			9.77	Recorder Reading	13.00	0.01				0.11	
30-Nov-1999 13:44:00			9.77	Recorder Reading	14.00	0.01				0.11	
30-Nov-1999 13:45:00			9.77	Recorder Reading	15.00	0.01				0.11	
30-Nov-1999 13:46:00			9.77	Recorder Reading	16.00	0.01				0.11	
30-Nov-1999 13:47:00			9.78	Recorder Reading	17.00	0.01				0.12	
30-Nov-1999 13:48:00			9.78	Recorder Reading	18.00	0.01				0.12	
30-Nov-1999 13:49:00			9.78	Recorder Reading	19.00	0.01				0.12	
30-Nov-1999 13:50:00			9.78	Recorder Reading	20.00	0.01				0.12	
30-Nov-1999 13:51:00			9.79	Recorder Reading	21.00	0.01				0.13	
30-Nov-1999 13:52:00			9.79	Recorder Reading	22.00	0.02				0.13	
30-Nov-1999 13:53:00			9.79	Recorder Reading	23.00	0.02				0.13	
30-Nov-1999 13:54:00			9.79	Recorder Reading	24.00	0.02				0.13	
30-Nov-1999 13:55:00			9.80	Recorder Reading	25.00	0.02				0.14	
30-Nov-1999 13:56:00			9.80	Recorder Reading	26.00	0.02				0.14	
30-Nov-1999 13:57:00			9.80	Recorder Reading	27.00	0.02				0.14	
30-Nov-1999 13:58:00			9.80	Recorder Reading	28.00	0.02				0.14	
30-Nov-1999 13:59:00			9.80	Recorder Reading	29.00	0.02				0.14	
30-Nov-1999 14:00:00			9.81	Recorder Reading	30.00	0.02				0.15	
30-Nov-1999 14:02:00			9.81	Recorder Reading	32.00	0.02				0.15	
30-Nov-1999 14:04:00			9.81	Recorder Reading	34.00	0.02				0.15	
30-Nov-1999 14:06:00			9.81	Recorder Reading	36.00	0.03				0.15	
30-Nov-1999 14:08:00			9.81	Recorder Reading	38.00	0.03				0.15	
30-Nov-1999 14:10:00			9.82	Recorder Reading	40.00	0.03				0.16	
30-Nov-1999 14:12:00			9.82	Recorder Reading	42.00	0.03				0.16	
30-Nov-1999 14:14:00			9.82	Recorder Reading	44.00	0.03				0.16	
30-Nov-1999 14:16:00			9.83	Recorder Reading	46.00	0.03				0.17	
30-Nov-1999 14:18:00			9.83	Recorder Reading	48.00	0.03				0.17	
30-Nov-1999 14:20:00			9.83	Recorder Reading	50.00	0.03				0.17	
30-Nov-1999 14:22:00			9.83	Recorder Reading	52.00	0.04				0.17	

Appendix 23: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 10641)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35aaa
OWRD Well Log ID Number: KLAM 10641
Measuring Point: top of recorder shelf
Measuring Tool: UNIDATA shaft encoder and data logger
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Recorder measurements were at 1 minute intervals
Note: Representative data presented here

Distance to Pumping Well: 2,825 feet
Owner Well Name/Number: unused irrigation well
Measuring Pt. = 0.93 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
30-Nov-1999 14:24:00			9.83	Recorder Reading	54.00	0.04				0.17	
30-Nov-1999 14:26:00			9.83	Recorder Reading	56.00	0.04				0.17	
30-Nov-1999 14:28:00			9.83	Recorder Reading	58.00	0.04				0.17	
30-Nov-1999 14:30:00			9.84	Recorder Reading	60.00	0.04				0.18	
30-Nov-1999 14:35:00			9.84	Recorder Reading	65.00	0.05				0.18	
30-Nov-1999 14:40:00			9.83	Recorder Reading	70.00	0.05				0.17	
30-Nov-1999 14:45:00			9.84	Recorder Reading	75.00	0.05				0.18	
30-Nov-1999 14:50:00			9.85	Recorder Reading	80.00	0.06				0.19	
30-Nov-1999 14:55:00			9.84	Recorder Reading	85.00	0.06				0.18	
30-Nov-1999 15:00:00			9.85	Recorder Reading	90.00	0.06				0.19	
30-Nov-1999 15:05:00			9.85	Recorder Reading	95.00	0.07				0.19	
30-Nov-1999 15:10:00			9.85	Recorder Reading	100.00	0.07				0.19	
30-Nov-1999 15:15:00			9.82	Recorder Reading	105.00	0.07				0.16	
30-Nov-1999 15:20:00			9.83	Recorder Reading	110.00	0.08				0.17	
30-Nov-1999 15:25:00			9.83	Recorder Reading	115.00	0.08				0.17	
30-Nov-1999 15:30:00			9.85	Recorder Reading	120.00	0.08				0.19	
30-Nov-1999 15:40:00			9.86	Recorder Reading	130.00	0.09				0.20	
30-Nov-1999 15:50:00			9.86	Recorder Reading	140.00	0.10				0.20	
30-Nov-1999 16:00:00			9.87	Recorder Reading	150.00	0.10				0.21	
30-Nov-1999 16:10:00			9.87	Recorder Reading	160.00	0.11				0.21	
30-Nov-1999 16:20:00			9.87	Recorder Reading	170.00	0.12				0.21	
30-Nov-1999 16:30:00			9.87	Recorder Reading	180.00	0.13				0.21	
30-Nov-1999 16:45:00			9.87	Recorder Reading	195.00	0.14				0.21	
30-Nov-1999 17:00:00			9.87	Recorder Reading	210.00	0.15				0.21	
30-Nov-1999 17:15:00			9.88	Recorder Reading	225.00	0.16				0.22	
30-Nov-1999 17:30:00			9.88	Recorder Reading	240.00	0.17				0.22	
30-Nov-1999 17:50:00			9.89	Recorder Reading	260.00	0.18				0.23	
30-Nov-1999 18:10:00			9.89	Recorder Reading	280.00	0.19				0.23	
30-Nov-1999 18:30:00			9.89	Recorder Reading	300.00	0.21				0.23	
30-Nov-1999 19:00:00			9.90	Recorder Reading	330.00	0.23				0.24	
30-Nov-1999 19:30:00			9.91	Recorder Reading	360.00	0.25				0.25	
30-Nov-1999 20:30:00			9.92	Recorder Reading	420.00	0.29				0.26	

Appendix 23: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 10641)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35aaa
OWRD Well Log ID Number: KLAM 10641
Measuring Point: top of recorder shelf
Measuring Tool: UNIDATA shaft encoder and data logger
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Recorder measurements were at 1 minute intervals
Note: Representative data presented here

Distance to Pumping Well: 2,825 feet
Owner Well Name/Number: unused irrigation well
Measuring Pt. = 0.93 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
30-Nov-1999 21:30:00			9.93	Recorder Reading	480.00	0.33				0.27	
30-Nov-1999 22:30:00			9.95	Recorder Reading	540.00	0.38				0.29	
30-Nov-1999 23:30:00			9.95	Recorder Reading	600.00	0.42				0.29	
01-Dec-1999 00:30:00			9.97	Recorder Reading	660.00	0.46				0.31	
01-Dec-1999 01:30:00			9.98	Recorder Reading	720.00	0.50				0.32	
01-Dec-1999 02:30:00			9.99	Recorder Reading	780.00	0.54				0.33	
01-Dec-1999 03:30:00			10.00	Recorder Reading	840.00	0.58				0.34	
01-Dec-1999 04:30:00			10.01	Recorder Reading	900.00	0.63				0.35	
01-Dec-1999 05:30:00			10.02	Recorder Reading	960.00	0.67				0.36	
01-Dec-1999 06:30:00			10.04	Recorder Reading	1,020.00	0.71				0.38	
01-Dec-1999 07:30:00			10.05	Recorder Reading	1,080.00	0.75				0.39	
01-Dec-1999 08:30:00			10.06	Recorder Reading	1,140.00	0.79				0.40	
01-Dec-1999 09:30:00			10.09	Recorder Reading	1,200.00	0.83				0.43	
01-Dec-1999 10:30:00			10.09	Recorder Reading	1,260.00	0.88				0.43	
01-Dec-1999 11:30:00			10.09	Recorder Reading	1,320.00	0.92				0.43	
01-Dec-1999 12:30:00			10.08	Recorder Reading	1,380.00	0.96				0.42	
01-Dec-1999 13:00:00			10.07	Recorder Reading	1,410.00	0.98				0.41	
01-Dec-1999 13:15:00			10.08	Recorder Reading	1,425.00	0.99				0.42	
01-Dec-1999 13:30:00			10.08	**Pumping Ends, Start Recovery**	1,440.00	1.00	0.00	0.00		0.42	0.00
01-Dec-1999 13:31:00			10.08	Recorder Reading	1,441.00	1.00	1.00	0.00	1,441.00		0.00
01-Dec-1999 13:32:00			10.04	Recorder Reading	1,442.00	1.00	2.00	0.00	721.00		0.04
01-Dec-1999 13:33:00			10.02	Recorder Reading	1,443.00	1.00	3.00	0.00	481.00		0.06
01-Dec-1999 13:34:00			10.01	Recorder Reading	1,444.00	1.00	4.00	0.00	361.00		0.07
01-Dec-1999 13:35:00			10.01	Recorder Reading	1,445.00	1.00	5.00	0.00	289.00		0.07
01-Dec-1999 13:36:00			10.00	Recorder Reading	1,446.00	1.00	6.00	0.00	241.00		0.08
01-Dec-1999 13:37:00			9.99	Recorder Reading	1,447.00	1.00	7.00	0.00	206.71		0.09
01-Dec-1999 13:38:00			9.99	Recorder Reading	1,448.00	1.01	8.00	0.01	181.00		0.09
01-Dec-1999 13:39:00			9.98	Recorder Reading	1,449.00	1.01	9.00	0.01	161.00		0.10
01-Dec-1999 13:40:00			9.98	Recorder Reading	1,450.00	1.01	10.00	0.01	145.00		0.10
01-Dec-1999 13:41:00			9.97	Recorder Reading	1,451.00	1.01	11.00	0.01	131.91		0.11
01-Dec-1999 13:42:00			9.97	Recorder Reading	1,452.00	1.01	12.00	0.01	121.00		0.11
01-Dec-1999 13:43:00			9.96	Recorder Reading	1,453.00	1.01	13.00	0.01	111.77		0.12

Appendix 23: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 10641)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35aaa
OWRD Well Log ID Number: KLAM 10641
Measuring Point: top of recorder shelf
Measuring Tool: UNIDATA shaft encoder and data logger
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Recorder measurements were at 1 minute intervals
Note: Representative data presented here

Distance to Pumping Well: 2,825 feet
Owner Well Name/Number: unused irrigation well
Measuring Pt. = 0.93 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
01-Dec-1999 13:44:00			9.96	Recorder Reading	1,454.00	1.01	14.00	0.01	103.86		0.12
01-Dec-1999 13:45:00			9.96	Recorder Reading	1,455.00	1.01	15.00	0.01	97.00		0.12
01-Dec-1999 13:46:00			9.95	Recorder Reading	1,456.00	1.01	16.00	0.01	91.00		0.13
01-Dec-1999 13:47:00			9.95	Recorder Reading	1,457.00	1.01	17.00	0.01	85.71		0.13
01-Dec-1999 13:48:00			9.95	Recorder Reading	1,458.00	1.01	18.00	0.01	81.00		0.13
01-Dec-1999 13:49:00			9.94	Recorder Reading	1,459.00	1.01	19.00	0.01	76.79		0.14
01-Dec-1999 13:50:00			9.94	Recorder Reading	1,460.00	1.01	20.00	0.01	73.00		0.14
01-Dec-1999 13:51:00			9.94	Recorder Reading	1,461.00	1.01	21.00	0.01	69.57		0.14
01-Dec-1999 13:52:00			9.94	Recorder Reading	1,462.00	1.02	22.00	0.02	66.45		0.14
01-Dec-1999 13:53:00			9.93	Recorder Reading	1,463.00	1.02	23.00	0.02	63.61		0.15
01-Dec-1999 13:54:00			9.93	Recorder Reading	1,464.00	1.02	24.00	0.02	61.00		0.15
01-Dec-1999 13:55:00			9.93	Recorder Reading	1,465.00	1.02	25.00	0.02	58.60		0.15
01-Dec-1999 13:56:00			9.93	Recorder Reading	1,466.00	1.02	26.00	0.02	56.38		0.15
01-Dec-1999 13:57:00			9.93	Recorder Reading	1,467.00	1.02	27.00	0.02	54.33		0.15
01-Dec-1999 13:58:00			9.93	Recorder Reading	1,468.00	1.02	28.00	0.02	52.43		0.15
01-Dec-1999 13:59:00			9.92	Recorder Reading	1,469.00	1.02	29.00	0.02	50.66		0.16
01-Dec-1999 14:00:00			9.92	Recorder Reading	1,470.00	1.02	30.00	0.02	49.00		0.16
01-Dec-1999 14:02:00			9.92	Recorder Reading	1,472.00	1.02	32.00	0.02	46.00		0.16
01-Dec-1999 14:04:00			9.92	Recorder Reading	1,474.00	1.02	34.00	0.02	43.35		0.16
01-Dec-1999 14:06:00			9.91	Recorder Reading	1,476.00	1.03	36.00	0.03	41.00		0.17
01-Dec-1999 14:08:00			9.91	Recorder Reading	1,478.00	1.03	38.00	0.03	38.89		0.17
01-Dec-1999 14:10:00			9.91	Recorder Reading	1,480.00	1.03	40.00	0.03	37.00		0.17
01-Dec-1999 14:12:00			9.91	Recorder Reading	1,482.00	1.03	42.00	0.03	35.29		0.17
01-Dec-1999 14:14:00			9.91	Recorder Reading	1,484.00	1.03	44.00	0.03	33.73		0.17
01-Dec-1999 14:16:00			9.90	Recorder Reading	1,486.00	1.03	46.00	0.03	32.30		0.18
01-Dec-1999 14:18:00			9.90	Recorder Reading	1,488.00	1.03	48.00	0.03	31.00		0.18
01-Dec-1999 14:20:00			9.90	Recorder Reading	1,490.00	1.03	50.00	0.03	29.80		0.18
01-Dec-1999 14:22:00			9.90	Recorder Reading	1,492.00	1.04	52.00	0.04	28.69		0.18
01-Dec-1999 14:24:00			9.90	Recorder Reading	1,494.00	1.04	54.00	0.04	27.67		0.18
01-Dec-1999 14:26:00			9.90	Recorder Reading	1,496.00	1.04	56.00	0.04	26.71		0.18
01-Dec-1999 14:28:00			9.89	Recorder Reading	1,498.00	1.04	58.00	0.04	25.83		0.19
01-Dec-1999 14:30:00			9.89	Recorder Reading	1,500.00	1.04	60.00	0.04	25.00		0.19

Appendix 23: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 10641)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35aaa
OWRD Well Log ID Number: KLAM 10641
Measuring Point: top of recorder shelf
Measuring Tool: UNIDATA shaft encoder and data logger
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Recorder measurements were at 1 minute intervals
Note: Representative data presented here

Distance to Pumping Well: 2,825 feet
Owner Well Name/Number: unused irrigation well
Measuring Pt. = 0.93 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
01-Dec-1999 14:35:00			9.89	Recorder Reading	1,505.00	1.05	65.00	0.05	23.15		0.19
01-Dec-1999 14:40:00			9.89	Recorder Reading	1,510.00	1.05	70.00	0.05	21.57		0.19
01-Dec-1999 14:45:00			9.89	Recorder Reading	1,515.00	1.05	75.00	0.05	20.20		0.19
01-Dec-1999 14:50:00			9.88	Recorder Reading	1,520.00	1.06	80.00	0.06	19.00		0.20
01-Dec-1999 14:55:00			9.88	Recorder Reading	1,525.00	1.06	85.00	0.06	17.94		0.20
01-Dec-1999 15:00:00			9.88	Recorder Reading	1,530.00	1.06	90.00	0.06	17.00		0.20
01-Dec-1999 15:05:00			9.88	Recorder Reading	1,535.00	1.07	95.00	0.07	16.16		0.20
01-Dec-1999 15:10:00			9.88	Recorder Reading	1,540.00	1.07	100.00	0.07	15.40		0.20
01-Dec-1999 15:15:00			9.87	Recorder Reading	1,545.00	1.07	105.00	0.07	14.71		0.21
01-Dec-1999 15:20:00			9.87	Recorder Reading	1,550.00	1.08	110.00	0.08	14.09		0.21
01-Dec-1999 15:25:00			9.87	Recorder Reading	1,555.00	1.08	115.00	0.08	13.52		0.21
01-Dec-1999 15:30:00			9.87	Recorder Reading	1,560.00	1.08	120.00	0.08	13.00		0.21
01-Dec-1999 15:40:00			9.87	Recorder Reading	1,570.00	1.09	130.00	0.09	12.08		0.21
01-Dec-1999 15:50:00			9.87	Recorder Reading	1,580.00	1.10	140.00	0.10	11.29		0.21
01-Dec-1999 16:00:00			9.87	Recorder Reading	1,590.00	1.10	150.00	0.10	10.60		0.21
01-Dec-1999 16:10:00			9.86	Recorder Reading	1,600.00	1.11	160.00	0.11	10.00		0.22
01-Dec-1999 16:20:00			9.86	Recorder Reading	1,610.00	1.12	170.00	0.12	9.47		0.22
01-Dec-1999 16:30:00			9.86	Recorder Reading	1,620.00	1.13	180.00	0.13	9.00		0.22
01-Dec-1999 16:45:00			9.86	Recorder Reading	1,635.00	1.14	195.00	0.14	8.38		0.22
01-Dec-1999 17:00:00			9.85	Recorder Reading	1,650.00	1.15	210.00	0.15	7.86		0.23
01-Dec-1999 17:15:00			9.85	Recorder Reading	1,665.00	1.16	225.00	0.16	7.40		0.23
01-Dec-1999 17:30:00			9.85	Recorder Reading	1,680.00	1.17	240.00	0.17	7.00		0.23
01-Dec-1999 17:50:00			9.84	Recorder Reading	1,700.00	1.18	260.00	0.18	6.54		0.24
01-Dec-1999 18:10:00			9.84	Recorder Reading	1,720.00	1.19	280.00	0.19	6.14		0.24
01-Dec-1999 18:30:00			9.84	Recorder Reading	1,740.00	1.21	300.00	0.21	5.80		0.24
01-Dec-1999 19:00:00			9.84	Recorder Reading	1,770.00	1.23	330.00	0.23	5.36		0.24
01-Dec-1999 19:30:00			9.83	Recorder Reading	1,800.00	1.25	360.00	0.25	5.00		0.25
01-Dec-1999 20:30:00			9.82	Recorder Reading	1,860.00	1.29	420.00	0.29	4.43		0.26
01-Dec-1999 21:30:00			9.82	Recorder Reading	1,920.00	1.33	480.00	0.33	4.00		0.26
01-Dec-1999 22:30:00			9.80	Recorder Reading	1,980.00	1.38	540.00	0.38	3.67		0.28
01-Dec-1999 23:30:00			9.79	Recorder Reading	2,040.00	1.42	600.00	0.42	3.40		0.29
02-Dec-1999 00:30:00			9.77	Recorder Reading	2,100.00	1.46	660.00	0.46	3.18		0.31

Appendix 23: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 10641)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35aaa
OWRD Well Log ID Number: KLAM 10641
Measuring Point: top of recorder shelf
Measuring Tool: UNIDATA shaft encoder and data logger
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Recorder measurements were at 1 minute intervals
Note: Representative data presented here

Distance to Pumping Well: 2,825 feet
Owner Well Name/Number: unused irrigation well
Measuring Pt. = 0.93 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
02-Dec-1999 01:30:00			9.74	Recorder Reading	2,160.00	1.50	720.00	0.50	3.00		0.34
02-Dec-1999 02:30:00			9.72	Recorder Reading	2,220.00	1.54	780.00	0.54	2.85		0.36
02-Dec-1999 03:30:00			9.72	Recorder Reading	2,280.00	1.58	840.00	0.58	2.71		0.36
02-Dec-1999 04:30:00			9.68	Recorder Reading	2,340.00	1.63	900.00	0.63	2.60		0.40
02-Dec-1999 05:30:00			9.65	Recorder Reading	2,400.00	1.67	960.00	0.67	2.50		0.43
02-Dec-1999 06:30:00			9.64	Recorder Reading	2,460.00	1.71	1,020.00	0.71	2.41		0.44
02-Dec-1999 07:30:00			9.65	Recorder Reading	2,520.00	1.75	1,080.00	0.75	2.33		0.43
02-Dec-1999 08:30:00			9.67	Recorder Reading	2,580.00	1.79	1,140.00	0.79	2.26		0.41
02-Dec-1999 09:30:00			9.69	Recorder Reading	2,640.00	1.83	1,200.00	0.83	2.20		0.39
02-Dec-1999 10:30:00			9.70	Recorder Reading	2,700.00	1.88	1,260.00	0.88	2.14		0.38
02-Dec-1999 11:30:00			9.70	Recorder Reading	2,760.00	1.92	1,320.00	0.92	2.09		0.38
02-Dec-1999 12:30:00			9.72	Recorder Reading	2,820.00	1.96	1,380.00	0.96	2.04		0.36
02-Dec-1999 13:30:00			9.72	**End of Test**	2,880.00	2.00	1,440.00	1.00	2.00		0.36

Appendix 23: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 10641)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35aaa
OWRD Well Log ID Number: KLAM 10641
Measuring Point: top of recorder shelf
Measuring Tool: UNIDATA shaft encoder and data logger
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Recorder measurements were at 1 minute intervals
Note: Representative data presented here

Distance to Pumping Well: 2,825 feet
Owner Well Name/Number: unused irrigation well
Measuring Pt. = 0.93 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 06:00:00 (h Pascals)	Barometer Difference from 11/30/99 at 06:00:00 (feet water)	WL Difference from 11/30/99 at 06:00:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 50% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
29-Nov-1999 18:50:00	880.02	29.45	-0.96	-0.03	-0.03	0.93		9.73		
29-Nov-1999 19:00:00	880.02	29.45	-0.96	-0.03	-0.03	0.93	0.00	9.73		
29-Nov-1999 20:00:00	878.58	29.40	-2.40	-0.08	-0.04	0.50	-0.05	9.74		
29-Nov-1999 21:00:00	878.58	29.40	-2.40	-0.08	-0.04	0.50	-0.05	9.74		
29-Nov-1999 22:00:00	879.06	29.41	-1.92	-0.06	-0.04	0.62	-0.03	9.74		
29-Nov-1999 23:00:00	878.82	29.41	-2.16	-0.07	-0.05	0.69	-0.04	9.73		
30-Nov-1999 00:00:00	879.30	29.42	-1.68	-0.06	-0.05	0.89	-0.02	9.72		
30-Nov-1999 01:00:00	879.54	29.43	-1.44	-0.05	-0.03	0.62	-0.02	9.74		
30-Nov-1999 02:00:00	880.02	29.45	-0.96	-0.03	-0.03	0.93	0.00	9.73		
30-Nov-1999 03:00:00	880.26	29.45	-0.72	-0.02	-0.02	0.83	0.01	9.74		
30-Nov-1999 04:00:00	880.26	29.45	-0.72	-0.02	-0.02	0.83	0.01	9.74		
30-Nov-1999 05:00:00	880.26	29.45	-0.72	-0.02	-0.01	0.42	0.01	9.75		
30-Nov-1999 06:00:00	880.98	29.48	0.00	0.00	0.00	0.68	0.03	9.74		
30-Nov-1999 07:00:00	880.98	29.48					0.03	9.74		
30-Nov-1999 08:00:00	881.22	29.49					0.04	9.74		
30-Nov-1999 09:00:00	881.22	29.49					0.04	9.74		
30-Nov-1999 10:00:00	881.70	29.50					0.06	9.71		
30-Nov-1999 11:00:00	881.22	29.49					0.04	9.70		
30-Nov-1999 12:00:00	880.26	29.45					0.01	9.69		
30-Nov-1999 13:00:00	879.30	29.42					-0.02	9.68		
30-Nov-1999 13:10:00	879.30	29.42					-0.02	9.68		
30-Nov-1999 13:20:00	878.82	29.41					-0.04	9.68		
30-Nov-1999 13:30:00	878.82	29.41					-0.04	9.68	0.00	
30-Nov-1999 13:31:00	878.82	29.41					-0.04	9.68	0.00	
30-Nov-1999 13:32:00	878.82	29.41					-0.04	9.70	0.02	
30-Nov-1999 13:33:00	878.82	29.41					-0.04	9.73	0.05	
30-Nov-1999 13:34:00	878.82	29.41					-0.04	9.73	0.05	
30-Nov-1999 13:35:00	878.82	29.41					-0.04	9.75	0.07	
30-Nov-1999 13:36:00	878.82	29.41					-0.04	9.75	0.07	
30-Nov-1999 13:37:00	878.82	29.41					-0.04	9.76	0.08	
30-Nov-1999 13:38:00	878.82	29.41					-0.04	9.77	0.09	
30-Nov-1999 13:39:00	878.82	29.41					-0.04	9.77	0.09	

Appendix 23: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 10641)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35aaa
OWRD Well Log ID Number: KLAM 10641
Measuring Point: top of recorder shelf
Measuring Tool: UNIDATA shaft encoder and data logger
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Recorder measurements were at 1 minute intervals
Note: Representative data presented here

Distance to Pumping Well: 2,825 feet
Owner Well Name/Number: unused irrigation well
Measuring Pt. = 0.93 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 06:00:00 (h Pascals)	Barometer Difference from 11/30/99 at 06:00:00 (feet water)	WL Difference from 11/30/99 at 06:00:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 50% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
30-Nov-1999 13:40:00	878.82	29.41					-0.04	9.77	0.09	
30-Nov-1999 13:41:00	878.82	29.41					-0.04	9.78	0.10	
30-Nov-1999 13:42:00	878.82	29.41					-0.04	9.78	0.10	
30-Nov-1999 13:43:00	878.82	29.41					-0.04	9.79	0.11	
30-Nov-1999 13:44:00	878.82	29.41					-0.04	9.79	0.11	
30-Nov-1999 13:45:00	878.82	29.41					-0.04	9.79	0.11	
30-Nov-1999 13:46:00	878.82	29.41					-0.04	9.79	0.11	
30-Nov-1999 13:47:00	878.82	29.41					-0.04	9.80	0.12	
30-Nov-1999 13:48:00	878.82	29.41					-0.04	9.80	0.12	
30-Nov-1999 13:49:00	878.58	29.40					-0.05	9.80	0.12	
30-Nov-1999 13:50:00	878.58	29.40					-0.05	9.80	0.12	
30-Nov-1999 13:51:00	878.82	29.41					-0.04	9.81	0.13	
30-Nov-1999 13:52:00	878.58	29.40					-0.05	9.81	0.13	
30-Nov-1999 13:53:00	878.82	29.41					-0.04	9.81	0.13	
30-Nov-1999 13:54:00	878.82	29.41					-0.04	9.81	0.13	
30-Nov-1999 13:55:00	878.82	29.41					-0.04	9.82	0.14	
30-Nov-1999 13:56:00	878.82	29.41					-0.04	9.82	0.14	
30-Nov-1999 13:57:00	878.82	29.41					-0.04	9.82	0.14	
30-Nov-1999 13:58:00	878.82	29.41					-0.04	9.82	0.14	
30-Nov-1999 13:59:00	878.82	29.41					-0.04	9.82	0.14	
30-Nov-1999 14:00:00	878.82	29.41					-0.04	9.83	0.15	
30-Nov-1999 14:02:00	878.82	29.41					-0.04	9.83	0.15	
30-Nov-1999 14:04:00	878.58	29.40					-0.05	9.83	0.15	
30-Nov-1999 14:06:00	878.58	29.40					-0.05	9.83	0.15	
30-Nov-1999 14:08:00	878.58	29.40					-0.05	9.83	0.15	
30-Nov-1999 14:10:00	878.58	29.40					-0.05	9.84	0.16	
30-Nov-1999 14:12:00	878.82	29.41					-0.04	9.84	0.16	
30-Nov-1999 14:14:00	878.82	29.41					-0.04	9.84	0.16	
30-Nov-1999 14:16:00	878.82	29.41					-0.04	9.85	0.17	
30-Nov-1999 14:18:00	878.58	29.40					-0.05	9.85	0.17	
30-Nov-1999 14:20:00	878.58	29.40					-0.05	9.85	0.17	
30-Nov-1999 14:22:00	878.58	29.40					-0.05	9.85	0.17	

Appendix 23: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 10641)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35aaa
OWRD Well Log ID Number: KLAM 10641
Measuring Point: top of recorder shelf
Measuring Tool: UNIDATA shaft encoder and data logger
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Recorder measurements were at 1 minute intervals
Note: Representative data presented here

Distance to Pumping Well: 2,825 feet
Owner Well Name/Number: unused irrigation well
Measuring Pt. = 0.93 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 06:00:00 (h Pascals)	Barometer Difference from 11/30/99 at 06:00:00 (feet water)	WL Difference from 11/30/99 at 06:00:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 50% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
30-Nov-1999 14:24:00	878.58	29.40					-0.05	9.85	0.17	
30-Nov-1999 14:26:00	878.58	29.40					-0.05	9.85	0.17	
30-Nov-1999 14:28:00	878.58	29.40					-0.05	9.85	0.17	
30-Nov-1999 14:30:00	878.58	29.40					-0.05	9.86	0.18	
30-Nov-1999 14:35:00	878.35	29.39					-0.06	9.87	0.19	
30-Nov-1999 14:40:00	878.35	29.39					-0.06	9.86	0.18	
30-Nov-1999 14:45:00	878.35	29.39					-0.06	9.87	0.19	
30-Nov-1999 14:50:00	878.35	29.39					-0.06	9.88	0.20	
30-Nov-1999 14:55:00	878.35	29.39					-0.06	9.87	0.19	
30-Nov-1999 15:00:00	878.11	29.38					-0.06	9.88	0.20	
30-Nov-1999 15:05:00	878.11	29.38					-0.06	9.88	0.20	
30-Nov-1999 15:10:00	878.35	29.39					-0.06	9.88	0.20	
30-Nov-1999 15:15:00	878.35	29.39					-0.06	9.85	0.17	
30-Nov-1999 15:20:00	878.35	29.39					-0.06	9.86	0.18	
30-Nov-1999 15:25:00	878.11	29.38					-0.06	9.86	0.18	
30-Nov-1999 15:30:00	878.11	29.38					-0.06	9.88	0.20	
30-Nov-1999 15:40:00	878.35	29.39					-0.06	9.89	0.21	
30-Nov-1999 15:50:00	878.35	29.39					-0.06	9.89	0.21	
30-Nov-1999 16:00:00	878.35	29.39					-0.06	9.90	0.22	
30-Nov-1999 16:10:00	878.11	29.38					-0.06	9.90	0.22	
30-Nov-1999 16:20:00	878.11	29.38					-0.06	9.90	0.22	
30-Nov-1999 16:30:00	877.87	29.37					-0.07	9.91	0.23	
30-Nov-1999 16:45:00	877.87	29.37					-0.07	9.91	0.23	
30-Nov-1999 17:00:00	877.87	29.37					-0.07	9.91	0.23	
30-Nov-1999 17:15:00	878.11	29.38					-0.06	9.91	0.23	
30-Nov-1999 17:30:00	878.11	29.38					-0.06	9.91	0.23	
30-Nov-1999 17:50:00	878.11	29.38					-0.06	9.92	0.24	
30-Nov-1999 18:10:00	878.11	29.38					-0.06	9.92	0.24	
30-Nov-1999 18:30:00	878.11	29.38					-0.06	9.92	0.24	
30-Nov-1999 19:00:00	878.58	29.40					-0.05	9.92	0.24	
30-Nov-1999 19:30:00	878.58	29.40					-0.05	9.93	0.25	
30-Nov-1999 20:30:00	879.06	29.41					-0.03	9.94	0.26	

Appendix 23: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 10641)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35aaa
OWRD Well Log ID Number: KLAM 10641
Measuring Point: top of recorder shelf
Measuring Tool: UNIDATA shaft encoder and data logger
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Recorder measurements were at 1 minute intervals
Note: Representative data presented here

Distance to Pumping Well: 2,825 feet
Owner Well Name/Number: unused irrigation well
Measuring Pt. = 0.93 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 06:00:00 (h Pascals)	Barometer Difference from 11/30/99 at 06:00:00 (feet water)	WL Difference from 11/30/99 at 06:00:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 50% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
30-Nov-1999 21:30:00	879.78	29.44					-0.01	9.93	0.25	
30-Nov-1999 22:30:00	880.74	29.47					0.02	9.94	0.26	
30-Nov-1999 23:30:00	881.22	29.49					0.04	9.93	0.25	
01-Dec-1999 00:30:00	881.94	29.51					0.06	9.94	0.26	
01-Dec-1999 01:30:00	882.41	29.53					0.08	9.94	0.26	
01-Dec-1999 02:30:00	882.89	29.54					0.10	9.94	0.26	
01-Dec-1999 03:30:00	883.13	29.55					0.10	9.95	0.27	
01-Dec-1999 04:30:00	883.61	29.57					0.12	9.95	0.27	
01-Dec-1999 05:30:00	884.33	29.59					0.14	9.95	0.27	
01-Dec-1999 06:30:00	885.29	29.62					0.18	9.95	0.27	
01-Dec-1999 07:30:00	885.77	29.64					0.19	9.95	0.27	
01-Dec-1999 08:30:00	886.72	29.67					0.22	9.95	0.27	
01-Dec-1999 09:30:00	887.44	29.69					0.25	9.97	0.29	
01-Dec-1999 10:30:00	887.68	29.70					0.26	9.96	0.28	
01-Dec-1999 11:30:00	887.68	29.70					0.26	9.96	0.28	
01-Dec-1999 12:30:00	886.96	29.68					0.23	9.96	0.28	
01-Dec-1999 13:00:00	886.96	29.68					0.23	9.95	0.27	
01-Dec-1999 13:15:00	887.20	29.69					0.24	9.96	0.28	
01-Dec-1999 13:30:00	887.20	29.69					0.24	9.96	0.28	0.00
01-Dec-1999 13:31:00	887.20	29.69					0.24	9.96		0.00
01-Dec-1999 13:32:00	886.96	29.68					0.23	9.92		0.04
01-Dec-1999 13:33:00	886.96	29.68					0.23	9.90		0.06
01-Dec-1999 13:34:00	886.96	29.68					0.23	9.89		0.07
01-Dec-1999 13:35:00	886.96	29.68					0.23	9.89		0.07
01-Dec-1999 13:36:00	886.96	29.68					0.23	9.88		0.08
01-Dec-1999 13:37:00	886.96	29.68					0.23	9.87		0.09
01-Dec-1999 13:38:00	886.96	29.68					0.23	9.87		0.09
01-Dec-1999 13:39:00	886.96	29.68					0.23	9.86		0.10
01-Dec-1999 13:40:00	886.96	29.68					0.23	9.86		0.10
01-Dec-1999 13:41:00	886.96	29.68					0.23	9.85		0.11
01-Dec-1999 13:42:00	886.96	29.68					0.23	9.85		0.11
01-Dec-1999 13:43:00	886.96	29.68					0.23	9.84		0.12

Appendix 23: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 10641)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35aaa
OWRD Well Log ID Number: KLAM 10641
Measuring Point: top of recorder shelf
Measuring Tool: UNIDATA shaft encoder and data logger
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Recorder measurements were at 1 minute intervals
Note: Representative data presented here

Distance to Pumping Well: 2,825 feet
Owner Well Name/Number: unused irrigation well
Measuring Pt. = 0.93 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 06:00:00 (h Pascals)	Barometer Difference from 11/30/99 at 06:00:00 (feet water)	WL Difference from 11/30/99 at 06:00:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 50% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
01-Dec-1999 13:44:00	886.96	29.68					0.23	9.84		0.12
01-Dec-1999 13:45:00	886.72	29.67					0.22	9.85		0.11
01-Dec-1999 13:46:00	886.72	29.67					0.22	9.84		0.12
01-Dec-1999 13:47:00	886.72	29.67					0.22	9.84		0.12
01-Dec-1999 13:48:00	886.72	29.67					0.22	9.84		0.12
01-Dec-1999 13:49:00	886.72	29.67					0.22	9.83		0.13
01-Dec-1999 13:50:00	886.72	29.67					0.22	9.83		0.13
01-Dec-1999 13:51:00	886.72	29.67					0.22	9.83		0.13
01-Dec-1999 13:52:00	886.72	29.67					0.22	9.83		0.13
01-Dec-1999 13:53:00	886.72	29.67					0.22	9.82		0.14
01-Dec-1999 13:54:00	886.72	29.67					0.22	9.82		0.14
01-Dec-1999 13:55:00	886.72	29.67					0.22	9.82		0.14
01-Dec-1999 13:56:00	886.72	29.67					0.22	9.82		0.14
01-Dec-1999 13:57:00	886.72	29.67					0.22	9.82		0.14
01-Dec-1999 13:58:00	886.72	29.67					0.22	9.82		0.14
01-Dec-1999 13:59:00	886.72	29.67					0.22	9.81		0.15
01-Dec-1999 14:00:00	886.72	29.67					0.22	9.81		0.15
01-Dec-1999 14:02:00	886.72	29.67					0.22	9.81		0.15
01-Dec-1999 14:04:00	886.72	29.67					0.22	9.81		0.15
01-Dec-1999 14:06:00	886.48	29.66					0.22	9.80		0.16
01-Dec-1999 14:08:00	886.48	29.66					0.22	9.80		0.16
01-Dec-1999 14:10:00	886.48	29.66					0.22	9.80		0.16
01-Dec-1999 14:12:00	886.48	29.66					0.22	9.80		0.16
01-Dec-1999 14:14:00	886.48	29.66					0.22	9.80		0.16
01-Dec-1999 14:16:00	886.48	29.66					0.22	9.79		0.17
01-Dec-1999 14:18:00	886.48	29.66					0.22	9.79		0.17
01-Dec-1999 14:20:00	886.48	29.66					0.22	9.79		0.17
01-Dec-1999 14:22:00	886.48	29.66					0.22	9.79		0.17
01-Dec-1999 14:24:00	886.48	29.66					0.22	9.79		0.17
01-Dec-1999 14:26:00	886.48	29.66					0.22	9.79		0.17
01-Dec-1999 14:28:00	886.48	29.66					0.22	9.78		0.18
01-Dec-1999 14:30:00	886.48	29.66					0.22	9.78		0.18

Appendix 23: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 10641)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35aaa
OWRD Well Log ID Number: KLAM 10641
Measuring Point: top of recorder shelf
Measuring Tool: UNIDATA shaft encoder and data logger
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Recorder measurements were at 1 minute intervals
Note: Representative data presented here

Distance to Pumping Well: 2,825 feet
Owner Well Name/Number: unused irrigation well
Measuring Pt. = 0.93 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 06:00:00 (h Pascals)	Barometer Difference from 11/30/99 at 06:00:00 (feet water)	WL Difference from 11/30/99 at 06:00:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 50% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
01-Dec-1999 14:35:00	886.72	29.67					0.22	9.78		0.18
01-Dec-1999 14:40:00	886.48	29.66					0.22	9.78		0.18
01-Dec-1999 14:45:00	886.48	29.66					0.22	9.78		0.18
01-Dec-1999 14:50:00	886.48	29.66					0.22	9.77		0.19
01-Dec-1999 14:55:00	886.48	29.66					0.22	9.77		0.19
01-Dec-1999 15:00:00	886.48	29.66					0.22	9.77		0.19
01-Dec-1999 15:05:00	886.48	29.66					0.22	9.77		0.19
01-Dec-1999 15:10:00	886.48	29.66					0.22	9.77		0.19
01-Dec-1999 15:15:00	886.48	29.66					0.22	9.76		0.20
01-Dec-1999 15:20:00	886.48	29.66					0.22	9.76		0.20
01-Dec-1999 15:25:00	886.48	29.66					0.22	9.76		0.20
01-Dec-1999 15:30:00	886.48	29.66					0.22	9.76		0.20
01-Dec-1999 15:40:00	886.72	29.67					0.22	9.76		0.20
01-Dec-1999 15:50:00	886.48	29.66					0.22	9.76		0.20
01-Dec-1999 16:00:00	886.48	29.66					0.22	9.76		0.20
01-Dec-1999 16:10:00	886.48	29.66					0.22	9.75		0.21
01-Dec-1999 16:20:00	886.72	29.67					0.22	9.75		0.21
01-Dec-1999 16:30:00	886.48	29.66					0.22	9.75		0.21
01-Dec-1999 16:45:00	886.24	29.65					0.21	9.76		0.20
01-Dec-1999 17:00:00	886.48	29.66					0.22	9.74		0.22
01-Dec-1999 17:15:00	886.48	29.66					0.22	9.74		0.22
01-Dec-1999 17:30:00	886.24	29.65					0.21	9.75		0.21
01-Dec-1999 17:50:00	886.24	29.65					0.21	9.74		0.22
01-Dec-1999 18:10:00	886.24	29.65					0.21	9.74		0.22
01-Dec-1999 18:30:00	886.24	29.65					0.21	9.74		0.22
01-Dec-1999 19:00:00	886.01	29.65					0.20	9.74		0.22
01-Dec-1999 19:30:00	885.77	29.64					0.19	9.73		0.23
01-Dec-1999 20:30:00	885.53	29.63					0.18	9.73		0.23
01-Dec-1999 21:30:00	885.53	29.63					0.18	9.73		0.23
01-Dec-1999 22:30:00	885.05	29.61					0.17	9.72		0.24
01-Dec-1999 23:30:00	884.09	29.58					0.14	9.72		0.24
02-Dec-1999 00:30:00	883.37	29.56					0.11	9.71		0.25

Appendix 23: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 10641)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35aaa
OWRD Well Log ID Number: KLAM 10641
Measuring Point: top of recorder shelf
Measuring Tool: UNIDATA shaft encoder and data logger
Power Meter: Start = 000 kwh **End =** 635 kwh

Note: Recorder measurements were at 1 minute intervals
Note: Representative data presented here

Distance to Pumping Well: 2,825 feet
Owner Well Name/Number: unused irrigation well
Measuring Pt. = 0.93 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 06:00:00 (h Pascals)	Barometer Difference from 11/30/99 at 06:00:00 (feet water)	WL Difference from 11/30/99 at 06:00:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 50% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
02-Dec-1999 01:30:00	881.94	29.51					0.06	9.71		0.25
02-Dec-1999 02:30:00	881.46	29.49					0.05	9.70		0.26
02-Dec-1999 03:30:00	881.46	29.49					0.05	9.70		0.26
02-Dec-1999 04:30:00	879.06	29.41					-0.03	9.70		0.26
02-Dec-1999 05:30:00	877.39	29.36					-0.09	9.69		0.27
02-Dec-1999 06:30:00	876.43	29.33					-0.12	9.70		0.26
02-Dec-1999 07:30:00	876.91	29.34					-0.10	9.70		0.26
02-Dec-1999 08:30:00	879.30	29.42					-0.02	9.68		0.28
02-Dec-1999 09:30:00	880.02	29.45					0.00	9.69		0.27
02-Dec-1999 10:30:00	881.22	29.49					0.04	9.68		0.28
02-Dec-1999 11:30:00	881.94	29.51					0.06	9.67		0.29
02-Dec-1999 12:30:00	882.89	29.54					0.10	9.67		0.29
02-Dec-1999 13:30:00	883.13	29.55					0.10	9.67		0.29

Appendix 24: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 15129)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R14E-sec 6bbb
OWRD Well Log ID Number: KLAM 15129
Measuring Point: concrete pad
Measuring Tool: steel tape and riser tube
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: 6,045 feet
Owner Well Name/Number: flowing well
Measuring Pt. = 0.46 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (feet above mp)	Measuring Point (ft alsd)	Water Level (feet above lsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
30-Nov-1999 06:00:00											
30-Nov-1999 09:36:00	7.79	0.46	8.25	shut off flowing well at 09:35:00	-234.00	-0.1625					
30-Nov-1999 09:46:00	7.81	0.46	8.27		-224.00	-0.1556					
30-Nov-1999 10:00:00	7.82	0.46	8.28		-210.00	-0.1458					
30-Nov-1999 10:15:00	7.83	0.46	8.29		-195.00	-0.1354					
30-Nov-1999 10:30:00	7.83	0.46	8.29		-180.00	-0.1250					
30-Nov-1999 10:45:00	7.84	0.46	8.30		-165.00	-0.1146					
30-Nov-1999 11:00:00	7.83	0.46	8.29		-150.00	-0.1042					
30-Nov-1999 11:12:00	7.85	0.46	8.31		-138.00	-0.0958					
30-Nov-1999 13:28:00	7.89	0.46	8.35	return to well	-2.00	-0.0014					
30-Nov-1999 13:30:00	7.88	0.46	8.34	**Start Test, Pumping Well On**	0.00	0.0000				0.00	
30-Nov-1999 13:31:00	7.88	0.46	8.34	water level fluctuates 0.01	1.00	0.0007				0.00	
30-Nov-1999 13:32:00	7.86	0.46	8.32	to 0.03 ft due to wind	2.00	0.0014				0.02	
30-Nov-1999 13:33:00	7.85	0.46	8.31		3.00	0.0021				0.03	
30-Nov-1999 13:34:00	7.85	0.46	8.31		4.00	0.0028				0.03	
30-Nov-1999 13:35:00	7.83	0.46	8.29		5.00	0.0035				0.05	
30-Nov-1999 13:36:00	7.83	0.46	8.29		6.00	0.0042				0.05	
30-Nov-1999 13:37:00	7.82	0.46	8.28		7.00	0.0049				0.06	
30-Nov-1999 13:38:00	7.82	0.46	8.28		8.00	0.0056				0.06	
30-Nov-1999 13:39:00	7.81	0.46	8.27		9.00	0.0062				0.07	
30-Nov-1999 13:40:00	7.81	0.46	8.27		10.00	0.0069				0.07	
30-Nov-1999 13:41:00	7.81	0.46	8.27		11.00	0.0076				0.07	
30-Nov-1999 13:42:00	7.80	0.46	8.26	fluctuates 0.05 ft with bigger gusts	12.00	0.0083				0.08	
30-Nov-1999 13:43:00	7.80	0.46	8.26		13.00	0.0090				0.08	
30-Nov-1999 13:44:00	7.80	0.46	8.26		14.00	0.0097				0.08	
30-Nov-1999 13:45:00	7.79	0.46	8.25		15.00	0.0104				0.09	
30-Nov-1999 13:46:00	7.80	0.46	8.26		16.00	0.0111				0.08	
30-Nov-1999 13:47:00	7.78	0.46	8.24		17.00	0.0118				0.10	
30-Nov-1999 13:48:00	7.78	0.46	8.24		18.00	0.0125				0.10	
30-Nov-1999 13:49:00	7.78	0.46	8.24	big gusts	19.00	0.0132				0.10	
30-Nov-1999 13:50:00	7.77	0.46	8.23		20.00	0.0139				0.11	
30-Nov-1999 13:51:00	7.79	0.46	8.25	big gusts	21.00	0.0146				0.09	

Appendix 24: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 15129)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R14E-sec 6bbb
OWRD Well Log ID Number: KLAM 15129
Measuring Point: concrete pad
Measuring Tool: steel tape and riser tube
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: 6,045 feet
Owner Well Name/Number: flowing well
Measuring Pt. = 0.46 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (feet above mp)	Measuring Point (ft alsd)	Water Level (feet above lsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
30-Nov-1999 13:52:00	7.77	0.46	8.23		22.00	0.0153				0.11	
30-Nov-1999 13:53:00	7.77	0.46	8.23		23.00	0.0160				0.11	
30-Nov-1999 13:54:00	7.78	0.46	8.24	big gusts	24.00	0.0167				0.10	
30-Nov-1999 13:55:00	7.77	0.46	8.23		25.00	0.0174				0.11	
30-Nov-1999 13:56:00	7.77	0.46	8.23		26.00	0.0181				0.11	
30-Nov-1999 13:57:00	7.78	0.46	8.24	big gusts	27.00	0.0188				0.10	
30-Nov-1999 13:58:00	7.76	0.46	8.22		28.00	0.0194				0.12	
30-Nov-1999 13:59:00	7.77	0.46	8.23		29.00	0.0201				0.11	
30-Nov-1999 14:00:00	7.76	0.46	8.22		30.00	0.0208				0.12	
30-Nov-1999 14:02:00	7.75	0.46	8.21		32.00	0.0222				0.13	
30-Nov-1999 14:04:00	7.76	0.46	8.22		34.00	0.0236				0.12	
30-Nov-1999 14:06:00	7.75	0.46	8.21	big gusts	36.00	0.0250				0.13	
30-Nov-1999 14:08:00	7.75	0.46	8.21		38.00	0.0264				0.13	
30-Nov-1999 14:10:00	7.75	0.46	8.21		40.00	0.0278				0.13	
30-Nov-1999 14:12:00	7.75	0.46	8.21		42.00	0.0292				0.13	
30-Nov-1999 14:14:00	7.75	0.46	8.21		44.00	0.0306				0.13	
30-Nov-1999 14:16:00	7.74	0.46	8.20		46.00	0.0319				0.14	
30-Nov-1999 14:18:00	7.75	0.46	8.21		48.00	0.0333				0.13	
30-Nov-1999 14:20:00	7.74	0.46	8.20		50.00	0.0347				0.14	
30-Nov-1999 14:22:00	7.73	0.46	8.19		52.00	0.0361				0.15	
30-Nov-1999 14:24:00	7.73	0.46	8.19		54.00	0.0375				0.15	
30-Nov-1999 14:26:00	7.73	0.46	8.19		56.00	0.0389				0.15	
30-Nov-1999 14:28:00	7.74	0.46	8.20	big gusts	58.00	0.0403				0.14	
30-Nov-1999 14:30:00	7.74	0.46	8.20		60.00	0.0417				0.14	
30-Nov-1999 14:35:00	7.74	0.46	8.20		65.00	0.0451				0.14	
30-Nov-1999 14:40:00	7.74	0.46	8.20	wind blowing hard	70.00	0.0486				0.14	
30-Nov-1999 14:45:00	7.74	0.46	8.20		75.00	0.0521				0.14	
30-Nov-1999 14:50:00	7.73	0.46	8.19		80.00	0.0556				0.15	
30-Nov-1999 14:55:00	7.73	0.46	8.19		85.00	0.0590				0.15	
30-Nov-1999 15:00:00	7.72	0.46	8.18		90.00	0.0625				0.16	
30-Nov-1999 15:05:00	7.72	0.46	8.18		95.00	0.0660				0.16	
30-Nov-1999 15:10:00	7.72	0.46	8.18	Power off at pumping well from	100.00	0.0694				0.16	

Appendix 24: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 15129)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R14E-sec 6bbb
OWRD Well Log ID Number: KLAM 15129
Measuring Point: concrete pad
Measuring Tool: steel tape and riser tube
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: 6,045 feet
Owner Well Name/Number: flowing well
Measuring Pt. = 0.46 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (feet above mp)	Measuring Point (ft alsd)	Water Level (feet above lsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
30-Nov-1999 15:15:00	7.75	0.46	8.21	15:13 to 15:16	105.00	0.0729				0.13	
30-Nov-1999 15:20:00	7.74	0.46	8.20	wind blowing hard	110.00	0.0764				0.14	
30-Nov-1999 15:25:00	7.74	0.46	8.20		115.00	0.0799				0.14	
30-Nov-1999 15:30:00	7.73	0.46	8.19		120.00	0.0833				0.15	
30-Nov-1999 15:40:00	7.72	0.46	8.18		130.00	0.0903				0.16	
30-Nov-1999 15:50:00	7.72	0.46	8.18		140.00	0.0972				0.16	
30-Nov-1999 16:00:00	7.71	0.46	8.17		150.00	0.1042				0.17	
30-Nov-1999 16:10:00	7.71	0.46	8.17		160.00	0.1111				0.17	
30-Nov-1999 16:20:00	7.70	0.46	8.16	gusty	170.00	0.1181				0.18	
30-Nov-1999 16:30:00	7.69	0.46	8.15		180.00	0.1250				0.19	
30-Nov-1999 16:45:00	7.70	0.46	8.16		195.00	0.1354				0.18	
30-Nov-1999 17:00:00	7.69	0.46	8.15		210.00	0.1458				0.19	
30-Nov-1999 17:15:00	7.69	0.46	8.15	slight breeze	225.00	0.1563				0.19	
30-Nov-1999 17:30:00	7.68	0.46	8.14		240.00	0.1667				0.20	
30-Nov-1999 17:50:00	7.68	0.46	8.14		260.00	0.1806				0.20	
30-Nov-1999 18:10:00	7.67	0.46	8.13	calm	280.00	0.1944				0.21	
30-Nov-1999 18:30:00	7.66	0.46	8.12		300.00	0.2083				0.22	
30-Nov-1999 19:00:00	7.66	0.46	8.12		330.00	0.2292				0.22	
30-Nov-1999 19:30:00	7.66	0.46	8.12	snowing	360.00	0.2500				0.22	
30-Nov-1999 20:46:00	7.64	0.46	8.10	stars	436.00	0.3028				0.24	
30-Nov-1999 21:45:00	7.62	0.46	8.08		495.00	0.3438				0.26	
30-Nov-1999 22:59:00	7.61	0.46	8.07	snowing	569.00	0.3951				0.27	
30-Nov-1999 23:44:00	7.60	0.46	8.06	snowing	614.00	0.4264				0.28	
01-Dec-1999 00:44:00	7.59	0.46	8.05	stars and snow	674.00	0.4681				0.29	
01-Dec-1999 01:44:00	7.58	0.46	8.04		734.00	0.5097				0.30	
01-Dec-1999 02:45:00	7.57	0.46	8.03		795.00	0.5521				0.31	
01-Dec-1999 03:46:00	7.56	0.46	8.02	water freezing in riser tube	856.00	0.5944				0.32	
01-Dec-1999 04:52:00	7.52	0.46	7.98	freezing problems	922.00	0.6403				0.36	
01-Dec-1999 05:48:00	7.52	0.46	7.98	freezing problems	978.00	0.6792				0.36	
01-Dec-1999 06:48:00	7.50	0.46	7.96		1,038.00	0.7208				0.38	
01-Dec-1999 07:43:00	7.49	0.46	7.95		1,093.00	0.7590				0.39	
01-Dec-1999 08:45:00	7.48	0.46	7.94		1,155.00	0.8021				0.40	

Appendix 24: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 15129)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R14E-sec 6bbb
OWRD Well Log ID Number: KLAM 15129
Measuring Point: concrete pad
Measuring Tool: steel tape and riser tube
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: 6,045 feet
Owner Well Name/Number: flowing well
Measuring Pt. = 0.46 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (feet above mp)	Measuring Point (ft alsd)	Water Level (feet above lsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
01-Dec-1999 09:46:00	7.47	0.46	7.93	above freezing	1,216.00	0.8444				0.41	
01-Dec-1999 10:44:00	7.47	0.46	7.93		1,274.00	0.8847				0.41	
01-Dec-1999 11:43:00	7.48	0.46	7.94		1,333.00	0.9257				0.40	
01-Dec-1999 12:45:00	7.49	0.46	7.95		1,395.00	0.9688				0.39	
01-Dec-1999 13:00:00	7.49	0.46	7.95		1,410.00	0.9792				0.39	
01-Dec-1999 13:15:00	7.49	0.46	7.95		1,425.00	0.9896				0.39	
01-Dec-1999 13:28:00	7.49	0.46	7.95		1,438.00	0.9986				0.39	
01-Dec-1999 13:30:00	7.49	0.46	7.95	**End Pumping, Start Recovery**	1,440.00	1.0000	0.00	0.0000		0.39	0.00
01-Dec-1999 13:31:00	7.50	0.46	7.96	clouds, slight breeze	1,441.00	1.0007	1.00	0.0007	1,441.0000		0.01
01-Dec-1999 13:32:00	7.51	0.46	7.97		1,442.00	1.0014	2.00	0.0014	721.0000		0.02
01-Dec-1999 13:33:00	7.52	0.46	7.98		1,443.00	1.0021	3.00	0.0021	481.0000		0.03
01-Dec-1999 13:34:00	7.53	0.46	7.99		1,444.00	1.0028	4.00	0.0028	361.0000		0.04
01-Dec-1999 13:35:00	7.53	0.46	7.99		1,445.00	1.0035	5.00	0.0035	289.0000		0.04
01-Dec-1999 13:36:00	7.54	0.46	8.00		1,446.00	1.0042	6.00	0.0042	241.0000		0.05
01-Dec-1999 13:37:00	7.55	0.46	8.01		1,447.00	1.0049	7.00	0.0049	206.7143		0.06
01-Dec-1999 13:38:00	7.55	0.46	8.01		1,448.00	1.0056	8.00	0.0056	181.0000		0.06
01-Dec-1999 13:39:00	7.56	0.46	8.02		1,449.00	1.0062	9.00	0.0062	161.0000		0.07
01-Dec-1999 13:40:00	7.56	0.46	8.02		1,450.00	1.0069	10.00	0.0069	145.0000		0.07
01-Dec-1999 13:41:00	7.57	0.46	8.03		1,451.00	1.0076	11.00	0.0076	131.9091		0.08
01-Dec-1999 13:42:00	7.57	0.46	8.03		1,452.00	1.0083	12.00	0.0083	121.0000		0.08
01-Dec-1999 13:43:00	7.58	0.46	8.04		1,453.00	1.0090	13.00	0.0090	111.7692		0.09
01-Dec-1999 13:44:00	7.58	0.46	8.04		1,454.00	1.0097	14.00	0.0097	103.8571		0.09
01-Dec-1999 13:45:00	7.58	0.46	8.04		1,455.00	1.0104	15.00	0.0104	97.0000		0.09
01-Dec-1999 13:46:00	7.58	0.46	8.04		1,456.00	1.0111	16.00	0.0111	91.0000		0.09
01-Dec-1999 13:47:00	7.59	0.46	8.05		1,457.00	1.0118	17.00	0.0118	85.7059		0.10
01-Dec-1999 13:48:00	7.59	0.46	8.05		1,458.00	1.0125	18.00	0.0125	81.0000		0.10
01-Dec-1999 13:49:00	7.59	0.46	8.05		1,459.00	1.0132	19.00	0.0132	76.7895		0.10
01-Dec-1999 13:50:00	7.60	0.46	8.06		1,460.00	1.0139	20.00	0.0139	73.0000		0.11
01-Dec-1999 13:51:00	7.60	0.46	8.06		1,461.00	1.0146	21.00	0.0146	69.5714		0.11
01-Dec-1999 13:52:00	7.60	0.46	8.06		1,462.00	1.0153	22.00	0.0153	66.4545		0.11
01-Dec-1999 13:53:00	7.60	0.46	8.06		1,463.00	1.0160	23.00	0.0160	63.6087		0.11
01-Dec-1999 13:54:00	7.60	0.46	8.06		1,464.00	1.0167	24.00	0.0167	61.0000		0.11

Appendix 24: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 15129)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R14E-sec 6bbb
OWRD Well Log ID Number: KLAM 15129
Measuring Point: concrete pad
Measuring Tool: steel tape and riser tube
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: 6,045 feet
Owner Well Name/Number: flowing well
Measuring Pt. = 0.46 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (feet above mp)	Measuring Point (ft alsd)	Water Level (feet above lsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
01-Dec-1999 13:55:00	7.61	0.46	8.07		1,465.00	1.0174	25.00	0.0174	58.6000		0.12
01-Dec-1999 13:56:00	7.61	0.46	8.07		1,466.00	1.0181	26.00	0.0181	56.3846		0.12
01-Dec-1999 13:57:00	7.61	0.46	8.07		1,467.00	1.0188	27.00	0.0188	54.3333		0.12
01-Dec-1999 13:58:00	7.61	0.46	8.07		1,468.00	1.0194	28.00	0.0194	52.4286		0.12
01-Dec-1999 13:59:00	7.61	0.46	8.07		1,469.00	1.0201	29.00	0.0201	50.6552		0.12
01-Dec-1999 14:00:00	7.62	0.46	8.08		1,470.00	1.0208	30.00	0.0208	49.0000		0.13
01-Dec-1999 14:02:00	7.62	0.46	8.08		1,472.00	1.0222	32.00	0.0222	46.0000		0.13
01-Dec-1999 14:04:00	7.62	0.46	8.08		1,474.00	1.0236	34.00	0.0236	43.3529		0.13
01-Dec-1999 14:06:00	7.62	0.46	8.08		1,476.00	1.0250	36.00	0.0250	41.0000		0.13
01-Dec-1999 14:08:00	7.63	0.46	8.09		1,478.00	1.0264	38.00	0.0264	38.8947		0.14
01-Dec-1999 14:10:00	7.63	0.46	8.09		1,480.00	1.0278	40.00	0.0278	37.0000		0.14
01-Dec-1999 14:12:00	7.63	0.46	8.09		1,482.00	1.0292	42.00	0.0292	35.2857		0.14
01-Dec-1999 14:14:00	7.63	0.46	8.09		1,484.00	1.0306	44.00	0.0306	33.7273		0.14
01-Dec-1999 14:16:00	7.63	0.46	8.09		1,486.00	1.0319	46.00	0.0319	32.3043		0.14
01-Dec-1999 14:18:00	7.64	0.46	8.10		1,488.00	1.0333	48.00	0.0333	31.0000		0.15
01-Dec-1999 14:20:00	7.64	0.46	8.10		1,490.00	1.0347	50.00	0.0347	29.8000		0.15
01-Dec-1999 14:22:00	7.64	0.46	8.10		1,492.00	1.0361	52.00	0.0361	28.6923		0.15
01-Dec-1999 14:24:00	7.64	0.46	8.10		1,494.00	1.0375	54.00	0.0375	27.6667		0.15
01-Dec-1999 14:26:00	7.64	0.46	8.10		1,496.00	1.0389	56.00	0.0389	26.7143		0.15
01-Dec-1999 14:28:00	7.64	0.46	8.10		1,498.00	1.0403	58.00	0.0403	25.8276		0.15
01-Dec-1999 14:30:00	7.65	0.46	8.11		1,500.00	1.0417	60.00	0.0417	25.0000		0.16
01-Dec-1999 14:35:00	7.65	0.46	8.11		1,505.00	1.0451	65.00	0.0451	23.1538		0.16
01-Dec-1999 14:40:00	7.65	0.46	8.11		1,510.00	1.0486	70.00	0.0486	21.5714		0.16
01-Dec-1999 14:45:00	7.65	0.46	8.11		1,515.00	1.0521	75.00	0.0521	20.2000		0.16
01-Dec-1999 14:50:00	7.65	0.46	8.11		1,520.00	1.0556	80.00	0.0556	19.0000		0.16
01-Dec-1999 14:55:00	7.65	0.46	8.11		1,525.00	1.0590	85.00	0.0590	17.9412		0.16
01-Dec-1999 15:00:00	7.65	0.46	8.11		1,530.00	1.0625	90.00	0.0625	17.0000		0.16
01-Dec-1999 15:05:00	7.65	0.46	8.11		1,535.00	1.0660	95.00	0.0660	16.1579		0.16
01-Dec-1999 15:10:00	7.66	0.46	8.12		1,540.00	1.0694	100.00	0.0694	15.4000		0.17
01-Dec-1999 15:15:00	7.66	0.46	8.12		1,545.00	1.0729	105.00	0.0729	14.7143		0.17
01-Dec-1999 15:20:00	7.66	0.46	8.12		1,550.00	1.0764	110.00	0.0764	14.0909		0.17
01-Dec-1999 15:25:00	7.66	0.46	8.12		1,555.00	1.0799	115.00	0.0799	13.5217		0.17

Appendix 24: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 15129)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R14E-sec 6bbb
OWRD Well Log ID Number: KLAM 15129
Measuring Point: concrete pad
Measuring Tool: steel tape and riser tube
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: 6,045 feet
Owner Well Name/Number: flowing well
Measuring Pt. = 0.46 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (feet above mp)	Measuring Point (ft alsd)	Water Level (feet above lsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
01-Dec-1999 15:30:00	7.66	0.46	8.12		1,560.00	1.0833	120.00	0.0833	13.0000		0.17
01-Dec-1999 15:40:00	7.66	0.46	8.12		1,570.00	1.0903	130.00	0.0903	12.0769		0.17
01-Dec-1999 15:50:00	7.66	0.46	8.12		1,580.00	1.0972	140.00	0.0972	11.2857		0.17
01-Dec-1999 16:00:00	7.67	0.46	8.13		1,590.00	1.1042	150.00	0.1042	10.6000		0.18
01-Dec-1999 16:10:00	7.67	0.46	8.13		1,600.00	1.1111	160.00	0.1111	10.0000		0.18
01-Dec-1999 16:20:00	7.67	0.46	8.13		1,610.00	1.1181	170.00	0.1181	9.4706		0.18
01-Dec-1999 16:30:00	7.67	0.46	8.13		1,620.00	1.1250	180.00	0.1250	9.0000		0.18
01-Dec-1999 16:45:00	7.68	0.46	8.14		1,635.00	1.1354	195.00	0.1354	8.3846		0.19
01-Dec-1999 17:00:00	7.68	0.46	8.14		1,650.00	1.1458	210.00	0.1458	7.8571		0.19
01-Dec-1999 17:15:00	7.68	0.46	8.14		1,665.00	1.1563	225.00	0.1563	7.4000		0.19
01-Dec-1999 17:30:00	7.68	0.46	8.14		1,680.00	1.1667	240.00	0.1667	7.0000		0.19
01-Dec-1999 17:50:00	7.68	0.46	8.14		1,700.00	1.1806	260.00	0.1806	6.5385		0.19
01-Dec-1999 18:10:00	7.68	0.46	8.14		1,720.00	1.1944	280.00	0.1944	6.1429		0.19
01-Dec-1999 18:30:00	7.68	0.46	8.14		1,740.00	1.2083	300.00	0.2083	5.8000		0.19
01-Dec-1999 19:00:00	7.68	0.46	8.14		1,770.00	1.2292	330.00	0.2292	5.3636		0.19
01-Dec-1999 19:30:00	7.69	0.46	8.15	GHG Retired for night, exhausted	1,800.00	1.2500	360.00	0.2500	5.0000		0.20
02-Dec-1999 09:46:00	7.85	0.46	8.31	wind gusts raising water to 7.87 ft	2,656.00	1.8444	1,216.00	0.8444	2.1842		0.36
02-Dec-1999 10:40:00	7.84	0.46	8.30		2,710.00	1.8819	1,270.00	0.8819	2.1339		0.35
02-Dec-1999 11:44:00	7.83	0.46	8.29		2,774.00	1.9264	1,334.00	0.9264	2.0795		0.34
02-Dec-1999 12:42:00	7.82	0.46	8.28		2,832.00	1.9667	1,392.00	0.9667	2.0345		0.33
02-Dec-1999 13:41:00	7.81	0.46	8.27	**End of Test**	2,891.00	2.0076	1,451.00	1.0076	1.9924		0.32

Appendix 24: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 15129)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R14E-sec 6bbb
OWRD Well Log ID Number: KLAM 15129
Measuring Point: concrete pad
Measuring Tool: steel tape and riser tube
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: 6,045 feet
Owner Well Name/Number: flowing well
Measuring Pt. = 0.46 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 50% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
30-Nov-1999 06:00:00	880.98	29.48								
30-Nov-1999 09:36:00	881.46	29.49					0.02	8.26		
30-Nov-1999 09:46:00	881.70	29.50	2.88	0.10	-0.07	-0.7264	0.02	8.28		
30-Nov-1999 10:00:00	881.70	29.50	2.88	0.10	-0.06	-0.6226	0.02	8.29		
30-Nov-1999 10:15:00	881.46	29.49	2.64	0.09	-0.05	-0.5660	0.02	8.30		
30-Nov-1999 10:30:00	881.22	29.49	2.40	0.08	-0.05	-0.6226	0.01	8.29		
30-Nov-1999 10:45:00	881.22	29.49	2.40	0.08	-0.04	-0.4981	0.01	8.30		
30-Nov-1999 11:00:00	881.22	29.49	2.40	0.08	-0.05	-0.6226	0.01	8.29		
30-Nov-1999 11:12:00	880.98	29.48	2.16	0.07	-0.03	-0.4151	0.00	8.31		
30-Nov-1999 13:28:00	878.82	29.41	0.00	0.00	0.01		-0.07	8.31		
30-Nov-1999 13:30:00	878.82	29.41	0.00	0.00	0.00		-0.07	8.30	0.00	
30-Nov-1999 13:31:00	878.82	29.41					-0.07	8.30	0.00	
30-Nov-1999 13:32:00	878.82	29.41					-0.07	8.28	0.02	
30-Nov-1999 13:33:00	878.82	29.41					-0.07	8.27	0.03	
30-Nov-1999 13:34:00	878.82	29.41					-0.07	8.27	0.03	
30-Nov-1999 13:35:00	878.82	29.41					-0.07	8.25	0.05	
30-Nov-1999 13:36:00	878.82	29.41					-0.07	8.25	0.05	
30-Nov-1999 13:37:00	878.82	29.41					-0.07	8.24	0.06	
30-Nov-1999 13:38:00	878.82	29.41					-0.07	8.24	0.06	
30-Nov-1999 13:39:00	878.82	29.41					-0.07	8.23	0.07	
30-Nov-1999 13:40:00	878.82	29.41					-0.07	8.23	0.07	
30-Nov-1999 13:41:00	878.82	29.41					-0.07	8.23	0.07	
30-Nov-1999 13:42:00	878.82	29.41					-0.07	8.22	0.08	
30-Nov-1999 13:43:00	878.82	29.41					-0.07	8.22	0.08	
30-Nov-1999 13:44:00	878.82	29.41					-0.07	8.22	0.08	
30-Nov-1999 13:45:00	878.82	29.41					-0.07	8.21	0.09	
30-Nov-1999 13:46:00	878.82	29.41					-0.07	8.22	0.08	
30-Nov-1999 13:47:00	878.82	29.41					-0.07	8.20	0.10	
30-Nov-1999 13:48:00	878.82	29.41					-0.07	8.20	0.10	
30-Nov-1999 13:49:00	878.58	29.40					-0.08	8.20	0.10	
30-Nov-1999 13:50:00	878.58	29.40					-0.08	8.19	0.11	
30-Nov-1999 13:51:00	878.82	29.41					-0.07	8.21	0.09	

Appendix 24: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 15129)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R14E-sec 6bbb
OWRD Well Log ID Number: KLAM 15129
Measuring Point: concrete pad
Measuring Tool: steel tape and riser tube
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: 6,045 feet
Owner Well Name/Number: flowing well
Measuring Pt. = 0.46 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 50% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
30-Nov-1999 13:52:00	878.58	29.40					-0.08	8.19	0.11	
30-Nov-1999 13:53:00	878.82	29.41					-0.07	8.19	0.11	
30-Nov-1999 13:54:00	878.82	29.41					-0.07	8.20	0.10	
30-Nov-1999 13:55:00	878.82	29.41					-0.07	8.19	0.11	
30-Nov-1999 13:56:00	878.82	29.41					-0.07	8.19	0.11	
30-Nov-1999 13:57:00	878.82	29.41					-0.07	8.20	0.10	
30-Nov-1999 13:58:00	878.82	29.41					-0.07	8.18	0.12	
30-Nov-1999 13:59:00	878.82	29.41					-0.07	8.19	0.11	
30-Nov-1999 14:00:00	878.82	29.41					-0.07	8.18	0.12	
30-Nov-1999 14:02:00	878.82	29.41					-0.07	8.17	0.13	
30-Nov-1999 14:04:00	878.58	29.40					-0.08	8.18	0.12	
30-Nov-1999 14:06:00	878.58	29.40					-0.08	8.17	0.13	
30-Nov-1999 14:08:00	878.58	29.40					-0.08	8.17	0.13	
30-Nov-1999 14:10:00	878.58	29.40					-0.08	8.17	0.13	
30-Nov-1999 14:12:00	878.82	29.41					-0.07	8.17	0.13	
30-Nov-1999 14:14:00	878.82	29.41					-0.07	8.17	0.13	
30-Nov-1999 14:16:00	878.82	29.41					-0.07	8.16	0.14	
30-Nov-1999 14:18:00	878.58	29.40					-0.08	8.17	0.13	
30-Nov-1999 14:20:00	878.58	29.40					-0.08	8.16	0.14	
30-Nov-1999 14:22:00	878.58	29.40					-0.08	8.15	0.15	
30-Nov-1999 14:24:00	878.58	29.40					-0.08	8.15	0.15	
30-Nov-1999 14:26:00	878.58	29.40					-0.08	8.15	0.15	
30-Nov-1999 14:28:00	878.58	29.40					-0.08	8.16	0.14	
30-Nov-1999 14:30:00	878.58	29.40					-0.08	8.16	0.14	
30-Nov-1999 14:35:00	878.35	29.39					-0.09	8.16	0.14	
30-Nov-1999 14:40:00	878.35	29.39					-0.09	8.16	0.14	
30-Nov-1999 14:45:00	878.35	29.39					-0.09	8.16	0.14	
30-Nov-1999 14:50:00	878.35	29.39					-0.09	8.15	0.15	
30-Nov-1999 14:55:00	878.35	29.39					-0.09	8.15	0.15	
30-Nov-1999 15:00:00	878.11	29.38					-0.10	8.13	0.17	
30-Nov-1999 15:05:00	878.11	29.38					-0.10	8.13	0.17	
30-Nov-1999 15:10:00	878.35	29.39					-0.09	8.14	0.16	

Appendix 24: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 15129)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R14E-sec 6bbb
OWRD Well Log ID Number: KLAM 15129
Measuring Point: concrete pad
Measuring Tool: steel tape and riser tube
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: 6,045 feet
Owner Well Name/Number: flowing well
Measuring Pt. = 0.46 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 50% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
30-Nov-1999 15:15:00	878.35	29.39					-0.09	8.17	0.13	
30-Nov-1999 15:20:00	878.35	29.39					-0.09	8.16	0.14	
30-Nov-1999 15:25:00	878.11	29.38					-0.10	8.15	0.15	
30-Nov-1999 15:30:00	878.11	29.38					-0.10	8.14	0.16	
30-Nov-1999 15:40:00	878.35	29.39					-0.09	8.14	0.16	
30-Nov-1999 15:50:00	878.35	29.39					-0.09	8.14	0.16	
30-Nov-1999 16:00:00	878.35	29.39					-0.09	8.13	0.17	
30-Nov-1999 16:10:00	878.11	29.38					-0.10	8.12	0.18	
30-Nov-1999 16:20:00	878.11	29.38					-0.10	8.11	0.19	
30-Nov-1999 16:30:00	877.87	29.37					-0.10	8.10	0.20	
30-Nov-1999 16:45:00	877.87	29.37					-0.10	8.11	0.19	
30-Nov-1999 17:00:00	877.87	29.37					-0.10	8.10	0.20	
30-Nov-1999 17:15:00	878.11	29.38					-0.10	8.10	0.20	
30-Nov-1999 17:30:00	878.11	29.38					-0.10	8.09	0.21	
30-Nov-1999 17:50:00	878.11	29.38					-0.10	8.09	0.21	
30-Nov-1999 18:10:00	878.11	29.38					-0.10	8.08	0.22	
30-Nov-1999 18:30:00	878.11	29.38					-0.10	8.07	0.23	
30-Nov-1999 19:00:00	878.58	29.40					-0.08	8.08	0.22	
30-Nov-1999 19:30:00	878.58	29.40					-0.08	8.08	0.22	
30-Nov-1999 20:46:00	879.54	29.43					-0.05	8.08	0.22	
30-Nov-1999 21:45:00	880.26	29.45					-0.02	8.07	0.23	
30-Nov-1999 22:59:00	881.22	29.49					0.01	8.07	0.23	
30-Nov-1999 23:44:00	881.46	29.49					0.02	8.07	0.23	
01-Dec-1999 00:44:00	882.18	29.52					0.04	8.07	0.23	
01-Dec-1999 01:44:00	882.65	29.53					0.06	8.07	0.23	
01-Dec-1999 02:45:00	883.13	29.55					0.07	8.07	0.23	
01-Dec-1999 03:46:00	882.89	29.54					0.06	8.05	0.25	
01-Dec-1999 04:52:00	883.85	29.57					0.10	8.03	0.27	
01-Dec-1999 05:48:00	884.33	29.59					0.11	8.04	0.26	
01-Dec-1999 06:48:00	885.53	29.63					0.15	8.04	0.26	
01-Dec-1999 07:43:00	886.24	29.65					0.18	8.04	0.26	
01-Dec-1999 08:45:00	886.72	29.67					0.19	8.04	0.26	

Appendix 24: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 15129)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R14E-sec 6bbb
OWRD Well Log ID Number: KLAM 15129
Measuring Point: concrete pad
Measuring Tool: steel tape and riser tube
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: 6,045 feet
Owner Well Name/Number: flowing well
Measuring Pt. = 0.46 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 50% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
01-Dec-1999 09:46:00	887.44	29.69					0.22	8.04	0.26	
01-Dec-1999 10:44:00	887.92	29.71					0.23	8.05	0.25	
01-Dec-1999 11:43:00	887.20	29.69					0.21	8.04	0.26	
01-Dec-1999 12:45:00	886.96	29.68					0.20	8.05	0.25	
01-Dec-1999 13:00:00	886.96	29.68					0.20	8.05	0.25	
01-Dec-1999 13:15:00	887.20	29.69					0.21	8.05	0.25	
01-Dec-1999 13:28:00	887.20	29.69					0.21	8.05	0.25	
01-Dec-1999 13:30:00	887.20	29.69					0.21	8.05	0.25	0.00
01-Dec-1999 13:31:00	887.20	29.69					0.21	8.06		0.01
01-Dec-1999 13:32:00	886.96	29.68					0.20	8.07		0.02
01-Dec-1999 13:33:00	886.96	29.68					0.20	8.08		0.03
01-Dec-1999 13:34:00	886.96	29.68					0.20	8.09		0.04
01-Dec-1999 13:35:00	886.96	29.68					0.20	8.09		0.04
01-Dec-1999 13:36:00	886.96	29.68					0.20	8.10		0.05
01-Dec-1999 13:37:00	886.96	29.68					0.20	8.11		0.06
01-Dec-1999 13:38:00	886.96	29.68					0.20	8.11		0.06
01-Dec-1999 13:39:00	886.96	29.68					0.20	8.12		0.07
01-Dec-1999 13:40:00	886.96	29.68					0.20	8.12		0.07
01-Dec-1999 13:41:00	886.96	29.68					0.20	8.13		0.08
01-Dec-1999 13:42:00	886.96	29.68					0.20	8.13		0.08
01-Dec-1999 13:43:00	886.96	29.68					0.20	8.14		0.09
01-Dec-1999 13:44:00	886.96	29.68					0.20	8.14		0.09
01-Dec-1999 13:45:00	886.72	29.67					0.19	8.14		0.09
01-Dec-1999 13:46:00	886.72	29.67					0.19	8.14		0.09
01-Dec-1999 13:47:00	886.72	29.67					0.19	8.15		0.10
01-Dec-1999 13:48:00	886.72	29.67					0.19	8.15		0.10
01-Dec-1999 13:49:00	886.72	29.67					0.19	8.15		0.10
01-Dec-1999 13:50:00	886.72	29.67					0.19	8.16		0.11
01-Dec-1999 13:51:00	886.72	29.67					0.19	8.16		0.11
01-Dec-1999 13:52:00	886.72	29.67					0.19	8.16		0.11
01-Dec-1999 13:53:00	886.72	29.67					0.19	8.16		0.11
01-Dec-1999 13:54:00	886.72	29.67					0.19	8.16		0.11

Appendix 24: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 15129)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R14E-sec 6bbb
OWRD Well Log ID Number: KLAM 15129
Measuring Point: concrete pad
Measuring Tool: steel tape and riser tube
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: 6,045 feet
Owner Well Name/Number: flowing well
Measuring Pt. = 0.46 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 50% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
01-Dec-1999 13:55:00	886.72	29.67					0.19	8.17		0.12
01-Dec-1999 13:56:00	886.72	29.67					0.19	8.17		0.12
01-Dec-1999 13:57:00	886.72	29.67					0.19	8.17		0.12
01-Dec-1999 13:58:00	886.72	29.67					0.19	8.17		0.12
01-Dec-1999 13:59:00	886.72	29.67					0.19	8.17		0.12
01-Dec-1999 14:00:00	886.72	29.67					0.19	8.18		0.13
01-Dec-1999 14:02:00	886.72	29.67					0.19	8.18		0.13
01-Dec-1999 14:04:00	886.72	29.67					0.19	8.18		0.13
01-Dec-1999 14:06:00	886.48	29.66					0.18	8.17		0.12
01-Dec-1999 14:08:00	886.48	29.66					0.18	8.18		0.13
01-Dec-1999 14:10:00	886.48	29.66					0.18	8.18		0.13
01-Dec-1999 14:12:00	886.48	29.66					0.18	8.18		0.13
01-Dec-1999 14:14:00	886.48	29.66					0.18	8.18		0.13
01-Dec-1999 14:16:00	886.48	29.66					0.18	8.18		0.13
01-Dec-1999 14:18:00	886.48	29.66					0.18	8.19		0.14
01-Dec-1999 14:20:00	886.48	29.66					0.18	8.19		0.14
01-Dec-1999 14:22:00	886.48	29.66					0.18	8.19		0.14
01-Dec-1999 14:24:00	886.48	29.66					0.18	8.19		0.14
01-Dec-1999 14:26:00	886.48	29.66					0.18	8.19		0.14
01-Dec-1999 14:28:00	886.48	29.66					0.18	8.19		0.14
01-Dec-1999 14:30:00	886.48	29.66					0.18	8.20		0.15
01-Dec-1999 14:35:00	886.72	29.67					0.19	8.21		0.16
01-Dec-1999 14:40:00	886.48	29.66					0.18	8.20		0.15
01-Dec-1999 14:45:00	886.48	29.66					0.18	8.20		0.15
01-Dec-1999 14:50:00	886.48	29.66					0.18	8.20		0.15
01-Dec-1999 14:55:00	886.48	29.66					0.18	8.20		0.15
01-Dec-1999 15:00:00	886.48	29.66					0.18	8.20		0.15
01-Dec-1999 15:05:00	886.48	29.66					0.18	8.20		0.15
01-Dec-1999 15:10:00	886.48	29.66					0.18	8.21		0.16
01-Dec-1999 15:15:00	886.48	29.66					0.18	8.21		0.16
01-Dec-1999 15:20:00	886.48	29.66					0.18	8.21		0.16
01-Dec-1999 15:25:00	886.48	29.66					0.18	8.21		0.16

Appendix 24: South Langell Valley 1999 OWRD aquifer test, observation well data (KLAM 15129)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R14E-sec 6bbb
OWRD Well Log ID Number: KLAM 15129
Measuring Point: concrete pad
Measuring Tool: steel tape and riser tube
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: 6,045 feet
Owner Well Name/Number: flowing well
Measuring Pt. = 0.46 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 50% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
01-Dec-1999 15:30:00	886.48	29.66					0.18	8.21		0.16
01-Dec-1999 15:40:00	886.72	29.67					0.19	8.22		0.17
01-Dec-1999 15:50:00	886.48	29.66					0.18	8.21		0.16
01-Dec-1999 16:00:00	886.48	29.66					0.18	8.22		0.17
01-Dec-1999 16:10:00	886.48	29.66					0.18	8.22		0.17
01-Dec-1999 16:20:00	886.72	29.67					0.19	8.23		0.18
01-Dec-1999 16:30:00	886.48	29.66					0.18	8.22		0.17
01-Dec-1999 16:45:00	886.24	29.65					0.18	8.23		0.18
01-Dec-1999 17:00:00	886.48	29.66					0.18	8.23		0.18
01-Dec-1999 17:15:00	886.48	29.66					0.18	8.23		0.18
01-Dec-1999 17:30:00	886.24	29.65					0.18	8.23		0.18
01-Dec-1999 17:50:00	886.24	29.65					0.18	8.23		0.18
01-Dec-1999 18:10:00	886.24	29.65			**WL Difference**		0.18	8.23		0.18
01-Dec-1999 18:30:00	886.24	29.65			**from 12/02/99**		0.18	8.23		0.18
01-Dec-1999 19:00:00	886.01	29.65			**at 09:46:00**		0.17	8.22		0.17
01-Dec-1999 19:30:00	885.77	29.64			**(feet water)**		0.16	8.23		0.18
02-Dec-1999 09:46:00	880.50	29.46	0.00	0.00	0.00		-0.02	8.30		0.25
02-Dec-1999 10:40:00	881.46	29.49	0.96	0.03	-0.01	-0.3113	0.02	8.31		0.26
02-Dec-1999 11:44:00	881.70	29.50	1.20	0.04	-0.02	-0.4981	0.02	8.30		0.25
02-Dec-1999 12:42:00	882.89	29.54	2.39	0.08	-0.03	-0.3751	0.06	8.31		0.26
02-Dec-1999 13:41:00	883.37	29.56	2.87	0.10	-0.04	-0.4165	0.08	8.31		0.26

Appendix 25: South Langell Valley 1999 OWRD aquifer test, observation well data (domestic sedimentary well)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: none
Measuring Point: top of sanitary seal bolt hole
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: about 50 feet
Owner Well Name/Number: domestic well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
30-Nov-1999 06:00:00											
30-Nov-1999 10:04:00	8.67	0.71	7.96								
30-Nov-1999 10:18:00	8.64	0.71	7.93								
30-Nov-1999 13:07:00	8.62	0.71	7.91								
30-Nov-1999 13:25:00	8.61	0.71	7.90								
30-Nov-1999 13:30:00	8.61	0.71	7.90	**Start Test, Pumping Well On**	0.00	0.0000				0.00	
30-Nov-1999 13:31:00	8.61	0.71	7.90		1.00	0.0007				0.00	
30-Nov-1999 13:32:00	8.61	0.71	7.90		2.00	0.0014				0.00	
30-Nov-1999 13:33:00	8.61	0.71	7.90		3.00	0.0021				0.00	
30-Nov-1999 13:34:00	8.61	0.71	7.90		4.00	0.0028				0.00	
30-Nov-1999 13:35:00	8.61	0.71	7.90		5.00	0.0035				0.00	
30-Nov-1999 13:36:00	8.61	0.71	7.90		6.00	0.0042				0.00	
30-Nov-1999 13:37:00	8.60	0.71	7.89		7.00	0.0049				-0.01	
30-Nov-1999 13:38:00	8.60	0.71	7.89		8.00	0.0056				-0.01	
30-Nov-1999 13:39:00	8.60	0.71	7.89		9.00	0.0062				-0.01	
30-Nov-1999 13:40:00	8.60	0.71	7.89		10.00	0.0069				-0.01	
30-Nov-1999 13:41:00	8.60	0.71	7.89		11.00	0.0076				-0.01	
30-Nov-1999 13:42:00	8.60	0.71	7.89		12.00	0.0083				-0.01	
30-Nov-1999 13:43:00	8.60	0.71	7.89		13.00	0.0090				-0.01	
30-Nov-1999 13:44:00	8.60	0.71	7.89		14.00	0.0097				-0.01	
30-Nov-1999 13:45:00	8.60	0.71	7.89		15.00	0.0104				-0.01	
30-Nov-1999 13:46:00	8.60	0.71	7.89		16.00	0.0111				-0.01	
30-Nov-1999 13:47:00	8.60	0.71	7.89		17.00	0.0118				-0.01	
30-Nov-1999 13:48:00	8.60	0.71	7.89		18.00	0.0125				-0.01	
30-Nov-1999 13:49:00	8.59	0.71	7.88		19.00	0.0132				-0.02	
30-Nov-1999 13:50:00	8.59	0.71	7.88		20.00	0.0139				-0.02	
30-Nov-1999 13:51:00	8.59	0.71	7.88		21.00	0.0146				-0.02	
30-Nov-1999 13:52:00	8.59	0.71	7.88		22.00	0.0153				-0.02	
30-Nov-1999 13:53:00	8.59	0.71	7.88		23.00	0.0160				-0.02	
30-Nov-1999 13:54:00	8.59	0.71	7.88		24.00	0.0167				-0.02	
30-Nov-1999 13:55:00	8.59	0.71	7.88		25.00	0.0174				-0.02	
30-Nov-1999 13:56:00	8.59	0.71	7.88		26.00	0.0181				-0.02	

Appendix 25: South Langell Valley 1999 OWRD aquifer test, observation well data (domestic sedimentary well)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: none
Measuring Point: top of sanitary seal bolt hole
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: about 50 feet
Owner Well Name/Number: domestic well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
30-Nov-1999 13:57:00	8.60	0.71	7.89		27.00	0.0188				-0.01	
30-Nov-1999 13:58:00	8.60	0.71	7.89		28.00	0.0194				-0.01	
30-Nov-1999 13:59:00	8.60	0.71	7.89		29.00	0.0201				-0.01	
30-Nov-1999 14:00:00	8.60	0.71	7.89		30.00	0.0208				-0.01	
30-Nov-1999 14:04:00	8.60	0.71	7.89		34.00	0.0236				-0.01	
30-Nov-1999 14:06:00	8.60	0.71	7.89		36.00	0.0250				-0.01	
30-Nov-1999 14:08:00	8.60	0.71	7.89		38.00	0.0264				-0.01	
30-Nov-1999 14:10:00	8.60	0.71	7.89		40.00	0.0278				-0.01	
30-Nov-1999 14:12:00	8.60	0.71	7.89		42.00	0.0292				-0.01	
30-Nov-1999 14:14:00	8.60	0.71	7.89		44.00	0.0306				-0.01	
30-Nov-1999 14:16:00	8.60	0.71	7.89		46.00	0.0319				-0.01	
30-Nov-1999 14:18:00	8.60	0.71	7.89		48.00	0.0333				-0.01	
30-Nov-1999 14:20:00	8.60	0.71	7.89		50.00	0.0347				-0.01	
30-Nov-1999 14:22:00	8.60	0.71	7.89		52.00	0.0361				-0.01	
30-Nov-1999 14:24:00	8.60	0.71	7.89		54.00	0.0375				-0.01	
30-Nov-1999 14:26:00	8.60	0.71	7.89		56.00	0.0389				-0.01	
30-Nov-1999 14:28:00	8.60	0.71	7.89		58.00	0.0403				-0.01	
30-Nov-1999 14:30:00	8.60	0.71	7.89		60.00	0.0417				-0.01	
30-Nov-1999 14:35:00	8.60	0.71	7.89		65.00	0.0451				-0.01	
30-Nov-1999 14:40:00	8.60	0.71	7.89		70.00	0.0486				-0.01	
30-Nov-1999 14:45:00	8.60	0.71	7.89		75.00	0.0521				-0.01	
30-Nov-1999 14:50:00	8.60	0.71	7.89		80.00	0.0556				-0.01	
30-Nov-1999 14:55:00	8.60	0.71	7.89		85.00	0.0590				-0.01	
30-Nov-1999 15:00:00	8.59	0.71	7.88		90.00	0.0625				-0.02	
30-Nov-1999 15:05:00	8.59	0.71	7.88		95.00	0.0660				-0.02	
30-Nov-1999 15:10:00	8.59	0.71	7.88	Power off at pumping well from	100.00	0.0694				-0.02	
30-Nov-1999 15:15:00	8.59	0.71	7.88	15:13 to 15:16	105.00	0.0729				-0.02	
30-Nov-1999 15:20:00	8.59	0.71	7.88		110.00	0.0764				-0.02	
30-Nov-1999 15:25:00	8.59	0.71	7.88		115.00	0.0799				-0.02	
30-Nov-1999 15:30:00	8.59	0.71	7.88		120.00	0.0833				-0.02	
30-Nov-1999 15:40:00	8.59	0.71	7.88		130.00	0.0903				-0.02	
30-Nov-1999 15:50:00	8.59	0.71	7.88		140.00	0.0972				-0.02	

Appendix 25: South Langell Valley 1999 OWRD aquifer test, observation well data (domestic sedimentary well)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: none
Measuring Point: top of sanitary seal bolt hole
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: about 50 feet
Owner Well Name/Number: domestic well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
30-Nov-1999 16:00:00	8.58	0.71	7.87		150.00	0.1042				-0.03	
30-Nov-1999 16:10:00	8.58	0.71	7.87		160.00	0.1111				-0.03	
30-Nov-1999 16:20:00	8.58	0.71	7.87		170.00	0.1181				-0.03	
30-Nov-1999 16:30:00	8.57	0.71	7.86		180.00	0.1250				-0.04	
30-Nov-1999 16:45:00	8.57	0.71	7.86		195.00	0.1354				-0.04	
30-Nov-1999 17:00:00	8.57	0.71	7.86		210.00	0.1458				-0.04	
30-Nov-1999 17:15:00	8.57	0.71	7.86		225.00	0.1563				-0.04	
30-Nov-1999 17:30:00	8.57	0.71	7.86		240.00	0.1667				-0.04	
30-Nov-1999 17:50:00	8.57	0.71	7.86		260.00	0.1806				-0.04	
30-Nov-1999 18:10:00	8.57	0.71	7.86		280.00	0.1944				-0.04	
30-Nov-1999 18:30:00	8.58	0.71	7.87		300.00	0.2083				-0.03	
30-Nov-1999 19:00:00	8.58	0.71	7.87		330.00	0.2292				-0.03	
30-Nov-1999 19:30:00	8.58	0.71	7.87		360.00	0.2500				-0.03	
30-Nov-1999 20:35:00	8.58	0.71	7.87		425.00	0.2951				-0.03	
30-Nov-1999 21:36:00	8.58	0.71	7.87		486.00	0.3375				-0.03	
30-Nov-1999 22:54:00	8.57	0.71	7.86		564.00	0.3917				-0.04	
30-Nov-1999 23:35:00	8.56	0.71	7.85		605.00	0.4201				-0.05	
01-Dec-1999 00:35:00	8.55	0.71	7.84		665.00	0.4618				-0.06	
01-Dec-1999 01:35:00	8.54	0.71	7.83		725.00	0.5035				-0.07	
01-Dec-1999 02:35:00	8.53	0.71	7.82		785.00	0.5451				-0.08	
01-Dec-1999 03:35:00	8.54	0.71	7.83		845.00	0.5868				-0.07	
01-Dec-1999 04:36:00	8.54	0.71	7.83		906.00	0.6292				-0.07	
01-Dec-1999 05:36:00	8.53	0.71	7.82		966.00	0.6708				-0.08	
01-Dec-1999 06:35:00	8.53	0.71	7.82		1,025.00	0.7118				-0.08	
01-Dec-1999 07:35:00	8.54	0.71	7.83		1,085.00	0.7535				-0.07	
01-Dec-1999 08:36:00	8.55	0.71	7.84		1,146.00	0.7958				-0.06	
01-Dec-1999 09:35:00	8.55	0.71	7.84		1,205.00	0.8368				-0.06	
01-Dec-1999 10:36:00	8.56	0.71	7.85		1,266.00	0.8792				-0.05	
01-Dec-1999 11:36:00	8.56	0.71	7.85		1,326.00	0.9208				-0.05	
01-Dec-1999 12:33:00	8.56	0.71	7.85		1,383.00	0.9604				-0.05	
01-Dec-1999 13:01:00	8.56	0.71	7.85		1,411.00	0.9799				-0.05	
01-Dec-1999 13:15:00	8.56	0.71	7.85		1,425.00	0.9896				-0.05	

Appendix 25: South Langell Valley 1999 OWRD aquifer test, observation well data (domestic sedimentary well)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: none
Measuring Point: top of sanitary seal bolt hole
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: about 50 feet
Owner Well Name/Number: domestic well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
01-Dec-1999 13:26:00	8.56	0.71	7.85		1,436.00	0.9972				-0.05	
01-Dec-1999 13:31:00	8.56	0.71	7.85	**Pump Well off at 13:30, Start**	1,441.00	1.0007	1.00	0.0007	1,441.0000	-0.05	0.00
01-Dec-1999 13:32:00	8.56	0.71	7.85	**Recovery Phase**	1,442.00	1.0014	2.00	0.0014	721.0000		0.00
01-Dec-1999 13:33:00	8.56	0.71	7.85		1,443.00	1.0021	3.00	0.0021	481.0000		0.00
01-Dec-1999 13:34:00	8.56	0.71	7.85		1,444.00	1.0028	4.00	0.0028	361.0000		0.00
01-Dec-1999 13:35:00	8.56	0.71	7.85		1,445.00	1.0035	5.00	0.0035	289.0000		0.00
01-Dec-1999 13:36:00	8.56	0.71	7.85		1,446.00	1.0042	6.00	0.0042	241.0000		0.00
01-Dec-1999 13:37:00	8.56	0.71	7.85		1,447.00	1.0049	7.00	0.0049	206.7143		0.00
01-Dec-1999 13:38:00	8.56	0.71	7.85		1,448.00	1.0056	8.00	0.0056	181.0000		0.00
01-Dec-1999 13:39:00	8.56	0.71	7.85		1,449.00	1.0062	9.00	0.0062	161.0000		0.00
01-Dec-1999 13:40:00	8.56	0.71	7.85		1,450.00	1.0069	10.00	0.0069	145.0000		0.00
01-Dec-1999 13:41:00	8.56	0.71	7.85		1,451.00	1.0076	11.00	0.0076	131.9091		0.00
01-Dec-1999 13:42:00	8.56	0.71	7.85		1,452.00	1.0083	12.00	0.0083	121.0000		0.00
01-Dec-1999 13:43:00	8.56	0.71	7.85		1,453.00	1.0090	13.00	0.0090	111.7692		0.00
01-Dec-1999 13:44:00	8.56	0.71	7.85		1,454.00	1.0097	14.00	0.0097	103.8571		0.00
01-Dec-1999 13:45:00	8.56	0.71	7.85		1,455.00	1.0104	15.00	0.0104	97.0000		0.00
01-Dec-1999 13:46:00	8.56	0.71	7.85		1,456.00	1.0111	16.00	0.0111	91.0000		0.00
01-Dec-1999 13:47:00	8.56	0.71	7.85		1,457.00	1.0118	17.00	0.0118	85.7059		0.00
01-Dec-1999 13:48:00	8.56	0.71	7.85		1,458.00	1.0125	18.00	0.0125	81.0000		0.00
01-Dec-1999 13:49:00	8.56	0.71	7.85		1,459.00	1.0132	19.00	0.0132	76.7895		0.00
01-Dec-1999 13:50:00	8.56	0.71	7.85		1,460.00	1.0139	20.00	0.0139	73.0000		0.00
01-Dec-1999 13:51:00	8.56	0.71	7.85		1,461.00	1.0146	21.00	0.0146	69.5714		0.00
01-Dec-1999 13:52:00	8.56	0.71	7.85		1,462.00	1.0153	22.00	0.0153	66.4545		0.00
01-Dec-1999 13:53:00	8.56	0.71	7.85		1,463.00	1.0160	23.00	0.0160	63.6087		0.00
01-Dec-1999 13:54:00	8.56	0.71	7.85		1,464.00	1.0167	24.00	0.0167	61.0000		0.00
01-Dec-1999 13:05:00	8.56	0.71	7.85		1,415.00	0.9826	-25.00	-0.0174	-56.6000		0.00
01-Dec-1999 13:56:00	8.56	0.71	7.85		1,466.00	1.0181	26.00	0.0181	56.3846		0.00
01-Dec-1999 13:57:00	8.56	0.71	7.85		1,467.00	1.0188	27.00	0.0188	54.3333		0.00
01-Dec-1999 13:58:00	8.56	0.71	7.85		1,468.00	1.0194	28.00	0.0194	52.4286		0.00
01-Dec-1999 13:59:00	8.56	0.71	7.85		1,469.00	1.0201	29.00	0.0201	50.6552		0.00
01-Dec-1999 14:00:00	8.56	0.71	7.85		1,470.00	1.0208	30.00	0.0208	49.0000		0.00
01-Dec-1999 14:02:00	8.56	0.71	7.85		1,472.00	1.0222	32.00	0.0222	46.0000		0.00

Appendix 25: South Langell Valley 1999 OWRD aquifer test, observation well data (domestic sedimentary well)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: none
Measuring Point: top of sanitary seal bolt hole
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: about 50 feet
Owner Well Name/Number: domestic well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
01-Dec-1999 14:04:00	8.56	0.71	7.85		1,474.00	1.0236	34.00	0.0236	43.3529		0.00
01-Dec-1999 14:06:00	8.56	0.71	7.85		1,476.00	1.0250	36.00	0.0250	41.0000		0.00
01-Dec-1999 14:08:00	8.56	0.71	7.85		1,478.00	1.0264	38.00	0.0264	38.8947		0.00
01-Dec-1999 14:10:00	8.56	0.71	7.85		1,480.00	1.0278	40.00	0.0278	37.0000		0.00
01-Dec-1999 14:12:00	8.56	0.71	7.85		1,482.00	1.0292	42.00	0.0292	35.2857		0.00
01-Dec-1999 14:14:00	8.56	0.71	7.85		1,484.00	1.0306	44.00	0.0306	33.7273		0.00
01-Dec-1999 14:16:00	8.56	0.71	7.85		1,486.00	1.0319	46.00	0.0319	32.3043		0.00
01-Dec-1999 14:18:00	8.56	0.71	7.85		1,488.00	1.0333	48.00	0.0333	31.0000		0.00
01-Dec-1999 14:20:00	8.56	0.71	7.85		1,490.00	1.0347	50.00	0.0347	29.8000		0.00
01-Dec-1999 14:22:00	8.56	0.71	7.85		1,492.00	1.0361	52.00	0.0361	28.6923		0.00
01-Dec-1999 14:24:00	8.56	0.71	7.85		1,494.00	1.0375	54.00	0.0375	27.6667		0.00
01-Dec-1999 14:26:00	8.56	0.71	7.85		1,496.00	1.0389	56.00	0.0389	26.7143		0.00
01-Dec-1999 14:28:00	8.56	0.71	7.85		1,498.00	1.0403	58.00	0.0403	25.8276		0.00
01-Dec-1999 14:30:00	8.56	0.71	7.85		1,500.00	1.0417	60.00	0.0417	25.0000		0.00
01-Dec-1999 14:35:00	8.56	0.71	7.85		1,505.00	1.0451	65.00	0.0451	23.1538		0.00
01-Dec-1999 14:40:00	8.56	0.71	7.85		1,510.00	1.0486	70.00	0.0486	21.5714		0.00
01-Dec-1999 14:45:00	8.56	0.71	7.85		1,515.00	1.0521	75.00	0.0521	20.2000		0.00
01-Dec-1999 14:50:00	8.56	0.71	7.85		1,520.00	1.0556	80.00	0.0556	19.0000		0.00
01-Dec-1999 14:55:00	8.56	0.71	7.85		1,525.00	1.0590	85.00	0.0590	17.9412		0.00
01-Dec-1999 15:00:00	8.56	0.71	7.85		1,530.00	1.0625	90.00	0.0625	17.0000		0.00
01-Dec-1999 15:05:00	8.56	0.71	7.85		1,535.00	1.0660	95.00	0.0660	16.1579		0.00
01-Dec-1999 15:10:00	8.56	0.71	7.85		1,540.00	1.0694	100.00	0.0694	15.4000		0.00
01-Dec-1999 15:15:00	8.56	0.71	7.85		1,545.00	1.0729	105.00	0.0729	14.7143		0.00
01-Dec-1999 15:20:00	8.56	0.71	7.85		1,550.00	1.0764	110.00	0.0764	14.0909		0.00
01-Dec-1999 15:25:00	8.56	0.71	7.85		1,555.00	1.0799	115.00	0.0799	13.5217		0.00
01-Dec-1999 15:30:00	8.56	0.71	7.85		1,560.00	1.0833	120.00	0.0833	13.0000		0.00
01-Dec-1999 15:40:00	8.56	0.71	7.85		1,570.00	1.0903	130.00	0.0903	12.0769		0.00
01-Dec-1999 15:50:00	8.57	0.71	7.86		1,580.00	1.0972	140.00	0.0972	11.2857		-0.01
01-Dec-1999 16:00:00	8.57	0.71	7.86		1,590.00	1.1042	150.00	0.1042	10.6000		-0.01
01-Dec-1999 16:10:00	8.57	0.71	7.86		1,600.00	1.1111	160.00	0.1111	10.0000		-0.01
01-Dec-1999 16:20:00	8.58	0.71	7.87		1,610.00	1.1181	170.00	0.1181	9.4706		-0.02
01-Dec-1999 16:30:00	8.58	0.71	7.87		1,620.00	1.1250	180.00	0.1250	9.0000		-0.02

Appendix 25: South Langell Valley 1999 OWRD aquifer test, observation well data (domestic sedimentary well)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: none
Measuring Point: top of sanitary seal bolt hole
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: about 50 feet
Owner Well Name/Number: domestic well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
01-Dec-1999 16:45:00	8.58	0.71	7.87		1,635.00	1.1354	195.00	0.1354	8.3846		-0.02
01-Dec-1999 17:00:00	8.58	0.71	7.87		1,650.00	1.1458	210.00	0.1458	7.8571		-0.02
01-Dec-1999 17:15:00	8.58	0.71	7.87		1,665.00	1.1563	225.00	0.1563	7.4000		-0.02
01-Dec-1999 17:30:00	8.58	0.71	7.87		1,680.00	1.1667	240.00	0.1667	7.0000		-0.02
01-Dec-1999 17:50:00	8.58	0.71	7.87		1,700.00	1.1806	260.00	0.1806	6.5385		-0.02
01-Dec-1999 18:10:00	8.58	0.71	7.87		1,720.00	1.1944	280.00	0.1944	6.1429		-0.02
01-Dec-1999 18:30:00	8.58	0.71	7.87		1,740.00	1.2083	300.00	0.2083	5.8000		-0.02
01-Dec-1999 19:00:00	8.58	0.71	7.87		1,770.00	1.2292	330.00	0.2292	5.3636		-0.02
01-Dec-1999 19:30:00	8.57	0.71	7.86	GHG retired for night, exhaustion	1,800.00	1.2500	360.00	0.2500	5.0000		-0.01
02-Dec-1999 09:43:00	8.49	0.71	7.78		2,653.00	1.8424	1,213.00	0.8424	2.1871		0.07
02-Dec-1999 10:32:00	8.49	0.71	7.78		2,702.00	1.8764	1,262.00	0.8764	2.1410		0.07
02-Dec-1999 11:34:00	8.50	0.71	7.79		2,764.00	1.9194	1,324.00	0.9194	2.0876		0.06
02-Dec-1999 12:33:00	8.51	0.71	7.80		2,823.00	1.9604	1,383.00	0.9604	2.0412		0.05
02-Dec-1999 13:33:00	8.51	0.71	7.80	**End of Test**	2,883.00	2.0021	1,443.00	1.0021	1.9979		0.05

Appendix 25: South Langell Valley 1999 OWRD aquifer test, observation well data (domestic sedimentary well)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: none
Measuring Point: top of sanitary seal bolt hole
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: about 50 feet
Owner Well Name/Number: domestic well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 30% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
30-Nov-1999 06:00:00	880.98	29.48								
30-Nov-1999 10:04:00	881.70	29.50	2.88	0.10	0.06	0.6226	0.02	7.95		
30-Nov-1999 10:18:00	881.46	29.49	2.64	0.09	0.03	0.3396	0.02	7.93		
30-Nov-1999 13:07:00	879.30	29.42	0.48	0.02	0.01	0.6226	-0.06	7.93		
30-Nov-1999 13:25:00	878.82	29.41	0.00	0.00	0.00		-0.07	7.92		
30-Nov-1999 13:30:00	878.82	29.41	0.00	0.00	0.00		-0.07	7.92		
30-Nov-1999 13:31:00	878.82	29.41					-0.07	7.92		
30-Nov-1999 13:32:00	878.82	29.41					-0.07	7.92		
30-Nov-1999 13:33:00	878.82	29.41					-0.07	7.92		
30-Nov-1999 13:34:00	878.82	29.41					-0.07	7.92		
30-Nov-1999 13:35:00	878.82	29.41					-0.07	7.92		
30-Nov-1999 13:36:00	878.82	29.41					-0.07	7.92		
30-Nov-1999 13:37:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 13:38:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 13:39:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 13:40:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 13:41:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 13:42:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 13:43:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 13:44:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 13:45:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 13:46:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 13:47:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 13:48:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 13:49:00	878.58	29.40					-0.08	7.90		
30-Nov-1999 13:50:00	878.58	29.40					-0.08	7.90		
30-Nov-1999 13:51:00	878.82	29.41					-0.07	7.90		
30-Nov-1999 13:52:00	878.58	29.40					-0.08	7.90		
30-Nov-1999 13:53:00	878.82	29.41					-0.07	7.90		
30-Nov-1999 13:54:00	878.82	29.41					-0.07	7.90		
30-Nov-1999 13:55:00	878.82	29.41					-0.07	7.90		
30-Nov-1999 13:56:00	878.82	29.41					-0.07	7.90		

Appendix 25: South Langell Valley 1999 OWRD aquifer test, observation well data (domestic sedimentary well)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: none
Measuring Point: top of sanitary seal bolt hole
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: about 50 feet
Owner Well Name/Number: domestic well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 30% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
30-Nov-1999 13:57:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 13:58:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 13:59:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 14:00:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 14:04:00	878.58	29.40					-0.08	7.91		
30-Nov-1999 14:06:00	878.58	29.40					-0.08	7.91		
30-Nov-1999 14:08:00	878.58	29.40					-0.08	7.91		
30-Nov-1999 14:10:00	878.58	29.40					-0.08	7.91		
30-Nov-1999 14:12:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 14:14:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 14:16:00	878.82	29.41					-0.07	7.91		
30-Nov-1999 14:18:00	878.58	29.40					-0.08	7.91		
30-Nov-1999 14:20:00	878.58	29.40					-0.08	7.91		
30-Nov-1999 14:22:00	878.58	29.40					-0.08	7.91		
30-Nov-1999 14:24:00	878.58	29.40					-0.08	7.91		
30-Nov-1999 14:26:00	878.58	29.40					-0.08	7.91		
30-Nov-1999 14:28:00	878.58	29.40					-0.08	7.91		
30-Nov-1999 14:30:00	878.58	29.40					-0.08	7.91		
30-Nov-1999 14:35:00	878.35	29.39					-0.09	7.92		
30-Nov-1999 14:40:00	878.35	29.39					-0.09	7.92		
30-Nov-1999 14:45:00	878.35	29.39					-0.09	7.92		
30-Nov-1999 14:50:00	878.35	29.39					-0.09	7.92		
30-Nov-1999 14:55:00	878.35	29.39					-0.09	7.92		
30-Nov-1999 15:00:00	878.11	29.38					-0.10	7.91		
30-Nov-1999 15:05:00	878.11	29.38					-0.10	7.91		
30-Nov-1999 15:10:00	878.35	29.39					-0.09	7.91		
30-Nov-1999 15:15:00	878.35	29.39					-0.09	7.91		
30-Nov-1999 15:20:00	878.35	29.39					-0.09	7.91		
30-Nov-1999 15:25:00	878.11	29.38					-0.10	7.91		
30-Nov-1999 15:30:00	878.11	29.38					-0.10	7.91		
30-Nov-1999 15:40:00	878.35	29.39					-0.09	7.91		
30-Nov-1999 15:50:00	878.35	29.39					-0.09	7.91		

Appendix 25: South Langell Valley 1999 OWRD aquifer test, observation well data (domestic sedimentary well)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: none
Measuring Point: top of sanitary seal bolt hole
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: about 50 feet
Owner Well Name/Number: domestic well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 30% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
30-Nov-1999 16:00:00	878.35	29.39					-0.09	7.90		
30-Nov-1999 16:10:00	878.11	29.38					-0.10	7.90		
30-Nov-1999 16:20:00	878.11	29.38					-0.10	7.90		
30-Nov-1999 16:30:00	877.87	29.37					-0.10	7.89		
30-Nov-1999 16:45:00	877.87	29.37					-0.10	7.89		
30-Nov-1999 17:00:00	877.87	29.37					-0.10	7.89		
30-Nov-1999 17:15:00	878.11	29.38					-0.10	7.89		
30-Nov-1999 17:30:00	878.11	29.38					-0.10	7.89		
30-Nov-1999 17:50:00	878.11	29.38					-0.10	7.89		
30-Nov-1999 18:10:00	878.11	29.38					-0.10	7.89		
30-Nov-1999 18:30:00	878.11	29.38					-0.10	7.90		
30-Nov-1999 19:00:00	878.58	29.40					-0.08	7.89		
30-Nov-1999 19:30:00	878.58	29.40					-0.08	7.89		
30-Nov-1999 20:35:00	879.30	29.42					-0.06	7.89		
30-Nov-1999 21:36:00	880.02	29.45					-0.03	7.88		
30-Nov-1999 22:54:00	880.98	29.48					0.00	7.86		
30-Nov-1999 23:35:00	881.46	29.49					0.02	7.85		
01-Dec-1999 00:35:00	882.18	29.52					0.04	7.83		
01-Dec-1999 01:35:00	882.41	29.53					0.05	7.82		
01-Dec-1999 02:35:00	882.89	29.54					0.06	7.80		
01-Dec-1999 03:35:00	883.13	29.55					0.07	7.81		
01-Dec-1999 04:36:00	883.61	29.57					0.09	7.80		
01-Dec-1999 05:36:00	884.33	29.59					0.11	7.79		
01-Dec-1999 06:35:00	885.29	29.62					0.14	7.78		
01-Dec-1999 07:35:00	886.01	29.65					0.17	7.78		
01-Dec-1999 08:36:00	886.48	29.66					0.18	7.78		
01-Dec-1999 09:35:00	887.44	29.69					0.22	7.78		
01-Dec-1999 10:36:00	887.92	29.71					0.23	7.78		
01-Dec-1999 11:36:00	887.44	29.69					0.22	7.79		
01-Dec-1999 12:33:00	886.96	29.68					0.20	7.79		
01-Dec-1999 13:01:00	886.96	29.68					0.20	7.79		
01-Dec-1999 13:15:00	887.20	29.69					0.21	7.79		

Appendix 25: South Langell Valley 1999 OWRD aquifer test, observation well data (domestic sedimentary well)

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Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: none
Measuring Point: top of sanitary seal bolt hole
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: about 50 feet
Owner Well Name/Number: domestic well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 30% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
01-Dec-1999 13:26:00	887.20	29.69					0.21	7.79		
01-Dec-1999 13:31:00	887.20	29.69					0.21	7.79		
01-Dec-1999 13:32:00	886.96	29.68					0.20	7.79		
01-Dec-1999 13:33:00	886.96	29.68					0.20	7.79		
01-Dec-1999 13:34:00	886.96	29.68					0.20	7.79		
01-Dec-1999 13:35:00	886.96	29.68					0.20	7.79		
01-Dec-1999 13:36:00	886.96	29.68					0.20	7.79		
01-Dec-1999 13:37:00	886.96	29.68					0.20	7.79		
01-Dec-1999 13:38:00	886.96	29.68					0.20	7.79		
01-Dec-1999 13:39:00	886.96	29.68					0.20	7.79		
01-Dec-1999 13:40:00	886.96	29.68					0.20	7.79		
01-Dec-1999 13:41:00	886.96	29.68					0.20	7.79		
01-Dec-1999 13:42:00	886.96	29.68					0.20	7.79		
01-Dec-1999 13:43:00	886.96	29.68					0.20	7.79		
01-Dec-1999 13:44:00	886.96	29.68					0.20	7.79		
01-Dec-1999 13:45:00	886.72	29.67					0.19	7.79		
01-Dec-1999 13:46:00	886.72	29.67					0.19	7.79		
01-Dec-1999 13:47:00	886.72	29.67					0.19	7.79		
01-Dec-1999 13:48:00	886.72	29.67					0.19	7.79		
01-Dec-1999 13:49:00	886.72	29.67					0.19	7.79		
01-Dec-1999 13:50:00	886.72	29.67					0.19	7.79		
01-Dec-1999 13:51:00	886.72	29.67					0.19	7.79		
01-Dec-1999 13:52:00	886.72	29.67					0.19	7.79		
01-Dec-1999 13:53:00	886.72	29.67					0.19	7.79		
01-Dec-1999 13:54:00	886.72	29.67					0.19	7.79		
01-Dec-1999 13:05:00	886.72	29.67					0.19	7.79		
01-Dec-1999 13:56:00	886.72	29.67					0.19	7.79		
01-Dec-1999 13:57:00	886.72	29.67					0.19	7.79		
01-Dec-1999 13:58:00	886.72	29.67					0.19	7.79		
01-Dec-1999 13:59:00	886.72	29.67					0.19	7.79		
01-Dec-1999 14:00:00	886.72	29.67					0.19	7.79		
01-Dec-1999 14:02:00	886.72	29.67					0.19	7.79		

Appendix 25: South Langell Valley 1999 OWRD aquifer test, observation well data (domestic sedimentary well)

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Measuring Point: top of sanitary seal bolt hole
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: about 50 feet
Owner Well Name/Number: domestic well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 30% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
01-Dec-1999 14:04:00	886.72	29.67					0.19	7.79		
01-Dec-1999 14:06:00	886.48	29.66					0.18	7.79		
01-Dec-1999 14:08:00	886.48	29.66					0.18	7.79		
01-Dec-1999 14:10:00	886.48	29.66					0.18	7.79		
01-Dec-1999 14:12:00	886.48	29.66					0.18	7.79		
01-Dec-1999 14:14:00	886.48	29.66					0.18	7.79		
01-Dec-1999 14:16:00	886.48	29.66					0.18	7.79		
01-Dec-1999 14:18:00	886.48	29.66					0.18	7.79		
01-Dec-1999 14:20:00	886.48	29.66					0.18	7.79		
01-Dec-1999 14:22:00	886.48	29.66					0.18	7.79		
01-Dec-1999 14:24:00	886.48	29.66					0.18	7.79		
01-Dec-1999 14:26:00	886.48	29.66					0.18	7.79		
01-Dec-1999 14:28:00	886.48	29.66					0.18	7.79		
01-Dec-1999 14:30:00	886.48	29.66					0.18	7.79		
01-Dec-1999 14:35:00	886.72	29.67					0.19	7.79		
01-Dec-1999 14:40:00	886.48	29.66					0.18	7.79		
01-Dec-1999 14:45:00	886.48	29.66					0.18	7.79		
01-Dec-1999 14:50:00	886.48	29.66					0.18	7.79		
01-Dec-1999 14:55:00	886.48	29.66					0.18	7.79		
01-Dec-1999 15:00:00	886.48	29.66					0.18	7.79		
01-Dec-1999 15:05:00	886.48	29.66					0.18	7.79		
01-Dec-1999 15:10:00	886.48	29.66					0.18	7.79		
01-Dec-1999 15:15:00	886.48	29.66					0.18	7.79		
01-Dec-1999 15:20:00	886.48	29.66					0.18	7.79		
01-Dec-1999 15:25:00	886.48	29.66					0.18	7.79		
01-Dec-1999 15:30:00	886.48	29.66					0.18	7.79		
01-Dec-1999 15:40:00	886.72	29.67					0.19	7.79		
01-Dec-1999 15:50:00	886.48	29.66					0.18	7.80		
01-Dec-1999 16:00:00	886.48	29.66					0.18	7.80		
01-Dec-1999 16:10:00	886.48	29.66					0.18	7.80		
01-Dec-1999 16:20:00	886.72	29.67					0.19	7.81		
01-Dec-1999 16:30:00	886.48	29.66					0.18	7.81		

Appendix 25: South Langell Valley 1999 OWRD aquifer test, observation well data (domestic sedimentary well)

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Water Level Measurements
Well Use for Test: Observation Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: none
Measuring Point: top of sanitary seal bolt hole
Measuring Tool: e-tape
Power Meter: Start = 000 kwh **End =** 635 kwh

Distance to Pumping Well: about 50 feet
Owner Well Name/Number: domestic well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometer Difference from 11/30/99 at 13:30:00 (h Pascals)	Barometer Difference from 11/30/99 at 13:30:00 (feet water)	WL Difference from 11/30/99 at 13:30:00 (feet water)	Ratio WL Diff vs Baro Diff	Cummulative Barometric Change (feet)	Adjusted Water Level 30% of Baro (ft blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
01-Dec-1999 16:45:00	886.24	29.65					0.18	7.82		
01-Dec-1999 17:00:00	886.48	29.66					0.18	7.81		
01-Dec-1999 17:15:00	886.48	29.66					0.18	7.81		
01-Dec-1999 17:30:00	886.24	29.65					0.18	7.82		
01-Dec-1999 17:50:00	886.24	29.65					0.18	7.82		
01-Dec-1999 18:10:00	886.24	29.65			**WL Difference**		0.18	7.82		
01-Dec-1999 18:30:00	886.24	29.65			**from 12/02/99**		0.18	7.82		
01-Dec-1999 19:00:00	886.01	29.65			**at 13:33:00**		0.17	7.82		
01-Dec-1999 19:30:00	885.77	29.64			**(feet water)**		0.16	7.81		
02-Dec-1999 09:43:00	880.50	29.46	-2.63	-0.09	-0.02	0.2273	-0.02	7.78		
02-Dec-1999 10:32:00	881.22	29.49	-1.91	-0.06	-0.02	0.3129	0.01	7.78		
02-Dec-1999 11:34:00	881.94	29.51	-1.19	-0.04	-0.01	0.2511	0.03	7.78		
02-Dec-1999 12:33:00	882.89	29.54	-0.24	-0.01	0.00	0.0000	0.06	7.78		
02-Dec-1999 13:33:00	883.13	29.55	0.00	0.00	0.00		0.07	7.78		

Appendix 26: South Langell Valley 1999 OWRD aquifer test, discharge data

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Discharge & Power
Well Use for Test: Pumping Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: KLAM 10495
Measuring Point: angle pipe
Measuring Tool: water level by e-tape and discharge by electronic non-intrusive flow meter
Power Meter: Start = 000 kwh **End =** 635 kwh

Owner Well Name/Number: irrigation well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Time Since Pumping Started (min) (t)	Discharge Rate Reading (gpm)	Power Reading (kwh)	Interval Discharge (calculated) (gallons)	Total Discharge (calculated) (gallons)	Average Discharge Rate (gpm)	Discharge Rate (calculated) (ft3/sec)	Interval Discharge (calculated) (ft3)	Total Discharge (calculated) (ft3)	Average Discharge Rate (ft3/sec)	Discharge vs Power (gal/kwh)	Remarks
30-Nov-1999 13:30:00	0	0		0	0	0	0.0000	0.00	0.00	0.0000		
30-Nov-1999 15:31:00	121		52	239,894	239,894						4,613.35	pump off 3 min (15:13 to 15:16)
30-Nov-1999 15:44:00	134	2,033		26,429	266,323	1,987	4.5295	3,533.04	35,602.20	4.4281		
30-Nov-1999 15:45:00	135	1,984		1,984	268,307	1,987	4.4204	265.22	35,867.43	4.4281		
30-Nov-1999 15:46:00	136	2,045		2,045	270,352	1,988	4.5563	273.38	36,140.80	4.4290		
30-Nov-1999 16:00:00	150	1,996		27,944	298,296	1,989	4.4471	3,735.57	39,876.37	4.4307		
30-Nov-1999 16:11:00	161		70	21,505	319,801						4,568.59	
30-Nov-1999 16:15:00	165	1,914		7,656	327,457	1,985	4.2644	1,023.46	43,774.63	4.4217		
30-Nov-1999 16:30:00	180	1,956		29,340	356,797	1,982	4.3580	3,922.19	47,696.82	4.4164		
30-Nov-1999 16:45:00	195	2,132		31,980	388,777	1,994	4.7501	4,275.11	51,971.93	4.4420		
30-Nov-1999 17:00:00	210	2,054		30,810	419,587	1,998	4.5763	4,118.70	56,090.62	4.4516		
30-Nov-1999 17:01:00	211		92	2,074	421,661						4,583.28	
30-Nov-1999 17:15:00	225	2,095		29,330	450,992	2,004	4.6677	3,920.86	60,288.80	4.4658		
30-Nov-1999 17:30:00	240	2,037		30,555	481,547	2,006	4.5385	4,084.61	64,373.41	4.4704		
30-Nov-1999 17:33:00	243		106	6,097	487,644						4,600.42	
30-Nov-1999 17:45:00	255	2,028		24,336	511,980	2,008	4.5184	3,253.26	68,441.78	4.4733		
30-Nov-1999 18:00:00	270	1,271		19,065	531,045	1,967	2.8318	2,548.62	70,990.40	4.3821		
30-Nov-1999 18:15:00	285	2,060		30,900	561,945	1,972	4.5897	4,130.73	75,121.13	4.3930		
30-Nov-1999 18:30:00	300	2,127		31,905	593,850	1,979	4.7390	4,265.08	79,386.21	4.4103		
30-Nov-1999 18:32:00	302		132	4,100	597,950						4,529.92	
30-Nov-1999 18:45:00	315	1,973		25,649	623,599	1,980	4.3959	3,428.79	83,363.07	4.4107		
30-Nov-1999 19:00:00	330	2,106		31,590	655,189	1,985	4.6922	4,222.97	87,586.04	4.4235		
30-Nov-1999 19:15:00	345	2,036		30,540	685,729	1,988	4.5362	4,082.61	91,668.64	4.4284		
30-Nov-1999 19:30:00	360	2,137		32,055	717,784	1,994	4.7613	4,285.13	95,953.77	4.4423		
30-Nov-1999 19:32:00	362		159	4,073	721,857						4,539.98	
30-Nov-1999 19:45:00	375	1,936		25,168	747,025	1,992	4.3134	3,364.49	99,862.73	4.4383		
30-Nov-1999 20:00:00	390	2,035		30,525	777,550	1,994	4.5340	4,080.60	103,943.33	4.4420		
30-Nov-1999 20:15:00	405	1,986		29,790	807,340	1,993	4.4248	3,982.34	107,925.67	4.4414		
30-Nov-1999 20:30:00	420	2,058		30,870	838,210	1,996	4.5852	4,126.72	112,052.39	4.4465		
30-Nov-1999 20:32:00	422		185	4,126	842,336						4,553.17	
30-Nov-1999 20:45:00	435	2,068		26,884	869,220	1,998	4.6075	3,593.89	116,197.83	4.4520		
30-Nov-1999 21:00:00	450	2,107		31,605	900,825	2,002	4.6944	4,224.98	120,422.80	4.4601		
30-Nov-1999 21:15:00	465	2,028		30,420	931,245	2,003	4.5184	4,066.56	124,489.37	4.4620		

Appendix 26: South Langell Valley 1999 OWRD aquifer test, discharge data

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Discharge & Power
Well Use for Test: Pumping Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: KLAM 10495
Measuring Point: angle pipe
Measuring Tool: water level by e-tape and discharge by electronic non-intrusive flow meter
Power Meter: Start = 000 kwh **End =** 635 kwh

Owner Well Name/Number: irrigation well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Time Since Pumping Started (min) (t)	Discharge Rate Reading (gpm)	Power Reading (kwh)	Interval Discharge (calculated) (gallons)	Total Discharge (calculated) (gallons)	Average Discharge Rate (gpm)	Discharge Rate (calculated) (ft3/sec)	Interval Discharge (calculated) (ft3)	Total Discharge (calculated) (ft3)	Average Discharge Rate (ft3/sec)	Discharge vs Power (gal/kwh)	Remarks
30-Nov-1999 21:30:00	480	2,145		32,175	963,420	2,007	4.7791	4,301.17	128,790.54	4.4719		
30-Nov-1999 21:31:00	481		212	2,108	965,528						4,554.38	
30-Nov-1999 21:45:00	495	2,072		29,008	994,537	2,009	4.6164	3,877.84	132,950.21	4.4764		
30-Nov-1999 22:00:00	510	2,200		33,000	1,027,537	2,015	4.9016	4,411.46	137,361.67	4.4889		
30-Nov-1999 22:15:00	525	2,011		30,165	1,057,702	2,015	4.4805	4,032.47	141,394.14	4.4887		
30-Nov-1999 22:30:00	540	1,992		29,880	1,087,582	2,014	4.4382	3,994.38	145,388.52	4.4873		
30-Nov-1999 22:45:00	555	2,063		30,945	1,118,527	2,015	4.5964	4,136.75	149,525.27	4.4902		
30-Nov-1999 22:50:00	560		247	10,170	1,128,696						4,569.62	
30-Nov-1999 23:00:00	570	2,005		20,050	1,148,747	2,015	4.4672	2,680.33	153,565.09	4.4902		
30-Nov-1999 23:15:00	585	1,191		17,865	1,166,612	1,994	2.6536	2,388.20	155,953.30	4.4431		
30-Nov-1999 23:30:00	600	2,151		32,265	1,198,877	1,998	4.7924	4,313.20	160,266.50	4.4518		
30-Nov-1999 23:32:00	602		265	4,265	1,203,141						4,540.16	
30-Nov-1999 23:45:00	615	2,114		27,482	1,230,624	2,001	4.7100	3,673.85	164,510.46	4.4583		
01-Dec-1999 00:00:00	630	2,074		31,110	1,261,733	2,003	4.6209	4,158.76	168,669.22	4.4622		
01-Dec-1999 00:15:00	645	2,072		31,080	1,292,813	2,004	4.6164	4,154.79	172,824.01	4.4657		
01-Dec-1999 00:30:00	660	2,096		31,440	1,324,253	2,006	4.6699	4,202.92	177,026.93	4.4704		
01-Dec-1999 00:32:00	662		291	4,133	1,328,386						4,564.90	
01-Dec-1999 00:45:00	675	2,037		26,481	1,354,867	2,007	4.5385	3,540.00	181,119.43	4.4721		
01-Dec-1999 01:00:00	690	1,998		29,970	1,384,838	2,007	4.4516	4,006.41	185,125.83	4.4716		
01-Dec-1999 01:15:00	705	1,951		29,265	1,414,103	2,006	4.3468	3,912.16	189,038.00	4.4690		
01-Dec-1999 01:30:00	720	2,053		30,795	1,444,898	2,007	4.5741	4,116.69	193,154.69	4.4712		
01-Dec-1999 01:32:00	722		318	4,133	1,449,030						4,556.70	
01-Dec-1999 01:45:00	735	2,080		27,040	1,476,071	2,008	4.6343	3,614.73	197,321.92	4.4744		
01-Dec-1999 02:00:00	750	2,009		30,135	1,506,206	2,008	4.4761	4,028.46	201,350.38	4.4745		
01-Dec-1999 02:15:00	765	2,108		31,620	1,537,826	2,010	4.6966	4,226.98	205,577.36	4.4788		
01-Dec-1999 02:30:00	780	2,071		31,065	1,568,891	2,011	4.6142	4,152.79	209,730.15	4.4814		
01-Dec-1999 02:32:00	782		345	4,160	1,573,050						4,559.57	
01-Dec-1999 02:45:00	795	2,089		27,157	1,600,208	2,013	4.6543	3,630.38	213,916.62	4.4846		
01-Dec-1999 03:00:00	810	1,988		29,820	1,630,028	2,012	4.4293	3,986.36	217,902.98	4.4836		
01-Dec-1999 03:15:00	825	2,136		32,040	1,662,068	2,015	4.7590	4,283.13	222,186.10	4.4886		
01-Dec-1999 03:30:00	840	2,054		30,810	1,692,878	2,015	4.5763	4,118.70	226,304.80	4.4902		
01-Dec-1999 03:32:00	842		371	4,050	1,696,927						4,573.93	
01-Dec-1999 03:45:00	855	1,996		25,948	1,722,876	2,015	4.4471	3,468.76	230,314.95	4.4896		

Appendix 26: South Langell Valley 1999 OWRD aquifer test, discharge data

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Discharge & Power
Well Use for Test: Pumping Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: KLAM 10495
Measuring Point: angle pipe
Measuring Tool: water level by e-tape and discharge by electronic non-intrusive flow meter
Power Meter: Start = 000 kwh **End =** 635 kwh

Owner Well Name/Number: irrigation well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Time Since Pumping Started (min) (t)	Discharge Rate Reading (gpm)	Power Reading (kwh)	Interval Discharge (calculated) (gallons)	Total Discharge (calculated) (gallons)	Average Discharge Rate (gpm)	Discharge Rate (calculated) (ft3/sec)	Interval Discharge (calculated) (ft3)	Total Discharge (calculated) (ft3)	Average Discharge Rate (ft3/sec)	Discharge vs Power (gal/kwh)	Remarks
01-Dec-1999 04:00:00	870	2,066		30,990	1,753,866	2,016	4.6031	4,142.76	234,457.71	4.4915		
01-Dec-1999 04:15:00	885	1,954		29,310	1,783,176	2,015	4.3535	3,918.18	238,375.89	4.4892		
01-Dec-1999 04:30:00	900	2,081		31,215	1,814,391	2,016	4.6365	4,172.84	242,548.73	4.4916		
01-Dec-1999 04:32:00	902		398	4,144	1,818,534						4,569.18	
01-Dec-1999 04:45:00	915	2,063		26,819	1,845,354	2,017	4.5964	3,585.20	246,687.88	4.4934		
01-Dec-1999 05:00:00	930	1,983		29,745	1,875,099	2,016	4.4181	3,976.33	250,664.21	4.4922		
01-Dec-1999 05:15:00	945	2,036		30,540	1,905,639	2,017	4.5362	4,082.61	254,746.82	4.4929		
01-Dec-1999 05:30:00	960	2,136		32,040	1,937,679	2,018	4.7590	4,283.13	259,029.94	4.4970		
01-Dec-1999 05:32:00	962		424	4,210	1,941,888						4,579.93	
01-Dec-1999 05:45:00	975	2,074		26,962	1,968,851	2,019	4.6209	3,604.33	263,197.04	4.4991		
01-Dec-1999 06:00:00	990	2,020		30,300	1,999,151	2,019	4.5006	4,050.52	267,247.56	4.4991		
01-Dec-1999 06:15:00	1005	2,032		30,480	2,029,631	2,020	4.5273	4,074.58	271,322.14	4.4995		
01-Dec-1999 06:30:00	1020	2,172		32,580	2,062,211	2,022	4.8392	4,355.31	275,677.46	4.5045		
01-Dec-1999 06:32:00	1022		451	4,257	2,066,467						4,581.97	
01-Dec-1999 06:45:00	1035	2,085		27,105	2,093,573	2,023	4.6454	3,623.45	279,869.95	4.5068		
01-Dec-1999 07:00:00	1050	2,037		30,555	2,124,128	2,023	4.5385	4,084.61	283,954.56	4.5072		
01-Dec-1999 07:15:00	1065	2,091		31,365	2,155,493	2,024	4.6588	4,192.89	288,147.45	4.5094		
01-Dec-1999 07:30:00	1080	2,070		31,050	2,186,543	2,025	4.6120	4,150.78	292,298.23	4.5108		
01-Dec-1999 07:33:00	1083		477	6,153	2,192,695						4,596.85	
01-Dec-1999 07:45:00	1095	2,032		24,384	2,217,080	2,025	4.5273	3,259.71	296,380.43	4.5111		
01-Dec-1999 08:00:00	1110	1,950		29,250	2,246,330	2,024	4.3446	3,910.16	300,290.59	4.5089		
01-Dec-1999 08:15:00	1125	2,060		30,900	2,277,230	2,024	4.5897	4,130.73	304,421.32	4.5099		
01-Dec-1999 08:30:00	1140	2,047		30,705	2,307,935	2,025	4.5607	4,104.66	308,525.98	4.5106		
01-Dec-1999 08:33:00	1143		504	6,094	2,314,029						4,591.33	
01-Dec-1999 08:45:00	1155	2,016		24,192	2,338,221	2,024	4.4917	3,234.05	312,574.70	4.5105		
01-Dec-1999 09:00:00	1170	2,238		33,570	2,371,791	2,027	4.9863	4,487.66	317,062.36	4.5166		
01-Dec-1999 09:15:00	1185	2,117		31,755	2,403,546	2,028	4.7167	4,245.03	321,307.38	4.5191		
01-Dec-1999 09:30:00	1200	1,980		29,700	2,433,246	2,028	4.4115	3,970.31	325,277.70	4.5177		
01-Dec-1999 09:32:00	1202		530	4,012	2,437,258						4,598.60	
01-Dec-1999 09:45:00	1215	2,032		26,416	2,463,674	2,028	4.5273	3,531.36	329,345.33	4.5178		
01-Dec-1999 10:00:00	1230	2,052		30,780	2,494,454	2,028	4.5719	4,114.69	333,460.02	4.5184		
01-Dec-1999 10:15:00	1245	2,080		31,200	2,525,654	2,029	4.6343	4,170.83	337,630.85	4.5198		
01-Dec-1999 10:30:00	1260	1,988		29,820	2,555,474	2,028	4.4293	3,986.36	341,617.21	4.5187		

Appendix 26: South Langell Valley 1999 OWRD aquifer test, discharge data

Aquifer Test: South Langell Valley
Aquifer Test Dates: 29 Nov 1999 to 03 Dec 1999
Data: Discharge & Power
Well Use for Test: Pumping Well
Well Location: T40S/R13E-sec 35daa
OWRD Well Log ID Number: KLAM 10495
Measuring Point: angle pipe
Measuring Tool: water level by e-tape and discharge by electronic non-intrusive flow meter
Power Meter: Start = 000 kwh **End =** 635 kwh

Owner Well Name/Number: irrigation well
Measuring Pt. = 0.71 ft. above land surface
Pump On: Date = 30 Nov 1999 **Time =** 13:30
Pump Off: Date = 01 Dec 1999 **Time =** 13:30

Date and Time (24 hour)	Time Since Pumping Started (min) (t)	Discharge Rate Reading (gpm)	Power Reading (kwh)	Interval Discharge (calculated) (gallons)	Total Discharge (calculated) (gallons)	Average Discharge Rate (gpm)	Discharge Rate (calculated) (ft3/sec)	Interval Discharge (calculated) (ft3)	Total Discharge (calculated) (ft3)	Average Discharge Rate (ft3/sec)	Discharge vs Power (gal/kwh)	Remarks
01-Dec-1999 10:31:00	1261		556	2,049	2,557,523						4,599.86	
01-Dec-1999 10:45:00	1275	2,110		29,540	2,587,063	2,029	4.7011	3,948.98	345,840.05	4.5208		
01-Dec-1999 11:00:00	1290	2,021		30,315	2,617,378	2,029	4.5028	4,052.53	349,892.57	4.5206		
01-Dec-1999 11:15:00	1305	2,070		31,050	2,648,428	2,029	4.6120	4,150.78	354,043.36	4.5216		
01-Dec-1999 11:30:00	1320	2,081		31,215	2,679,643	2,030	4.6365	4,172.84	358,216.20	4.5229		
01-Dec-1999 11:32:00	1322		584	4,076	2,683,719						4,595.41	
01-Dec-1999 11:45:00	1335	1,995		25,935	2,709,654	2,030	4.4449	3,467.07	362,228.08	4.5222		
01-Dec-1999 12:00:00	1350	2,071		31,065	2,740,719	2,030	4.6142	4,152.79	366,380.87	4.5232		
01-Dec-1999 12:15:00	1365	2,024		30,360	2,771,079	2,030	4.5095	4,058.54	370,439.41	4.5231		
01-Dec-1999 12:30:00	1380	2,106		31,590	2,802,669	2,031	4.6922	4,222.97	374,662.38	4.5249		
01-Dec-1999 12:34:00	1384		610	8,347	2,811,017						4,608.22	
01-Dec-1999 12:45:00	1395	2,068		22,749	2,833,765	2,031	4.6075	3,041.03	378,819.31	4.5259		
01-Dec-1999 13:00:00	1410	2,086		31,290	2,865,055	2,032	4.6476	4,182.87	383,002.18	4.5272		
01-Dec-1999 13:02:00	1412		623	4,237	2,869,293						4,605.61	
01-Dec-1999 13:15:00	1425	2,152		27,977	2,897,269	2,033	4.7947	3,739.92	387,308.57	4.5299		
01-Dec-1999 13:16:00	1426		629	2,151	2,899,421						4,609.57	
01-Dec-1999 13:30:00	1440		635	30,129	2,929,549						4,613.46	

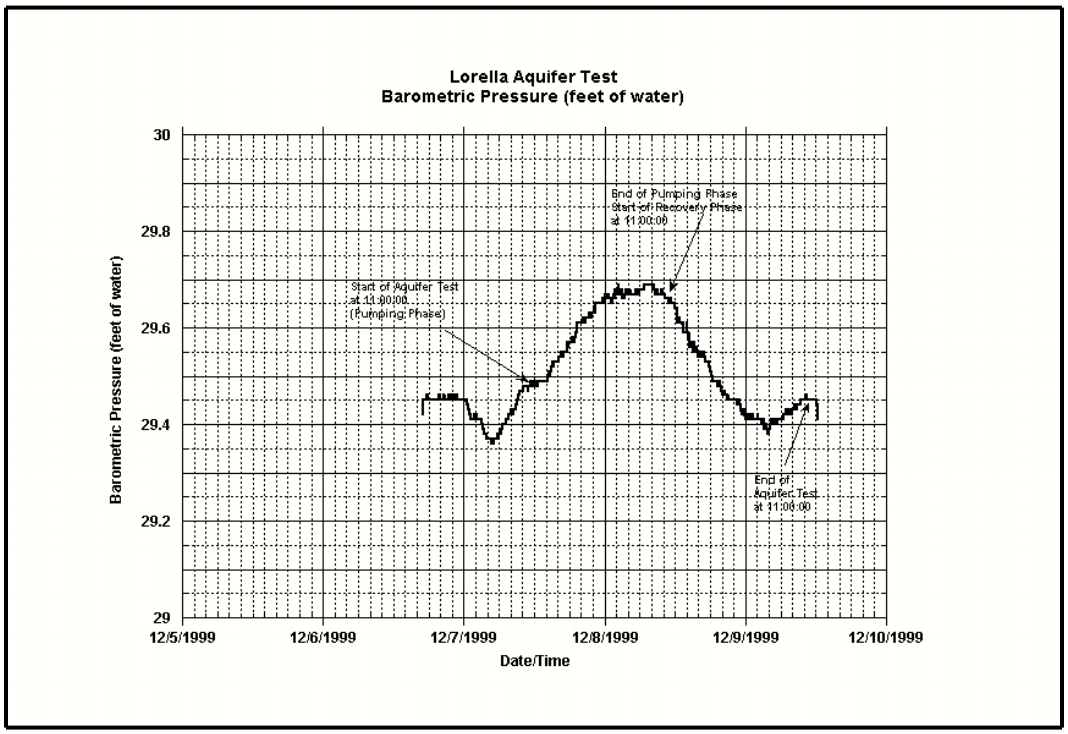
Appendix 27

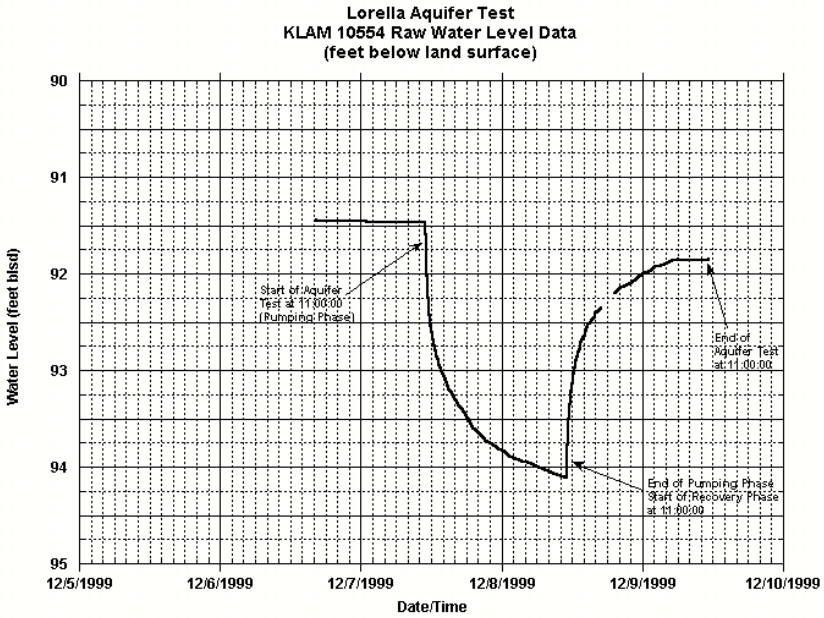
Lorella 1999 OWRD Aquifer Test Graphs

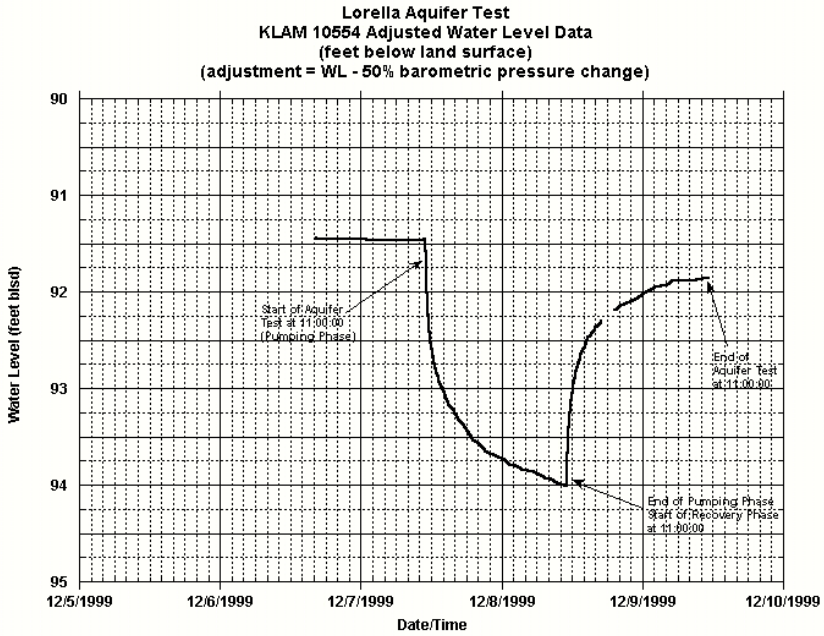
The following graphs plot data from an aquifer test of canal-influenced basalt ground water northeast of Lorella. OWRD staff conducted the test from December 7 to 9, 1999. The test included pumping well KLAM 10175 for 24 hours at an average of 1,404 gal/min, and measuring ground water levels at five observation wells prior to the test, during the 24-hour pumping period, and during a 24-hour recovery period. Water level measurements at the pumping well were not possible during the pumping periods. The observation wells included four canal-influenced basalt wells (KLAM 10554, KLAM 52204, KLAM 10362, and KLAM 10364) and basalt well KLAM 52096. Wells KLAM 52204 and KLAM 52096 are the isolated shallow and deep portions of the same hole. Hand measurements occurred at each observation well. Additionally, 1-minute recorder measurements occurred at wells KLAM 52204, KLAM 10362 and KLAM 52096.

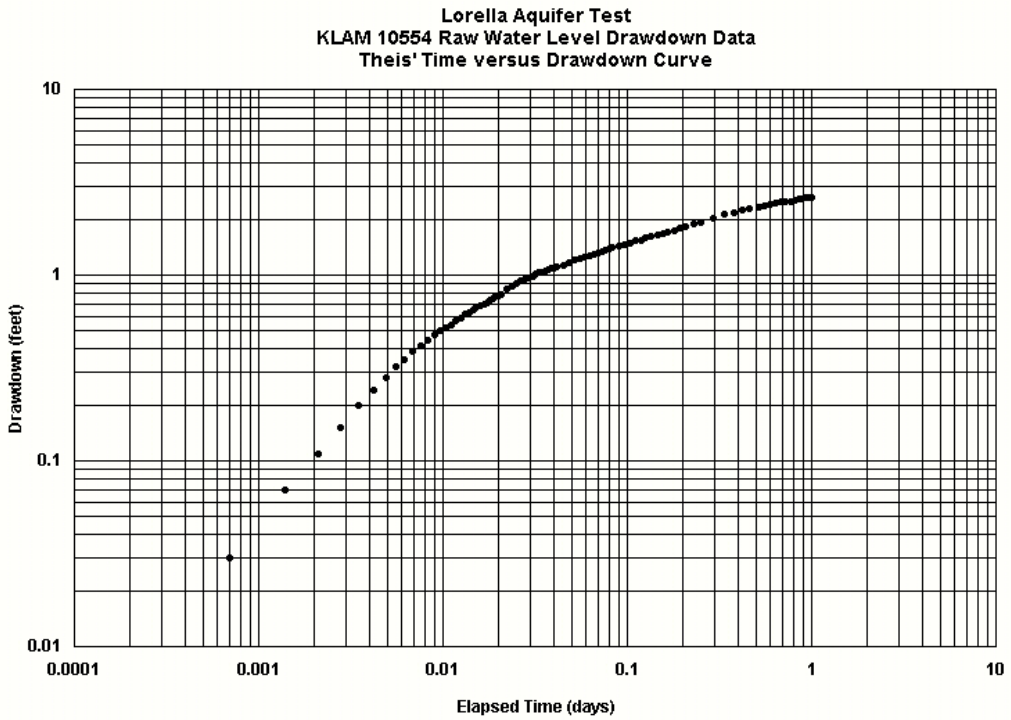
Water level responses to the pumping varied. Two wells responded directly to the pumping (KLAM 10554 and KLAM 52204). One well (KLAM 52096) possibly responded inefficiently. Lastly, two wells (KLAM 10362 and KLAM 10364) did not respond to the pumping, but they did respond to earth tides.

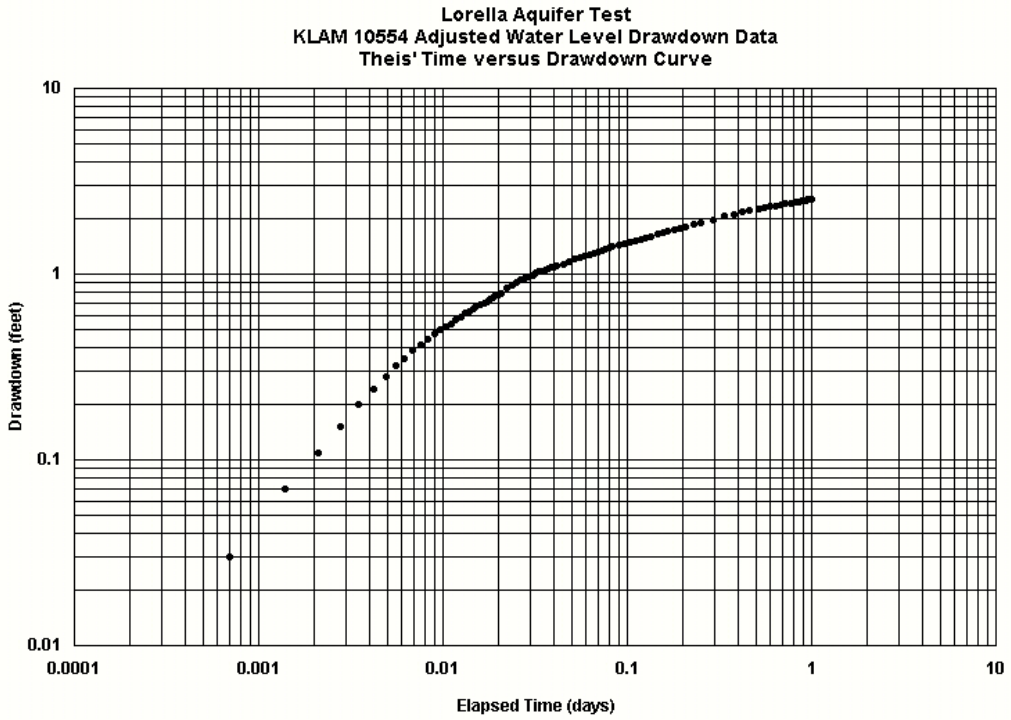
Barometric pressure change during the aquifer test influenced the water levels measured. The barometric pressure changes equaled about 0.35 ft of water level change (see barometric pressure graph below). This made it necessary to adjust the raw data for sites directly or possibly influenced by the ground water pumping with 50 percent of the barometric pressure change. Graphs of raw and adjusted data are paired for those sites. Only Raw data are presented for the other sites.

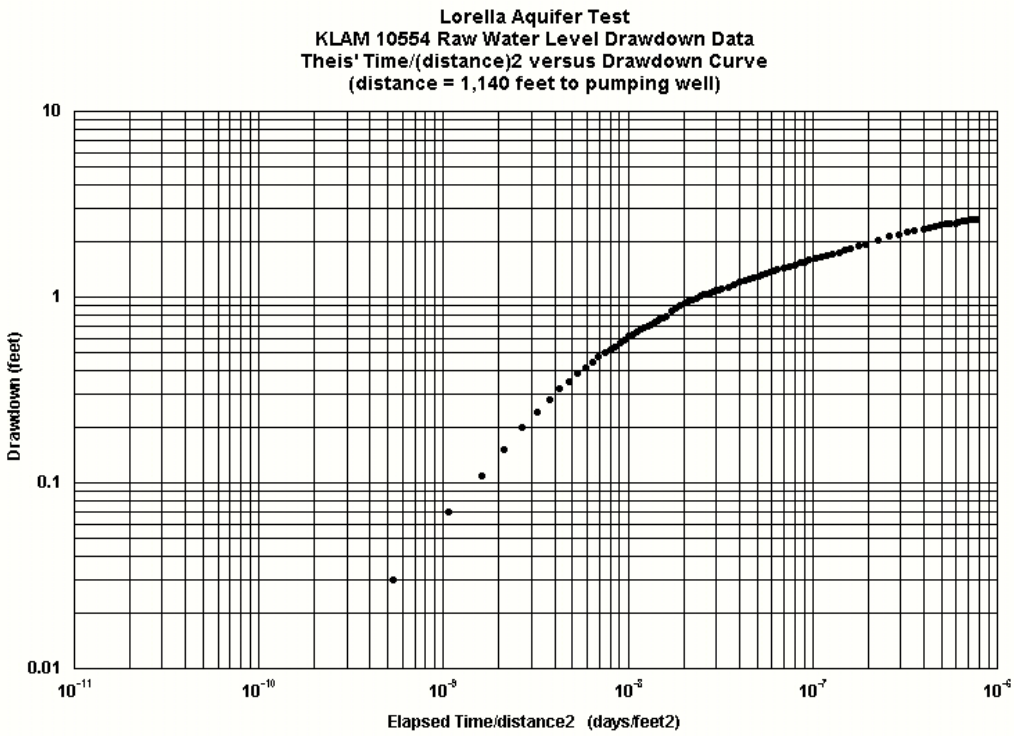


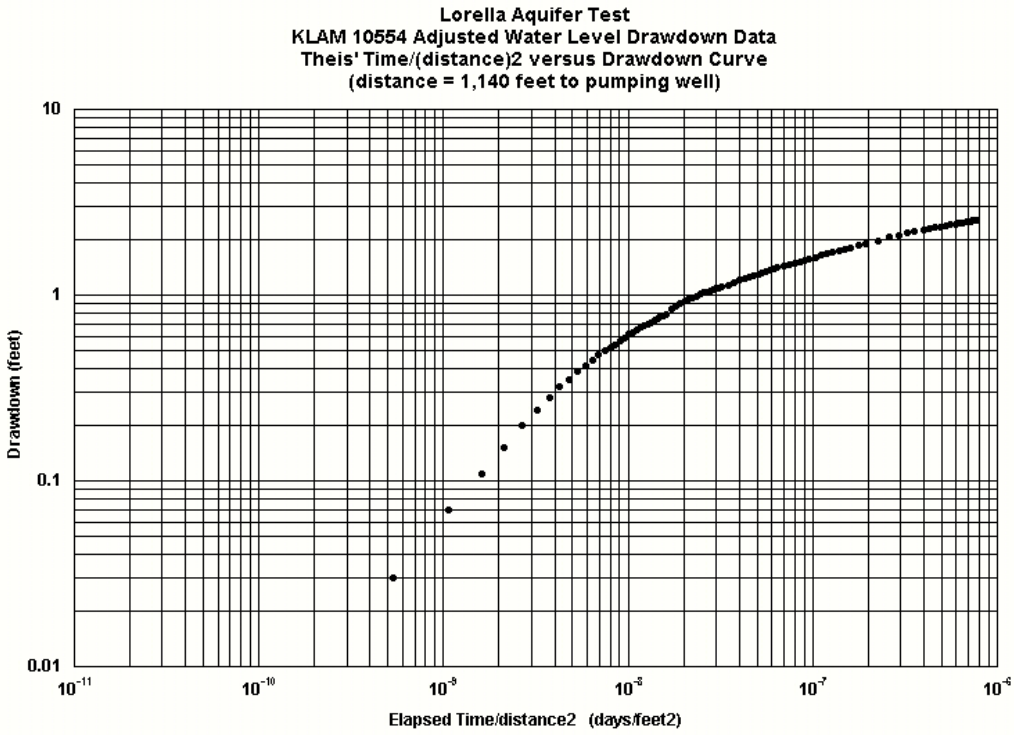

Lorella Aquifer Test
KLAM 10554 Raw Water Level Data
(feet below land surface)
Water Level (feet blsd)
90
91
92
93
94
95
12/5/1999
12/6/1999
12/7/1999
12/8/1999
12/9/1999
12/10/1999
Date/Time
Start of Aquifer Test at 11:00:00 (Pumping Phase)
End of Aquifer Test at 11:00:00
End of Pumping Phase Start of Recovery Phase at 11:00:00

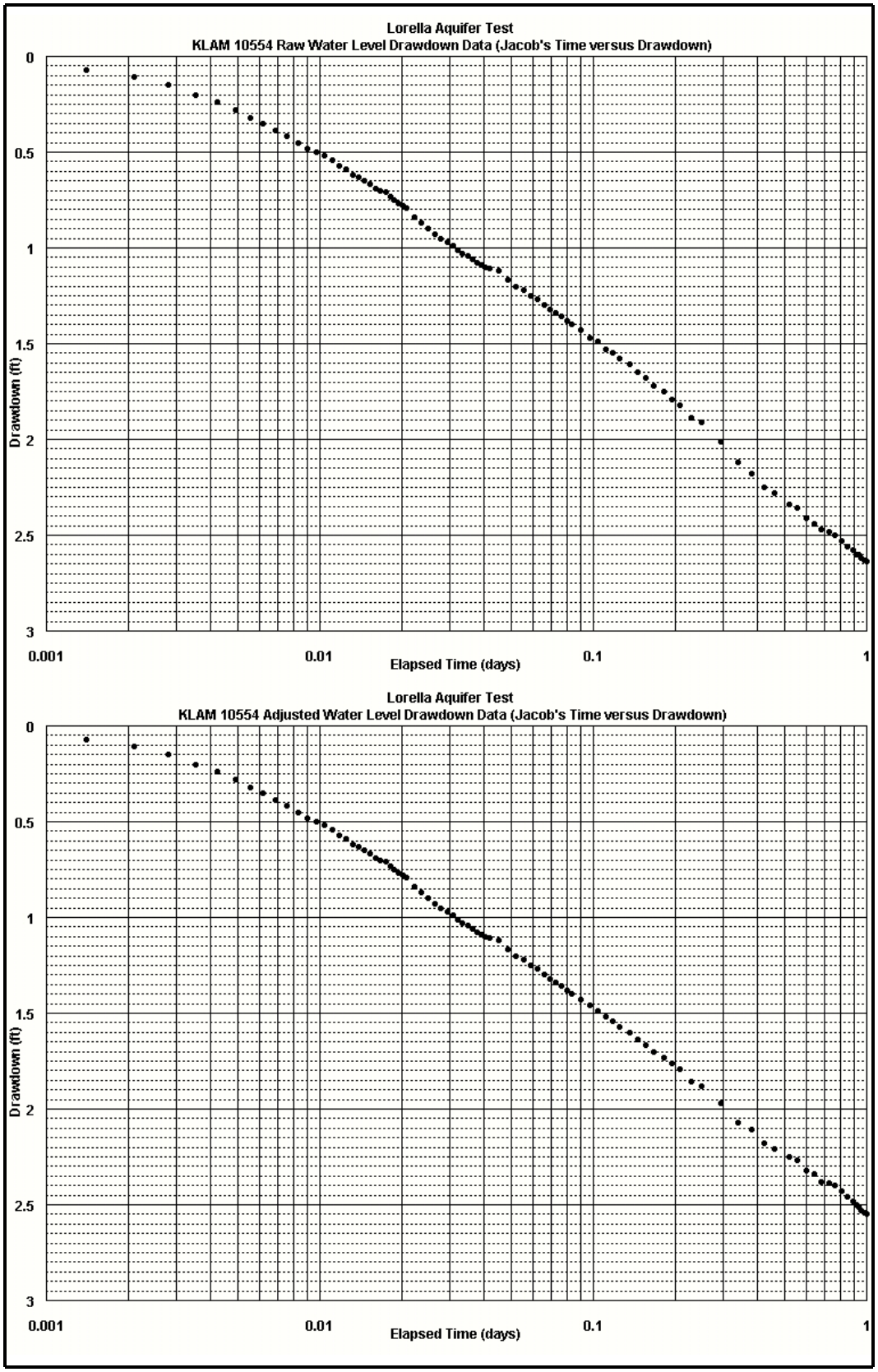

Lorella Aquifer Test
KLAM 10554 Adjusted Water Level Data
(feet below land surface)
(adjustment = WL - 50% barometric pressure change)
Water Level (feet blsd)
90
91
92
93
94
95
12/5/1999
12/6/1999
12/7/1999
12/8/1999
12/9/1999
12/10/1999
Date/Time
Start of Aquifer Test at 11:00:00 (Pumping Phase)
End of Aquifer Test at 11:00:00
End of Pumping Phase Start of Recovery Phase at 11:00:00

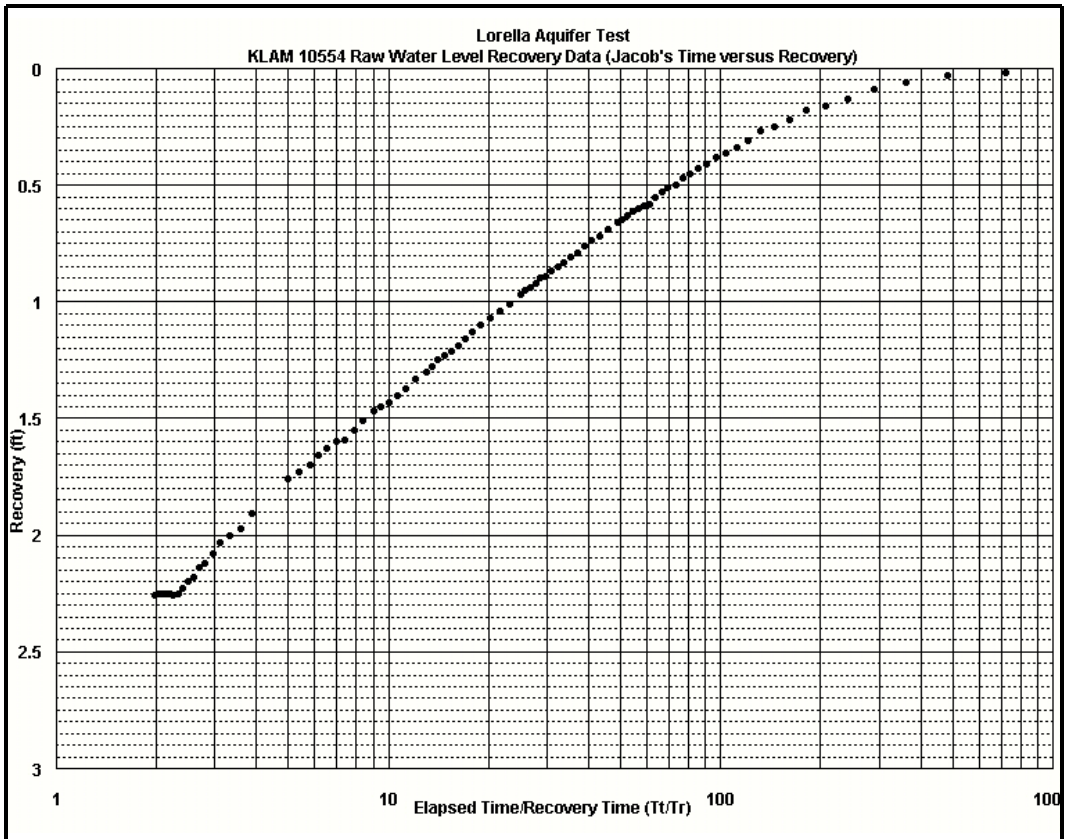

Lorella Aquifer Test
KLAM 10554 Raw Water Level Drawdown Data
Theis' Time versus Drawdown Curve
Drawdown (feet)
10
1
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
Elapsed Time (days)

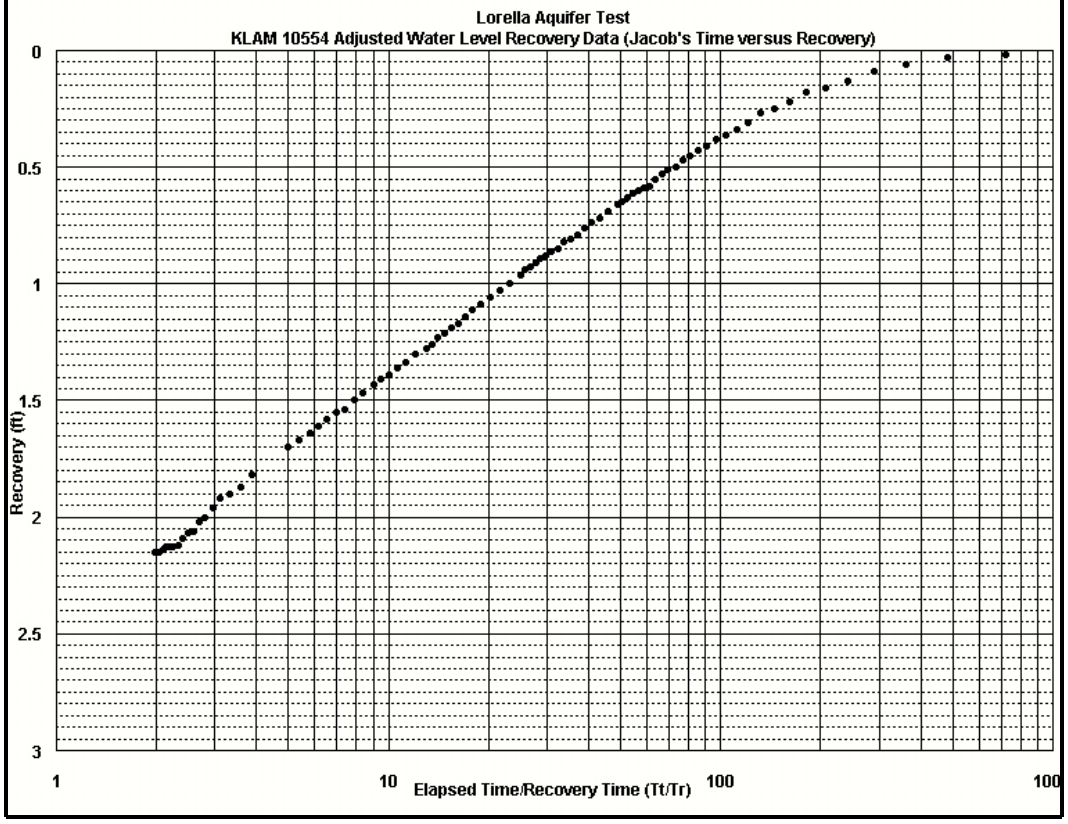

Lorella Aquifer Test
KLAM 10554 Adjusted Water Level Drawdown Data
Theis' Time versus Drawdown Curve
Drawdown (feet)
10
1
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
Elapsed Time (days)

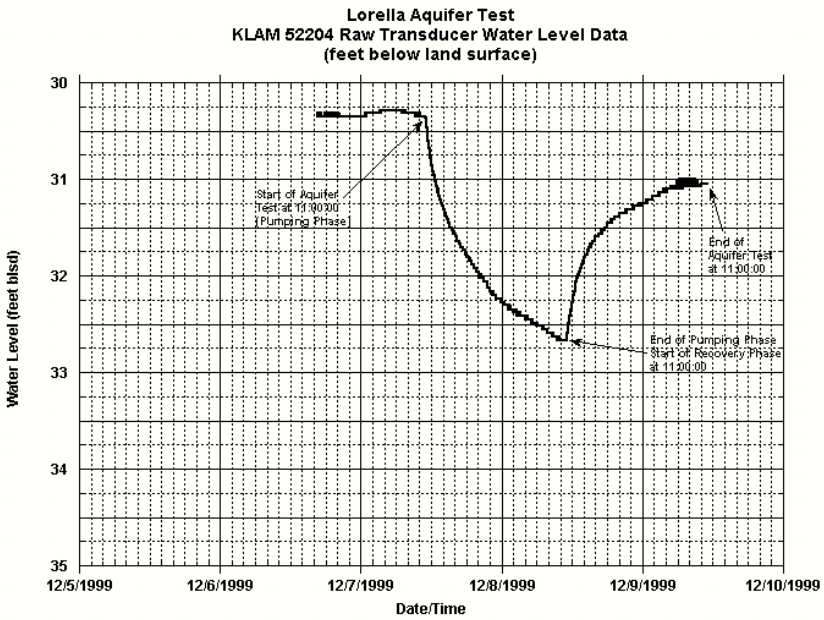

Lorella Aquifer Test
KLAM 10554 Raw Water Level Drawdown Data
Theis' Time/(distance)2 versus Drawdown Curve
(distance = 1,140 feet to pumping well)
Drawdown (feet)
10
1
0.1
0.01
10-11
10-10
10-9
10-8
10-7
10-6
Elapsed Time/distance2 (days/feet2)

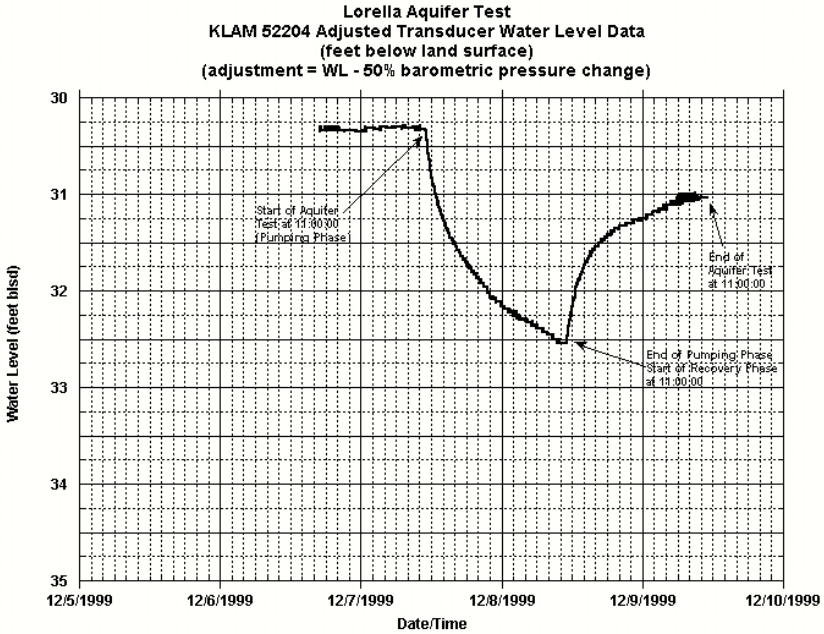

Lorella Aquifer Test
KLAM 10554 Adjusted Water Level Drawdown Data
Theis' Time/(distance)2 versus Drawdown Curve
(distance = 1,140 feet to pumping well)
Drawdown (feet)
10
1
0.1
0.01
10-11
10-10
10-9
10-8
10-7
10-6
Elapsed Time/distance2 (days/feet2)

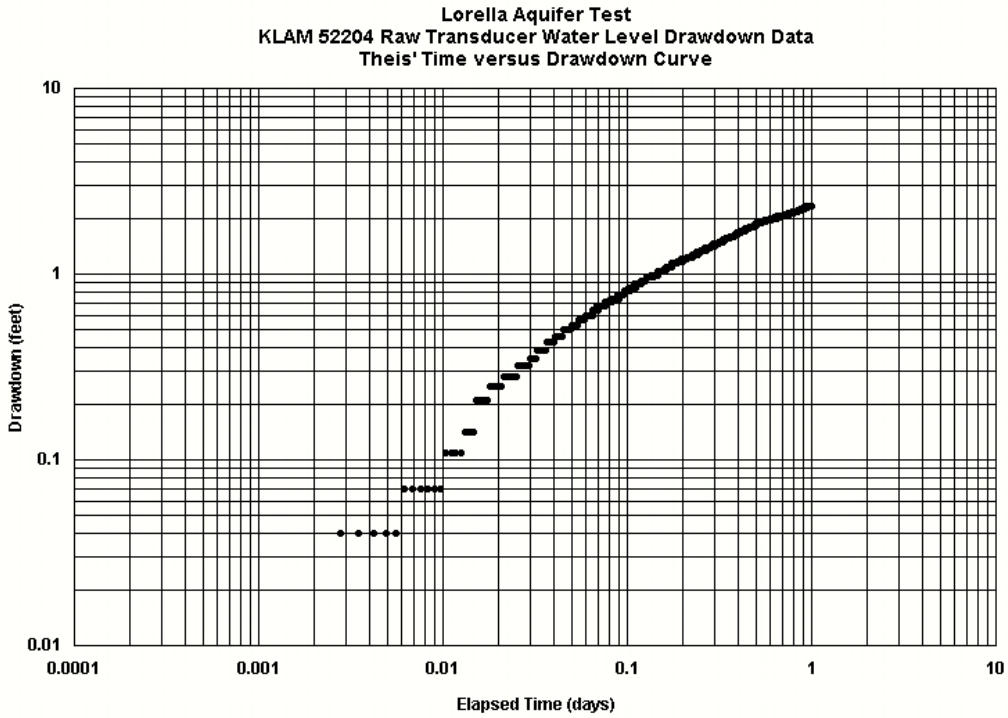

Lorella Aquifer Test
KLAM 10554 Raw Water Level Drawdown Data (Jacob's Time versus Drawdown)
Drawdown (ft)
0
0.5
1
1.5
2
2.5
3
0.001
0.01
0.1
1
Elapsed Time (days)
Lorella Aquifer Test
KLAM 10554 Adjusted Water Level Drawdown Data (Jacob's Time versus Drawdown)
Drawdown (ft)
0
0.5
1
1.5
2
2.5
3
0.001
0.01
0.1
1
Elapsed Time (days)

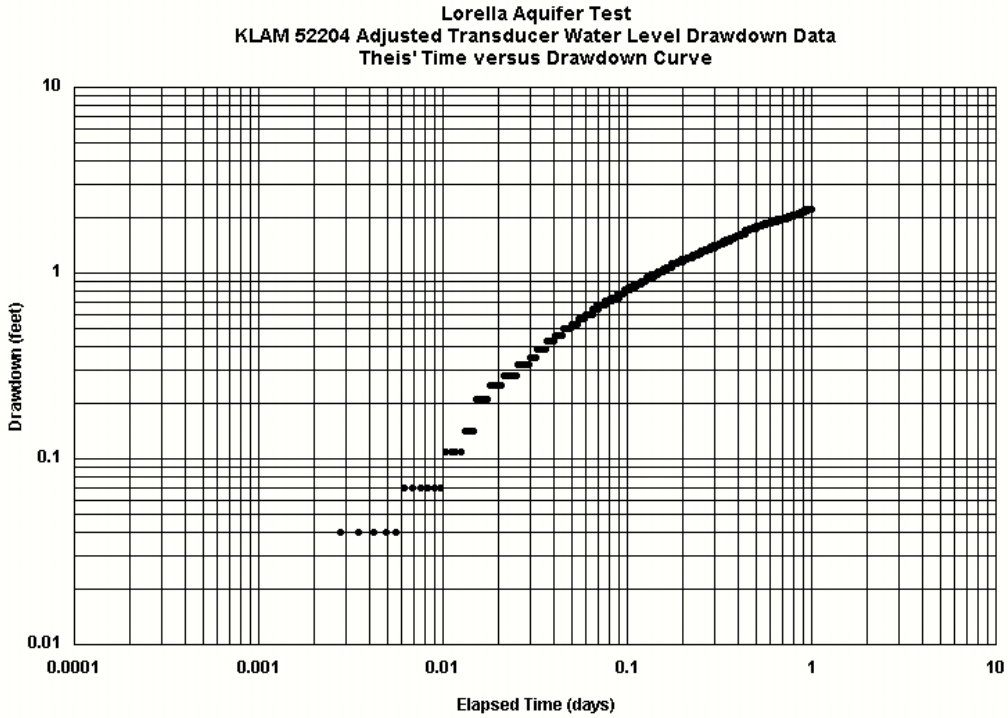

Lorella Aquifer Test
KLAM 10554 Raw Water Level Recovery Data (Jacob's Time versus Recovery)
Recovery (ft)
0
0.5
1
1.5
2
2.5
3
1
10
100
1000
Elapsed Time/Recovery Time (Tt/Tr)

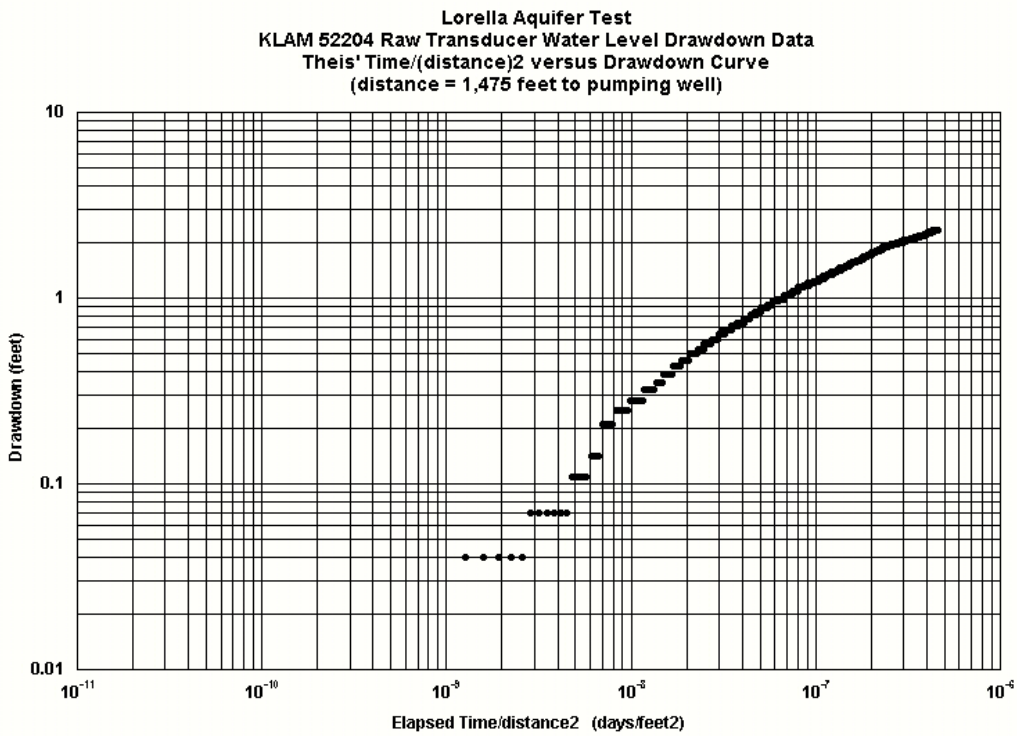

Lorella Aquifer Test
KLAM 10554 Adjusted Water Level Recovery Data (Jacob's Time versus Recovery)
Recovery (ft)
0
0.5
1
1.5
2
2.5
3
1
10
100
1000
Elapsed Time/Recovery Time (Tt/Tr)

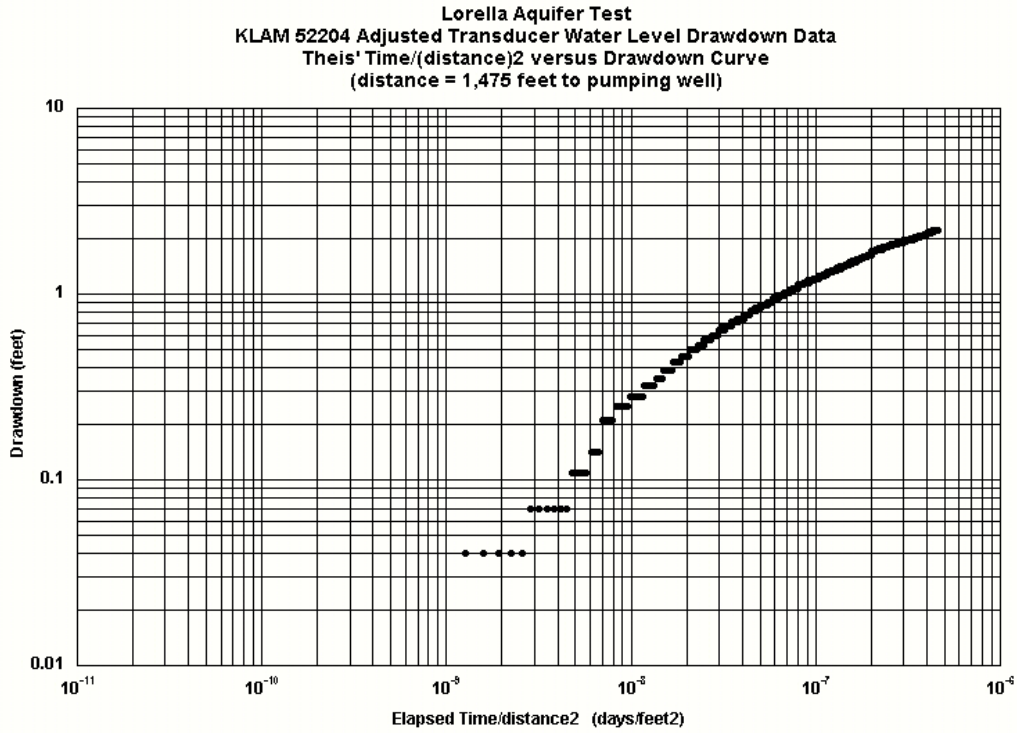

Lorella Aquifer Test
KLAM 52204 Raw Transducer Water Level Data
(feet below land surface)
Water Level (feet blsd)
30
31
32
33
34
35
12/5/1999
12/6/1999
12/7/1999
12/8/1999
12/9/1999
12/10/1999
Date/Time
Start of Aquifer Test at 11:00:00 (Pumping Phase)
End of Aquifer Test at 11:00:00
End of Pumping Phase Start of Recovery Phase at 11:00:00

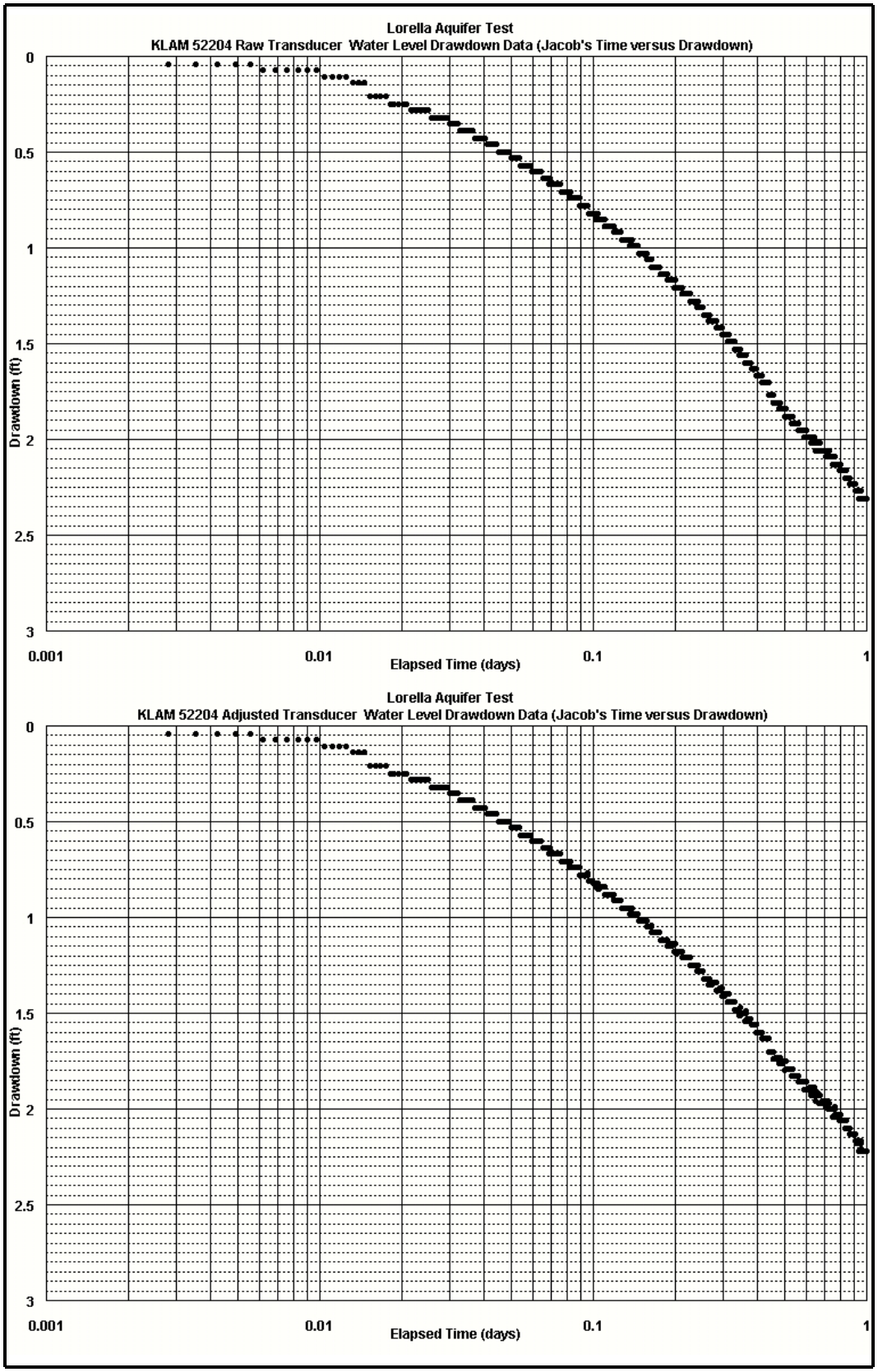

Lorella Aquifer Test
KLAM 52204 Adjusted Transducer Water Level Data
(feet below land surface)
(adjustment = WL - 50% barometric pressure change)
Water Level (feet blsd)
30
31
32
33
34
35
12/5/1999
12/6/1999
12/7/1999
12/8/1999
12/9/1999
12/10/1999
Date/Time
Start of Aquifer Test at 11:00:00 (Pumping Phase)
End of Aquifer Test at 11:00:00
End of Pumping Phase Start of Recovery Phase at 11:00:00

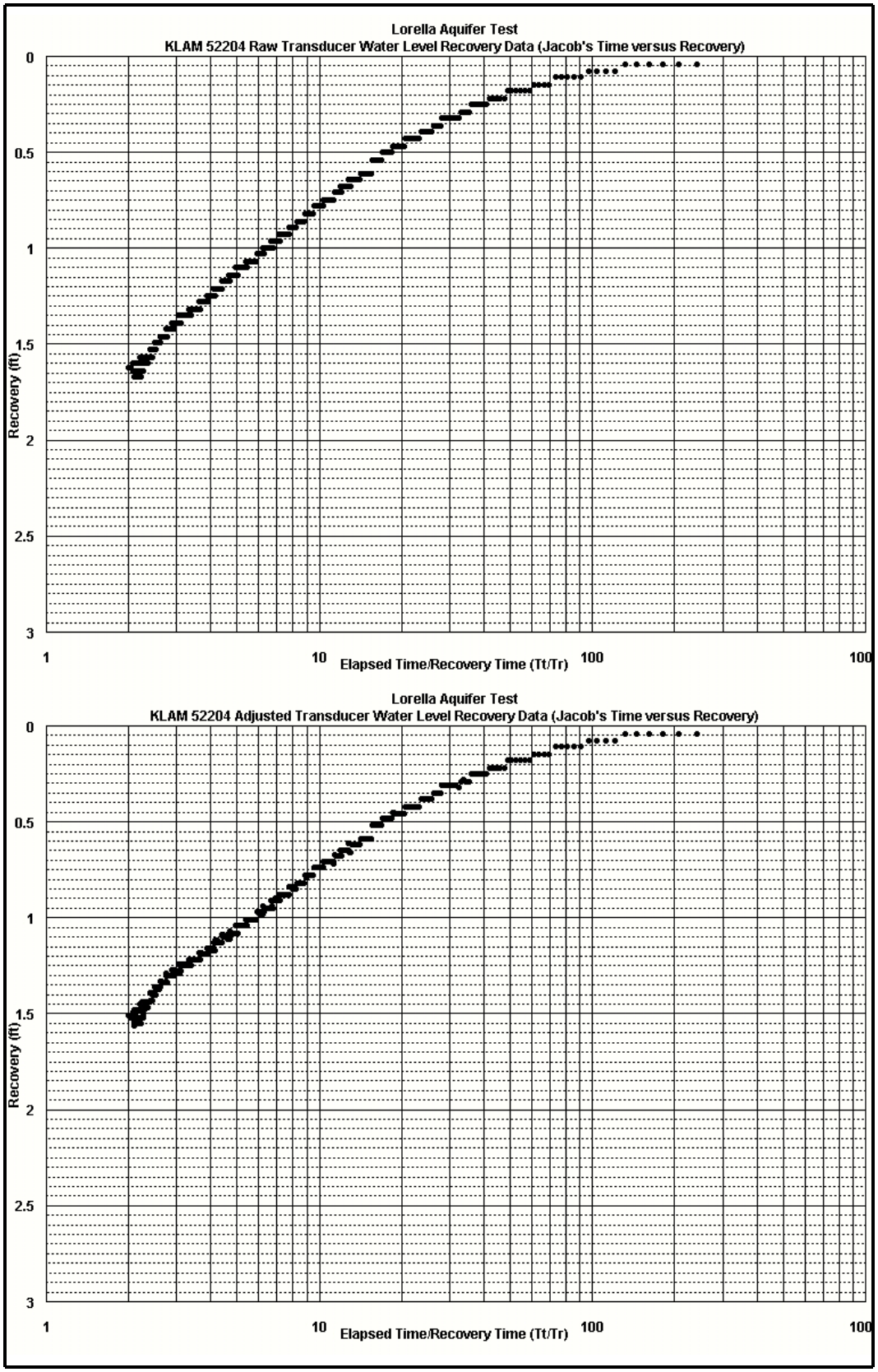

Lorella Aquifer Test
KLAM 52204 Raw Transducer Water Level Drawdown Data
Theis' Time versus Drawdown Curve
Drawdown (feet)
10
1
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
Elapsed Time (days)

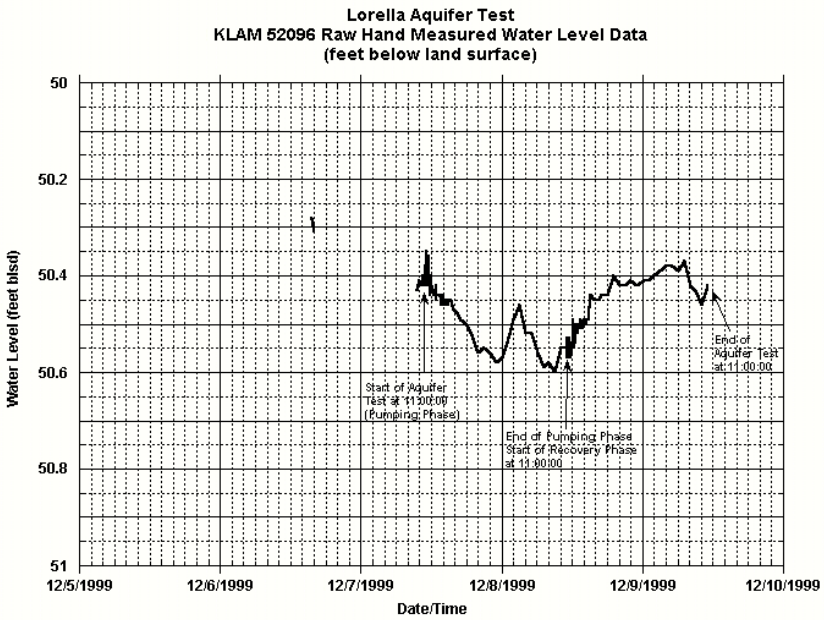

Lorella Aquifer Test
KLAM 52204 Adjusted Transducer Water Level Drawdown Data
Theis' Time versus Drawdown Curve
Drawdown (feet)
10
1
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
Elapsed Time (days)

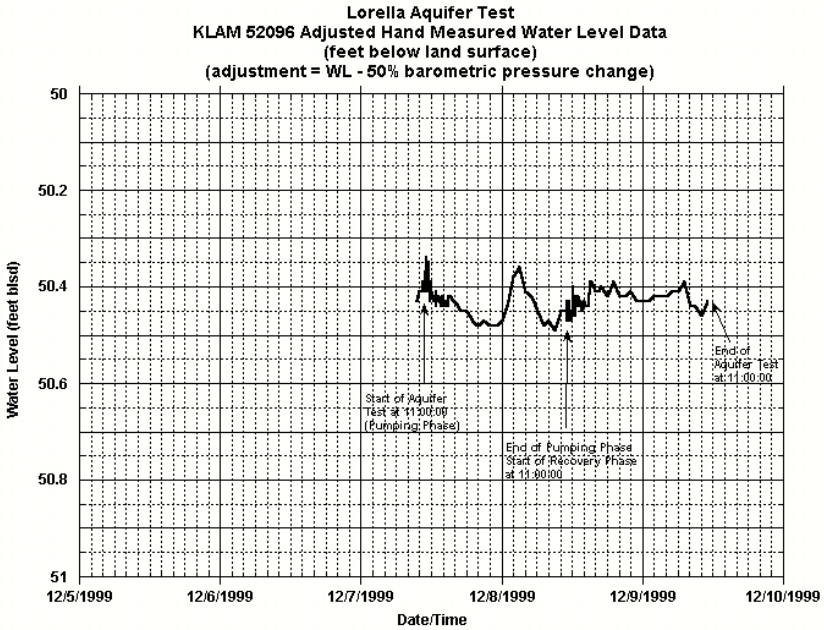

Lorella Aquifer Test
KLAM 52204 Raw Transducer Water Level Drawdown Data
Theis' Time/(distance)2 versus Drawdown Curve
(distance = 1,475 feet to pumping well)
Drawdown (feet)
10
1
0.1
0.01
10-11
10-10
10-9
10-8
10-7
10-6
Elapsed Time/distance2 (days/feet2)

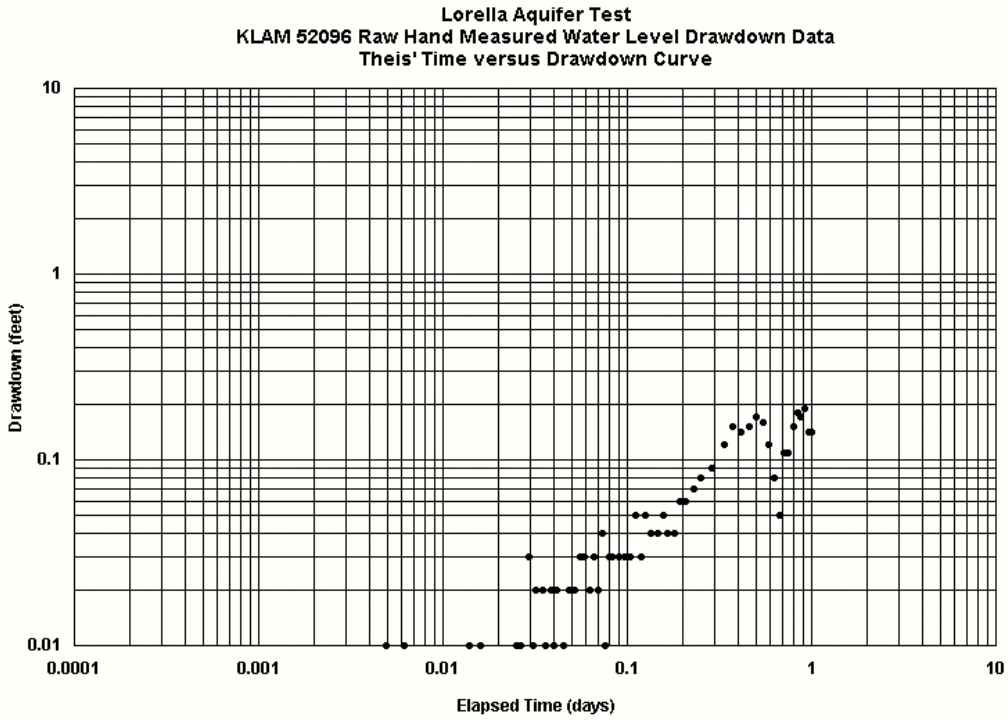

Lorella Aquifer Test
KLAM 52204 Adjusted Transducer Water Level Drawdown Data
Theis' Time/(distance)2 versus Drawdown Curve
(distance = 1,475 feet to pumping well)
Drawdown (feet)
10
1
0.1
0.01
10-11
10-10
10-9
10-8
10-7
10-6
Elapsed Time/distance2 (days/feet2)

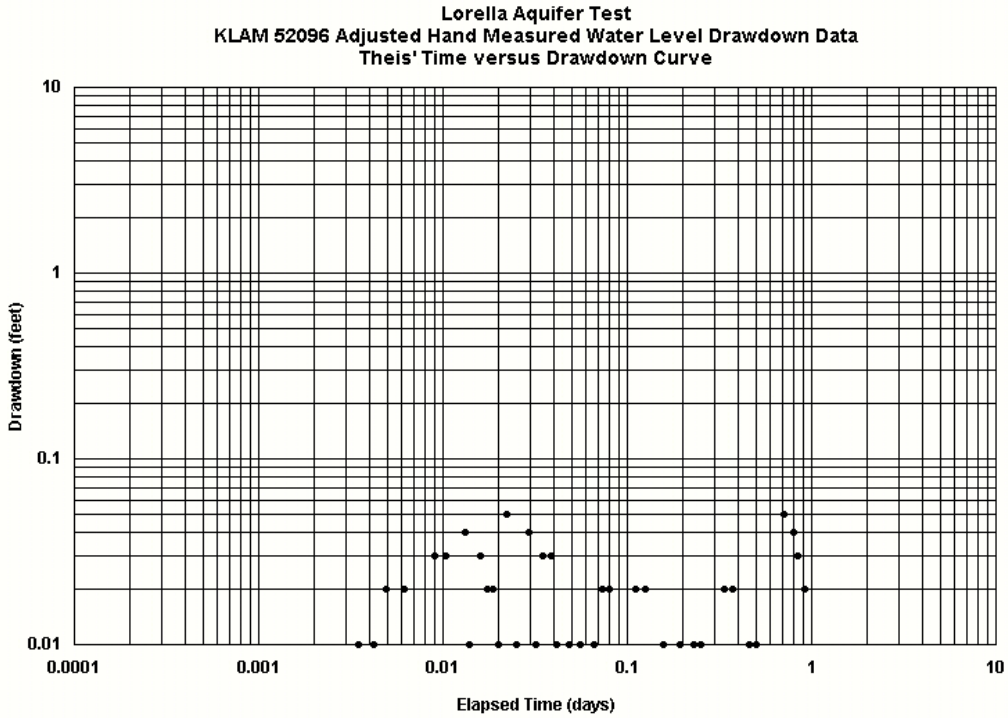

Lorella Aquifer Test
KLAM 52204 Raw Transducer Water Level Drawdown Data (Jacob's Time versus Drawdown)
Drawdown (ft)
0
0.5
1
1.5
2
2.5
3
0.001
0.01
0.1
1
Elapsed Time (days)
Lorella Aquifer Test
KLAM 52204 Adjusted Transducer Water Level Drawdown Data (Jacob's Time versus Drawdown)
Drawdown (ft)
0
0.5
1
1.5
2
2.5
3
0.001
0.01
0.1
1
Elapsed Time (days)

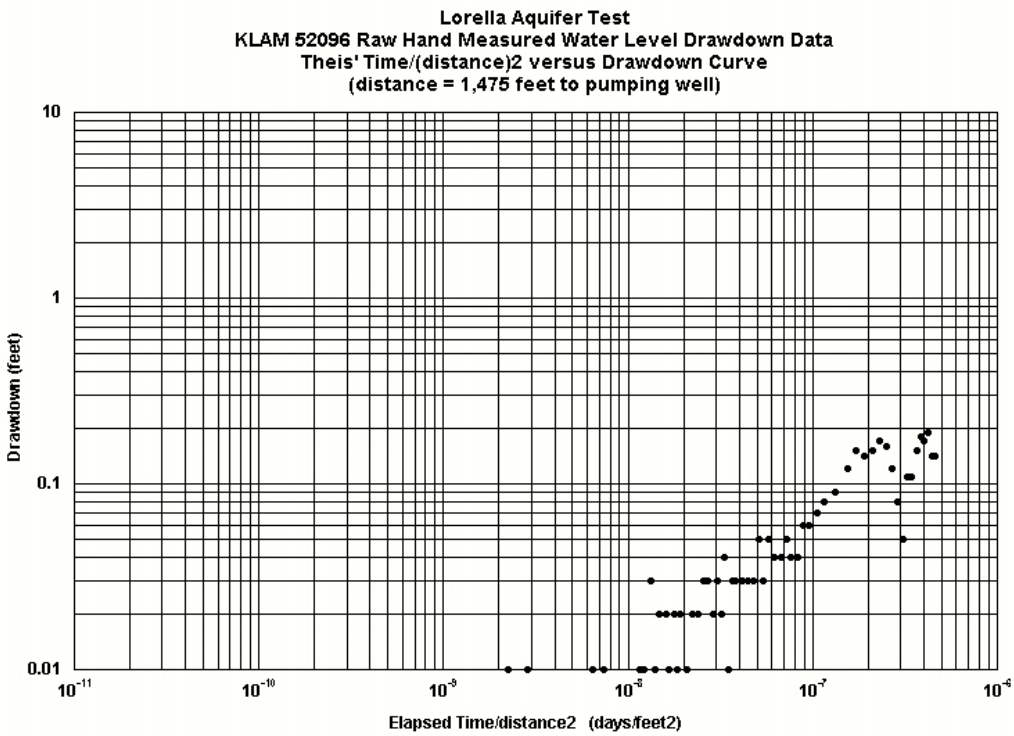

Lorella Aquifer Test
KLAM 52204 Raw Transducer Water Level Recovery Data (Jacob's Time versus Recovery)
Recovery (ft)
0
0.5
1
1.5
2
2.5
3
1
10
100
100
Elapsed Time/Recovery Time (Tt/Tr)
Lorella Aquifer Test
KLAM 52204 Adjusted Transducer Water Level Recovery Data (Jacob's Time versus Recovery)
Recovery (ft)
0
0.5
1
1.5
2
2.5
3
1
10
100
100
Elapsed Time/Recovery Time (Tt/Tr)

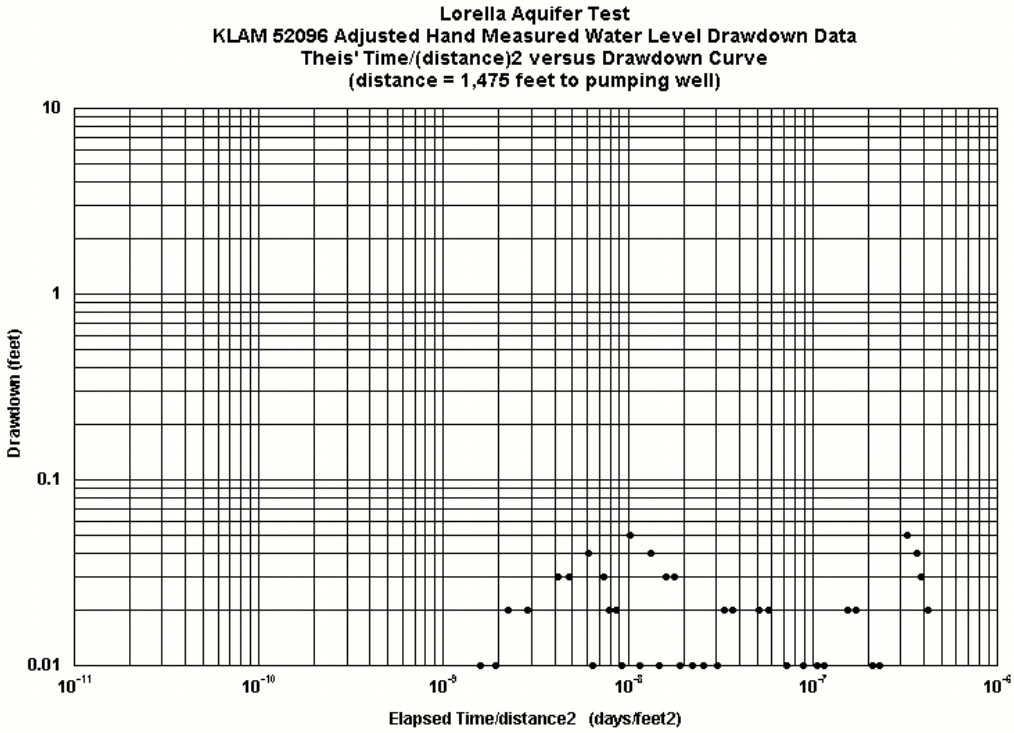

Lorella Aquifer Test
KLAM 52096 Raw Hand Measured Water Level Data
(feet below land surface)
Water Level (feet blsd)
50
50.2
50.4
50.6
50.8
51
12/5/1999
12/6/1999
12/7/1999
12/8/1999
12/9/1999
12/10/1999
Date/Time
Start of Aquifer Test at 11:00:00 (Pumping Phase)
End of Pumping Phase Start of Recovery Phase at 11:00:00
End of Aquifer Test at 11:00:00

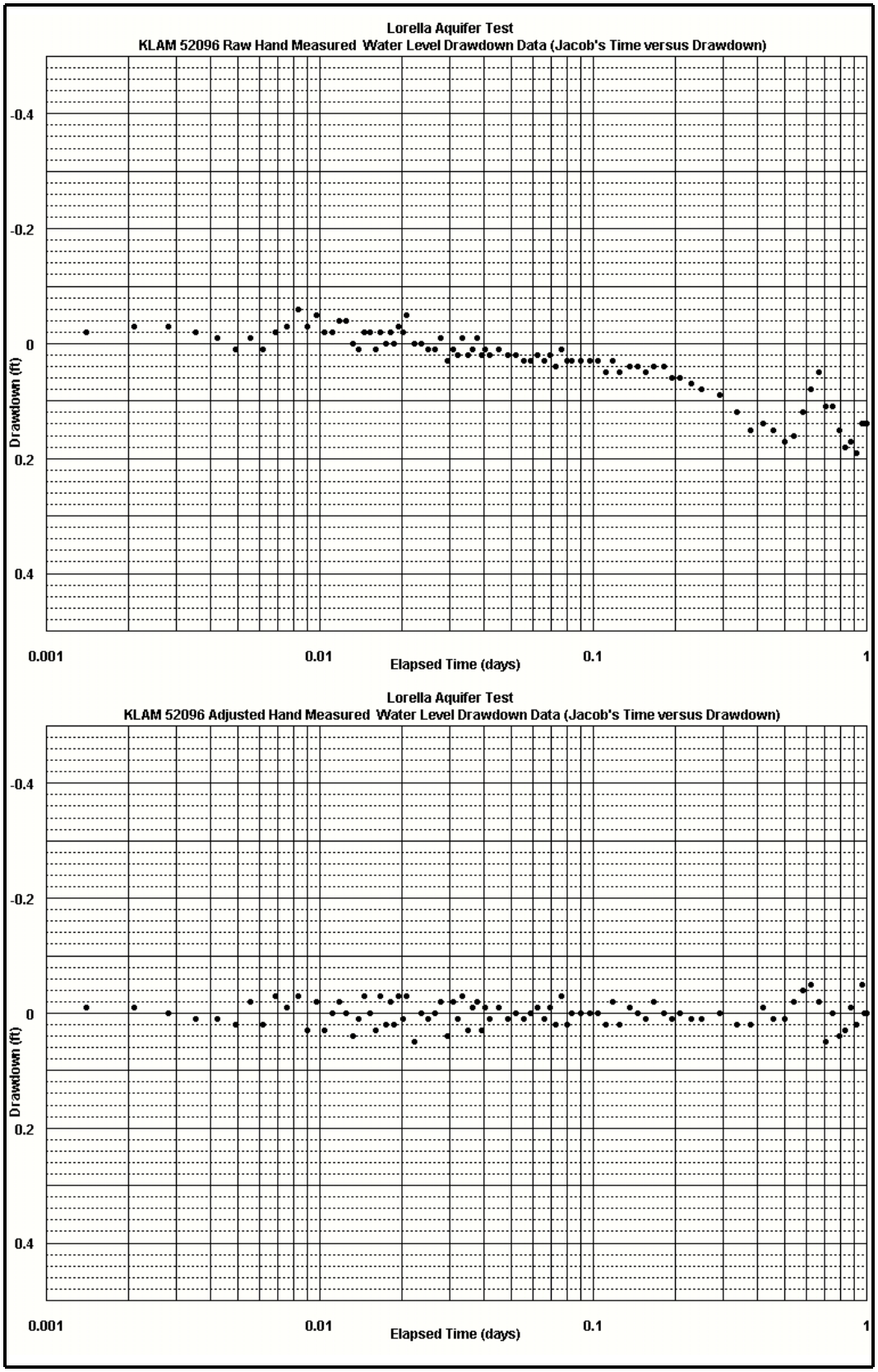

Lorella Aquifer Test
KLAM 52096 Adjusted Hand Measured Water Level Data
(feet below land surface)
(adjustment = WL - 50% barometric pressure change)
Water Level (feet blsd)
50
50.2
50.4
50.6
50.8
51
12/5/1999
12/6/1999
12/7/1999
12/8/1999
12/9/1999
12/10/1999
Date/Time
Start of Aquifer Test at 11:00:00 (Pumping Phase)
End of Pumping Phase Start of Recovery Phase at 11:00:00
End of Aquifer Test at 11:00:00

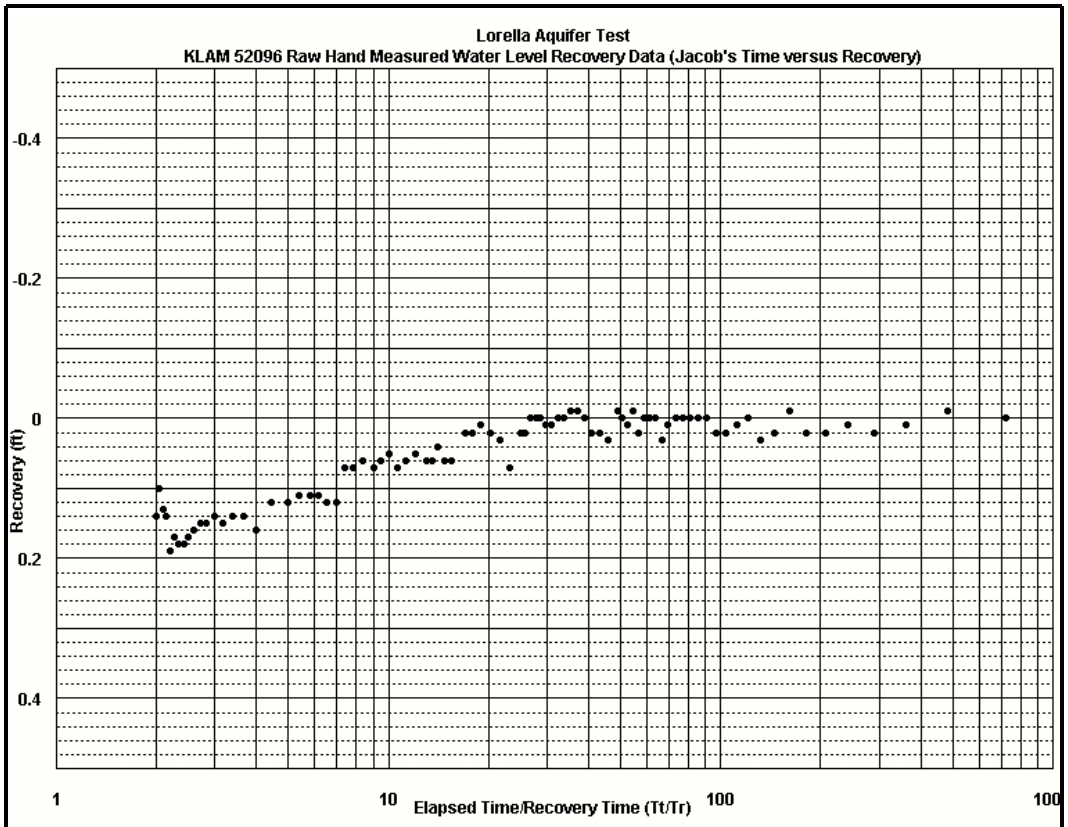

Lorella Aquifer Test
KLAM 52096 Raw Hand Measured Water Level Drawdown Data
Theis' Time versus Drawdown Curve
Drawdown (feet)
10
1
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
Elapsed Time (days)

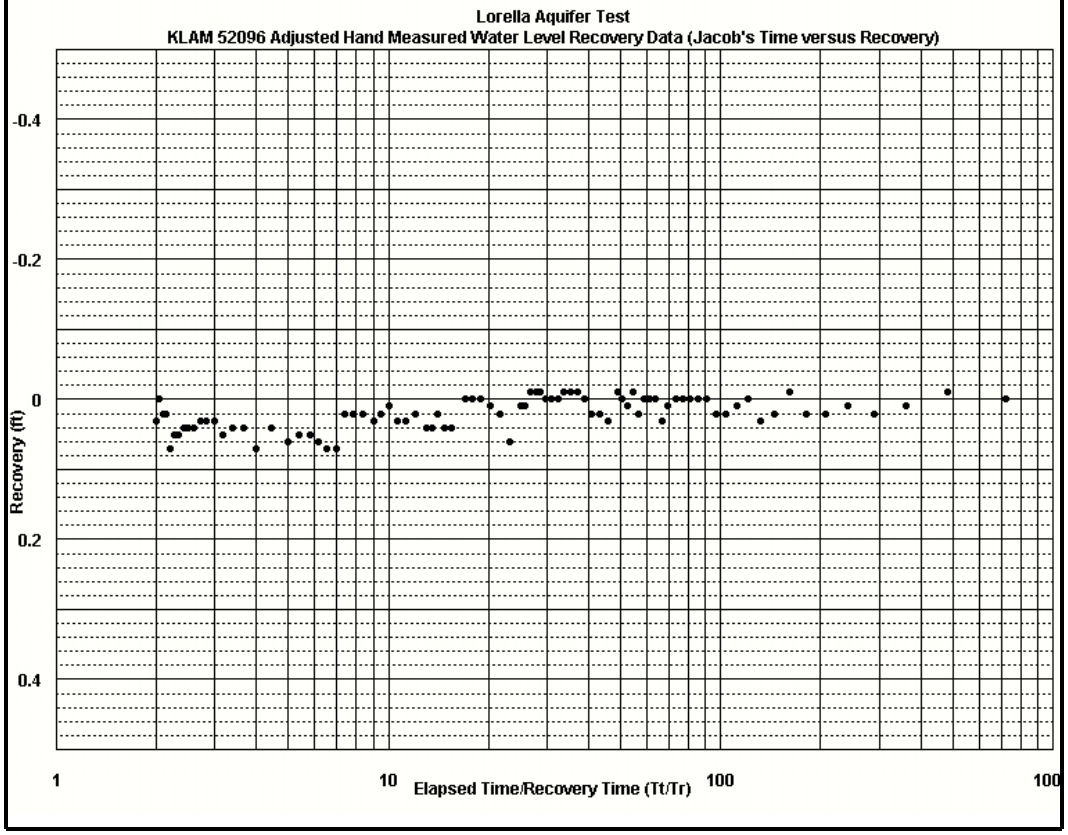

Lorella Aquifer Test
KLAM 52096 Adjusted Hand Measured Water Level Drawdown Data
Theis' Time versus Drawdown Curve
Drawdown (feet)
10
1
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
Elapsed Time (days)

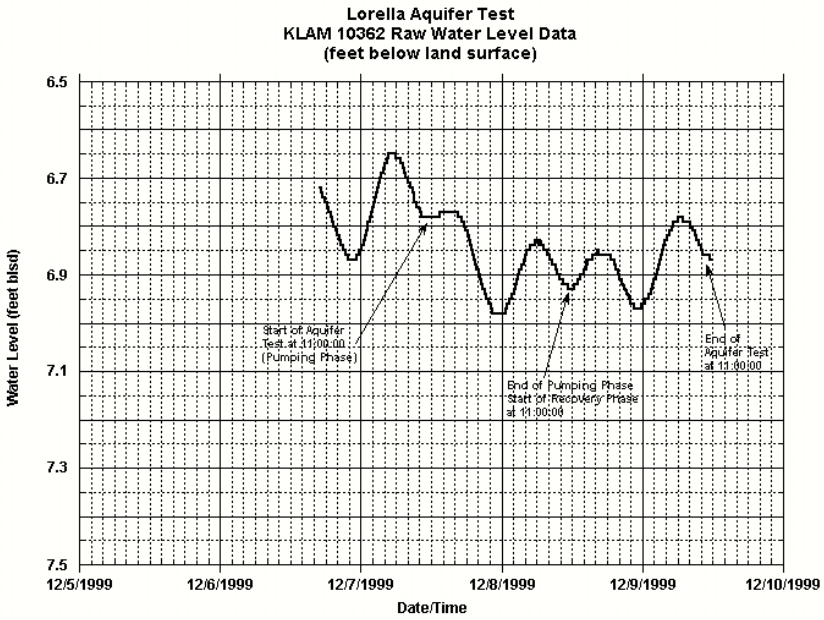

Lorella Aquifer Test
KLAM 52096 Raw Hand Measured Water Level Drawdown Data
Theis' Time/(distance)2 versus Drawdown Curve
(distance = 1,475 feet to pumping well)
Drawdown (feet)
10
1
0.1
0.01
10-11
10-10
10-9
10-8
10-7
10-6
Elapsed Time/distance2 (days/feet2)

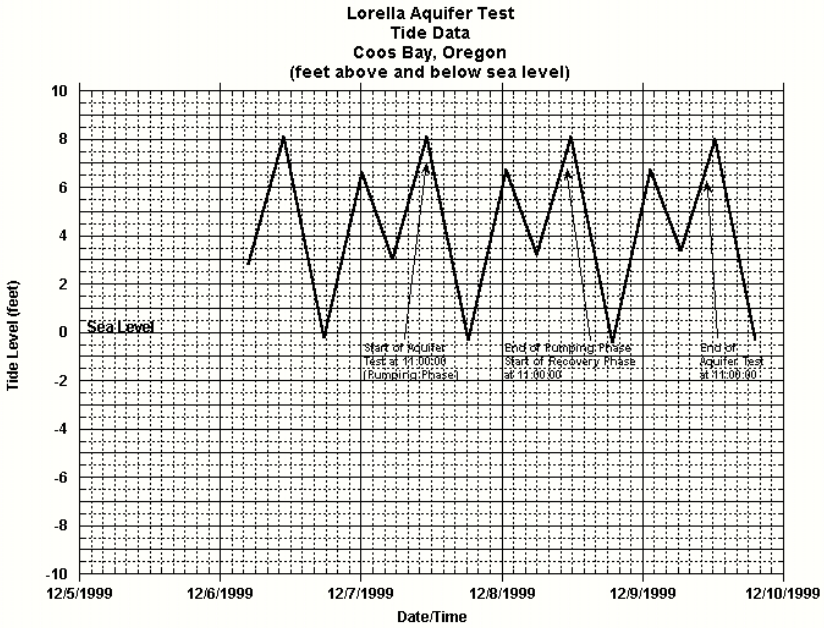

Lorella Aquifer Test
KLAM 52096 Adjusted Hand Measured Water Level Drawdown Data
Theis' Time/(distance)2 versus Drawdown Curve
(distance = 1,475 feet to pumping well)
Drawdown (feet)
10
1
0.1
0.01
10-11
10-10
10-9
10-8
10-7
10-6
Elapsed Time/distance2 (days/feet2)

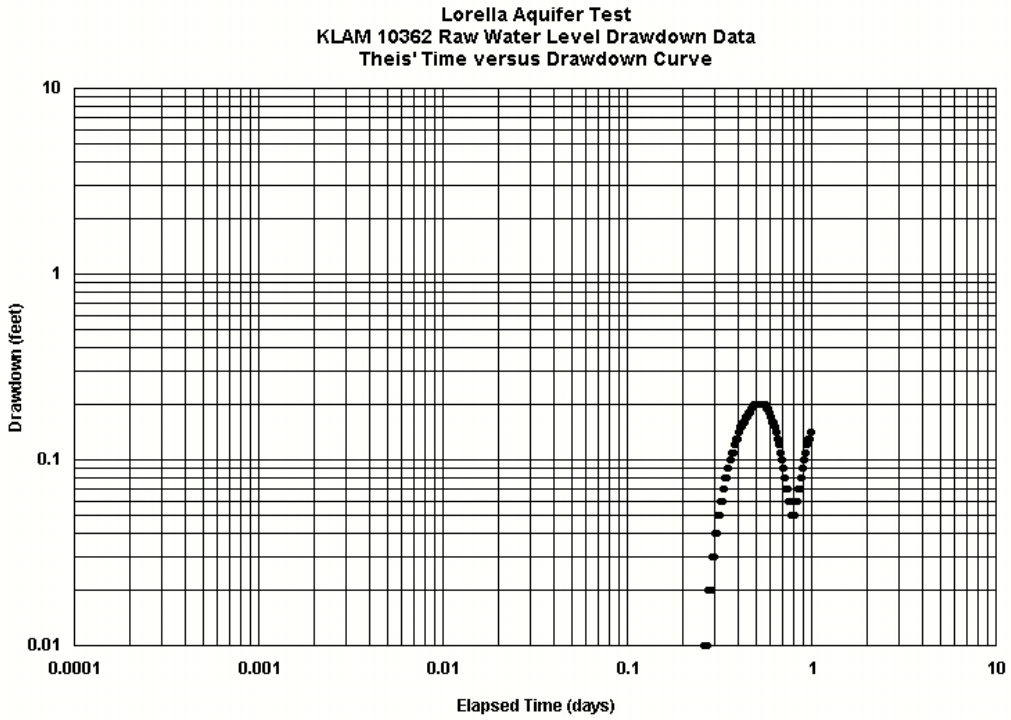

Lorella Aquifer Test
KLAM 52096 Raw Hand Measured Water Level Drawdown Data (Jacob's Time versus Drawdown)
-0.4
-0.2
0
0.2
0.4
Drawdown (ft)
0.001
0.01
0.1
1
Elapsed Time (days)
Lorella Aquifer Test
KLAM 52096 Adjusted Hand Measured Water Level Drawdown Data (Jacob's Time versus Drawdown)
-0.4
-0.2
0
0.2
0.4
Drawdown (ft)
0.001
0.01
0.1
1
Elapsed Time (days)

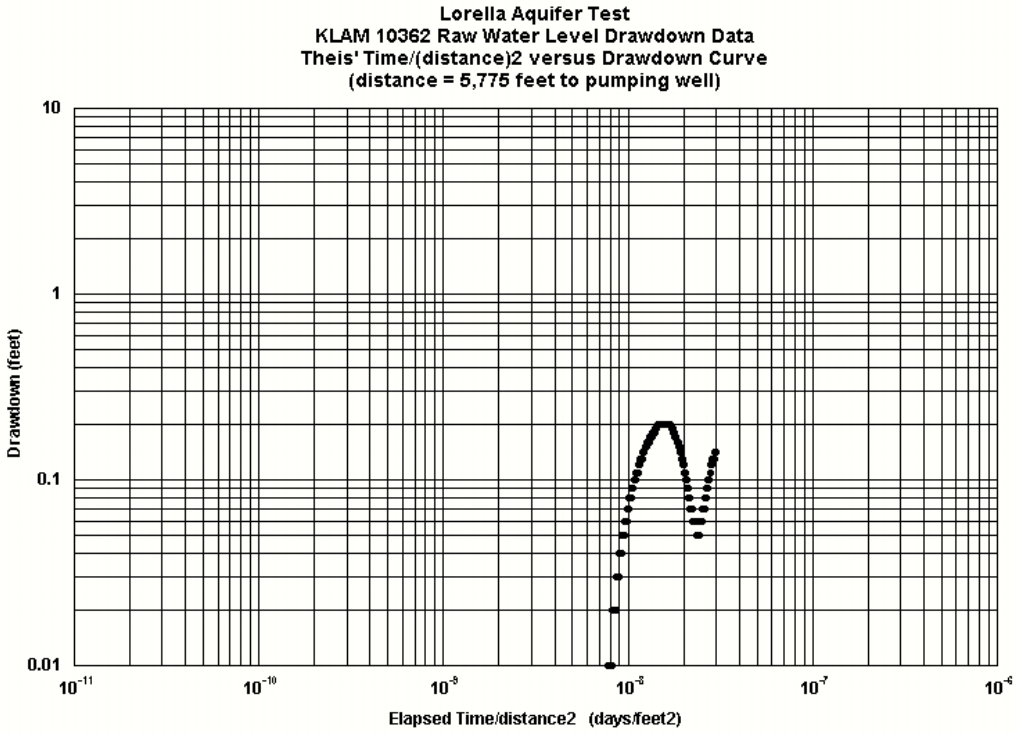

Lorella Aquifer Test
KLAM 52096 Raw Hand Measured Water Level Recovery Data (Jacob's Time versus Recovery)
-0.4
-0.2
0
0.2
0.4
Recovery (ft)
1
10
100
100
Elapsed Time/Recovery Time (Tt/Tr)

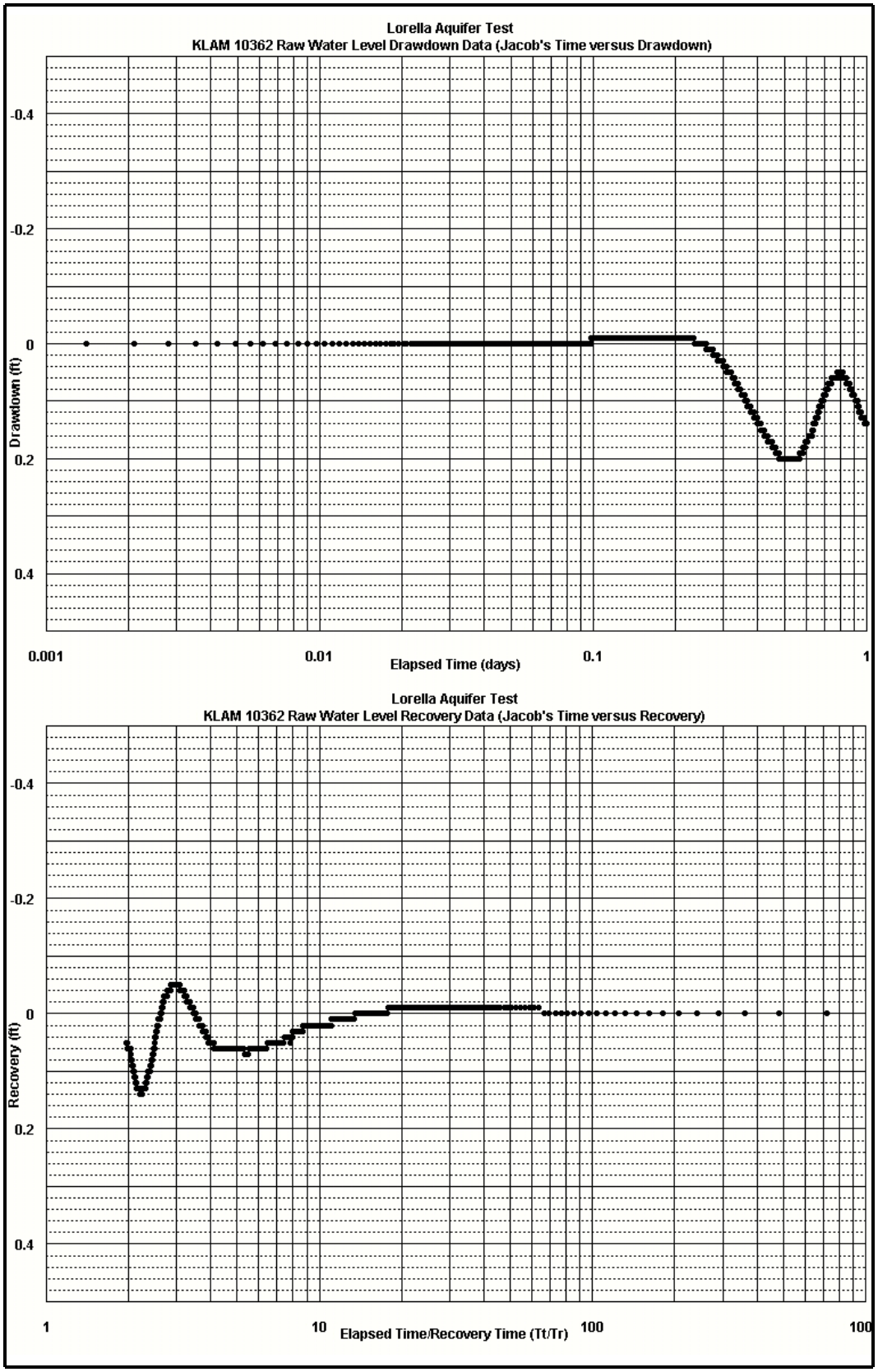

Lorella Aquifer Test
KLAM 52096 Adjusted Hand Measured Water Level Recovery Data (Jacob's Time versus Recovery)
-0.4
-0.2
0
0.2
0.4
Recovery (ft)
1
10
100
100
Elapsed Time/Recovery Time (Tt/Tr)

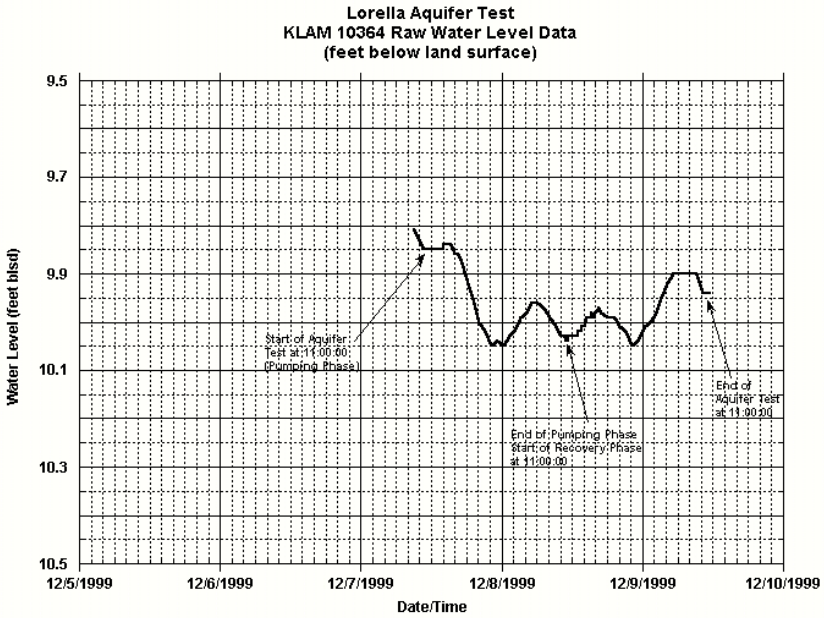

Lorella Aquifer Test
KLAM 10362 Raw Water Level Data
(feet below land surface)
Water Level (feet blsd)
6.5
6.7
6.9
7.1
7.3
7.5
12/5/1999
12/6/1999
12/7/1999
12/8/1999
12/9/1999
12/10/1999
Date/Time
Start of Aquifer Test at 11:00:00 (Pumping Phase)
End of Pumping Phase Start of Recovery Phase at 11:00:00
End of Aquifer Test at 11:00:00

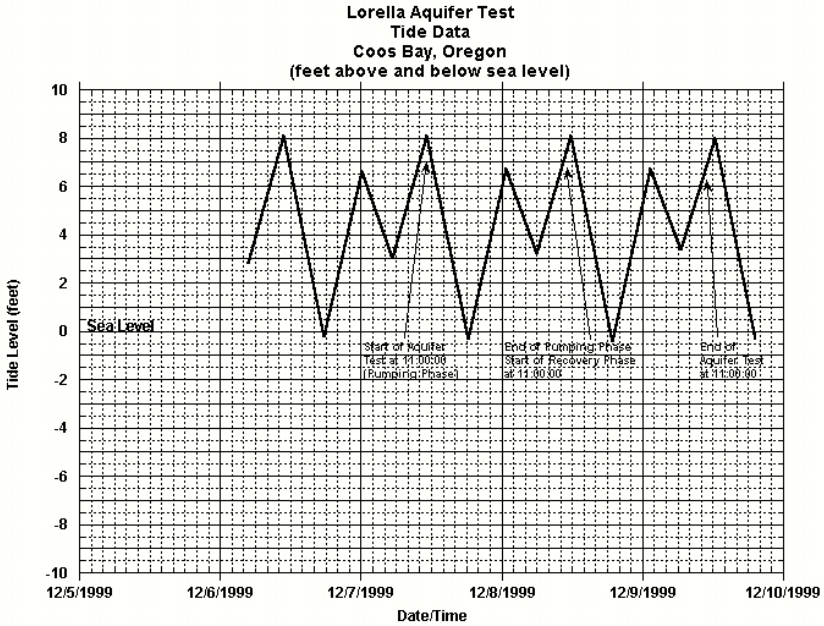

Lorella Aquifer Test
Tide Data
Coos Bay, Oregon
(feet above and below sea level)
Tide Level (feet)
10
8
6
4
2
0
-2
-4
-6
-8
-10
Sea Level
12/5/1999
12/6/1999
12/7/1999
12/8/1999
12/9/1999
12/10/1999
Date/Time
Start of Aquifer Test at 11:00:00 (Pumping Phase)
End of Pumping Phase Start of Recovery Phase at 11:00:00
End of Aquifer Test at 11:00:00

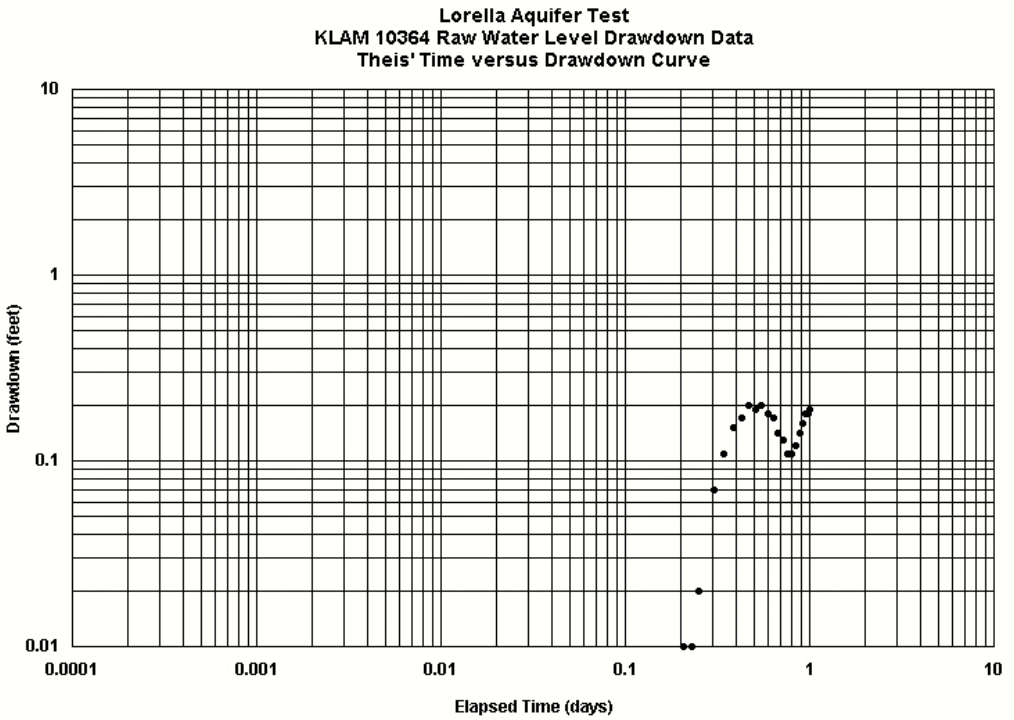

Lorella Aquifer Test
KLAM 10362 Raw Water Level Drawdown Data
Theis' Time versus Drawdown Curve
Drawdown (feet)
10
1
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
Elapsed Time (days)

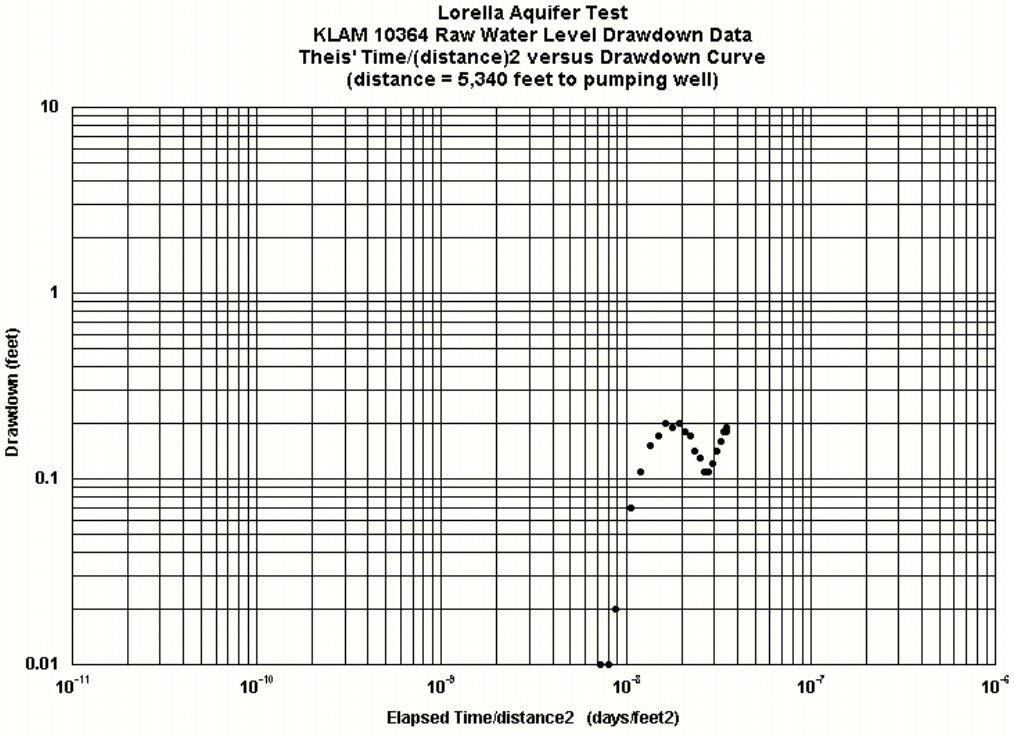

Lorella Aquifer Test
KLAM 10362 Raw Water Level Drawdown Data
Theis' Time/(distance)2 versus Drawdown Curve
(distance = 5,775 feet to pumping well)
Drawdown (feet)
10
1
0.1
0.01
10^-11
10^-10
10^-9
10^-8
10^-7
10^-6
Elapsed Time/distance2 (days/feet2)

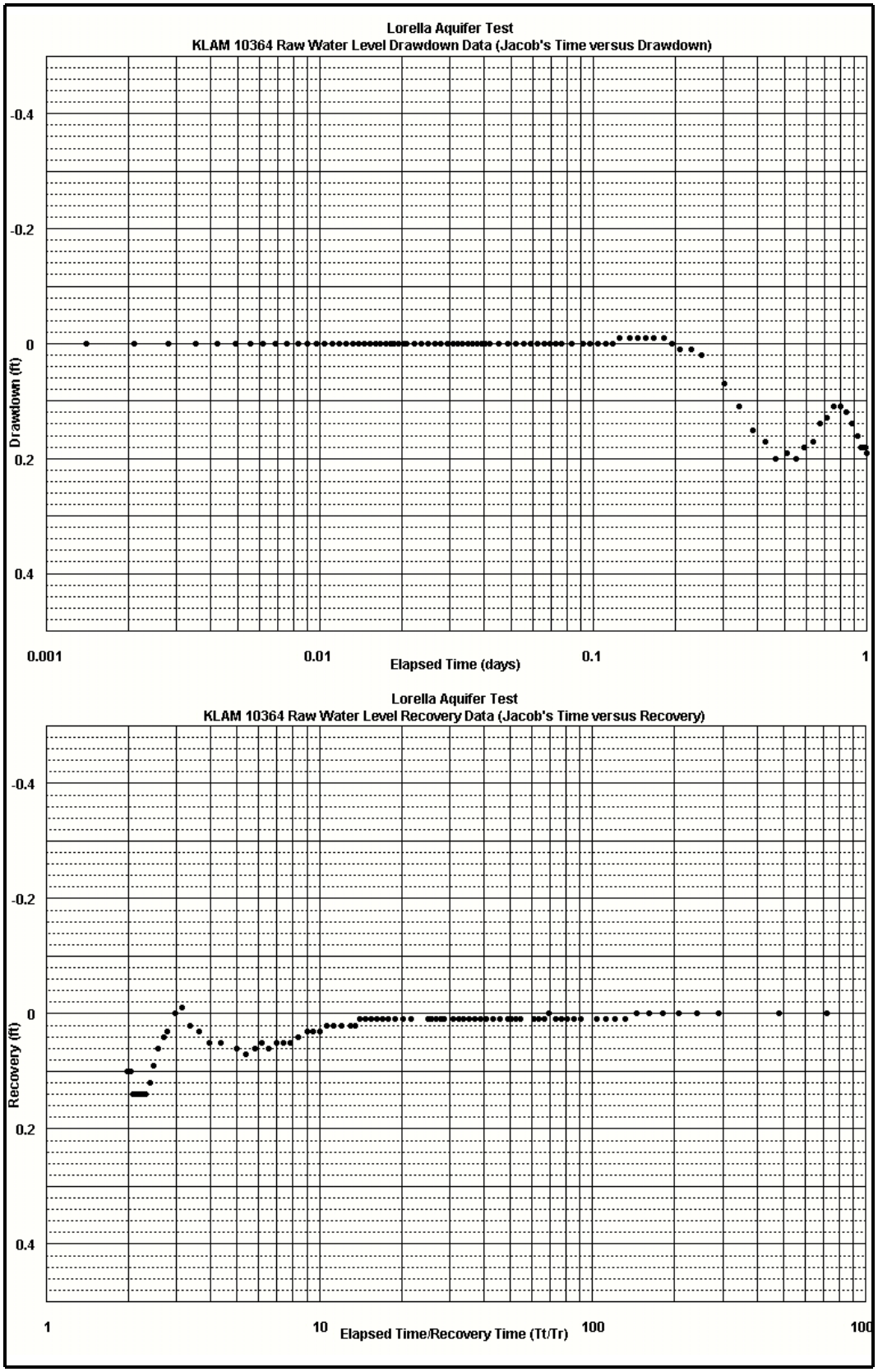

Lorella Aquifer Test
KLAM 10362 Raw Water Level Drawdown Data (Jacob's Time versus Drawdown)
-0.4
-0.2
0
0.2
0.4
Drawdown (ft)
0.001
0.01
0.1
1
Elapsed Time (days)
Lorella Aquifer Test
KLAM 10362 Raw Water Level Recovery Data (Jacob's Time versus Recovery)
-0.4
-0.2
0
0.2
0.4
Recovery (ft)
1
10
100
100
Elapsed Time/Recovery Time (Tt/Tr)


Lorella Aquifer Test
KLAM 10364 Raw Water Level Data
(feet below land surface)
Water Level (feet blsd)
9.5
9.7
9.9
10.1
10.3
10.5
12/5/1999
12/6/1999
12/7/1999
12/8/1999
12/9/1999
12/10/1999
Date/Time
Start of Aquifer Test at 11:00:00 (Pumping Phase)
End of Pumping Phase Start of Recovery Phase at 11:00:00
End of Aquifer Test at 11:00:00


Lorella Aquifer Test
Tide Data
Coos Bay, Oregon
(feet above and below sea level)
Tide Level (feet)
10
8
6
4
2
0
-2
-4
-6
-8
-10
Sea Level
Start of Aquifer Test at 11:00:00 (Pumping Phase)
End of Pumping Phase Start of Recovery Phase at 11:00:00
End of Aquifer Test at 11:00:00
12/5/1999
12/6/1999
12/7/1999
12/8/1999
12/9/1999
12/10/1999
Date/Time


Lorella Aquifer Test
KLAM 10364 Raw Water Level Drawdown Data
Theis' Time versus Drawdown Curve
Drawdown (feet)
10
1
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
Elapsed Time (days)


Lorella Aquifer Test
KLAM 10364 Raw Water Level Drawdown Data
Theis' Time/(distance)2 versus Drawdown Curve
(distance = 5,340 feet to pumping well)
Drawdown (feet)
10
1
0.1
0.01
10-11
10-10
10-9
10-8
10-7
10-6
Elapsed Time/distance2 (days/feet2)


Lorella Aquifer Test
KLAM 10364 Raw Water Level Drawdown Data (Jacob's Time versus Drawdown)
-0.4
-0.2
0
0.2
0.4
Drawdown (ft)
0.001
0.01
0.1
1
Elapsed Time (days)
Lorella Aquifer Test
KLAM 10364 Raw Water Level Recovery Data (Jacob's Time versus Recovery)
-0.4
-0.2
0
0.2
0.4
Recovery (ft)
1
10
100
Elapsed Time/Recovery Time (Tt/Tr)

Appendix 28: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10554)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 aad
OWRD Well Log ID Number: KLAM 10554
Measuring Point: access hole at top of sanitary seal
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,140 feet
Owner Well Name/Number: stock well
Measuring Pt. = 0.75 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
06-Dec-1999 16:23:00	92.19	0.75	91.44		-1,117.00	-0.7757						
07-Dec-1999 09:26:00	92.22	0.75	91.47		-94.00	-0.0653						
07-Dec-1999 10:43:00	92.22	0.75	91.47		-17.00	-0.0118						
07-Dec-1999 10:50:00	92.22	0.75	91.47		-10.00	-0.0069						
07-Dec-1999 11:00:00	92.22	0.75	91.47	**Start Test, Pumping Well On**	0.00	0.0000				0.0000E+00	0.00	
07-Dec-1999 11:01:00	92.25	0.75	91.50		1.00	0.0007				5.3435E-10	0.03	
07-Dec-1999 11:02:00	92.29	0.75	91.54		2.00	0.0014				1.0687E-09	0.07	
07-Dec-1999 11:03:00	92.33	0.75	91.58		3.00	0.0021				1.6031E-09	0.11	
07-Dec-1999 11:04:00	92.37	0.75	91.62		4.00	0.0028				2.1374E-09	0.15	
07-Dec-1999 11:05:00	92.42	0.75	91.67		5.00	0.0035				2.6718E-09	0.20	
07-Dec-1999 11:06:00	92.46	0.75	91.71		6.00	0.0042				3.2061E-09	0.24	
07-Dec-1999 11:07:00	92.50	0.75	91.75		7.00	0.0049				3.7405E-09	0.28	
07-Dec-1999 11:08:00	92.54	0.75	91.79		8.00	0.0056				4.2748E-09	0.32	
07-Dec-1999 11:09:00	92.57	0.75	91.82		9.00	0.0062				4.8092E-09	0.35	
07-Dec-1999 11:10:00	92.61	0.75	91.86		10.00	0.0069				5.3435E-09	0.39	
07-Dec-1999 11:11:00	92.64	0.75	91.89		11.00	0.0076				5.8779E-09	0.42	
07-Dec-1999 11:12:00	92.67	0.75	91.92		12.00	0.0083				6.4122E-09	0.45	
07-Dec-1999 11:13:00	92.70	0.75	91.95		13.00	0.0090				6.9466E-09	0.48	
07-Dec-1999 11:14:00	92.72	0.75	91.97		14.00	0.0097				7.4809E-09	0.50	
07-Dec-1999 11:15:00	92.74	0.75	91.99		15.00	0.0104				8.0153E-09	0.52	
07-Dec-1999 11:16:00	92.76	0.75	92.01		16.00	0.0111				8.5496E-09	0.54	
07-Dec-1999 11:17:00	92.79	0.75	92.04		17.00	0.0118				9.0840E-09	0.57	
07-Dec-1999 11:18:00	92.81	0.75	92.06		18.00	0.0125				9.6183E-09	0.59	
07-Dec-1999 11:19:00	92.84	0.75	92.09		19.00	0.0132				1.0153E-08	0.62	
07-Dec-1999 11:20:00	92.85	0.75	92.10		20.00	0.0139				1.0687E-08	0.63	
07-Dec-1999 11:21:00	92.87	0.75	92.12		21.00	0.0146				1.1221E-08	0.65	
07-Dec-1999 11:22:00	92.89	0.75	92.14		22.00	0.0153				1.1756E-08	0.67	
07-Dec-1999 11:23:00	92.91	0.75	92.16		23.00	0.0160				1.2290E-08	0.69	
07-Dec-1999 11:24:00	92.92	0.75	92.17		24.00	0.0167				1.2824E-08	0.70	
07-Dec-1999 11:25:00	92.93	0.75	92.18		25.00	0.0174				1.3359E-08	0.71	
07-Dec-1999 11:26:00	92.95	0.75	92.20		26.00	0.0181				1.3893E-08	0.73	
07-Dec-1999 11:27:00	92.97	0.75	92.22		27.00	0.0187				1.4428E-08	0.75	
07-Dec-1999 11:28:00	92.99	0.75	92.24		28.00	0.0194				1.4962E-08	0.77	
07-Dec-1999 11:29:00	93.00	0.75	92.25		29.00	0.0201				1.5496E-08	0.78	

Appendix 28: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10554)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 aad
OWRD Well Log ID Number: KLAM 10554
Measuring Point: access hole at top of sanitary seal
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,140 feet
Owner Well Name/Number: stock well
Measuring Pt. = 0.75 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
07-Dec-1999 11:30:00	93.01	0.75	92.26		30.00	0.0208				1.6031E-08	0.79	
07-Dec-1999 11:32:00	93.06	0.75	92.31		32.00	0.0222				1.7099E-08	0.84	
07-Dec-1999 11:34:00	93.09	0.75	92.34		34.00	0.0236				1.8168E-08	0.87	
07-Dec-1999 11:36:00	93.12	0.75	92.37		36.00	0.0250				1.9237E-08	0.90	
07-Dec-1999 11:38:00	93.15	0.75	92.40		38.00	0.0264				2.0305E-08	0.93	
07-Dec-1999 11:40:00	93.17	0.75	92.42		40.00	0.0278				2.1374E-08	0.95	
07-Dec-1999 11:42:00	93.19	0.75	92.44		42.00	0.0292				2.2443E-08	0.97	
07-Dec-1999 11:44:00	93.21	0.75	92.46		44.00	0.0306				2.3512E-08	0.99	
07-Dec-1999 11:46:00	93.23	0.75	92.48		46.00	0.0319				2.4580E-08	1.01	
07-Dec-1999 11:48:00	93.25	0.75	92.50		48.00	0.0333				2.5649E-08	1.03	
07-Dec-1999 11:50:00	93.26	0.75	92.51		50.00	0.0347				2.6718E-08	1.04	
07-Dec-1999 11:52:00	93.28	0.75	92.53		52.00	0.0361				2.7786E-08	1.06	
07-Dec-1999 11:54:00	93.30	0.75	92.55		54.00	0.0375				2.8855E-08	1.08	
07-Dec-1999 11:56:00	93.31	0.75	92.56		56.00	0.0389				2.9924E-08	1.09	
07-Dec-1999 11:58:00	93.32	0.75	92.57		58.00	0.0403				3.0992E-08	1.10	
07-Dec-1999 12:00:00	93.33	0.75	92.58		60.00	0.0417				3.2061E-08	1.11	
07-Dec-1999 12:05:00	93.34	0.75	92.59		65.00	0.0451				3.4733E-08	1.12	
07-Dec-1999 12:10:00	93.39	0.75	92.64		70.00	0.0486				3.7405E-08	1.17	
07-Dec-1999 12:15:00	93.42	0.75	92.67		75.00	0.0521				4.0076E-08	1.20	
07-Dec-1999 12:20:00	93.44	0.75	92.69		80.00	0.0556				4.2748E-08	1.22	
07-Dec-1999 12:25:00	93.47	0.75	92.72		85.00	0.0590				4.5420E-08	1.25	
07-Dec-1999 12:30:00	93.49	0.75	92.74		90.00	0.0625				4.8092E-08	1.27	
07-Dec-1999 12:35:00	93.52	0.75	92.77		95.00	0.0660				5.0763E-08	1.30	
07-Dec-1999 12:40:00	93.54	0.75	92.79		100.00	0.0694				5.3435E-08	1.32	
07-Dec-1999 12:45:00	93.56	0.75	92.81		105.00	0.0729				5.6107E-08	1.34	
07-Dec-1999 12:50:00	93.58	0.75	92.83		110.00	0.0764				5.8779E-08	1.36	
07-Dec-1999 12:55:00	93.60	0.75	92.85		115.00	0.0799				6.1451E-08	1.38	
07-Dec-1999 13:00:00	93.62	0.75	92.87		120.00	0.0833				6.4122E-08	1.40	
07-Dec-1999 13:10:00	93.65	0.75	92.90		130.00	0.0903				6.9466E-08	1.43	
07-Dec-1999 13:20:00	93.69	0.75	92.94		140.00	0.0972				7.4809E-08	1.47	
07-Dec-1999 13:30:00	93.71	0.75	92.96		150.00	0.1042				8.0153E-08	1.49	
07-Dec-1999 13:40:00	93.75	0.75	93.00		160.00	0.1111				8.5496E-08	1.53	
07-Dec-1999 13:50:00	93.77	0.75	93.02		170.00	0.1181				9.0840E-08	1.55	
07-Dec-1999 14:00:00	93.80	0.75	93.05		180.00	0.1250				9.6183E-08	1.58	

Appendix 28: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10554)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 aad
OWRD Well Log ID Number: KLAM 10554
Measuring Point: access hole at top of sanitary seal
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,140 feet
Owner Well Name/Number: stock well
Measuring Pt. = 0.75 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
07-Dec-1999 14:15:00	93.83	0.75	93.08		195.00	0.1354				1.0420E-07	1.61	
07-Dec-1999 14:30:00	93.87	0.75	93.12		210.00	0.1458				1.1221E-07	1.65	
07-Dec-1999 14:45:00	93.90	0.75	93.15		225.00	0.1563				1.2023E-07	1.68	
07-Dec-1999 15:00:00	93.94	0.75	93.19		240.00	0.1667				1.2824E-07	1.72	
07-Dec-1999 15:20:00	93.97	0.75	93.22		260.00	0.1806				1.3893E-07	1.75	
07-Dec-1999 15:40:00	94.01	0.75	93.26		280.00	0.1944				1.4962E-07	1.79	
07-Dec-1999 16:00:00	94.04	0.75	93.29		300.00	0.2083				1.6031E-07	1.82	
07-Dec-1999 16:30:00	94.11	0.75	93.36		330.00	0.2292				1.7634E-07	1.89	
07-Dec-1999 17:00:00	94.13	0.75	93.38	Pump wel operating at 17:05	360.00	0.2500				1.9237E-07	1.91	
07-Dec-1999 18:03:00	94.23	0.75	93.48	Pump off temporarily at 17:22	423.00	0.2937				2.2603E-07	2.01	
07-Dec-1999 19:07:00	94.34	0.75	93.59		487.00	0.3382				2.6023E-07	2.12	
07-Dec-1999 20:05:00	94.40	0.75	93.65		545.00	0.3785				2.9122E-07	2.18	
07-Dec-1999 21:08:00	94.47	0.75	93.72		608.00	0.4222				3.2489E-07	2.25	
07-Dec-1999 22:03:00	94.50	0.75	93.75		663.00	0.4604				3.5428E-07	2.28	
07-Dec-1999 23:30:00	94.56	0.75	93.81		750.00	0.5208				4.0076E-07	2.34	
08-Dec-1999 00:24:00	94.58	0.75	93.83		804.00	0.5583				4.2962E-07	2.36	
08-Dec-1999 01:24:00	94.63	0.75	93.88		864.00	0.6000				4.6168E-07	2.41	
08-Dec-1999 02:23:00	94.66	0.75	93.91		923.00	0.6410				4.9321E-07	2.44	
08-Dec-1999 03:24:00	94.69	0.75	93.94		984.00	0.6833				5.2580E-07	2.47	
08-Dec-1999 04:26:00	94.70	0.75	93.95		1,046.00	0.7264				5.5893E-07	2.48	
08-Dec-1999 05:26:00	94.72	0.75	93.97		1,106.00	0.7681				5.9099E-07	2.50	
08-Dec-1999 06:23:00	94.75	0.75	94.00		1,163.00	0.8076				6.2145E-07	2.53	
08-Dec-1999 07:24:00	94.78	0.75	94.03		1,224.00	0.8500				6.5405E-07	2.56	
08-Dec-1999 08:23:00	94.80	0.75	94.05		1,283.00	0.8910				6.8557E-07	2.58	
08-Dec-1999 09:00:00	94.82	0.75	94.07		1,320.00	0.9167				7.0535E-07	2.60	
08-Dec-1999 09:22:00	94.82	0.75	94.07		1,342.00	0.9319				7.1710E-07	2.60	
08-Dec-1999 10:00:00	94.84	0.75	94.09		1,380.00	0.9583				7.3741E-07	2.62	
08-Dec-1999 10:30:00	94.85	0.75	94.10		1,410.00	0.9792				7.5344E-07	2.63	
08-Dec-1999 10:45:00	94.85	0.75	94.10		1,425.00	0.9896				7.6145E-07	2.63	
08-Dec-1999 11:00:00	94.86	0.75	94.11	**End Pumping, Start Recovery**	1,440.00	1.0000	0.00	0.0000		7.6947E-07	2.64	0.00
08-Dec-1999 11:01:00	94.86	0.75	94.11		1,441.00	1.0007	1.00	0.0007	1,441.00			0.00
08-Dec-1999 11:02:00	94.84	0.75	94.09		1,442.00	1.0014	2.00	0.0014	721.00			0.02
08-Dec-1999 11:03:00	94.83	0.75	94.08		1,443.00	1.0021	3.00	0.0021	481.00			0.03
08-Dec-1999 11:04:00	94.80	0.75	94.05		1,444.00	1.0028	4.00	0.0028	361.00			0.06

Appendix 28: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10554)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 aad
OWRD Well Log ID Number: KLAM 10554
Measuring Point: access hole at top of sanitary seal
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,140 feet
Owner Well Name/Number: stock well
Measuring Pt. = 0.75 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
08-Dec-1999 11:05:00	94.77	0.75	94.02		1,445.00	1.0035	5.00	0.0035	289.00			0.09
08-Dec-1999 11:06:00	94.73	0.75	93.98		1,446.00	1.0042	6.00	0.0042	241.00			0.13
08-Dec-1999 11:07:00	94.70	0.75	93.95		1,447.00	1.0049	7.00	0.0049	206.71			0.16
08-Dec-1999 11:08:00	94.68	0.75	93.93		1,448.00	1.0056	8.00	0.0056	181.00			0.18
08-Dec-1999 11:09:00	94.64	0.75	93.89		1,449.00	1.0062	9.00	0.0062	161.00			0.22
08-Dec-1999 11:10:00	94.61	0.75	93.86		1,450.00	1.0069	10.00	0.0069	145.00			0.25
08-Dec-1999 11:11:00	94.59	0.75	93.84		1,451.00	1.0076	11.00	0.0076	131.91			0.27
08-Dec-1999 11:12:00	94.55	0.75	93.80		1,452.00	1.0083	12.00	0.0083	121.00			0.31
08-Dec-1999 11:13:00	94.52	0.75	93.77		1,453.00	1.0090	13.00	0.0090	111.77			0.34
08-Dec-1999 11:14:00	94.50	0.75	93.75		1,454.00	1.0097	14.00	0.0097	103.86			0.36
08-Dec-1999 11:15:00	94.48	0.75	93.73		1,455.00	1.0104	15.00	0.0104	97.00			0.38
08-Dec-1999 11:16:00	94.45	0.75	93.70		1,456.00	1.0111	16.00	0.0111	91.00			0.41
08-Dec-1999 11:17:00	94.43	0.75	93.68		1,457.00	1.0118	17.00	0.0118	85.71			0.43
08-Dec-1999 11:18:00	94.41	0.75	93.66		1,458.00	1.0125	18.00	0.0125	81.00			0.45
08-Dec-1999 11:19:00	94.39	0.75	93.64		1,459.00	1.0132	19.00	0.0132	76.79			0.47
08-Dec-1999 11:20:00	94.36	0.75	93.61		1,460.00	1.0139	20.00	0.0139	73.00			0.50
08-Dec-1999 11:21:00	94.35	0.75	93.60		1,461.00	1.0146	21.00	0.0146	69.57			0.51
08-Dec-1999 11:22:00	94.33	0.75	93.58		1,462.00	1.0153	22.00	0.0153	66.45			0.53
08-Dec-1999 11:23:00	94.31	0.75	93.56		1,463.00	1.0160	23.00	0.0160	63.61			0.55
08-Dec-1999 11:24:00	94.28	0.75	93.53		1,464.00	1.0167	24.00	0.0167	61.00			0.58
08-Dec-1999 11:25:00	94.27	0.75	93.52		1,465.00	1.0174	25.00	0.0174	58.60			0.59
08-Dec-1999 11:26:00	94.26	0.75	93.51		1,466.00	1.0181	26.00	0.0181	56.38			0.60
08-Dec-1999 11:27:00	94.25	0.75	93.50		1,467.00	1.0187	27.00	0.0187	54.33			0.61
08-Dec-1999 11:28:00	94.23	0.75	93.48		1,468.00	1.0194	28.00	0.0194	52.43			0.63
08-Dec-1999 11:29:00	94.21	0.75	93.46		1,469.00	1.0201	29.00	0.0201	50.66			0.65
08-Dec-1999 11:30:00	94.20	0.75	93.45		1,470.00	1.0208	30.00	0.0208	49.00			0.66
08-Dec-1999 11:32:00	94.17	0.75	93.42		1,472.00	1.0222	32.00	0.0222	46.00			0.69
08-Dec-1999 11:34:00	94.14	0.75	93.39		1,474.00	1.0236	34.00	0.0236	43.35			0.72
08-Dec-1999 11:36:00	94.12	0.75	93.37		1,476.00	1.0250	36.00	0.0250	41.00			0.74
08-Dec-1999 11:38:00	94.10	0.75	93.35		1,478.00	1.0264	38.00	0.0264	38.89			0.76
08-Dec-1999 11:40:00	94.07	0.75	93.32		1,480.00	1.0278	40.00	0.0278	37.00			0.79
08-Dec-1999 11:42:00	94.05	0.75	93.30		1,482.00	1.0292	42.00	0.0292	35.29			0.81
08-Dec-1999 11:44:00	94.03	0.75	93.28		1,484.00	1.0306	44.00	0.0306	33.73			0.83
08-Dec-1999 11:46:00	94.01	0.75	93.26		1,486.00	1.0319	46.00	0.0319	32.30			0.85

Appendix 28: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10554)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 aad
OWRD Well Log ID Number: KLAM 10554
Measuring Point: access hole at top of sanitary seal
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,140 feet
Owner Well Name/Number: stock well
Measuring Pt. = 0.75 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
08-Dec-1999 11:48:00	93.99	0.75	93.24		1,488.00	1.0333	48.00	0.0333	31.00			0.87
08-Dec-1999 11:50:00	93.97	0.75	93.22		1,490.00	1.0347	50.00	0.0347	29.80			0.89
08-Dec-1999 11:52:00	93.96	0.75	93.21		1,492.00	1.0361	52.00	0.0361	28.69			0.90
08-Dec-1999 11:54:00	93.94	0.75	93.19		1,494.00	1.0375	54.00	0.0375	27.67			0.92
08-Dec-1999 11:56:00	93.92	0.75	93.17		1,496.00	1.0389	56.00	0.0389	26.71			0.94
08-Dec-1999 11:58:00	93.91	0.75	93.16		1,498.00	1.0403	58.00	0.0403	25.83			0.95
08-Dec-1999 12:00:00	93.89	0.75	93.14		1,500.00	1.0417	60.00	0.0417	25.00			0.97
08-Dec-1999 12:05:00	93.85	0.75	93.10		1,505.00	1.0451	65.00	0.0451	23.15			1.01
08-Dec-1999 12:10:00	93.82	0.75	93.07		1,510.00	1.0486	70.00	0.0486	21.57			1.04
08-Dec-1999 12:15:00	93.79	0.75	93.04		1,515.00	1.0521	75.00	0.0521	20.20			1.07
08-Dec-1999 12:20:00	93.76	0.75	93.01		1,520.00	1.0556	80.00	0.0556	19.00			1.10
08-Dec-1999 12:25:00	93.73	0.75	92.98		1,525.00	1.0590	85.00	0.0590	17.94			1.13
08-Dec-1999 12:30:00	93.70	0.75	92.95		1,530.00	1.0625	90.00	0.0625	17.00			1.16
08-Dec-1999 12:35:00	93.67	0.75	92.92		1,535.00	1.0660	95.00	0.0660	16.16			1.19
08-Dec-1999 12:40:00	93.65	0.75	92.90		1,540.00	1.0694	100.00	0.0694	15.40			1.21
08-Dec-1999 12:45:00	93.63	0.75	92.88		1,545.00	1.0729	105.00	0.0729	14.71			1.23
08-Dec-1999 12:50:00	93.61	0.75	92.86		1,550.00	1.0764	110.00	0.0764	14.09			1.25
08-Dec-1999 12:55:00	93.58	0.75	92.83		1,555.00	1.0799	115.00	0.0799	13.52			1.28
08-Dec-1999 13:00:00	93.56	0.75	92.81		1,560.00	1.0833	120.00	0.0833	13.00			1.30
08-Dec-1999 13:10:00	93.53	0.75	92.78		1,570.00	1.0903	130.00	0.0903	12.08			1.33
08-Dec-1999 13:20:00	93.49	0.75	92.74		1,580.00	1.0972	140.00	0.0972	11.29			1.37
08-Dec-1999 13:30:00	93.46	0.75	92.71		1,590.00	1.1042	150.00	0.1042	10.60			1.40
08-Dec-1999 13:40:00	93.43	0.75	92.68		1,600.00	1.1111	160.00	0.1111	10.00			1.43
08-Dec-1999 13:50:00	93.41	0.75	92.66		1,610.00	1.1181	170.00	0.1181	9.47			1.45
08-Dec-1999 14:00:00	93.39	0.75	92.64		1,620.00	1.1250	180.00	0.1250	9.00			1.47
08-Dec-1999 14:15:00	93.35	0.75	92.60		1,635.00	1.1354	195.00	0.1354	8.38			1.51
08-Dec-1999 14:30:00	93.31	0.75	92.56		1,650.00	1.1458	210.00	0.1458	7.86			1.55
08-Dec-1999 14:45:00	93.27	0.75	92.52		1,665.00	1.1563	225.00	0.1563	7.40			1.59
08-Dec-1999 15:00:00	93.26	0.75	92.51		1,680.00	1.1667	240.00	0.1667	7.00			1.60
08-Dec-1999 15:20:00	93.23	0.75	92.48		1,700.00	1.1806	260.00	0.1806	6.54			1.63
08-Dec-1999 15:40:00	93.20	0.75	92.45		1,720.00	1.1944	280.00	0.1944	6.14			1.66
08-Dec-1999 16:00:00	93.16	0.75	92.41		1,740.00	1.2083	300.00	0.2083	5.80			1.70
08-Dec-1999 16:30:00	93.13	0.75	92.38		1,770.00	1.2292	330.00	0.2292	5.36			1.73
08-Dec-1999 17:00:00	93.10	0.75	92.35		1,800.00	1.2500	360.00	0.2500	5.00			1.76

Appendix 28: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10554)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 aad
OWRD Well Log ID Number: KLAM 10554
Measuring Point: access hole at top of sanitary seal
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,140 feet
Owner Well Name/Number: stock well
Measuring Pt. = 0.75 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
08-Dec-1999 18:20:00				No measure: pump in this well on	1,880.00	1.3056	440.00	0.3056	4.27			
08-Dec-1999 19:20:00	92.95	0.75	92.20	recorded: hold = 95, cut = -2.95	1,940.00	1.3472	500.00	0.3472	3.88			1.91
08-Dec-1999 20:19:00	92.89	0.75	92.14	recorded: hold = 95, cut = -2.89	1,999.00	1.3882	559.00	0.3882	3.58			1.97
08-Dec-1999 21:19:00	92.86	0.75	92.11	recorded: hold = 95, cut = -2.86	2,059.00	1.4299	619.00	0.4299	3.33			2.00
08-Dec-1999 22:19:00	92.83	0.75	92.08	recorded: hold = 95, cut = -2.83	2,119.00	1.4715	679.00	0.4715	3.12			2.03
08-Dec-1999 23:19:00	92.78	0.75	92.03	recorded: hold = 95, cut = -2.78	2,179.00	1.5132	739.00	0.5132	2.95			2.08
09-Dec-1999 00:20:00	92.74	0.75	91.99		2,240.00	1.5556	800.00	0.5556	2.80			2.12
09-Dec-1999 01:08:00	92.72	0.75	91.97		2,288.00	1.5889	848.00	0.5889	2.70			2.14
09-Dec-1999 02:08:00	92.68	0.75	91.93		2,348.00	1.6306	908.00	0.6306	2.59			2.18
09-Dec-1999 03:07:00	92.66	0.75	91.91		2,407.00	1.6715	967.00	0.6715	2.49			2.20
09-Dec-1999 04:08:00	92.63	0.75	91.88		2,468.00	1.7139	1,028.00	0.7139	2.40			2.23
09-Dec-1999 05:07:00	92.61	0.75	91.86		2,527.00	1.7549	1,087.00	0.7549	2.32			2.25
09-Dec-1999 06:11:00	92.60	0.75	91.85		2,591.00	1.7993	1,151.00	0.7993	2.25			2.26
09-Dec-1999 07:11:00	92.61	0.75	91.86		2,651.00	1.8410	1,211.00	0.8410	2.19			2.25
09-Dec-1999 08:10:00	92.61	0.75	91.86		2,710.00	1.8819	1,270.00	0.8819	2.13			2.25
09-Dec-1999 09:07:00	92.61	0.75	91.86		2,767.00	1.9215	1,327.00	0.9215	2.09			2.25
09-Dec-1999 10:09:00	92.61	0.75	91.86		2,829.00	1.9646	1,389.00	0.9646	2.04			2.25
09-Dec-1999 11:23:00	92.60	0.75	91.85	**End of Test**	2,903.00	2.0160	1,463.00	1.0160	1.98			2.26

Appendix 28: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10554)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 aad
OWRD Well Log ID Number: KLAM 10554
Measuring Point: access hole at top of sanitary seal
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,140 feet
Owner Well Name/Number: stock well
Measuring Pt. = 0.75 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 04:08:00 (hPascal)	Barometric Change from 9 Dec 1999 at 04:08:00 (feet of water)	Water Level Change from 9 Dec 1999 at 04:08:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
06-Dec-1999 16:23:00								91.44		
07-Dec-1999 09:26:00	880.50	29.46						91.47		
07-Dec-1999 10:43:00	880.98	29.48					0.02	91.46		
07-Dec-1999 10:50:00	880.98	29.48					0.02	91.46		
07-Dec-1999 11:00:00	880.98	29.48					0.02	91.46	0.00	
07-Dec-1999 11:01:00	880.98	29.48					0.02	91.49	0.03	
07-Dec-1999 11:02:00	880.98	29.48					0.02	91.53	0.07	
07-Dec-1999 11:03:00	880.98	29.48					0.02	91.57	0.11	
07-Dec-1999 11:04:00	880.98	29.48					0.02	91.61	0.15	
07-Dec-1999 11:05:00	880.98	29.48					0.02	91.66	0.20	
07-Dec-1999 11:06:00	880.98	29.48					0.02	91.70	0.24	
07-Dec-1999 11:07:00	880.98	29.48					0.02	91.74	0.28	
07-Dec-1999 11:08:00	880.98	29.48					0.02	91.78	0.32	
07-Dec-1999 11:09:00	880.98	29.48					0.02	91.81	0.35	
07-Dec-1999 11:10:00	880.98	29.48					0.02	91.85	0.39	
07-Dec-1999 11:11:00	880.98	29.48					0.02	91.88	0.42	
07-Dec-1999 11:12:00	880.98	29.48					0.02	91.91	0.45	
07-Dec-1999 11:13:00	880.98	29.48					0.02	91.94	0.48	
07-Dec-1999 11:14:00	880.98	29.48					0.02	91.96	0.50	
07-Dec-1999 11:15:00	880.98	29.48					0.02	91.98	0.52	
07-Dec-1999 11:16:00	880.98	29.48					0.02	92.00	0.54	
07-Dec-1999 11:17:00	880.98	29.48					0.02	92.03	0.57	
07-Dec-1999 11:18:00	881.22	29.49					0.02	92.05	0.59	
07-Dec-1999 11:19:00	881.22	29.49					0.02	92.08	0.62	
07-Dec-1999 11:20:00	881.22	29.49					0.02	92.09	0.63	
07-Dec-1999 11:21:00	881.22	29.49					0.02	92.11	0.65	
07-Dec-1999 11:22:00	881.22	29.49					0.02	92.13	0.67	
07-Dec-1999 11:23:00	881.22	29.49					0.02	92.15	0.69	
07-Dec-1999 11:24:00	881.22	29.49					0.02	92.16	0.70	
07-Dec-1999 11:25:00	881.22	29.49					0.02	92.17	0.71	
07-Dec-1999 11:26:00	881.22	29.49					0.02	92.19	0.73	
07-Dec-1999 11:27:00	880.98	29.48					0.02	92.21	0.75	
07-Dec-1999 11:28:00	880.98	29.48					0.02	92.23	0.77	
07-Dec-1999 11:29:00	880.98	29.48					0.02	92.24	0.78	

Appendix 28: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10554)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 aad
OWRD Well Log ID Number: KLAM 10554
Measuring Point: access hole at top of sanitary seal
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,140 feet
Owner Well Name/Number: stock well
Measuring Pt. = 0.75 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 04:08:00 (hPascal)	Barometric Change from 9 Dec 1999 at 04:08:00 (feet of water)	Water Level Change from 9 Dec 1999 at 04:08:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
07-Dec-1999 11:30:00	881.22	29.49					0.02	92.25	0.79	
07-Dec-1999 11:32:00	881.22	29.49					0.02	92.30	0.84	
07-Dec-1999 11:34:00	881.22	29.49					0.02	92.33	0.87	
07-Dec-1999 11:36:00	881.22	29.49					0.02	92.36	0.90	
07-Dec-1999 11:38:00	881.22	29.49					0.02	92.39	0.93	
07-Dec-1999 11:40:00	881.22	29.49					0.02	92.41	0.95	
07-Dec-1999 11:42:00	881.22	29.49					0.02	92.43	0.97	
07-Dec-1999 11:44:00	881.22	29.49					0.02	92.45	0.99	
07-Dec-1999 11:46:00	881.22	29.49					0.02	92.47	1.01	
07-Dec-1999 11:48:00	881.22	29.49					0.02	92.49	1.03	
07-Dec-1999 11:50:00	881.22	29.49					0.02	92.50	1.04	
07-Dec-1999 11:52:00	881.22	29.49					0.02	92.52	1.06	
07-Dec-1999 11:54:00	881.22	29.49					0.02	92.54	1.08	
07-Dec-1999 11:56:00	881.22	29.49					0.02	92.55	1.09	
07-Dec-1999 11:58:00	881.22	29.49					0.02	92.56	1.10	
07-Dec-1999 12:00:00	881.22	29.49					0.02	92.57	1.11	
07-Dec-1999 12:05:00	881.22	29.49					0.02	92.58	1.12	
07-Dec-1999 12:10:00	881.22	29.49					0.02	92.63	1.17	
07-Dec-1999 12:15:00	880.98	29.48					0.02	92.66	1.20	
07-Dec-1999 12:20:00	881.22	29.49					0.02	92.68	1.22	
07-Dec-1999 12:25:00	881.22	29.49					0.02	92.71	1.25	
07-Dec-1999 12:30:00	881.22	29.49					0.02	92.73	1.27	
07-Dec-1999 12:35:00	880.98	29.48					0.02	92.76	1.30	
07-Dec-1999 12:40:00	881.22	29.49					0.02	92.78	1.32	
07-Dec-1999 12:45:00	881.22	29.49					0.02	92.80	1.34	
07-Dec-1999 12:50:00	881.22	29.49					0.02	92.82	1.36	
07-Dec-1999 12:55:00	881.22	29.49					0.02	92.84	1.38	
07-Dec-1999 13:00:00	881.22	29.49					0.02	92.86	1.40	
07-Dec-1999 13:10:00	881.22	29.49					0.02	92.89	1.43	
07-Dec-1999 13:20:00	881.46	29.49					0.03	92.92	1.46	
07-Dec-1999 13:30:00	881.22	29.49					0.02	92.95	1.49	
07-Dec-1999 13:40:00	881.46	29.49					0.03	92.98	1.52	
07-Dec-1999 13:50:00	881.46	29.49					0.03	93.00	1.54	
07-Dec-1999 14:00:00	881.46	29.49					0.03	93.03	1.57	

Appendix 28: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10554)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 aad
OWRD Well Log ID Number: KLAM 10554
Measuring Point: access hole at top of sanitary seal
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,140 feet
Owner Well Name/Number: stock well
Measuring Pt. = 0.75 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 04:08:00 (hPascal)	Barometric Change from 9 Dec 1999 at 04:08:00 (feet of water)	Water Level Change from 9 Dec 1999 at 04:08:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
07-Dec-1999 14:15:00	881.46	29.49					0.03	93.06	1.60	
07-Dec-1999 14:30:00	881.70	29.50					0.04	93.10	1.64	
07-Dec-1999 14:45:00	881.70	29.50					0.04	93.13	1.67	
07-Dec-1999 15:00:00	882.18	29.52					0.06	93.16	1.70	
07-Dec-1999 15:20:00	882.18	29.52					0.06	93.19	1.73	
07-Dec-1999 15:40:00	882.65	29.53					0.07	93.22	1.76	
07-Dec-1999 16:00:00	882.65	29.53					0.07	93.25	1.79	
07-Dec-1999 16:30:00	882.89	29.54					0.08	93.32	1.86	
07-Dec-1999 17:00:00	882.89	29.54					0.08	93.34	1.88	
07-Dec-1999 18:03:00	883.61	29.57					0.10	93.43	1.97	
07-Dec-1999 19:07:00	884.33	29.59					0.13	93.53	2.07	
07-Dec-1999 20:05:00	885.05	29.61					0.15	93.57	2.11	
07-Dec-1999 21:08:00	885.29	29.62					0.16	93.64	2.18	
07-Dec-1999 22:03:00	885.53	29.63					0.17	93.67	2.21	
07-Dec-1999 23:30:00	886.24	29.65					0.19	93.71	2.25	
08-Dec-1999 00:24:00	886.48	29.66					0.20	93.73	2.27	
08-Dec-1999 01:24:00	886.48	29.66					0.20	93.78	2.32	
08-Dec-1999 02:23:00	887.20	29.69					0.22	93.80	2.34	
08-Dec-1999 03:24:00	886.72	29.67					0.21	93.84	2.38	
08-Dec-1999 04:26:00	886.72	29.67					0.21	93.85	2.39	
08-Dec-1999 05:26:00	886.96	29.68					0.22	93.86	2.40	
08-Dec-1999 06:23:00	886.96	29.68					0.22	93.89	2.43	
08-Dec-1999 07:24:00	887.20	29.69					0.22	93.92	2.46	
08-Dec-1999 08:23:00	886.96	29.68					0.22	93.94	2.48	
08-Dec-1999 09:00:00	886.96	29.68					0.22	93.96	2.50	
08-Dec-1999 09:22:00	886.72	29.67					0.21	93.97	2.51	
08-Dec-1999 10:00:00	886.72	29.67					0.21	93.99	2.53	
08-Dec-1999 10:30:00	886.48	29.66					0.20	94.00	2.54	
08-Dec-1999 10:45:00	886.48	29.66					0.20	94.00	2.54	
08-Dec-1999 11:00:00	886.48	29.66					0.20	94.01	2.55	0.00
08-Dec-1999 11:01:00	886.48	29.66					0.20	94.01		0.00
08-Dec-1999 11:02:00	886.48	29.66					0.20	93.99		0.02
08-Dec-1999 11:03:00	886.48	29.66					0.20	93.98		0.03
08-Dec-1999 11:04:00	886.48	29.66					0.20	93.95		0.06

Appendix 28: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10554)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 aad
OWRD Well Log ID Number: KLAM 10554
Measuring Point: access hole at top of sanitary seal
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,140 feet
Owner Well Name/Number: stock well
Measuring Pt. = 0.75 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 04:08:00 (hPascal)	Barometric Change from 9 Dec 1999 at 04:08:00 (feet of water)	Water Level Change from 9 Dec 1999 at 04:08:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
08-Dec-1999 11:05:00	886.48	29.66					0.20	93.92		0.09
08-Dec-1999 11:06:00	886.48	29.66					0.20	93.88		0.13
08-Dec-1999 11:07:00	886.48	29.66					0.20	93.85		0.16
08-Dec-1999 11:08:00	886.24	29.65					0.19	93.83		0.18
08-Dec-1999 11:09:00	886.48	29.66					0.20	93.79		0.22
08-Dec-1999 11:10:00	886.24	29.65					0.19	93.76		0.25
08-Dec-1999 11:11:00	886.24	29.65					0.19	93.74		0.27
08-Dec-1999 11:12:00	886.24	29.65					0.19	93.70		0.31
08-Dec-1999 11:13:00	886.24	29.65					0.19	93.67		0.34
08-Dec-1999 11:14:00	886.48	29.66					0.20	93.65		0.36
08-Dec-1999 11:15:00	886.24	29.65					0.19	93.63		0.38
08-Dec-1999 11:16:00	886.24	29.65					0.19	93.60		0.41
08-Dec-1999 11:17:00	886.24	29.65					0.19	93.58		0.43
08-Dec-1999 11:18:00	886.24	29.65					0.19	93.56		0.45
08-Dec-1999 11:19:00	886.24	29.65					0.19	93.54		0.47
08-Dec-1999 11:20:00	886.24	29.65					0.19	93.51		0.50
08-Dec-1999 11:21:00	886.24	29.65					0.19	93.50		0.51
08-Dec-1999 11:22:00	886.24	29.65					0.19	93.48		0.53
08-Dec-1999 11:23:00	886.24	29.65					0.19	93.46		0.55
08-Dec-1999 11:24:00	886.24	29.65					0.19	93.43		0.58
08-Dec-1999 11:25:00	886.24	29.65					0.19	93.42		0.59
08-Dec-1999 11:26:00	886.24	29.65					0.19	93.41		0.60
08-Dec-1999 11:27:00	886.24	29.65					0.19	93.40		0.61
08-Dec-1999 11:28:00	886.24	29.65					0.19	93.38		0.63
08-Dec-1999 11:29:00	886.24	29.65					0.19	93.36		0.65
08-Dec-1999 11:30:00	886.24	29.65					0.19	93.35		0.66
08-Dec-1999 11:32:00	886.24	29.65					0.19	93.32		0.69
08-Dec-1999 11:34:00	886.24	29.65					0.19	93.29		0.72
08-Dec-1999 11:36:00	886.24	29.65					0.19	93.27		0.74
08-Dec-1999 11:38:00	886.24	29.65					0.19	93.25		0.76
08-Dec-1999 11:40:00	886.24	29.65					0.19	93.22		0.79
08-Dec-1999 11:42:00	886.24	29.65					0.19	93.20		0.81
08-Dec-1999 11:44:00	886.01	29.65					0.18	93.19		0.82
08-Dec-1999 11:46:00	886.24	29.65					0.19	93.16		0.85

Appendix 28: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10554)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 aad
OWRD Well Log ID Number: KLAM 10554
Measuring Point: access hole at top of sanitary seal
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,140 feet
Owner Well Name/Number: stock well
Measuring Pt. = 0.75 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 04:08:00 (hPascal)	Barometric Change from 9 Dec 1999 at 04:08:00 (feet of water)	Water Level Change from 9 Dec 1999 at 04:08:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
08-Dec-1999 11:48:00	886.01	29.65					0.18	93.15		0.86
08-Dec-1999 11:50:00	886.01	29.65					0.18	93.13		0.88
08-Dec-1999 11:52:00	886.01	29.65					0.18	93.12		0.89
08-Dec-1999 11:54:00	886.01	29.65					0.18	93.10		0.91
08-Dec-1999 11:56:00	886.01	29.65					0.18	93.08		0.93
08-Dec-1999 11:58:00	886.01	29.65					0.18	93.07		0.94
08-Dec-1999 12:00:00	886.01	29.65					0.18	93.05		0.96
08-Dec-1999 12:05:00	885.77	29.64					0.18	93.01		1.00
08-Dec-1999 12:10:00	885.77	29.64					0.18	92.98		1.03
08-Dec-1999 12:15:00	885.77	29.64					0.18	92.95		1.06
08-Dec-1999 12:20:00	885.77	29.64					0.18	92.92		1.09
08-Dec-1999 12:25:00	885.53	29.63					0.17	92.90		1.11
08-Dec-1999 12:30:00	885.29	29.62					0.16	92.87		1.14
08-Dec-1999 12:35:00	885.29	29.62					0.16	92.84		1.17
08-Dec-1999 12:40:00	885.29	29.62					0.16	92.82		1.19
08-Dec-1999 12:45:00	885.29	29.62					0.16	92.80		1.21
08-Dec-1999 12:50:00	885.05	29.61					0.15	92.78		1.23
08-Dec-1999 12:55:00	885.05	29.61					0.15	92.75		1.26
08-Dec-1999 13:00:00	885.05	29.61					0.15	92.73		1.28
08-Dec-1999 13:10:00	884.81	29.61					0.14	92.71		1.30
08-Dec-1999 13:20:00	884.81	29.61					0.14	92.67		1.34
08-Dec-1999 13:30:00	884.33	29.59					0.13	92.65		1.36
08-Dec-1999 13:40:00	884.33	29.59					0.13	92.62		1.39
08-Dec-1999 13:50:00	884.33	29.59					0.13	92.60		1.41
08-Dec-1999 14:00:00	884.33	29.59					0.13	92.58		1.43
08-Dec-1999 14:15:00	884.33	29.59					0.13	92.54		1.47
08-Dec-1999 14:30:00	883.37	29.56					0.10	92.51		1.50
08-Dec-1999 14:45:00	883.37	29.56					0.10	92.47		1.54
08-Dec-1999 15:00:00	883.37	29.56					0.10	92.46		1.55
08-Dec-1999 15:20:00	883.37	29.56					0.10	92.43		1.58
08-Dec-1999 15:40:00	883.37	29.56					0.10	92.40		1.61
08-Dec-1999 16:00:00	883.13	29.55					0.09	92.37		1.64
08-Dec-1999 16:30:00	882.89	29.54					0.08	92.34		1.67
08-Dec-1999 17:00:00	882.89	29.54					0.08	92.31		1.70

Appendix 28: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10554)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 aad
OWRD Well Log ID Number: KLAM 10554
Measuring Point: access hole at top of sanitary seal
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,140 feet
Owner Well Name/Number: stock well
Measuring Pt. = 0.75 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 04:08:00 (hPascal)	Barometric Change from 9 Dec 1999 at 04:08:00 (feet of water)	Water Level Change from 9 Dec 1999 at 04:08:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
08-Dec-1999 18:20:00	881.70	29.50					0.04			
08-Dec-1999 19:20:00	880.98	29.48					0.02	92.19		1.82
08-Dec-1999 20:19:00	880.74	29.47					0.01	92.14		1.87
08-Dec-1999 21:19:00	880.26	29.45					-0.01	92.11		1.90
08-Dec-1999 22:19:00	880.02	29.45					-0.02	92.09		1.92
08-Dec-1999 23:19:00	879.30	29.42					-0.04	92.05		1.96
09-Dec-1999 00:20:00	879.06	29.41	0.71	0.02	-0.11		-0.05	92.01		2.00
09-Dec-1999 01:08:00	879.30	29.42	0.95	0.03	-0.09		-0.04	91.99		2.02
09-Dec-1999 02:08:00	879.30	29.42	0.95	0.03	-0.05		-0.04	91.95		2.06
09-Dec-1999 03:07:00	878.82	29.41	0.47	0.02	-0.03		-0.06	91.94		2.07
09-Dec-1999 04:08:00	878.35	29.39	0.00	0.00	0.00		-0.07	91.92		2.09
09-Dec-1999 05:07:00	878.82	29.41	0.47	0.02	0.02	1.27	-0.06	91.89		2.12
09-Dec-1999 06:11:00	878.82	29.41	0.47	0.02	0.03	1.91	-0.06	91.88		2.13
09-Dec-1999 07:11:00	879.30	29.42	0.95	0.03	0.02	0.63	-0.04	91.88		2.13
09-Dec-1999 08:10:00	879.54	29.43	1.19	0.04	0.02	0.50	-0.03	91.88		2.13
09-Dec-1999 09:07:00	879.78	29.44	1.43	0.05	0.02	0.42	-0.02	91.87		2.14
09-Dec-1999 10:09:00	880.26	29.45	1.91	0.06	0.02	0.31	-0.01	91.86		2.15
09-Dec-1999 11:23:00	880.02	29.45	1.67	0.06	0.03	0.54	-0.02	91.86		2.15

Appendix 29: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52204)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52204
Measuring Point: access hole at top of sanitary seal
Measuring Tool: pressure transducer and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: shallow water level well
Measuring Pt. = 2.15 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
06-Dec-1999 16:37:00	32.51		30.36	Recorder Reading	-1,103.00	-0.7660						
06-Dec-1999 17:00:00	32.47		30.32	Recorder Reading	-1,080.00	-0.7500						
06-Dec-1999 18:00:00	32.47		30.32	Recorder Reading	-1,020.00	-0.7083						
06-Dec-1999 19:00:00	32.47		30.32	Recorder Reading	-960.00	-0.6667						
06-Dec-1999 20:00:00	32.51		30.36	Recorder Reading	-900.00	-0.6250						
06-Dec-1999 21:00:00	32.51		30.36	Recorder Reading	-840.00	-0.5833						
06-Dec-1999 22:00:00	32.51		30.36	Recorder Reading	-780.00	-0.5417						
06-Dec-1999 23:00:00	32.51		30.36	Recorder Reading	-720.00	-0.5000						
07-Dec-1999 00:00:00	32.51		30.36	Recorder Reading	-660.00	-0.4583						
07-Dec-1999 01:00:00	32.47		30.32	Recorder Reading	-600.00	-0.4167						
07-Dec-1999 02:00:00	32.47		30.32	Recorder Reading	-540.00	-0.3750						
07-Dec-1999 03:00:00	32.47		30.32	Recorder Reading	-480.00	-0.3333						
07-Dec-1999 04:00:00	32.44		30.29	Recorder Reading	-420.00	-0.2917						
07-Dec-1999 05:00:00	32.44		30.29	Recorder Reading	-360.00	-0.2500						
07-Dec-1999 06:00:00	32.44		30.29	Recorder Reading	-300.00	-0.2083						
07-Dec-1999 07:00:00	32.44		30.29	Recorder Reading	-240.00	-0.1667						
07-Dec-1999 08:00:00	32.47		30.32	Recorder Reading	-180.00	-0.1250						
07-Dec-1999 09:00:00	32.47		30.32	Recorder Reading	-120.00	-0.0833						
07-Dec-1999 09:17:00	32.47	2.15	30.32	head above transducer = 42.61 ft	-103.00	-0.0715						
07-Dec-1999 10:00:00	32.47		30.32	Recorder Reading	-60.00	-0.0417						
07-Dec-1999 10:30:00	32.51		30.36	Recorder Reading	-30.00	-0.0208						
07-Dec-1999 10:40:00	32.51		30.36	Recorder Reading	-20.00	-0.0139						
07-Dec-1999 10:50:00	32.51		30.36	Recorder Reading	-10.00	-0.0069						
07-Dec-1999 11:00:00	32.51		30.36	**Start Test, Pumping Well On**	0.00	0.0000				0.0000E+00	0.00	
07-Dec-1999 11:01:00	32.51		30.36	Recorder Reading	1.00	0.0007				3.1919E-10	0.00	
07-Dec-1999 11:02:00	32.51		30.36	Recorder Reading	2.00	0.0014				6.3839E-10	0.00	
07-Dec-1999 11:03:00	32.51		30.36	Recorder Reading	3.00	0.0021				9.5758E-10	0.00	
07-Dec-1999 11:04:00	32.55		30.40	Recorder Reading	4.00	0.0028				1.2768E-09	0.04	
07-Dec-1999 11:05:00	32.55		30.40	Recorder Reading	5.00	0.0035				1.5960E-09	0.04	
07-Dec-1999 11:06:00	32.55		30.40	Recorder Reading	6.00	0.0042				1.9152E-09	0.04	
07-Dec-1999 11:07:00	32.55		30.40	Recorder Reading	7.00	0.0049				2.2344E-09	0.04	
07-Dec-1999 11:08:00	32.55		30.40	Recorder Reading	8.00	0.0056				2.5535E-09	0.04	
07-Dec-1999 11:09:00	32.58		30.43	Recorder Reading	9.00	0.0062				2.8727E-09	0.07	
07-Dec-1999 11:10:00	32.58		30.43	Recorder Reading	10.00	0.0069				3.1919E-09	0.07	

Appendix 29: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52204)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52204
Measuring Point: access hole at top of sanitary seal
Measuring Tool: pressure transducer and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: shallow water level well
Measuring Pt. = 2.15 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
07-Dec-1999 11:11:00	32.58		30.43	Recorder Reading	11.00	0.0076				3.5111E-09	0.07	
07-Dec-1999 11:12:00	32.58		30.43	Recorder Reading	12.00	0.0083				3.8303E-09	0.07	
07-Dec-1999 11:13:00	32.58		30.43	Recorder Reading	13.00	0.0090				4.1495E-09	0.07	
07-Dec-1999 11:14:00	32.58		30.43	Recorder Reading	14.00	0.0097				4.4687E-09	0.07	
07-Dec-1999 11:15:00	32.62		30.47	Recorder Reading	15.00	0.0104				4.7879E-09	0.11	
07-Dec-1999 11:16:00	32.62		30.47	Recorder Reading	16.00	0.0111				5.1071E-09	0.11	
07-Dec-1999 11:17:00	32.62		30.47	Recorder Reading	17.00	0.0118				5.4263E-09	0.11	
07-Dec-1999 11:18:00	32.62		30.47	Recorder Reading	18.00	0.0125				5.7455E-09	0.11	
07-Dec-1999 11:19:00	32.65		30.50	Recorder Reading	19.00	0.0132				6.0647E-09	0.14	
07-Dec-1999 11:20:00	32.65		30.50	Recorder Reading	20.00	0.0139				6.3839E-09	0.14	
07-Dec-1999 11:21:00	32.65		30.50	Recorder Reading	21.00	0.0146				6.7031E-09	0.14	
07-Dec-1999 11:22:00	32.72		30.57	Recorder Reading	22.00	0.0153				7.0222E-09	0.21	
07-Dec-1999 11:23:00	32.72		30.57	Recorder Reading	23.00	0.0160				7.3414E-09	0.21	
07-Dec-1999 11:24:00	32.72		30.57	Recorder Reading	24.00	0.0167				7.6606E-09	0.21	
07-Dec-1999 11:25:00	32.72		30.57	Recorder Reading	25.00	0.0174				7.9798E-09	0.21	
07-Dec-1999 11:26:00	32.76		30.61	Recorder Reading	26.00	0.0181				8.2990E-09	0.25	
07-Dec-1999 11:27:00	32.76		30.61	Recorder Reading	27.00	0.0187				8.6182E-09	0.25	
07-Dec-1999 11:28:00	32.76		30.61	Recorder Reading	28.00	0.0194				8.9374E-09	0.25	
07-Dec-1999 11:29:00	32.76		30.61	Recorder Reading	29.00	0.0201				9.2566E-09	0.25	
07-Dec-1999 11:30:00	32.76		30.61	Recorder Reading	30.00	0.0208				9.5758E-09	0.25	
07-Dec-1999 11:32:00	32.79		30.64	Recorder Reading	32.00	0.0222				1.0214E-08	0.28	
07-Dec-1999 11:34:00	32.79		30.64	Recorder Reading	34.00	0.0236				1.0853E-08	0.28	
07-Dec-1999 11:36:00	32.79		30.64	Recorder Reading	36.00	0.0250				1.1491E-08	0.28	
07-Dec-1999 11:38:00	32.83		30.68	Recorder Reading	38.00	0.0264				1.2129E-08	0.32	
07-Dec-1999 11:40:00	32.83		30.68	Recorder Reading	40.00	0.0278				1.2768E-08	0.32	
07-Dec-1999 11:41:00	32.83		30.68	Recorder Reading	41.00	0.0285				1.3087E-08	0.32	
07-Dec-1999 11:42:00	32.83		30.68	Recorder Reading	42.00	0.0292				1.3406E-08	0.32	
07-Dec-1999 11:44:00	32.86		30.71	Recorder Reading	44.00	0.0306				1.4044E-08	0.35	
07-Dec-1999 11:46:00	32.86		30.71	Recorder Reading	46.00	0.0319				1.4683E-08	0.35	
07-Dec-1999 11:48:00	32.90		30.75	Recorder Reading	48.00	0.0333				1.5321E-08	0.39	
07-Dec-1999 11:50:00	32.90		30.75	Recorder Reading	50.00	0.0347				1.5960E-08	0.39	
07-Dec-1999 11:52:00	32.90		30.75	Recorder Reading	52.00	0.0361				1.6598E-08	0.39	
07-Dec-1999 11:54:00	32.94		30.79	Recorder Reading	54.00	0.0375				1.7236E-08	0.43	
07-Dec-1999 11:56:00	32.94		30.79	Recorder Reading	56.00	0.0389				1.7875E-08	0.43	

Appendix 29: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52204)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52204
Measuring Point: access hole at top of sanitary seal
Measuring Tool: pressure transducer and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: shallow water level well
Measuring Pt. = 2.15 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
07-Dec-1999 11:58:00	32.94		30.79	Recorder Reading	58.00	0.0403				1.8513E-08	0.43	
07-Dec-1999 12:00:00	32.97		30.82	Recorder Reading	60.00	0.0417				1.9152E-08	0.46	
07-Dec-1999 12:05:00	33.01		30.86	Recorder Reading	65.00	0.0451				2.0748E-08	0.50	
07-Dec-1999 12:10:00	33.01		30.86	Recorder Reading	70.00	0.0486				2.2344E-08	0.50	
07-Dec-1999 12:15:00	33.04		30.89	Recorder Reading	75.00	0.0521				2.3939E-08	0.53	
07-Dec-1999 12:20:00	33.08		30.93	Recorder Reading	80.00	0.0556				2.5535E-08	0.57	
07-Dec-1999 12:25:00	33.08		30.93	Recorder Reading	85.00	0.0590				2.7131E-08	0.57	
07-Dec-1999 12:30:00	33.11		30.96	Recorder Reading	90.00	0.0625				2.8727E-08	0.60	
07-Dec-1999 12:35:00	33.15		31.00	Recorder Reading	95.00	0.0660				3.0323E-08	0.64	
07-Dec-1999 12:40:00	33.15		31.00	Recorder Reading	100.00	0.0694				3.1919E-08	0.64	
07-Dec-1999 12:45:00	33.18		31.03	Recorder Reading	105.00	0.0729				3.3515E-08	0.67	
07-Dec-1999 12:50:00	33.22		31.07	Recorder Reading	110.00	0.0764				3.5111E-08	0.71	
07-Dec-1999 12:55:00	33.22		31.07	Recorder Reading	115.00	0.0799				3.6707E-08	0.71	
07-Dec-1999 13:00:00	33.25		31.10	Recorder Reading	120.00	0.0833				3.8303E-08	0.74	
07-Dec-1999 13:10:00	33.29		31.14	Recorder Reading	130.00	0.0903				4.1495E-08	0.78	
07-Dec-1999 13:20:00	33.33		31.18	Recorder Reading	140.00	0.0972				4.4687E-08	0.82	
07-Dec-1999 13:30:00	33.36		31.21	Recorder Reading	150.00	0.1042				4.7879E-08	0.85	
07-Dec-1999 13:40:00	33.40		31.25	Recorder Reading	160.00	0.1111				5.1071E-08	0.89	
07-Dec-1999 13:50:00	33.40		31.25	Recorder Reading	170.00	0.1181				5.4263E-08	0.89	
07-Dec-1999 14:00:00	33.43		31.28	Recorder Reading	180.00	0.1250				5.7455E-08	0.92	
07-Dec-1999 14:15:00	33.50		31.35	Recorder Reading	195.00	0.1354				6.2243E-08	0.99	
07-Dec-1999 14:30:00	33.50		31.35	Recorder Reading	210.00	0.1458				6.7031E-08	0.99	
07-Dec-1999 14:45:00	33.54		31.39	Recorder Reading	225.00	0.1563				7.1818E-08	1.03	
07-Dec-1999 15:00:00	33.61		31.46	Recorder Reading	240.00	0.1667				7.6606E-08	1.10	
07-Dec-1999 15:20:00	33.65		31.50	Recorder Reading	260.00	0.1806				8.2990E-08	1.14	
07-Dec-1999 15:40:00	33.68		31.53	Recorder Reading	280.00	0.1944				8.9374E-08	1.17	
07-Dec-1999 16:00:00	33.72		31.57	Recorder Reading	300.00	0.2083				9.5758E-08	1.21	
07-Dec-1999 16:30:00	33.79		31.64	Recorder Reading	330.00	0.2292				1.0533E-07	1.28	
07-Dec-1999 17:00:00	33.82		31.67	Recorder Reading	360.00	0.2500				1.1491E-07	1.31	
07-Dec-1999 18:00:00	33.93		31.78	Recorder Reading	420.00	0.2917				1.3406E-07	1.42	
07-Dec-1999 19:00:00	34.04		31.89	Recorder Reading	480.00	0.3333				1.5321E-07	1.53	
07-Dec-1999 20:00:00	34.11		31.96	Recorder Reading	540.00	0.3750				1.7236E-07	1.60	
07-Dec-1999 21:00:00	34.21		32.06	Recorder Reading	600.00	0.4167				1.9152E-07	1.70	
07-Dec-1999 22:00:00	34.32		32.17	Recorder Reading	660.00	0.4583				2.1067E-07	1.81	

Appendix 29: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52204)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52204
Measuring Point: access hole at top of sanitary seal
Measuring Tool: pressure transducer and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: shallow water level well
Measuring Pt. = 2.15 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
07-Dec-1999 23:00:00	34.35		32.20	Recorder Reading	720.00	0.5000				2.2982E-07	1.84	
08-Dec-1999 00:00:00	34.43		32.28	Recorder Reading	780.00	0.5417				2.4897E-07	1.92	
08-Dec-1999 01:00:00	34.46		32.31	Recorder Reading	840.00	0.5833				2.6812E-07	1.95	
08-Dec-1999 02:00:00	34.53		32.38	Recorder Reading	900.00	0.6250				2.8727E-07	2.02	
08-Dec-1999 03:00:00	34.57		32.42	Recorder Reading	960.00	0.6667				3.0643E-07	2.06	
08-Dec-1999 04:00:00	34.57		32.42	Recorder Reading	1,020.00	0.7083				3.2558E-07	2.06	
08-Dec-1999 05:00:00	34.60		32.45	Recorder Reading	1,080.00	0.7500				3.4473E-07	2.09	
08-Dec-1999 06:00:00	34.67		32.52	Recorder Reading	1,140.00	0.7917				3.6388E-07	2.16	
08-Dec-1999 07:00:00	34.67		32.52	Recorder Reading	1,200.00	0.8333				3.8303E-07	2.16	
08-Dec-1999 08:00:00	34.74		32.59	Recorder Reading	1,260.00	0.8750				4.0218E-07	2.23	
08-Dec-1999 09:00:00	34.78		32.63	Recorder Reading	1,320.00	0.9167				4.2133E-07	2.27	
08-Dec-1999 10:00:00	34.82		32.67	Recorder Reading	1,380.00	0.9583				4.4049E-07	2.31	
08-Dec-1999 10:40:00	34.82		32.67	Recorder Reading	1,420.00	0.9861				4.5325E-07	2.31	
08-Dec-1999 10:50:00	34.82		32.67	Recorder Reading	1,430.00	0.9931				4.5645E-07	2.31	
08-Dec-1999 11:00:00	34.82		32.67	**Start Recovery, Pump Off**	1,440.00	1.0000	0.00	0.0000		4.5964E-07	2.31	0.00
08-Dec-1999 11:01:00	34.82		32.67	Recorder Reading	1,441.00	1.0007	1.00	0.0007	1,441.0000			0.00
08-Dec-1999 11:02:00	34.82		32.67	Recorder Reading	1,442.00	1.0014	2.00	0.0014	721.0000			0.00
08-Dec-1999 11:03:00	34.82		32.67	Recorder Reading	1,443.00	1.0021	3.00	0.0021	481.0000			0.00
08-Dec-1999 11:04:00	34.82		32.67	Recorder Reading	1,444.00	1.0028	4.00	0.0028	361.0000			0.00
08-Dec-1999 11:05:00	34.82		32.67	Recorder Reading	1,445.00	1.0035	5.00	0.0035	289.0000			0.00
08-Dec-1999 11:06:00	34.78		32.63	Recorder Reading	1,446.00	1.0042	6.00	0.0042	241.0000			0.04
08-Dec-1999 11:07:00	34.78		32.63	Recorder Reading	1,447.00	1.0049	7.00	0.0049	206.7143			0.04
08-Dec-1999 11:08:00	34.78		32.63	Recorder Reading	1,448.00	1.0056	8.00	0.0056	181.0000			0.04
08-Dec-1999 11:09:00	34.78		32.63	Recorder Reading	1,449.00	1.0062	9.00	0.0062	161.0000			0.04
08-Dec-1999 11:10:00	34.78		32.63	Recorder Reading	1,450.00	1.0069	10.00	0.0069	145.0000			0.04
08-Dec-1999 11:11:00	34.78		32.63	Recorder Reading	1,451.00	1.0076	11.00	0.0076	131.9091			0.04
08-Dec-1999 11:12:00	34.74		32.59	Recorder Reading	1,452.00	1.0083	12.00	0.0083	121.0000			0.08
08-Dec-1999 11:13:00	34.74		32.59	Recorder Reading	1,453.00	1.0090	13.00	0.0090	111.7692			0.08
08-Dec-1999 11:14:00	34.74		32.59	Recorder Reading	1,454.00	1.0097	14.00	0.0097	103.8571			0.08
08-Dec-1999 11:15:00	34.74		32.59	Recorder Reading	1,455.00	1.0104	15.00	0.0104	97.0000			0.08
08-Dec-1999 11:16:00	34.71		32.56	Recorder Reading	1,456.00	1.0111	16.00	0.0111	91.0000			0.11
08-Dec-1999 11:17:00	34.71		32.56	Recorder Reading	1,457.00	1.0118	17.00	0.0118	85.7059			0.11
08-Dec-1999 11:18:00	34.71		32.56	Recorder Reading	1,458.00	1.0125	18.00	0.0125	81.0000			0.11
08-Dec-1999 11:19:00	34.71		32.56	Recorder Reading	1,459.00	1.0132	19.00	0.0132	76.7895			0.11

Appendix 29: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52204)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52204
Measuring Point: access hole at top of sanitary seal
Measuring Tool: pressure transducer and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: shallow water level well
Measuring Pt. = 2.15 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
08-Dec-1999 11:20:00	34.71		32.56	Recorder Reading	1,460.00	1.0139	20.00	0.0139	73.0000			0.11
08-Dec-1999 11:21:00	34.67		32.52	Recorder Reading	1,461.00	1.0146	21.00	0.0146	69.5714			0.15
08-Dec-1999 11:22:00	34.67		32.52	Recorder Reading	1,462.00	1.0153	22.00	0.0153	66.4545			0.15
08-Dec-1999 11:23:00	34.67		32.52	Recorder Reading	1,463.00	1.0160	23.00	0.0160	63.6087			0.15
08-Dec-1999 11:24:00	34.67		32.52	Recorder Reading	1,464.00	1.0167	24.00	0.0167	61.0000			0.15
08-Dec-1999 11:25:00	34.64		32.49	Recorder Reading	1,465.00	1.0174	25.00	0.0174	58.6000			0.18
08-Dec-1999 11:26:00	34.64		32.49	Recorder Reading	1,466.00	1.0181	26.00	0.0181	56.3846			0.18
08-Dec-1999 11:27:00	34.64		32.49	Recorder Reading	1,467.00	1.0187	27.00	0.0187	54.3333			0.18
08-Dec-1999 11:28:00	34.64		32.49	Recorder Reading	1,468.00	1.0194	28.00	0.0194	52.4286			0.18
08-Dec-1999 11:29:00	34.64		32.49	Recorder Reading	1,469.00	1.0201	29.00	0.0201	50.6552			0.18
08-Dec-1999 11:30:00	34.64		32.49	Recorder Reading	1,470.00	1.0208	30.00	0.0208	49.0000			0.18
08-Dec-1999 11:32:00	34.60		32.45	Recorder Reading	1,472.00	1.0222	32.00	0.0222	46.0000			0.22
08-Dec-1999 11:34:00	34.60		32.45	Recorder Reading	1,474.00	1.0236	34.00	0.0236	43.3529			0.22
08-Dec-1999 11:36:00	34.57		32.42	Recorder Reading	1,476.00	1.0250	36.00	0.0250	41.0000			0.25
08-Dec-1999 11:38:00	34.57		32.42	Recorder Reading	1,478.00	1.0264	38.00	0.0264	38.8947			0.25
08-Dec-1999 11:40:00	34.57		32.42	Recorder Reading	1,480.00	1.0278	40.00	0.0278	37.0000			0.25
08-Dec-1999 11:42:00	34.53		32.38	Recorder Reading	1,482.00	1.0292	42.00	0.0292	35.2857			0.29
08-Dec-1999 11:44:00	34.53		32.38	Recorder Reading	1,484.00	1.0306	44.00	0.0306	33.7273			0.29
08-Dec-1999 11:46:00	34.50		32.35	Recorder Reading	1,486.00	1.0319	46.00	0.0319	32.3043			0.32
08-Dec-1999 11:48:00	34.50		32.35	Recorder Reading	1,488.00	1.0333	48.00	0.0333	31.0000			0.32
08-Dec-1999 11:50:00	34.50		32.35	Recorder Reading	1,490.00	1.0347	50.00	0.0347	29.8000			0.32
08-Dec-1999 11:52:00	34.50		32.35	Recorder Reading	1,492.00	1.0361	52.00	0.0361	28.6923			0.32
08-Dec-1999 11:54:00	34.46		32.31	Recorder Reading	1,494.00	1.0375	54.00	0.0375	27.6667			0.36
08-Dec-1999 11:56:00	34.46		32.31	Recorder Reading	1,496.00	1.0389	56.00	0.0389	26.7143			0.36
08-Dec-1999 11:58:00	34.43		32.28	Recorder Reading	1,498.00	1.0403	58.00	0.0403	25.8276			0.39
08-Dec-1999 12:00:00	34.43		32.28	Recorder Reading	1,500.00	1.0417	60.00	0.0417	25.0000			0.39
08-Dec-1999 12:05:00	34.39		32.24	Recorder Reading	1,505.00	1.0451	65.00	0.0451	23.1538			0.43
08-Dec-1999 12:10:00	34.39		32.24	Recorder Reading	1,510.00	1.0486	70.00	0.0486	21.5714			0.43
08-Dec-1999 12:15:00	34.35		32.20	Recorder Reading	1,515.00	1.0521	75.00	0.0521	20.2000			0.47
08-Dec-1999 12:20:00	34.35		32.20	Recorder Reading	1,520.00	1.0556	80.00	0.0556	19.0000			0.47
08-Dec-1999 12:25:00	34.32		32.17	Recorder Reading	1,525.00	1.0590	85.00	0.0590	17.9412			0.50
08-Dec-1999 12:30:00	34.32		32.17	Recorder Reading	1,530.00	1.0625	90.00	0.0625	17.0000			0.50
08-Dec-1999 12:35:00	34.28		32.13	Recorder Reading	1,535.00	1.0660	95.00	0.0660	16.1579			0.54
08-Dec-1999 12:40:00	34.21		32.06	Recorder Reading	1,540.00	1.0694	100.00	0.0694	15.4000			0.61

Appendix 29: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52204)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52204
Measuring Point: access hole at top of sanitary seal
Measuring Tool: pressure transducer and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: shallow water level well
Measuring Pt. = 2.15 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
08-Dec-1999 12:45:00	34.21		32.06	Recorder Reading	1,545.00	1.0729	105.00	0.0729	14.7143			0.61
08-Dec-1999 12:50:00	34.18		32.03	Recorder Reading	1,550.00	1.0764	110.00	0.0764	14.0909			0.64
08-Dec-1999 12:55:00	34.18		32.03	Recorder Reading	1,555.00	1.0799	115.00	0.0799	13.5217			0.64
08-Dec-1999 13:00:00	34.14		31.99	Recorder Reading	1,560.00	1.0833	120.00	0.0833	13.0000			0.68
08-Dec-1999 13:10:00	34.14		31.99	Recorder Reading	1,570.00	1.0903	130.00	0.0903	12.0769			0.68
08-Dec-1999 13:20:00	34.07		31.92	Recorder Reading	1,580.00	1.0972	140.00	0.0972	11.2857			0.75
08-Dec-1999 13:30:00	34.07		31.92	Recorder Reading	1,590.00	1.1042	150.00	0.1042	10.6000			0.75
08-Dec-1999 13:40:00	34.04		31.89	Recorder Reading	1,600.00	1.1111	160.00	0.1111	10.0000			0.78
08-Dec-1999 13:50:00	34.00		31.85	Recorder Reading	1,610.00	1.1181	170.00	0.1181	9.4706			0.82
08-Dec-1999 14:00:00	34.00		31.85	Recorder Reading	1,620.00	1.1250	180.00	0.1250	9.0000			0.82
08-Dec-1999 14:15:00	33.96		31.81	Recorder Reading	1,635.00	1.1354	195.00	0.1354	8.3846			0.86
08-Dec-1999 14:30:00	33.93		31.78	Recorder Reading	1,650.00	1.1458	210.00	0.1458	7.8571			0.89
08-Dec-1999 14:45:00	33.89		31.74	Recorder Reading	1,665.00	1.1563	225.00	0.1563	7.4000			0.93
08-Dec-1999 15:00:00	33.86		31.71	Recorder Reading	1,680.00	1.1667	240.00	0.1667	7.0000			0.96
08-Dec-1999 15:20:00	33.82		31.67	Recorder Reading	1,700.00	1.1806	260.00	0.1806	6.5385			1.00
08-Dec-1999 15:40:00	33.79		31.64	Recorder Reading	1,720.00	1.1944	280.00	0.1944	6.1429			1.03
08-Dec-1999 16:00:00	33.75		31.60	Recorder Reading	1,740.00	1.2083	300.00	0.2083	5.8000			1.07
08-Dec-1999 16:30:00	33.72		31.57	Recorder Reading	1,770.00	1.2292	330.00	0.2292	5.3636			1.10
08-Dec-1999 17:00:00	33.72		31.57	Recorder Reading	1,800.00	1.2500	360.00	0.2500	5.0000			1.10
08-Dec-1999 18:00:00	33.65		31.50	Recorder Reading	1,860.00	1.2917	420.00	0.2917	4.4286			1.17
08-Dec-1999 19:00:00	33.57		31.42	Recorder Reading	1,920.00	1.3333	480.00	0.3333	4.0000			1.25
08-Dec-1999 20:00:00	33.54		31.39	Recorder Reading	1,980.00	1.3750	540.00	0.3750	3.6667			1.28
08-Dec-1999 21:00:00	33.50		31.35	Recorder Reading	2,040.00	1.4167	600.00	0.4167	3.4000			1.32
08-Dec-1999 22:00:00	33.47		31.32	Recorder Reading	2,100.00	1.4583	660.00	0.4583	3.1818			1.35
08-Dec-1999 23:00:00	33.43		31.28	Recorder Reading	2,160.00	1.5000	720.00	0.5000	3.0000			1.39
09-Dec-1999 00:00:00	33.40		31.25	Recorder Reading	2,220.00	1.5417	780.00	0.5417	2.8462			1.42
09-Dec-1999 01:00:00	33.36		31.21	Recorder Reading	2,280.00	1.5833	840.00	0.5833	2.7143			1.46
09-Dec-1999 02:00:00	33.33		31.18	Recorder Reading	2,340.00	1.6250	900.00	0.6250	2.6000			1.49
09-Dec-1999 03:00:00	33.29		31.14	Recorder Reading	2,400.00	1.6667	960.00	0.6667	2.5000			1.53
09-Dec-1999 04:00:00	33.25		31.10	Recorder Reading	2,460.00	1.7083	1,020.00	0.7083	2.4118			1.57
09-Dec-1999 05:00:00	33.25		31.10	Recorder Reading	2,520.00	1.7500	1,080.00	0.7500	2.3333			1.57
09-Dec-1999 06:00:00	33.18		31.03	Recorder Reading	2,580.00	1.7917	1,140.00	0.7917	2.2632			1.64
09-Dec-1999 07:00:00	33.22		31.07	Recorder Reading	2,640.00	1.8333	1,200.00	0.8333	2.2000			1.60
09-Dec-1999 08:00:00	33.22		31.07	Recorder Reading	2,700.00	1.8750	1,260.00	0.8750	2.1429			1.60

Appendix 29: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52204)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52204
Measuring Point: access hole at top of sanitary seal
Measuring Tool: pressure transducer and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: shallow water level well
Measuring Pt. = 2.15 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
09-Dec-1999 09:00:00	33.22		31.07	Recorder Reading	2,760.00	1.9167	1,320.00	0.9167	2.0909			1.60
09-Dec-1999 10:00:00	33.20	2.15	31.05	Recorder Reading	2,820.00	1.9583	1,380.00	0.9583	2.0435			1.62
09-Dec-1999 11:00:00	33.20	2.15	31.05	**End of Test**	2,880.00	2.0000	1,440.00	1.0000	2.0000			1.62

Appendix 29: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52204)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52204
Measuring Point: access hole at top of sanitary seal
Measuring Tool: pressure transducer and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: shallow water level well
Measuring Pt. = 2.15 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 04:00:00 (hPascal)	Barometric Change from 9 Dec 1999 at 04:00:00 (feet of water)	Water Level Change from 9 Dec 1999 at 04:00:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
06-Dec-1999 16:37:00										
06-Dec-1999 17:00:00	880.02	29.45					0.02	30.31		
06-Dec-1999 18:00:00	880.26	29.45					0.03	30.30		
06-Dec-1999 19:00:00	880.26	29.45					0.03	30.30		
06-Dec-1999 20:00:00	880.26	29.45					0.03	30.34		
06-Dec-1999 21:00:00	880.26	29.45					0.03	30.34		
06-Dec-1999 22:00:00	880.26	29.45					0.03	30.34		
06-Dec-1999 23:00:00	880.26	29.45					0.03	30.34		
07-Dec-1999 00:00:00	880.02	29.45					0.02	30.35		
07-Dec-1999 01:00:00	879.54	29.43					0.01	30.32		
07-Dec-1999 02:00:00	879.30	29.42					0.00	30.32		
07-Dec-1999 03:00:00	878.58	29.40					-0.02	30.33		
07-Dec-1999 04:00:00	877.87	29.37					-0.05	30.31		
07-Dec-1999 05:00:00	877.39	29.36					-0.06	30.32		
07-Dec-1999 06:00:00	878.11	29.38					-0.04	30.31		
07-Dec-1999 07:00:00	878.58	29.40					-0.02	30.30		
07-Dec-1999 08:00:00	879.54	29.43					0.01	30.32		
07-Dec-1999 09:00:00	880.02	29.45					0.02	30.31		
07-Dec-1999 09:17:00	880.26	29.45					0.03	30.30		
07-Dec-1999 10:00:00	880.74	29.47					0.05	30.30		
07-Dec-1999 10:30:00	880.98	29.48					0.06	30.33		
07-Dec-1999 10:40:00	880.98	29.48					0.06	30.33		
07-Dec-1999 10:50:00	880.98	29.48					0.06	30.33		
07-Dec-1999 11:00:00	880.98	29.48					0.06	30.33	0.00	
07-Dec-1999 11:01:00	880.98	29.48					0.06	30.33	0.00	
07-Dec-1999 11:02:00	880.98	29.48					0.06	30.33	0.00	
07-Dec-1999 11:03:00	880.98	29.48					0.06	30.33	0.00	
07-Dec-1999 11:04:00	880.98	29.48					0.06	30.37	0.04	
07-Dec-1999 11:05:00	880.98	29.48					0.06	30.37	0.04	
07-Dec-1999 11:06:00	880.98	29.48					0.06	30.37	0.04	
07-Dec-1999 11:07:00	880.98	29.48					0.06	30.37	0.04	
07-Dec-1999 11:08:00	880.98	29.48					0.06	30.37	0.04	
07-Dec-1999 11:09:00	880.98	29.48					0.06	30.40	0.07	
07-Dec-1999 11:10:00	880.98	29.48					0.06	30.40	0.07	

Appendix 29: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52204)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52204
Measuring Point: access hole at top of sanitary seal
Measuring Tool: pressure transducer and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: shallow water level well
Measuring Pt. = 2.15 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 04:00:00 (hPascal)	Barometric Change from 9 Dec 1999 at 04:00:00 (feet of water)	Water Level Change from 9 Dec 1999 at 04:00:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
07-Dec-1999 11:11:00	880.98	29.48					0.06	30.40	0.07	
07-Dec-1999 11:12:00	880.98	29.48					0.06	30.40	0.07	
07-Dec-1999 11:13:00	880.98	29.48					0.06	30.40	0.07	
07-Dec-1999 11:14:00	880.98	29.48					0.06	30.40	0.07	
07-Dec-1999 11:15:00	880.98	29.48					0.06	30.44	0.11	
07-Dec-1999 11:16:00	880.98	29.48					0.06	30.44	0.11	
07-Dec-1999 11:17:00	880.98	29.48					0.06	30.44	0.11	
07-Dec-1999 11:18:00	881.22	29.49					0.06	30.44	0.11	
07-Dec-1999 11:19:00	881.22	29.49					0.06	30.47	0.14	
07-Dec-1999 11:20:00	881.22	29.49					0.06	30.47	0.14	
07-Dec-1999 11:21:00	881.22	29.49					0.06	30.47	0.14	
07-Dec-1999 11:22:00	881.22	29.49					0.06	30.54	0.21	
07-Dec-1999 11:23:00	881.22	29.49					0.06	30.54	0.21	
07-Dec-1999 11:24:00	881.22	29.49					0.06	30.54	0.21	
07-Dec-1999 11:25:00	881.22	29.49					0.06	30.54	0.21	
07-Dec-1999 11:26:00	881.22	29.49					0.06	30.58	0.25	
07-Dec-1999 11:27:00	880.98	29.48					0.06	30.58	0.25	
07-Dec-1999 11:28:00	880.98	29.48					0.06	30.58	0.25	
07-Dec-1999 11:29:00	880.98	29.48					0.06	30.58	0.25	
07-Dec-1999 11:30:00	881.22	29.49					0.06	30.58	0.25	
07-Dec-1999 11:32:00	881.22	29.49					0.06	30.61	0.28	
07-Dec-1999 11:34:00	881.22	29.49					0.06	30.61	0.28	
07-Dec-1999 11:36:00	881.22	29.49					0.06	30.61	0.28	
07-Dec-1999 11:38:00	881.22	29.49					0.06	30.65	0.32	
07-Dec-1999 11:40:00	881.22	29.49					0.06	30.65	0.32	
07-Dec-1999 11:41:00	881.22	29.49					0.06	30.65	0.32	
07-Dec-1999 11:42:00	881.22	29.49					0.06	30.65	0.32	
07-Dec-1999 11:44:00	881.22	29.49					0.06	30.68	0.35	
07-Dec-1999 11:46:00	881.22	29.49					0.06	30.68	0.35	
07-Dec-1999 11:48:00	881.22	29.49					0.06	30.72	0.39	
07-Dec-1999 11:50:00	881.22	29.49					0.06	30.72	0.39	
07-Dec-1999 11:52:00	881.22	29.49					0.06	30.72	0.39	
07-Dec-1999 11:54:00	881.22	29.49					0.06	30.76	0.43	
07-Dec-1999 11:56:00	881.22	29.49					0.06	30.76	0.43	

Appendix 29: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52204)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52204
Measuring Point: access hole at top of sanitary seal
Measuring Tool: pressure transducer and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: shallow water level well
Measuring Pt. = 2.15 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 04:00:00 (hPascal)	Barometric Change from 9 Dec 1999 at 04:00:00 (feet of water)	Water Level Change from 9 Dec 1999 at 04:00:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
07-Dec-1999 11:58:00	881.22	29.49					0.06	30.76	0.43	
07-Dec-1999 12:00:00	881.22	29.49					0.06	30.79	0.46	
07-Dec-1999 12:05:00	881.22	29.49					0.06	30.83	0.50	
07-Dec-1999 12:10:00	881.22	29.49					0.06	30.83	0.50	
07-Dec-1999 12:15:00	880.98	29.48					0.06	30.86	0.53	
07-Dec-1999 12:20:00	881.22	29.49					0.06	30.90	0.57	
07-Dec-1999 12:25:00	881.22	29.49					0.06	30.90	0.57	
07-Dec-1999 12:30:00	881.22	29.49					0.06	30.93	0.60	
07-Dec-1999 12:35:00	880.98	29.48					0.06	30.97	0.64	
07-Dec-1999 12:40:00	881.22	29.49					0.06	30.97	0.64	
07-Dec-1999 12:45:00	881.22	29.49					0.06	31.00	0.67	
07-Dec-1999 12:50:00	881.22	29.49					0.06	31.04	0.71	
07-Dec-1999 12:55:00	881.22	29.49					0.06	31.04	0.71	
07-Dec-1999 13:00:00	881.22	29.49					0.06	31.07	0.74	
07-Dec-1999 13:10:00	881.22	29.49					0.06	31.11	0.78	
07-Dec-1999 13:20:00	881.46	29.49					0.07	31.14	0.81	
07-Dec-1999 13:30:00	881.22	29.49					0.06	31.18	0.85	
07-Dec-1999 13:40:00	881.46	29.49					0.07	31.21	0.88	
07-Dec-1999 13:50:00	881.46	29.49					0.07	31.21	0.88	
07-Dec-1999 14:00:00	881.46	29.49					0.07	31.24	0.91	
07-Dec-1999 14:15:00	881.46	29.49					0.07	31.31	0.98	
07-Dec-1999 14:30:00	881.70	29.50					0.08	31.31	0.98	
07-Dec-1999 14:45:00	881.70	29.50					0.08	31.35	1.02	
07-Dec-1999 15:00:00	882.18	29.52					0.10	31.41	1.08	
07-Dec-1999 15:20:00	882.18	29.52					0.10	31.45	1.12	
07-Dec-1999 15:40:00	882.65	29.53					0.11	31.47	1.14	
07-Dec-1999 16:00:00	882.65	29.53					0.11	31.51	1.18	
07-Dec-1999 16:30:00	882.89	29.54					0.12	31.58	1.25	
07-Dec-1999 17:00:00	882.89	29.54					0.12	31.61	1.28	
07-Dec-1999 18:00:00	883.85	29.57					0.15	31.70	1.37	
07-Dec-1999 19:00:00	884.09	29.58					0.16	31.81	1.48	
07-Dec-1999 20:00:00	885.05	29.61					0.19	31.86	1.53	
07-Dec-1999 21:00:00	885.29	29.62					0.20	31.96	1.63	
07-Dec-1999 22:00:00	885.53	29.63					0.21	32.07	1.74	

Appendix 29: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52204)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52204
Measuring Point: access hole at top of sanitary seal
Measuring Tool: pressure transducer and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: shallow water level well
Measuring Pt. = 2.15 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 04:00:00 (hPascal)	Barometric Change from 9 Dec 1999 at 04:00:00 (feet of water)	Water Level Change from 9 Dec 1999 at 04:00:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
07-Dec-1999 23:00:00	886.24	29.65					0.23	32.08	1.75	
08-Dec-1999 00:00:00	886.48	29.66					0.24	32.16	1.83	
08-Dec-1999 01:00:00	886.48	29.66					0.24	32.19	1.86	
08-Dec-1999 02:00:00	886.72	29.67					0.25	32.26	1.93	
08-Dec-1999 03:00:00	886.72	29.67					0.25	32.30	1.97	
08-Dec-1999 04:00:00	886.96	29.68					0.26	32.29	1.96	
08-Dec-1999 05:00:00	886.72	29.67					0.25	32.33	2.00	
08-Dec-1999 06:00:00	886.96	29.68					0.26	32.39	2.06	
08-Dec-1999 07:00:00	887.20	29.69					0.26	32.39	2.06	
08-Dec-1999 08:00:00	887.20	29.69					0.26	32.46	2.13	
08-Dec-1999 09:00:00	886.96	29.68					0.26	32.50	2.17	
08-Dec-1999 10:00:00	886.72	29.67					0.25	32.55	2.22	
08-Dec-1999 10:40:00	886.48	29.66					0.24	32.55	2.22	
08-Dec-1999 10:50:00	886.48	29.66					0.24	32.55	2.22	
08-Dec-1999 11:00:00	886.48	29.66					0.24	32.55	2.22	0.00
08-Dec-1999 11:01:00	886.48	29.66					0.24	32.55		0.00
08-Dec-1999 11:02:00	886.48	29.66					0.24	32.55		0.00
08-Dec-1999 11:03:00	886.48	29.66					0.24	32.55		0.00
08-Dec-1999 11:04:00	886.48	29.66					0.24	32.55		0.00
08-Dec-1999 11:05:00	886.48	29.66					0.24	32.55		0.00
08-Dec-1999 11:06:00	886.48	29.66					0.24	32.51		0.04
08-Dec-1999 11:07:00	886.48	29.66					0.24	32.51		0.04
08-Dec-1999 11:08:00	886.24	29.65					0.23	32.51		0.04
08-Dec-1999 11:09:00	886.48	29.66					0.24	32.51		0.04
08-Dec-1999 11:10:00	886.24	29.65					0.23	32.51		0.04
08-Dec-1999 11:11:00	886.24	29.65					0.23	32.51		0.04
08-Dec-1999 11:12:00	886.24	29.65					0.23	32.47		0.08
08-Dec-1999 11:13:00	886.24	29.65					0.23	32.47		0.08
08-Dec-1999 11:14:00	886.48	29.66					0.24	32.47		0.08
08-Dec-1999 11:15:00	886.24	29.65					0.23	32.47		0.08
08-Dec-1999 11:16:00	886.24	29.65					0.23	32.44		0.11
08-Dec-1999 11:17:00	886.24	29.65					0.23	32.44		0.11
08-Dec-1999 11:18:00	886.24	29.65					0.23	32.44		0.11
08-Dec-1999 11:19:00	886.24	29.65					0.23	32.44		0.11

Appendix 29: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52204)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52204
Measuring Point: access hole at top of sanitary seal
Measuring Tool: pressure transducer and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: shallow water level well
Measuring Pt. = 2.15 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 04:00:00 (hPascal)	Barometric Change from 9 Dec 1999 at 04:00:00 (feet of water)	Water Level Change from 9 Dec 1999 at 04:00:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
08-Dec-1999 11:20:00	886.24	29.65					0.23	32.44		0.11
08-Dec-1999 11:21:00	886.24	29.65					0.23	32.40		0.15
08-Dec-1999 11:22:00	886.24	29.65					0.23	32.40		0.15
08-Dec-1999 11:23:00	886.24	29.65					0.23	32.40		0.15
08-Dec-1999 11:24:00	886.24	29.65					0.23	32.40		0.15
08-Dec-1999 11:25:00	886.24	29.65					0.23	32.37		0.18
08-Dec-1999 11:26:00	886.24	29.65					0.23	32.37		0.18
08-Dec-1999 11:27:00	886.24	29.65					0.23	32.37		0.18
08-Dec-1999 11:28:00	886.24	29.65					0.23	32.37		0.18
08-Dec-1999 11:29:00	886.24	29.65					0.23	32.37		0.18
08-Dec-1999 11:30:00	886.24	29.65					0.23	32.37		0.18
08-Dec-1999 11:32:00	886.24	29.65					0.23	32.33		0.22
08-Dec-1999 11:34:00	886.24	29.65					0.23	32.33		0.22
08-Dec-1999 11:36:00	886.24	29.65					0.23	32.30		0.25
08-Dec-1999 11:38:00	886.24	29.65					0.23	32.30		0.25
08-Dec-1999 11:40:00	886.24	29.65					0.23	32.30		0.25
08-Dec-1999 11:42:00	886.24	29.65					0.23	32.26		0.29
08-Dec-1999 11:44:00	886.01	29.65					0.22	32.27		0.28
08-Dec-1999 11:46:00	886.24	29.65					0.23	32.23		0.32
08-Dec-1999 11:48:00	886.01	29.65					0.22	32.24		0.31
08-Dec-1999 11:50:00	886.01	29.65					0.22	32.24		0.31
08-Dec-1999 11:52:00	886.01	29.65					0.22	32.24		0.31
08-Dec-1999 11:54:00	886.01	29.65					0.22	32.20		0.35
08-Dec-1999 11:56:00	886.01	29.65					0.22	32.20		0.35
08-Dec-1999 11:58:00	886.01	29.65					0.22	32.17		0.38
08-Dec-1999 12:00:00	886.01	29.65					0.22	32.17		0.38
08-Dec-1999 12:05:00	885.77	29.64					0.22	32.13		0.42
08-Dec-1999 12:10:00	885.77	29.64					0.22	32.13		0.42
08-Dec-1999 12:15:00	885.77	29.64					0.22	32.09		0.46
08-Dec-1999 12:20:00	885.77	29.64					0.22	32.09		0.46
08-Dec-1999 12:25:00	885.53	29.63					0.21	32.07		0.48
08-Dec-1999 12:30:00	885.29	29.62					0.20	32.07		0.48
08-Dec-1999 12:35:00	885.29	29.62					0.20	32.03		0.52
08-Dec-1999 12:40:00	885.29	29.62					0.20	31.96		0.59

Appendix 29: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52204)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52204
Measuring Point: access hole at top of sanitary seal
Measuring Tool: pressure transducer and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: shallow water level well
Measuring Pt. = 2.15 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 04:00:00 (hPascal)	Barometric Change from 9 Dec 1999 at 04:00:00 (feet of water)	Water Level Change from 9 Dec 1999 at 04:00:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
08-Dec-1999 12:45:00	885.29	29.62					0.20	31.96		0.59
08-Dec-1999 12:50:00	885.05	29.61					0.19	31.93		0.62
08-Dec-1999 12:55:00	885.05	29.61					0.19	31.93		0.62
08-Dec-1999 13:00:00	885.05	29.61					0.19	31.89		0.66
08-Dec-1999 13:10:00	884.81	29.61					0.18	31.90		0.65
08-Dec-1999 13:20:00	884.81	29.61					0.18	31.83		0.72
08-Dec-1999 13:30:00	884.33	29.59					0.17	31.84		0.71
08-Dec-1999 13:40:00	884.33	29.59					0.17	31.81		0.74
08-Dec-1999 13:50:00	884.33	29.59					0.17	31.77		0.78
08-Dec-1999 14:00:00	884.33	29.59					0.17	31.77		0.78
08-Dec-1999 14:15:00	884.33	29.59					0.17	31.73		0.82
08-Dec-1999 14:30:00	883.37	29.56					0.14	31.71		0.84
08-Dec-1999 14:45:00	883.37	29.56					0.14	31.67		0.88
08-Dec-1999 15:00:00	883.37	29.56					0.14	31.64		0.91
08-Dec-1999 15:20:00	883.37	29.56					0.14	31.60		0.95
08-Dec-1999 15:40:00	883.37	29.56					0.14	31.57		0.98
08-Dec-1999 16:00:00	883.13	29.55					0.13	31.54		1.01
08-Dec-1999 16:30:00	882.89	29.54					0.12	31.51		1.04
08-Dec-1999 17:00:00	882.89	29.54					0.12	31.51		1.04
08-Dec-1999 18:00:00	881.94	29.51					0.09	31.46		1.09
08-Dec-1999 19:00:00	881.22	29.49					0.06	31.39		1.16
08-Dec-1999 20:00:00	880.74	29.47					0.05	31.37		1.18
08-Dec-1999 21:00:00	880.26	29.45					0.03	31.33		1.22
08-Dec-1999 22:00:00	880.26	29.45					0.03	31.30		1.25
08-Dec-1999 23:00:00	879.78	29.44					0.02	31.27		1.28
09-Dec-1999 00:00:00	879.06	29.41					-0.01	31.25		1.30
09-Dec-1999 01:00:00	879.30	29.42					0.00	31.21		1.34
09-Dec-1999 02:00:00	879.06	29.41					-0.01	31.18		1.37
09-Dec-1999 03:00:00	878.58	29.40					-0.02	31.15		1.40
09-Dec-1999 04:00:00	878.35	29.39	0.00	0.00	0.00		-0.03	31.12		1.43
09-Dec-1999 05:00:00	878.58	29.40	0.23	0.01	0.00	0.0000	-0.02	31.11		1.44
09-Dec-1999 06:00:00	878.82	29.41	0.47	0.02	0.07	4.4511	-0.02	31.04		1.51
09-Dec-1999 07:00:00	879.54	29.43	1.19	0.04	0.03	0.7534	0.01	31.07		1.48
09-Dec-1999 08:00:00	879.54	29.43	1.19	0.04	0.03	0.7534	0.01	31.07		1.48

Appendix 29: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52204)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52204
Measuring Point: access hole at top of sanitary seal
Measuring Tool: pressure transducer and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: shallow water level well
Measuring Pt. = 2.15 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 04:00:00 (hPascal)	Barometric Change from 9 Dec 1999 at 04:00:00 (feet of water)	Water Level Change from 9 Dec 1999 at 04:00:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
09-Dec-1999 09:00:00	879.78	29.44	1.43	0.05	0.03	0.6270	0.02	31.06		1.49
09-Dec-1999 10:00:00	880.26	29.45	1.91	0.06	0.05	0.7824	0.03	31.03		1.52
09-Dec-1999 11:00:00	880.02	29.45	1.67	0.06	0.05	0.8948	0.02	31.04		1.51

Appendix 30: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52096)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52096
Measuring Point: top lip of 1.5 inch inner casing
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: deep water level well
Measuring Pt. = 2.86 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
06-Dec-1999 15:33:00	53.14	2.86	50.28		-1,167.00	-0.8104						
06-Dec-1999 16:00:00	53.17	2.86	50.31		-1,140.00	-0.7917						
07-Dec-1999 09:28:00	53.29	2.86	50.43	head above transducer = 147.19 ft	-92.00	-0.0639						
07-Dec-1999 09:45:00	53.28	2.86	50.42		-75.00	-0.0521						
07-Dec-1999 10:00:00	53.27	2.86	50.41		-60.00	-0.0417						
07-Dec-1999 10:15:00	53.28	2.86	50.42		-45.00	-0.0313						
07-Dec-1999 10:34:00	53.26	2.86	50.40		-26.00	-0.0181						
07-Dec-1999 10:45:00	53.28	2.86	50.42		-15.00	-0.0104						
07-Dec-1999 11:00:00	53.27	2.86	50.41	**Start of Test, Pumping Well On**	0.00	0.0000				0.0000E+00	0.00	
07-Dec-1999 11:01:00	53.26	2.86	50.40		1.00	0.0007				3.1919E-10	-0.01	
07-Dec-1999 11:02:00	53.25	2.86	50.39		2.00	0.0014				6.3839E-10	-0.02	
07-Dec-1999 11:03:00	53.24	2.86	50.38		3.00	0.0021				9.5758E-10	-0.03	
07-Dec-1999 11:04:00	53.24	2.86	50.38		4.00	0.0028				1.2768E-09	-0.03	
07-Dec-1999 11:05:00	53.25	2.86	50.39		5.00	0.0035				1.5960E-09	-0.02	
07-Dec-1999 11:06:00	53.26	2.86	50.40		6.00	0.0042				1.9152E-09	-0.01	
07-Dec-1999 11:07:00	53.28	2.86	50.42		7.00	0.0049				2.2344E-09	0.01	
07-Dec-1999 11:08:00	53.26	2.86	50.40		8.00	0.0056				2.5535E-09	-0.01	
07-Dec-1999 11:09:00	53.28	2.86	50.42		9.00	0.0062				2.8727E-09	0.01	
07-Dec-1999 11:10:00	53.25	2.86	50.39		10.00	0.0069				3.1919E-09	-0.02	
07-Dec-1999 11:11:00	53.24	2.86	50.38		11.00	0.0076				3.5111E-09	-0.03	
07-Dec-1999 11:12:00	53.21	2.86	50.35		12.00	0.0083				3.8303E-09	-0.06	
07-Dec-1999 11:13:00	53.24	2.86	50.38		13.00	0.0090				4.1495E-09	-0.03	
07-Dec-1999 11:14:00	53.22	2.86	50.36		14.00	0.0097				4.4687E-09	-0.05	
07-Dec-1999 11:15:00	53.25	2.86	50.39		15.00	0.0104				4.7879E-09	-0.02	
07-Dec-1999 11:16:00	53.25	2.86	50.39		16.00	0.0111				5.1071E-09	-0.02	
07-Dec-1999 11:17:00	53.23	2.86	50.37		17.00	0.0118				5.4263E-09	-0.04	
07-Dec-1999 11:18:00	53.23	2.86	50.37		18.00	0.0125				5.7455E-09	-0.04	
07-Dec-1999 11:19:00	53.27	2.86	50.41		19.00	0.0132				6.0647E-09	0.00	
07-Dec-1999 11:20:00	53.28	2.86	50.42		20.00	0.0139				6.3839E-09	0.01	
07-Dec-1999 11:21:00	53.25	2.86	50.39		21.00	0.0146				6.7031E-09	-0.02	
07-Dec-1999 11:22:00	53.25	2.86	50.39		22.00	0.0153				7.0222E-09	-0.02	
07-Dec-1999 11:23:00	53.28	2.86	50.42		23.00	0.0160				7.3414E-09	0.01	
07-Dec-1999 11:24:00	53.25	2.86	50.39		24.00	0.0167				7.6606E-09	-0.02	
07-Dec-1999 11:25:00	53.27	2.86	50.41		25.00	0.0174				7.9798E-09	0.00	

Appendix 30: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52096)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52096
Measuring Point: top lip of 1.5 inch inner casing
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: deep water level well
Measuring Pt. = 2.86 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
07-Dec-1999 11:26:00	53.25	2.86	50.39		26.00	0.0181				8.2990E-09	-0.02	
07-Dec-1999 11:27:00	53.27	2.86	50.41		27.00	0.0187				8.6182E-09	0.00	
07-Dec-1999 11:28:00	53.24	2.86	50.38		28.00	0.0194				8.9374E-09	-0.03	
07-Dec-1999 11:29:00	53.25	2.86	50.39		29.00	0.0201				9.2566E-09	-0.02	
07-Dec-1999 11:30:00	53.22	2.86	50.36		30.00	0.0208				9.5758E-09	-0.05	
07-Dec-1999 11:32:00	53.27	2.86	50.41		32.00	0.0222				1.0214E-08	0.00	
07-Dec-1999 11:34:00	53.27	2.86	50.41		34.00	0.0236				1.0853E-08	0.00	
07-Dec-1999 11:36:00	53.28	2.86	50.42		36.00	0.0250				1.1491E-08	0.01	
07-Dec-1999 11:38:00	53.28	2.86	50.42		38.00	0.0264				1.2129E-08	0.01	
07-Dec-1999 11:40:00	53.26	2.86	50.40		40.00	0.0278				1.2768E-08	-0.01	
07-Dec-1999 11:42:00	53.30	2.86	50.44		42.00	0.0292				1.3406E-08	0.03	
07-Dec-1999 11:44:00	53.28	2.86	50.42		44.00	0.0306				1.4044E-08	0.01	
07-Dec-1999 11:46:00	53.29	2.86	50.43		46.00	0.0319				1.4683E-08	0.02	
07-Dec-1999 11:48:00	53.26	2.86	50.40		48.00	0.0333				1.5321E-08	-0.01	
07-Dec-1999 11:50:00	53.29	2.86	50.43		50.00	0.0347				1.5960E-08	0.02	
07-Dec-1999 11:52:00	53.28	2.86	50.42		52.00	0.0361				1.6598E-08	0.01	
07-Dec-1999 11:54:00	53.26	2.86	50.40		54.00	0.0375				1.7236E-08	-0.01	
07-Dec-1999 11:56:00	53.29	2.86	50.43		56.00	0.0389				1.7875E-08	0.02	
07-Dec-1999 11:58:00	53.28	2.86	50.42		58.00	0.0403				1.8513E-08	0.01	
07-Dec-1999 12:00:00	53.29	2.86	50.43		60.00	0.0417				1.9152E-08	0.02	
07-Dec-1999 12:05:00	53.28	2.86	50.42		65.00	0.0451				2.0748E-08	0.01	
07-Dec-1999 12:10:00	53.29	2.86	50.43		70.00	0.0486				2.2344E-08	0.02	
07-Dec-1999 12:15:00	53.29	2.86	50.43		75.00	0.0521				2.3939E-08	0.02	
07-Dec-1999 12:20:00	53.30	2.86	50.44		80.00	0.0556				2.5535E-08	0.03	
07-Dec-1999 12:25:00	53.30	2.86	50.44		85.00	0.0590				2.7131E-08	0.03	
07-Dec-1999 12:30:00	53.29	2.86	50.43		90.00	0.0625				2.8727E-08	0.02	
07-Dec-1999 12:35:00	53.30	2.86	50.44		95.00	0.0660				3.0323E-08	0.03	
07-Dec-1999 12:40:00	53.29	2.86	50.43		100.00	0.0694				3.1919E-08	0.02	
07-Dec-1999 12:45:00	53.31	2.86	50.45		105.00	0.0729				3.3515E-08	0.04	
07-Dec-1999 12:50:00	53.28	2.86	50.42		110.00	0.0764				3.5111E-08	0.01	
07-Dec-1999 12:55:00	53.30	2.86	50.44		115.00	0.0799				3.6707E-08	0.03	
07-Dec-1999 13:00:00	53.30	2.86	50.44		120.00	0.0833				3.8303E-08	0.03	
07-Dec-1999 13:10:00	53.30	2.86	50.44		130.00	0.0903				4.1495E-08	0.03	
07-Dec-1999 13:20:00	53.30	2.86	50.44		140.00	0.0972				4.4687E-08	0.03	

Appendix 30: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52096)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52096
Measuring Point: top lip of 1.5 inch inner casing
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: deep water level well
Measuring Pt. = 2.86 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
07-Dec-1999 13:30:00	53.30	2.86	50.44		150.00	0.1042				4.7879E-08	0.03	
07-Dec-1999 13:40:00	53.32	2.86	50.46		160.00	0.1111				5.1071E-08	0.05	
07-Dec-1999 13:50:00	53.30	2.86	50.44		170.00	0.1181				5.4263E-08	0.03	
07-Dec-1999 14:00:00	53.32	2.86	50.46		180.00	0.1250				5.7455E-08	0.05	
07-Dec-1999 14:15:00	53.31	2.86	50.45		195.00	0.1354				6.2243E-08	0.04	
07-Dec-1999 14:30:00	53.31	2.86	50.45		210.00	0.1458				6.7031E-08	0.04	
07-Dec-1999 14:45:00	53.32	2.86	50.46		225.00	0.1563				7.1818E-08	0.05	
07-Dec-1999 15:00:00	53.31	2.86	50.45		240.00	0.1667				7.6606E-08	0.04	
07-Dec-1999 15:20:00	53.31	2.86	50.45		260.00	0.1806				8.2990E-08	0.04	
07-Dec-1999 15:40:00	53.33	2.86	50.47		280.00	0.1944				8.9374E-08	0.06	
07-Dec-1999 16:00:00	53.33	2.86	50.47		300.00	0.2083				9.5758E-08	0.06	
07-Dec-1999 16:30:00	53.34	2.86	50.48		330.00	0.2292				1.0533E-07	0.07	
07-Dec-1999 17:00:00	53.35	2.86	50.49		360.00	0.2500				1.1491E-07	0.08	
07-Dec-1999 17:57:00	53.36	2.86	50.50		417.00	0.2896				1.3310E-07	0.09	
07-Dec-1999 19:01:00	53.39	2.86	50.53		481.00	0.3340				1.5353E-07	0.12	
07-Dec-1999 20:01:00	53.42	2.86	50.56		541.00	0.3757				1.7268E-07	0.15	
07-Dec-1999 21:01:00	53.41	2.86	50.55		601.00	0.4174				1.9184E-07	0.14	
07-Dec-1999 21:57:00	53.42	2.86	50.56		657.00	0.4562				2.0971E-07	0.15	
07-Dec-1999 22:59:00	53.44	2.86	50.58		719.00	0.4993				2.2950E-07	0.17	
08-Dec-1999 00:03:00	53.43	2.86	50.57	condensation in pipe?	783.00	0.5437				2.4993E-07	0.16	
08-Dec-1999 01:03:00	53.39	2.86	50.53		843.00	0.5854				2.6908E-07	0.12	
08-Dec-1999 02:03:00	53.35	2.86	50.49		903.00	0.6271				2.8823E-07	0.08	
08-Dec-1999 03:02:00	53.32	2.86	50.46		962.00	0.6681				3.0706E-07	0.05	
08-Dec-1999 04:03:00	53.38	2.86	50.52		1,023.00	0.7104				3.2653E-07	0.11	
08-Dec-1999 05:02:00	53.38	2.86	50.52		1,082.00	0.7514				3.4537E-07	0.11	
08-Dec-1999 06:03:00	53.42	2.86	50.56		1,143.00	0.7937				3.6484E-07	0.15	
08-Dec-1999 07:04:00	53.45	2.86	50.59	condensation in pipe?	1,204.00	0.8361				3.8431E-07	0.18	
08-Dec-1999 08:03:00	53.44	2.86	50.58		1,263.00	0.8771				4.0314E-07	0.17	
08-Dec-1999 09:05:00	53.46	2.86	50.60		1,325.00	0.9201				4.2293E-07	0.19	
08-Dec-1999 10:01:00	53.41	2.86	50.55		1,381.00	0.9590				4.4081E-07	0.14	
08-Dec-1999 10:31:00	53.41	2.86	50.55		1,411.00	0.9799				4.5038E-07	0.14	
08-Dec-1999 10:55:00	53.41	2.86	50.55		1,435.00	0.9965				4.5804E-07	0.14	
08-Dec-1999 11:00:00				**Start Recovery, Pumping Ends**	1,440.00	1.0000	0.00	0.0000		4.5964E-07		
08-Dec-1999 11:02:00	53.42	2.86	50.56		1,442.00	1.0014	2.00	0.0014	721.0000			0.00

Appendix 30: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52096)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52096
Measuring Point: top lip of 1.5 inch inner casing
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: deep water level well
Measuring Pt. = 2.86 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
08-Dec-1999 11:03:00	53.43	2.86	50.57		1,443.00	1.0021	3.00	0.0021	481.0000			-0.01
08-Dec-1999 11:04:00	53.41	2.86	50.55		1,444.00	1.0028	4.00	0.0028	361.0000			0.01
08-Dec-1999 11:05:00	53.40	2.86	50.54		1,445.00	1.0035	5.00	0.0035	289.0000			0.02
08-Dec-1999 11:06:00	53.41	2.86	50.55		1,446.00	1.0042	6.00	0.0042	241.0000			0.01
08-Dec-1999 11:07:00	53.40	2.86	50.54		1,447.00	1.0049	7.00	0.0049	206.7143			0.02
08-Dec-1999 11:08:00	53.40	2.86	50.54		1,448.00	1.0056	8.00	0.0056	181.0000			0.02
08-Dec-1999 11:09:00	53.43	2.86	50.57		1,449.00	1.0062	9.00	0.0062	161.0000			-0.01
08-Dec-1999 11:10:00	53.40	2.86	50.54		1,450.00	1.0069	10.00	0.0069	145.0000			0.02
08-Dec-1999 11:11:00	53.39	2.86	50.53		1,451.00	1.0076	11.00	0.0076	131.9091			0.03
08-Dec-1999 11:12:00	53.42	2.86	50.56		1,452.00	1.0083	12.00	0.0083	121.0000			0.00
08-Dec-1999 11:13:00	53.41	2.86	50.55		1,453.00	1.0090	13.00	0.0090	111.7692			0.01
08-Dec-1999 11:14:00	53.40	2.86	50.54		1,454.00	1.0097	14.00	0.0097	103.8571			0.02
08-Dec-1999 11:15:00	53.40	2.86	50.54		1,455.00	1.0104	15.00	0.0104	97.0000			0.02
08-Dec-1999 11:16:00	53.42	2.86	50.56		1,456.00	1.0111	16.00	0.0111	91.0000			0.00
08-Dec-1999 11:17:00	53.42	2.86	50.56		1,457.00	1.0118	17.00	0.0118	85.7059			0.00
08-Dec-1999 11:18:00	53.42	2.86	50.56		1,458.00	1.0125	18.00	0.0125	81.0000			0.00
08-Dec-1999 11:19:00	53.42	2.86	50.56		1,459.00	1.0132	19.00	0.0132	76.7895			0.00
08-Dec-1999 11:20:00	53.42	2.86	50.56		1,460.00	1.0139	20.00	0.0139	73.0000			0.00
08-Dec-1999 11:21:00	53.41	2.86	50.55		1,461.00	1.0146	21.00	0.0146	69.5714			0.01
08-Dec-1999 11:22:00	53.39	2.86	50.53		1,462.00	1.0153	22.00	0.0153	66.4545			0.03
08-Dec-1999 11:23:00	53.42	2.86	50.56		1,463.00	1.0160	23.00	0.0160	63.6087			0.00
08-Dec-1999 11:24:00	53.42	2.86	50.56		1,464.00	1.0167	24.00	0.0167	61.0000			0.00
08-Dec-1999 11:25:00	53.42	2.86	50.56		1,465.00	1.0174	25.00	0.0174	58.6000			0.00
08-Dec-1999 11:26:00	53.40	2.86	50.54		1,466.00	1.0181	26.00	0.0181	56.3846			0.02
08-Dec-1999 11:27:00	53.43	2.86	50.57		1,467.00	1.0187	27.00	0.0187	54.3333			-0.01
08-Dec-1999 11:28:00	53.41	2.86	50.55		1,468.00	1.0194	28.00	0.0194	52.4286			0.01
08-Dec-1999 11:29:00	53.42	2.86	50.56		1,469.00	1.0201	29.00	0.0201	50.6552			0.00
08-Dec-1999 11:30:00	53.43	2.86	50.57		1,470.00	1.0208	30.00	0.0208	49.0000			-0.01
08-Dec-1999 11:32:00	53.39	2.86	50.53		1,472.00	1.0222	32.00	0.0222	46.0000			0.03
08-Dec-1999 11:34:00	53.40	2.86	50.54		1,474.00	1.0236	34.00	0.0236	43.3529			0.02
08-Dec-1999 11:36:00	53.40	2.86	50.54		1,476.00	1.0250	36.00	0.0250	41.0000			0.02
08-Dec-1999 11:38:00	53.42	2.86	50.56		1,478.00	1.0264	38.00	0.0264	38.8947			0.00
08-Dec-1999 11:40:00	53.43	2.86	50.57		1,480.00	1.0278	40.00	0.0278	37.0000			-0.01
08-Dec-1999 11:42:00	53.43	2.86	50.57		1,482.00	1.0292	42.00	0.0292	35.2857			-0.01

Appendix 30: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52096)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52096
Measuring Point: top lip of 1.5 inch inner casing
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: deep water level well
Measuring Pt. = 2.86 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
08-Dec-1999 11:44:00	53.42	2.86	50.56		1,484.00	1.0306	44.00	0.0306	33.7273			0.00
08-Dec-1999 11:46:00	53.42	2.86	50.56		1,486.00	1.0319	46.00	0.0319	32.3043			0.00
08-Dec-1999 11:48:00	53.41	2.86	50.55		1,488.00	1.0333	48.00	0.0333	31.0000			0.01
08-Dec-1999 11:50:00	53.41	2.86	50.55		1,490.00	1.0347	50.00	0.0347	29.8000			0.01
08-Dec-1999 11:52:00	53.42	2.86	50.56		1,492.00	1.0361	52.00	0.0361	28.6923			0.00
08-Dec-1999 11:54:00	53.42	2.86	50.56		1,494.00	1.0375	54.00	0.0375	27.6667			0.00
08-Dec-1999 11:56:00	53.42	2.86	50.56		1,496.00	1.0389	56.00	0.0389	26.7143			0.00
08-Dec-1999 11:58:00	53.40	2.86	50.54		1,498.00	1.0403	58.00	0.0403	25.8276			0.02
08-Dec-1999 12:00:00	53.40	2.86	50.54		1,500.00	1.0417	60.00	0.0417	25.0000			0.02
08-Dec-1999 12:05:00	53.35	2.86	50.49		1,505.00	1.0451	65.00	0.0451	23.1538			0.07
08-Dec-1999 12:10:00	53.39	2.86	50.53		1,510.00	1.0486	70.00	0.0486	21.5714			0.03
08-Dec-1999 12:15:00	53.40	2.86	50.54		1,515.00	1.0521	75.00	0.0521	20.2000			0.02
08-Dec-1999 12:20:00	53.41	2.86	50.55		1,520.00	1.0556	80.00	0.0556	19.0000			0.01
08-Dec-1999 12:25:00	53.40	2.86	50.54		1,525.00	1.0590	85.00	0.0590	17.9412			0.02
08-Dec-1999 12:30:00	53.40	2.86	50.54		1,530.00	1.0625	90.00	0.0625	17.0000			0.02
08-Dec-1999 12:40:00	53.36	2.86	50.50		1,540.00	1.0694	100.00	0.0694	15.4000			0.06
08-Dec-1999 12:45:00	53.36	2.86	50.50		1,545.00	1.0729	105.00	0.0729	14.7143			0.06
08-Dec-1999 12:50:00	53.38	2.86	50.52		1,550.00	1.0764	110.00	0.0764	14.0909			0.04
08-Dec-1999 12:55:00	53.36	2.86	50.50		1,555.00	1.0799	115.00	0.0799	13.5217			0.06
08-Dec-1999 13:00:00	53.36	2.86	50.50		1,560.00	1.0833	120.00	0.0833	13.0000			0.06
08-Dec-1999 13:10:00	53.37	2.86	50.51		1,570.00	1.0903	130.00	0.0903	12.0769			0.05
08-Dec-1999 13:20:00	53.36	2.86	50.50		1,580.00	1.0972	140.00	0.0972	11.2857			0.06
08-Dec-1999 13:30:00	53.35	2.86	50.49		1,590.00	1.1042	150.00	0.1042	10.6000			0.07
08-Dec-1999 13:40:00	53.37	2.86	50.51		1,600.00	1.1111	160.00	0.1111	10.0000			0.05
08-Dec-1999 13:50:00	53.36	2.86	50.50		1,610.00	1.1181	170.00	0.1181	9.4706			0.06
08-Dec-1999 14:00:00	53.35	2.86	50.49		1,620.00	1.1250	180.00	0.1250	9.0000			0.07
08-Dec-1999 14:15:00	53.36	2.86	50.50		1,635.00	1.1354	195.00	0.1354	8.3846			0.06
08-Dec-1999 14:30:00	53.35	2.86	50.49		1,650.00	1.1458	210.00	0.1458	7.8571			0.07
08-Dec-1999 14:45:00	53.35	2.86	50.49		1,665.00	1.1563	225.00	0.1563	7.4000			0.07
08-Dec-1999 15:00:00	53.30	2.86	50.44		1,680.00	1.1667	240.00	0.1667	7.0000			0.12
08-Dec-1999 15:20:00	53.30	2.86	50.44		1,700.00	1.1806	260.00	0.1806	6.5385			0.12
08-Dec-1999 15:40:00	53.31	2.86	50.45		1,720.00	1.1944	280.00	0.1944	6.1429			0.11
08-Dec-1999 16:00:00	53.31	2.86	50.45		1,740.00	1.2083	300.00	0.2083	5.8000			0.11
08-Dec-1999 16:30:00	53.31	2.86	50.45		1,770.00	1.2292	330.00	0.2292	5.3636			0.11

Appendix 30: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52096)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52096
Measuring Point: top lip of 1.5 inch inner casing
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: deep water level well
Measuring Pt. = 2.86 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
08-Dec-1999 17:00:00	53.30	2.86	50.44		1,800.00	1.2500	360.00	0.2500	5.0000			0.12
08-Dec-1999 18:00:00	53.30	2.86	50.44		1,860.00	1.2917	420.00	0.2917	4.4286			0.12
08-Dec-1999 19:01:00	53.26	2.86	50.40		1,921.00	1.3340	481.00	0.3340	3.9938			0.16
08-Dec-1999 20:01:00	53.28	2.86	50.42		1,981.00	1.3757	541.00	0.3757	3.6617			0.14
08-Dec-1999 21:01:00	53.28	2.86	50.42		2,041.00	1.4174	601.00	0.4174	3.3960			0.14
08-Dec-1999 22:01:00	53.27	2.86	50.41		2,101.00	1.4590	661.00	0.4590	3.1785			0.15
08-Dec-1999 23:01:00	53.28	2.86	50.42		2,161.00	1.5007	721.00	0.5007	2.9972			0.14
09-Dec-1999 00:13:00	53.27	2.86	50.41		2,233.00	1.5507	793.00	0.5507	2.8159			0.15
09-Dec-1999 01:02:00	53.27	2.86	50.41		2,282.00	1.5847	842.00	0.5847	2.7102			0.15
09-Dec-1999 02:01:00	53.26	2.86	50.40		2,341.00	1.6257	901.00	0.6257	2.5982			0.16
09-Dec-1999 03:01:00	53.25	2.86	50.39		2,401.00	1.6674	961.00	0.6674	2.4984			0.17
09-Dec-1999 04:01:00	53.24	2.86	50.38		2,461.00	1.7090	1,021.00	0.7090	2.4104			0.18
09-Dec-1999 05:02:00	53.24	2.86	50.38		2,522.00	1.7514	1,082.00	0.7514	2.3309			0.18
09-Dec-1999 06:05:00	53.25	2.86	50.39		2,585.00	1.7951	1,145.00	0.7951	2.2576			0.17
09-Dec-1999 07:04:00	53.23	2.86	50.37		2,644.00	1.8361	1,204.00	0.8361	2.1960			0.19
09-Dec-1999 08:05:00	53.28	2.86	50.42		2,705.00	1.8785	1,265.00	0.8785	2.1383			0.14
09-Dec-1999 09:02:00	53.29	2.86	50.43		2,762.00	1.9181	1,322.00	0.9181	2.0893			0.13
09-Dec-1999 10:03:00	53.32	2.86	50.46		2,823.00	1.9604	1,383.00	0.9604	2.0412			0.10
09-Dec-1999 11:02:00	53.28	2.86	50.42	**End of Test**	2,882.00	2.0014	1,442.00	1.0014	1.9986			0.14

Appendix 30: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52096)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52096
Measuring Point: top lip of 1.5 inch inner casing
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: deep water level well
Measuring Pt. = 2.86 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 03:01:00 (hPascal)	Barometric Change from 9 Dec 1999 at 03:01:00 (feet of water)	Water Level Change from 9 Dec 1999 at 03:01:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
06-Dec-1999 15:33:00								50.28		
06-Dec-1999 16:00:00								50.31		
07-Dec-1999 09:28:00	880.50	29.46						50.43		
07-Dec-1999 09:45:00	880.74	29.47					0.01	50.42		
07-Dec-1999 10:00:00	880.74	29.47					0.01	50.41		
07-Dec-1999 10:15:00	880.98	29.48					0.02	50.41		
07-Dec-1999 10:34:00	880.98	29.48					0.02	50.39		
07-Dec-1999 10:45:00	880.98	29.48					0.02	50.41		
07-Dec-1999 11:00:00	880.98	29.48					0.02	50.40	-0.01	
07-Dec-1999 11:01:00	880.98	29.48					0.02	50.39	-0.01	
07-Dec-1999 11:02:00	880.98	29.48					0.02	50.38	-0.01	
07-Dec-1999 11:03:00	880.98	29.48					0.02	50.37	-0.01	
07-Dec-1999 11:04:00	880.98	29.48					0.02	50.37	0.00	
07-Dec-1999 11:05:00	880.98	29.48					0.02	50.38	0.01	
07-Dec-1999 11:06:00	880.98	29.48					0.02	50.39	0.01	
07-Dec-1999 11:07:00	880.98	29.48					0.02	50.41	0.02	
07-Dec-1999 11:08:00	880.98	29.48					0.02	50.39	-0.02	
07-Dec-1999 11:09:00	880.98	29.48					0.02	50.41	0.02	
07-Dec-1999 11:10:00	880.98	29.48					0.02	50.38	-0.03	
07-Dec-1999 11:11:00	880.98	29.48					0.02	50.37	-0.01	
07-Dec-1999 11:12:00	880.98	29.48					0.02	50.34	-0.03	
07-Dec-1999 11:13:00	880.98	29.48					0.02	50.37	0.03	
07-Dec-1999 11:14:00	880.98	29.48					0.02	50.35	-0.02	
07-Dec-1999 11:15:00	880.98	29.48					0.02	50.38	0.03	
07-Dec-1999 11:16:00	880.98	29.48					0.02	50.38	0.00	
07-Dec-1999 11:17:00	880.98	29.48					0.02	50.36	-0.02	
07-Dec-1999 11:18:00	881.22	29.49					0.02	50.36	0.00	
07-Dec-1999 11:19:00	881.22	29.49					0.02	50.40	0.04	
07-Dec-1999 11:20:00	881.22	29.49					0.02	50.41	0.01	
07-Dec-1999 11:21:00	881.22	29.49					0.02	50.38	-0.03	
07-Dec-1999 11:22:00	881.22	29.49					0.02	50.38	0.00	
07-Dec-1999 11:23:00	881.22	29.49					0.02	50.41	0.03	
07-Dec-1999 11:24:00	881.22	29.49					0.02	50.38	-0.03	
07-Dec-1999 11:25:00	881.22	29.49					0.02	50.40	0.02	

Appendix 30: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52096)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52096
Measuring Point: top lip of 1.5 inch inner casing
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: deep water level well
Measuring Pt. = 2.86 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 03:01:00 (hPascal)	Barometric Change from 9 Dec 1999 at 03:01:00 (feet of water)	Water Level Change from 9 Dec 1999 at 03:01:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
07-Dec-1999 11:26:00	881.22	29.49					0.02	50.38	-0.02	
07-Dec-1999 11:27:00	880.98	29.48					0.02	50.40	0.02	
07-Dec-1999 11:28:00	880.98	29.48					0.02	50.37	-0.03	
07-Dec-1999 11:29:00	880.98	29.48					0.02	50.38	0.01	
07-Dec-1999 11:30:00	881.22	29.49					0.02	50.35	-0.03	
07-Dec-1999 11:32:00	881.22	29.49					0.02	50.40	0.05	
07-Dec-1999 11:34:00	881.22	29.49					0.02	50.40	0.00	
07-Dec-1999 11:36:00	881.22	29.49					0.02	50.41	0.01	
07-Dec-1999 11:38:00	881.22	29.49					0.02	50.41	0.00	
07-Dec-1999 11:40:00	881.22	29.49					0.02	50.39	-0.02	
07-Dec-1999 11:42:00	881.22	29.49					0.02	50.43	0.04	
07-Dec-1999 11:44:00	881.22	29.49					0.02	50.41	-0.02	
07-Dec-1999 11:46:00	881.22	29.49					0.02	50.42	0.01	
07-Dec-1999 11:48:00	881.22	29.49					0.02	50.39	-0.03	
07-Dec-1999 11:50:00	881.22	29.49					0.02	50.42	0.03	
07-Dec-1999 11:52:00	881.22	29.49					0.02	50.41	-0.01	
07-Dec-1999 11:54:00	881.22	29.49					0.02	50.39	-0.02	
07-Dec-1999 11:56:00	881.22	29.49					0.02	50.42	0.03	
07-Dec-1999 11:58:00	881.22	29.49					0.02	50.41	-0.01	
07-Dec-1999 12:00:00	881.22	29.49					0.02	50.42	0.01	
07-Dec-1999 12:05:00	881.22	29.49					0.02	50.41	-0.01	
07-Dec-1999 12:10:00	881.22	29.49					0.02	50.42	0.01	
07-Dec-1999 12:15:00	880.98	29.48					0.02	50.42	0.00	
07-Dec-1999 12:20:00	881.22	29.49					0.02	50.43	0.01	
07-Dec-1999 12:25:00	881.22	29.49					0.02	50.43	0.00	
07-Dec-1999 12:30:00	881.22	29.49					0.02	50.42	-0.01	
07-Dec-1999 12:35:00	880.98	29.48					0.02	50.43	0.01	
07-Dec-1999 12:40:00	881.22	29.49					0.02	50.42	-0.01	
07-Dec-1999 12:45:00	881.22	29.49					0.02	50.44	0.02	
07-Dec-1999 12:50:00	881.22	29.49					0.02	50.41	-0.03	
07-Dec-1999 12:55:00	881.22	29.49					0.02	50.43	0.02	
07-Dec-1999 13:00:00	881.22	29.49					0.02	50.43	0.00	
07-Dec-1999 13:10:00	881.22	29.49					0.02	50.43	0.00	
07-Dec-1999 13:20:00	881.46	29.49					0.03	50.42	0.00	

Appendix 30: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52096)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52096
Measuring Point: top lip of 1.5 inch inner casing
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: deep water level well
Measuring Pt. = 2.86 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 03:01:00 (hPascal)	Barometric Change from 9 Dec 1999 at 03:01:00 (feet of water)	Water Level Change from 9 Dec 1999 at 03:01:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
07-Dec-1999 13:30:00	881.22	29.49					0.02	50.43	0.00	
07-Dec-1999 13:40:00	881.46	29.49					0.03	50.44	0.02	
07-Dec-1999 13:50:00	881.46	29.49					0.03	50.42	-0.02	
07-Dec-1999 14:00:00	881.46	29.49					0.03	50.44	0.02	
07-Dec-1999 14:15:00	881.46	29.49					0.03	50.43	-0.01	
07-Dec-1999 14:30:00	881.70	29.50					0.04	50.43	0.00	
07-Dec-1999 14:45:00	881.70	29.50					0.04	50.44	0.01	
07-Dec-1999 15:00:00	882.18	29.52					0.06	50.42	-0.02	
07-Dec-1999 15:20:00	882.18	29.52					0.06	50.42	0.00	
07-Dec-1999 15:40:00	882.65	29.53					0.07	50.43	0.01	
07-Dec-1999 16:00:00	882.65	29.53					0.07	50.43	0.00	
07-Dec-1999 16:30:00	882.89	29.54					0.08	50.44	0.01	
07-Dec-1999 17:00:00	882.89	29.54					0.08	50.45	0.01	
07-Dec-1999 17:57:00	883.61	29.57					0.10	50.45	0.00	
07-Dec-1999 19:01:00	884.33	29.59					0.13	50.47	0.02	
07-Dec-1999 20:01:00	885.05	29.61					0.15	50.48	0.02	
07-Dec-1999 21:01:00	885.29	29.62					0.16	50.47	-0.01	
07-Dec-1999 21:57:00	885.53	29.63					0.17	50.48	0.01	
07-Dec-1999 22:59:00	886.24	29.65					0.19	50.48	0.01	
08-Dec-1999 00:03:00	886.72	29.67					0.21	50.47	-0.02	
08-Dec-1999 01:03:00	886.48	29.66					0.20	50.43	-0.04	
08-Dec-1999 02:03:00	886.96	29.68					0.22	50.38	-0.05	
08-Dec-1999 03:02:00	886.48	29.66					0.20	50.36	-0.02	
08-Dec-1999 04:03:00	886.96	29.68					0.22	50.41	0.05	
08-Dec-1999 05:02:00	886.72	29.67					0.21	50.42	0.00	
08-Dec-1999 06:03:00	886.96	29.68					0.22	50.45	0.04	
08-Dec-1999 07:04:00	887.20	29.69					0.22	50.48	0.03	
08-Dec-1999 08:03:00	887.20	29.69					0.22	50.47	-0.01	
08-Dec-1999 09:05:00	886.96	29.68					0.22	50.49	0.02	
08-Dec-1999 10:01:00	886.72	29.67					0.21	50.45	-0.05	
08-Dec-1999 10:31:00	886.48	29.66					0.20	50.45	0.00	
08-Dec-1999 10:55:00	886.48	29.66					0.20	50.45	0.00	
08-Dec-1999 11:00:00	886.48	29.66					0.20			
08-Dec-1999 11:02:00	886.48	29.66					0.20	50.46		0.00

Appendix 30: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52096)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52096
Measuring Point: top lip of 1.5 inch inner casing
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: deep water level well
Measuring Pt. = 2.86 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 03:01:00 (hPascal)	Barometric Change from 9 Dec 1999 at 03:01:00 (feet of water)	Water Level Change from 9 Dec 1999 at 03:01:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
08-Dec-1999 11:03:00	886.48	29.66					0.20	50.47		-0.01
08-Dec-1999 11:04:00	886.48	29.66					0.20	50.45		0.01
08-Dec-1999 11:05:00	886.48	29.66					0.20	50.44		0.02
08-Dec-1999 11:06:00	886.48	29.66					0.20	50.45		0.01
08-Dec-1999 11:07:00	886.48	29.66					0.20	50.44		0.02
08-Dec-1999 11:08:00	886.24	29.65					0.19	50.44		0.02
08-Dec-1999 11:09:00	886.48	29.66					0.20	50.47		-0.01
08-Dec-1999 11:10:00	886.24	29.65					0.19	50.44		0.02
08-Dec-1999 11:11:00	886.24	29.65					0.19	50.43		0.03
08-Dec-1999 11:12:00	886.24	29.65					0.19	50.46		0.00
08-Dec-1999 11:13:00	886.24	29.65					0.19	50.45		0.01
08-Dec-1999 11:14:00	886.48	29.66					0.20	50.44		0.02
08-Dec-1999 11:15:00	886.24	29.65					0.19	50.44		0.02
08-Dec-1999 11:16:00	886.24	29.65					0.19	50.46		0.00
08-Dec-1999 11:17:00	886.24	29.65					0.19	50.46		0.00
08-Dec-1999 11:18:00	886.24	29.65					0.19	50.46		0.00
08-Dec-1999 11:19:00	886.24	29.65					0.19	50.46		0.00
08-Dec-1999 11:20:00	886.24	29.65					0.19	50.46		0.00
08-Dec-1999 11:21:00	886.24	29.65					0.19	50.45		0.01
08-Dec-1999 11:22:00	886.24	29.65					0.19	50.43		0.03
08-Dec-1999 11:23:00	886.24	29.65					0.19	50.46		0.00
08-Dec-1999 11:24:00	886.24	29.65					0.19	50.46		0.00
08-Dec-1999 11:25:00	886.24	29.65					0.19	50.46		0.00
08-Dec-1999 11:26:00	886.24	29.65					0.19	50.44		0.02
08-Dec-1999 11:27:00	886.24	29.65					0.19	50.47		-0.01
08-Dec-1999 11:28:00	886.24	29.65					0.19	50.45		0.01
08-Dec-1999 11:29:00	886.24	29.65					0.19	50.46		0.00
08-Dec-1999 11:30:00	886.24	29.65					0.19	50.47		-0.01
08-Dec-1999 11:32:00	886.24	29.65					0.19	50.43		0.03
08-Dec-1999 11:34:00	886.24	29.65					0.19	50.44		0.02
08-Dec-1999 11:36:00	886.24	29.65					0.19	50.44		0.02
08-Dec-1999 11:38:00	886.24	29.65					0.19	50.46		0.00
08-Dec-1999 11:40:00	886.24	29.65					0.19	50.47		-0.01
08-Dec-1999 11:42:00	886.24	29.65					0.19	50.47		-0.01

Appendix 30: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52096)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52096
Measuring Point: top lip of 1.5 inch inner casing
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: deep water level well
Measuring Pt. = 2.86 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 03:01:00 (hPascal)	Barometric Change from 9 Dec 1999 at 03:01:00 (feet of water)	Water Level Change from 9 Dec 1999 at 03:01:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
08-Dec-1999 11:44:00	886.01	29.65					0.18	50.47		-0.01
08-Dec-1999 11:46:00	886.24	29.65					0.19	50.46		0.00
08-Dec-1999 11:48:00	886.01	29.65					0.18	50.46		0.00
08-Dec-1999 11:50:00	886.01	29.65					0.18	50.46		0.00
08-Dec-1999 11:52:00	886.01	29.65					0.18	50.47		-0.01
08-Dec-1999 11:54:00	886.01	29.65					0.18	50.47		-0.01
08-Dec-1999 11:56:00	886.01	29.65					0.18	50.47		-0.01
08-Dec-1999 11:58:00	886.01	29.65					0.18	50.45		0.01
08-Dec-1999 12:00:00	886.01	29.65					0.18	50.45		0.01
08-Dec-1999 12:05:00	885.77	29.64					0.18	50.40		0.06
08-Dec-1999 12:10:00	885.77	29.64					0.18	50.44		0.02
08-Dec-1999 12:15:00	885.77	29.64					0.18	50.45		0.01
08-Dec-1999 12:20:00	885.77	29.64					0.18	50.46		0.00
08-Dec-1999 12:25:00	885.53	29.63					0.17	50.46		0.00
08-Dec-1999 12:30:00	885.29	29.62					0.16	50.46		0.00
08-Dec-1999 12:40:00	885.29	29.62					0.16	50.42		0.04
08-Dec-1999 12:45:00	885.29	29.62					0.16	50.42		0.04
08-Dec-1999 12:50:00	885.05	29.61					0.15	50.44		0.02
08-Dec-1999 12:55:00	885.05	29.61					0.15	50.42		0.04
08-Dec-1999 13:00:00	885.05	29.61					0.15	50.42		0.04
08-Dec-1999 13:10:00	884.81	29.61					0.14	50.44		0.02
08-Dec-1999 13:20:00	884.81	29.61					0.14	50.43		0.03
08-Dec-1999 13:30:00	884.33	29.59					0.13	50.43		0.03
08-Dec-1999 13:40:00	884.33	29.59					0.13	50.45		0.01
08-Dec-1999 13:50:00	884.33	29.59					0.13	50.44		0.02
08-Dec-1999 14:00:00	884.33	29.59					0.13	50.43		0.03
08-Dec-1999 14:15:00	884.33	29.59					0.13	50.44		0.02
08-Dec-1999 14:30:00	883.37	29.56					0.10	50.44		0.02
08-Dec-1999 14:45:00	883.37	29.56					0.10	50.44		0.02
08-Dec-1999 15:00:00	883.37	29.56					0.10	50.39		0.07
08-Dec-1999 15:20:00	883.37	29.56					0.10	50.39		0.07
08-Dec-1999 15:40:00	883.37	29.56					0.10	50.40		0.06
08-Dec-1999 16:00:00	883.13	29.55					0.09	50.41		0.05
08-Dec-1999 16:30:00	882.89	29.54					0.08	50.41		0.05

Appendix 30: Lorella 1999 OWRD aquifer test, observation well data (KLAM 52096)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T39S/R12E-35 abb
OWRD Well Log ID Number: KLAM 52096
Measuring Point: top lip of 1.5 inch inner casing
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 1,475 feet
Owner Well Name/Number: deep water level well
Measuring Pt. = 2.86 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Barometer Reading (h Pascals)	Barometer Reading (feet water)	Barometric Change from 9 Dec 1999 at 03:01:00 (hPascal)	Barometric Change from 9 Dec 1999 at 03:01:00 (feet of water)	Water Level Change from 9 Dec 1999 at 03:01:00 (feet of water)	Ratio WL Diff vs Baro Diff	Cumulative Barometric Pressure Change (feet water)	Adjusted Water Level WL - 50% barometer (feet blsd)	Drawdown (Adjusted) (feet)	Residual Drawdown (Adjusted) (feet)
08-Dec-1999 17:00:00	882.89	29.54					0.08	50.40		0.06
08-Dec-1999 18:00:00	881.94	29.51					0.05	50.42		0.04
08-Dec-1999 19:01:00	881.22	29.49					0.02	50.39		0.07
08-Dec-1999 20:01:00	880.74	29.47					0.01	50.42		0.04
08-Dec-1999 21:01:00	880.50	29.46					0.00	50.42		0.04
08-Dec-1999 22:01:00	880.26	29.45					-0.01	50.41		0.05
08-Dec-1999 23:01:00	879.78	29.44					-0.02	50.43		0.03
09-Dec-1999 00:13:00	879.06	29.41					-0.05	50.43		0.03
09-Dec-1999 01:02:00	879.06	29.41					-0.05	50.43		0.03
09-Dec-1999 02:01:00	879.06	29.41					-0.05	50.42		0.04
09-Dec-1999 03:01:00	878.58	29.40	0.00	0.00	0.00		-0.06	50.42		0.04
09-Dec-1999 04:01:00	878.35	29.39	-0.23	-0.01	-0.01	1.30	-0.07	50.42		0.04
09-Dec-1999 05:02:00	878.58	29.40	0.00	0.00	-0.01		-0.06	50.41		0.05
09-Dec-1999 06:05:00	879.06	29.41	0.48	0.02	0.00	0.00	-0.05	50.41		0.05
09-Dec-1999 07:04:00	879.30	29.42	0.72	0.02	-0.02	-0.83	-0.04	50.39		0.07
09-Dec-1999 08:05:00	879.54	29.43	0.96	0.03	0.03	0.93	-0.03	50.44		0.02
09-Dec-1999 09:02:00	879.78	29.44	1.20	0.04	0.04	1.00	-0.02	50.44		0.02
09-Dec-1999 10:03:00	880.26	29.45	1.68	0.06	0.07	1.25	-0.01	50.46		0.00
09-Dec-1999 11:02:00	880.02	29.45	1.44	0.05	0.03	0.62	-0.02	50.43		0.03

Appendix 31: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10362)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T40S/R13E-1 bba
OWRD Well Log ID Number: KLAM 10362
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 5,775 feet
Owner Well Name/Number: 1,200 foot deep well
Measuring Pt. = 1.83 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
06-Dec-1999 17:05:00			6.72	Recorder Reading	-1,075.00	-0.7465						
06-Dec-1999 18:00:00			6.75	Recorder Reading	-1,020.00	-0.7083						
06-Dec-1999 19:00:00			6.78	Recorder Reading	-960.00	-0.6667						
06-Dec-1999 20:00:00			6.82	Recorder Reading	-900.00	-0.6250						
06-Dec-1999 21:00:00			6.85	Recorder Reading	-840.00	-0.5833						
06-Dec-1999 22:00:00			6.87	Recorder Reading	-780.00	-0.5417						
06-Dec-1999 23:00:00			6.87	Recorder Reading	-720.00	-0.5000						
07-Dec-1999 00:00:00			6.85	Recorder Reading	-660.00	-0.4583						
07-Dec-1999 01:00:00			6.81	Recorder Reading	-600.00	-0.4167						
07-Dec-1999 02:00:00			6.77	Recorder Reading	-540.00	-0.3750						
07-Dec-1999 03:00:00			6.72	Recorder Reading	-480.00	-0.3333						
07-Dec-1999 04:00:00			6.68	Recorder Reading	-420.00	-0.2917						
07-Dec-1999 05:00:00			6.65	Recorder Reading	-360.00	-0.2500						
07-Dec-1999 06:00:00			6.65	Recorder Reading	-300.00	-0.2083						
07-Dec-1999 07:00:00			6.67	Recorder Reading	-240.00	-0.1667						
07-Dec-1999 08:00:00			6.70	Recorder Reading	-180.00	-0.1250						
07-Dec-1999 09:00:00			6.73	Recorder Reading	-120.00	-0.0833						
07-Dec-1999 10:00:00			6.76	Recorder Reading	-60.00	-0.0417						
07-Dec-1999 10:30:00			6.78	Recorder Reading	-30.00	-0.0208						
07-Dec-1999 10:40:00			6.78	Recorder Reading	-20.00	-0.0139						
07-Dec-1999 10:50:00			6.78	Recorder Reading	-10.00	-0.0069						
07-Dec-1999 11:00:00			6.78	**Start Test, Pumping Well On**	0.00	0.0000				0.0000E+00	0.00	
07-Dec-1999 11:01:00			6.78	Recorder Reading	1.00	0.0007				2.0823E-11	0.00	
07-Dec-1999 11:02:00			6.78	Recorder Reading	2.00	0.0014				4.1645E-11	0.00	
07-Dec-1999 11:03:00			6.78	Recorder Reading	3.00	0.0021				6.2468E-11	0.00	
07-Dec-1999 11:04:00			6.78	Recorder Reading	4.00	0.0028				8.3290E-11	0.00	
07-Dec-1999 11:05:00			6.78	Recorder Reading	5.00	0.0035				1.0411E-10	0.00	
07-Dec-1999 11:06:00			6.78	Recorder Reading	6.00	0.0042				1.2494E-10	0.00	
07-Dec-1999 11:07:00			6.78	Recorder Reading	7.00	0.0049				1.4576E-10	0.00	
07-Dec-1999 11:08:00			6.78	Recorder Reading	8.00	0.0056				1.6658E-10	0.00	
07-Dec-1999 11:09:00			6.78	Recorder Reading	9.00	0.0062				1.8740E-10	0.00	
07-Dec-1999 11:10:00			6.78	Recorder Reading	10.00	0.0069				2.0823E-10	0.00	
07-Dec-1999 11:11:00			6.78	Recorder Reading	11.00	0.0076				2.2905E-10	0.00	
07-Dec-1999 11:12:00			6.78	Recorder Reading	12.00	0.0083				2.4987E-10	0.00	

Appendix 31: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10362)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T40S/R13E-1 bba
OWRD Well Log ID Number: KLAM 10362
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 5,775 feet
Owner Well Name/Number: 1,200 foot deep well
Measuring Pt. = 1.83 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
07-Dec-1999 11:13:00			6.78	Recorder Reading	13.00	0.0090				2.7069E-10	0.00	
07-Dec-1999 11:14:00			6.78	Recorder Reading	14.00	0.0097				2.9152E-10	0.00	
07-Dec-1999 11:15:00			6.78	Recorder Reading	15.00	0.0104				3.1234E-10	0.00	
07-Dec-1999 11:16:00			6.78	Recorder Reading	16.00	0.0111				3.3316E-10	0.00	
07-Dec-1999 11:17:00			6.78	Recorder Reading	17.00	0.0118				3.5398E-10	0.00	
07-Dec-1999 11:18:00			6.78	Recorder Reading	18.00	0.0125				3.7481E-10	0.00	
07-Dec-1999 11:19:00			6.78	Recorder Reading	19.00	0.0132				3.9563E-10	0.00	
07-Dec-1999 11:20:00			6.78	Recorder Reading	20.00	0.0139				4.1645E-10	0.00	
07-Dec-1999 11:21:00			6.78	Recorder Reading	21.00	0.0146				4.3727E-10	0.00	
07-Dec-1999 11:22:00			6.78	Recorder Reading	22.00	0.0153				4.5810E-10	0.00	
07-Dec-1999 11:23:00			6.78	Recorder Reading	23.00	0.0160				4.7892E-10	0.00	
07-Dec-1999 11:24:00			6.78	Recorder Reading	24.00	0.0167				4.9974E-10	0.00	
07-Dec-1999 11:25:00			6.78	Recorder Reading	25.00	0.0174				5.2056E-10	0.00	
07-Dec-1999 11:26:00			6.78	Recorder Reading	26.00	0.0181				5.4139E-10	0.00	
07-Dec-1999 11:27:00			6.78	Recorder Reading	27.00	0.0187				5.6221E-10	0.00	
07-Dec-1999 11:28:00			6.78	Recorder Reading	28.00	0.0194				5.8303E-10	0.00	
07-Dec-1999 11:29:00			6.78	Recorder Reading	29.00	0.0201				6.0385E-10	0.00	
07-Dec-1999 11:30:00			6.78	Recorder Reading	30.00	0.0208				6.2468E-10	0.00	
07-Dec-1999 11:32:00			6.78	Recorder Reading	32.00	0.0222				6.6632E-10	0.00	
07-Dec-1999 11:34:00			6.78	Recorder Reading	34.00	0.0236				7.0797E-10	0.00	
07-Dec-1999 11:36:00			6.78	Recorder Reading	36.00	0.0250				7.4961E-10	0.00	
07-Dec-1999 11:38:00			6.78	Recorder Reading	38.00	0.0264				7.9126E-10	0.00	
07-Dec-1999 11:40:00			6.78	Recorder Reading	40.00	0.0278				8.3290E-10	0.00	
07-Dec-1999 11:42:00			6.78	Recorder Reading	42.00	0.0292				8.7455E-10	0.00	
07-Dec-1999 11:44:00			6.78	Recorder Reading	44.00	0.0306				9.1619E-10	0.00	
07-Dec-1999 11:46:00			6.78	Recorder Reading	46.00	0.0319				9.5784E-10	0.00	
07-Dec-1999 11:48:00			6.78	Recorder Reading	48.00	0.0333				9.9948E-10	0.00	
07-Dec-1999 11:50:00			6.78	Recorder Reading	50.00	0.0347				1.0411E-09	0.00	
07-Dec-1999 11:52:00			6.78	Recorder Reading	52.00	0.0361				1.0828E-09	0.00	
07-Dec-1999 11:54:00			6.78	Recorder Reading	54.00	0.0375				1.1244E-09	0.00	
07-Dec-1999 11:56:00			6.78	Recorder Reading	56.00	0.0389				1.1661E-09	0.00	
07-Dec-1999 11:58:00			6.78	Recorder Reading	58.00	0.0403				1.2077E-09	0.00	
07-Dec-1999 12:00:00			6.78	Recorder Reading	60.00	0.0417				1.2494E-09	0.00	
07-Dec-1999 12:05:00			6.78	Recorder Reading	65.00	0.0451				1.3535E-09	0.00	

Appendix 31: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10362)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T40S/R13E-1 bba
OWRD Well Log ID Number: KLAM 10362
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 5,775 feet
Owner Well Name/Number: 1,200 foot deep well
Measuring Pt. = 1.83 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
07-Dec-1999 12:10:00			6.78	Recorder Reading	70.00	0.0486				1.4576E-09	0.00	
07-Dec-1999 12:15:00			6.78	Recorder Reading	75.00	0.0521				1.5617E-09	0.00	
07-Dec-1999 12:20:00			6.78	Recorder Reading	80.00	0.0556				1.6658E-09	0.00	
07-Dec-1999 12:25:00			6.78	Recorder Reading	85.00	0.0590				1.7699E-09	0.00	
07-Dec-1999 12:30:00			6.78	Recorder Reading	90.00	0.0625				1.8740E-09	0.00	
07-Dec-1999 12:35:00			6.78	Recorder Reading	95.00	0.0660				1.9781E-09	0.00	
07-Dec-1999 12:40:00			6.78	Recorder Reading	100.00	0.0694				2.0823E-09	0.00	
07-Dec-1999 12:45:00			6.78	Recorder Reading	105.00	0.0729				2.1864E-09	0.00	
07-Dec-1999 12:50:00			6.78	Recorder Reading	110.00	0.0764				2.2905E-09	0.00	
07-Dec-1999 12:55:00			6.78	Recorder Reading	115.00	0.0799				2.3946E-09	0.00	
07-Dec-1999 13:00:00			6.78	Recorder Reading	120.00	0.0833				2.4987E-09	0.00	
07-Dec-1999 13:10:00			6.78	Recorder Reading	130.00	0.0903				2.7069E-09	0.00	
07-Dec-1999 13:20:00			6.78	Recorder Reading	140.00	0.0972				2.9152E-09	0.00	
07-Dec-1999 13:30:00			6.77	Recorder Reading	150.00	0.1042				3.1234E-09	-0.01	
07-Dec-1999 13:40:00			6.77	Recorder Reading	160.00	0.1111				3.3316E-09	-0.01	
07-Dec-1999 13:50:00			6.77	Recorder Reading	170.00	0.1181				3.5398E-09	-0.01	
07-Dec-1999 14:00:00			6.77	Recorder Reading	180.00	0.1250				3.7481E-09	-0.01	
07-Dec-1999 14:20:00			6.77	Recorder Reading	200.00	0.1389				4.1645E-09	-0.01	
07-Dec-1999 14:40:00			6.77	Recorder Reading	220.00	0.1528				4.5810E-09	-0.01	
07-Dec-1999 15:00:00			6.77	Recorder Reading	240.00	0.1667				4.9974E-09	-0.01	
07-Dec-1999 15:30:00			6.77	Recorder Reading	270.00	0.1875				5.6221E-09	-0.01	
07-Dec-1999 16:00:00			6.77	Recorder Reading	300.00	0.2083				6.2468E-09	-0.01	
07-Dec-1999 17:00:00			6.78	Recorder Reading	360.00	0.2500				7.4961E-09	0.00	
07-Dec-1999 18:00:00			6.81	Recorder Reading	420.00	0.2917				8.7455E-09	0.03	
07-Dec-1999 19:00:00			6.85	Recorder Reading	480.00	0.3333				9.9948E-09	0.07	
07-Dec-1999 20:00:00			6.89	Recorder Reading	540.00	0.3750				1.1244E-08	0.11	
07-Dec-1999 21:00:00			6.93	Recorder Reading	600.00	0.4167				1.2494E-08	0.15	
07-Dec-1999 22:00:00			6.96	Recorder Reading	660.00	0.4583				1.3743E-08	0.18	
07-Dec-1999 23:00:00			6.98	Recorder Reading	720.00	0.5000				1.4992E-08	0.20	
08-Dec-1999 00:00:00			6.98	Recorder Reading	780.00	0.5417				1.6242E-08	0.20	
08-Dec-1999 01:00:00			6.96	Recorder Reading	840.00	0.5833				1.7491E-08	0.18	
08-Dec-1999 02:00:00			6.94	Recorder Reading	900.00	0.6250				1.8740E-08	0.16	
08-Dec-1999 03:00:00			6.90	Recorder Reading	960.00	0.6667				1.9990E-08	0.12	
08-Dec-1999 04:00:00			6.86	Recorder Reading	1,020.00	0.7083				2.1239E-08	0.08	

Appendix 31: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10362)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T40S/R13E-1 bba
OWRD Well Log ID Number: KLAM 10362
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 5,775 feet
Owner Well Name/Number: 1,200 foot deep well
Measuring Pt. = 1.83 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
08-Dec-1999 05:00:00			6.84	Recorder Reading	1,080.00	0.7500				2.2488E-08	0.06	
08-Dec-1999 06:00:00			6.83	Recorder Reading	1,140.00	0.7917				2.3738E-08	0.05	
08-Dec-1999 07:00:00			6.84	Recorder Reading	1,200.00	0.8333				2.4987E-08	0.06	
08-Dec-1999 08:00:00			6.86	Recorder Reading	1,260.00	0.8750				2.6236E-08	0.08	
08-Dec-1999 09:00:00			6.88	Recorder Reading	1,320.00	0.9167				2.7486E-08	0.10	
08-Dec-1999 10:00:00			6.91	Recorder Reading	1,380.00	0.9583				2.8735E-08	0.13	
08-Dec-1999 10:30:00			6.92	Recorder Reading	1,410.00	0.9792				2.9360E-08	0.14	
08-Dec-1999 10:40:00			6.92	Recorder Reading	1,420.00	0.9861				2.9568E-08	0.14	
08-Dec-1999 10:50:00			6.92	Recorder Reading	1,430.00	0.9931				2.9776E-08	0.14	
08-Dec-1999 11:00:00			6.92	**Start Recovery, Pump Off**	1,440.00	1.0000	0.00	0.0000		2.9984E-08	0.14	0.00
08-Dec-1999 11:01:00			6.92	Recorder Reading	1,441.00	1.0007	1.00	0.0007	1,441.0000			0.00
08-Dec-1999 11:02:00			6.92	Recorder Reading	1,442.00	1.0014	2.00	0.0014	721.0000			0.00
08-Dec-1999 11:03:00			6.92	Recorder Reading	1,443.00	1.0021	3.00	0.0021	481.0000			0.00
08-Dec-1999 11:04:00			6.92	Recorder Reading	1,444.00	1.0028	4.00	0.0028	361.0000			0.00
08-Dec-1999 11:05:00			6.92	Recorder Reading	1,445.00	1.0035	5.00	0.0035	289.0000			0.00
08-Dec-1999 11:06:00			6.92	Recorder Reading	1,446.00	1.0042	6.00	0.0042	241.0000			0.00
08-Dec-1999 11:07:00			6.92	Recorder Reading	1,447.00	1.0049	7.00	0.0049	206.7143			0.00
08-Dec-1999 11:08:00			6.92	Recorder Reading	1,448.00	1.0056	8.00	0.0056	181.0000			0.00
08-Dec-1999 11:09:00			6.92	Recorder Reading	1,449.00	1.0062	9.00	0.0062	161.0000			0.00
08-Dec-1999 11:10:00			6.92	Recorder Reading	1,450.00	1.0069	10.00	0.0069	145.0000			0.00
08-Dec-1999 11:11:00			6.92	Recorder Reading	1,451.00	1.0076	11.00	0.0076	131.9091			0.00
08-Dec-1999 11:12:00			6.92	Recorder Reading	1,452.00	1.0083	12.00	0.0083	121.0000			0.00
08-Dec-1999 11:13:00			6.92	Recorder Reading	1,453.00	1.0090	13.00	0.0090	111.7692			0.00
08-Dec-1999 11:14:00			6.92	Recorder Reading	1,454.00	1.0097	14.00	0.0097	103.8571			0.00
08-Dec-1999 11:15:00			6.92	Recorder Reading	1,455.00	1.0104	15.00	0.0104	97.0000			0.00
08-Dec-1999 11:16:00			6.92	Recorder Reading	1,456.00	1.0111	16.00	0.0111	91.0000			0.00
08-Dec-1999 11:17:00			6.92	Recorder Reading	1,457.00	1.0118	17.00	0.0118	85.7059			0.00
08-Dec-1999 11:18:00			6.92	Recorder Reading	1,458.00	1.0125	18.00	0.0125	81.0000			0.00
08-Dec-1999 11:19:00			6.92	Recorder Reading	1,459.00	1.0132	19.00	0.0132	76.7895			0.00
08-Dec-1999 11:20:00			6.92	Recorder Reading	1,460.00	1.0139	20.00	0.0139	73.0000			0.00
08-Dec-1999 11:21:00			6.92	Recorder Reading	1,461.00	1.0146	21.00	0.0146	69.5714			0.00
08-Dec-1999 11:22:00			6.92	Recorder Reading	1,462.00	1.0153	22.00	0.0153	66.4545			0.00
08-Dec-1999 11:23:00			6.93	Recorder Reading	1,463.00	1.0160	23.00	0.0160	63.6087			-0.01
08-Dec-1999 11:24:00			6.93	Recorder Reading	1,464.00	1.0167	24.00	0.0167	61.0000			-0.01

Appendix 31: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10362)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T40S/R13E-1 bba
OWRD Well Log ID Number: KLAM 10362
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 5,775 feet
Owner Well Name/Number: 1,200 foot deep well
Measuring Pt. = 1.83 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
08-Dec-1999 11:25:00			6.93	Recorder Reading	1,465.00	1.0174	25.00	0.0174	58.6000			-0.01
08-Dec-1999 11:26:00			6.93	Recorder Reading	1,466.00	1.0181	26.00	0.0181	56.3846			-0.01
08-Dec-1999 11:27:00			6.93	Recorder Reading	1,467.00	1.0187	27.00	0.0187	54.3333			-0.01
08-Dec-1999 11:28:00			6.93	Recorder Reading	1,468.00	1.0194	28.00	0.0194	52.4286			-0.01
08-Dec-1999 11:29:00			6.93	Recorder Reading	1,469.00	1.0201	29.00	0.0201	50.6552			-0.01
08-Dec-1999 11:30:00			6.93	Recorder Reading	1,470.00	1.0208	30.00	0.0208	49.0000			-0.01
08-Dec-1999 11:32:00			6.93	Recorder Reading	1,472.00	1.0222	32.00	0.0222	46.0000			-0.01
08-Dec-1999 11:34:00			6.93	Recorder Reading	1,474.00	1.0236	34.00	0.0236	43.3529			-0.01
08-Dec-1999 11:36:00			6.93	Recorder Reading	1,476.00	1.0250	36.00	0.0250	41.0000			-0.01
08-Dec-1999 11:38:00			6.93	Recorder Reading	1,478.00	1.0264	38.00	0.0264	38.8947			-0.01
08-Dec-1999 11:40:00			6.93	Recorder Reading	1,480.00	1.0278	40.00	0.0278	37.0000			-0.01
08-Dec-1999 11:42:00			6.93	Recorder Reading	1,482.00	1.0292	42.00	0.0292	35.2857			-0.01
08-Dec-1999 11:44:00			6.93	Recorder Reading	1,484.00	1.0306	44.00	0.0306	33.7273			-0.01
08-Dec-1999 11:46:00			6.93	Recorder Reading	1,486.00	1.0319	46.00	0.0319	32.3043			-0.01
08-Dec-1999 11:48:00			6.93	Recorder Reading	1,488.00	1.0333	48.00	0.0333	31.0000			-0.01
08-Dec-1999 11:50:00			6.93	Recorder Reading	1,490.00	1.0347	50.00	0.0347	29.8000			-0.01
08-Dec-1999 11:52:00			6.93	Recorder Reading	1,492.00	1.0361	52.00	0.0361	28.6923			-0.01
08-Dec-1999 11:54:00			6.93	Recorder Reading	1,494.00	1.0375	54.00	0.0375	27.6667			-0.01
08-Dec-1999 11:56:00			6.93	Recorder Reading	1,496.00	1.0389	56.00	0.0389	26.7143			-0.01
08-Dec-1999 11:58:00			6.93	Recorder Reading	1,498.00	1.0403	58.00	0.0403	25.8276			-0.01
08-Dec-1999 12:00:00			6.93	Recorder Reading	1,500.00	1.0417	60.00	0.0417	25.0000			-0.01
08-Dec-1999 12:05:00			6.93	Recorder Reading	1,505.00	1.0451	65.00	0.0451	23.1538			-0.01
08-Dec-1999 12:10:00			6.93	Recorder Reading	1,510.00	1.0486	70.00	0.0486	21.5714			-0.01
08-Dec-1999 12:15:00			6.93	Recorder Reading	1,515.00	1.0521	75.00	0.0521	20.2000			-0.01
08-Dec-1999 12:20:00			6.93	Recorder Reading	1,520.00	1.0556	80.00	0.0556	19.0000			-0.01
08-Dec-1999 12:25:00			6.93	Recorder Reading	1,525.00	1.0590	85.00	0.0590	17.9412			-0.01
08-Dec-1999 12:30:00			6.92	Recorder Reading	1,530.00	1.0625	90.00	0.0625	17.0000			0.00
08-Dec-1999 12:35:00			6.92	Recorder Reading	1,535.00	1.0660	95.00	0.0660	16.1579			0.00
08-Dec-1999 12:40:00			6.92	Recorder Reading	1,540.00	1.0694	100.00	0.0694	15.4000			0.00
08-Dec-1999 12:45:00			6.92	Recorder Reading	1,545.00	1.0729	105.00	0.0729	14.7143			0.00
08-Dec-1999 12:50:00			6.92	Recorder Reading	1,550.00	1.0764	110.00	0.0764	14.0909			0.00
08-Dec-1999 12:55:00			6.92	Recorder Reading	1,555.00	1.0799	115.00	0.0799	13.5217			0.00
08-Dec-1999 13:00:00			6.91	Recorder Reading	1,560.00	1.0833	120.00	0.0833	13.0000			0.01
08-Dec-1999 13:10:00			6.91	Recorder Reading	1,570.00	1.0903	130.00	0.0903	12.0769			0.01

Appendix 31: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10362)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T40S/R13E-1 bba
OWRD Well Log ID Number: KLAM 10362
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 5,775 feet
Owner Well Name/Number: 1,200 foot deep well
Measuring Pt. = 1.83 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
08-Dec-1999 13:20:00			6.91	Recorder Reading	1,580.00	1.0972	140.00	0.0972	11.2857			0.01
08-Dec-1999 13:30:00			6.90	Recorder Reading	1,590.00	1.1042	150.00	0.1042	10.6000			0.02
08-Dec-1999 13:40:00			6.90	Recorder Reading	1,600.00	1.1111	160.00	0.1111	10.0000			0.02
08-Dec-1999 13:50:00			6.90	Recorder Reading	1,610.00	1.1181	170.00	0.1181	9.4706			0.02
08-Dec-1999 14:00:00			6.90	Recorder Reading	1,620.00	1.1250	180.00	0.1250	9.0000			0.02
08-Dec-1999 14:20:00			6.89	Recorder Reading	1,640.00	1.1389	200.00	0.1389	8.2000			0.03
08-Dec-1999 14:40:00			6.88	Recorder Reading	1,660.00	1.1528	220.00	0.1528	7.5455			0.04
08-Dec-1999 15:00:00			6.87	Recorder Reading	1,680.00	1.1667	240.00	0.1667	7.0000			0.05
08-Dec-1999 15:30:00			6.86	Recorder Reading	1,710.00	1.1875	270.00	0.1875	6.3333			0.06
08-Dec-1999 16:00:00			6.86	Recorder Reading	1,740.00	1.2083	300.00	0.2083	5.8000			0.06
08-Dec-1999 17:00:00			6.86	Recorder Reading	1,800.00	1.2500	360.00	0.2500	5.0000			0.06
08-Dec-1999 18:00:00			6.86	Recorder Reading	1,860.00	1.2917	420.00	0.2917	4.4286			0.06
08-Dec-1999 19:00:00			6.87	Recorder Reading	1,920.00	1.3333	480.00	0.3333	4.0000			0.05
08-Dec-1999 20:00:00			6.90	Recorder Reading	1,980.00	1.3750	540.00	0.3750	3.6667			0.02
08-Dec-1999 21:00:00			6.93	Recorder Reading	2,040.00	1.4167	600.00	0.4167	3.4000			-0.01
08-Dec-1999 22:00:00			6.96	Recorder Reading	2,100.00	1.4583	660.00	0.4583	3.1818			-0.04
08-Dec-1999 23:00:00			6.97	Recorder Reading	2,160.00	1.5000	720.00	0.5000	3.0000			-0.05
09-Dec-1999 00:00:00			6.96	Recorder Reading	2,220.00	1.5417	780.00	0.5417	2.8462			-0.04
09-Dec-1999 01:00:00			6.95	Recorder Reading	2,280.00	1.5833	840.00	0.5833	2.7143			-0.03
09-Dec-1999 02:00:00			6.91	Recorder Reading	2,340.00	1.6250	900.00	0.6250	2.6000			0.01
09-Dec-1999 03:00:00			6.87	Recorder Reading	2,400.00	1.6667	960.00	0.6667	2.5000			0.05
09-Dec-1999 04:00:00			6.83	Recorder Reading	2,460.00	1.7083	1,020.00	0.7083	2.4118			0.09
09-Dec-1999 05:00:00			6.80	Recorder Reading	2,520.00	1.7500	1,080.00	0.7500	2.3333			0.12
09-Dec-1999 06:00:00			6.79	Recorder Reading	2,580.00	1.7917	1,140.00	0.7917	2.2632			0.13
09-Dec-1999 07:00:00			6.79	Recorder Reading	2,640.00	1.8333	1,200.00	0.8333	2.2000			0.13
09-Dec-1999 08:00:00			6.79	Recorder Reading	2,700.00	1.8750	1,260.00	0.8750	2.1429			0.13
09-Dec-1999 09:00:00			6.82	Recorder Reading	2,760.00	1.9167	1,320.00	0.9167	2.0909			0.10
09-Dec-1999 10:00:00			6.84	Recorder Reading	2,820.00	1.9583	1,380.00	0.9583	2.0435			0.08
09-Dec-1999 11:00:00			6.86	**End of Test**	2,880.00	2.0000	1,440.00	1.0000	2.0000			0.06

Appendix 32: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10364)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T40S/R13E-2 aaa
OWRD Well Log ID Number: KLAM 10364
Measuring Point: 1.5 inch breather hole (horizontal) at pump base
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 5,340 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.27 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
06-Dec-1999 17:20:00	10.02	0.27	9.75		-1,060.00	-0.7361						
07-Dec-1999 09:02:00	10.08	0.27	9.81		-118.00	-0.0819						
07-Dec-1999 10:45:00	10.12	0.27	9.85		-15.00	-0.0104						
07-Dec-1999 10:55:00	10.12	0.27	9.85		-5.00	-0.0035						
07-Dec-1999 11:00:00	10.12	0.27	9.85	**Start of Test, Pumping Well On**	0.00	0.0000				0.0000E+00	0.00	
07-Dec-1999 11:01:00	10.12	0.27	9.85		1.00	0.0007				2.4353E-11	0.00	
07-Dec-1999 11:02:00	10.12	0.27	9.85		2.00	0.0014				4.8706E-11	0.00	
07-Dec-1999 11:03:00	10.12	0.27	9.85		3.00	0.0021				7.3059E-11	0.00	
07-Dec-1999 11:04:00	10.12	0.27	9.85		4.00	0.0028				9.7413E-11	0.00	
07-Dec-1999 11:05:00	10.12	0.27	9.85		5.00	0.0035				1.2177E-10	0.00	
07-Dec-1999 11:06:00	10.12	0.27	9.85		6.00	0.0042				1.4612E-10	0.00	
07-Dec-1999 11:07:00	10.12	0.27	9.85		7.00	0.0049				1.7047E-10	0.00	
07-Dec-1999 11:08:00	10.12	0.27	9.85		8.00	0.0056				1.9483E-10	0.00	
07-Dec-1999 11:09:00	10.12	0.27	9.85		9.00	0.0062				2.1918E-10	0.00	
07-Dec-1999 11:10:00	10.12	0.27	9.85		10.00	0.0069				2.4353E-10	0.00	
07-Dec-1999 11:11:00	10.12	0.27	9.85		11.00	0.0076				2.6788E-10	0.00	
07-Dec-1999 11:12:00	10.12	0.27	9.85		12.00	0.0083				2.9224E-10	0.00	
07-Dec-1999 11:13:00	10.12	0.27	9.85		13.00	0.0090				3.1659E-10	0.00	
07-Dec-1999 11:14:00	10.12	0.27	9.85		14.00	0.0097				3.4094E-10	0.00	
07-Dec-1999 11:15:00	10.12	0.27	9.85		15.00	0.0104				3.6530E-10	0.00	
07-Dec-1999 11:16:00	10.12	0.27	9.85		16.00	0.0111				3.8965E-10	0.00	
07-Dec-1999 11:17:00	10.12	0.27	9.85		17.00	0.0118				4.1400E-10	0.00	
07-Dec-1999 11:18:00	10.12	0.27	9.85		18.00	0.0125				4.3836E-10	0.00	
07-Dec-1999 11:19:00	10.12	0.27	9.85		19.00	0.0132				4.6271E-10	0.00	
07-Dec-1999 11:20:00	10.12	0.27	9.85		20.00	0.0139				4.8706E-10	0.00	
07-Dec-1999 11:21:00	10.12	0.27	9.85		21.00	0.0146				5.1142E-10	0.00	
07-Dec-1999 11:22:00	10.12	0.27	9.85		22.00	0.0153				5.3577E-10	0.00	
07-Dec-1999 11:23:00	10.12	0.27	9.85		23.00	0.0160				5.6012E-10	0.00	
07-Dec-1999 11:24:00	10.12	0.27	9.85		24.00	0.0167				5.8448E-10	0.00	
07-Dec-1999 11:25:00	10.12	0.27	9.85		25.00	0.0174				6.0883E-10	0.00	
07-Dec-1999 11:26:00	10.12	0.27	9.85		26.00	0.0181				6.3318E-10	0.00	
07-Dec-1999 11:27:00	10.12	0.27	9.85		27.00	0.0187				6.5753E-10	0.00	
07-Dec-1999 11:28:00	10.12	0.27	9.85		28.00	0.0194				6.8189E-10	0.00	

Appendix 32: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10364)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T40S/R13E-2 aaa
OWRD Well Log ID Number: KLAM 10364
Measuring Point: 1.5 inch breather hole (horizontal) at pump base
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 5,340 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.27 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
07-Dec-1999 11:29:00	10.12	0.27	9.85		29.00	0.0201				7.0624E-10	0.00	
07-Dec-1999 11:30:00	10.12	0.27	9.85		30.00	0.0208				7.3059E-10	0.00	
07-Dec-1999 11:32:00	10.12	0.27	9.85		32.00	0.0222				7.7930E-10	0.00	
07-Dec-1999 11:34:00	10.12	0.27	9.85		34.00	0.0236				8.2801E-10	0.00	
07-Dec-1999 11:36:00	10.12	0.27	9.85		36.00	0.0250				8.7671E-10	0.00	
07-Dec-1999 11:38:00	10.12	0.27	9.85		38.00	0.0264				9.2542E-10	0.00	
07-Dec-1999 11:40:00	10.12	0.27	9.85		40.00	0.0278				9.7413E-10	0.00	
07-Dec-1999 11:42:00	10.12	0.27	9.85		42.00	0.0292				1.0228E-09	0.00	
07-Dec-1999 11:44:00	10.12	0.27	9.85		44.00	0.0306				1.0715E-09	0.00	
07-Dec-1999 11:46:00	10.12	0.27	9.85		46.00	0.0319				1.1202E-09	0.00	
07-Dec-1999 11:48:00	10.12	0.27	9.85		48.00	0.0333				1.1690E-09	0.00	
07-Dec-1999 11:50:00	10.12	0.27	9.85		50.00	0.0347				1.2177E-09	0.00	
07-Dec-1999 11:52:00	10.12	0.27	9.85		52.00	0.0361				1.2664E-09	0.00	
07-Dec-1999 11:54:00	10.12	0.27	9.85		54.00	0.0375				1.3151E-09	0.00	
07-Dec-1999 11:56:00	10.12	0.27	9.85		56.00	0.0389				1.3638E-09	0.00	
07-Dec-1999 11:58:00	10.12	0.27	9.85		58.00	0.0403				1.4125E-09	0.00	
07-Dec-1999 12:00:00	10.12	0.27	9.85		60.00	0.0417				1.4612E-09	0.00	
07-Dec-1999 12:05:00	10.12	0.27	9.85		65.00	0.0451				1.5830E-09	0.00	
07-Dec-1999 12:10:00	10.12	0.27	9.85		70.00	0.0486				1.7047E-09	0.00	
07-Dec-1999 12:15:00	10.12	0.27	9.85		75.00	0.0521				1.8265E-09	0.00	
07-Dec-1999 12:20:00	10.12	0.27	9.85		80.00	0.0556				1.9483E-09	0.00	
07-Dec-1999 12:25:00	10.12	0.27	9.85		85.00	0.0590				2.0700E-09	0.00	
07-Dec-1999 12:30:00	10.12	0.27	9.85		90.00	0.0625				2.1918E-09	0.00	
07-Dec-1999 12:35:00	10.12	0.27	9.85		95.00	0.0660				2.3135E-09	0.00	
07-Dec-1999 12:40:00	10.12	0.27	9.85		100.00	0.0694				2.4353E-09	0.00	
07-Dec-1999 12:45:00	10.12	0.27	9.85		105.00	0.0729				2.5571E-09	0.00	
07-Dec-1999 12:50:00	10.12	0.27	9.85		110.00	0.0764				2.6788E-09	0.00	
07-Dec-1999 13:00:00	10.12	0.27	9.85	missed 12:55 measurement	120.00	0.0833				2.9224E-09	0.00	
07-Dec-1999 13:12:00	10.12	0.27	9.85		132.00	0.0917				3.2146E-09	0.00	
07-Dec-1999 13:20:00	10.12	0.27	9.85		140.00	0.0972				3.4094E-09	0.00	
07-Dec-1999 13:30:00	10.12	0.27	9.85		150.00	0.1042				3.6530E-09	0.00	
07-Dec-1999 13:40:00	10.12	0.27	9.85		160.00	0.1111				3.8965E-09	0.00	
07-Dec-1999 13:50:00	10.12	0.27	9.85		170.00	0.1181				4.1400E-09	0.00	
07-Dec-1999 14:00:00	10.11	0.27	9.84		180.00	0.1250				4.3836E-09	-0.01	

Appendix 32: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10364)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T40S/R13E-2 aaa
OWRD Well Log ID Number: KLAM 10364
Measuring Point: 1.5 inch breather hole (horizontal) at pump base
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 5,340 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.27 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
07-Dec-1999 14:15:00	10.11	0.27	9.84		195.00	0.1354				4.7489E-09	-0.01	
07-Dec-1999 14:30:00	10.11	0.27	9.84		210.00	0.1458				5.1142E-09	-0.01	
07-Dec-1999 14:45:00	10.11	0.27	9.84	14:52 Cheyne cows loose	225.00	0.1563				5.4795E-09	-0.01	
07-Dec-1999 15:00:00	10.11	0.27	9.84		240.00	0.1667				5.8448E-09	-0.01	
07-Dec-1999 15:20:00	10.11	0.27	9.84		260.00	0.1806				6.3318E-09	-0.01	
07-Dec-1999 15:40:00	10.12	0.27	9.85		280.00	0.1944				6.8189E-09	0.00	
07-Dec-1999 16:00:00	10.13	0.27	9.86		300.00	0.2083				7.3059E-09	0.01	
07-Dec-1999 16:30:00	10.13	0.27	9.86		330.00	0.2292				8.0365E-09	0.01	
07-Dec-1999 17:00:00	10.14	0.27	9.87		360.00	0.2500				8.7671E-09	0.02	
07-Dec-1999 18:14:00	10.19	0.27	9.92		434.00	0.3014				1.0569E-08	0.07	
07-Dec-1999 19:13:00	10.23	0.27	9.96		493.00	0.3424				1.2006E-08	0.11	
07-Dec-1999 20:12:00	10.27	0.27	10.00		552.00	0.3833				1.3443E-08	0.15	
07-Dec-1999 21:14:00	10.29	0.27	10.02		614.00	0.4264				1.4953E-08	0.17	
07-Dec-1999 22:09:00	10.32	0.27	10.05		669.00	0.4646				1.6292E-08	0.20	
07-Dec-1999 23:15:00	10.31	0.27	10.04		735.00	0.5104				1.7900E-08	0.19	
08-Dec-1999 00:13:00	10.32	0.27	10.05		793.00	0.5507				1.9312E-08	0.20	
08-Dec-1999 01:14:00	10.30	0.27	10.03		854.00	0.5931				2.0798E-08	0.18	
08-Dec-1999 02:14:00	10.29	0.27	10.02		914.00	0.6347				2.2259E-08	0.17	
08-Dec-1999 03:13:00	10.26	0.27	9.99		973.00	0.6757				2.3696E-08	0.14	
08-Dec-1999 04:14:00	10.25	0.27	9.98		1,034.00	0.7181				2.5181E-08	0.13	
08-Dec-1999 05:11:00	10.23	0.27	9.96		1,091.00	0.7576				2.6569E-08	0.11	
08-Dec-1999 06:11:00	10.23	0.27	9.96		1,151.00	0.7993				2.8030E-08	0.11	
08-Dec-1999 07:13:00	10.24	0.27	9.97		1,213.00	0.8424				2.9540E-08	0.12	
08-Dec-1999 08:12:00	10.26	0.27	9.99		1,272.00	0.8833				3.0977E-08	0.14	
08-Dec-1999 09:12:00	10.28	0.27	10.01		1,332.00	0.9250				3.2438E-08	0.16	
08-Dec-1999 10:00:00	10.30	0.27	10.03		1,380.00	0.9583				3.3607E-08	0.18	
08-Dec-1999 10:30:00	10.30	0.27	10.03		1,410.00	0.9792				3.4338E-08	0.18	
08-Dec-1999 10:45:00	10.30	0.27	10.03		1,425.00	0.9896				3.4703E-08	0.18	
08-Dec-1999 11:00:00	10.31	0.27	10.04	**Start Recovery, Pumping Ends**	1,440.00	1.0000	0.00	0.0000		3.5069E-08	0.19	0.00
08-Dec-1999 11:01:00	10.31	0.27	10.04		1,441.00	1.0007	1.00	0.0007	1,441.0000			0.00
08-Dec-1999 11:02:00	10.31	0.27	10.04		1,442.00	1.0014	2.00	0.0014	721.0000			0.00
08-Dec-1999 11:03:00	10.31	0.27	10.04		1,443.00	1.0021	3.00	0.0021	481.0000			0.00
08-Dec-1999 11:05:00	10.31	0.27	10.04	missed 11:04 measurement	1,445.00	1.0035	5.00	0.0035	289.0000			0.00
08-Dec-1999 11:06:00	10.31	0.27	10.04		1,446.00	1.0042	6.00	0.0042	241.0000			0.00

Appendix 32: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10364)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T40S/R13E-2 aaa
OWRD Well Log ID Number: KLAM 10364
Measuring Point: 1.5 inch breather hole (horizontal) at pump base
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 5,340 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.27 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
08-Dec-1999 11:07:00	10.31	0.27	10.04		1,447.00	1.0049	7.00	0.0049	206.7143			0.00
08-Dec-1999 11:08:00	10.31	0.27	10.04		1,448.00	1.0056	8.00	0.0056	181.0000			0.00
08-Dec-1999 11:09:00	10.31	0.27	10.04		1,449.00	1.0062	9.00	0.0062	161.0000			0.00
08-Dec-1999 11:10:00	10.31	0.27	10.04		1,450.00	1.0069	10.00	0.0069	145.0000			0.00
08-Dec-1999 11:11:00	10.30	0.27	10.03		1,451.00	1.0076	11.00	0.0076	131.9091			0.01
08-Dec-1999 11:12:00	10.30	0.27	10.03		1,452.00	1.0083	12.00	0.0083	121.0000			0.01
08-Dec-1999 11:13:00	10.30	0.27	10.03		1,453.00	1.0090	13.00	0.0090	111.7692			0.01
08-Dec-1999 11:14:00	10.30	0.27	10.03		1,454.00	1.0097	14.00	0.0097	103.8571			0.01
08-Dec-1999 11:16:00	10.30	0.27	10.03	missed 11:15 measurement	1,456.00	1.0111	16.00	0.0111	91.0000			0.01
08-Dec-1999 11:17:00	10.30	0.27	10.03		1,457.00	1.0118	17.00	0.0118	85.7059			0.01
08-Dec-1999 11:18:00	10.30	0.27	10.03		1,458.00	1.0125	18.00	0.0125	81.0000			0.01
08-Dec-1999 11:19:00	10.30	0.27	10.03		1,459.00	1.0132	19.00	0.0132	76.7895			0.01
08-Dec-1999 11:20:00	10.30	0.27	10.03		1,460.00	1.0139	20.00	0.0139	73.0000			0.01
08-Dec-1999 11:21:00	10.31	0.27	10.04		1,461.00	1.0146	21.00	0.0146	69.5714			0.00
08-Dec-1999 11:22:00	10.30	0.27	10.03		1,462.00	1.0153	22.00	0.0153	66.4545			0.01
08-Dec-1999 11:23:00	10.30	0.27	10.03		1,463.00	1.0160	23.00	0.0160	63.6087			0.01
08-Dec-1999 11:24:00	10.30	0.27	10.03		1,464.00	1.0167	24.00	0.0167	61.0000			0.01
08-Dec-1999 11:27:00	10.30	0.27	10.03	missed 11:25 and 11:26 measurments	1,467.00	1.0187	27.00	0.0187	54.3333			0.01
08-Dec-1999 11:28:00	10.30	0.27	10.03		1,468.00	1.0194	28.00	0.0194	52.4286			0.01
08-Dec-1999 11:29:00	10.30	0.27	10.03		1,469.00	1.0201	29.00	0.0201	50.6552			0.01
08-Dec-1999 11:30:00	10.30	0.27	10.03		1,470.00	1.0208	30.00	0.0208	49.0000			0.01
08-Dec-1999 11:32:00	10.30	0.27	10.03		1,472.00	1.0222	32.00	0.0222	46.0000			0.01
08-Dec-1999 11:34:00	10.30	0.27	10.03		1,474.00	1.0236	34.00	0.0236	43.3529			0.01
08-Dec-1999 11:36:00	10.30	0.27	10.03		1,476.00	1.0250	36.00	0.0250	41.0000			0.01
08-Dec-1999 11:38:00	10.30	0.27	10.03		1,478.00	1.0264	38.00	0.0264	38.8947			0.01
08-Dec-1999 11:40:00	10.30	0.27	10.03		1,480.00	1.0278	40.00	0.0278	37.0000			0.01
08-Dec-1999 11:42:00	10.30	0.27	10.03		1,482.00	1.0292	42.00	0.0292	35.2857			0.01
08-Dec-1999 11:44:00	10.30	0.27	10.03		1,484.00	1.0306	44.00	0.0306	33.7273			0.01
08-Dec-1999 11:46:00	10.30	0.27	10.03		1,486.00	1.0319	46.00	0.0319	32.3043			0.01
08-Dec-1999 11:48:00	10.30	0.27	10.03		1,488.00	1.0333	48.00	0.0333	31.0000			0.01
08-Dec-1999 11:52:00	10.30	0.27	10.03	missed 11:50 measurement	1,492.00	1.0361	52.00	0.0361	28.6923			0.01
08-Dec-1999 11:54:00	10.30	0.27	10.03		1,494.00	1.0375	54.00	0.0375	27.6667			0.01
08-Dec-1999 11:56:00	10.30	0.27	10.03		1,496.00	1.0389	56.00	0.0389	26.7143			0.01
08-Dec-1999 11:58:00	10.30	0.27	10.03		1,498.00	1.0403	58.00	0.0403	25.8276			0.01

Appendix 32: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10364)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T40S/R13E-2 aaa
OWRD Well Log ID Number: KLAM 10364
Measuring Point: 1.5 inch breather hole (horizontal) at pump base
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 5,340 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.27 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
08-Dec-1999 12:00:00	10.30	0.27	10.03		1,500.00	1.0417	60.00	0.0417	25.0000			0.01
08-Dec-1999 12:10:00	10.30	0.27	10.03	missed 12:05 measurement	1,510.00	1.0486	70.00	0.0486	21.5714			0.01
08-Dec-1999 12:15:00	10.30	0.27	10.03		1,515.00	1.0521	75.00	0.0521	20.2000			0.01
08-Dec-1999 12:20:00	10.30	0.27	10.03		1,520.00	1.0556	80.00	0.0556	19.0000			0.01
08-Dec-1999 12:25:00	10.30	0.27	10.03		1,525.00	1.0590	85.00	0.0590	17.9412			0.01
08-Dec-1999 12:30:00	10.30	0.27	10.03	light snow flurry	1,530.00	1.0625	90.00	0.0625	17.0000			0.01
08-Dec-1999 12:35:00	10.30	0.27	10.03		1,535.00	1.0660	95.00	0.0660	16.1579			0.01
08-Dec-1999 12:40:00	10.30	0.27	10.03		1,540.00	1.0694	100.00	0.0694	15.4000			0.01
08-Dec-1999 12:45:00	10.30	0.27	10.03		1,545.00	1.0729	105.00	0.0729	14.7143			0.01
08-Dec-1999 12:50:00	10.30	0.27	10.03		1,550.00	1.0764	110.00	0.0764	14.0909			0.01
08-Dec-1999 12:55:00	10.29	0.27	10.02		1,555.00	1.0799	115.00	0.0799	13.5217			0.02
08-Dec-1999 13:00:00	10.29	0.27	10.02		1,560.00	1.0833	120.00	0.0833	13.0000			0.02
08-Dec-1999 13:10:00	10.29	0.27	10.02		1,570.00	1.0903	130.00	0.0903	12.0769			0.02
08-Dec-1999 13:20:00	10.29	0.27	10.02		1,580.00	1.0972	140.00	0.0972	11.2857			0.02
08-Dec-1999 13:30:00	10.29	0.27	10.02	steady snow flurry	1,590.00	1.1042	150.00	0.1042	10.6000			0.02
08-Dec-1999 13:40:00	10.28	0.27	10.01		1,600.00	1.1111	160.00	0.1111	10.0000			0.03
08-Dec-1999 13:50:00	10.28	0.27	10.01		1,610.00	1.1181	170.00	0.1181	9.4706			0.03
08-Dec-1999 14:00:00	10.28	0.27	10.01		1,620.00	1.1250	180.00	0.1250	9.0000			0.03
08-Dec-1999 14:15:00	10.27	0.27	10.00		1,635.00	1.1354	195.00	0.1354	8.3846			0.04
08-Dec-1999 14:30:00	10.26	0.27	9.99		1,650.00	1.1458	210.00	0.1458	7.8571			0.05
08-Dec-1999 14:45:00	10.26	0.27	9.99	snow flurry stopped	1,665.00	1.1563	225.00	0.1563	7.4000			0.05
08-Dec-1999 15:00:00	10.26	0.27	9.99		1,680.00	1.1667	240.00	0.1667	7.0000			0.05
08-Dec-1999 15:20:00	10.25	0.27	9.98		1,700.00	1.1806	260.00	0.1806	6.5385			0.06
08-Dec-1999 15:40:00	10.26	0.27	9.99		1,720.00	1.1944	280.00	0.1944	6.1429			0.05
08-Dec-1999 16:00:00	10.25	0.27	9.98		1,740.00	1.2083	300.00	0.2083	5.8000			0.06
08-Dec-1999 16:30:00	10.24	0.27	9.97		1,770.00	1.2292	330.00	0.2292	5.3636			0.07
08-Dec-1999 17:00:00	10.25	0.27	9.98		1,800.00	1.2500	360.00	0.2500	5.0000			0.06
08-Dec-1999 18:09:00	10.26	0.27	9.99		1,869.00	1.2979	429.00	0.2979	4.3566			0.05
08-Dec-1999 19:10:00	10.26	0.27	9.99		1,930.00	1.3403	490.00	0.3403	3.9388			0.05
08-Dec-1999 20:10:00	10.28	0.27	10.01		1,990.00	1.3819	550.00	0.3819	3.6182			0.03
08-Dec-1999 21:09:00	10.29	0.27	10.02		2,049.00	1.4229	609.00	0.4229	3.3645			0.02
08-Dec-1999 22:10:00	10.32	0.27	10.05		2,110.00	1.4653	670.00	0.4653	3.1493			-0.01
08-Dec-1999 23:09:00	10.31	0.27	10.04		2,169.00	1.5062	729.00	0.5062	2.9753			0.00
09-Dec-1999 00:30:00	10.28	0.27	10.01		2,250.00	1.5625	810.00	0.5625	2.7778			0.03

Appendix 32: Lorella 1999 OWRD aquifer test, observation well data (KLAM 10364)

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Water Level Measurement
Well Use for Test: Observation Well
Well Location: T40S/R13E-2 aaa
OWRD Well Log ID Number: KLAM 10364
Measuring Point: 1.5 inch breather hole (horizontal) at pump base
Measuring Tool: e-tape
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Distance to Pumping Well: 5,340 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.27 feet above land surface
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Elapsed Time versus (Distance)2 days/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
09-Dec-1999 01:16:00	10.27	0.27	10.00		2,296.00	1.5944	856.00	0.5944	2.6822			0.04
09-Dec-1999 02:16:00	10.25	0.27	9.98		2,356.00	1.6361	916.00	0.6361	2.5721			0.06
09-Dec-1999 03:15:00	10.22	0.27	9.95		2,415.00	1.6771	975.00	0.6771	2.4769			0.09
09-Dec-1999 04:16:00	10.19	0.27	9.92		2,476.00	1.7194	1,036.00	0.7194	2.3900			0.12
09-Dec-1999 05:15:00	10.17	0.27	9.90		2,535.00	1.7604	1,095.00	0.7604	2.3151			0.14
09-Dec-1999 06:19:00	10.17	0.27	9.90		2,599.00	1.8049	1,159.00	0.8049	2.2425			0.14
09-Dec-1999 07:19:00	10.17	0.27	9.90		2,659.00	1.8465	1,219.00	0.8465	2.1813			0.14
09-Dec-1999 08:18:00	10.17	0.27	9.90		2,718.00	1.8875	1,278.00	0.8875	2.1268			0.14
09-Dec-1999 09:14:00	10.17	0.27	9.90		2,774.00	1.9264	1,334.00	0.9264	2.0795			0.14
09-Dec-1999 10:16:00	10.21	0.27	9.94		2,836.00	1.9694	1,396.00	0.9694	2.0315			0.10
09-Dec-1999 11:35:00	10.21	0.27	9.94	**End of Test**	2,915.00	2.0243	1,475.00	1.0243	1.9763			0.10

Appendix 33: Lorella 1999 OWRD aquifer test, discharge data

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Discharge and Power
Well Use for Test: Pumping Well
Well Location: T39S/R12E- 35 aab
OWRD Well Log ID Number: KLAM 10175
Measuring Point: (unable to measure during aquifer test)
Measuring Tool: electronic non-intrusive flow meter
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Owner Well Name/Number: irrigation well
Measuring Pt. =
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24-hour)	Time Since Pumping Started (min) (t)	Discharge Rate Reading (gpm)	Power Reading (kwh)	Interval Discharge (calculated) (gallons)	Total Discharge (calculated) (gallons)	Average Discharge Rate (gpm)	Discharge Rate (calculated) (ft3/sec)	Interval Discharge (calculated) (ft3)	Total Discharge (calculated) (ft3)	Average Discharge Rate (ft3/sec)	Discharge vs Power (gal/kwh)	Remarks
07-Dec-1999 11:00:00	0.00		none	0	0	--	0.0000	0.00	0.00	--	--	**Start Test, Pump On**
07-Dec-1999 12:23:30	83.50		10,092	--	--	--	--	--	--	--	--	
07-Dec-1999 12:24:30	84.50		10,093	--	--	--	--	--	--	--	--	
07-Dec-1999 12:30:00	90.00	1,415		127,350	127,350	1,415	3.1526	17,024.22	17,024.22	3.1526		
07-Dec-1999 12:45:00	105.00	1,407		21,105	148,455	1,414	3.1348	2,821.33	19,845.55	3.1501		
07-Dec-1999 13:00:00	120.00	1,427		21,405	169,860	1,415	3.1794	2,861.43	22,706.98	3.1537		
07-Dec-1999 13:15:00	135.00	1,425		21,375	191,235	1,417	3.1749	2,857.42	25,564.40	3.1561		
07-Dec-1999 13:30:00	150.00	1,397		20,955	212,190	1,415	3.1125	2,801.28	28,365.68	3.1517		
07-Dec-1999 13:45:00	165.00	1,403		21,045	233,235	1,414	3.1259	2,813.31	31,178.98	3.1494		
07-Dec-1999 14:00:00	180.00	1,422		21,330	254,565	1,414	3.1682	2,851.41	34,030.39	3.1510		
07-Dec-1999 14:15:00	195.00	1,421		21,315	275,880	1,415	3.1660	2,849.40	36,879.79	3.1521		
07-Dec-1999 14:30:00	210.00	1,423		21,345	297,225	1,415	3.1705	2,853.41	39,733.20	3.1534		
07-Dec-1999 14:45:00	225.00	1,407		21,105	318,330	1,415	3.1348	2,821.33	42,554.53	3.1522		
07-Dec-1999 15:00:00	240.00	1,411		21,165	339,495	1,415	3.1437	2,829.35	45,383.88	3.1517		
07-Dec-1999 15:15:00	255.00	1,415		21,225	360,720	1,415	3.1526	2,837.37	48,221.25	3.1517		
07-Dec-1999 15:30:00	270.00	1,375		20,625	381,345	1,412	3.0635	2,757.16	50,978.41	3.1468		
07-Dec-1999 15:45:00	285.00	1,402		21,030	402,375	1,412	3.1237	2,811.30	53,789.71	3.1456		
07-Dec-1999 16:00:00	300.00	1,407		21,105	423,480	1,412	3.1348	2,821.33	56,611.04	3.1451		
07-Dec-1999 16:13:45	313.75		10,330	19,202	442,682						1,366.30	
07-Dec-1999 16:15:00	315.00	1,386		1,732	444,414	1,411	3.0880	231.60	59,409.56	3.1434		
07-Dec-1999 16:30:00	330.00	1,396		20,940	465,354	1,410	3.1103	2,799.27	62,208.83	3.1419		
07-Dec-1999 16:45:00	345.00	1,405		21,075	486,429	1,410	3.1304	2,817.32	65,026.14	3.1414		
07-Dec-1999 17:00:00	360.00	1,422		21,330	507,759	1,410	3.1682	2,851.41	67,877.55	3.1425		
07-Dec-1999 17:15:00	375.00	1,414		21,210	528,969	1,411	3.1504	2,835.36	70,712.92	3.1428		
07-Dec-1999 17:30:00	390.00	1,394		20,910	549,879	1,410	3.1058	2,795.26	73,508.18	3.1414		
07-Dec-1999 17:45:00	405.00	1,414		21,210	571,089	1,410	3.1504	2,835.36	76,343.54	3.1417		
07-Dec-1999 18:00:00	420.00	1,402		21,030	592,119	1,410	3.1237	2,811.30	79,154.84	3.1411		
07-Dec-1999 18:15:00	435.00	1,406		21,090	613,209	1,410	3.1326	2,819.32	81,974.16	3.1408		
07-Dec-1999 18:30:00	450.00	1,438		21,570	634,779	1,411	3.2039	2,883.49	84,857.65	3.1429		
07-Dec-1999 18:45:00	465.00	1,406		21,090	655,869	1,410	3.1326	2,819.32	87,676.98	3.1425		
07-Dec-1999 19:00:00	480.00	1,429		21,435	677,304	1,411	3.1838	2,865.44	90,542.42	3.1438		
07-Dec-1999 19:15:00	495.00	1,405		21,075	698,379	1,411	3.1304	2,817.32	93,359.74	3.1434		
07-Dec-1999 19:30:00	510.00	1,405		21,075	719,454	1,411	3.1304	2,817.32	96,177.05	3.1430		
07-Dec-1999 19:45:00	525.00	1,392		20,880	740,334	1,410	3.1014	2,791.25	98,968.30	3.1419		
07-Dec-1999 20:00:00	540.00	1,411		21,165	761,499	1,410	3.1437	2,829.35	101,797.65	3.1419		

Appendix 33: Lorella 1999 OWRD aquifer test, discharge data

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Discharge and Power
Well Use for Test: Pumping Well
Well Location: T39S/R12E- 35 aab
OWRD Well Log ID Number: KLAM 10175
Measuring Point: (unable to measure during aquifer test)
Measuring Tool: electronic non-intrusive flow meter
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Owner Well Name/Number: irrigation well
Measuring Pt. =
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24-hour)	Time Since Pumping Started (min) (t)	Discharge Rate Reading (gpm)	Power Reading (kwh)	Interval Discharge (calculated) (gallons)	Total Discharge (calculated) (gallons)	Average Discharge Rate (gpm)	Discharge Rate (calculated) (ft3/sec)	Interval Discharge (calculated) (ft3)	Total Discharge (calculated) (ft3)	Average Discharge Rate (ft3/sec)	Discharge vs Power (gal/kwh)	Remarks
07-Dec-1999 20:15:00	555.00	1,414		21,210	782,709	1,410	3.1504	2,835.36	104,633.02	3.1421		
07-Dec-1999 20:30:00	570.00	1,438		21,570	804,279	1,411	3.2039	2,883.49	107,516.51	3.1438		
07-Dec-1999 20:45:00	585.00	1,394		20,910	825,189	1,411	3.1058	2,795.26	110,311.77	3.1428		
07-Dec-1999 21:00:00	600.00	1,420		21,300	846,489	1,411	3.1638	2,847.40	113,159.16	3.1433		
07-Dec-1999 21:15:00	615.00	1,427		21,405	867,894	1,411	3.1794	2,861.43	116,020.59	3.1442		
07-Dec-1999 21:30:00	630.00	1,428		21,420	889,314	1,412	3.1816	2,863.44	118,884.03	3.1451		
07-Dec-1999 21:45:00	645.00	1,436		21,540	910,854	1,412	3.1994	2,879.48	121,763.51	3.1463		
07-Dec-1999 22:00:00	660.00	1,405		21,075	931,929	1,412	3.1304	2,817.32	124,580.83	3.1460		
07-Dec-1999 22:15:00	675.00	1,412		21,180	953,109	1,412	3.1460	2,831.35	127,412.18	3.1460		
07-Dec-1999 22:30:00	690.00	1,413		21,195	974,304	1,412	3.1482	2,833.36	130,245.54	3.1460		
07-Dec-1999 22:45:00	705.00	1,399		20,985	995,289	1,412	3.1170	2,805.29	133,050.83	3.1454		
07-Dec-1999 23:00:00	720.00	1,409		21,135	1,016,424	1,412	3.1393	2,825.34	135,876.17	3.1453		
07-Dec-1999 23:15:00	735.00	1,409		21,135	1,037,559	1,412	3.1393	2,825.34	138,701.50	3.1452		
07-Dec-1999 23:30:00	750.00	1,388		20,820	1,058,379	1,411	3.0925	2,783.23	141,484.73	3.1441		
07-Dec-1999 23:45:00	765.00	1,415		21,225	1,079,604	1,411	3.1526	2,837.37	144,322.10	3.1443		
08-Dec-1999 00:00:00	780.00	1,401		21,015	1,100,619	1,411	3.1214	2,809.30	147,131.40	3.1438		
08-Dec-1999 00:15:00	795.00	1,406		21,090	1,121,709	1,411	3.1326	2,819.32	149,950.72	3.1436		
08-Dec-1999 00:30:00	810.00	1,374		20,610	1,142,319	1,410	3.0613	2,755.16	152,705.88	3.1421		
08-Dec-1999 00:45:00	825.00	1,399		20,985	1,163,304	1,410	3.1170	2,805.29	155,511.16	3.1416		
08-Dec-1999 01:00:00	840.00	1,405		21,075	1,184,379	1,410	3.1304	2,817.32	158,328.48	3.1414		
08-Dec-1999 01:15:00	855.00	1,401		21,015	1,205,394	1,410	3.1214	2,809.30	161,137.78	3.1411		
08-Dec-1999 01:30:00	870.00	1,394		20,910	1,226,304	1,410	3.1058	2,795.26	163,933.04	3.1405		
08-Dec-1999 01:45:00	885.00	1,424		21,360	1,247,664	1,410	3.1727	2,855.42	166,788.46	3.1410		
08-Dec-1999 02:00:00	900.00	1,382		20,730	1,268,394	1,409	3.0791	2,771.20	169,559.65	3.1400		
08-Dec-1999 02:15:00	915.00	1,391		20,865	1,289,259	1,409	3.0992	2,789.24	172,348.90	3.1393		
08-Dec-1999 02:30:00	930.00	1,395		20,925	1,310,184	1,409	3.1081	2,797.27	175,146.16	3.1388		
08-Dec-1999 02:45:00	945.00	1,394		20,910	1,331,094	1,409	3.1058	2,795.26	177,941.42	3.1383		
08-Dec-1999 03:00:00	960.00	1,393		20,895	1,351,989	1,408	3.1036	2,793.26	180,734.68	3.1378		
08-Dec-1999 03:15:00	975.00	1,394		20,910	1,372,899	1,408	3.1058	2,795.26	183,529.94	3.1373		
08-Dec-1999 03:30:00	990.00	1,397		20,955	1,393,854	1,408	3.1125	2,801.28	186,331.21	3.1369		
08-Dec-1999 03:45:00	1,005.00	1,416		21,240	1,415,094	1,408	3.1549	2,839.37	189,170.59	3.1372		
08-Dec-1999 04:00:00	1,020.00	1,387		20,805	1,435,899	1,408	3.0903	2,781.22	191,951.81	3.1365		
08-Dec-1999 04:15:00	1,035.00	1,401		21,015	1,456,914	1,408	3.1214	2,809.30	194,761.11	3.1363		
08-Dec-1999 04:30:00	1,050.00	1,410		21,150	1,478,064	1,408	3.1415	2,827.34	197,588.45	3.1363		
08-Dec-1999 04:45:00	1,065.00	1,398		20,970	1,499,034	1,408	3.1148	2,803.28	200,391.73	3.1360		

Appendix 33: Lorella 1999 OWRD aquifer test, discharge data

Aquifer Test: Lorella
Aquifer Test Dates: 07 Dec 1999 to 09 Dec 1999
Data: Discharge and Power
Well Use for Test: Pumping Well
Well Location: T39S/R12E- 35 aab
OWRD Well Log ID Number: KLAM 10175
Measuring Point: (unable to measure during aquifer test)
Measuring Tool: electronic non-intrusive flow meter
Power Meter: First Reading (12:23:30) **=** 10,092 kwh **End =** 11,496.9 kwh

Owner Well Name/Number: irrigation well
Measuring Pt. =
Pump On: Date = 07 Dec 1999 **Time =** 11:00
Pump Off: Date = 08 Dec 1999 **Time =** 11:00

Date and Time (24-hour)	Time Since Pumping Started (min) (t)	Discharge Rate Reading (gpm)	Power Reading (kwh)	Interval Discharge (calculated) (gallons)	Total Discharge (calculated) (gallons)	Average Discharge Rate (gpm)	Discharge Rate (calculated) (ft3/sec)	Interval Discharge (calculated) (ft3)	Total Discharge (calculated) (ft3)	Average Discharge Rate (ft3/sec)	Discharge vs Power (gal/kwh)	Remarks
08-Dec-1999 05:00:00	1,080.00	1,401		21,015	1,520,049	1,407	3.1214	2,809.30	203,201.03	3.1358		
08-Dec-1999 05:15:00	1,095.00	1,375		20,625	1,540,674	1,407	3.0635	2,757.16	205,958.19	3.1348		
08-Dec-1999 05:30:00	1,110.00	1,375		20,625	1,561,299	1,407	3.0635	2,757.16	208,715.35	3.1339		
08-Dec-1999 05:45:00	1,125.00	1,401		21,015	1,582,314	1,407	3.1214	2,809.30	211,524.65	3.1337		
08-Dec-1999 06:00:00	1,140.00	1,408		21,120	1,603,434	1,407	3.1370	2,823.33	214,347.98	3.1337		
08-Dec-1999 06:15:00	1,155.00	1,380		20,700	1,624,134	1,406	3.0747	2,767.19	217,115.17	3.1330		
08-Dec-1999 06:30:00	1,170.00	1,420		21,300	1,645,434	1,406	3.1638	2,847.40	219,962.57	3.1334		
08-Dec-1999 06:45:00	1,185.00	1,389		20,835	1,666,269	1,406	3.0947	2,785.23	222,747.80	3.1329		
08-Dec-1999 07:00:00	1,200.00	1,401		21,015	1,687,284	1,406	3.1214	2,809.30	225,557.10	3.1327		
08-Dec-1999 07:15:00	1,215.00	1,373		20,595	1,707,879	1,406	3.0591	2,753.15	228,310.25	3.1318		
08-Dec-1999 07:30:00	1,230.00	1,385		20,775	1,728,654	1,405	3.0858	2,777.21	231,087.46	3.1313		
08-Dec-1999 07:45:00	1,245.00	1,367		20,505	1,749,159	1,405	3.0457	2,741.12	233,828.58	3.1302		
08-Dec-1999 08:00:00	1,260.00	1,395		20,925	1,770,084	1,405	3.1081	2,797.27	236,625.85	3.1300		
08-Dec-1999 08:15:00	1,275.00	1,350		20,250	1,790,334	1,404	3.0078	2,707.03	239,332.88	3.1285		
08-Dec-1999 08:30:00	1,290.00	1,393		20,895	1,811,229	1,404	3.1036	2,793.26	242,126.13	3.1282		
08-Dec-1999 08:45:00	1,305.00	1,422		21,330	1,832,559	1,404	3.1682	2,851.41	244,977.54	3.1287		
08-Dec-1999 08:48:20	1,308.33		11,360	4,690	1,837,249						1,356.91	
08-Dec-1999 09:00:00	1,320.00	1,392		16,240	1,853,489	1,404	3.1014	2,170.97	247,775.47	3.1285		
08-Dec-1999 09:15:00	1,335.00	1,396		20,940	1,874,429	1,404	3.1103	2,799.27	250,574.74	3.1283		
08-Dec-1999 09:30:00	1,350.00	1,406		21,090	1,895,519	1,404	3.1326	2,819.32	253,394.07	3.1283		
08-Dec-1999 09:45:00	1,365.00	1,403		21,045	1,916,564	1,404	3.1259	2,813.31	256,207.37	3.1283		
08-Dec-1999 10:00:00	1,380.00	1,387		20,805	1,937,369	1,404	3.0903	2,781.22	258,988.60	3.1279		
08-Dec-1999 10:15:00	1,395.00	1,412		21,180	1,958,549	1,404	3.1460	2,831.35	261,819.95	3.1281		
08-Dec-1999 10:30:00	1,410.00	1,387		20,805	1,979,354	1,404	3.0903	2,781.22	264,601.17	3.1277		
08-Dec-1999 10:45:00	1,425.00	1,402		21,030	2,000,384	1,404	3.1237	2,811.30	267,412.48	3.1276		
08-Dec-1999 11:00:00	1,440.00	1,419	11,497	21,285	2,021,669	1,404	3.1615	2,845.39	270,257.87	3.1280	1,355.92	**Pumping Ends**

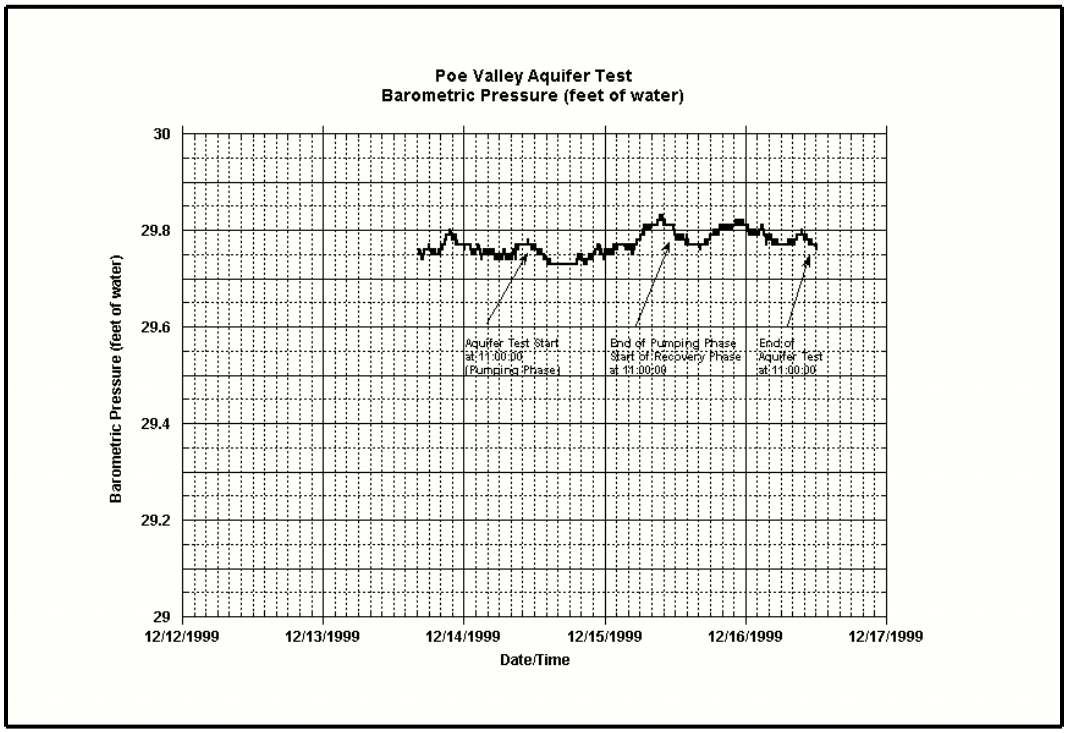
Appendix 34

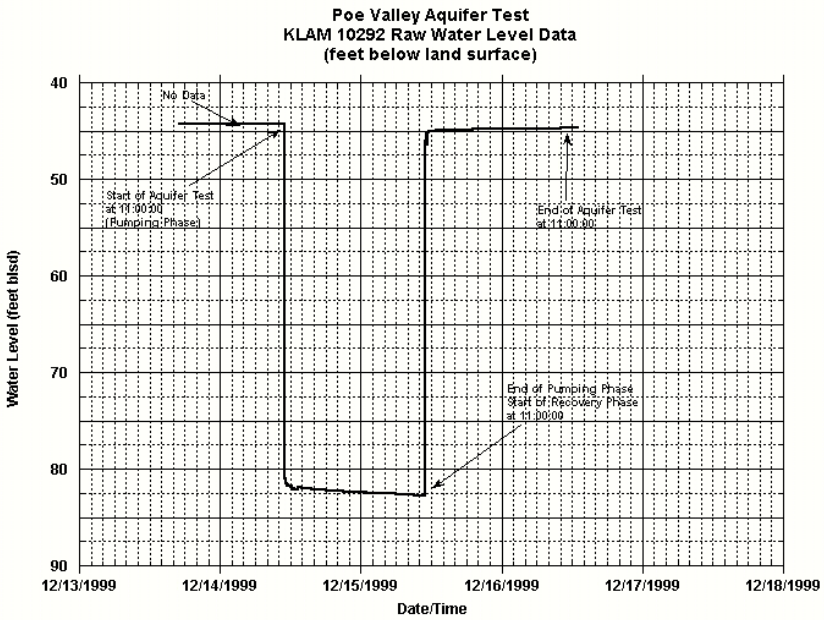
North Poe Valley 1999 OWRD Aquifer Test Graphs

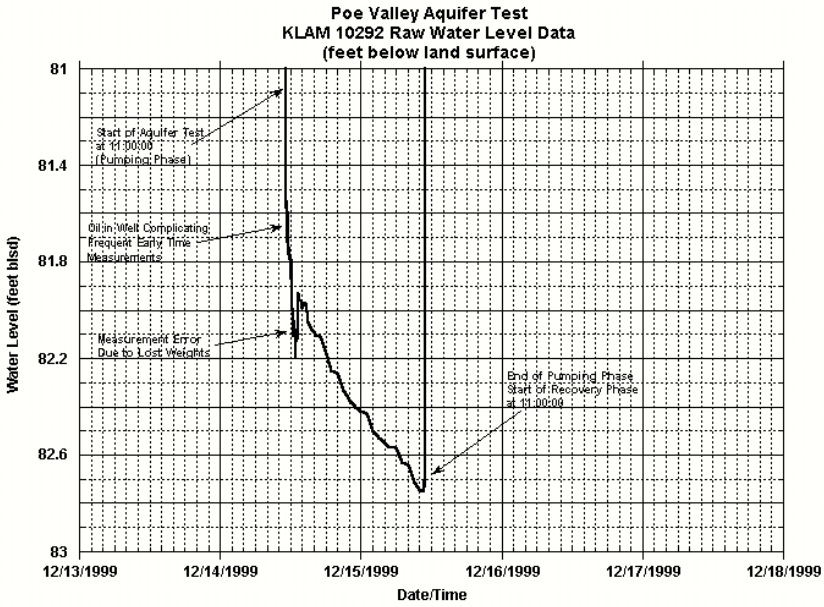
The following graphs plot data from an aquifer test of ground water in basalt in north Poe Valley. OWRD staff conducted the test from December 14 to 16, 1999. The test included pumping ground water from basalt at well KLAM 10292 for 24-hours and measuring water levels at the pumping well and two observation wells (KLAM 10252 and KLAM 51131) during the pumping period and 24 hours of recovery. Hand measurements were made at the pumping well and one-minute recorder readings were made at each observation well.

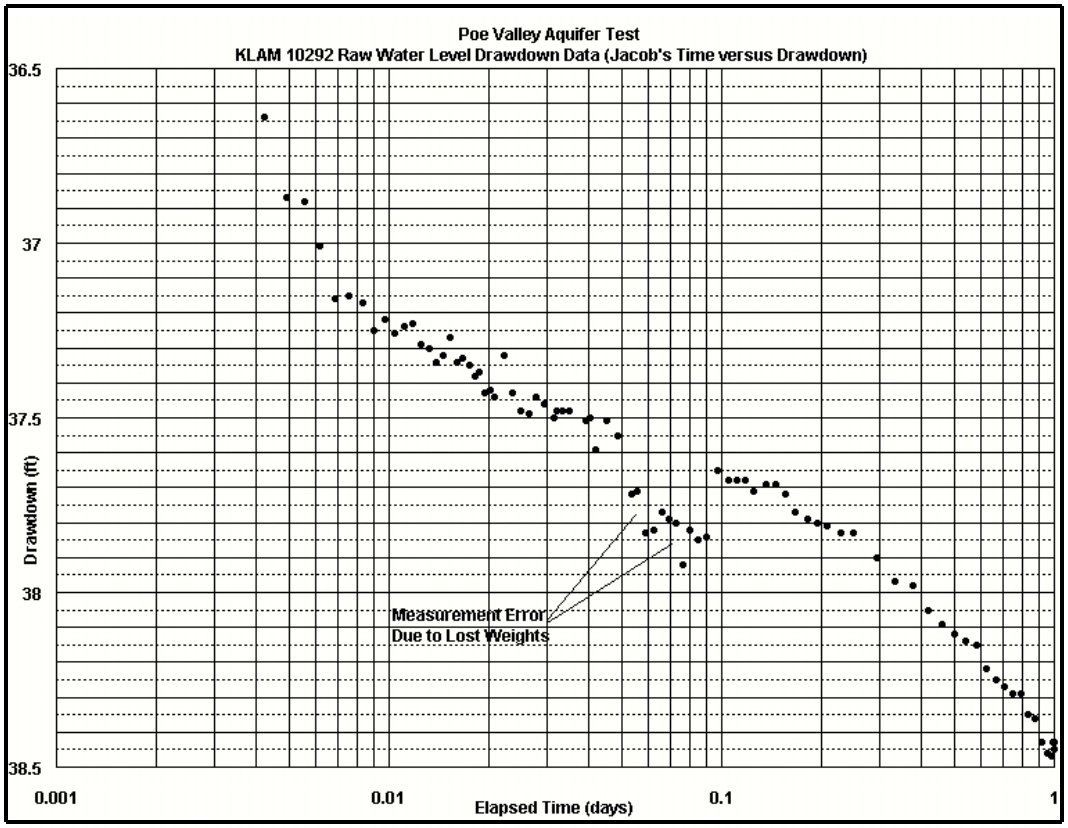
Water level responses to the pumping varied. Well KLAM 10252 responded directly to the pumping. Well KLAM 51131 responded inefficiently.

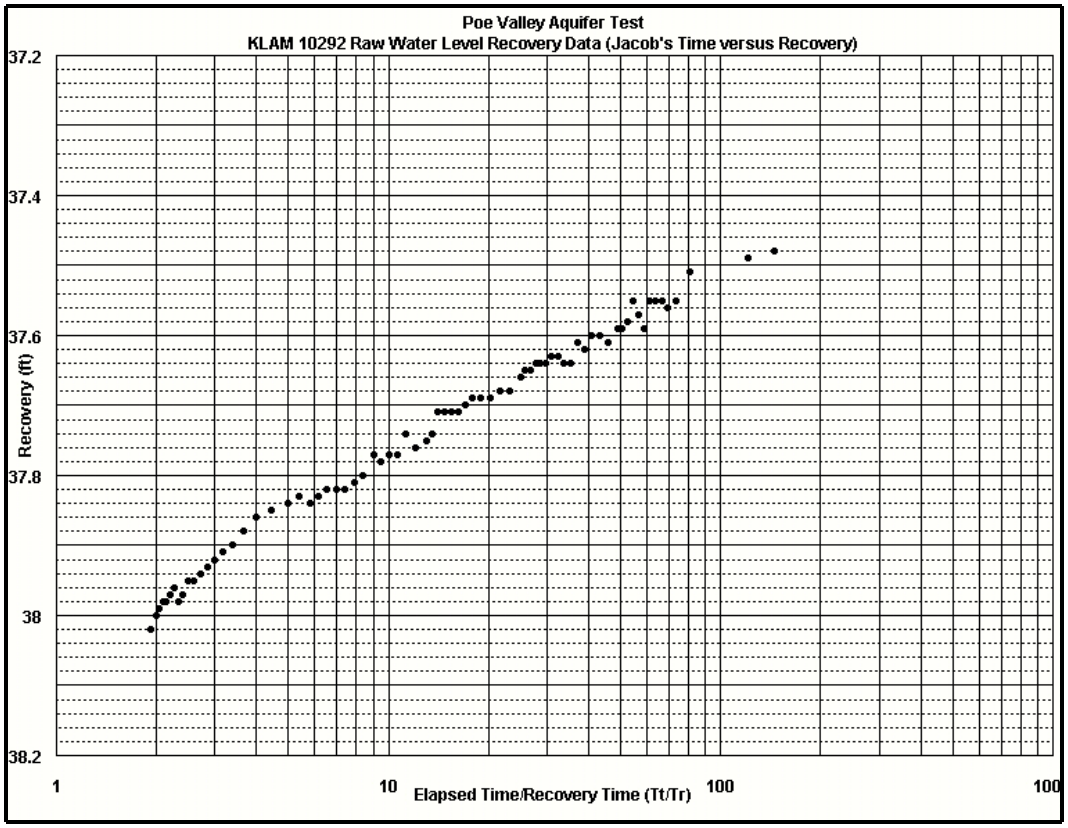
Little weather change occurred during the aquifer test. The maximum barometric pressure change was about 0.10 feet (see barometric pressure graph below), a small percentage of the observed drawdown. Thus, adjusting the raw data prior to data analyses was unnecessary. Graphs of the raw data follow.

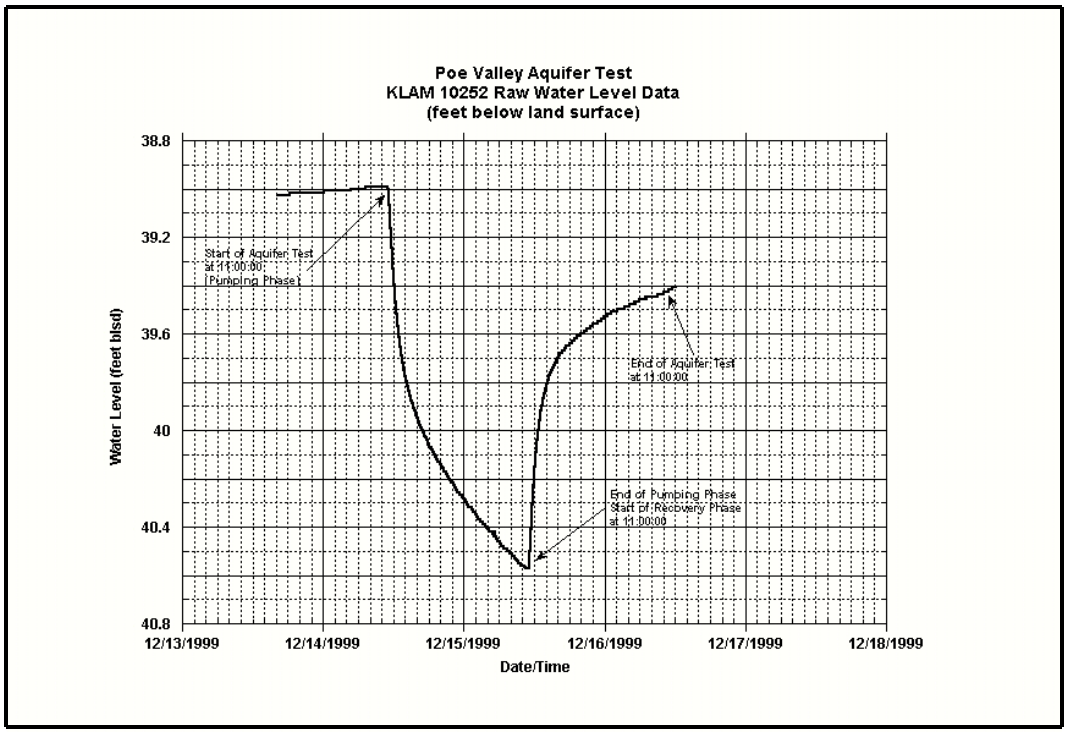


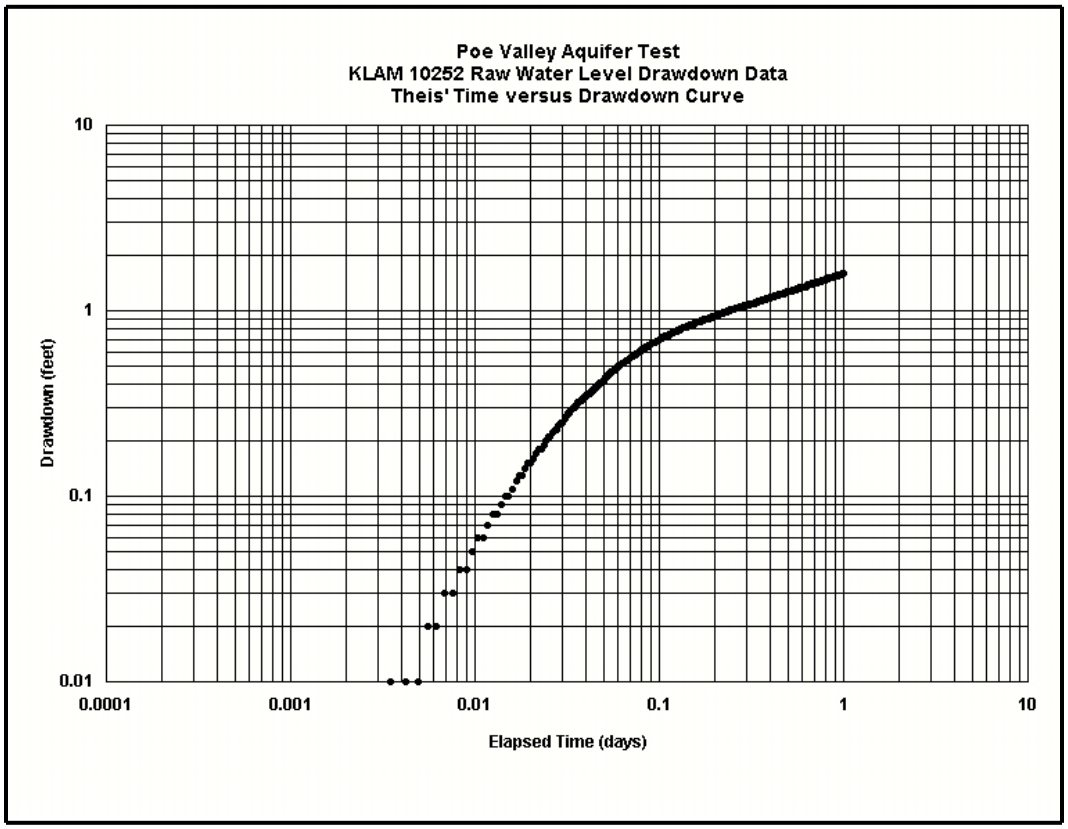

Poe Valley Aquifer Test
KLAM 10292 Raw Water Level Data
(feet below land surface)
No Data
Start of Aquifer Test
at 11:00:00
(Pumping Phase)
End of Aquifer Test
at 11:00:00
End of Pumping Phase
Start of Recovery Phase
at 11:00:00
Water Level (feet blsd)
40
50
60
70
80
90
12/13/1999
12/14/1999
12/15/1999
12/16/1999
12/17/1999
12/18/1999
Date/Time

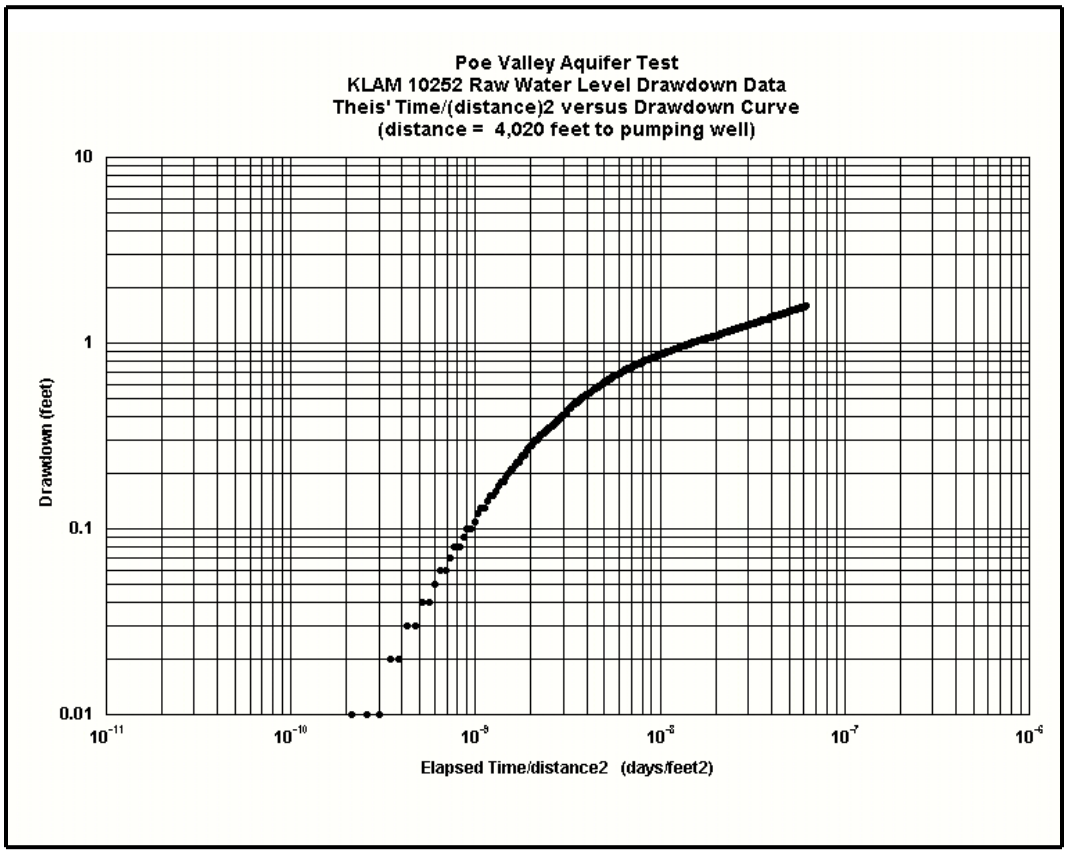

Poe Valley Aquifer Test
KLAM 10292 Raw Water Level Data
(feet below land surface)
Start of Aquifer Test
at 11:00:00
(Pumping Phase)
Oil in Well Complicating
Frequent Early Time
Measurements
Measurement Error
Due to Lost Weights
End of Pumping Phase
Start of Recovery Phase
at 11:00:00
Water Level (feet blsd)
81
81.4
81.8
82.2
82.6
83
12/13/1999
12/14/1999
12/15/1999
12/16/1999
12/17/1999
12/18/1999
Date/Time

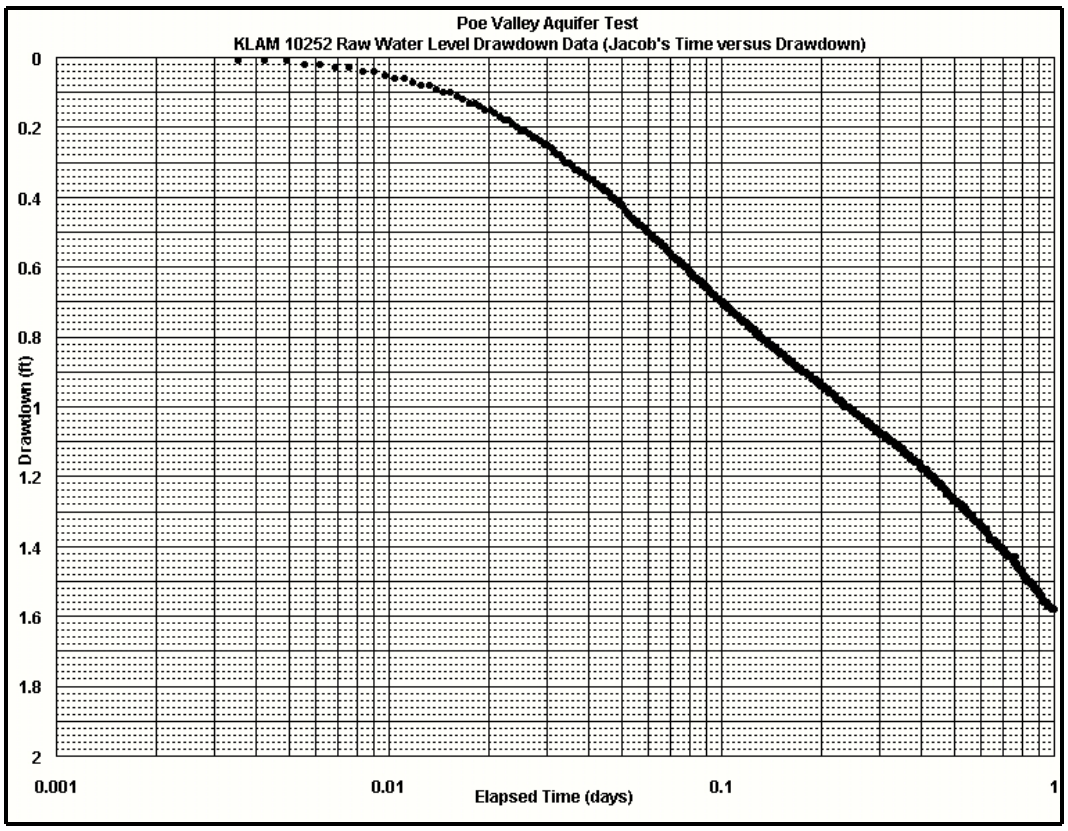

Poe Valley Aquifer Test
KLAM 10292 Raw Water Level Drawdown Data (Jacob's Time versus Drawdown)
36.5
37
37.5
38
38.5
Drawdown (ft)
Measurement Error
Due to Lost Weights
0.001
0.01
0.1
1
Elapsed Time (days)

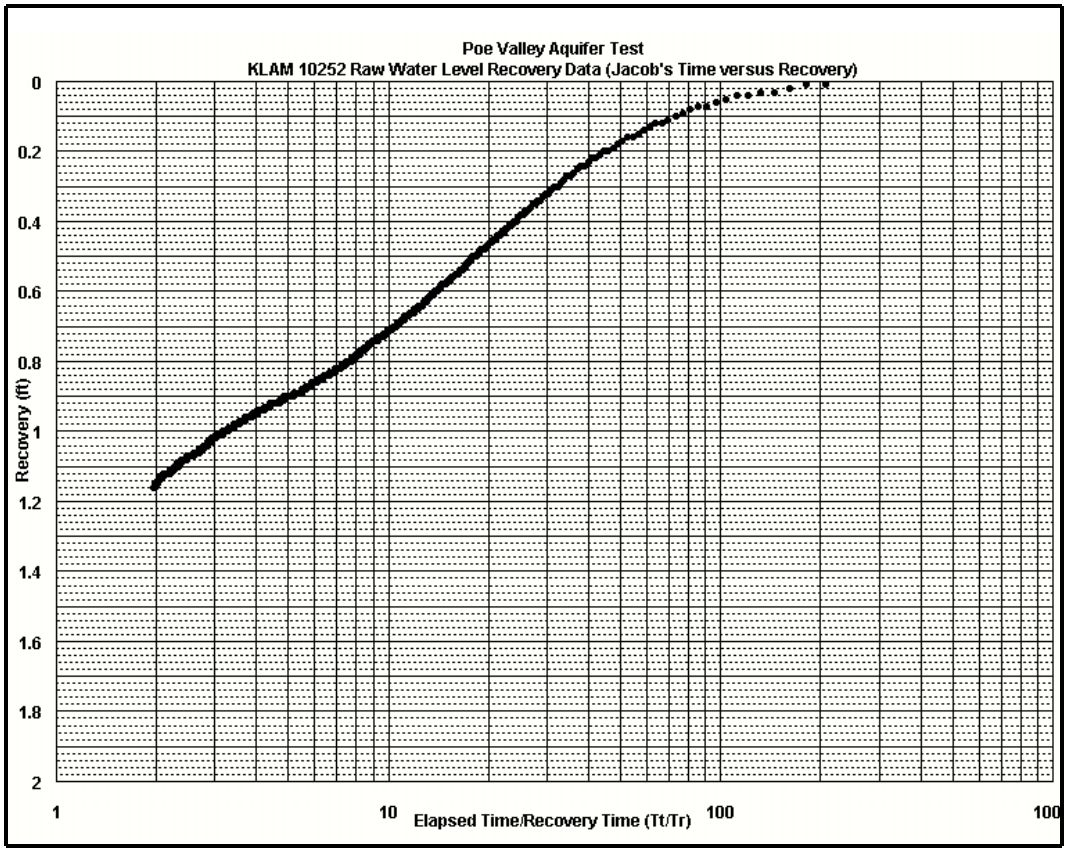

Poe Valley Aquifer Test
KLAM 10292 Raw Water Level Recovery Data (Jacob's Time versus Recovery)
37.2
37.4
37.6
37.8
38
38.2
Recovery (ft)
1
10
100
100
Elapsed Time/Recovery Time (Tt/Tr)

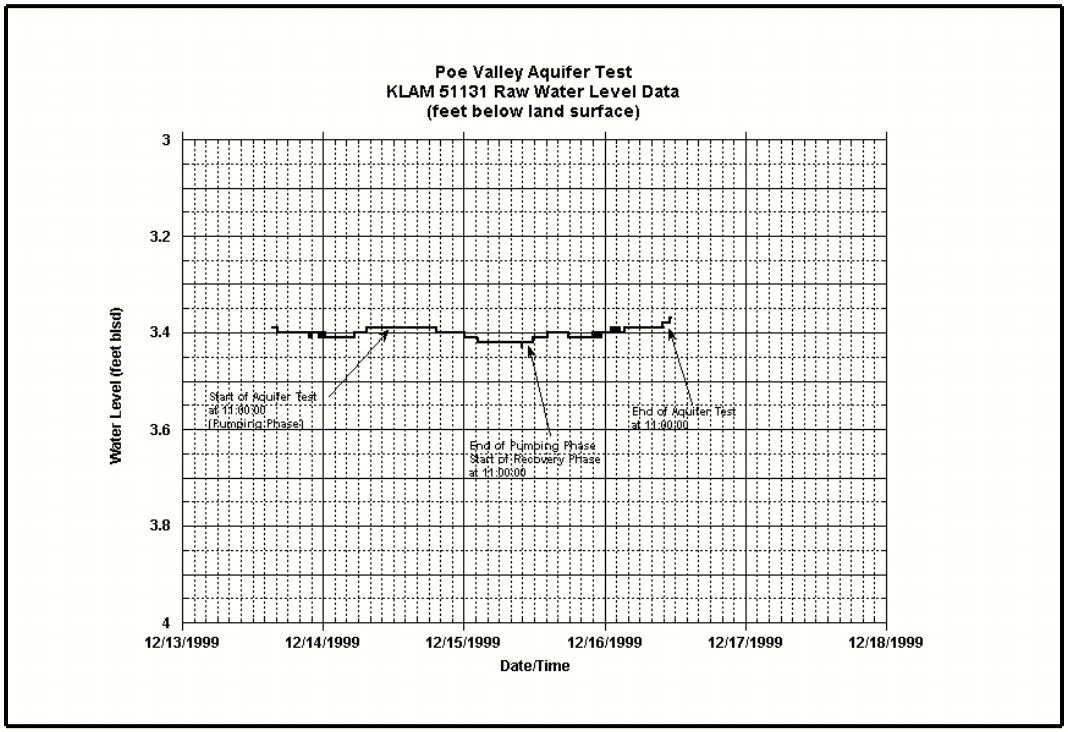

Poe Valley Aquifer Test
KLAM 10252 Raw Water Level Data
(feet below land surface)
Water Level (feet blsd)
38.8
39.2
39.6
40
40.4
40.8
Start of Aquifer Test
at 11:00:00
(Pumping Phase)
End of Aquifer Test
at 11:00:00
End of Pumping Phase
Start of Recovery Phase
at 11:00:00
12/13/1999
12/14/1999
12/15/1999
12/16/1999
12/17/1999
12/18/1999
Date/Time

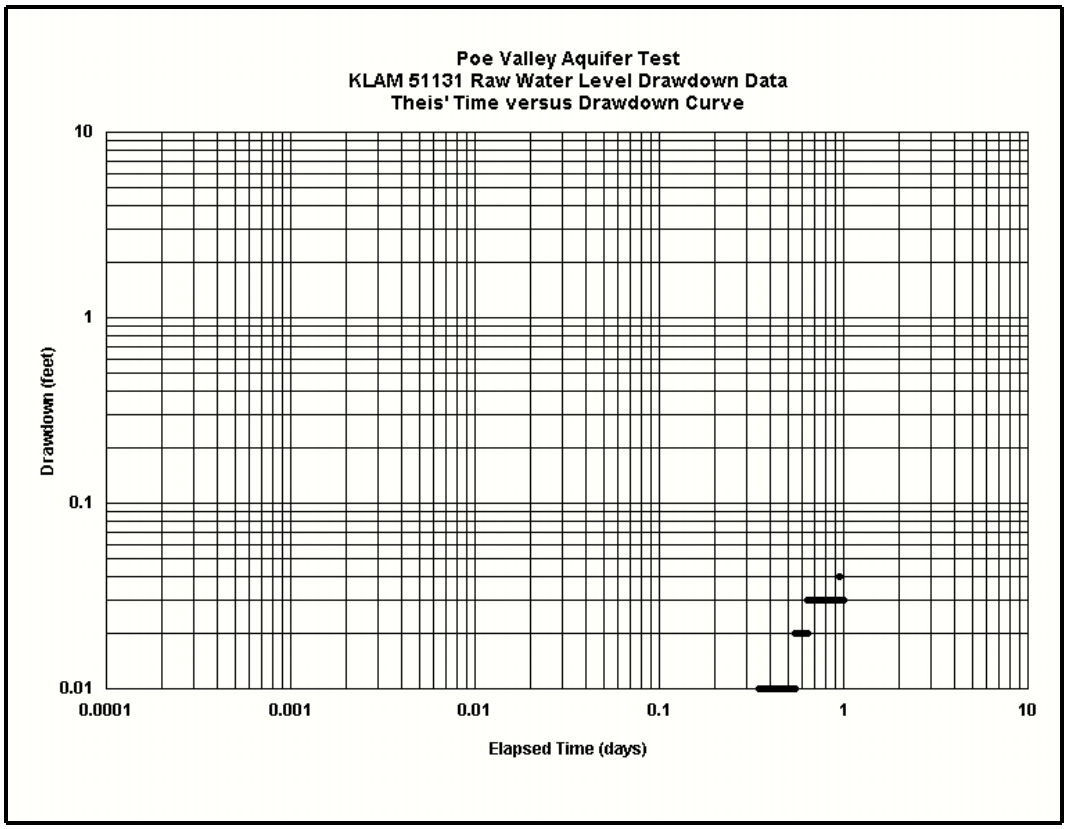

Poe Valley Aquifer Test
KLAM 10252 Raw Water Level Drawdown Data
Theis' Time versus Drawdown Curve
Drawdown (feet)
10
1
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
Elapsed Time (days)

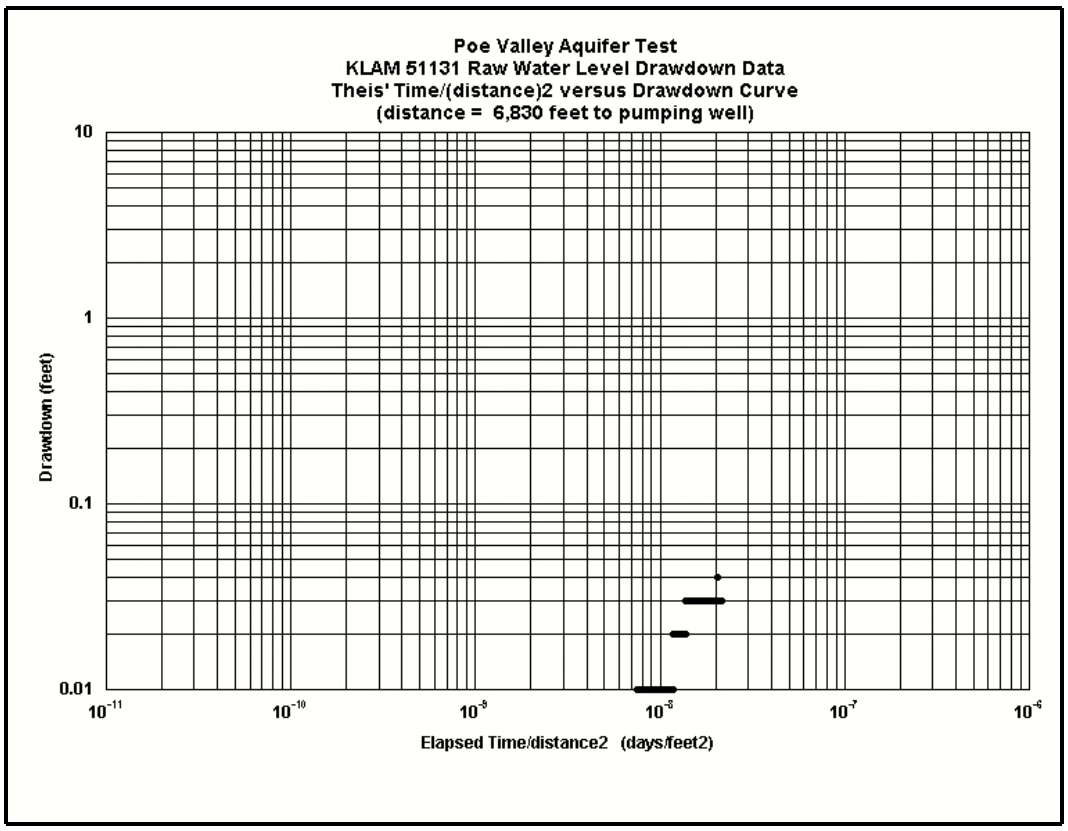

Poe Valley Aquifer Test
KLAM 10252 Raw Water Level Drawdown Data
Theis' Time/(distance)2 versus Drawdown Curve
(distance = 4,020 feet to pumping well)
Drawdown (feet)
10
1
0.1
0.01
10^{-11}
10^{-10}
10^{-9}
10^{-8}
10^{-7}
10^{-6}
Elapsed Time/distance2 (days/feet2)

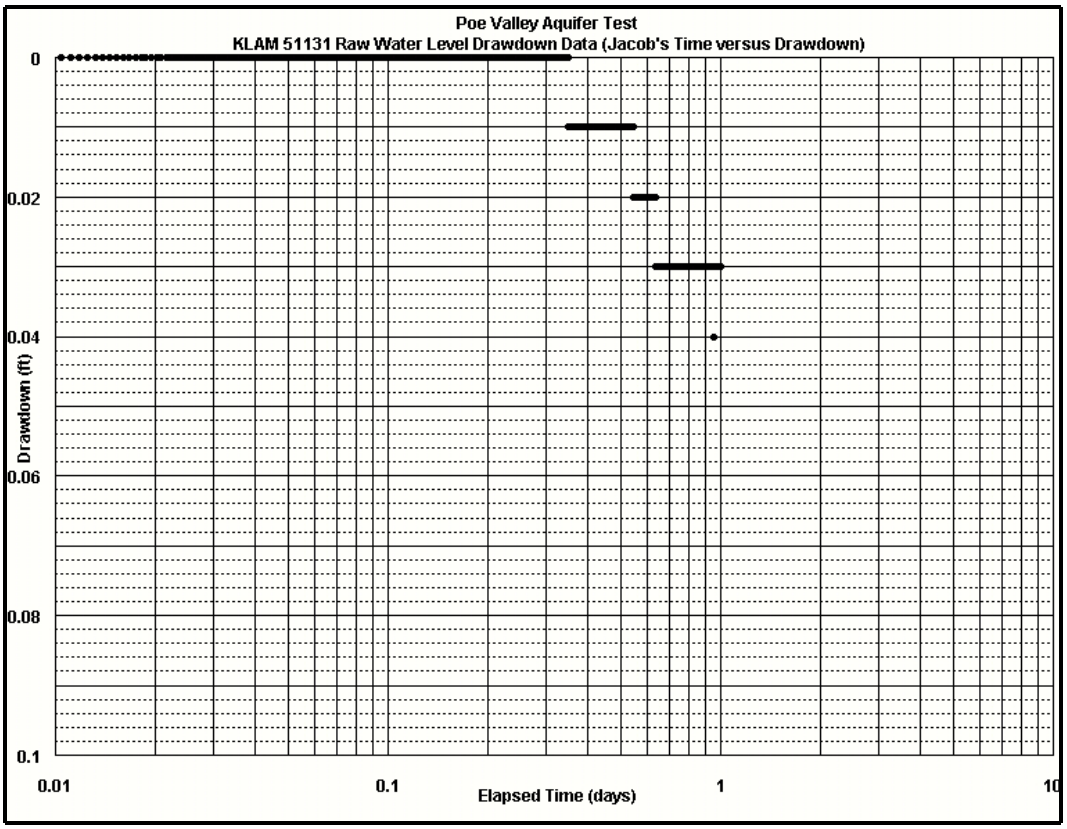

Poe Valley Aquifer Test
KLAM 10252 Raw Water Level Drawdown Data (Jacob's Time versus Drawdown)
Drawdown (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0.001
0.01
0.1
1
Elapsed Time (days)

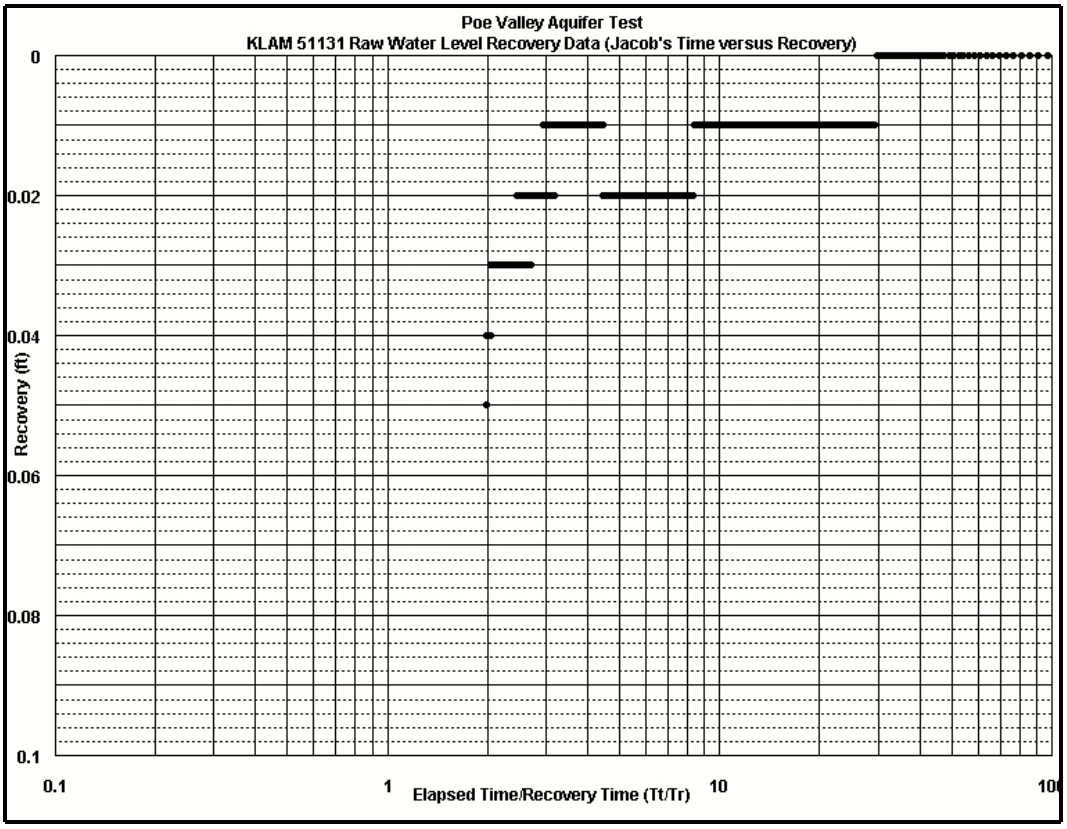

Poe Valley Aquifer Test
KLAM 10252 Raw Water Level Recovery Data (Jacob's Time versus Recovery)
Recovery (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
1
10
100
1000
Elapsed Time/Recovery Time (Tt/Tr)


Poe Valley Aquifer Test
KLAM 51131 Raw Water Level Data
(feet below land surface)
Water Level (feet blsd)
3
3.2
3.4
3.6
3.8
4
Start of Aquifer Test
at 11:00:00
(Pumping Phase)
End of Pumping Phase
Start of Recovery Phase
at 11:00:00
End of Aquifer Test
at 11:00:00
12/13/1999
12/14/1999
12/15/1999
12/16/1999
12/17/1999
12/18/1999
Date/Time


Poe Valley Aquifer Test
KLAM 51131 Raw Water Level Drawdown Data
Theis' Time versus Drawdown Curve
Drawdown (feet)
10
1
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
Elapsed Time (days)


Poe Valley Aquifer Test
KLAM 51131 Raw Water Level Drawdown Data
Theis' Time/(distance)2 versus Drawdown Curve
(distance = 6,830 feet to pumping well)
Drawdown (feet)
10
1
0.1
0.01
10^-11
10^-10
10^-9
10^-8
10^-7
10^-6
Elapsed Time/distance2 (days/feet2)


Poe Valley Aquifer Test
KLAM 51131 Raw Water Level Drawdown Data (Jacob's Time versus Drawdown)
Drawdown (ft)
0
0.02
0.04
0.06
0.08
0.1
0.01
0.1
1
10
Elapsed Time (days)


Poe Valley Aquifer Test
KLAM 51131 Raw Water Level Recovery Data (Jacob's Time versus Recovery)
Recovery (ft)
0
0.02
0.04
0.06
0.08
0.1
0.1
1
10
100
Elapsed Time/Recovery Time (Tt/Tr)

Appendix 35: North Poe Valley 1999 OWRD aquifer test, pumping well data (KLAM 10292)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Pumping Well
Well Location: T39S/R11.5E-sec 26 dba
OWRD Well Log ID Number: KLAM 10292
Measuring Point: open hole at pump base on NE side of turbine
Measuring Tool: e-tape
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.30 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
13-Dec-1999 17:00:00	44.59	0.30	44.29	e-tape	-1,080.00	-0.7500					0.01	
13-Dec-1999 17:15:00	45.85	0.30	45.55	steel tape (oil thickness = 1.26 ft)	-1,065.00	-0.7396					1.27	
14-Dec-1999 09:28:00	44.60	0.30	44.30	e-tape	-92.00	-0.0639					0.02	
14-Dec-1999 10:52:00	44.58	0.30	44.28	e-tape	-8.00	-0.0056					0.00	
14-Dec-1999 10:59:00	44.58	0.30	44.28		-1.00	-0.0007					0.00	
14-Dec-1999 11:00:00	44.58	0.30	44.28	**Start Pumping**	0.00	0.0000					0.00	
14-Dec-1999 11:01:00	76.25	0.30	75.95	note: all measurements are	1.00	0.0007					31.67	
14-Dec-1999 11:02:00	78.50	0.30	78.20	oil-water interface which	2.00	0.0014					33.92	
14-Dec-1999 11:03:00	79.56	0.30	79.26	complicates measurements	3.00	0.0021					34.98	
14-Dec-1999 11:04:00	80.43	0.30	80.13		4.00	0.0028					35.85	
14-Dec-1999 11:05:00	80.92	0.30	80.62		5.00	0.0035					36.34	
14-Dec-1999 11:06:00	81.22	0.30	80.92		6.00	0.0042					36.64	
14-Dec-1999 11:07:00	81.45	0.30	81.15		7.00	0.0049					36.87	
14-Dec-1999 11:08:00	81.46	0.30	81.16		8.00	0.0056					36.88	
14-Dec-1999 11:09:00	81.59	0.30	81.29		9.00	0.0062					37.01	
14-Dec-1999 11:10:00	81.74	0.30	81.44		10.00	0.0069					37.16	
14-Dec-1999 11:11:00	81.73	0.30	81.43		11.00	0.0076					37.15	
14-Dec-1999 11:12:00	81.75	0.30	81.45		12.00	0.0083					37.17	
14-Dec-1999 11:13:00	81.83	0.30	81.53		13.00	0.0090					37.25	
14-Dec-1999 11:14:00	81.80	0.30	81.50		14.00	0.0097					37.22	
14-Dec-1999 11:15:00	81.84	0.30	81.54		15.00	0.0104					37.26	
14-Dec-1999 11:16:00	81.82	0.30	81.52		16.00	0.0111					37.24	
14-Dec-1999 11:17:00	81.81	0.30	81.51		17.00	0.0118					37.23	
14-Dec-1999 11:18:00	81.87	0.30	81.57		18.00	0.0125					37.29	
14-Dec-1999 11:19:00	81.88	0.30	81.58		19.00	0.0132					37.30	
14-Dec-1999 11:20:00	81.92	0.30	81.62		20.00	0.0139					37.34	
14-Dec-1999 11:21:00	81.90	0.30	81.60		21.00	0.0146					37.32	
14-Dec-1999 11:22:00	81.85	0.30	81.55		22.00	0.0153					37.27	
14-Dec-1999 11:23:00	81.92	0.30	81.62		23.00	0.0160					37.34	
14-Dec-1999 11:24:00	81.91	0.30	81.61		24.00	0.0167					37.33	
14-Dec-1999 11:25:00	81.93	0.30	81.63		25.00	0.0174					37.35	
14-Dec-1999 11:26:00	81.96	0.30	81.66		26.00	0.0181					37.38	
14-Dec-1999 11:27:00	81.95	0.30	81.65		27.00	0.0187					37.37	

Appendix 35: North Poe Valley 1999 OWRD aquifer test, pumping well data (KLAM 10292)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Pumping Well
Well Location: T39S/R11.5E-sec 26 dba
OWRD Well Log ID Number: KLAM 10292
Measuring Point: open hole at pump base on NE side of turbine
Measuring Tool: e-tape
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.30 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
14-Dec-1999 11:28:00	82.01	0.30	81.71		28.00	0.0194					37.43	
14-Dec-1999 11:29:00	82.00	0.30	81.70		29.00	0.0201					37.42	
14-Dec-1999 11:30:00	82.02	0.30	81.72		30.00	0.0208					37.44	
14-Dec-1999 11:32:00	81.90	0.30	81.60		32.00	0.0222					37.32	
14-Dec-1999 11:34:00	82.01	0.30	81.71	4425 kwh at 11:33	34.00	0.0236					37.43	
14-Dec-1999 11:36:00	82.06	0.30	81.76		36.00	0.0250					37.48	
14-Dec-1999 11:38:00	82.07	0.30	81.77		38.00	0.0264					37.49	
14-Dec-1999 11:40:00	82.02	0.30	81.72		40.00	0.0278					37.44	
14-Dec-1999 11:42:00	82.04	0.30	81.74	discharge rate = 3,388 gpm	42.00	0.0292					37.46	
14-Dec-1999 11:45:00	82.08	0.30	81.78	discharge rate = 3,342 gpm	45.00	0.0313					37.50	
14-Dec-1999 11:46:00	82.06	0.30	81.76		46.00	0.0319					37.48	
14-Dec-1999 11:48:00	82.06	0.30	81.76		48.00	0.0333					37.48	
14-Dec-1999 11:50:00	82.06	0.30	81.76		50.00	0.0347					37.48	
14-Dec-1999 11:52:00				no measurement	52.00	0.0361						
14-Dec-1999 11:54:00				no measurement	54.00	0.0375						
14-Dec-1999 11:56:00	82.09	0.30	81.79		56.00	0.0389					37.51	
14-Dec-1999 11:58:00	82.08	0.30	81.78		58.00	0.0403					37.50	
14-Dec-1999 12:00:00	82.17	0.30	81.87	discharge rate = 3,402 gpm	60.00	0.0417					37.59	
14-Dec-1999 12:05:00	82.09	0.30	81.79		65.00	0.0451					37.51	
14-Dec-1999 12:10:00	82.13	0.30	81.83		70.00	0.0486					37.55	
14-Dec-1999 12:17:00	82.30	0.30	82.00	missing weights?	77.00	0.0535					37.72	
14-Dec-1999 12:20:00	82.29	0.30	81.99	missing weights?	80.00	0.0556					37.71	
14-Dec-1999 12:25:00	82.41	0.30	82.11	missing weights?	85.00	0.0590					37.83	
14-Dec-1999 12:30:00	82.40	0.30	82.10	missing weights? 3,374 gpm	90.00	0.0625					37.82	
14-Dec-1999 12:35:00	82.35	0.30	82.05	missing weights?	95.00	0.0660					37.77	
14-Dec-1999 12:40:00	82.37	0.30	82.07	missing weights?	100.00	0.0694					37.79	
14-Dec-1999 12:45:00	82.38	0.30	82.08	missing weights? 3,326 gpm	105.00	0.0729					37.80	
14-Dec-1999 12:50:00	82.50	0.30	82.20	missing weights?	110.00	0.0764					37.92	
14-Dec-1999 12:55:00	82.40	0.30	82.10	missing weights? 4549 kwh at 12:57	115.00	0.0799					37.82	
14-Dec-1999 13:02:00	82.43	0.30	82.13	missing weights? 3,416 gpm at 13:00	122.00	0.0847					37.85	
14-Dec-1999 13:10:00	82.42	0.30	82.12	found e-tape weights missing	130.00	0.0903					37.84	
14-Dec-1999 13:20:00	82.23	0.30	81.93		140.00	0.0972					37.65	
14-Dec-1999 13:31:00	82.26	0.30	81.96	3,352 gpm at 13:30	151.00	0.1049					37.68	
14-Dec-1999 13:40:00	82.26	0.30	81.96		160.00	0.1111					37.68	

Appendix 35: North Poe Valley 1999 OWRD aquifer test, pumping well data (KLAM 10292)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Pumping Well
Well Location: T39S/R11.5E-sec 26 dba
OWRD Well Log ID Number: KLAM 10292
Measuring Point: open hole at pump base on NE side of turbine
Measuring Tool: e-tape
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.30 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
14-Dec-1999 13:50:00	82.26	0.30	81.96		170.00	0.1181					37.68	
14-Dec-1999 14:00:00	82.29	0.30	81.99	3,375 gpm at 14:00	180.00	0.1250					37.71	
14-Dec-1999 14:15:00	82.27	0.30	81.97		195.00	0.1354					37.69	
14-Dec-1999 14:30:00	82.27	0.30	81.97	3,336 gpm @ 14:30 & 4685 kwh @ 14:29	210.00	0.1458					37.69	
14-Dec-1999 14:45:00	82.30	0.30	82.00		225.00	0.1563					37.72	
14-Dec-1999 15:00:00	82.35	0.30	82.05	3,351 gpm @ 15:00 & 4734 kwh @ 15:02	240.00	0.1667					37.77	
14-Dec-1999 15:20:00	82.37	0.30	82.07		260.00	0.1806					37.79	
14-Dec-1999 15:40:00	82.38	0.30	82.08	weir: 1.68 ft deep 2 ft before weir edge	280.00	0.1944					37.80	
14-Dec-1999 16:00:00	82.39	0.30	82.09		300.00	0.2083					37.81	
14-Dec-1999 16:30:00	82.41	0.30	82.11	3,258 gpm @ 16:30 & 4806 kwh @ 16:31	330.00	0.2292					37.83	
14-Dec-1999 17:00:00	82.41	0.30	82.11	3,371 gpm	360.00	0.2500					37.83	
14-Dec-1999 18:00:00	82.48	0.30	82.18	3,311 gpm	420.00	0.2917					37.90	
14-Dec-1999 19:00:00	82.55	0.30	82.25	3,371 gpm	480.00	0.3333					37.97	
14-Dec-1999 20:00:00	82.56	0.30	82.26	3,342 gpm	540.00	0.3750					37.98	
14-Dec-1999 21:00:00	82.63	0.30	82.33	3,319 gpm	600.00	0.4167					38.05	
14-Dec-1999 22:00:00	82.67	0.30	82.37	3,334 gpm	660.00	0.4583					38.09	
14-Dec-1999 23:00:00	82.70	0.30	82.40	3,359 gpm	720.00	0.5000					38.12	
15-Dec-1999 00:00:00	82.72	0.30	82.42	3,305 gpm	780.00	0.5417					38.14	
15-Dec-1999 01:00:00	82.73	0.30	82.43	3,340 gpm	840.00	0.5833					38.15	
15-Dec-1999 02:00:00	82.80	0.30	82.50	3,291 gpm	900.00	0.6250					38.22	
15-Dec-1999 03:00:00	82.83	0.30	82.53	3,396 gpm	960.00	0.6667					38.25	
15-Dec-1999 04:00:00	82.85	0.30	82.55	3,321 gpm	1,020.00	0.7083					38.27	
15-Dec-1999 05:00:00	82.87	0.30	82.57	3,315 gpm	1,080.00	0.7500					38.29	
15-Dec-1999 06:00:00	82.87	0.30	82.57	3,387 gpm	1,140.00	0.7917					38.29	
15-Dec-1999 07:00:00	82.93	0.30	82.63	3,380 gpm	1,200.00	0.8333					38.35	
15-Dec-1999 08:00:00	82.94	0.30	82.64	3,313 gpm	1,260.00	0.8750					38.36	
15-Dec-1999 09:00:00	83.01	0.30	82.71	3,239 gpm @ 09:00 & 6326 kwh @ 08:58	1,320.00	0.9167					38.43	
15-Dec-1999 10:00:00	83.04	0.30	82.74	3,355 gpm	1,380.00	0.9583					38.46	
15-Dec-1999 10:30:00	83.05	0.30	82.75	weir: 1.68 ft deep 2 ft before weir edge	1,410.00	0.9792					38.47	
15-Dec-1999 10:45:00	83.01	0.30	82.71	at 09:34, weir lip = 1.0 ft above bottom	1,425.00	0.9896					38.43	
15-Dec-1999 10:55:00	83.01	0.30	82.71	water temp = 63 F at 10:30	1,435.00	0.9965					38.43	
15-Dec-1999 11:00:00	83.03	0.30	82.73	**Pump Off**	1,440.00	1.0000	0.00	0.0000			38.45	0.00
15-Dec-1999 11:01:00				measurement problem due to	1,441.00	1.0007	1.00	1.0000	1,441.00			
15-Dec-1999 11:02:00				rapid rise and oil in well	1,442.00	1.0014	2.00	2.0000	721.00			

Appendix 35: North Poe Valley 1999 OWRD aquifer test, pumping well data (KLAM 10292)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Pumping Well
Well Location: T39S/R11.5E-sec 26 dba
OWRD Well Log ID Number: KLAM 10292
Measuring Point: open hole at pump base on NE side of turbine
Measuring Tool: e-tape
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.30 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
15-Dec-1999 11:03:00	46.38	0.30	46.08	measurement problem due to	1,443.00	1.0021	3.00	3.0000	481.00			36.65
15-Dec-1999 11:04:00	46.22	0.30	45.92	rapid rise and oil in well	1,444.00	1.0028	4.00	4.0000	361.00			36.81
15-Dec-1999 11:05:00				measurement problem due to	1,445.00	1.0035	5.00	5.0000	289.00			
15-Dec-1999 11:06:00				rapid rise and oil in well	1,446.00	1.0042	6.00	6.0000	241.00			
15-Dec-1999 11:07:00				measurement problem due to	1,447.00	1.0049	7.00	7.0000	206.71			
15-Dec-1999 11:08:00				rapid rise and oil in well	1,448.00	1.0056	8.00	8.0000	181.00			
15-Dec-1999 11:09:00				measurement problem due to	1,449.00	1.0062	9.00	9.0000	161.00			
15-Dec-1999 11:10:00	45.55	0.30	45.25	rapid rise and oil in well	1,450.00	1.0069	10.00	10.0000	145.00			37.48
15-Dec-1999 11:11:00	46.20	0.30	45.90	measurement problem due to	1,451.00	1.0076	11.00	11.0000	131.91			36.83
15-Dec-1999 11:12:00	45.54	0.30	45.24	rapid rise and oil in well	1,452.00	1.0083	12.00	12.0000	121.00			37.49
15-Dec-1999 11:13:00	46.42	0.30	46.12	measurement problem due to	1,453.00	1.0090	13.00	13.0000	111.77			36.61
15-Dec-1999 11:14:00				rapid rise and oil in well	1,454.00	1.0097	14.00	14.0000	103.86			
15-Dec-1999 11:15:00				measurement problem due to	1,455.00	1.0104	15.00	15.0000	97.00			
15-Dec-1999 11:16:00				rapid rise and oil in well	1,456.00	1.0111	16.00	16.0000	91.00			
15-Dec-1999 11:17:00	46.79	0.30	46.49	measurement problem due to	1,457.00	1.0118	17.00	17.0000	85.71			36.24
15-Dec-1999 11:18:00	45.52	0.30	45.22	rapid rise and oil in well	1,458.00	1.0125	18.00	18.0000	81.00			37.51
15-Dec-1999 11:19:00				measurement problem	1,459.00	1.0132	19.00	19.0000	76.79			
15-Dec-1999 11:20:00	45.48	0.30	45.18		1,460.00	1.0139	20.00	20.0000	73.00			37.55
15-Dec-1999 11:21:00	45.47	0.30	45.17		1,461.00	1.0146	21.00	21.0000	69.57			37.56
15-Dec-1999 11:22:00	45.48	0.30	45.18		1,462.00	1.0153	22.00	22.0000	66.45			37.55
15-Dec-1999 11:23:00	45.48	0.30	45.18		1,463.00	1.0160	23.00	23.0000	63.61			37.55
15-Dec-1999 11:24:00	45.48	0.30	45.18		1,464.00	1.0167	24.00	24.0000	61.00			37.55
15-Dec-1999 11:25:00	45.44	0.30	45.14		1,465.00	1.0174	25.00	25.0000	58.60			37.59
15-Dec-1999 11:26:00	45.46	0.30	45.16		1,466.00	1.0181	26.00	26.0000	56.38			37.57
15-Dec-1999 11:27:00	45.48	0.30	45.18		1,467.00	1.0187	27.00	27.0000	54.33			37.55
15-Dec-1999 11:28:00	45.45	0.30	45.15		1,468.00	1.0194	28.00	28.0000	52.43			37.58
15-Dec-1999 11:29:00	45.44	0.30	45.14		1,469.00	1.0201	29.00	29.0000	50.66			37.59
15-Dec-1999 11:30:00	45.44	0.30	45.14		1,470.00	1.0208	30.00	30.0000	49.00			37.59
15-Dec-1999 11:32:00	45.42	0.30	45.12		1,472.00	1.0222	32.00	32.0000	46.00			37.61
15-Dec-1999 11:34:00	45.43	0.30	45.13		1,474.00	1.0236	34.00	34.0000	43.35			37.60
15-Dec-1999 11:36:00	45.43	0.30	45.13		1,476.00	1.0250	36.00	36.0000	41.00			37.60
15-Dec-1999 11:38:00	45.41	0.30	45.11		1,478.00	1.0264	38.00	38.0000	38.89			37.62
15-Dec-1999 11:40:00	45.42	0.30	45.12		1,480.00	1.0278	40.00	40.0000	37.00			37.61
15-Dec-1999 11:42:00	45.39	0.30	45.09		1,482.00	1.0292	42.00	42.0000	35.29			37.64

Appendix 35: North Poe Valley 1999 OWRD aquifer test, pumping well data (KLAM 10292)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Pumping Well
Well Location: T39S/R11.5E-sec 26 dba
OWRD Well Log ID Number: KLAM 10292
Measuring Point: open hole at pump base on NE side of turbine
Measuring Tool: e-tape
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.30 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
15-Dec-1999 11:44:00	45.39	0.30	45.09		1,484.00	1.0306	44.00	44.0000	33.73			37.64
15-Dec-1999 11:46:00	45.40	0.30	45.10		1,486.00	1.0319	46.00	46.0000	32.30			37.63
15-Dec-1999 11:48:00	45.40	0.30	45.10		1,488.00	1.0333	48.00	48.0000	31.00			37.63
15-Dec-1999 11:50:00	45.39	0.30	45.09		1,490.00	1.0347	50.00	50.0000	29.80			37.64
15-Dec-1999 11:52:00	45.39	0.30	45.09		1,492.00	1.0361	52.00	52.0000	28.69			37.64
15-Dec-1999 11:54:00	45.39	0.30	45.09		1,494.00	1.0375	54.00	54.0000	27.67			37.64
15-Dec-1999 11:56:00	45.38	0.30	45.08		1,496.00	1.0389	56.00	56.0000	26.71			37.65
15-Dec-1999 11:58:00	45.38	0.30	45.08		1,498.00	1.0403	58.00	58.0000	25.83			37.65
15-Dec-1999 12:00:00	45.37	0.30	45.07		1,500.00	1.0417	60.00	60.0000	25.00			37.66
15-Dec-1999 12:05:00	45.35	0.30	45.05		1,505.00	1.0451	65.00	65.0000	23.15			37.68
15-Dec-1999 12:10:00	45.35	0.30	45.05		1,510.00	1.0486	70.00	70.0000	21.57			37.68
15-Dec-1999 12:15:00	45.34	0.30	45.04		1,515.00	1.0521	75.00	75.0000	20.20			37.69
15-Dec-1999 12:20:00	45.34	0.30	45.04		1,520.00	1.0556	80.00	80.0000	19.00			37.69
15-Dec-1999 12:25:00	45.34	0.30	45.04		1,525.00	1.0590	85.00	85.0000	17.94			37.69
15-Dec-1999 12:30:00	45.33	0.30	45.03		1,530.00	1.0625	90.00	90.0000	17.00			37.70
15-Dec-1999 12:35:00	45.32	0.30	45.02		1,535.00	1.0660	95.00	95.0000	16.16			37.71
15-Dec-1999 12:40:00	45.32	0.30	45.02		1,540.00	1.0694	100.00	100.0000	15.40			37.71
15-Dec-1999 12:45:00	45.32	0.30	45.02		1,545.00	1.0729	105.00	105.0000	14.71			37.71
15-Dec-1999 12:50:00	45.32	0.30	45.02		1,550.00	1.0764	110.00	110.0000	14.09			37.71
15-Dec-1999 12:55:00	45.29	0.30	44.99		1,555.00	1.0799	115.00	115.0000	13.52			37.74
15-Dec-1999 13:00:00	45.28	0.30	44.98		1,560.00	1.0833	120.00	120.0000	13.00			37.75
15-Dec-1999 13:10:00	45.27	0.30	44.97	weights still on e-tape	1,570.00	1.0903	130.00	130.0000	12.08			37.76
15-Dec-1999 13:20:00	45.29	0.30	44.99		1,580.00	1.0972	140.00	140.0000	11.29			37.74
15-Dec-1999 13:30:00	45.26	0.30	44.96		1,590.00	1.1042	150.00	150.0000	10.60			37.77
15-Dec-1999 13:40:00	45.26	0.30	44.96		1,600.00	1.1111	160.00	160.0000	10.00			37.77
15-Dec-1999 13:50:00	45.25	0.30	44.95		1,610.00	1.1181	170.00	170.0000	9.47			37.78
15-Dec-1999 14:00:00	45.26	0.30	44.96		1,620.00	1.1250	180.00	180.0000	9.00			37.77
15-Dec-1999 14:15:00	45.23	0.30	44.93		1,635.00	1.1354	195.00	195.0000	8.38			37.80
15-Dec-1999 14:30:00	45.22	0.30	44.92		1,650.00	1.1458	210.00	210.0000	7.86			37.81
15-Dec-1999 14:45:00	45.21	0.30	44.91		1,665.00	1.1563	225.00	225.0000	7.40			37.82
15-Dec-1999 15:00:00	45.21	0.30	44.91		1,680.00	1.1667	240.00	240.0000	7.00			37.82
15-Dec-1999 15:20:00	45.21	0.30	44.91		1,700.00	1.1806	260.00	260.0000	6.54			37.82
15-Dec-1999 15:40:00	45.20	0.30	44.90		1,720.00	1.1944	280.00	280.0000	6.14			37.83
15-Dec-1999 16:00:00	45.19	0.30	44.89		1,740.00	1.2083	300.00	300.0000	5.80			37.84

Appendix 35: North Poe Valley 1999 OWRD aquifer test, pumping well data (KLAM 10292)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Pumping Well
Well Location: T39S/R11.5E-sec 26 dba
OWRD Well Log ID Number: KLAM 10292
Measuring Point: open hole at pump base on NE side of turbine
Measuring Tool: e-tape
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 0 feet
Owner Well Name/Number: irrigation well
Measuring Pt. = 0.30 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
15-Dec-1999 16:30:00	45.20	0.30	44.90		1,770.00	1.2292	330.00	330.0000	5.36			37.83
15-Dec-1999 17:00:00	45.19	0.30	44.89		1,800.00	1.2500	360.00	360.0000	5.00			37.84
15-Dec-1999 18:00:00	45.18	0.30	44.88		1,860.00	1.2917	420.00	420.0000	4.43			37.85
15-Dec-1999 19:00:00	45.17	0.30	44.87		1,920.00	1.3333	480.00	480.0000	4.00			37.86
15-Dec-1999 20:00:00	45.15	0.30	44.85		1,980.00	1.3750	540.00	540.0000	3.67			37.88
15-Dec-1999 21:00:00	45.13	0.30	44.83		2,040.00	1.4167	600.00	600.0000	3.40			37.90
15-Dec-1999 22:00:00	45.12	0.30	44.82		2,100.00	1.4583	660.00	660.0000	3.18			37.91
15-Dec-1999 23:00:00	45.11	0.30	44.81		2,160.00	1.5000	720.00	720.0000	3.00			37.92
16-Dec-1999 00:00:00	45.10	0.30	44.80		2,220.00	1.5417	780.00	780.0000	2.85			37.93
16-Dec-1999 01:00:00	45.09	0.30	44.79		2,280.00	1.5833	840.00	840.0000	2.71			37.94
16-Dec-1999 02:00:00	45.08	0.30	44.78		2,340.00	1.6250	900.00	900.0000	2.60			37.95
16-Dec-1999 03:00:00	45.08	0.30	44.78		2,400.00	1.6667	960.00	960.0000	2.50			37.95
16-Dec-1999 04:00:00	45.06	0.30	44.76		2,460.00	1.7083	1,020.00	1,020.0000	2.41			37.97
16-Dec-1999 05:00:00	45.05	0.30	44.75		2,520.00	1.7500	1,080.00	1,080.0000	2.33			37.98
16-Dec-1999 06:00:00	45.07	0.30	44.77		2,580.00	1.7917	1,140.00	1,140.0000	2.26			37.96
16-Dec-1999 07:00:00	45.06	0.30	44.76		2,640.00	1.8333	1,200.00	1,200.0000	2.20			37.97
16-Dec-1999 08:00:00	45.05	0.30	44.75		2,700.00	1.8750	1,260.00	1,260.0000	2.14			37.98
16-Dec-1999 09:00:00	45.05	0.30	44.75		2,760.00	1.9167	1,320.00	1,320.0000	2.09			37.98
16-Dec-1999 10:00:00	45.04	0.30	44.74		2,820.00	1.9583	1,380.00	1,380.0000	2.04			37.99
16-Dec-1999 11:00:00	45.03	0.30	44.73	**End Test**	2,880.00	2.0000	1,440.00	1,440.0000	2.00			38.00

Appendix 36: North Poe Valley 1999 OWRD aquifer test, observation well data (KLAM 10252)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Observation Well
Well Location: T39S/R11.5E-sec 25 caa
OWRD Well Log ID Number: KLAM 10252
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 4,020 feet
Owner Well Name/Number: 543 foot well east of ranch office
Measuring Pt. = 1.55 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
13-Dec-1999 16:17:00			39.03	Recorder Reading	-1,123.00	-0.7799						
13-Dec-1999 17:00:00			39.03	Recorder Reading	-1,080.00	-0.7500						
13-Dec-1999 18:00:00			39.03	Recorder Reading	-1,020.00	-0.7083						
13-Dec-1999 19:00:00			39.02	Recorder Reading	-960.00	-0.6667						
13-Dec-1999 20:00:00			39.02	Recorder Reading	-900.00	-0.6250						
13-Dec-1999 21:00:00			39.02	Recorder Reading	-840.00	-0.5833						
13-Dec-1999 22:00:00			39.02	Recorder Reading	-780.00	-0.5417						
13-Dec-1999 23:00:00			39.02	Recorder Reading	-720.00	-0.5000						
14-Dec-1999 00:00:00			39.02	Recorder Reading	-660.00	-0.4583						
14-Dec-1999 01:00:00			39.01	Recorder Reading	-600.00	-0.4167						
14-Dec-1999 02:00:00			39.01	Recorder Reading	-540.00	-0.3750						
14-Dec-1999 03:00:00			39.01	Recorder Reading	-480.00	-0.3333						
14-Dec-1999 04:00:00			39.01	Recorder Reading	-420.00	-0.2917						
14-Dec-1999 05:00:00			39.00	Recorder Reading	-360.00	-0.2500						
14-Dec-1999 06:00:00			39.00	Recorder Reading	-300.00	-0.2083						
14-Dec-1999 07:00:00			39.00	Recorder Reading	-240.00	-0.1667						
14-Dec-1999 08:00:00			38.99	Recorder Reading	-180.00	-0.1250						
14-Dec-1999 09:00:00			38.99	Recorder Reading	-120.00	-0.0833						
14-Dec-1999 10:00:00			38.99	Recorder Reading	-60.00	-0.0417						
14-Dec-1999 10:30:00			38.99	Recorder Reading	-30.00	-0.0208						
14-Dec-1999 10:40:00			38.99	Recorder Reading	-20.00	-0.0139						
14-Dec-1999 10:50:00			38.99	Recorder Reading	-10.00	-0.0069						
14-Dec-1999 11:00:00			38.99	**Start Test, Pumping Well On**	0.00	0.0000				0.0000E+00	0.00	
14-Dec-1999 11:01:00			38.99	Recorder Reading	1.00	0.0007				4.2972E-11	0.00	
14-Dec-1999 11:02:00			38.99	Recorder Reading	2.00	0.0014				8.5944E-11	0.00	
14-Dec-1999 11:03:00			38.99	Recorder Reading	3.00	0.0021				1.2892E-10	0.00	
14-Dec-1999 11:04:00			38.99	Recorder Reading	4.00	0.0028				1.7189E-10	0.00	
14-Dec-1999 11:05:00			39.00	Recorder Reading	5.00	0.0035				2.1486E-10	0.01	
14-Dec-1999 11:06:00			39.00	Recorder Reading	6.00	0.0042				2.5783E-10	0.01	
14-Dec-1999 11:07:00			39.00	Recorder Reading	7.00	0.0049				3.0080E-10	0.01	
14-Dec-1999 11:08:00			39.01	Recorder Reading	8.00	0.0056				3.4378E-10	0.02	
14-Dec-1999 11:09:00			39.01	Recorder Reading	9.00	0.0062				3.8675E-10	0.02	
14-Dec-1999 11:10:00			39.02	Recorder Reading	10.00	0.0069				4.2972E-10	0.03	
14-Dec-1999 11:11:00			39.02	Recorder Reading	11.00	0.0076				4.7269E-10	0.03	

Appendix 36: North Poe Valley 1999 OWRD aquifer test, observation well data (KLAM 10252)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Observation Well
Well Location: T39S/R11.5E-sec 25 caa
OWRD Well Log ID Number: KLAM 10252
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 4,020 feet
Owner Well Name/Number: 543 foot well east of ranch office
Measuring Pt. = 1.55 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
14-Dec-1999 11:12:00			39.03	Recorder Reading	12.00	0.0083				5.1566E-10	0.04	
14-Dec-1999 11:13:00			39.03	Recorder Reading	13.00	0.0090				5.5864E-10	0.04	
14-Dec-1999 11:14:00			39.04	Recorder Reading	14.00	0.0097				6.0161E-10	0.05	
14-Dec-1999 11:15:00			39.05	Recorder Reading	15.00	0.0104				6.4458E-10	0.06	
14-Dec-1999 11:16:00			39.05	Recorder Reading	16.00	0.0111				6.8755E-10	0.06	
14-Dec-1999 11:17:00			39.06	Recorder Reading	17.00	0.0118				7.3052E-10	0.07	
14-Dec-1999 11:18:00			39.07	Recorder Reading	18.00	0.0125				7.7350E-10	0.08	
14-Dec-1999 11:19:00			39.07	Recorder Reading	19.00	0.0132				8.1647E-10	0.08	
14-Dec-1999 11:20:00			39.08	Recorder Reading	20.00	0.0139				8.5944E-10	0.09	
14-Dec-1999 11:21:00			39.09	Recorder Reading	21.00	0.0146				9.0241E-10	0.10	
14-Dec-1999 11:22:00			39.09	Recorder Reading	22.00	0.0153				9.4538E-10	0.10	
14-Dec-1999 11:23:00			39.10	Recorder Reading	23.00	0.0160				9.8836E-10	0.11	
14-Dec-1999 11:24:00			39.11	Recorder Reading	24.00	0.0167				1.0313E-09	0.12	
14-Dec-1999 11:25:00			39.12	Recorder Reading	25.00	0.0174				1.0743E-09	0.13	
14-Dec-1999 11:26:00			39.12	Recorder Reading	26.00	0.0181				1.1173E-09	0.13	
14-Dec-1999 11:27:00			39.13	Recorder Reading	27.00	0.0187				1.1602E-09	0.14	
14-Dec-1999 11:28:00			39.14	Recorder Reading	28.00	0.0194				1.2032E-09	0.15	
14-Dec-1999 11:29:00			39.14	Recorder Reading	29.00	0.0201				1.2462E-09	0.15	
14-Dec-1999 11:30:00			39.15	Recorder Reading	30.00	0.0208				1.2892E-09	0.16	
14-Dec-1999 11:32:00			39.17	Recorder Reading	32.00	0.0222				1.3751E-09	0.18	
14-Dec-1999 11:34:00			39.18	Recorder Reading	34.00	0.0236				1.4610E-09	0.19	
14-Dec-1999 11:36:00			39.20	Recorder Reading	36.00	0.0250				1.5470E-09	0.21	
14-Dec-1999 11:38:00			39.21	Recorder Reading	38.00	0.0264				1.6329E-09	0.22	
14-Dec-1999 11:40:00			39.22	Recorder Reading	40.00	0.0278				1.7189E-09	0.23	
14-Dec-1999 11:42:00			39.24	Recorder Reading	42.00	0.0292				1.8048E-09	0.25	
14-Dec-1999 11:44:00			39.25	Recorder Reading	44.00	0.0306				1.8908E-09	0.26	
14-Dec-1999 11:46:00			39.27	Recorder Reading	46.00	0.0319				1.9767E-09	0.28	
14-Dec-1999 11:48:00			39.28	Recorder Reading	48.00	0.0333				2.0627E-09	0.29	
14-Dec-1999 11:50:00			39.29	Recorder Reading	50.00	0.0347				2.1486E-09	0.30	
14-Dec-1999 11:52:00			39.31	Recorder Reading	52.00	0.0361				2.2345E-09	0.32	
14-Dec-1999 11:54:00			39.32	Recorder Reading	54.00	0.0375				2.3205E-09	0.33	
14-Dec-1999 11:56:00			39.33	Recorder Reading	56.00	0.0389				2.4064E-09	0.34	
14-Dec-1999 11:58:00			39.34	Recorder Reading	58.00	0.0403				2.4924E-09	0.35	
14-Dec-1999 12:00:00			39.35	Recorder Reading	60.00	0.0417				2.5783E-09	0.36	

Appendix 36: North Poe Valley 1999 OWRD aquifer test, observation well data (KLAM 10252)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Observation Well
Well Location: T39S/R11.5E-sec 25 caa
OWRD Well Log ID Number: KLAM 10252
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 4,020 feet
Owner Well Name/Number: 543 foot well east of ranch office
Measuring Pt. = 1.55 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
14-Dec-1999 12:05:00			39.37	Recorder Reading	65.00	0.0451				2.7932E-09	0.38	
14-Dec-1999 12:10:00			39.40	Recorder Reading	70.00	0.0486				3.0080E-09	0.41	
14-Dec-1999 12:15:00			39.44	Recorder Reading	75.00	0.0521				3.2229E-09	0.45	
14-Dec-1999 12:20:00			39.46	Recorder Reading	80.00	0.0556				3.4378E-09	0.47	
14-Dec-1999 12:25:00			39.48	Recorder Reading	85.00	0.0590				3.6526E-09	0.49	
14-Dec-1999 12:30:00			39.51	Recorder Reading	90.00	0.0625				3.8675E-09	0.52	
14-Dec-1999 12:35:00			39.53	Recorder Reading	95.00	0.0660				4.0823E-09	0.54	
14-Dec-1999 12:40:00			39.55	Recorder Reading	100.00	0.0694				4.2972E-09	0.56	
14-Dec-1999 12:45:00			39.57	Recorder Reading	105.00	0.0729				4.5121E-09	0.58	
14-Dec-1999 12:50:00			39.58	Recorder Reading	110.00	0.0764				4.7269E-09	0.59	
14-Dec-1999 12:55:00			39.60	Recorder Reading	115.00	0.0799				4.9418E-09	0.61	
14-Dec-1999 13:00:00			39.62	Recorder Reading	120.00	0.0833				5.1566E-09	0.63	
14-Dec-1999 13:10:00			39.65	Recorder Reading	130.00	0.0903				5.5864E-09	0.66	
14-Dec-1999 13:20:00			39.68	Recorder Reading	140.00	0.0972				6.0161E-09	0.69	
14-Dec-1999 13:30:00			39.71	Recorder Reading	150.00	0.1042				6.4458E-09	0.72	
14-Dec-1999 13:40:00			39.73	Recorder Reading	160.00	0.1111				6.8755E-09	0.74	
14-Dec-1999 13:50:00			39.75	Recorder Reading	170.00	0.1181				7.3052E-09	0.76	
14-Dec-1999 14:00:00			39.77	Recorder Reading	180.00	0.1250				7.7350E-09	0.78	
14-Dec-1999 14:15:00			39.80	Recorder Reading	195.00	0.1354				8.3795E-09	0.81	
14-Dec-1999 14:30:00			39.82	Recorder Reading	210.00	0.1458				9.0241E-09	0.83	
14-Dec-1999 14:45:00			39.85	Recorder Reading	225.00	0.1563				9.6687E-09	0.86	
14-Dec-1999 15:00:00			39.87	Recorder Reading	240.00	0.1667				1.0313E-08	0.88	
14-Dec-1999 15:20:00			39.90	Recorder Reading	260.00	0.1806				1.1173E-08	0.91	
14-Dec-1999 15:40:00			39.92	Recorder Reading	280.00	0.1944				1.2032E-08	0.93	
14-Dec-1999 16:00:00			39.94	Recorder Reading	300.00	0.2083				1.2892E-08	0.95	
14-Dec-1999 16:30:00			39.98	Recorder Reading	330.00	0.2292				1.4181E-08	0.99	
14-Dec-1999 17:00:00			40.00	Recorder Reading	360.00	0.2500				1.5470E-08	1.01	
14-Dec-1999 18:00:00			40.06	Recorder Reading	420.00	0.2917				1.8048E-08	1.07	
14-Dec-1999 19:00:00			40.10	Recorder Reading	480.00	0.3333				2.0627E-08	1.11	
14-Dec-1999 20:00:00			40.14	Recorder Reading	540.00	0.3750				2.3205E-08	1.15	
14-Dec-1999 21:00:00			40.18	Recorder Reading	600.00	0.4167				2.5783E-08	1.19	
14-Dec-1999 22:00:00			40.22	Recorder Reading	660.00	0.4583				2.8362E-08	1.23	
14-Dec-1999 23:00:00			40.26	Recorder Reading	720.00	0.5000				3.0940E-08	1.27	
15-Dec-1999 00:00:00			40.28	Recorder Reading	780.00	0.5417				3.3518E-08	1.29	

Appendix 36: North Poe Valley 1999 OWRD aquifer test, observation well data (KLAM 10252)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Observation Well
Well Location: T39S/R11.5E-sec 25 caa
OWRD Well Log ID Number: KLAM 10252
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 4,020 feet
Owner Well Name/Number: 543 foot well east of ranch office
Measuring Pt. = 1.55 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
15-Dec-1999 01:00:00			40.32	Recorder Reading	840.00	0.5833				3.6096E-08	1.33	
15-Dec-1999 02:00:00			40.35	Recorder Reading	900.00	0.6250				3.8675E-08	1.36	
15-Dec-1999 03:00:00			40.38	Recorder Reading	960.00	0.6667				4.1253E-08	1.39	
15-Dec-1999 04:00:00			40.41	Recorder Reading	1,020.00	0.7083				4.3831E-08	1.42	
15-Dec-1999 05:00:00			40.43	Recorder Reading	1,080.00	0.7500				4.6410E-08	1.44	
15-Dec-1999 06:00:00			40.46	Recorder Reading	1,140.00	0.7917				4.8988E-08	1.47	
15-Dec-1999 07:00:00			40.49	Recorder Reading	1,200.00	0.8333				5.1566E-08	1.50	
15-Dec-1999 08:00:00			40.51	Recorder Reading	1,260.00	0.8750				5.4145E-08	1.52	
15-Dec-1999 09:00:00			40.54	Recorder Reading	1,320.00	0.9167				5.6723E-08	1.55	
15-Dec-1999 10:00:00			40.56	Recorder Reading	1,380.00	0.9583				5.9301E-08	1.57	
15-Dec-1999 11:00:00			40.57	**Start Recovery, Pump Off**	1,440.00	1.0000	0.00	0.0000		6.1880E-08	1.58	0.00
15-Dec-1999 11:01:00			40.57	Recorder Reading	1,441.00	1.0007	1.00	0.0007	1,441.00			0.00
15-Dec-1999 11:02:00			40.57	Recorder Reading	1,442.00	1.0014	2.00	0.0014	721.00			0.00
15-Dec-1999 11:03:00			40.57	Recorder Reading	1,443.00	1.0021	3.00	0.0021	481.00			0.00
15-Dec-1999 11:04:00			40.57	Recorder Reading	1,444.00	1.0028	4.00	0.0028	361.00			0.00
15-Dec-1999 11:05:00			40.57	Recorder Reading	1,445.00	1.0035	5.00	0.0035	289.00			0.00
15-Dec-1999 11:06:00			40.57	Recorder Reading	1,446.00	1.0042	6.00	0.0042	241.00			0.00
15-Dec-1999 11:07:00			40.56	Recorder Reading	1,447.00	1.0049	7.00	0.0049	206.71			0.01
15-Dec-1999 11:08:00			40.56	Recorder Reading	1,448.00	1.0056	8.00	0.0056	181.00			0.01
15-Dec-1999 11:09:00			40.55	Recorder Reading	1,449.00	1.0062	9.00	0.0062	161.00			0.02
15-Dec-1999 11:10:00			40.54	Recorder Reading	1,450.00	1.0069	10.00	0.0069	145.00			0.03
15-Dec-1999 11:11:00			40.54	Recorder Reading	1,451.00	1.0076	11.00	0.0076	131.91			0.03
15-Dec-1999 11:12:00			40.53	Recorder Reading	1,452.00	1.0083	12.00	0.0083	121.00			0.04
15-Dec-1999 11:13:00			40.53	Recorder Reading	1,453.00	1.0090	13.00	0.0090	111.77			0.04
15-Dec-1999 11:14:00			40.52	Recorder Reading	1,454.00	1.0097	14.00	0.0097	103.86			0.05
15-Dec-1999 11:15:00			40.51	Recorder Reading	1,455.00	1.0104	15.00	0.0104	97.00			0.06
15-Dec-1999 11:16:00			40.50	Recorder Reading	1,456.00	1.0111	16.00	0.0111	91.00			0.07
15-Dec-1999 11:17:00			40.50	Recorder Reading	1,457.00	1.0118	17.00	0.0118	85.71			0.07
15-Dec-1999 11:18:00			40.49	Recorder Reading	1,458.00	1.0125	18.00	0.0125	81.00			0.08
15-Dec-1999 11:19:00			40.48	Recorder Reading	1,459.00	1.0132	19.00	0.0132	76.79			0.09
15-Dec-1999 11:20:00			40.47	Recorder Reading	1,460.00	1.0139	20.00	0.0139	73.00			0.10
15-Dec-1999 11:21:00			40.46	Recorder Reading	1,461.00	1.0146	21.00	0.0146	69.57			0.11
15-Dec-1999 11:22:00			40.45	Recorder Reading	1,462.00	1.0153	22.00	0.0153	66.45			0.12
15-Dec-1999 11:23:00			40.45	Recorder Reading	1,463.00	1.0160	23.00	0.0160	63.61			0.12

Appendix 36: North Poe Valley 1999 OWRD aquifer test, observation well data (KLAM 10252)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Observation Well
Well Location: T39S/R11.5E-sec 25 caa
OWRD Well Log ID Number: KLAM 10252
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 4,020 feet
Owner Well Name/Number: 543 foot well east of ranch office
Measuring Pt. = 1.55 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
15-Dec-1999 11:24:00			40.44	Recorder Reading	1,464.00	1.0167	24.00	0.0167	61.00			0.13
15-Dec-1999 11:25:00			40.43	Recorder Reading	1,465.00	1.0174	25.00	0.0174	58.60			0.14
15-Dec-1999 11:26:00			40.42	Recorder Reading	1,466.00	1.0181	26.00	0.0181	56.38			0.15
15-Dec-1999 11:27:00			40.41	Recorder Reading	1,467.00	1.0187	27.00	0.0187	54.33			0.16
15-Dec-1999 11:28:00			40.41	Recorder Reading	1,468.00	1.0194	28.00	0.0194	52.43			0.16
15-Dec-1999 11:29:00			40.40	Recorder Reading	1,469.00	1.0201	29.00	0.0201	50.66			0.17
15-Dec-1999 11:30:00			40.39	Recorder Reading	1,470.00	1.0208	30.00	0.0208	49.00			0.18
15-Dec-1999 11:32:00			40.37	Recorder Reading	1,472.00	1.0222	32.00	0.0222	46.00			0.20
15-Dec-1999 11:34:00			40.36	Recorder Reading	1,474.00	1.0236	34.00	0.0236	43.35			0.21
15-Dec-1999 11:36:00			40.35	Recorder Reading	1,476.00	1.0250	36.00	0.0250	41.00			0.22
15-Dec-1999 11:38:00			40.33	Recorder Reading	1,478.00	1.0264	38.00	0.0264	38.89			0.24
15-Dec-1999 11:40:00			40.32	Recorder Reading	1,480.00	1.0278	40.00	0.0278	37.00			0.25
15-Dec-1999 11:42:00			40.30	Recorder Reading	1,482.00	1.0292	42.00	0.0292	35.29			0.27
15-Dec-1999 11:44:00			40.29	Recorder Reading	1,484.00	1.0306	44.00	0.0306	33.73			0.28
15-Dec-1999 11:46:00			40.27	Recorder Reading	1,486.00	1.0319	46.00	0.0319	32.30			0.30
15-Dec-1999 11:48:00			40.26	Recorder Reading	1,488.00	1.0333	48.00	0.0333	31.00			0.31
15-Dec-1999 11:50:00			40.25	Recorder Reading	1,490.00	1.0347	50.00	0.0347	29.80			0.32
15-Dec-1999 11:52:00			40.23	Recorder Reading	1,492.00	1.0361	52.00	0.0361	28.69			0.34
15-Dec-1999 11:54:00			40.22	Recorder Reading	1,494.00	1.0375	54.00	0.0375	27.67			0.35
15-Dec-1999 11:56:00			40.21	Recorder Reading	1,496.00	1.0389	56.00	0.0389	26.71			0.36
15-Dec-1999 11:58:00			40.20	Recorder Reading	1,498.00	1.0403	58.00	0.0403	25.83			0.37
15-Dec-1999 12:00:00			40.19	Recorder Reading	1,500.00	1.0417	60.00	0.0417	25.00			0.38
15-Dec-1999 12:05:00			40.16	Recorder Reading	1,505.00	1.0451	65.00	0.0451	23.15			0.41
15-Dec-1999 12:10:00			40.13	Recorder Reading	1,510.00	1.0486	70.00	0.0486	21.57			0.44
15-Dec-1999 12:15:00			40.11	Recorder Reading	1,515.00	1.0521	75.00	0.0521	20.20			0.46
15-Dec-1999 12:20:00			40.09	Recorder Reading	1,520.00	1.0556	80.00	0.0556	19.00			0.48
15-Dec-1999 12:25:00			40.07	Recorder Reading	1,525.00	1.0590	85.00	0.0590	17.94			0.50
15-Dec-1999 12:30:00			40.04	Recorder Reading	1,530.00	1.0625	90.00	0.0625	17.00			0.53
15-Dec-1999 12:35:00			40.02	Recorder Reading	1,535.00	1.0660	95.00	0.0660	16.16			0.55
15-Dec-1999 12:40:00			40.01	Recorder Reading	1,540.00	1.0694	100.00	0.0694	15.40			0.56
15-Dec-1999 12:45:00			39.99	Recorder Reading	1,545.00	1.0729	105.00	0.0729	14.71			0.58
15-Dec-1999 12:50:00			39.97	Recorder Reading	1,550.00	1.0764	110.00	0.0764	14.09			0.60
15-Dec-1999 12:55:00			39.96	Recorder Reading	1,555.00	1.0799	115.00	0.0799	13.52			0.61
15-Dec-1999 13:00:00			39.94	Recorder Reading	1,560.00	1.0833	120.00	0.0833	13.00			0.63

Appendix 36: North Poe Valley 1999 OWRD aquifer test, observation well data (KLAM 10252)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Observation Well
Well Location: T39S/R11.5E-sec 25 caa
OWRD Well Log ID Number: KLAM 10252
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 4,020 feet
Owner Well Name/Number: 543 foot well east of ranch office
Measuring Pt. = 1.55 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
15-Dec-1999 13:10:00			39.92	Recorder Reading	1,570.00	1.0903	130.00	0.0903	12.08			0.65
15-Dec-1999 13:20:00			39.90	Recorder Reading	1,580.00	1.0972	140.00	0.0972	11.29			0.67
15-Dec-1999 13:30:00			39.88	Recorder Reading	1,590.00	1.1042	150.00	0.1042	10.60			0.69
15-Dec-1999 13:40:00			39.86	Recorder Reading	1,600.00	1.1111	160.00	0.1111	10.00			0.71
15-Dec-1999 13:50:00			39.84	Recorder Reading	1,610.00	1.1181	170.00	0.1181	9.47			0.73
15-Dec-1999 14:00:00			39.83	Recorder Reading	1,620.00	1.1250	180.00	0.1250	9.00			0.74
15-Dec-1999 14:15:00			39.80	Recorder Reading	1,635.00	1.1354	195.00	0.1354	8.38			0.77
15-Dec-1999 14:30:00			39.78	Recorder Reading	1,650.00	1.1458	210.00	0.1458	7.86			0.79
15-Dec-1999 14:45:00			39.76	Recorder Reading	1,665.00	1.1563	225.00	0.1563	7.40			0.81
15-Dec-1999 15:00:00			39.75	Recorder Reading	1,680.00	1.1667	240.00	0.1667	7.00			0.82
15-Dec-1999 15:20:00			39.73	Recorder Reading	1,700.00	1.1806	260.00	0.1806	6.54			0.84
15-Dec-1999 15:40:00			39.72	Recorder Reading	1,720.00	1.1944	280.00	0.1944	6.14			0.85
15-Dec-1999 16:00:00			39.70	Recorder Reading	1,740.00	1.2083	300.00	0.2083	5.80			0.87
15-Dec-1999 16:30:00			39.68	Recorder Reading	1,770.00	1.2292	330.00	0.2292	5.36			0.89
15-Dec-1999 17:00:00			39.67	Recorder Reading	1,800.00	1.2500	360.00	0.2500	5.00			0.90
15-Dec-1999 18:00:00			39.65	Recorder Reading	1,860.00	1.2917	420.00	0.2917	4.43			0.92
15-Dec-1999 19:00:00			39.62	Recorder Reading	1,920.00	1.3333	480.00	0.3333	4.00			0.95
15-Dec-1999 20:00:00			39.60	Recorder Reading	1,980.00	1.3750	540.00	0.3750	3.67			0.97
15-Dec-1999 21:00:00			39.58	Recorder Reading	2,040.00	1.4167	600.00	0.4167	3.40			0.99
15-Dec-1999 22:00:00			39.57	Recorder Reading	2,100.00	1.4583	660.00	0.4583	3.18			1.00
15-Dec-1999 23:00:00			39.55	Recorder Reading	2,160.00	1.5000	720.00	0.5000	3.00			1.02
16-Dec-1999 00:00:00			39.53	Recorder Reading	2,220.00	1.5417	780.00	0.5417	2.85			1.04
16-Dec-1999 01:00:00			39.52	Recorder Reading	2,280.00	1.5833	840.00	0.5833	2.71			1.05
16-Dec-1999 02:00:00			39.51	Recorder Reading	2,340.00	1.6250	900.00	0.6250	2.60			1.06
16-Dec-1999 03:00:00			39.50	Recorder Reading	2,400.00	1.6667	960.00	0.6667	2.50			1.07
16-Dec-1999 04:00:00			39.49	Recorder Reading	2,460.00	1.7083	1,020.00	0.7083	2.41			1.08
16-Dec-1999 05:00:00			39.48	Recorder Reading	2,520.00	1.7500	1,080.00	0.7500	2.33			1.09
16-Dec-1999 06:00:00			39.46	Recorder Reading	2,580.00	1.7917	1,140.00	0.7917	2.26			1.11
16-Dec-1999 07:00:00			39.46	Recorder Reading	2,640.00	1.8333	1,200.00	0.8333	2.20			1.11
16-Dec-1999 08:00:00			39.45	Recorder Reading	2,700.00	1.8750	1,260.00	0.8750	2.14			1.12
16-Dec-1999 09:00:00			39.45	Recorder Reading	2,760.00	1.9167	1,320.00	0.9167	2.09			1.12
16-Dec-1999 10:00:00			39.44	Recorder Reading	2,820.00	1.9583	1,380.00	0.9583	2.04			1.13
16-Dec-1999 11:00:00			39.42	**End Test**	2,880.00	2.0000	1,440.00	1.0000	2.00			1.15

Appendix 37: North Poe Valley 1999 OWRD aquifer test, observation well data (KLAM 51131)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Observation Well
Well Location: T39S/R11.5E-sec 35 dda
OWRD Well Log ID Number: KLAM 51131
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 6,830 feet
Owner Well Name/Number: 1,009 foot well south of Lost River
Measuring Pt. = 1.52 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
13-Dec-1999 15:25:00			3.39	Recorder Reading	-1,175.00	-0.8160						
13-Dec-1999 16:00:00			3.39	Recorder Reading	-1,140.00	-0.7917						
13-Dec-1999 17:00:00			3.40	Recorder Reading	-1,080.00	-0.7500						
13-Dec-1999 18:00:00			3.40	Recorder Reading	-1,020.00	-0.7083						
13-Dec-1999 19:00:00			3.40	Recorder Reading	-960.00	-0.6667						
13-Dec-1999 20:00:00			3.40	Recorder Reading	-900.00	-0.6250						
13-Dec-1999 21:00:00			3.40	Recorder Reading	-840.00	-0.5833						
13-Dec-1999 22:00:00			3.41	Recorder Reading	-780.00	-0.5417						
13-Dec-1999 23:00:00			3.40	Recorder Reading	-720.00	-0.5000						
14-Dec-1999 00:00:00			3.40	Recorder Reading	-660.00	-0.4583						
14-Dec-1999 01:00:00			3.41	Recorder Reading	-600.00	-0.4167						
14-Dec-1999 02:00:00			3.41	Recorder Reading	-540.00	-0.3750						
14-Dec-1999 03:00:00			3.41	Recorder Reading	-480.00	-0.3333						
14-Dec-1999 04:00:00			3.41	Recorder Reading	-420.00	-0.2917						
14-Dec-1999 05:00:00			3.41	Recorder Reading	-360.00	-0.2500						
14-Dec-1999 06:00:00			3.40	Recorder Reading	-300.00	-0.2083						
14-Dec-1999 07:00:00			3.40	Recorder Reading	-240.00	-0.1667						
14-Dec-1999 08:00:00			3.39	Recorder Reading	-180.00	-0.1250						
14-Dec-1999 09:00:00			3.39	Recorder Reading	-120.00	-0.0833						
14-Dec-1999 10:00:00			3.39	Recorder Reading	-60.00	-0.0417						
14-Dec-1999 10:30:00			3.39	Recorder Reading	-30.00	-0.0208						
14-Dec-1999 10:40:00			3.39	Recorder Reading	-20.00	-0.0139						
14-Dec-1999 10:50:00			3.39	Recorder Reading	-10.00	-0.0069						
14-Dec-1999 11:00:00			3.39	**Start Test, Pumping Well On**	0.00	0.0000				0.0000E+00	0.00	
14-Dec-1999 11:01:00			3.39	Recorder Reading	1.00	0.0007				1.4887E-11	0.00	
14-Dec-1999 11:02:00			3.39	Recorder Reading	2.00	0.0014				2.9773E-11	0.00	
14-Dec-1999 11:03:00			3.39	Recorder Reading	3.00	0.0021				4.4660E-11	0.00	
14-Dec-1999 11:04:00			3.39	Recorder Reading	4.00	0.0028				5.9546E-11	0.00	
14-Dec-1999 11:05:00			3.39	Recorder Reading	5.00	0.0035				7.4433E-11	0.00	
14-Dec-1999 11:06:00			3.39	Recorder Reading	6.00	0.0042				8.9320E-11	0.00	
14-Dec-1999 11:07:00			3.39	Recorder Reading	7.00	0.0049				1.0421E-10	0.00	
14-Dec-1999 11:08:00			3.39	Recorder Reading	8.00	0.0056				1.1909E-10	0.00	
14-Dec-1999 11:09:00			3.39	Recorder Reading	9.00	0.0062				1.3398E-10	0.00	
14-Dec-1999 11:10:00			3.39	Recorder Reading	10.00	0.0069				1.4887E-10	0.00	
14-Dec-1999 11:11:00			3.39	Recorder Reading	11.00	0.0076				1.6375E-10	0.00	

Appendix 37: North Poe Valley 1999 OWRD aquifer test, observation well data (KLAM 51131)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Observation Well
Well Location: T39S/R11.5E-sec 35 dda
OWRD Well Log ID Number: KLAM 51131
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 6,830 feet
Owner Well Name/Number: 1,009 foot well south of Lost River
Measuring Pt. = 1.52 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
14-Dec-1999 11:12:00			3.39	Recorder Reading	12.00	0.0083				1.7864E-10	0.00	
14-Dec-1999 11:13:00			3.39	Recorder Reading	13.00	0.0090				1.9353E-10	0.00	
14-Dec-1999 11:14:00			3.39	Recorder Reading	14.00	0.0097				2.0841E-10	0.00	
14-Dec-1999 11:15:00			3.39	Recorder Reading	15.00	0.0104				2.2330E-10	0.00	
14-Dec-1999 11:16:00			3.39	Recorder Reading	16.00	0.0111				2.3819E-10	0.00	
14-Dec-1999 11:17:00			3.39	Recorder Reading	17.00	0.0118				2.5307E-10	0.00	
14-Dec-1999 11:18:00			3.39	Recorder Reading	18.00	0.0125				2.6796E-10	0.00	
14-Dec-1999 11:19:00			3.39	Recorder Reading	19.00	0.0132				2.8285E-10	0.00	
14-Dec-1999 11:20:00			3.39	Recorder Reading	20.00	0.0139				2.9773E-10	0.00	
14-Dec-1999 11:21:00			3.39	Recorder Reading	21.00	0.0146				3.1262E-10	0.00	
14-Dec-1999 11:22:00			3.39	Recorder Reading	22.00	0.0153				3.2751E-10	0.00	
14-Dec-1999 11:23:00			3.39	Recorder Reading	23.00	0.0160				3.4239E-10	0.00	
14-Dec-1999 11:24:00			3.39	Recorder Reading	24.00	0.0167				3.5728E-10	0.00	
14-Dec-1999 11:25:00			3.39	Recorder Reading	25.00	0.0174				3.7217E-10	0.00	
14-Dec-1999 11:26:00			3.39	Recorder Reading	26.00	0.0181				3.8705E-10	0.00	
14-Dec-1999 11:27:00			3.39	Recorder Reading	27.00	0.0187				4.0194E-10	0.00	
14-Dec-1999 11:28:00			3.39	Recorder Reading	28.00	0.0194				4.1683E-10	0.00	
14-Dec-1999 11:29:00			3.39	Recorder Reading	29.00	0.0201				4.3171E-10	0.00	
14-Dec-1999 11:30:00			3.39	Recorder Reading	30.00	0.0208				4.4660E-10	0.00	
14-Dec-1999 11:32:00			3.39	Recorder Reading	32.00	0.0222				4.7637E-10	0.00	
14-Dec-1999 11:34:00			3.39	Recorder Reading	34.00	0.0236				5.0615E-10	0.00	
14-Dec-1999 11:36:00			3.39	Recorder Reading	36.00	0.0250				5.3592E-10	0.00	
14-Dec-1999 11:38:00			3.39	Recorder Reading	38.00	0.0264				5.6569E-10	0.00	
14-Dec-1999 11:40:00			3.39	Recorder Reading	40.00	0.0278				5.9546E-10	0.00	
14-Dec-1999 11:42:00			3.39	Recorder Reading	42.00	0.0292				6.2524E-10	0.00	
14-Dec-1999 11:44:00			3.39	Recorder Reading	44.00	0.0306				6.5501E-10	0.00	
14-Dec-1999 11:46:00			3.39	Recorder Reading	46.00	0.0319				6.8478E-10	0.00	
14-Dec-1999 11:48:00			3.39	Recorder Reading	48.00	0.0333				7.1456E-10	0.00	
14-Dec-1999 11:50:00			3.39	Recorder Reading	50.00	0.0347				7.4433E-10	0.00	
14-Dec-1999 11:52:00			3.39	Recorder Reading	52.00	0.0361				7.7410E-10	0.00	
14-Dec-1999 11:54:00			3.39	Recorder Reading	54.00	0.0375				8.0388E-10	0.00	
14-Dec-1999 11:56:00			3.39	Recorder Reading	56.00	0.0389				8.3365E-10	0.00	
14-Dec-1999 11:58:00			3.39	Recorder Reading	58.00	0.0403				8.6342E-10	0.00	
14-Dec-1999 12:00:00			3.39	Recorder Reading	60.00	0.0417				8.9320E-10	0.00	
14-Dec-1999 12:05:00			3.39	Recorder Reading	65.00	0.0451				9.6763E-10	0.00	

Appendix 37: North Poe Valley 1999 OWRD aquifer test, observation well data (KLAM 51131)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Observation Well
Well Location: T39S/R11.5E-sec 35 dda
OWRD Well Log ID Number: KLAM 51131
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 6,830 feet
Owner Well Name/Number: 1,009 foot well south of Lost River
Measuring Pt. = 1.52 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
14-Dec-1999 12:10:00			3.39	Recorder Reading	70.00	0.0486				1.0421E-09	0.00	
14-Dec-1999 12:15:00			3.39	Recorder Reading	75.00	0.0521				1.1165E-09	0.00	
14-Dec-1999 12:20:00			3.39	Recorder Reading	80.00	0.0556				1.1909E-09	0.00	
14-Dec-1999 12:25:00			3.39	Recorder Reading	85.00	0.0590				1.2654E-09	0.00	
14-Dec-1999 12:30:00			3.39	Recorder Reading	90.00	0.0625				1.3398E-09	0.00	
14-Dec-1999 12:35:00			3.39	Recorder Reading	95.00	0.0660				1.4142E-09	0.00	
14-Dec-1999 12:40:00			3.39	Recorder Reading	100.00	0.0694				1.4887E-09	0.00	
14-Dec-1999 12:45:00			3.39	Recorder Reading	105.00	0.0729				1.5631E-09	0.00	
14-Dec-1999 12:50:00			3.39	Recorder Reading	110.00	0.0764				1.6375E-09	0.00	
14-Dec-1999 12:55:00			3.39	Recorder Reading	115.00	0.0799				1.7120E-09	0.00	
14-Dec-1999 13:00:00			3.39	Recorder Reading	120.00	0.0833				1.7864E-09	0.00	
14-Dec-1999 13:10:00			3.39	Recorder Reading	130.00	0.0903				1.9353E-09	0.00	
14-Dec-1999 13:20:00			3.39	Recorder Reading	140.00	0.0972				2.0841E-09	0.00	
14-Dec-1999 13:30:00			3.39	Recorder Reading	150.00	0.1042				2.2330E-09	0.00	
14-Dec-1999 13:40:00			3.39	Recorder Reading	160.00	0.1111				2.3819E-09	0.00	
14-Dec-1999 13:50:00			3.39	Recorder Reading	170.00	0.1181				2.5307E-09	0.00	
14-Dec-1999 14:00:00			3.39	Recorder Reading	180.00	0.1250				2.6796E-09	0.00	
14-Dec-1999 14:15:00			3.39	Recorder Reading	195.00	0.1354				2.9029E-09	0.00	
14-Dec-1999 14:30:00			3.39	Recorder Reading	210.00	0.1458				3.1262E-09	0.00	
14-Dec-1999 14:45:00			3.39	Recorder Reading	225.00	0.1563				3.3495E-09	0.00	
14-Dec-1999 15:00:00			3.39	Recorder Reading	240.00	0.1667				3.5728E-09	0.00	
14-Dec-1999 15:20:00			3.39	Recorder Reading	260.00	0.1806				3.8705E-09	0.00	
14-Dec-1999 15:40:00			3.39	Recorder Reading	280.00	0.1944				4.1683E-09	0.00	
14-Dec-1999 16:00:00			3.39	Recorder Reading	300.00	0.2083				4.4660E-09	0.00	
14-Dec-1999 16:30:00			3.39	Recorder Reading	330.00	0.2292				4.9126E-09	0.00	
14-Dec-1999 17:00:00			3.39	Recorder Reading	360.00	0.2500				5.3592E-09	0.00	
14-Dec-1999 18:00:00			3.39	Recorder Reading	420.00	0.2917				6.2524E-09	0.00	
14-Dec-1999 19:00:00			3.39	Recorder Reading	480.00	0.3333				7.1456E-09	0.00	
14-Dec-1999 20:00:00			3.40	Recorder Reading	540.00	0.3750				8.0388E-09	0.01	
14-Dec-1999 21:00:00			3.40	Recorder Reading	600.00	0.4167				8.9320E-09	0.01	
14-Dec-1999 22:00:00			3.40	Recorder Reading	660.00	0.4583				9.8252E-09	0.01	
14-Dec-1999 23:00:00			3.40	Recorder Reading	720.00	0.5000				1.0718E-08	0.01	
15-Dec-1999 00:00:00			3.40	Recorder Reading	780.00	0.5417				1.1612E-08	0.01	
15-Dec-1999 01:00:00			3.41	Recorder Reading	840.00	0.5833				1.2505E-08	0.02	
15-Dec-1999 02:00:00			3.41	Recorder Reading	900.00	0.6250				1.3398E-08	0.02	

Appendix 37: North Poe Valley 1999 OWRD aquifer test, observation well data (KLAM 51131)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Observation Well
Well Location: T39S/R11.5E-sec 35 dda
OWRD Well Log ID Number: KLAM 51131
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 6,830 feet
Owner Well Name/Number: 1,009 foot well south of Lost River
Measuring Pt. = 1.52 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
15-Dec-1999 03:00:00			3.42	Recorder Reading	960.00	0.6667				1.4291E-08	0.03	
15-Dec-1999 04:00:00			3.42	Recorder Reading	1,020.00	0.7083				1.5184E-08	0.03	
15-Dec-1999 05:00:00			3.42	Recorder Reading	1,080.00	0.7500				1.6078E-08	0.03	
15-Dec-1999 06:00:00			3.42	Recorder Reading	1,140.00	0.7917				1.6971E-08	0.03	
15-Dec-1999 07:00:00			3.42	Recorder Reading	1,200.00	0.8333				1.7864E-08	0.03	
15-Dec-1999 08:00:00			3.42	Recorder Reading	1,260.00	0.8750				1.8757E-08	0.03	
15-Dec-1999 09:00:00			3.42	Recorder Reading	1,320.00	0.9167				1.9650E-08	0.03	
15-Dec-1999 10:00:00			3.42	Recorder Reading	1,380.00	0.9583				2.0544E-08	0.03	
15-Dec-1999 11:00:00			3.42	**Start Rcovery, Pump Off**	1,440.00	1.0000	0.00	0.0000		2.1437E-08	0.03	0.00
15-Dec-1999 11:01:00			3.42	Recorder Reading	1,441.00	1.0007	1.00	0.0007	1,441.0000			0.00
15-Dec-1999 11:02:00			3.42	Recorder Reading	1,442.00	1.0014	2.00	0.0014	721.0000			0.00
15-Dec-1999 11:03:00			3.42	Recorder Reading	1,443.00	1.0021	3.00	0.0021	481.0000			0.00
15-Dec-1999 11:04:00			3.42	Recorder Reading	1,444.00	1.0028	4.00	0.0028	361.0000			0.00
15-Dec-1999 11:05:00			3.42	Recorder Reading	1,445.00	1.0035	5.00	0.0035	289.0000			0.00
15-Dec-1999 11:06:00			3.42	Recorder Reading	1,446.00	1.0042	6.00	0.0042	241.0000			0.00
15-Dec-1999 11:07:00			3.42	Recorder Reading	1,447.00	1.0049	7.00	0.0049	206.7143			0.00
15-Dec-1999 11:08:00			3.42	Recorder Reading	1,448.00	1.0056	8.00	0.0056	181.0000			0.00
15-Dec-1999 11:09:00			3.42	Recorder Reading	1,449.00	1.0062	9.00	0.0062	161.0000			0.00
15-Dec-1999 11:10:00			3.42	Recorder Reading	1,450.00	1.0069	10.00	0.0069	145.0000			0.00
15-Dec-1999 11:11:00			3.42	Recorder Reading	1,451.00	1.0076	11.00	0.0076	131.9091			0.00
15-Dec-1999 11:12:00			3.42	Recorder Reading	1,452.00	1.0083	12.00	0.0083	121.0000			0.00
15-Dec-1999 11:13:00			3.42	Recorder Reading	1,453.00	1.0090	13.00	0.0090	111.7692			0.00
15-Dec-1999 11:14:00			3.42	Recorder Reading	1,454.00	1.0097	14.00	0.0097	103.8571			0.00
15-Dec-1999 11:15:00			3.42	Recorder Reading	1,455.00	1.0104	15.00	0.0104	97.0000			0.00
15-Dec-1999 11:16:00			3.42	Recorder Reading	1,456.00	1.0111	16.00	0.0111	91.0000			0.00
15-Dec-1999 11:17:00			3.42	Recorder Reading	1,457.00	1.0118	17.00	0.0118	85.7059			0.00
15-Dec-1999 11:18:00			3.42	Recorder Reading	1,458.00	1.0125	18.00	0.0125	81.0000			0.00
15-Dec-1999 11:19:00			3.42	Recorder Reading	1,459.00	1.0132	19.00	0.0132	76.7895			0.00
15-Dec-1999 11:20:00			3.42	Recorder Reading	1,460.00	1.0139	20.00	0.0139	73.0000			0.00
15-Dec-1999 11:21:00			3.42	Recorder Reading	1,461.00	1.0146	21.00	0.0146	69.5714			0.00
15-Dec-1999 11:22:00			3.42	Recorder Reading	1,462.00	1.0153	22.00	0.0153	66.4545			0.00
15-Dec-1999 11:23:00			3.42	Recorder Reading	1,463.00	1.0160	23.00	0.0160	63.6087			0.00
15-Dec-1999 11:24:00			3.42	Recorder Reading	1,464.00	1.0167	24.00	0.0167	61.0000			0.00
15-Dec-1999 11:25:00			3.42	Recorder Reading	1,465.00	1.0174	25.00	0.0174	58.6000			0.00
15-Dec-1999 11:26:00			3.42	Recorder Reading	1,466.00	1.0181	26.00	0.0181	56.3846			0.00

Appendix 37: North Poe Valley 1999 OWRD aquifer test, observation well data (KLAM 51131)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Observation Well
Well Location: T39S/R11.5E-sec 35 dda
OWRD Well Log ID Number: KLAM 51131
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 6,830 feet
Owner Well Name/Number: 1,009 foot well south of Lost River
Measuring Pt. = 1.52 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
15-Dec-1999 11:27:00			3.42	Recorder Reading	1,467.00	1.0187	27.00	0.0187	54.3333			0.00
15-Dec-1999 11:28:00			3.42	Recorder Reading	1,468.00	1.0194	28.00	0.0194	52.4286			0.00
15-Dec-1999 11:29:00			3.42	Recorder Reading	1,469.00	1.0201	29.00	0.0201	50.6552			0.00
15-Dec-1999 11:30:00			3.42	Recorder Reading	1,470.00	1.0208	30.00	0.0208	49.0000			0.00
15-Dec-1999 11:32:00			3.42	Recorder Reading	1,472.00	1.0222	32.00	0.0222	46.0000			0.00
15-Dec-1999 11:34:00			3.42	Recorder Reading	1,474.00	1.0236	34.00	0.0236	43.3529			0.00
15-Dec-1999 11:36:00			3.42	Recorder Reading	1,476.00	1.0250	36.00	0.0250	41.0000			0.00
15-Dec-1999 11:38:00			3.42	Recorder Reading	1,478.00	1.0264	38.00	0.0264	38.8947			0.00
15-Dec-1999 11:40:00			3.42	Recorder Reading	1,480.00	1.0278	40.00	0.0278	37.0000			0.00
15-Dec-1999 11:42:00			3.42	Recorder Reading	1,482.00	1.0292	42.00	0.0292	35.2857			0.00
15-Dec-1999 11:44:00			3.42	Recorder Reading	1,484.00	1.0306	44.00	0.0306	33.7273			0.00
15-Dec-1999 11:46:00			3.42	Recorder Reading	1,486.00	1.0319	46.00	0.0319	32.3043			0.00
15-Dec-1999 11:48:00			3.42	Recorder Reading	1,488.00	1.0333	48.00	0.0333	31.0000			0.00
15-Dec-1999 11:50:00			3.42	Recorder Reading	1,490.00	1.0347	50.00	0.0347	29.8000			0.00
15-Dec-1999 11:52:00			3.41	Recorder Reading	1,492.00	1.0361	52.00	0.0361	28.6923			0.01
15-Dec-1999 11:54:00			3.41	Recorder Reading	1,494.00	1.0375	54.00	0.0375	27.6667			0.01
15-Dec-1999 11:56:00			3.41	Recorder Reading	1,496.00	1.0389	56.00	0.0389	26.7143			0.01
15-Dec-1999 11:58:00			3.41	Recorder Reading	1,498.00	1.0403	58.00	0.0403	25.8276			0.01
15-Dec-1999 12:00:00			3.41	Recorder Reading	1,500.00	1.0417	60.00	0.0417	25.0000			0.01
15-Dec-1999 12:05:00			3.41	Recorder Reading	1,505.00	1.0451	65.00	0.0451	23.1538			0.01
15-Dec-1999 12:10:00			3.41	Recorder Reading	1,510.00	1.0486	70.00	0.0486	21.5714			0.01
15-Dec-1999 12:15:00			3.41	Recorder Reading	1,515.00	1.0521	75.00	0.0521	20.2000			0.01
15-Dec-1999 12:20:00			3.41	Recorder Reading	1,520.00	1.0556	80.00	0.0556	19.0000			0.01
15-Dec-1999 12:25:00			3.41	Recorder Reading	1,525.00	1.0590	85.00	0.0590	17.9412			0.01
15-Dec-1999 12:30:00			3.41	Recorder Reading	1,530.00	1.0625	90.00	0.0625	17.0000			0.01
15-Dec-1999 12:35:00			3.41	Recorder Reading	1,535.00	1.0660	95.00	0.0660	16.1579			0.01
15-Dec-1999 12:40:00			3.41	Recorder Reading	1,540.00	1.0694	100.00	0.0694	15.4000			0.01
15-Dec-1999 12:45:00			3.41	Recorder Reading	1,545.00	1.0729	105.00	0.0729	14.7143			0.01
15-Dec-1999 12:50:00			3.41	Recorder Reading	1,550.00	1.0764	110.00	0.0764	14.0909			0.01
15-Dec-1999 12:55:00			3.41	Recorder Reading	1,555.00	1.0799	115.00	0.0799	13.5217			0.01
15-Dec-1999 13:00:00			3.41	Recorder Reading	1,560.00	1.0833	120.00	0.0833	13.0000			0.01
15-Dec-1999 13:10:00			3.41	Recorder Reading	1,570.00	1.0903	130.00	0.0903	12.0769			0.01
15-Dec-1999 13:20:00			3.41	Recorder Reading	1,580.00	1.0972	140.00	0.0972	11.2857			0.01
15-Dec-1999 13:30:00			3.41	Recorder Reading	1,590.00	1.1042	150.00	0.1042	10.6000			0.01
15-Dec-1999 13:40:00			3.41	Recorder Reading	1,600.00	1.1111	160.00	0.1111	10.0000			0.01

Appendix 37: North Poe Valley 1999 OWRD aquifer test, observation well data (KLAM 51131)

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Observation Well
Well Location: T39S/R11.5E-sec 35 dda
OWRD Well Log ID Number: KLAM 51131
Measuring Point: top of recorder shelf at counter weight hole
Measuring Tool: shaft encoder and data logger
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Distance to Pumping Well: 6,830 feet
Owner Well Name/Number: 1,009 foot well south of Lost River
Measuring Pt. = 1.52 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24 hour)	Water Level (ft bmp)	Measuring Point (ft alsd)	Water Level (ft blsd)	Remarks	Time Since Pumping Started (min) (t)	Time Since Pumping Started (day) (t)	Time Since Pumping Stopped (min) (t')	Time Since Pumping Stopped (day) (t')	Ratio (t/t')	Time versus (Distance)2 day/(feet)2	Drawdown (feet) (s)	Residual Drawdown (feet) (s)
15-Dec-1999 13:50:00			3.41	Recorder Reading	1,610.00	1.1181	170.00	0.1181	9.4706			0.01
15-Dec-1999 14:00:00			3.41	Recorder Reading	1,620.00	1.1250	180.00	0.1250	9.0000			0.01
15-Dec-1999 14:15:00			3.41	Recorder Reading	1,635.00	1.1354	195.00	0.1354	8.3846			0.01
15-Dec-1999 14:30:00			3.40	Recorder Reading	1,650.00	1.1458	210.00	0.1458	7.8571			0.02
15-Dec-1999 14:45:00			3.40	Recorder Reading	1,665.00	1.1563	225.00	0.1563	7.4000			0.02
15-Dec-1999 15:00:00			3.40	Recorder Reading	1,680.00	1.1667	240.00	0.1667	7.0000			0.02
15-Dec-1999 15:20:00			3.40	Recorder Reading	1,700.00	1.1806	260.00	0.1806	6.5385			0.02
15-Dec-1999 15:40:00			3.40	Recorder Reading	1,720.00	1.1944	280.00	0.1944	6.1429			0.02
15-Dec-1999 16:00:00			3.40	Recorder Reading	1,740.00	1.2083	300.00	0.2083	5.8000			0.02
15-Dec-1999 16:30:00			3.40	Recorder Reading	1,770.00	1.2292	330.00	0.2292	5.3636			0.02
15-Dec-1999 17:00:00			3.40	Recorder Reading	1,800.00	1.2500	360.00	0.2500	5.0000			0.02
15-Dec-1999 18:00:00			3.41	Recorder Reading	1,860.00	1.2917	420.00	0.2917	4.4286			0.01
15-Dec-1999 19:00:00			3.41	Recorder Reading	1,920.00	1.3333	480.00	0.3333	4.0000			0.01
15-Dec-1999 20:00:00			3.41	Recorder Reading	1,980.00	1.3750	540.00	0.3750	3.6667			0.01
15-Dec-1999 21:00:00			3.41	Recorder Reading	2,040.00	1.4167	600.00	0.4167	3.4000			0.01
15-Dec-1999 22:00:00			3.40	Recorder Reading	2,100.00	1.4583	660.00	0.4583	3.1818			0.02
15-Dec-1999 23:00:00			3.40	Recorder Reading	2,160.00	1.5000	720.00	0.5000	3.0000			0.02
16-Dec-1999 00:00:00			3.40	Recorder Reading	2,220.00	1.5417	780.00	0.5417	2.8462			0.02
16-Dec-1999 01:00:00			3.40	Recorder Reading	2,280.00	1.5833	840.00	0.5833	2.7143			0.02
16-Dec-1999 02:00:00			3.40	Recorder Reading	2,340.00	1.6250	900.00	0.6250	2.6000			0.02
16-Dec-1999 03:00:00			3.40	Recorder Reading	2,400.00	1.6667	960.00	0.6667	2.5000			0.02
16-Dec-1999 04:00:00			3.39	Recorder Reading	2,460.00	1.7083	1,020.00	0.7083	2.4118			0.03
16-Dec-1999 05:00:00			3.39	Recorder Reading	2,520.00	1.7500	1,080.00	0.7500	2.3333			0.03
16-Dec-1999 06:00:00			3.39	Recorder Reading	2,580.00	1.7917	1,140.00	0.7917	2.2632			0.03
16-Dec-1999 07:00:00			3.39	Recorder Reading	2,640.00	1.8333	1,200.00	0.8333	2.2000			0.03
16-Dec-1999 08:00:00			3.39	Recorder Reading	2,700.00	1.8750	1,260.00	0.8750	2.1429			0.03
16-Dec-1999 09:00:00			3.39	Recorder Reading	2,760.00	1.9167	1,320.00	0.9167	2.0909			0.03
16-Dec-1999 10:00:00			3.38	Recorder Reading	2,820.00	1.9583	1,380.00	0.9583	2.0435			0.04
16-Dec-1999 11:00:00			3.38	**End Test**	2,880.00	2.0000	1,440.00	1.0000	2.0000			0.04

Appendix 38: North Poe Valley 1999 OWRD aquifer test, discharge data

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Pumping Well
Well Location: T39S/R11.5E-sec 26 dba
OWRD Well Log ID Number: KLAM 10292
Measuring Point: open hole at pump base on NE side of turbine
Measuring Tool: water level by e-tape and discharge by electronic non-intrusive flow meter
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Owner Well Name/Number: irrigation well
Measuring Pt. = 0.30 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24-hour)	Time Since Pumping Started (min) (t)	Discharge Rate Reading (gpm)	Power Reading (kwh)	Interval Discharge (calculated) (gallons)	Total Discharge (calculated) (gallons)	Average Discharge Rate (gpm)	Discharge Rate (calculated) (ft3/sec)	Interval Discharge (calculated) (ft3)	Total Discharge (calculated) (ft3)	Average Discharge Rate (ft3/sec)	Discharge vs Power (gal/kwh)	Remarks
14-Dec-1999 11:00:00	0.00	--	4,376	0	0	--	0.0000	0.00	0.00	--	--	**Start Test, Pump On**
14-Dec-1999 11:33:00	33.00	--	4,425	--	--	--	--	--	--	--	--	
14-Dec-1999 11:42:00	42.00	3,388		142,296	142,296	3,388	7.5485	19,022.21	19,022.21	7.5485		
14-Dec-1999 11:45:00	45.00	3,342		10,026	152,322	3,385	7.4460	1,340.28	20,362.49	7.5417		
14-Dec-1999 11:52:00	52.00		4,453	23,604	175,926						2,284.75	
14-Dec-1999 12:00:00	60.00	3,402		27,216	203,142	3,386	7.5797	3,638.25	27,156.13	7.5434		
14-Dec-1999 12:03:00	63.00		4,469	10,050	213,192						2,292.39	
14-Dec-1999 12:15:00	75.00	3,298		39,576	252,768	3,370	7.3480	5,290.54	33,790.16	7.5089		
14-Dec-1999 12:30:00	90.00	3,374		50,610	303,378	3,371	7.5173	6,765.57	40,555.74	7.5103		
14-Dec-1999 12:45:00	105.00	3,326		49,890	353,268	3,364	7.4104	6,669.32	47,225.06	7.4960		
14-Dec-1999 12:57:00	117.00		4,549	40,452	393,720						2,275.84	
14-Dec-1999 13:00:00	120.00	3,416		10,248	403,968	3,366	7.6109	1,369.96	54,002.66	7.5004		
14-Dec-1999 13:15:00	135.00	3,337		50,055	454,023	3,363	7.4349	6,691.38	60,694.04	7.4931		
14-Dec-1999 13:30:00	150.00	3,352		50,280	504,303	3,362	7.4683	6,721.46	67,415.50	7.4906		
14-Dec-1999 13:45:00	165.00	3,345		50,175	554,478	3,360	7.4527	6,707.42	74,122.92	7.4872		
14-Dec-1999 14:00:00	180.00	3,375		50,625	605,103	3,362	7.5195	6,767.58	80,890.50	7.4899		
14-Dec-1999 14:15:00	195.00	3,356		50,340	655,443	3,361	7.4772	6,729.48	87,619.98	7.4889		
14-Dec-1999 14:29:00	209.00		4,685	46,844	702,287						2,272.77	
14-Dec-1999 14:30:00	210.00	3,336		3,336	705,623	3,360	7.4326	445.96	94,328.07	7.4864		
14-Dec-1999 14:45:00	225.00	3,314		49,710	755,333	3,357	7.3836	6,645.26	100,973.33	7.4795		
14-Dec-1999 15:00:00	240.00	3,351		50,265	805,598	3,357	7.4661	6,719.45	107,692.78	7.4787		
14-Dec-1999 15:02:00	242.00		4,734	6,636	812,234						2,268.81	
14-Dec-1999 15:15:00	255.00	3,285		42,705	854,939	3,353	7.3190	5,708.83	114,288.71	7.4699		
14-Dec-1999 15:30:00	270.00	3,344		50,160	905,099	3,352	7.4505	6,705.42	120,994.13	7.4688		
14-Dec-1999 15:45:00	285.00	3,404		51,060	956,159	3,355	7.5841	6,825.73	127,819.86	7.4748		
14-Dec-1999 16:00:00	300.00	3,326		49,890	1,006,049	3,353	7.4104	6,669.32	134,489.18	7.4716		
14-Dec-1999 16:15:00	315.00	3,299		49,485	1,055,534	3,351	7.3502	6,615.18	141,104.36	7.4658		
14-Dec-1999 16:30:00	330.00	3,258		48,870	1,104,404	3,347	7.2589	6,532.97	147,637.33	7.4564		
14-Dec-1999 16:31:00	331.00		4,866	3,259	1,107,662						2,260.54	
14-Dec-1999 16:45:00	345.00	3,259		45,626	1,153,288	3,343	7.2611	6,099.31	154,172.24	7.4479		
14-Dec-1999 17:00:00	360.00	3,371		50,565	1,203,854	3,344	7.5106	6,759.56	160,931.79	7.4505		
14-Dec-1999 17:15:00	375.00	3,364		50,460	1,254,313	3,345	7.4950	6,745.52	167,677.31	7.4523		
14-Dec-1999 17:30:00	390.00	3,359		50,385	1,304,698	3,345	7.4839	6,735.49	174,412.81	7.4535		
14-Dec-1999 17:45:00	405.00	3,342		50,130	1,354,829	3,345	7.4460	6,701.41	181,114.21	7.4533		
14-Dec-1999 18:00:00	420.00	3,311		49,665	1,404,493	3,344	7.3769	6,639.24	187,753.46	7.4505		

Appendix 38: North Poe Valley 1999 OWRD aquifer test, discharge data

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Pumping Well
Well Location: T39S/R11.5E-sec 26 dba
OWRD Well Log ID Number: KLAM 10292
Measuring Point: open hole at pump base on NE side of turbine
Measuring Tool: water level by e-tape and discharge by electronic non-intrusive flow meter
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Owner Well Name/Number: irrigation well
Measuring Pt. = 0.30 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24-hour)	Time Since Pumping Started (min) (t)	Discharge Rate Reading (gpm)	Power Reading (kwh)	Interval Discharge (calculated) (gallons)	Total Discharge (calculated) (gallons)	Average Discharge Rate (gpm)	Discharge Rate (calculated) (ft3/sec)	Interval Discharge (calculated) (ft3)	Total Discharge (calculated) (ft3)	Average Discharge Rate (ft3/sec)	Discharge vs Power (gal/kwh)	Remarks
14-Dec-1999 18:15:00	435.00	3,345		50,175	1,454,668	3,344	7.4527	6,707.42	194,460.88	7.4506		
14-Dec-1999 18:30:00	450.00	3,331		49,965	1,504,634	3,344	7.4215	6,679.35	201,140.23	7.4496		
14-Dec-1999 18:45:00	465.00	3,348		50,220	1,554,853	3,344	7.4594	6,713.44	207,853.67	7.4500		
14-Dec-1999 19:00:00	480.00	3,371		50,565	1,605,418	3,345	7.5106	6,759.56	214,613.22	7.4519		
14-Dec-1999 19:15:00	495.00	3,407		51,105	1,656,524	3,347	7.5908	6,831.74	221,444.97	7.4561		
14-Dec-1999 19:30:00	510.00	3,270		49,050	1,705,573	3,344	7.2856	6,557.03	228,002.00	7.4510		
14-Dec-1999 19:45:00	525.00	3,318		49,770	1,755,343	3,344	7.3925	6,653.28	234,655.28	7.4494		
14-Dec-1999 20:00:00	540.00	3,342		50,130	1,805,474	3,343	7.4460	6,701.41	241,356.68	7.4493		
14-Dec-1999 20:15:00	555.00	3,349		50,235	1,855,708	3,344	7.4616	6,715.44	248,072.13	7.4496		
14-Dec-1999 20:30:00	570.00	3,395		50,925	1,906,633	3,345	7.5641	6,807.68	254,879.81	7.4526		
14-Dec-1999 20:45:00	585.00	3,332		49,980	1,956,614	3,345	7.4237	6,681.35	261,561.16	7.4519		
14-Dec-1999 21:00:00	600.00	3,319		49,785	2,006,398	3,344	7.3948	6,655.29	268,216.45	7.4505		
14-Dec-1999 21:15:00	615.00	3,358		50,370	2,056,768	3,344	7.4817	6,733.49	274,949.94	7.4512		
14-Dec-1999 21:30:00	630.00	3,351		50,265	2,107,034	3,344	7.4661	6,719.45	281,669.39	7.4516		
14-Dec-1999 21:45:00	645.00	3,344		50,160	2,157,193	3,344	7.4505	6,705.42	288,374.81	7.4515		
14-Dec-1999 22:00:00	660.00	3,334		50,010	2,207,203	3,344	7.4282	6,685.36	295,060.17	7.4510		
14-Dec-1999 22:15:00	675.00	3,383		50,745	2,257,949	3,345	7.5374	6,783.62	301,843.79	7.4529		
14-Dec-1999 22:30:00	690.00	3,349		50,235	2,308,183	3,345	7.4616	6,715.44	308,559.23	7.4531		
14-Dec-1999 22:45:00	705.00	3,351		50,265	2,358,448	3,345	7.4661	6,719.45	315,278.68	7.4534		
14-Dec-1999 23:00:00	720.00	3,359		50,385	2,408,834	3,346	7.4839	6,735.49	322,014.18	7.4540		
14-Dec-1999 23:15:00	735.00	3,320		49,800	2,458,633	3,345	7.3970	6,657.29	328,671.47	7.4529		
14-Dec-1999 23:30:00	750.00	3,374		50,610	2,509,243	3,346	7.5173	6,765.57	335,437.04	7.4542		
14-Dec-1999 23:45:00	765.00	3,323		49,845	2,559,089	3,345	7.4037	6,663.31	342,100.35	7.4532		
15-Dec-1999 00:00:00	780.00	3,305		49,575	2,608,663	3,344	7.3636	6,627.21	348,727.56	7.4514		
15-Dec-1999 00:15:00	795.00	3,338		50,070	2,658,733	3,344	7.4371	6,693.38	355,420.95	7.4512		
15-Dec-1999 00:30:00	810.00	3,323		49,845	2,708,579	3,344	7.4037	6,663.31	362,084.25	7.4503		
15-Dec-1999 00:45:00	825.00	3,337		50,055	2,758,633	3,344	7.4349	6,691.38	368,775.63	7.4500		
15-Dec-1999 01:00:00	840.00	3,340		50,100	2,808,733	3,344	7.4416	6,697.40	375,473.03	7.4499		
15-Dec-1999 01:15:00	855.00	3,355		50,325	2,859,059	3,344	7.4750	6,727.47	382,200.50	7.4503		
15-Dec-1999 01:30:00	870.00	3,279		49,185	2,908,243	3,343	7.3056	6,575.08	388,775.58	7.4478		
15-Dec-1999 01:45:00	885.00	3,336		50,040	2,958,283	3,343	7.4326	6,689.37	395,464.95	7.4476		
15-Dec-1999 02:00:00	900.00	3,291		49,365	3,007,649	3,342	7.3324	6,599.14	402,064.09	7.4456		
15-Dec-1999 02:15:00	915.00	3,331		49,965	3,057,613	3,342	7.4215	6,679.35	408,743.44	7.4452		
15-Dec-1999 02:30:00	930.00	3,401		51,015	3,108,628	3,343	7.5775	6,819.71	415,563.16	7.4474		
15-Dec-1999 02:45:00	945.00	3,299		49,485	3,158,114	3,342	7.3502	6,615.18	422,178.34	7.4458		

Appendix 38: North Poe Valley 1999 OWRD aquifer test, discharge data

Aquifer Test: Poe Valley
Aquifer Test Dates: 14 Dec 1999 to 16 Dec 1999
Data: Discharge & Power
Well Use for Test: Pumping Well
Well Location: T39S/R11.5E-sec 26 dba
OWRD Well Log ID Number: KLAM 10292
Measuring Point: open hole at pump base on NE side of turbine
Measuring Tool: water level by e-tape and discharge by electronic non-intrusive flow meter
Power Meter: Start = 4,376 kwh **End =** 6,506 kwh

Owner Well Name/Number: irrigation well
Measuring Pt. = 0.30 ft above land surface
Pump On: Date = 14 December 1999 **Time =** 11:00:00
Pump Off: Date = 15 December 1999 **Time =** 11:00:00

Date and Time (24-hour)	Time Since Pumping Started (min) (t)	Discharge Rate Reading (gpm)	Power Reading (kwh)	Interval Discharge (calculated) (gallons)	Total Discharge (calculated) (gallons)	Average Discharge Rate (gpm)	Discharge Rate (calculated) (ft3/sec)	Interval Discharge (calculated) (ft3)	Total Discharge (calculated) (ft3)	Average Discharge Rate (ft3/sec)	Discharge vs Power (gal/kwh)	Remarks
15-Dec-1999 03:00:00	960.00	3,396		50,940	3,209,053	3,343	7.5663	6,809.69	428,988.02	7.4477		
15-Dec-1999 03:15:00	975.00	3,355		50,325	3,259,378	3,343	7.4750	6,727.47	435,715.50	7.4481		
15-Dec-1999 03:30:00	990.00	3,357		50,355	3,309,734	3,343	7.4794	6,731.48	442,446.98	7.4486		
15-Dec-1999 03:45:00	1,005.00	3,333		49,995	3,359,728	3,343	7.4260	6,683.36	449,130.34	7.4483		
15-Dec-1999 04:00:00	1,020.00	3,321		49,815	3,409,543	3,343	7.3992	6,659.30	455,789.64	7.4475		
15-Dec-1999 04:15:00	1,035.00	3,351		50,265	3,459,809	3,343	7.4661	6,719.45	462,509.09	7.4478		
15-Dec-1999 04:30:00	1,050.00	3,351		50,265	3,510,073	3,343	7.4661	6,719.45	469,228.54	7.4481		
15-Dec-1999 04:45:00	1,065.00	3,334		50,010	3,560,083	3,343	7.4282	6,685.36	475,913.91	7.4478		
15-Dec-1999 05:00:00	1,080.00	3,315		49,725	3,609,809	3,342	7.3859	6,647.27	482,561.17	7.4469		
15-Dec-1999 05:15:00	1,095.00	3,321		49,815	3,659,623	3,342	7.3992	6,659.30	489,220.47	7.4463		
15-Dec-1999 05:30:00	1,110.00	3,331		49,965	3,709,588	3,342	7.4215	6,679.35	495,899.82	7.4459		
15-Dec-1999 05:45:00	1,125.00	3,374		50,610	3,760,199	3,342	7.5173	6,765.57	502,665.39	7.4469		
15-Dec-1999 06:00:00	1,140.00	3,387		50,805	3,811,003	3,343	7.5463	6,791.64	509,457.03	7.4482		
15-Dec-1999 06:15:00	1,155.00	3,339		50,085	3,861,088	3,343	7.4393	6,695.39	516,152.42	7.4481		
15-Dec-1999 06:30:00	1,170.00	3,292		49,380	3,910,469	3,342	7.3346	6,601.15	522,753.57	7.4466		
15-Dec-1999 06:45:00	1,185.00	3,349		50,235	3,960,703	3,342	7.4616	6,715.44	529,469.01	7.4468		
15-Dec-1999 07:00:00	1,200.00	3,380		50,700	4,011,403	3,343	7.5307	6,777.60	536,246.61	7.4479		
15-Dec-1999 07:15:00	1,215.00	3,311		49,665	4,061,069	3,342	7.3769	6,639.24	542,885.86	7.4470		
15-Dec-1999 07:30:00	1,230.00	3,356		50,340	4,111,408	3,343	7.4772	6,729.48	549,615.33	7.4474		
15-Dec-1999 07:45:00	1,245.00	3,279		49,185	4,160,593	3,342	7.3056	6,575.08	556,190.41	7.4457		
15-Dec-1999 08:00:00	1,260.00	3,313		49,695	4,210,289	3,341	7.3814	6,643.25	562,833.67	7.4449		
15-Dec-1999 08:15:00	1,275.00	3,321		49,815	4,260,103	3,341	7.3992	6,659.30	569,492.96	7.4444		
15-Dec-1999 08:30:00	1,290.00	3,329		49,935	4,310,038	3,341	7.4170	6,675.34	576,168.30	7.4440		
15-Dec-1999 08:45:00	1,305.00	3,313		49,695	4,359,733	3,341	7.3814	6,643.25	582,811.56	7.4433		
15-Dec-1999 08:58:00	1,318.00		6,326	42,588	4,402,322						2,257.60	
15-Dec-1999 09:00:00	1,320.00	3,239		6,478	4,408,799	3,340	7.2165	865.98	589,370.73	7.4416		
15-Dec-1999 09:15:00	1,335.00	3,298		49,470	4,458,269	3,340	7.3480	6,613.18	595,983.90	7.4405		
15-Dec-1999 09:30:00	1,350.00	3,370		50,550	4,508,820	3,340	7.5084	6,757.55	602,741.45	7.4413		
15-Dec-1999 09:45:00	1,365.00	3,291		49,365	4,558,184	3,339	7.3324	6,599.14	609,340.59	7.4401		
15-Dec-1999 10:00:00	1,380.00	3,355		50,325	4,608,509	3,339	7.4750	6,727.47	616,068.07	7.4404		
15-Dec-1999 10:15:00	1,395.00	3,331		49,965	4,658,475	3,339	7.4215	6,679.35	622,747.42	7.4402		
15-Dec-1999 10:30:00	1,410.00	3,293		49,395	4,707,869	3,339	7.3368	6,603.15	629,350.57	7.4391		
15-Dec-1999 10:45:00	1,425.00	3,294		49,410	4,757,279	3,338	7.3391	6,605.16	635,955.72	7.4381		
15-Dec-1999 11:00:00	1,440.00	3,338	6,506	50,070	4,807,350	3,338	7.4371	6,693.38	642,649.11	7.4381	2,256.97	**End Pumping Phase**

Appendix 39: Ground water drawdown calculated for South Langell Valley sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L) — r = radial distance (L)
T = transmissivity (L*L/T) — t = time (T)
S = storage coefficient (dimensionless) — u = dimensionless
pi = 3.141592654 — W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: 1999 OWRD 24-hour aquifer test pumping water from basalt saw no response in nearby domestic well completed in sediments
Note: domestic well in sediment responded to 2001 ground water pumping from basalt at KLAM 10748 according to owner of both wells
Note: no direct connection to Bonanza Big Springs
Note: hydraulic connection between ground water in basalt and Kilgore Spring established in 2001
Note: ground water permits do not address flow depletion from Kilgore Springs and related seeps and springs
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Kilgore Spring and related seeps and springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
Application Number =		**G**	**12885**		**Total Acres**	227.60						**Note:** pro-rated pumping rate = continuous pumping rate
Permit Number =		**G**	**12455**		**Primary Acres**	62.60						since it takes 378 days to pump total volume allowed
Applicant Name =			**Biaggi**		**Supp Acres**	165.00						at continuous rate
					Priority	20-Apr-1992						
KLAM 14873 to Lost River												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	340.21	0.76	30.00	6,200	3.14	1.3347E-04	8.3445	0.072		Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	93.57	0.21	30.00	6,200	3.14	1.3347E-04	8.3445	0.020		Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	246.64	0.55	30.00	6,200	3.14	1.3347E-04	8.3445	0.053		Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	340.21	0.76	184.00	6,200	3.14	2.1762E-05	10.1582	0.088		Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	93.57	0.21	184.00	6,200	3.14	2.1762E-05	10.1582	0.024		Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	246.64	0.55	184.00	6,200	3.14	2.1762E-05	10.1582	0.064		Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	340.21	0.76	30.00	6,200	3.14	1.3347E-04	8.3445	0.072		Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	93.57	0.21	30.00	6,200	3.14	1.3347E-04	8.3445	0.020		Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	246.64	0.55	30.00	6,200	3.14	1.3347E-04	8.3445	0.053		Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	340.21	0.76	184.00	6,200	3.14	2.1762E-05	10.1582	0.088		Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	93.57	0.21	184.00	6,200	3.14	2.1762E-05	10.1582	0.024		Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	246.64	0.55	184.00	6,200	3.14	2.1762E-05	10.1582	0.064		Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 14873 to Kilgore Spring												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	340.21	0.76	30.00	21,800	3.14	1.6501E-03	5.8313		0.051	Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	93.57	0.21	30.00	21,800	3.14	1.6501E-03	5.8313		0.014	Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	246.64	0.55	30.00	21,800	3.14	1.6501E-03	5.8313		0.037	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	340.21	0.76	184.00	21,800	3.14	2.6904E-04	7.6437		0.066	Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	93.57	0.21	184.00	21,800	3.14	2.6904E-04	7.6437		0.018	Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	246.64	0.55	184.00	21,800	3.14	2.6904E-04	7.6437		0.048	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	340.21	0.76	30.00	21,800	3.14	1.6501E-03	5.8313		0.051	Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	93.57	0.21	30.00	21,800	3.14	1.6501E-03	5.8313		0.014	Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	246.64	0.55	30.00	21,800	3.14	1.6501E-03	5.8313		0.037	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	340.21	0.76	184.00	21,800	3.14	2.6904E-04	7.6437		0.066	Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	93.57	0.21	184.00	21,800	3.14	2.6904E-04	7.6437		0.018	Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	246.64	0.55	184.00	21,800	3.14	2.6904E-04	7.6437		0.048	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 39: Ground water drawdown calculated for South Langell Valley sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L) — r = radial distance (L)
T = transmissivity (L*L/T) — t = time (T)
S = storage coefficient (dimensionless) — u = dimensionless
pi = 3.141592654 — W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: 1999 OWRD 24-hour aquifer test pumping water from basalt saw no response in nearby domestic well completed in sediments
Note: domestic well in sediment responded to 2001 ground water pumping from basalt at KLAM 10748 according to owner of both wells
Note: no direct connection to Bonanza Big Springs
Note: hydraulic connection between ground water in basalt and Kilgore Spring established in 2001
Note: ground water permits do not address flow depletion from Kilgore Springs and related seeps and springs
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Kilgore Spring and related seeps and springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
Application Number =		**G**	**13011**		**Total Acres**	1,089.20						
Permit Number =		**G**	**12459**		**Primary Acres**	108.00						
Applicant Name =			**Hammerich**		**Supp Acres**	981.20						
					Priority	29-Jun-1992						
KLAM 10641 to Lost River												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	6,110.83	13.61	30.00	5,600	3.14	1.0889E-04	8.5481	1.334		Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	605.92	1.35	30.00	5,600	3.14	1.0889E-04	8.5481	0.132		Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	5,504.91	12.26	30.00	5,600	3.14	1.0889E-04	8.5481	1.201		Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	6,110.83	13.61	184.00	5,600	3.14	1.7754E-05	10.3617	1.617		Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	605.92	1.35	184.00	5,600	3.14	1.7754E-05	10.3617	0.160		Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	5,504.91	12.26	184.00	5,600	3.14	1.7754E-05	10.3617	1.456		Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	3,348.78	7.46	30.00	5,600	3.14	1.0889E-04	8.5481	0.731		Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	332.05	0.74	30.00	5,600	3.14	1.0889E-04	8.5481	0.072		Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	3,016.73	6.72	30.00	5,600	3.14	1.0889E-04	8.5481	0.658		Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	3,348.78	7.46	184.00	5,600	3.14	1.7754E-05	10.3617	0.886		Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	332.05	0.74	184.00	5,600	3.14	1.7754E-05	10.3617	0.088		Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	3,016.73	6.72	184.00	5,600	3.14	1.7754E-05	10.3617	0.798		Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10641 to Kilgore Spring												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	6,110.83	13.61	30.00	16,400	3.14	9.3389E-04	6.3999		0.998	Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	605.92	1.35	30.00	16,400	3.14	9.3389E-04	6.3999		0.099	Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	5,504.91	12.26	30.00	16,400	3.14	9.3389E-04	6.3999		0.899	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	6,110.83	13.61	184.00	16,400	3.14	1.5226E-04	8.2128		1.281	Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	605.92	1.35	184.00	16,400	3.14	1.5226E-04	8.2128		0.127	Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	5,504.91	12.26	184.00	16,400	3.14	1.5226E-04	8.2128		1.154	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	3,348.78	7.46	30.00	16,400	3.14	9.3389E-04	6.3999		0.547	Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	332.05	0.74	30.00	16,400	3.14	9.3389E-04	6.3999		0.054	Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	3,016.73	6.72	30.00	16,400	3.14	9.3389E-04	6.3999		0.493	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	3,348.78	7.46	184.00	16,400	3.14	1.5226E-04	8.2128		0.702	Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	332.05	0.74	184.00	16,400	3.14	1.5226E-04	8.2128		0.070	Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	3,016.73	6.72	184.00	16,400	3.14	1.5226E-04	8.2128		0.633	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 39: Ground water drawdown calculated for South Langell Valley sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L) — r = radial distance (L)
T = transmissivity (L*L/T) — t = time (T)
S = storage coefficient (dimensionless) — u = dimensionless
pi = 3.141592654 — W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: 1999 OWRD 24-hour aquifer test pumping water from basalt saw no response in nearby domestic well completed in sediments
Note: domestic well in sediment responded to 2001 ground water pumping from basalt at KLAM 10748 according to owner of both wells
Note: no direct connection to Bonanza Big Springs
Note: hydraulic connection between ground water in basalt and Kilgore Spring established in 2001
Note: ground water permits do not address flow depletion from Kilgore Springs and related seeps and springs
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Kilgore Spring and related seeps and springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
Application Number =		**G**	**13011**		**Total Acres**	1,089.20						
Permit Number =		**G**	**12459**		**Primary Acres**	108.00						
Applicant Name =			**Hammerich (continued)**		**Supp Acres**	981.20						
					Priority	29-Jun-1992						
KLAM 10495 to Lost River												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	6,110.83	13.61	30.00	5,300	3.14	9.7535E-05	8.6582	1.351		Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	605.92	1.35	30.00	5,300	3.14	9.7535E-05	8.6582	0.134		Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	5,504.91	12.26	30.00	5,300	3.14	9.7535E-05	8.6582	1.217		Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	6,110.83	13.61	184.00	5,300	3.14	1.5902E-05	10.4718	1.634		Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	605.92	1.35	184.00	5,300	3.14	1.5902E-05	10.4718	0.162		Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	5,504.91	12.26	184.00	5,300	3.14	1.5902E-05	10.4718	1.472		Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	3,348.78	7.46	30.00	5,300	3.14	9.7535E-05	8.6582	0.740		Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	332.05	0.74	30.00	5,300	3.14	9.7535E-05	8.6582	0.073		Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	3,016.73	6.72	30.00	5,300	3.14	9.7535E-05	8.6582	0.667		Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	3,348.78	7.46	184.00	5,300	3.14	1.5902E-05	10.4718	0.895		Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	332.05	0.74	184.00	5,300	3.14	1.5902E-05	10.4718	0.089		Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	3,016.73	6.72	184.00	5,300	3.14	1.5902E-05	10.4718	0.807		Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10495 to Kilgore Spring												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	6,110.83	13.61	30.00	14,000	3.14	6.8056E-04	6.7161		1.048	Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	605.92	1.35	30.00	14,000	3.14	6.8056E-04	6.7161		0.104	Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	5,504.91	12.26	30.00	14,000	3.14	6.8056E-04	6.7161		0.944	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	6,110.83	13.61	184.00	14,000	3.14	1.1096E-04	8.5292		1.331	Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	605.92	1.35	184.00	14,000	3.14	1.1096E-04	8.5292		0.132	Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	5,504.91	12.26	184.00	14,000	3.14	1.1096E-04	8.5292		1.199	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	3,348.78	7.46	30.00	14,000	3.14	6.8056E-04	6.7161		0.574	Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	332.05	0.74	30.00	14,000	3.14	6.8056E-04	6.7161		0.057	Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	3,016.73	6.72	30.00	14,000	3.14	6.8056E-04	6.7161		0.517	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	3,348.78	7.46	184.00	14,000	3.14	1.1096E-04	8.5292		0.729	Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	332.05	0.74	184.00	14,000	3.14	1.1096E-04	8.5292		0.072	Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	3,016.73	6.72	184.00	14,000	3.14	1.1096E-04	8.5292		0.657	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 39: Ground water drawdown calculated for South Langell Valley sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: 1999 OWRD 24-hour aquifer test pumping water from basalt saw no response in nearby domestic well completed in sediments
Note: domestic well in sediment responded to 2001 ground water pumping from basalt at KLAM 10748 according to owner of both wells
Note: no direct connection to Bonanza Big Springs
Note: hydraulic connection between ground water in basalt and Kilgore Spring established in 2001
Note: ground water permits do not address flow depletion from Kilgore Springs and related seeps and springs
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Kilgore Spring and related seeps and springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
Application Number =		**G 13011**			**Total Acres**	1,089.20						
Permit Number =		**G 12459**			**Primary Acres**	108.00						
Applicant Name =			**Hammerich (continued)**		**Supp Acres**	981.20						
					Priority	29-Jun-1992						
KLAM 10764 to Lost River												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	6,110.83	13.61	30.00	600	3.14	1.2500E-06	13.0152	2.031		Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	605.92	1.35	30.00	600	3.14	1.2500E-06	13.0152	0.201		Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	5,504.91	12.26	30.00	600	3.14	1.2500E-06	13.0152	1.829		Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	6,110.83	13.61	184.00	600	3.14	2.0380E-07	14.8289	2.314		Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	605.92	1.35	184.00	600	3.14	2.0380E-07	14.8289	0.229		Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	5,504.91	12.26	184.00	600	3.14	2.0380E-07	14.8289	2.084		Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	3,348.78	7.46	30.00	600	3.14	1.2500E-06	13.0152	1.113		Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	332.05	0.74	30.00	600	3.14	1.2500E-06	13.0152	0.110		Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	3,016.73	6.72	30.00	600	3.14	1.2500E-06	13.0152	1.002		Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	3,348.78	7.46	184.00	600	3.14	2.0380E-07	14.8289	1.268		Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	332.05	0.74	184.00	600	3.14	2.0380E-07	14.8289	0.126		Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	3,016.73	6.72	184.00	600	3.14	2.0380E-07	14.8289	1.142		Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10764 to Kilgore Spring												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	6,110.83	13.61	30.00	7,300	3.14	1.8503E-04	8.0179		1.251	Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	605.92	1.35	30.00	7,300	3.14	1.8503E-04	8.0179		0.124	Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	5,504.91	12.26	30.00	7,300	3.14	1.8503E-04	8.0179		1.127	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	6,110.83	13.61	184.00	7,300	3.14	3.0169E-05	9.8315		1.534	Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	605.92	1.35	184.00	7,300	3.14	3.0169E-05	9.8315		0.152	Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	5,504.91	12.26	184.00	7,300	3.14	3.0169E-05	9.8315		1.382	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	3,348.78	7.46	30.00	7,300	3.14	1.8503E-04	8.0179		0.686	Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	332.05	0.74	30.00	7,300	3.14	1.8503E-04	8.0179		0.068	Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	3,016.73	6.72	30.00	7,300	3.14	1.8503E-04	8.0179		0.618	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	3,348.78	7.46	184.00	7,300	3.14	3.0169E-05	9.8315		0.841	Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	332.05	0.74	184.00	7,300	3.14	3.0169E-05	9.8315		0.083	Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	3,016.73	6.72	184.00	7,300	3.14	3.0169E-05	9.8315		0.757	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 39: Ground water drawdown calculated for South Langell Valley sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L) — r = radial distance (L)
T = transmissivity (L*L/T) — t = time (T)
S = storage coefficient (dimensionless) — u = dimensionless
pi = 3.141592654 — W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: 1999 OWRD 24-hour aquifer test pumping water from basalt saw no response in nearby domestic well completed in sediments
Note: domestic well in sediment responded to 2001 ground water pumping from basalt at KLAM 10748 according to owner of both wells
Note: no direct connection to Bonanza Big Springs
Note: hydraulic connection between ground water in basalt and Kilgore Spring established in 2001
Note: ground water permits do not address flow depletion from Kilgore Springs and related seeps and springs
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Kilgore Spring and related seeps and springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
Application Number =		**G**	**12901**		**Total Acres**	170.70						
Permit Number =		**G**	**13743**		**Primary Acres**	0.00						
Applicant Name =			**Smith**		**Supp Acres**	170.70						
					Priority	04-May-1992						
KLAM 10458 to Lost River												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	897.66	2.00	30.00	13,700	3.14	6.5170E-04	6.7594	0.155		Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	0.00	0.00	30.00	13,700	3.14	6.5170E-04	6.7594	0.000		Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	897.66	2.00	30.00	13,700	3.14	6.5170E-04	6.7594	0.155		Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	897.66	2.00	184.00	13,700	3.14	1.0626E-04	8.5726	0.196		Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	0.00	0.00	184.00	13,700	3.14	1.0626E-04	8.5726	0.000		Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	897.66	2.00	184.00	13,700	3.14	1.0626E-04	8.5726	0.196		Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	524.82	1.17	30.00	13,700	3.14	6.5170E-04	6.7594	0.091		Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	0.00	0.00	30.00	13,700	3.14	6.5170E-04	6.7594	0.000		Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	524.82	1.17	30.00	13,700	3.14	6.5170E-04	6.7594	0.091		Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	524.82	1.17	184.00	13,700	3.14	1.0626E-04	8.5726	0.115		Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	0.00	0.00	184.00	13,700	3.14	1.0626E-04	8.5726	0.000		Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	524.82	1.17	184.00	13,700	3.14	1.0626E-04	8.5726	0.115		Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10458 to Kilgore Spring												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	897.66	2.00	30.00	29,900	3.14	3.1042E-03	5.2009		0.119	Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	0.00	0.00	30.00	29,900	3.14	3.1042E-03	5.2009		0.000	Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	897.66	2.00	30.00	29,900	3.14	3.1042E-03	5.2009		0.119	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	897.66	2.00	184.00	29,900	3.14	5.0612E-04	7.0120		0.161	Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	0.00	0.00	184.00	29,900	3.14	5.0612E-04	7.0120		0.000	Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	897.66	2.00	184.00	29,900	3.14	5.0612E-04	7.0120		0.161	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	524.82	1.17	30.00	29,900	3.14	3.1042E-03	5.2009		0.070	Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	0.00	0.00	30.00	29,900	3.14	3.1042E-03	5.2009		0.000	Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	524.82	1.17	30.00	29,900	3.14	3.1042E-03	5.2009		0.070	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	524.82	1.17	184.00	29,900	3.14	5.0612E-04	7.0120		0.094	Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	0.00	0.00	184.00	29,900	3.14	5.0612E-04	7.0120		0.000	Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	524.82	1.17	184.00	29,900	3.14	5.0612E-04	7.0120		0.094	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 39: Ground water drawdown calculated for South Langell Valley sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L) — r = radial distance (L)
T = transmissivity (L*L/T) — t = time (T)
S = storage coefficient (dimensionless) — u = dimensionless
pi = 3.141592654 — W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: 1999 OWRD 24-hour aquifer test pumping water from basalt saw no response in nearby domestic well completed in sediments
Note: domestic well in sediment responded to 2001 ground water pumping from basalt at KLAM 10748 according to owner of both wells
Note: no direct connection to Bonanza Big Springs
Note: hydraulic connection between ground water in basalt and Kilgore Spring established in 2001
Note: ground water permits do not address flow depletion from Kilgore Springs and related seeps and springs
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Kilgore Spring and related seeps and springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
Application Number =		**G**	**13514**		**Total Acres**	87.60						
Permit Number =		**G**	**13775**		**Primary Acres**	87.60						
Applicant Name =			**Randall**		**Supp Acres**	0.00						
					Priority	13-Sep-1993						
KLAM 10473 to Lost River												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	491.47	1.09	30.00	7,800	3.14	2.1125E-04	7.8855	0.099		Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	491.47	1.09	30.00	7,800	3.14	2.1125E-04	7.8855	0.099		Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	0.00	0.00	30.00	7,800	3.14	2.1125E-04	7.8855	0.000		Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	491.47	1.09	184.00	7,800	3.14	3.4443E-05	9.6990	0.122		Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	491.47	1.09	184.00	7,800	3.14	3.4443E-05	9.6990	0.122		Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	0.00	0.00	184.00	7,800	3.14	3.4443E-05	9.6990	0.000		Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	491.26	1.09	30.00	7,800	3.14	2.1125E-04	7.8855	0.099		Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	491.26	1.09	30.00	7,800	3.14	2.1125E-04	7.8855	0.099		Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	0.00	0.00	30.00	7,800	3.14	2.1125E-04	7.8855	0.000		Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	491.26	1.09	184.00	7,800	3.14	3.4443E-05	9.6990	0.122		Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	491.26	1.09	184.00	7,800	3.14	3.4443E-05	9.6990	0.122		Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	0.00	0.00	184.00	7,800	3.14	3.4443E-05	9.6990	0.000		Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10473 to Kilgore Spring												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	491.47	1.09	30.00	11,800	3.14	4.8347E-04	7.0578		0.089	Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	491.47	1.09	30.00	11,800	3.14	4.8347E-04	7.0578		0.089	Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	0.00	0.00	30.00	11,800	3.14	4.8347E-04	7.0578		0.000	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	491.47	1.09	184.00	11,800	3.14	7.8827E-05	8.8711		0.111	Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	491.47	1.09	184.00	11,800	3.14	7.8827E-05	8.8711		0.111	Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	0.00	0.00	184.00	11,800	3.14	7.8827E-05	8.8711		0.000	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	491.26	1.09	30.00	11,800	3.14	4.8347E-04	7.0578		0.089	Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	491.26	1.09	30.00	11,800	3.14	4.8347E-04	7.0578		0.089	Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	0.00	0.00	30.00	11,800	3.14	4.8347E-04	7.0578		0.000	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	491.26	1.09	184.00	11,800	3.14	7.8827E-05	8.8711		0.111	Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	491.26	1.09	184.00	11,800	3.14	7.8827E-05	8.8711		0.111	Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	0.00	0.00	184.00	11,800	3.14	7.8827E-05	8.8711		0.000	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 39: Ground water drawdown calculated for South Langell Valley sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: 1999 OWRD 24-hour aquifer test pumping water from basalt saw no response in nearby domestic well completed in sediments
Note: domestic well in sediment responded to 2001 ground water pumping from basalt at KLAM 10748 according to owner of both wells
Note: no direct connection to Bonanza Big Springs
Note: hydraulic connection between ground water in basalt and Kilgore Spring established in 2001
Note: ground water permits do not address flow depletion from Kilgore Springs and related seeps and springs
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Kilgore Spring and related seeps and springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
Application Number =		**G**	**13184**		**Total Acres**	572.90						
Permit Number =		**G**	**12463**		**Primary Acres**	476.00						
Applicant Name =			**Balin**		**Supp Acres**	96.90						
					Priority	13-Nov-1992						
KLAM 10748 to Lost River												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	3,214.08	7.16	30.00	2,800	3.14	2.7222E-05	9.9343	0.815		Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	2,670.45	5.95	30.00	2,800	3.14	2.7222E-05	9.9343	0.677		Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	543.63	1.21	30.00	2,800	3.14	2.7222E-05	9.9343	0.138		Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	3,214.08	7.16	184.00	2,800	3.14	4.4384E-06	11.7480	0.964		Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	2,670.45	5.95	184.00	2,800	3.14	4.4384E-06	11.7480	0.801		Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	543.63	1.21	184.00	2,800	3.14	4.4384E-06	11.7480	0.163		Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	1,761.40	3.92	30.00	2,800	3.14	2.7222E-05	9.9343	0.447		Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	1,463.48	3.26	30.00	2,800	3.14	2.7222E-05	9.9343	0.371		Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	297.92	0.66	30.00	2,800	3.14	2.7222E-05	9.9343	0.076		Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	1,761.40	3.92	184.00	2,800	3.14	4.4384E-06	11.7480	0.528		Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	1,463.48	3.26	184.00	2,800	3.14	4.4384E-06	11.7480	0.439		Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	297.92	0.66	184.00	2,800	3.14	4.4384E-06	11.7480	0.089		Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10748 to Kilgore Spring												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	3,214.08	7.16	30.00	6,400	3.14	1.4222E-04	8.2810		0.680	Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	2,670.45	5.95	30.00	6,400	3.14	1.4222E-04	8.2810		0.565	Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	543.63	1.21	30.00	6,400	3.14	1.4222E-04	8.2810		0.115	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	3,214.08	7.16	184.00	6,400	3.14	2.3188E-05	10.0947		0.828	Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	2,670.45	5.95	184.00	6,400	3.14	2.3188E-05	10.0947		0.688	Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	543.63	1.21	184.00	6,400	3.14	2.3188E-05	10.0947		0.140	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	1,761.40	3.92	30.00	6,400	3.14	1.4222E-04	8.2810		0.372	Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	1,463.48	3.26	30.00	6,400	3.14	1.4222E-04	8.2810		0.309	Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	297.92	0.66	30.00	6,400	3.14	1.4222E-04	8.2810		0.063	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	1,761.40	3.92	184.00	6,400	3.14	2.3188E-05	10.0947		0.454	Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	1,463.48	3.26	184.00	6,400	3.14	2.3188E-05	10.0947		0.377	Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	297.92	0.66	184.00	6,400	3.14	2.3188E-05	10.0947		0.077	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 39: Ground water drawdown calculated for South Langell Valley sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L) — r = radial distance (L)
T = transmissivity (L*L/T) — t = time (T)
S = storage coefficient (dimensionless) — u = dimensionless
pi = 3.141592654 — W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: 1999 OWRD 24-hour aquifer test pumping water from basalt saw no response in nearby domestic well completed in sediments
Note: domestic well in sediment responded to 2001 ground water pumping from basalt at KLAM 10748 according to owner of both wells
Note: no direct connection to Bonanza Big Springs
Note: hydraulic connection between ground water in basalt and Kilgore Spring established in 2001
Note: ground water permits do not address flow depletion from Kilgore Springs and related seeps and springs
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Kilgore Spring and related seeps and springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
Application Number =		**G**	**13106**		**Total Acres**	408.40						
Permit Number =		**G**	**12462**		**Primary Acres**	0.00						
Applicant Name =			**Grohs**		**Supp Acres**	408.40						
					Priority	08-Sep-1992						
KLAM 10575 to Lost River												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	2,001.79	4.46	30.00	1,700	3.14	1.0035E-05	10.9323	0.559		Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	0.00	0.00	30.00	1,700	3.14	1.0035E-05	10.9323	0.000		Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	2,001.79	4.46	30.00	1,700	3.14	1.0035E-05	10.9323	0.559		Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	2,001.79	4.46	184.00	1,700	3.14	1.6361E-06	12.7460	0.651		Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	0.00	0.00	184.00	1,700	3.14	1.6361E-06	12.7460	0.000		Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	2,001.79	4.46	184.00	1,700	3.14	1.6361E-06	12.7460	0.651		Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	1,255.64	2.80	30.00	1,700	3.14	1.0035E-05	10.9323	0.350		Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	0.00	0.00	30.00	1,700	3.14	1.0035E-05	10.9323	0.000		Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	1,255.64	2.80	30.00	1,700	3.14	1.0035E-05	10.9323	0.350		Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	1,255.64	2.80	184.00	1,700	3.14	1.6361E-06	12.7460	0.409		Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	0.00	0.00	184.00	1,700	3.14	1.6361E-06	12.7460	0.000		Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	1,255.64	2.80	184.00	1,700	3.14	1.6361E-06	12.7460	0.409		Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10575 to Kilgore Spring												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	2,001.79	4.46	30.00	7,600	3.14	2.0056E-04	7.9374		0.406	Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	0.00	0.00	30.00	7,600	3.14	2.0056E-04	7.9374		0.000	Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	2,001.79	4.46	30.00	7,600	3.14	2.0056E-04	7.9374		0.406	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	2,001.79	4.46	184.00	7,600	3.14	3.2699E-05	9.7510		0.498	Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	0.00	0.00	184.00	7,600	3.14	3.2699E-05	9.7510		0.000	Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	2,001.79	4.46	184.00	7,600	3.14	3.2699E-05	9.7510		0.498	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	1,255.64	2.80	30.00	7,600	3.14	2.0056E-04	7.9374		0.254	Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	0.00	0.00	30.00	7,600	3.14	2.0056E-04	7.9374		0.000	Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	1,255.64	2.80	30.00	7,600	3.14	2.0056E-04	7.9374		0.254	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	1,255.64	2.80	184.00	7,600	3.14	3.2699E-05	9.7510		0.313	Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	0.00	0.00	184.00	7,600	3.14	3.2699E-05	9.7510		0.000	Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	1,255.64	2.80	184.00	7,600	3.14	3.2699E-05	9.7510		0.313	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 39: Ground water drawdown calculated for South Langell Valley sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: 1999 OWRD 24-hour aquifer test pumping water from basalt saw no response in nearby domestic well completed in sediments
Note: domestic well in sediment responded to 2001 ground water pumping from basalt at KLAM 10748 according to owner of both wells
Note: no direct connection to Bonanza Big Springs
Note: hydraulic connection between ground water in basalt and Kilgore Spring established in 2001
Note: ground water permits do not address flow depletion from Kilgore Springs and related seeps and springs
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Kilgore Spring and related seeps and springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
Application Number =		**G**	**12972**		**Total Acres**	307.10						
Permit Number =		**G**	**12458**		**Primary Acres**	77.80						
Applicant Name =			**Balin**		**Supp Acres**	229.30						
					Priority	05-Jun-1992						
KLAM 10642 to Lost River												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	1,570.91	3.50	30.00	1,500	3.14	7.8125E-06	11.1826	0.449		Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	397.97	0.89	30.00	1,500	3.14	7.8125E-06	11.1826	0.114		Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	1,172.94	2.61	30.00	1,500	3.14	7.8125E-06	11.1826	0.335		Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	1,570.91	3.50	184.00	1,500	3.14	1.2738E-06	12.9963	0.521		Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	397.97	0.89	184.00	1,500	3.14	1.2738E-06	12.9963	0.132		Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	1,172.94	2.61	184.00	1,500	3.14	1.2738E-06	12.9963	0.389		Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	944.19	2.10	30.00	1,500	3.14	7.8125E-06	11.1826	0.270		Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	239.20	0.53	30.00	1,500	3.14	7.8125E-06	11.1826	0.068		Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	704.99	1.57	30.00	1,500	3.14	7.8125E-06	11.1826	0.201		Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	944.19	2.10	184.00	1,500	3.14	1.2738E-06	12.9963	0.313		Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	239.20	0.53	184.00	1,500	3.14	1.2738E-06	12.9963	0.079		Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	704.99	1.57	184.00	1,500	3.14	1.2738E-06	12.9963	0.234		Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10642 to Kilgore Spring												
	Continuous Pumping											
4,488,312.00	600,000.00	0.00025	1,570.91	3.50	30.00	4,800	3.14	8.0000E-05	8.8563		0.355	Total Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	397.97	0.89	30.00	4,800	3.14	8.0000E-05	8.8563		0.090	Primary Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	1,172.94	2.61	30.00	4,800	3.14	8.0000E-05	8.8563		0.265	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
4,488,312.00	600,000.00	0.00025	1,570.91	3.50	184.00	4,800	3.14	1.3043E-05	10.6700		0.428	Total Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	397.97	0.89	184.00	4,800	3.14	1.3043E-05	10.6700		0.108	Primary Acres: Continuous Pumping at Full Rate (all season)
4,488,312.00	600,000.00	0.00025	1,172.94	2.61	184.00	4,800	3.14	1.3043E-05	10.6700		0.320	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
4,488,312.00	600,000.00	0.00025	944.19	2.10	30.00	4,800	3.14	8.0000E-05	8.8563		0.213	Total Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	239.20	0.53	30.00	4,800	3.14	8.0000E-05	8.8563		0.054	Primary Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	704.99	1.57	30.00	4,800	3.14	8.0000E-05	8.8563		0.159	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
4,488,312.00	600,000.00	0.00025	944.19	2.10	184.00	4,800	3.14	1.3043E-05	10.6700		0.257	Total Acres: Pro-Rated Pumping Rate (all seasons)
4,488,312.00	600,000.00	0.00025	239.20	0.53	184.00	4,800	3.14	1.3043E-05	10.6700		0.065	Primary Acres: Pro-Rated Pumping Rate (all season)
4,488,312.00	600,000.00	0.00025	704.99	1.57	184.00	4,800	3.14	1.3043E-05	10.6700		0.192	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 39: Ground water drawdown calculated for South Langell Valley sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: 1999 OWRD 24-hour aquifer test pumping water from basalt saw no response in nearby domestic well completed in sediments
Note: domestic well in sediment responded to 2001 ground water pumping from basalt at KLAM 10748 according to owner of both wells
Note: no direct connection to Bonanza Big Springs
Note: hydraulic connection between ground water in basalt and Kilgore Spring established in 2001
Note: ground water permits do not address flow depletion from Kilgore Springs and related seeps and springs
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Kilgore Spring and related seeps and springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
		Full Rate Pumping			Acres							
		Total (sum)	14,626.95	32.59	Total	2,863.50				N.A.	2.950	Total Acres: Continuous Pumping at Full Rate (30 days)
		Primary (sum)	4,259.39	9.49	Primary	812.00				N.A.	0.881	Primary Acres: Continuous Pumping at Full Rate (30 days)
		Supplemental (sum)	10,367.56	23.10	Supplemental	2,051.50				N.A.	2.069	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
		Total (sum)	14,626.95	32.59						N.A.	3.627	Total Acres: Continuous Pumping at Full Rate (all season)
		Primary (total rate*(p-acres/t-acres))	4,147.75	9.24						N.A.	1.078	Primary Acres: Continuous Pumping at Full Rate (all season)
		Supplemental (total rate*(s-acres/t-acres))	10,479.20	23.35						N.A.	2.549	Supplemental Acres: Continuous Pumping at Full Rate (all season)
		Pro-Rated Pumping										
		Total (sum)	8,666.30	19.31						N.A.	1.735	Total Acres: Pro-Rated Pumping Rate (30 days)
		Primary (sum)	2,619.56	5.84						N.A.	0.534	Primary Acres: Pro-Rated Pumping Rate (30 days)
		Supplemental (sum)	6,046.74	13.47						N.A.	1.201	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
		Total (sum)	8,666.30	19.31						N.A.	2.136	Total Acres: Pro-Rated Pumping Rate (all seasons)
		Primary (total rate*(p-acres/t-acres))	2,457.49	5.48						N.A.	0.655	Primary Acres: Pro-Rated Pumping Rate (all season)
		Supplemental (total rate*(s-acres/t-acres))	6,208.81	13.83						N.A.	1.481	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 40: Ground water drawdown calculated for Lorella sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: basalt aquifer properties vary which is reflected in the drawdown calculations
Note: compartmentalization may isolate many of these wells from the Lost River
Note: conducted calculations as if the wells are hydraulically connected to the Lost River
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: no evidence of direct connection to Bonanza Big Springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
Application Number =		**G**	**12493**		**Total Acres**	250.00		**Note:** compartmentalization may isolate this well from the Lost River				
Permit Number =		**G**	**12624**		**Primary Acres**	5.50		**Note:** wells betwenn KLAM 13556 and the Lost River did not respond during 24-hr OWRD Lorella area aquifer test				
Applicant Name =			**Randall**		**Supp Acres**	244.50		**Note:** aquifer parameters derived from 24-hr OWRD Lorella area aquifer test				
					Priority	22-Apr-1991						
KLAM 13556 to Lost River												
	Continuous Pumping											
374,026.00	50,000.00	0.00030	1,404.84	3.13	30.00	13,600	3.14	9.2480E-03	4.1154	1.771	N.A.	Total Acres: Continuous Pumping at Full Rate (30 days)
374,026.00	50,000.00	0.00030	30.91	0.07	30.00	13,600	3.14	9.2480E-03	4.1154	0.039	N.A.	Primary Acres: Continuous Pumping at Full Rate (30 days)
374,026.00	50,000.00	0.00030	1,373.93	3.06	30.00	13,600	3.14	9.2480E-03	4.1154	1.732	N.A.	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
374,026.00	50,000.00	0.00030	1,404.84	3.13	184.00	13,600	3.14	1.5078E-03	5.9214	2.549	N.A.	Total Acres: Continuous Pumping at Full Rate (all season)
374,026.00	50,000.00	0.00030	30.91	0.07	184.00	13,600	3.14	1.5078E-03	5.9214	0.056	N.A.	Primary Acres: Continuous Pumping at Full Rate (all season)
374,026.00	50,000.00	0.00030	1,373.93	3.06	184.00	13,600	3.14	1.5078E-03	5.9214	2.493	N.A.	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
374,026.00	50,000.00	0.00030	768.63	1.71	30.00	13,600	3.14	9.2480E-03	4.1154	0.969	N.A.	Total Acres: Pro-Rated Pumping Rate (30 days)
374,026.00	50,000.00	0.00030	16.91	0.04	30.00	13,600	3.14	9.2480E-03	4.1154	0.021	N.A.	Primary Acres: Pro-Rated Pumping Rate (30 days)
374,026.00	50,000.00	0.00030	751.72	1.67	30.00	13,600	3.14	9.2480E-03	4.1154	0.948	N.A.	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
374,026.00	50,000.00	0.00030	768.63	1.71	184.00	13,600	3.14	1.5078E-03	5.9214	1.394	N.A.	Total Acres: Pro-Rated Pumping Rate (all seasons)
374,026.00	50,000.00	0.00030	16.91	0.04	184.00	13,600	3.14	1.5078E-03	5.9214	0.031	N.A.	Primary Acres: Pro-Rated Pumping Rate (all season)
374,026.00	50,000.00	0.00030	751.72	1.67	184.00	13,600	3.14	1.5078E-03	5.9214	1.364	N.A.	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 40: Ground water drawdown calculated for Lorella sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	**1.1545E-04**

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: basalt aquifer properties vary which is reflected in the drawdown calculations
Note: compartmentalization may isolate many of these wells from the Lost River
Note: conducted calculations as if the wells are hydraulically connected to the Lost River
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: no evidence of direct connection to Bonanza Big Springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
Application Number =		**G**	**13387**		**Total Acres**	333.90		**Note:** compartmentalization may isolate this well from the Lost River				
Permit Number =		**G**	**12465**		**Primary Acres**	57.90		**Note:** no data to date to indicate pumping at KLAM 10526 will cause drawdown at Lost River				
Applicant Name =			**DeJong**		**Supp Acres**	276.00		**Note:** aquifer parameters derived from 24-hr OWRD Lorella area aquifer test				
					Priority	03-May-1993						
KLAM 10526 to Lost River												
	Continuous Pumping											
374,026.00	50,000.00	0.00030	1,873.42	4.17	30.00	9,000	3.14	4.0500E-03	4.9359	2.833	N.A.	Total Acres: Continuous Pumping at Full Rate (30 days)
374,026.00	50,000.00	0.00030	324.86	0.72	30.00	9,000	3.14	4.0500E-03	4.9359	0.491	N.A.	Primary Acres: Continuous Pumping at Full Rate (30 days)
374,026.00	50,000.00	0.00030	1,548.56	3.45	30.00	9,000	3.14	4.0500E-03	4.9359	2.342	N.A.	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
374,026.00	50,000.00	0.00030	1,873.42	4.17	184.00	9,000	3.14	6.6033E-04	6.7462	3.872	N.A.	Total Acres: Continuous Pumping at Full Rate (all season)
374,026.00	50,000.00	0.00030	324.86	0.72	184.00	9,000	3.14	6.6033E-04	6.7462	0.671	N.A.	Primary Acres: Continuous Pumping at Full Rate (all season)
374,026.00	50,000.00	0.00030	1,548.56	3.45	184.00	9,000	3.14	6.6033E-04	6.7462	3.201	N.A.	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
374,026.00	50,000.00	0.00030	1,026.59	2.29	30.00	9,000	3.14	4.0500E-03	4.9359	1.552	N.A.	Total Acres: Pro-Rated Pumping Rate (30 days)
374,026.00	50,000.00	0.00030	178.02	0.40	30.00	9,000	3.14	4.0500E-03	4.9359	0.269	N.A.	Primary Acres: Pro-Rated Pumping Rate (30 days)
374,026.00	50,000.00	0.00030	848.57	1.89	30.00	9,000	3.14	4.0500E-03	4.9359	1.283	N.A.	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
374,026.00	50,000.00	0.00030	1,026.59	2.29	184.00	9,000	3.14	6.6033E-04	6.7462	2.122	N.A.	Total Acres: Pro-Rated Pumping Rate (all seasons)
374,026.00	50,000.00	0.00030	178.02	0.40	184.00	9,000	3.14	6.6033E-04	6.7462	0.368	N.A.	Primary Acres: Pro-Rated Pumping Rate (all season)
374,026.00	50,000.00	0.00030	848.57	1.89	184.00	9,000	3.14	6.6033E-04	6.7462	1.754	N.A.	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 40: Ground water drawdown calculated for Lorella sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	**1.1545E-04**

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: basalt aquifer properties vary which is reflected in the drawdown calculations
Note: compartmentalization may isolate many of these wells from the Lost River
Note: conducted calculations as if the wells are hydraulically connected to the Lost River
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: no evidence of direct connection to Bonanza Big Springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
Application Number =		**G**	**13101**		**Total Acres**	391.50		**Note:** assuming drawdown at Lost River is reasonable given location of KLAM 10634 and surrounding geology				
Permit Number =		**G**	**12461**		**Primary Acres**	106.50		**Note:** aquifer parameters derived from 24-hr OWRD Lorella area aquifer test				
Applicant Name =			**Barrett**		**Supp Acres**	285.00						
					Priority	31-Aug-1992						
KLAM 10634 to Lost River												
	Continuous Pumping											
374,026.00	50,000.00	0.00030	2,196.58	4.89	30.00	3,000	3.14	4.5000E-04	7.1295	4.798	N.A.	Total Acres: Continuous Pumping at Full Rate (30 days)
374,026.00	50,000.00	0.00030	597.54	1.33	30.00	3,000	3.14	4.5000E-04	7.1295	1.305	N.A.	Primary Acres: Continuous Pumping at Full Rate (30 days)
374,026.00	50,000.00	0.00030	1,599.04	3.56	30.00	3,000	3.14	4.5000E-04	7.1295	3.493	N.A.	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
374,026.00	50,000.00	0.00030	2,196.58	4.89	184.00	3,000	3.14	7.3370E-05	8.9429	6.018	N.A.	Total Acres: Continuous Pumping at Full Rate (all season)
374,026.00	50,000.00	0.00030	597.54	1.33	184.00	3,000	3.14	7.3370E-05	8.9429	1.637	N.A.	Primary Acres: Continuous Pumping at Full Rate (all season)
374,026.00	50,000.00	0.00030	1,599.04	3.56	184.00	3,000	3.14	7.3370E-05	8.9429	4.381	N.A.	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
374,026.00	50,000.00	0.00030	1,203.68	2.68	30.00	3,000	3.14	4.5000E-04	7.1295	2.629	N.A.	Total Acres: Pro-Rated Pumping Rate (30 days)
374,026.00	50,000.00	0.00030	327.44	0.73	30.00	3,000	3.14	4.5000E-04	7.1295	0.715	N.A.	Primary Acres: Pro-Rated Pumping Rate (30 days)
374,026.00	50,000.00	0.00030	876.24	1.95	30.00	3,000	3.14	4.5000E-04	7.1295	1.914	N.A.	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
374,026.00	50,000.00	0.00030	1,203.68	2.68	184.00	3,000	3.14	7.3370E-05	8.9429	3.298	N.A.	Total Acres: Pro-Rated Pumping Rate (all seasons)
374,026.00	50,000.00	0.00030	327.44	0.73	184.00	3,000	3.14	7.3370E-05	8.9429	0.897	N.A.	Primary Acres: Pro-Rated Pumping Rate (all season)
374,026.00	50,000.00	0.00030	876.24	1.95	184.00	3,000	3.14	7.3370E-05	8.9429	2.401	N.A.	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 40: Ground water drawdown calculated for Lorella sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	**1.1545E-04**

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: basalt aquifer properties vary which is reflected in the drawdown calculations
Note: compartmentalization may isolate many of these wells from the Lost River
Note: conducted calculations as if the wells are hydraulically connected to the Lost River
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: no evidence of direct connection to Bonanza Big Springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
Application Number =		**G**	**13101**		**Total Acres**	391.50		**Note:** may not be able to assume drawdown at Lost River given well location on basalt finger with low hydraulic conductivity				
Permit Number =		**G**	**12461**		**Primary Acres**	106.50		**Note:** well owner finds the production at this well very inadequate				
Applicant Name =			**Barrett (continued)**		**Supp Acres**	285.00		**Note:** no aquifer parameters for this low transmissivity compartment, used southeast compartment values for worst case				
					Priority	31-Aug-1992						
KLAM 10608 to Lost River												
	Continuous Pumping											
15,335.07	2,050.00	0.00030	2,196.58	4.89	30.00	3,800	3.14	1.7610E-02	3.4796	57.114	N.A.	Total Acres: Continuous Pumping at Full Rate (30 days)
15,335.07	2,050.00	0.00030	597.54	1.33	30.00	3,800	3.14	1.7610E-02	3.4796	15.537	N.A.	Primary Acres: Continuous Pumping at Full Rate (30 days)
15,335.07	2,050.00	0.00030	1,599.04	3.56	30.00	3,800	3.14	1.7610E-02	3.4796	41.578	N.A.	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
15,335.07	2,050.00	0.00030	2,196.58	4.89	184.00	3,800	3.14	2.8712E-03	5.2787	86.644	N.A.	Total Acres: Continuous Pumping at Full Rate (all season)
15,335.07	2,050.00	0.00030	597.54	1.33	184.00	3,800	3.14	2.8712E-03	5.2787	23.570	N.A.	Primary Acres: Continuous Pumping at Full Rate (all season)
15,335.07	2,050.00	0.00030	1,599.04	3.56	184.00	3,800	3.14	2.8712E-03	5.2787	63.074	N.A.	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
15,335.07	2,050.00	0.00030	1,203.68	2.68	30.00	3,800	3.14	1.7610E-02	3.4796	31.297	N.A.	Total Acres: Pro-Rated Pumping Rate (30 days)
15,335.07	2,050.00	0.00030	327.44	0.73	30.00	3,800	3.14	1.7610E-02	3.4796	8.514	N.A.	Primary Acres: Pro-Rated Pumping Rate (30 days)
15,335.07	2,050.00	0.00030	876.24	1.95	30.00	3,800	3.14	1.7610E-02	3.4796	22.784	N.A.	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
15,335.07	2,050.00	0.00030	1,203.68	2.68	184.00	3,800	3.14	2.8712E-03	5.2787	47.479	N.A.	Total Acres: Pro-Rated Pumping Rate (all seasons)
15,335.07	2,050.00	0.00030	327.44	0.73	184.00	3,800	3.14	2.8712E-03	5.2787	12.916	N.A.	Primary Acres: Pro-Rated Pumping Rate (all season)
15,335.07	2,050.00	0.00030	876.24	1.95	184.00	3,800	3.14	2.8712E-03	5.2787	34.563	N.A.	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 40: Ground water drawdown calculated for Lorella sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654
r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	**1.1545E-04**

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: basalt aquifer properties vary which is reflected in the drawdown calculations
Note: compartmentalization may isolate many of these wells from the Lost River
Note: conducted calculations as if the wells are hydraulically connected to the Lost River
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: no evidence of direct connection to Bonanza Big Springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
Application Number =		**G**	**12772**		**Total Acres**	247.80		**Note:** no data to date to indicate pumping at KLAM 10699 will cause drawdown at Lost River				
Permit Number =		**G**	**12448**		**Primary Acres**	94.40		**Note:** may not be able to assume drawdown at Lost River given location of KLAM 10699 on terrace west of Lost River				
Applicant Name =			**Gibson**		**Supp Acres**	153.40		**Note:** CH2MHill "Liston" and "Wright" aquifer tests indicate possible compartmentalization				
					Priority	05-Feb-1992		**Note:** aquifer parameters derived from CH2MHill "Liston" aquifer test and analysis of recorder data at KLAM 10699				
KLAM 10699 to Lost River												
	Continuous Pumping											
89,766.24	12,000.00	0.00015	1,427.28	3.18	30.00	4,600	3.14	2.2042E-03	5.5424	10.098	N.A.	Total Acres: Continuous Pumping at Full Rate (30 days)
89,766.24	12,000.00	0.00015	543.73	1.21	30.00	4,600	3.14	2.2042E-03	5.5424	3.847	N.A.	Primary Acres: Continuous Pumping at Full Rate (30 days)
89,766.24	12,000.00	0.00015	883.55	1.97	30.00	4,600	3.14	2.2042E-03	5.5424	6.251	N.A.	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
89,766.24	12,000.00	0.00015	1,427.28	3.18	184.00	4,600	3.14	3.5938E-04	7.3543	13.400	N.A.	Total Acres: Continuous Pumping at Full Rate (all season)
89,766.24	12,000.00	0.00015	543.73	1.21	184.00	4,600	3.14	3.5938E-04	7.3543	5.105	N.A.	Primary Acres: Continuous Pumping at Full Rate (all season)
89,766.24	12,000.00	0.00015	883.55	1.97	184.00	4,600	3.14	3.5938E-04	7.3543	8.295	N.A.	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
89,766.24	12,000.00	0.00015	761.87	1.70	30.00	4,600	3.14	2.2042E-03	5.5424	5.390	N.A.	Total Acres: Pro-Rated Pumping Rate (30 days)
89,766.24	12,000.00	0.00015	290.24	0.65	30.00	4,600	3.14	2.2042E-03	5.5424	2.053	N.A.	Primary Acres: Pro-Rated Pumping Rate (30 days)
89,766.24	12,000.00	0.00015	471.63	1.05	30.00	4,600	3.14	2.2042E-03	5.5424	3.337	N.A.	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
89,766.24	12,000.00	0.00015	761.87	1.70	184.00	4,600	3.14	3.5938E-04	7.3543	7.153	N.A.	Total Acres: Pro-Rated Pumping Rate (all seasons)
89,766.24	12,000.00	0.00015	290.24	0.65	184.00	4,600	3.14	3.5938E-04	7.3543	2.725	N.A.	Primary Acres: Pro-Rated Pumping Rate (all season)
89,766.24	12,000.00	0.00015	471.63	1.05	184.00	4,600	3.14	3.5938E-04	7.3543	4.428	N.A.	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 40: Ground water drawdown calculated for Lorella sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: basalt aquifer properties vary which is reflected in the drawdown calculations
Note: compartmentalization may isolate many of these wells from the Lost River
Note: conducted calculations as if the wells are hydraulically connected to the Lost River
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: no evidence of direct connection to Bonanza Big Springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
Application Number =		**G**	**13198**		**Total Acres**	72.20		**Note:** no data to date to indicate pumping at KLAM 14864 will cause drawdown at Lost River				
Permit Number =		**G**	**12497**		**Primary Acres**	72.20		**Note:** may not be able to assume drawdown at Lost River given location of KLAM 14864 on terrace west of Lost River				
Applicant Name =			**Gallup**		**Supp Acres**	0.00		**Note:** CH2MHill "Liston" and "Wright" aquifer tests indicate possible compartmentalization				
					Priority	25-Nov-1992		**Note:** aquifer parameters derived from CH2MHill "Liston" aquifer test and analysis of recorder data at KLAM 10699				
KLAM 14864 to Lost River												
	Continuous Pumping											
89,766.24	12,000.00	0.00015	405.29	0.90	30.00	4,100	3.14	1.7510E-03	5.7721	2.986	N.A.	Total Acres: Continuous Pumping at Full Rate (30 days)
89,766.24	12,000.00	0.00015	405.29	0.90	30.00	4,100	3.14	1.7510E-03	5.7721	2.986	N.A.	Primary Acres: Continuous Pumping at Full Rate (30 days)
89,766.24	12,000.00	0.00015	0.00	0.00	30.00	4,100	3.14	1.7510E-03	5.7721	0.000	N.A.	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
89,766.24	12,000.00	0.00015	405.29	0.90	184.00	4,100	3.14	2.8550E-04	7.5844	3.924	N.A.	Total Acres: Continuous Pumping at Full Rate (all season)
89,766.24	12,000.00	0.00015	405.29	0.90	184.00	4,100	3.14	2.8550E-04	7.5844	3.924	N.A.	Primary Acres: Continuous Pumping at Full Rate (all season)
89,766.24	12,000.00	0.00015	0.00	0.00	184.00	4,100	3.14	2.8550E-04	7.5844	0.000	N.A.	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
89,766.24	12,000.00	0.00015	221.98	0.49	30.00	4,100	3.14	1.7510E-03	5.7721	1.636	N.A.	Total Acres: Pro-Rated Pumping Rate (30 days)
89,766.24	12,000.00	0.00015	221.98	0.49	30.00	4,100	3.14	1.7510E-03	5.7721	1.636	N.A.	Primary Acres: Pro-Rated Pumping Rate (30 days)
89,766.24	12,000.00	0.00015	0.00	0.00	30.00	4,100	3.14	1.7510E-03	5.7721	0.000	N.A.	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
89,766.24	12,000.00	0.00015	221.98	0.49	184.00	4,100	3.14	2.8550E-04	7.5844	2.149	N.A.	Total Acres: Pro-Rated Pumping Rate (all seasons)
89,766.24	12,000.00	0.00015	221.98	0.49	184.00	4,100	3.14	2.8550E-04	7.5844	2.149	N.A.	Primary Acres: Pro-Rated Pumping Rate (all season)
89,766.24	12,000.00	0.00015	0.00	0.00	184.00	4,100	3.14	2.8550E-04	7.5844	0.000	N.A.	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 40: Ground water drawdown calculated for Lorella sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: basalt aquifer properties vary which is reflected in the drawdown calculations
Note: compartmentalization may isolate many of these wells from the Lost River
Note: conducted calculations as if the wells are hydraulically connected to the Lost River
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: no evidence of direct connection to Bonanza Big Springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
		Full Rate Pumping			Acres							
		Total (sum)	7,307.41	16.28	Total Acres	1,295.40				N.A.	N.A.	Total Acres: Continuous Pumping at Full Rate (30 days)
		Primary (sum)	1,902.32	4.24	Primary Acres	336.50				N.A.	N.A.	Primary Acres: Continuous Pumping at Full Rate (30 days)
		Supplemental (sum)	5,405.09	12.04	Supp Acres	958.90				N.A.	N.A.	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
		Total (sum)	7,307.41	16.28						N.A.	N.A.	Total Acres: Continuous Pumping at Full Rate (all season)
		Primary (total rate*(p-acres/t-acres))	1,898.21	4.23						N.A.	N.A.	Primary Acres: Continuous Pumping at Full Rate (all season)
		Supplemental (total rate*(s-acres/t-acres))	5,409.20	12.05						N.A.	N.A.	Supplemental Acres: Continuous Pumping at Full Rate (all season)
		Pro-Rated Pumping										
		Total (sum)	3,982.75	8.87						N.A.	N.A.	Total Acres: Pro-Rated Pumping Rate (30 days)
		Primary (sum)	1,034.58	2.31						N.A.	N.A.	Primary Acres: Pro-Rated Pumping Rate (30 days)
		Supplemental (sum)	2,948.17	6.57						N.A.	N.A.	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
		Total (sum)	3,982.75	8.87						N.A.	N.A.	Total Acres: Pro-Rated Pumping Rate (all seasons)
		Primary (total rate*(p-acres/t-acres))	1,034.58	2.31						N.A.	N.A.	Primary Acres: Pro-Rated Pumping Rate (all season)
		Supplemental (total rate*(s-acres/t-acres))	2,948.17	6.57						N.A.	N.A.	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**13013**		**Total Acres**	31.60							
Permit Number =		**G**	**12435**		**Primary Acres**	31.60							
Applicant Name =			**Johnson/Jeld-Wen**		**Supp Acres**	0.00							
					Priority	29-Jun-1992							
KLAM 2373 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	179.53	0.40	30.00	56,700	3.14	7.6957E-02	2.0628	0.017			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	179.53	0.40	30.00	56,700	3.14	7.6957E-02	2.0628	0.017			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	56,700	3.14	7.6957E-02	2.0628	0.000			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	179.53	0.40	184.00	56,700	3.14	1.2547E-02	3.8135	0.031			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	179.53	0.40	184.00	56,700	3.14	1.2547E-02	3.8135	0.031			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	56,700	3.14	1.2547E-02	3.8135	0.000			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	97.16	0.22	30.00	56,700	3.14	7.6957E-02	2.0628	0.009			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	97.16	0.22	30.00	56,700	3.14	7.6957E-02	2.0628	0.009			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	56,700	3.14	7.6957E-02	2.0628	0.000			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	97.16	0.22	184.00	56,700	3.14	1.2547E-02	3.8135	0.017			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	97.16	0.22	184.00	56,700	3.14	1.2547E-02	3.8135	0.017			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	56,700	3.14	1.2547E-02	3.8135	0.000			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 2373 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	179.53	0.40	30.00	57,600	3.14	7.9419E-02	2.0337		0.017	0.013	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	179.53	0.40	30.00	57,600	3.14	7.9419E-02	2.0337		0.017	0.013	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	57,600	3.14	7.9419E-02	2.0337		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	179.53	0.40	184.00	57,600	3.14	1.2949E-02	3.7824		0.031	0.023	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	179.53	0.40	184.00	57,600	3.14	1.2949E-02	3.7824		0.031	0.023	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	57,600	3.14	1.2949E-02	3.7824		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	97.16	0.22	30.00	57,600	3.14	7.9419E-02	2.0337		0.009	0.007	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	97.16	0.22	30.00	57,600	3.14	7.9419E-02	2.0337		0.009	0.007	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	57,600	3.14	7.9419E-02	2.0337		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	97.16	0.22	184.00	57,600	3.14	1.2949E-02	3.7824		0.017	0.013	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	97.16	0.22	184.00	57,600	3.14	1.2949E-02	3.7824		0.017	0.013	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	57,600	3.14	1.2949E-02	3.7824		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**13013**		**Total Acres**	31.00							
Permit Number =		**G**	**12435**		**Primary Acres**	31.00							
Applicant Name =			**Johnson /Jeld-Wen (cont.)**		**Supp Acres**	0.00							
					Priority	29-Jun-1992							
KLAM 10181 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	175.04	0.39	30.00	58,400	3.14	8.1641E-02	2.0082	0.016			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	175.04	0.39	30.00	58,400	3.14	8.1641E-02	2.0082	0.016			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	58,400	3.14	8.1641E-02	2.0082	0.000			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	175.04	0.39	184.00	58,400	3.14	1.3311E-02	3.7552	0.030			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	175.04	0.39	184.00	58,400	3.14	1.3311E-02	3.7552	0.030			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	58,400	3.14	1.3311E-02	3.7552	0.000			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	95.31	0.21	30.00	58,400	3.14	8.1641E-02	2.0082	0.009			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	95.31	0.21	30.00	58,400	3.14	8.1641E-02	2.0082	0.009			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	58,400	3.14	8.1641E-02	2.0082	0.000			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	95.31	0.21	184.00	58,400	3.14	1.3311E-02	3.7552	0.016			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	95.31	0.21	184.00	58,400	3.14	1.3311E-02	3.7552	0.016			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	58,400	3.14	1.3311E-02	3.7552	0.000			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10181 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	175.04	0.39	30.00	59,300	3.14	8.4177E-02	1.9801		0.016	0.012	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	175.04	0.39	30.00	59,300	3.14	8.4177E-02	1.9801		0.016	0.012	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	59,300	3.14	8.4177E-02	1.9801		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	175.04	0.39	184.00	59,300	3.14	1.3724E-02	3.7250		0.030	0.022	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	175.04	0.39	184.00	59,300	3.14	1.3724E-02	3.7250		0.030	0.022	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	59,300	3.14	1.3724E-02	3.7250		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	95.31	0.21	30.00	59,300	3.14	8.4177E-02	1.9801		0.009	0.006	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	95.31	0.21	30.00	59,300	3.14	8.4177E-02	1.9801		0.009	0.006	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	59,300	3.14	8.4177E-02	1.9801		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	95.31	0.21	184.00	59,300	3.14	1.3724E-02	3.7250		0.016	0.012	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	95.31	0.21	184.00	59,300	3.14	1.3724E-02	3.7250		0.016	0.012	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	59,300	3.14	1.3724E-02	3.7250		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12618**		**Total Acres**	515.10							
Permit Number =		**G**	**12441**		**Primary Acres**	17.80							
Applicant Name =			**Haskins**		**Supp Acres**	497.30							
					Priority	22-Jul-1991							
KLAM 12415 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	2,890.02	6.44	30.00	28,700	3.14	1.9717E-02	3.3687	0.446			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	99.87	0.22	30.00	28,700	3.14	1.9717E-02	3.3687	0.015			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	2,790.15	6.22	30.00	28,700	3.14	1.9717E-02	3.3687	0.431			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	2,890.02	6.44	184.00	28,700	3.14	3.2148E-03	5.1660	0.684			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	99.87	0.22	184.00	28,700	3.14	3.2148E-03	5.1660	0.024			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	2,790.15	6.22	184.00	28,700	3.14	3.2148E-03	5.1660	0.661			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,583.69	3.53	30.00	28,700	3.14	1.9717E-02	3.3687	0.245			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	54.73	0.12	30.00	28,700	3.14	1.9717E-02	3.3687	0.008			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,528.96	3.41	30.00	28,700	3.14	1.9717E-02	3.3687	0.236			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,583.69	3.53	184.00	28,700	3.14	3.2148E-03	5.1660	0.375			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	54.73	0.12	184.00	28,700	3.14	3.2148E-03	5.1660	0.013			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	1,528.96	3.41	184.00	28,700	3.14	3.2148E-03	5.1660	0.362			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 12415 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	2,890.02	6.44	30.00	30,800	3.14	2.2708E-02	3.2304		0.428	0.321	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	99.87	0.22	30.00	30,800	3.14	2.2708E-02	3.2304		0.015	0.011	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	2,790.15	6.22	30.00	30,800	3.14	2.2708E-02	3.2304		0.413	0.310	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	2,890.02	6.44	184.00	30,800	3.14	3.7024E-03	5.0252		0.666	0.499	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	99.87	0.22	184.00	30,800	3.14	3.7024E-03	5.0252		0.023	0.017	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	2,790.15	6.22	184.00	30,800	3.14	3.7024E-03	5.0252		0.643	0.482	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,583.69	3.53	30.00	30,800	3.14	2.2708E-02	3.2304		0.234	0.176	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	54.73	0.12	30.00	30,800	3.14	2.2708E-02	3.2304		0.008	0.006	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,528.96	3.41	30.00	30,800	3.14	2.2708E-02	3.2304		0.226	0.170	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,583.69	3.53	184.00	30,800	3.14	3.7024E-03	5.0252		0.365	0.274	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	54.73	0.12	184.00	30,800	3.14	3.7024E-03	5.0252		0.013	0.009	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	1,528.96	3.41	184.00	30,800	3.14	3.7024E-03	5.0252		0.352	0.264	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12618**		**Total Acres**	515.10							
Permit Number =		**G**	**12441**		**Primary Acres**	17.80							
Applicant Name =			**Haskins (continued)**		**Supp Acres**	497.30							
					Priority	22-Jul-1991							
KLAM 999991 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	2,890.02	6.44	30.00	27,500	3.14	1.8103E-02	3.4525	0.457			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	99.87	0.22	30.00	27,500	3.14	1.8103E-02	3.4525	0.016			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	2,790.15	6.22	30.00	27,500	3.14	1.8103E-02	3.4525	0.442			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	2,890.02	6.44	184.00	27,500	3.14	2.9516E-03	5.2512	0.696			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	99.87	0.22	184.00	27,500	3.14	2.9516E-03	5.2512	0.024			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	2,790.15	6.22	184.00	27,500	3.14	2.9516E-03	5.2512	0.672			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,583.69	3.53	30.00	27,500	3.14	1.8103E-02	3.4525	0.251			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	54.73	0.12	30.00	27,500	3.14	1.8103E-02	3.4525	0.009			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,528.96	3.41	30.00	27,500	3.14	1.8103E-02	3.4525	0.242			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,583.69	3.53	184.00	27,500	3.14	2.9516E-03	5.2512	0.381			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	54.73	0.12	184.00	27,500	3.14	2.9516E-03	5.2512	0.013			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	1,528.96	3.41	184.00	27,500	3.14	2.9516E-03	5.2512	0.368			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 999991 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	2,890.02	6.44	30.00	28,900	3.14	1.9993E-02	3.3551		0.444	0.333	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	99.87	0.22	30.00	28,900	3.14	1.9993E-02	3.3551		0.015	0.012	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	2,790.15	6.22	30.00	28,900	3.14	1.9993E-02	3.3551		0.429	0.322	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	2,890.02	6.44	184.00	28,900	3.14	3.2597E-03	5.1522		0.682	0.512	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	99.87	0.22	184.00	28,900	3.14	3.2597E-03	5.1522		0.024	0.018	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	2,790.15	6.22	184.00	28,900	3.14	3.2597E-03	5.1522		0.659	0.494	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,583.69	3.53	30.00	28,900	3.14	1.9993E-02	3.3551		0.244	0.183	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	54.73	0.12	30.00	28,900	3.14	1.9993E-02	3.3551		0.008	0.006	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,528.96	3.41	30.00	28,900	3.14	1.9993E-02	3.3551		0.235	0.176	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,583.69	3.53	184.00	28,900	3.14	3.2597E-03	5.1522		0.374	0.281	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	54.73	0.12	184.00	28,900	3.14	3.2597E-03	5.1522		0.013	0.010	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	1,528.96	3.41	184.00	28,900	3.14	3.2597E-03	5.1522		0.361	0.271	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12769**		**Total Acres**	198.50							
Permit Number =		**G**	**13178**		**Primary Acres**	172.10							
Applicant Name =			**Ritter**		**Supp Acres**	26.40							
					Priority	15-Aug-1994							
KLAM 12261 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	664.72	1.48	30.00	44,600	3.14	4.7616E-02	2.5144	0.077			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	576.31	1.28	30.00	44,600	3.14	4.7616E-02	2.5144	0.066			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	88.41	0.20	30.00	44,600	3.14	4.7616E-02	2.5144	0.010			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	664.72	1.48	214.00	44,600	3.14	6.6751E-03	4.4388	0.135			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	576.31	1.28	214.00	44,600	3.14	6.6751E-03	4.4388	0.117			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	88.41	0.20	214.00	44,600	3.14	6.6751E-03	4.4388	0.018			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	524.74	1.17	30.00	44,600	3.14	4.7616E-02	2.5144	0.060			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	454.95	1.01	30.00	44,600	3.14	4.7616E-02	2.5144	0.052			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	69.79	0.16	30.00	44,600	3.14	4.7616E-02	2.5144	0.008			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	524.74	1.17	214.00	44,600	3.14	6.6751E-03	4.4388	0.107			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	454.95	1.01	214.00	44,600	3.14	6.6751E-03	4.4388	0.093			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	69.79	0.16	214.00	44,600	3.14	6.6751E-03	4.4388	0.014			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 12261 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	664.72	1.48	30.00	45,500	3.14	4.9557E-02	2.4764		0.075	0.057	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	576.31	1.28	30.00	45,500	3.14	4.9557E-02	2.4764		0.065	0.049	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	88.41	0.20	30.00	45,500	3.14	4.9557E-02	2.4764		0.010	0.008	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	664.72	1.48	214.00	45,500	3.14	6.9472E-03	4.3991		0.134	0.101	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	576.31	1.28	214.00	45,500	3.14	6.9472E-03	4.3991		0.116	0.087	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	88.41	0.20	214.00	45,500	3.14	6.9472E-03	4.3991		0.018	0.013	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	524.74	1.17	30.00	45,500	3.14	4.9557E-02	2.4764		0.060	0.045	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	454.95	1.01	30.00	45,500	3.14	4.9557E-02	2.4764		0.052	0.039	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	69.79	0.16	30.00	45,500	3.14	4.9557E-02	2.4764		0.008	0.006	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	524.74	1.17	214.00	45,500	3.14	6.9472E-03	4.3991		0.106	0.079	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	454.95	1.01	214.00	45,500	3.14	6.9472E-03	4.3991		0.092	0.069	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	69.79	0.16	214.00	45,500	3.14	6.9472E-03	4.3991		0.014	0.011	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12769**		**Total Acres**	198.50							
Permit Number =		**G**	**13178**		**Primary Acres**	172.10							
Applicant Name =			**Ritter (continued)**		**Supp Acres**	26.40							
					Priority	03-Feb-1992							
KLAM 999990 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	664.72	1.48	30.00	47,000	3.14	5.2878E-02	2.4147	0.074			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	576.31	1.28	30.00	47,000	3.14	5.2878E-02	2.4147	0.064			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	88.41	0.20	30.00	47,000	3.14	5.2878E-02	2.4147	0.010			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	664.72	1.48	214.00	47,000	3.14	7.4128E-03	4.3347	0.132			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	576.31	1.28	214.00	47,000	3.14	7.4128E-03	4.3347	0.115			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	88.41	0.20	214.00	47,000	3.14	7.4128E-03	4.3347	0.018			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	524.74	1.17	30.00	47,000	3.14	5.2878E-02	2.4147	0.058			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	454.95	1.01	30.00	47,000	3.14	5.2878E-02	2.4147	0.050			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	69.79	0.16	30.00	47,000	3.14	5.2878E-02	2.4147	0.008			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	524.74	1.17	214.00	47,000	3.14	7.4128E-03	4.3347	0.104			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	454.95	1.01	214.00	47,000	3.14	7.4128E-03	4.3347	0.090			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	69.79	0.16	214.00	47,000	3.14	7.4128E-03	4.3347	0.014			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 999990 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	664.72	1.48	30.00	47,900	3.14	5.4923E-02	2.3788		0.072	0.054	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	576.31	1.28	30.00	47,900	3.14	5.4923E-02	2.3788		0.063	0.047	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	88.41	0.20	30.00	47,900	3.14	5.4923E-02	2.3788		0.010	0.007	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	664.72	1.48	214.00	47,900	3.14	7.6995E-03	4.2971		0.131	0.098	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	576.31	1.28	214.00	47,900	3.14	7.6995E-03	4.2971		0.114	0.085	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	88.41	0.20	214.00	47,900	3.14	7.6995E-03	4.2971		0.017	0.013	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	524.74	1.17	30.00	47,900	3.14	5.4923E-02	2.3788		0.057	0.043	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	454.95	1.01	30.00	47,900	3.14	5.4923E-02	2.3788		0.050	0.037	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	69.79	0.16	30.00	47,900	3.14	5.4923E-02	2.3788		0.008	0.006	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	524.74	1.17	214.00	47,900	3.14	7.6995E-03	4.2971		0.103	0.078	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	454.95	1.01	214.00	47,900	3.14	7.6995E-03	4.2971		0.090	0.067	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	69.79	0.16	214.00	47,900	3.14	7.6995E-03	4.2971		0.014	0.010	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12897**		**Total Acres**	290.90							
Permit Number =		**G**	**12456**		**Primary Acres**	106.30							
Applicant Name =			**Gorden**		**Supp Acres**	184.60							
					Priority	30-Apr-1992							
KLAM 13458 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,633.74	3.64	30.00	17,300	3.14	7.1643E-03	4.3686	0.327			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	597.00	1.33	30.00	17,300	3.14	7.1643E-03	4.3686	0.120			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,036.74	2.31	30.00	17,300	3.14	7.1643E-03	4.3686	0.208			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,633.74	3.64	184.00	17,300	3.14	1.1681E-03	6.1763	0.463			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	597.00	1.33	184.00	17,300	3.14	1.1681E-03	6.1763	0.169			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,036.74	2.31	184.00	17,300	3.14	1.1681E-03	6.1763	0.294			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	894.38	1.99	30.00	17,300	3.14	7.1643E-03	4.3686	0.179			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	326.82	0.73	30.00	17,300	3.14	7.1643E-03	4.3686	0.065			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	567.56	1.26	30.00	17,300	3.14	7.1643E-03	4.3686	0.114			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	894.38	1.99	184.00	17,300	3.14	1.1681E-03	6.1763	0.253			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	326.82	0.73	184.00	17,300	3.14	1.1681E-03	6.1763	0.093			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	567.56	1.26	184.00	17,300	3.14	1.1681E-03	6.1763	0.161			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 13458 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,633.74	3.64	30.00	27,600	3.14	1.8235E-02	3.4454		0.258	0.194	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	597.00	1.33	30.00	27,600	3.14	1.8235E-02	3.4454		0.094	0.071	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,036.74	2.31	30.00	27,600	3.14	1.8235E-02	3.4454		0.164	0.123	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,633.74	3.64	184.00	27,600	3.14	2.9731E-03	5.2439		0.393	0.295	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	597.00	1.33	184.00	27,600	3.14	2.9731E-03	5.2439		0.143	0.108	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,036.74	2.31	184.00	27,600	3.14	2.9731E-03	5.2439		0.249	0.187	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	894.38	1.99	30.00	27,600	3.14	1.8235E-02	3.4454		0.141	0.106	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	326.82	0.73	30.00	27,600	3.14	1.8235E-02	3.4454		0.052	0.039	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	567.56	1.26	30.00	27,600	3.14	1.8235E-02	3.4454		0.090	0.067	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	894.38	1.99	184.00	27,600	3.14	2.9731E-03	5.2439		0.215	0.161	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	326.82	0.73	184.00	27,600	3.14	2.9731E-03	5.2439		0.079	0.059	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	567.56	1.26	184.00	27,600	3.14	2.9731E-03	5.2439		0.136	0.102	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12897**		**Total Acres**	290.90							
Permit Number =		**G**	**12456**		**Primary Acres**	106.30							
Applicant Name =			**Gorden (continued)**		**Supp Acres**	184.60							
					Priority	30-Apr-1992							
KLAM 999995 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,633.74	3.64	30.00	21,300	3.14	1.0860E-02	3.9563	0.296			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	597.00	1.33	30.00	21,300	3.14	1.0860E-02	3.9563	0.108			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,036.74	2.31	30.00	21,300	3.14	1.0860E-02	3.9563	0.188			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,633.74	3.64	184.00	21,300	3.14	1.7707E-03	5.7609	0.431			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	597.00	1.33	184.00	21,300	3.14	1.7707E-03	5.7609	0.158			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,036.74	2.31	184.00	21,300	3.14	1.7707E-03	5.7609	0.274			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	894.38	1.99	30.00	21,300	3.14	1.0860E-02	3.9563	0.162			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	326.82	0.73	30.00	21,300	3.14	1.0860E-02	3.9563	0.059			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	567.56	1.26	30.00	21,300	3.14	1.0860E-02	3.9563	0.103			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	894.38	1.99	184.00	21,300	3.14	1.7707E-03	5.7609	0.236			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	326.82	0.73	184.00	21,300	3.14	1.7707E-03	5.7609	0.086			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	567.56	1.26	184.00	21,300	3.14	1.7707E-03	5.7609	0.150			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 999995 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,633.74	3.64	30.00	31,500	3.14	2.3752E-02	3.1865		0.239	0.179	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	597.00	1.33	30.00	31,500	3.14	2.3752E-02	3.1865		0.087	0.065	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,036.74	2.31	30.00	31,500	3.14	2.3752E-02	3.1865		0.151	0.114	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,633.74	3.64	184.00	31,500	3.14	3.8726E-03	4.9805		0.373	0.280	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	597.00	1.33	184.00	31,500	3.14	3.8726E-03	4.9805		0.136	0.102	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,036.74	2.31	184.00	31,500	3.14	3.8726E-03	4.9805		0.237	0.178	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	894.38	1.99	30.00	31,500	3.14	2.3752E-02	3.1865		0.131	0.098	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	326.82	0.73	30.00	31,500	3.14	2.3752E-02	3.1865		0.048	0.036	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	567.56	1.26	30.00	31,500	3.14	2.3752E-02	3.1865		0.083	0.062	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	894.38	1.99	184.00	31,500	3.14	3.8726E-03	4.9805		0.204	0.153	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	326.82	0.73	184.00	31,500	3.14	3.8726E-03	4.9805		0.075	0.056	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	567.56	1.26	184.00	31,500	3.14	3.8726E-03	4.9805		0.130	0.097	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12617**		**Total Acres**	525.30							
Permit Number =		**G**	**12440**		**Primary Acres**	525.30							
Applicant Name =			**Newman & Uecker**		**Supp Acres**	0.00							
					Priority	22-Jul-1991							
KLAM 13462 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,640.93	3.66	30.00	16,800	3.14	6.7562E-03	4.4268	0.333			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,640.93	3.66	30.00	16,800	3.14	6.7562E-03	4.4268	0.333			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	16,800	3.14	6.7562E-03	4.4268	0.000			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,640.93	3.66	184.00	16,800	3.14	1.1015E-03	6.2349	0.469			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,640.93	3.66	184.00	16,800	3.14	1.1015E-03	6.2349	0.469			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	16,800	3.14	1.1015E-03	6.2349	0.000			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,615.05	3.60	30.00	16,800	3.14	6.7562E-03	4.4268	0.328			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,615.05	3.60	30.00	16,800	3.14	6.7562E-03	4.4268	0.328			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	16,800	3.14	6.7562E-03	4.4268	0.000			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,615.05	3.60	184.00	16,800	3.14	1.1015E-03	6.2349	0.462			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	1,615.05	3.60	184.00	16,800	3.14	1.1015E-03	6.2349	0.462			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	16,800	3.14	1.1015E-03	6.2349	0.000			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 13462 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,640.93	3.66	30.00	27,400	3.14	1.7971E-02	3.4596		0.260	0.195	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,640.93	3.66	30.00	27,400	3.14	1.7971E-02	3.4596		0.260	0.195	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	27,400	3.14	1.7971E-02	3.4596		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,640.93	3.66	184.00	27,400	3.14	2.9301E-03	5.2584		0.396	0.297	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,640.93	3.66	184.00	27,400	3.14	2.9301E-03	5.2584		0.396	0.297	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	27,400	3.14	2.9301E-03	5.2584		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,615.05	3.60	30.00	27,400	3.14	1.7971E-02	3.4596		0.256	0.192	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,615.05	3.60	30.00	27,400	3.14	1.7971E-02	3.4596		0.256	0.192	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	27,400	3.14	1.7971E-02	3.4596		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,615.05	3.60	184.00	27,400	3.14	2.9301E-03	5.2584		0.389	0.292	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	1,615.05	3.60	184.00	27,400	3.14	2.9301E-03	5.2584		0.389	0.292	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	27,400	3.14	2.9301E-03	5.2584		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12617**		**Total Acres**	525.30							
Permit Number =		**G**	**12440**		**Primary Acres**	525.30							
Applicant Name =			**Newman & Uecker (cont.)**		**Supp Acres**	0.00							
					Priority	22-Jul-1991							
KLAM 999997 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,640.93	3.66	30.00	19,600	3.14	9.1959E-03	4.1210	0.310			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,640.93	3.66	30.00	19,600	3.14	9.1959E-03	4.1210	0.310			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	19,600	3.14	9.1959E-03	4.1210	0.000			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,640.93	3.66	184.00	19,600	3.14	1.4993E-03	5.9270	0.446			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,640.93	3.66	184.00	19,600	3.14	1.4993E-03	5.9270	0.446			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	19,600	3.14	1.4993E-03	5.9270	0.000			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,615.05	3.60	30.00	19,600	3.14	9.1959E-03	4.1210	0.305			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,615.05	3.60	30.00	19,600	3.14	9.1959E-03	4.1210	0.305			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	19,600	3.14	9.1959E-03	4.1210	0.000			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,615.05	3.60	184.00	19,600	3.14	1.4993E-03	5.9270	0.439			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	1,615.05	3.60	184.00	19,600	3.14	1.4993E-03	5.9270	0.439			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	19,600	3.14	1.4993E-03	5.9270	0.000			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 999997 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,640.93	3.66	30.00	31,400	3.14	2.3602E-02	3.1927		0.240	0.180	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,640.93	3.66	30.00	31,400	3.14	2.3602E-02	3.1927		0.240	0.180	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	31,400	3.14	2.3602E-02	3.1927		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,640.93	3.66	184.00	31,400	3.14	3.8481E-03	4.9868		0.375	0.281	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,640.93	3.66	184.00	31,400	3.14	3.8481E-03	4.9868		0.375	0.281	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	31,400	3.14	3.8481E-03	4.9868		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,615.05	3.60	30.00	31,400	3.14	2.3602E-02	3.1927		0.236	0.177	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,615.05	3.60	30.00	31,400	3.14	2.3602E-02	3.1927		0.236	0.177	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	31,400	3.14	2.3602E-02	3.1927		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,615.05	3.60	184.00	31,400	3.14	3.8481E-03	4.9868		0.369	0.277	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	1,615.05	3.60	184.00	31,400	3.14	3.8481E-03	4.9868		0.369	0.277	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	31,400	3.14	3.8481E-03	4.9868		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12746**		**Total Acres**	332.20							
Permit Number =		**G**	**12445**		**Primary Acres**	139.00							
Applicant Name =			**Horsley**		**Supp Acres**	193.20							
					Priority	31-Dec-1991							
KLAM 13326 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,867.14	4.16	30.00	6,000	3.14	8.6176E-04	6.4802	0.555			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	781.25	1.74	30.00	6,000	3.14	8.6176E-04	6.4802	0.232			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,085.89	2.42	30.00	6,000	3.14	8.6176E-04	6.4802	0.323			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,867.14	4.16	184.00	6,000	3.14	1.4050E-04	8.2932	0.710			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	781.25	1.74	184.00	6,000	3.14	1.4050E-04	8.2932	0.297			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,085.89	2.42	184.00	6,000	3.14	1.4050E-04	8.2932	0.413			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,021.36	2.28	30.00	6,000	3.14	8.6176E-04	6.4802	0.303			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	427.36	0.95	30.00	6,000	3.14	8.6176E-04	6.4802	0.127			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	594.00	1.32	30.00	6,000	3.14	8.6176E-04	6.4802	0.176			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,021.36	2.28	184.00	6,000	3.14	1.4050E-04	8.2932	0.388			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	427.36	0.95	184.00	6,000	3.14	1.4050E-04	8.2932	0.162			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	594.00	1.32	184.00	6,000	3.14	1.4050E-04	8.2932	0.226			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 13326 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,867.14	4.16	30.00	9,600	3.14	2.2061E-03	5.5415		0.474	0.356	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	781.25	1.74	30.00	9,600	3.14	2.2061E-03	5.5415		0.198	0.149	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,085.89	2.42	30.00	9,600	3.14	2.2061E-03	5.5415		0.276	0.207	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,867.14	4.16	184.00	9,600	3.14	3.5969E-04	7.3534		0.629	0.472	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	781.25	1.74	184.00	9,600	3.14	3.5969E-04	7.3534		0.263	0.197	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,085.89	2.42	184.00	9,600	3.14	3.5969E-04	7.3534		0.366	0.275	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,021.36	2.28	30.00	9,600	3.14	2.2061E-03	5.5415		0.259	0.195	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	427.36	0.95	30.00	9,600	3.14	2.2061E-03	5.5415		0.109	0.081	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	594.00	1.32	30.00	9,600	3.14	2.2061E-03	5.5415		0.151	0.113	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,021.36	2.28	184.00	9,600	3.14	3.5969E-04	7.3534		0.344	0.258	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	427.36	0.95	184.00	9,600	3.14	3.5969E-04	7.3534		0.144	0.108	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	594.00	1.32	184.00	9,600	3.14	3.5969E-04	7.3534		0.200	0.150	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12746**		**Total Acres**	332.20							
Permit Number =		**G**	**12445**		**Primary Acres**	139.00							
Applicant Name =			**Horsley (continued)**		**Supp Acres**	193.20							
					Priority	31-Dec-1991							
KLAM 10440 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,867.14	4.16	30.00	2,200	3.14	1.1586E-04	8.4860	0.726			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	781.25	1.74	30.00	2,200	3.14	1.1586E-04	8.4860	0.304			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,085.89	2.42	30.00	2,200	3.14	1.1586E-04	8.4860	0.422			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,867.14	4.16	184.00	2,200	3.14	1.8890E-05	10.2997	0.881			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	781.25	1.74	184.00	2,200	3.14	1.8890E-05	10.2997	0.369			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,085.89	2.42	184.00	2,200	3.14	1.8890E-05	10.2997	0.513			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,021.36	2.28	30.00	2,200	3.14	1.1586E-04	8.4860	0.397			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	427.36	0.95	30.00	2,200	3.14	1.1586E-04	8.4860	0.166			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	594.00	1.32	30.00	2,200	3.14	1.1586E-04	8.4860	0.231			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,021.36	2.28	184.00	2,200	3.14	1.8890E-05	10.2997	0.482			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	427.36	0.95	184.00	2,200	3.14	1.8890E-05	10.2997	0.202			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	594.00	1.32	184.00	2,200	3.14	1.8890E-05	10.2997	0.280			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10440 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,867.14	4.16	30.00	5,700	3.14	7.7773E-04	6.5827		0.563	0.423	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	781.25	1.74	30.00	5,700	3.14	7.7773E-04	6.5827		0.236	0.177	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,085.89	2.42	30.00	5,700	3.14	7.7773E-04	6.5827		0.328	0.246	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,867.14	4.16	184.00	5,700	3.14	1.2680E-04	8.3958		0.719	0.539	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	781.25	1.74	184.00	5,700	3.14	1.2680E-04	8.3958		0.301	0.225	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,085.89	2.42	184.00	5,700	3.14	1.2680E-04	8.3958		0.418	0.313	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,021.36	2.28	30.00	5,700	3.14	7.7773E-04	6.5827		0.308	0.231	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	427.36	0.95	30.00	5,700	3.14	7.7773E-04	6.5827		0.129	0.097	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	594.00	1.32	30.00	5,700	3.14	7.7773E-04	6.5827		0.179	0.134	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,021.36	2.28	184.00	5,700	3.14	1.2680E-04	8.3958		0.393	0.295	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	427.36	0.95	184.00	5,700	3.14	1.2680E-04	8.3958		0.164	0.123	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	594.00	1.32	184.00	5,700	3.14	1.2680E-04	8.3958		0.229	0.171	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12735**		**Total Acres**	156.10							
Permit Number =		**G**	**12444**		**Primary Acres**	35.30							
Applicant Name =			**Teague**		**Supp Acres**	120.80							
					Priority	19-Dec-1991							
KLAM 10352 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	873.87	1.95	30.00	7,000	3.14	1.1729E-03	6.1722	0.247			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	197.61	0.44	30.00	7,000	3.14	1.1729E-03	6.1722	0.056			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	676.26	1.51	30.00	7,000	3.14	1.1729E-03	6.1722	0.191			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	873.87	1.95	184.00	7,000	3.14	1.9124E-04	7.9850	0.320			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	197.61	0.44	184.00	7,000	3.14	1.9124E-04	7.9850	0.072			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	676.26	1.51	184.00	7,000	3.14	1.9124E-04	7.9850	0.248			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	479.93	1.07	30.00	7,000	3.14	1.1729E-03	6.1722	0.136			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	108.53	0.24	30.00	7,000	3.14	1.1729E-03	6.1722	0.031			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	371.40	0.83	30.00	7,000	3.14	1.1729E-03	6.1722	0.105			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	479.93	1.07	184.00	7,000	3.14	1.9124E-04	7.9850	0.176			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	108.53	0.24	184.00	7,000	3.14	1.9124E-04	7.9850	0.040			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	371.40	0.83	184.00	7,000	3.14	1.9124E-04	7.9850	0.136			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10352 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	873.87	1.95	30.00	8,000	3.14	1.5320E-03	5.9055		0.237	0.177	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	197.61	0.44	30.00	8,000	3.14	1.5320E-03	5.9055		0.053	0.040	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	676.26	1.51	30.00	8,000	3.14	1.5320E-03	5.9055		0.183	0.137	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	873.87	1.95	184.00	8,000	3.14	2.4978E-04	7.7179		0.309	0.232	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	197.61	0.44	184.00	8,000	3.14	2.4978E-04	7.7179		0.070	0.052	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	676.26	1.51	184.00	8,000	3.14	2.4978E-04	7.7179		0.239	0.179	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	479.93	1.07	30.00	8,000	3.14	1.5320E-03	5.9055		0.130	0.097	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	108.53	0.24	30.00	8,000	3.14	1.5320E-03	5.9055		0.029	0.022	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	371.40	0.83	30.00	8,000	3.14	1.5320E-03	5.9055		0.101	0.075	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	479.93	1.07	184.00	8,000	3.14	2.4978E-04	7.7179		0.170	0.127	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	108.53	0.24	184.00	8,000	3.14	2.4978E-04	7.7179		0.038	0.029	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	371.40	0.83	184.00	8,000	3.14	2.4978E-04	7.7179		0.131	0.099	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12735**		**Total Acres**	156.10							
Permit Number =		**G**	**12444**		**Primary Acres**	35.30							
Applicant Name =			**Teague (continued)**		**Supp Acres**	120.80							
					Priority	19-Dec-1991							
KLAM 10357 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	873.87	1.95	30.00	6,300	3.14	9.5009E-04	6.3827	0.256			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	197.61	0.44	30.00	6,300	3.14	9.5009E-04	6.3827	0.058			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	676.26	1.51	30.00	6,300	3.14	9.5009E-04	6.3827	0.198			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	873.87	1.95	184.00	6,300	3.14	1.5491E-04	8.1956	0.328			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	197.61	0.44	184.00	6,300	3.14	1.5491E-04	8.1956	0.074			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	676.26	1.51	184.00	6,300	3.14	1.5491E-04	8.1956	0.254			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	479.93	1.07	30.00	6,300	3.14	9.5009E-04	6.3827	0.140			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	108.53	0.24	30.00	6,300	3.14	9.5009E-04	6.3827	0.032			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	371.40	0.83	30.00	6,300	3.14	9.5009E-04	6.3827	0.109			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	479.93	1.07	184.00	6,300	3.14	1.5491E-04	8.1956	0.180			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	108.53	0.24	184.00	6,300	3.14	1.5491E-04	8.1956	0.041			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	371.40	0.83	184.00	6,300	3.14	1.5491E-04	8.1956	0.140			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10357 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	873.87	1.95	30.00	7,300	3.14	1.2756E-03	6.0884		0.244	0.183	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	197.61	0.44	30.00	7,300	3.14	1.2756E-03	6.0884		0.055	0.041	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	676.26	1.51	30.00	7,300	3.14	1.2756E-03	6.0884		0.189	0.142	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	873.87	1.95	184.00	7,300	3.14	2.0798E-04	7.9010		0.316	0.237	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	197.61	0.44	184.00	7,300	3.14	2.0798E-04	7.9010		0.072	0.054	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	676.26	1.51	184.00	7,300	3.14	2.0798E-04	7.9010		0.245	0.184	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	479.93	1.07	30.00	7,300	3.14	1.2756E-03	6.0884		0.134	0.100	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	108.53	0.24	30.00	7,300	3.14	1.2756E-03	6.0884		0.030	0.023	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	371.40	0.83	30.00	7,300	3.14	1.2756E-03	6.0884		0.104	0.078	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	479.93	1.07	184.00	7,300	3.14	2.0798E-04	7.9010		0.174	0.130	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	108.53	0.24	184.00	7,300	3.14	2.0798E-04	7.9010		0.039	0.029	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	371.40	0.83	184.00	7,300	3.14	2.0798E-04	7.9010		0.135	0.101	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654
r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12876**		**Total Acres**	265.10							
Permit Number =		**G**	**12453**		**Primary Acres**	0.00							
Applicant Name =			**Masten**		**Supp Acres**	265.10							
					Priority	15-Apr-1992							
KLAM 10461 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,485.63	3.31	30.00	4,200	3.14	4.2226E-04	7.1931	0.490			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	4,200	3.14	4.2226E-04	7.1931	0.000			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,485.63	3.31	30.00	4,200	3.14	4.2226E-04	7.1931	0.490			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,485.63	3.31	184.00	4,200	3.14	6.8847E-05	9.0065	0.613			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	4,200	3.14	6.8847E-05	9.0065	0.000			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,485.63	3.31	184.00	4,200	3.14	6.8847E-05	9.0065	0.613			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	815.06	1.82	30.00	4,200	3.14	4.2226E-04	7.1931	0.269			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	4,200	3.14	4.2226E-04	7.1931	0.000			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	815.06	1.82	30.00	4,200	3.14	4.2226E-04	7.1931	0.269			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	815.06	1.82	184.00	4,200	3.14	6.8847E-05	9.0065	0.336			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	4,200	3.14	6.8847E-05	9.0065	0.000			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	815.06	1.82	184.00	4,200	3.14	6.8847E-05	9.0065	0.336			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10461 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,485.63	3.31	30.00	6,000	3.14	8.6176E-04	6.4802		0.441	0.331	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	6,000	3.14	8.6176E-04	6.4802		0.000	0.000	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,485.63	3.31	30.00	6,000	3.14	8.6176E-04	6.4802		0.441	0.331	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,485.63	3.31	184.00	6,000	3.14	1.4050E-04	8.2932		0.565	0.424	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	6,000	3.14	1.4050E-04	8.2932		0.000	0.000	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,485.63	3.31	184.00	6,000	3.14	1.4050E-04	8.2932		0.565	0.424	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	815.06	1.82	30.00	6,000	3.14	8.6176E-04	6.4802		0.242	0.182	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	6,000	3.14	8.6176E-04	6.4802		0.000	0.000	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	815.06	1.82	30.00	6,000	3.14	8.6176E-04	6.4802		0.242	0.182	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	815.06	1.82	184.00	6,000	3.14	1.4050E-04	8.2932		0.310	0.232	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	6,000	3.14	1.4050E-04	8.2932		0.000	0.000	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	815.06	1.82	184.00	6,000	3.14	1.4050E-04	8.2932		0.310	0.232	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12955**		**Total Acres**	407.70							
Permit Number =		**G**	**12457**		**Primary Acres**	91.50							
Applicant Name =			**Brock**		**Supp Acres**	316.20							
					Priority	04-Jun-1992							
KLAM 10421 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	2,001.79	4.46	30.00	8,400	3.14	1.6890E-03	5.8081	0.533			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	449.26	1.00	30.00	8,400	3.14	1.6890E-03	5.8081	0.120			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,552.53	3.46	30.00	8,400	3.14	1.6890E-03	5.8081	0.413			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	2,001.79	4.46	184.00	8,400	3.14	2.7539E-04	7.6204	0.699			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	449.26	1.00	184.00	8,400	3.14	2.7539E-04	7.6204	0.157			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,552.53	3.46	184.00	8,400	3.14	2.7539E-04	7.6204	0.542			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,253.49	2.79	30.00	8,400	3.14	1.6890E-03	5.8081	0.334			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	281.32	0.63	30.00	8,400	3.14	1.6890E-03	5.8081	0.075			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	972.17	2.17	30.00	8,400	3.14	1.6890E-03	5.8081	0.259			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,253.49	2.79	184.00	8,400	3.14	2.7539E-04	7.6204	0.438			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	281.32	0.63	184.00	8,400	3.14	2.7539E-04	7.6204	0.098			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	972.17	2.17	184.00	8,400	3.14	2.7539E-04	7.6204	0.340			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10421 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	2,001.79	4.46	30.00	8,800	3.14	1.8537E-03	5.7152		0.524	0.393	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	449.26	1.00	30.00	8,800	3.14	1.8537E-03	5.7152		0.118	0.088	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,552.53	3.46	30.00	8,800	3.14	1.8537E-03	5.7152		0.407	0.305	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	2,001.79	4.46	184.00	8,800	3.14	3.0224E-04	7.5274		0.691	0.518	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	449.26	1.00	184.00	8,800	3.14	3.0224E-04	7.5274		0.155	0.116	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,552.53	3.46	184.00	8,800	3.14	3.0224E-04	7.5274		0.536	0.402	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,253.49	2.79	30.00	8,800	3.14	1.8537E-03	5.7152		0.328	0.246	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	281.32	0.63	30.00	8,800	3.14	1.8537E-03	5.7152		0.074	0.055	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	972.17	2.17	30.00	8,800	3.14	1.8537E-03	5.7152		0.255	0.191	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,253.49	2.79	184.00	8,800	3.14	3.0224E-04	7.5274		0.432	0.324	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	281.32	0.63	184.00	8,800	3.14	3.0224E-04	7.5274		0.097	0.073	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	972.17	2.17	184.00	8,800	3.14	3.0224E-04	7.5274		0.335	0.252	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12877**		**Total Acres**	562.30							
Permit Number =		**G**	**12454**		**Primary Acres**	188.80							
Applicant Name =			**Masten**		**Supp Acres**	373.50							
					Priority	15-Apr-1992							
KLAM 10475 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	3,155.28	7.03	30.00	8,100	3.14	1.5706E-03	5.8807	0.851			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,059.43	2.36	30.00	8,100	3.14	1.5706E-03	5.8807	0.286			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	2,095.85	4.67	30.00	8,100	3.14	1.5706E-03	5.8807	0.565			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	3,155.28	7.03	184.00	8,100	3.14	2.5607E-04	7.6931	1.113			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,059.43	2.36	184.00	8,100	3.14	2.5607E-04	7.6931	0.374			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	2,095.85	4.67	184.00	8,100	3.14	2.5607E-04	7.6931	0.739			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,728.81	3.85	30.00	8,100	3.14	1.5706E-03	5.8807	0.466			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	580.47	1.29	30.00	8,100	3.14	1.5706E-03	5.8807	0.156			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,148.34	2.56	30.00	8,100	3.14	1.5706E-03	5.8807	0.310			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,728.81	3.85	184.00	8,100	3.14	2.5607E-04	7.6931	0.610			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	580.47	1.29	184.00	8,100	3.14	2.5607E-04	7.6931	0.205			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	1,148.34	2.56	184.00	8,100	3.14	2.5607E-04	7.6931	0.405			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10475 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	3,155.28	7.03	30.00	11,200	3.14	3.0027E-03	5.2340		0.757	0.568	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,059.43	2.36	30.00	11,200	3.14	3.0027E-03	5.2340		0.254	0.191	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	2,095.85	4.67	30.00	11,200	3.14	3.0027E-03	5.2340		0.503	0.377	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	3,155.28	7.03	184.00	11,200	3.14	4.8958E-04	7.0452		1.019	0.764	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,059.43	2.36	184.00	11,200	3.14	4.8958E-04	7.0452		0.342	0.257	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	2,095.85	4.67	184.00	11,200	3.14	4.8958E-04	7.0452		0.677	0.508	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,728.81	3.85	30.00	11,200	3.14	3.0027E-03	5.2340		0.415	0.311	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	580.47	1.29	30.00	11,200	3.14	3.0027E-03	5.2340		0.139	0.104	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,148.34	2.56	30.00	11,200	3.14	3.0027E-03	5.2340		0.275	0.207	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,728.81	3.85	184.00	11,200	3.14	4.8958E-04	7.0452		0.558	0.419	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	580.47	1.29	184.00	11,200	3.14	4.8958E-04	7.0452		0.187	0.141	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	1,148.34	2.56	184.00	11,200	3.14	4.8958E-04	7.0452		0.371	0.278	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12877**		**Total Acres**	562.30							
Permit Number =		**G**	**12454**		**Primary Acres**	188.80							
Applicant Name =			**Masten (continued)**		**Supp Acres**	373.50							
					Priority	15-Apr-1992							
KLAM 10460 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	3,155.28	7.03	30.00	5,600	3.14	7.5069E-04	6.6181	0.957			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,059.43	2.36	30.00	5,600	3.14	7.5069E-04	6.6181	0.321			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	2,095.85	4.67	30.00	5,600	3.14	7.5069E-04	6.6181	0.636			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	3,155.28	7.03	184.00	5,600	3.14	1.2239E-04	8.4312	1.219			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,059.43	2.36	184.00	5,600	3.14	1.2239E-04	8.4312	0.409			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	2,095.85	4.67	184.00	5,600	3.14	1.2239E-04	8.4312	0.810			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,728.81	3.85	30.00	5,600	3.14	7.5069E-04	6.6181	0.524			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	580.47	1.29	30.00	5,600	3.14	7.5069E-04	6.6181	0.176			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,148.34	2.56	30.00	5,600	3.14	7.5069E-04	6.6181	0.348			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,728.81	3.85	184.00	5,600	3.14	1.2239E-04	8.4312	0.668			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	580.47	1.29	184.00	5,600	3.14	1.2239E-04	8.4312	0.224			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	1,148.34	2.56	184.00	5,600	3.14	1.2239E-04	8.4312	0.444			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10460 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	3,155.28	7.03	30.00	7,100	3.14	1.2067E-03	6.1439		0.889	0.666	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,059.43	2.36	30.00	7,100	3.14	1.2067E-03	6.1439		0.298	0.224	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	2,095.85	4.67	30.00	7,100	3.14	1.2067E-03	6.1439		0.590	0.443	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	3,155.28	7.03	184.00	7,100	3.14	1.9674E-04	7.9566		1.151	0.863	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,059.43	2.36	184.00	7,100	3.14	1.9674E-04	7.9566		0.386	0.290	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	2,095.85	4.67	184.00	7,100	3.14	1.9674E-04	7.9566		0.764	0.573	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,728.81	3.85	30.00	7,100	3.14	1.2067E-03	6.1439		0.487	0.365	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	580.47	1.29	30.00	7,100	3.14	1.2067E-03	6.1439		0.163	0.123	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,148.34	2.56	30.00	7,100	3.14	1.2067E-03	6.1439		0.323	0.243	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,728.81	3.85	184.00	7,100	3.14	1.9674E-04	7.9566		0.631	0.473	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	580.47	1.29	184.00	7,100	3.14	1.9674E-04	7.9566		0.212	0.159	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	1,148.34	2.56	184.00	7,100	3.14	1.9674E-04	7.9566		0.419	0.314	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
	Application Number =	**G**	**12518**		**Total Acres**	40.10							
	Permit Number =	**G**	**12469**		**Primary Acres**	40.10							
	Applicant Name =		**Wells**		**Supp Acres**	0.00							
					Priority	06-May-1991							
KLAM 10242 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	224.42	0.50	30.00	2,100	3.14	1.0557E-04	8.5791	0.088			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	224.42	0.50	30.00	2,100	3.14	1.0557E-04	8.5791	0.088			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	2,100	3.14	1.0557E-04	8.5791	0.000			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	224.42	0.50	184.00	2,100	3.14	1.7212E-05	10.3927	0.107			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	224.42	0.50	184.00	2,100	3.14	1.7212E-05	10.3927	0.107			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	2,100	3.14	1.7212E-05	10.3927	0.000			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	123.29	0.27	30.00	2,100	3.14	1.0557E-04	8.5791	0.048			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	123.29	0.27	30.00	2,100	3.14	1.0557E-04	8.5791	0.048			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	2,100	3.14	1.0557E-04	8.5791	0.000			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	123.29	0.27	184.00	2,100	3.14	1.7212E-05	10.3927	0.059			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	123.29	0.27	184.00	2,100	3.14	1.7212E-05	10.3927	0.059			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	2,100	3.14	1.7212E-05	10.3927	0.000			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10242 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	224.42	0.50	30.00	3,100	3.14	2.3004E-04	7.8003		0.080	0.060	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	224.42	0.50	30.00	3,100	3.14	2.3004E-04	7.8003		0.080	0.060	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	3,100	3.14	2.3004E-04	7.8003		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	224.42	0.50	184.00	3,100	3.14	3.7507E-05	9.6138		0.099	0.074	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	224.42	0.50	184.00	3,100	3.14	3.7507E-05	9.6138		0.099	0.074	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	3,100	3.14	3.7507E-05	9.6138		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	123.29	0.27	30.00	3,100	3.14	2.3004E-04	7.8003		0.044	0.033	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	123.29	0.27	30.00	3,100	3.14	2.3004E-04	7.8003		0.044	0.033	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	3,100	3.14	2.3004E-04	7.8003		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	123.29	0.27	184.00	3,100	3.14	3.7507E-05	9.6138		0.054	0.041	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	123.29	0.27	184.00	3,100	3.14	3.7507E-05	9.6138		0.054	0.041	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	3,100	3.14	3.7507E-05	9.6138		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12814**		**Total Acres**	118.90							
Permit Number =		**G**	**12449**		**Primary Acres**	118.90							
Applicant Name =			**Manning**		**Supp Acres**	0.00							
					Priority	09-Mar-1992							
KLAM 10416 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	666.96	1.49	30.00	600	3.14	8.6176E-06	11.0845	0.339			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	666.96	1.49	30.00	600	3.14	8.6176E-06	11.0845	0.339			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	600	3.14	8.6176E-06	11.0845	0.000			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	666.96	1.49	184.00	600	3.14	1.4050E-06	12.8982	0.394			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	666.96	1.49	184.00	600	3.14	1.4050E-06	12.8982	0.394			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	600	3.14	1.4050E-06	12.8982	0.000			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	365.56	0.81	30.00	600	3.14	8.6176E-06	11.0845	0.186			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	365.56	0.81	30.00	600	3.14	8.6176E-06	11.0845	0.186			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	600	3.14	8.6176E-06	11.0845	0.000			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	365.56	0.81	184.00	600	3.14	1.4050E-06	12.8982	0.216			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	365.56	0.81	184.00	600	3.14	1.4050E-06	12.8982	0.216			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	600	3.14	1.4050E-06	12.8982	0.000			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10416 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	666.96	1.49	30.00	2,900	3.14	2.0132E-04	7.9336		0.243	0.182	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	666.96	1.49	30.00	2,900	3.14	2.0132E-04	7.9336		0.243	0.182	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	2,900	3.14	2.0132E-04	7.9336		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	666.96	1.49	184.00	2,900	3.14	3.2823E-05	9.7472		0.298	0.223	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	666.96	1.49	184.00	2,900	3.14	3.2823E-05	9.7472		0.298	0.223	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	2,900	3.14	3.2823E-05	9.7472		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	365.56	0.81	30.00	2,900	3.14	2.0132E-04	7.9336		0.133	0.100	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	365.56	0.81	30.00	2,900	3.14	2.0132E-04	7.9336		0.133	0.100	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	2,900	3.14	2.0132E-04	7.9336		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	365.56	0.81	184.00	2,900	3.14	3.2823E-05	9.7472		0.163	0.122	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	365.56	0.81	184.00	2,900	3.14	3.2823E-05	9.7472		0.163	0.122	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	2,900	3.14	3.2823E-05	9.7472		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12766**		**Total Acres**	96.00							
Permit Number =		**G**	**12446**		**Primary Acres**	96.00							
Applicant Name =			**Hill**		**Supp Acres**	0.00							
					Priority	24-Jan-1992							
KLAM 999976 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	538.60	1.20	30.00	1,500	3.14	5.3860E-05	9.2520	0.228			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	538.60	1.20	30.00	1,500	3.14	5.3860E-05	9.2520	0.228			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	1,500	3.14	5.3860E-05	9.2520	0.000			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	538.60	1.20	184.00	1,500	3.14	8.7815E-06	11.0657	0.273			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	538.60	1.20	184.00	1,500	3.14	8.7815E-06	11.0657	0.273			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	1,500	3.14	8.7815E-06	11.0657	0.000			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	295.16	0.66	30.00	1,500	3.14	5.3860E-05	9.2520	0.125			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	295.16	0.66	30.00	1,500	3.14	5.3860E-05	9.2520	0.125			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	1,500	3.14	5.3860E-05	9.2520	0.000			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	295.16	0.66	184.00	1,500	3.14	8.7815E-06	11.0657	0.150			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	295.16	0.66	184.00	1,500	3.14	8.7815E-06	11.0657	0.150			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	1,500	3.14	8.7815E-06	11.0657	0.000			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 999976 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	538.60	1.20	30.00	3,100	3.14	2.3004E-04	7.8003		0.193	0.144	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	538.60	1.20	30.00	3,100	3.14	2.3004E-04	7.8003		0.193	0.144	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	3,100	3.14	2.3004E-04	7.8003		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	538.60	1.20	184.00	3,100	3.14	3.7507E-05	9.6138		0.237	0.178	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	538.60	1.20	184.00	3,100	3.14	3.7507E-05	9.6138		0.237	0.178	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	3,100	3.14	3.7507E-05	9.6138		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	295.16	0.66	30.00	3,100	3.14	2.3004E-04	7.8003		0.106	0.079	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	295.16	0.66	30.00	3,100	3.14	2.3004E-04	7.8003		0.106	0.079	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	3,100	3.14	2.3004E-04	7.8003		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	295.16	0.66	184.00	3,100	3.14	3.7507E-05	9.6138		0.130	0.098	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	295.16	0.66	184.00	3,100	3.14	3.7507E-05	9.6138		0.130	0.098	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	3,100	3.14	3.7507E-05	9.6138		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12507**		**Total Acres**	229.30							
Permit Number =		**G**	**12439**		**Primary Acres**	229.30							
Applicant Name =			**Babson**		**Supp Acres**	0.00							
					Priority	26-Apr-1991							
KLAM 13403 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,286.35	2.87	30.00	2,300	3.14	1.2663E-04	8.3972	0.495			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,286.35	2.87	30.00	2,300	3.14	1.2663E-04	8.3972	0.495			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	2,300	3.14	1.2663E-04	8.3972	0.000			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,286.35	2.87	184.00	2,300	3.14	2.0646E-05	10.2108	0.602			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,286.35	2.87	184.00	2,300	3.14	2.0646E-05	10.2108	0.602			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	2,300	3.14	2.0646E-05	10.2108	0.000			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	704.99	1.57	30.00	2,300	3.14	1.2663E-04	8.3972	0.271			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	704.99	1.57	30.00	2,300	3.14	1.2663E-04	8.3972	0.271			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	2,300	3.14	1.2663E-04	8.3972	0.000			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	704.99	1.57	184.00	2,300	3.14	2.0646E-05	10.2108	0.330			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	704.99	1.57	184.00	2,300	3.14	2.0646E-05	10.2108	0.330			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	2,300	3.14	2.0646E-05	10.2108	0.000			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 13403 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,286.35	2.87	30.00	10,700	3.14	2.7406E-03	5.3251		0.314	0.235	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,286.35	2.87	30.00	10,700	3.14	2.7406E-03	5.3251		0.314	0.235	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	10,700	3.14	2.7406E-03	5.3251		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,286.35	2.87	184.00	10,700	3.14	4.4684E-04	7.1365		0.421	0.316	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,286.35	2.87	184.00	10,700	3.14	4.4684E-04	7.1365		0.421	0.316	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	10,700	3.14	4.4684E-04	7.1365		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	704.99	1.57	30.00	10,700	3.14	2.7406E-03	5.3251		0.172	0.129	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	704.99	1.57	30.00	10,700	3.14	2.7406E-03	5.3251		0.172	0.129	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	10,700	3.14	2.7406E-03	5.3251		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	704.99	1.57	184.00	10,700	3.14	4.4684E-04	7.1365		0.231	0.173	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	704.99	1.57	184.00	10,700	3.14	4.4684E-04	7.1365		0.231	0.173	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	10,700	3.14	4.4684E-04	7.1365		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12732**		**Total Acres**	350.40							
Permit Number =		**G**	**12443**		**Primary Acres**	350.40							
Applicant Name =			**Wiersma**		**Supp Acres**	0.00							
					Priority	12-Dec-1991							
KLAM 10378 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,965.88	4.38	30.00	600	3.14	8.6176E-06	11.0845	0.999			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,965.88	4.38	30.00	600	3.14	8.6176E-06	11.0845	0.999			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	600	3.14	8.6176E-06	11.0845	0.000			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,965.88	4.38	184.00	600	3.14	1.4050E-06	12.8982	1.162			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,965.88	4.38	184.00	600	3.14	1.4050E-06	12.8982	1.162			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	600	3.14	1.4050E-06	12.8982	0.000			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,077.32	2.40	30.00	600	3.14	8.6176E-06	11.0845	0.547			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,077.32	2.40	30.00	600	3.14	8.6176E-06	11.0845	0.547			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	600	3.14	8.6176E-06	11.0845	0.000			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,077.32	2.40	184.00	600	3.14	1.4050E-06	12.8982	0.637			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	1,077.32	2.40	184.00	600	3.14	1.4050E-06	12.8982	0.637			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	600	3.14	1.4050E-06	12.8982	0.000			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10378 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,965.88	4.38	30.00	2,200	3.14	1.1586E-04	8.4860		0.765	0.574	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,965.88	4.38	30.00	2,200	3.14	1.1586E-04	8.4860		0.765	0.574	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	2,200	3.14	1.1586E-04	8.4860		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,965.88	4.38	184.00	2,200	3.14	1.8890E-05	10.2997		0.928	0.696	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,965.88	4.38	184.00	2,200	3.14	1.8890E-05	10.2997		0.928	0.696	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	2,200	3.14	1.8890E-05	10.2997		0.000	0.000	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,077.32	2.40	30.00	2,200	3.14	1.1586E-04	8.4860		0.419	0.314	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,077.32	2.40	30.00	2,200	3.14	1.1586E-04	8.4860		0.419	0.314	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	0.00	0.00	30.00	2,200	3.14	1.1586E-04	8.4860		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,077.32	2.40	184.00	2,200	3.14	1.8890E-05	10.2997		0.509	0.381	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	1,077.32	2.40	184.00	2,200	3.14	1.8890E-05	10.2997		0.509	0.381	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	0.00	0.00	184.00	2,200	3.14	1.8890E-05	10.2997		0.000	0.000	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12768**		**Total Acres**	636.90							
Permit Number =		**G**	**12447**		**Primary Acres**	93.70							
Applicant Name =			**DeJong**		**Supp Acres**	543.20							
					Priority	03-Feb-1992							
KLAM 10431 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	3,572.69	7.96	30.00	2,800	3.14	1.8767E-04	8.0038	1.311			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	525.61	1.17	30.00	2,800	3.14	1.8767E-04	8.0038	0.193			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	3,047.08	6.79	30.00	2,800	3.14	1.8767E-04	8.0038	1.118			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	3,572.69	7.96	184.00	2,800	3.14	3.0599E-05	9.8174	1.608			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	525.61	1.17	184.00	2,800	3.14	3.0599E-05	9.8174	0.237			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	3,047.08	6.79	184.00	2,800	3.14	3.0599E-05	9.8174	1.371			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,958.17	4.36	30.00	2,800	3.14	1.8767E-04	8.0038	0.718			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	288.08	0.64	30.00	2,800	3.14	1.8767E-04	8.0038	0.106			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,670.09	3.72	30.00	2,800	3.14	1.8767E-04	8.0038	0.613			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,958.17	4.36	184.00	2,800	3.14	3.0599E-05	9.8174	0.881			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	288.08	0.64	184.00	2,800	3.14	3.0599E-05	9.8174	0.130			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	1,670.09	3.72	184.00	2,800	3.14	3.0599E-05	9.8174	0.752			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10431 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	3,572.69	7.96	30.00	5,800	3.14	8.0526E-04	6.5479		1.072	0.804	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	525.61	1.17	30.00	5,800	3.14	8.0526E-04	6.5479		0.158	0.118	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	3,047.08	6.79	30.00	5,800	3.14	8.0526E-04	6.5479		0.915	0.686	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	3,572.69	7.96	184.00	5,800	3.14	1.3129E-04	8.3610		1.369	1.027	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	525.61	1.17	184.00	5,800	3.14	1.3129E-04	8.3610		0.201	0.151	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	3,047.08	6.79	184.00	5,800	3.14	1.3129E-04	8.3610		1.168	0.876	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,958.17	4.36	30.00	5,800	3.14	8.0526E-04	6.5479		0.588	0.441	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	288.08	0.64	30.00	5,800	3.14	8.0526E-04	6.5479		0.086	0.065	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,670.09	3.72	30.00	5,800	3.14	8.0526E-04	6.5479		0.501	0.376	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,958.17	4.36	184.00	5,800	3.14	1.3129E-04	8.3610		0.750	0.563	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	288.08	0.64	184.00	5,800	3.14	1.3129E-04	8.3610		0.110	0.083	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	1,670.09	3.72	184.00	5,800	3.14	1.3129E-04	8.3610		0.640	0.480	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12768**		**Total Acres**	636.90							
Permit Number =		**G**	**12447**		**Primary Acres**	93.70							
Applicant Name =			**DeJong (continued)**		**Supp Acres**	543.20							
					Priority	03-Feb-1992							
KLAM 10432 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	3,572.69	7.96	30.00	1,600	3.14	6.1280E-05	9.1229	1.494			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	525.61	1.17	30.00	1,600	3.14	6.1280E-05	9.1229	0.220			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	3,047.08	6.79	30.00	1,600	3.14	6.1280E-05	9.1229	1.274			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	3,572.69	7.96	184.00	1,600	3.14	9.9914E-06	10.9366	1.791			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	525.61	1.17	184.00	1,600	3.14	9.9914E-06	10.9366	0.263			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	3,047.08	6.79	184.00	1,600	3.14	9.9914E-06	10.9366	1.527			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,958.17	4.36	30.00	1,600	3.14	6.1280E-05	9.1229	0.819			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	288.08	0.64	30.00	1,600	3.14	6.1280E-05	9.1229	0.120			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,670.09	3.72	30.00	1,600	3.14	6.1280E-05	9.1229	0.698			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,958.17	4.36	184.00	1,600	3.14	9.9914E-06	10.9366	0.982			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	288.08	0.64	184.00	1,600	3.14	9.9914E-06	10.9366	0.144			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	1,670.09	3.72	184.00	1,600	3.14	9.9914E-06	10.9366	0.837			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10432 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	3,572.69	7.96	30.00	10,500	3.14	2.6391E-03	5.3627		0.878	0.659	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	525.61	1.17	30.00	10,500	3.14	2.6391E-03	5.3627		0.129	0.097	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	3,047.08	6.79	30.00	10,500	3.14	2.6391E-03	5.3627		0.749	0.562	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	3,572.69	7.96	184.00	10,500	3.14	4.3029E-04	7.1743		1.175	0.881	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	525.61	1.17	184.00	10,500	3.14	4.3029E-04	7.1743		0.173	0.130	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	3,047.08	6.79	184.00	10,500	3.14	4.3029E-04	7.1743		1.002	0.752	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,958.17	4.36	30.00	10,500	3.14	2.6391E-03	5.3627		0.481	0.361	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	288.08	0.64	30.00	10,500	3.14	2.6391E-03	5.3627		0.071	0.053	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,670.09	3.72	30.00	10,500	3.14	2.6391E-03	5.3627		0.411	0.308	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,958.17	4.36	184.00	10,500	3.14	4.3029E-04	7.1743		0.644	0.483	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	288.08	0.64	184.00	10,500	3.14	4.3029E-04	7.1743		0.095	0.071	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	1,670.09	3.72	184.00	10,500	3.14	4.3029E-04	7.1743		0.549	0.412	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12874**		**Total Acres**	248.70							
Permit Number =		**G**	**12452**		**Primary Acres**	68.30							
Applicant Name =			**Masten**		**Supp Acres**	180.40							
					Priority	14-Apr-1992							
KLAM 10498 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,799.81	4.01	30.00	3,700	3.14	3.2771E-04	7.4465	0.614			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	494.28	1.10	30.00	3,700	3.14	3.2771E-04	7.4465	0.169			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,305.53	2.91	30.00	3,700	3.14	3.2771E-04	7.4465	0.446			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,799.81	4.01	184.00	3,700	3.14	5.3430E-05	9.2600	0.764			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	494.28	1.10	184.00	3,700	3.14	5.3430E-05	9.2600	0.210			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,305.53	2.91	184.00	3,700	3.14	5.3430E-05	9.2600	0.554			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	764.64	1.70	30.00	3,700	3.14	3.2771E-04	7.4465	0.261			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	209.99	0.47	30.00	3,700	3.14	3.2771E-04	7.4465	0.072			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	554.65	1.24	30.00	3,700	3.14	3.2771E-04	7.4465	0.189			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	764.64	1.70	184.00	3,700	3.14	5.3430E-05	9.2600	0.325			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	209.99	0.47	184.00	3,700	3.14	5.3430E-05	9.2600	0.089			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	554.65	1.24	184.00	3,700	3.14	5.3430E-05	9.2600	0.235			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10498 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	1,799.81	4.01	30.00	17,200	3.14	7.0817E-03	4.3801		0.361	0.271	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	494.28	1.10	30.00	17,200	3.14	7.0817E-03	4.3801		0.099	0.074	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,305.53	2.91	30.00	17,200	3.14	7.0817E-03	4.3801		0.262	0.197	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,799.81	4.01	184.00	17,200	3.14	1.1546E-03	6.1879		0.510	0.383	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	494.28	1.10	184.00	17,200	3.14	1.1546E-03	6.1879		0.140	0.105	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,305.53	2.91	184.00	17,200	3.14	1.1546E-03	6.1879		0.370	0.278	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	764.64	1.70	30.00	17,200	3.14	7.0817E-03	4.3801		0.154	0.115	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	209.99	0.47	30.00	17,200	3.14	7.0817E-03	4.3801		0.042	0.032	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	554.65	1.24	30.00	17,200	3.14	7.0817E-03	4.3801		0.111	0.084	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	764.64	1.70	184.00	17,200	3.14	1.1546E-03	6.1879		0.217	0.163	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	209.99	0.47	184.00	17,200	3.14	1.1546E-03	6.1879		0.060	0.045	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	554.65	1.24	184.00	17,200	3.14	1.1546E-03	6.1879		0.157	0.118	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
Application Number =		**G**	**12869**		**Total Acres**	440.30							
Permit Number =		**G**	**12451**		**Primary Acres**	116.10							
Applicant Name =			**Babson**		**Supp Acres**	324.20							
					Priority	10-Apr-1992							
KLAM 51920 to Lost River													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	2,468.57	5.50	30.00	2,200	3.14	1.1586E-04	8.4860	0.960			Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	650.92	1.45	30.00	2,200	3.14	1.1586E-04	8.4860	0.253			Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,817.65	4.05	30.00	2,200	3.14	1.1586E-04	8.4860	0.707			Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	2,468.57	5.50	184.00	2,200	3.14	1.8890E-05	10.2997	1.165			Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	650.92	1.45	184.00	2,200	3.14	1.8890E-05	10.2997	0.307			Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,817.65	4.05	184.00	2,200	3.14	1.8890E-05	10.2997	0.858			Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,353.72	3.02	30.00	2,200	3.14	1.1586E-04	8.4860	0.527			Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	356.95	0.80	30.00	2,200	3.14	1.1586E-04	8.4860	0.139			Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	996.77	2.22	30.00	2,200	3.14	1.1586E-04	8.4860	0.388			Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,353.72	3.02	184.00	2,200	3.14	1.8890E-05	10.2997	0.639			Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	356.95	0.80	184.00	2,200	3.14	1.8890E-05	10.2997	0.169			Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	996.77	2.22	184.00	2,200	3.14	1.8890E-05	10.2997	0.471			Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 51920 to Bonanza Big Springs													
	Continuous Pumping												
2,500,000.00	334,201.37	0.00096	2,468.57	5.50	30.00	19,300	3.14	8.9165E-03	4.1515		0.470	0.352	Total Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	650.92	1.45	30.00	19,300	3.14	8.9165E-03	4.1515		0.124	0.093	Primary Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,817.65	4.05	30.00	19,300	3.14	8.9165E-03	4.1515		0.346	0.259	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
2,500,000.00	334,201.37	0.00096	2,468.57	5.50	184.00	19,300	3.14	1.4538E-03	5.9578		0.674	0.506	Total Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	650.92	1.45	184.00	19,300	3.14	1.4538E-03	5.9578		0.178	0.133	Primary Acres: Continuous Pumping at Full Rate (all season)
2,500,000.00	334,201.37	0.00096	1,817.65	4.05	184.00	19,300	3.14	1.4538E-03	5.9578		0.496	0.372	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping												
2,500,000.00	334,201.37	0.00096	1,353.72	3.02	30.00	19,300	3.14	8.9165E-03	4.1515		0.258	0.193	Total Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	356.95	0.80	30.00	19,300	3.14	8.9165E-03	4.1515		0.068	0.051	Primary Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	996.77	2.22	30.00	19,300	3.14	8.9165E-03	4.1515		0.190	0.142	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
2,500,000.00	334,201.37	0.00096	1,353.72	3.02	184.00	19,300	3.14	1.4538E-03	5.9578		0.370	0.277	Total Acres: Pro-Rated Pumping Rate (all seasons)
2,500,000.00	334,201.37	0.00096	356.95	0.80	184.00	19,300	3.14	1.4538E-03	5.9578		0.097	0.073	Primary Acres: Pro-Rated Pumping Rate (all season)
2,500,000.00	334,201.37	0.00096	996.77	2.22	184.00	19,300	3.14	1.4538E-03	5.9578		0.272	0.204	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 41: Ground water drawdown calculated for Bonanza sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: the basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: Theis drawdown calculation assumes uniform aquifer parameters including at Bonanza Big Springs
Note: Aquifer parameters change in the vicinity of Bonanza Big Springs
Note: Converting Theis Big Springs drawdown accounts for change in aquifer parameters at Bonanza Big Springs
Note: Conversion for Bonanza Big Springs drawdown = (75% of Theis Big Springs drawdown)
Note: 75 percent conversion based upon comparison of KLAM 50318 (Big Springs Park) vs KLAM 51922 and KLAM 13353 water level changes
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at Bonanza Big Springs (GW-SW relationship may be non-linear)

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown Bonanza s (feet)	Drawdown Converted Big Springs s (feet)	Comments
		Full Rate Pumping			Acres								
		Total (sum)	29,090.97	64.81	Total	5,476.40					N.A.	5.422	Total Acres: Continuous Pumping at Full Rate (30 days)
		Primary (sum)	12,109.26	26.98	Primary	2,451.50					N.A.	2.362	Primary Acres: Continuous Pumping at Full Rate (30 days)
		Supplemental (sum)	16,981.71	37.84	Supplemental	3,024.90					N.A.	3.060	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
		Total (sum)	29,090.97	64.81							N.A.	7.233	Total Acres: Continuous Pumping at Full Rate (all season)
		Primary (total rate*(p-acres/t-acres))	13,022.52	29.01							N.A.	3.117	Primary Acres: Continuous Pumping at Full Rate (all season)
		Supplemental (total rate*(s-acres/t-acres))	16,068.45	35.80							N.A.	4.116	Supplemental Acres: Continuous Pumping at Full Rate (all season)
		Pro-Rated Pumping											
		Total (sum)	16,751.83	37.32							N.A.	3.068	Total Acres: Pro-Rated Pumping Rate (30 days)
		Primary (sum)	7,463.05	16.63							N.A.	1.389	Primary Acres: Pro-Rated Pumping Rate (30 days)
		Supplemental (sum)	9,288.78	20.70							N.A.	1.678	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
		Total (sum)	16,751.83	37.32							N.A.	4.111	Total Acres: Pro-Rated Pumping Rate (all seasons)
		Primary (total rate*(p-acres/t-acres))	7,498.92	16.71							N.A.	1.854	Primary Acres: Pro-Rated Pumping Rate (all season)
		Supplemental (total rate*(s-acres/t-acres))	9,252.91	20.62							N.A.	2.256	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 42: Ground water drawdown calculated for Swan Lake Valley to Poe Valley sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L) — r = radial distance (L)
T = transmissivity (L*L/T) — t = time (T)
S = storage coefficient (dimensionless) — u = dimensionless
pi = 3.141592654 — W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: basalt aquifer properties vary which is reflected in the drawdown calculations
Note: compartmentalization may isolate many of these wells from the Lost River
Note: no direct connection to Bonanza Big Springs
Note: compartmentalization isolates KLAM 50623 from springs along western river segment and basalt wells north of river
Note: ground water permits do not address flow depletion from High un-named springs and related seeps and springs
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at High un-named spring and related seeps and springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
Application Number =		**G**	**12644**		**Total Acres**	1,483.00						
Permit Number =		**G**	**12442**		**Primary Acres**	0.00						
	Name =		**Kennedy**		**Supp Acres**	1,483.00						
					Priority	23-Aug-1991						
KLAM 10252 to Lost River												
	Continuous Pumping											
1,122,078.00	150,000.00	0.00040	8,321.33	18.54	30.00	1,300	3.14	3.7556E-05	9.6125	8.169		Total Acres: Continuous Pumping at Full Rate (30 days)
1,122,078.00	150,000.00	0.00040	0.00	0.00	30.00	1,300	3.14	3.7556E-05	9.6125	0.000		Primary Acres: Continuous Pumping at Full Rate (30 days)
1,122,078.00	150,000.00	0.00040	8,321.33	18.54	30.00	1,300	3.14	3.7556E-05	9.6125	8.169		Supplemental Acres: Continuous Pumping at Full Rate (30 days)
1,122,078.00	150,000.00	0.00040	8,321.33	18.54	184.00	1,300	3.14	6.1232E-06	11.4262	9.710		Total Acres: Continuous Pumping at Full Rate (all season)
1,122,078.00	150,000.00	0.00040	0.00	0.00	184.00	1,300	3.14	6.1232E-06	11.4262	0.000		Primary Acres: Continuous Pumping at Full Rate (all season)
1,122,078.00	150,000.00	0.00040	8,321.33	18.54	184.00	1,300	3.14	6.1232E-06	11.4262	9.710		Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
1,122,078.00	150,000.00	0.00040	4,559.53	10.16	30.00	1,300	3.14	3.7556E-05	9.6125	4.476		Total Acres: Pro-Rated Pumping Rate (30 days)
1,122,078.00	150,000.00	0.00040	0.00	0.00	30.00	1,300	3.14	3.7556E-05	9.6125	0.000		Primary Acres: Pro-Rated Pumping Rate (30 days)
1,122,078.00	150,000.00	0.00040	4,559.53	10.16	30.00	1,300	3.14	3.7556E-05	9.6125	4.476		Supplemental Acres: Pro-Rated Pumping Rate (30 days)
1,122,078.00	150,000.00	0.00040	4,559.53	10.16	184.00	1,300	3.14	6.1232E-06	11.4262	5.320		Total Acres: Pro-Rated Pumping Rate (all seasons)
1,122,078.00	150,000.00	0.00040	0.00	0.00	184.00	1,300	3.14	6.1232E-06	11.4262	0.000		Primary Acres: Pro-Rated Pumping Rate (all season)
1,122,078.00	150,000.00	0.00040	4,559.53	10.16	184.00	1,300	3.14	6.1232E-06	11.4262	5.320		Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10252 to High Un-Named Spring												
	Continuous Pumping											
1,122,078.00	150,000.00	0.00040	8,321.33	18.54	30.00	27,700	3.14	1.7051E-02	3.5113		2.984	Total Acres: Continuous Pumping at Full Rate (30 days)
1,122,078.00	150,000.00	0.00040	0.00	0.00	30.00	27,700	3.14	1.7051E-02	3.5113		0.000	Primary Acres: Continuous Pumping at Full Rate (30 days)
1,122,078.00	150,000.00	0.00040	8,321.33	18.54	30.00	27,700	3.14	1.7051E-02	3.5113		2.984	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
1,122,078.00	150,000.00	0.00040	8,321.33	18.54	184.00	27,700	3.14	2.7800E-03	5.3109		4.513	Total Acres: Continuous Pumping at Full Rate (all season)
1,122,078.00	150,000.00	0.00040	0.00	0.00	184.00	27,700	3.14	2.7800E-03	5.3109		0.000	Primary Acres: Continuous Pumping at Full Rate (all season)
1,122,078.00	150,000.00	0.00040	8,321.33	18.54	184.00	27,700	3.14	2.7800E-03	5.3109		4.513	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
1,122,078.00	150,000.00	0.00040	4,559.53	10.16	30.00	27,700	3.14	1.7051E-02	3.5113		1.635	Total Acres: Pro-Rated Pumping Rate (30 days)
1,122,078.00	150,000.00	0.00040	0.00	0.00	30.00	27,700	3.14	1.7051E-02	3.5113		0.000	Primary Acres: Pro-Rated Pumping Rate (30 days)
1,122,078.00	150,000.00	0.00040	4,559.53	10.16	30.00	27,700	3.14	1.7051E-02	3.5113		1.635	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
1,122,078.00	150,000.00	0.00040	4,559.53	10.16	184.00	27,700	3.14	2.7800E-03	5.3109		2.473	Total Acres: Pro-Rated Pumping Rate (all seasons)
1,122,078.00	150,000.00	0.00040	0.00	0.00	184.00	27,700	3.14	2.7800E-03	5.3109		0.000	Primary Acres: Pro-Rated Pumping Rate (all season)
1,122,078.00	150,000.00	0.00040	4,559.53	10.16	184.00	27,700	3.14	2.7800E-03	5.3109		2.473	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 42: Ground water drawdown calculated for Swan Lake Valley to Poe Valley sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L) — r = radial distance (L)
T = transmissivity (L*L/T) — t = time (T)
S = storage coefficient (dimensionless) — u = dimensionless
pi = 3.141592654 — W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: basalt aquifer properties vary which is reflected in the drawdown calculations
Note: compartmentalization may isolate many of these wells from the Lost River
Note: no direct connection to Bonanza Big Springs
Note: compartmentalization isolates KLAM 50623 from springs along western river segment and basalt wells north of river
Note: ground water permits do not address flow depletion from High un-named springs and related seeps and springs
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at High un-named spring and related seeps and springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
	Application Number =		**G 12644**		**Total Acres**	1,483.00						
	Permit Number =		**G 12442**		**Primary Acres**	0.00						
	Name =		**Kennedy (continued)**		**Supp Acres**	1,483.00						
					Priority	23-Aug-1991						
KLAM 10292 to Lost River												
	Continuous Pumping											
1,122,078.00	150,000.00	0.00040	8,321.33	18.54	30.00	2,700	3.14	1.6200E-04	8.1509	6.927		Total Acres: Continuous Pumping at Full Rate (30 days)
1,122,078.00	150,000.00	0.00040	0.00	0.00	30.00	2,700	3.14	1.6200E-04	8.1509	0.000		Primary Acres: Continuous Pumping at Full Rate (30 days)
1,122,078.00	150,000.00	0.00040	8,321.33	18.54	30.00	2,700	3.14	1.6200E-04	8.1509	6.927		Supplemental Acres: Continuous Pumping at Full Rate (30 days)
1,122,078.00	150,000.00	0.00040	8,321.33	18.54	184.00	2,700	3.14	2.6413E-05	9.9645	8.468		Total Acres: Continuous Pumping at Full Rate (all season)
1,122,078.00	150,000.00	0.00040	0.00	0.00	184.00	2,700	3.14	2.6413E-05	9.9645	0.000		Primary Acres: Continuous Pumping at Full Rate (all season)
1,122,078.00	150,000.00	0.00040	8,321.33	18.54	184.00	2,700	3.14	2.6413E-05	9.9645	8.468		Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
1,122,078.00	150,000.00	0.00040	4,559.53	10.16	30.00	2,700	3.14	1.6200E-04	8.1509	3.795		Total Acres: Pro-Rated Pumping Rate (30 days)
1,122,078.00	150,000.00	0.00040	0.00	0.00	30.00	2,700	3.14	1.6200E-04	8.1509	0.000		Primary Acres: Pro-Rated Pumping Rate (30 days)
1,122,078.00	150,000.00	0.00040	4,559.53	10.16	30.00	2,700	3.14	1.6200E-04	8.1509	3.795		Supplemental Acres: Pro-Rated Pumping Rate (30 days)
1,122,078.00	150,000.00	0.00040	4,559.53	10.16	184.00	2,700	3.14	2.6413E-05	9.9645	4.640		Total Acres: Pro-Rated Pumping Rate (all seasons)
1,122,078.00	150,000.00	0.00040	0.00	0.00	184.00	2,700	3.14	2.6413E-05	9.9645	0.000		Primary Acres: Pro-Rated Pumping Rate (all season)
1,122,078.00	150,000.00	0.00040	4,559.53	10.16	184.00	2,700	3.14	2.6413E-05	9.9645	4.640		Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 10292 to High Un-Named Spring												
	Continuous Pumping											
1,122,078.00	150,000.00	0.00040	8,321.33	18.54	30.00	23,700	3.14	1.2482E-02	3.8187		3.245	Total Acres: Continuous Pumping at Full Rate (30 days)
1,122,078.00	150,000.00	0.00040	0.00	0.00	30.00	23,700	3.14	1.2482E-02	3.8187		0.000	Primary Acres: Continuous Pumping at Full Rate (30 days)
1,122,078.00	150,000.00	0.00040	8,321.33	18.54	30.00	23,700	3.14	1.2482E-02	3.8187		3.245	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
1,122,078.00	150,000.00	0.00040	8,321.33	18.54	184.00	23,700	3.14	2.0351E-03	5.6220		4.778	Total Acres: Continuous Pumping at Full Rate (all season)
1,122,078.00	150,000.00	0.00040	0.00	0.00	184.00	23,700	3.14	2.0351E-03	5.6220		0.000	Primary Acres: Continuous Pumping at Full Rate (all season)
1,122,078.00	150,000.00	0.00040	8,321.33	18.54	184.00	23,700	3.14	2.0351E-03	5.6220		4.778	Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
1,122,078.00	150,000.00	0.00040	4,559.53	10.16	30.00	23,700	3.14	1.2482E-02	3.8187		1.778	Total Acres: Pro-Rated Pumping Rate (30 days)
1,122,078.00	150,000.00	0.00040	0.00	0.00	30.00	23,700	3.14	1.2482E-02	3.8187		0.000	Primary Acres: Pro-Rated Pumping Rate (30 days)
1,122,078.00	150,000.00	0.00040	4,559.53	10.16	30.00	23,700	3.14	1.2482E-02	3.8187		1.778	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
1,122,078.00	150,000.00	0.00040	4,559.53	10.16	184.00	23,700	3.14	2.0351E-03	5.6220		2.618	Total Acres: Pro-Rated Pumping Rate (all seasons)
1,122,078.00	150,000.00	0.00040	0.00	0.00	184.00	23,700	3.14	2.0351E-03	5.6220		0.000	Primary Acres: Pro-Rated Pumping Rate (all season)
1,122,078.00	150,000.00	0.00040	4,559.53	10.16	184.00	23,700	3.14	2.0351E-03	5.6220		2.618	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Appendix 42: Ground water drawdown calculated for Swan Lake Valley to Poe Valley sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L) — r = radial distance (L)
T = transmissivity (L*L/T) — t = time (T)
S = storage coefficient (dimensionless) — u = dimensionless
pi = 3.141592654 — W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: basalt aquifer properties vary which is reflected in the drawdown calculations
Note: compartmentalization may isolate many of these wells from the Lost River
Note: no direct connection to Bonanza Big Springs
Note: compartmentalization isolates KLAM 50623 from springs along western river segment and basalt wells north of river
Note: ground water permits do not address flow depletion from High un-named springs and related seeps and springs
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at High un-named spring and related seeps and springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
	Application Number =		**G 13019**		**Total Acres**	272.20						
	Permit Number =		**G 12460**		**Primary Acres**	0.00						
	Name =		**Wells**		**Supp Acres**	272.20						
					Priority	06-Jul-1992						
KLAM 50623 to Lost River												
	Continuous Pumping											
54,308.58	7,260.00	0.00058	1,526.03	3.40	30.00	6,300	3.14	2.6196E-02	3.0910	9.953		Total Acres: Continuous Pumping at Full Rate (30 days)
54,308.58	7,260.00	0.00058	0.00	0.00	30.00	6,300	3.14	2.6196E-02	3.0910	0.000		Primary Acres: Continuous Pumping at Full Rate (30 days)
54,308.58	7,260.00	0.00058	1,526.03	3.40	30.00	6,300	3.14	2.6196E-02	3.0910	9.953		Supplemental Acres: Continuous Pumping at Full Rate (30 days)
54,308.58	7,260.00	0.00058	1,526.03	3.40	184.00	6,300	3.14	4.2710E-03	4.8829	15.723		Total Acres: Continuous Pumping at Full Rate (all season)
54,308.58	7,260.00	0.00058	0.00	0.00	184.00	6,300	3.14	4.2710E-03	4.8829	0.000		Primary Acres: Continuous Pumping at Full Rate (all season)
54,308.58	7,260.00	0.00058	1,526.03	3.40	184.00	6,300	3.14	4.2710E-03	4.8829	15.723		Supplemental Acres: Continuous Pumping at Full Rate (all season)
	Pro-Rated Pumping											
54,308.58	7,260.00	0.00058	836.89	1.86	30.00	6,300	3.14	2.6196E-02	3.0910	5.458		Total Acres: Pro-Rated Pumping Rate (30 days)
54,308.58	7,260.00	0.00058	0.00	0.00	30.00	6,300	3.14	2.6196E-02	3.0910	0.000		Primary Acres: Pro-Rated Pumping Rate (30 days)
54,308.58	7,260.00	0.00058	836.89	1.86	30.00	6,300	3.14	2.6196E-02	3.0910	5.458		Supplemental Acres: Pro-Rated Pumping Rate (30 days)
54,308.58	7,260.00	0.00058	836.89	1.86	184.00	6,300	3.14	4.2710E-03	4.8829	8.623		Total Acres: Pro-Rated Pumping Rate (all seasons)
54,308.58	7,260.00	0.00058	0.00	0.00	184.00	6,300	3.14	4.2710E-03	4.8829	0.000		Primary Acres: Pro-Rated Pumping Rate (all season)
54,308.58	7,260.00	0.00058	836.89	1.86	184.00	6,300	3.14	4.2710E-03	4.8829	8.623		Supplemental Acres: Pro-Rated Pumping Rate (all season)
KLAM 50623 to High Un-Named Spring												
	Continuous Pumping											
54,308.58	7,260.00	0.00058	1,526.03	3.40	30.00	24,200	3.14	3.8653E-01	0.7255		N.A.	No apparent connection to springs
54,308.58	7,260.00	0.00058	0.00	0.00	30.00	24,200	3.14	3.8653E-01	0.7255		N.A.	No apparent connection to springs
54,308.58	7,260.00	0.00058	1,526.03	3.40	30.00	24,200	3.14	3.8653E-01	0.7255		N.A.	No apparent connection to springs
54,308.58	7,260.00	0.00058	1,526.03	3.40	184.00	24,200	3.14	6.3021E-02	2.2491		N.A.	No apparent connection to springs
54,308.58	7,260.00	0.00058	0.00	0.00	184.00	24,200	3.14	6.3021E-02	2.2491		N.A.	No apparent connection to springs
54,308.58	7,260.00	0.00058	1,526.03	3.40	184.00	24,200	3.14	6.3021E-02	2.2491		N.A.	No apparent connection to springs
	Pro-Rated Pumping											No apparent connection to springs
54,308.58	7,260.00	0.00058	836.89	1.86	30.00	24,200	3.14	3.8653E-01	0.7255		N.A.	No apparent connection to springs
54,308.58	7,260.00	0.00058	0.00	0.00	30.00	24,200	3.14	3.8653E-01	0.7255		N.A.	No apparent connection to springs
54,308.58	7,260.00	0.00058	836.89	1.86	30.00	24,200	3.14	3.8653E-01	0.7255		N.A.	No apparent connection to springs
54,308.58	7,260.00	0.00058	836.89	1.86	184.00	24,200	3.14	6.3021E-02	2.2491		N.A.	No apparent connection to springs
54,308.58	7,260.00	0.00058	0.00	0.00	184.00	24,200	3.14	6.3021E-02	2.2491		N.A.	No apparent connection to springs
54,308.58	7,260.00	0.00058	836.89	1.86	184.00	24,200	3.14	6.3021E-02	2.2491		N.A.	No apparent connection to springs

Appendix 42: Ground water drawdown calculated for Swan Lake Valley to Poe Valley sub-area ADR ground water permits

Theis Equation: s = [Q/(4*T*pi)][W(u)]
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...
u = (r*r*S)/(4*T*t)
s = drawdown (L)
T = transmissivity (L*L/T)
S = storage coefficient (dimensionless)
pi = 3.141592654

r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

W(u) calculation test:

u	W(u)
7.0000E+00	1.1545E-04

Note : W(u) calculation valid when u < 7.1

Note: drawdown estimates uses Theis equation and "effective" aquifer properties which include boundary influences
Note: distance = most direct distance to nearest Lost River reach or spring of interest
Note: basalt aquifer is generally separated from Lost River by finer grained sedimentary layer
Note: basalt aquifer properties vary which is reflected in the drawdown calculations
Note: compartmentalization may isolate many of these wells from the Lost River
Note: no direct connection to Bonanza Big Springs
Note: compartmentalization isolates KLAM 50623 from springs along western river segment and basalt wells north of river
Note: ground water permits do not address flow depletion from High un-named springs and related seeps and springs
Note: insufficient data to calculate flow depletion at the Lost River (GW-SW relationship may be non-linear)
Note: insufficient data to calculate flow depletion at High un-named spring and related seeps and springs

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Theis Drawdown at River s (feet)	Theis Drawdown at Spring s (feet)	Comments
		Full Rate Pumping			Acres							
		Total (sum)	9,847.36	21.94	Total	1,755.20				N.A.	3.245	Total Acres: Continuous Pumping at Full Rate (30 days)
		Primary (sum)	0.00	0.00	Primary	0.00				N.A.	0.000	Primary Acres: Continuous Pumping at Full Rate (30 days)
		Supplemental (sum)	9,847.36	21.94	Supplemental	1,755.20				N.A.	3.245	Supplemental Acres: Continuous Pumping at Full Rate (30 days)
		Total (sum)	9,847.36	21.94						N.A.	4.778	Total Acres: Continuous Pumping at Full Rate (all season)
		Primary (total rate*(p-acres/t-acres))	0.00	0.00						N.A.	0.000	Primary Acres: Continuous Pumping at Full Rate (all season)
		Supplemental (total rate*(s-acres/t-acres))	9,847.36	21.94						N.A.	4.778	Supplemental Acres: Continuous Pumping at Full Rate (all season)
		Pro-Rated Pumping										
		Total (sum)	5,396.42	12.02						N.A.	1.778	Total Acres: Pro-Rated Pumping Rate (30 days)
		Primary (sum)	0.00	0.00						N.A.	0.000	Primary Acres: Pro-Rated Pumping Rate (30 days)
		Supplemental (sum)	5,396.42	12.02						N.A.	1.778	Supplemental Acres: Pro-Rated Pumping Rate (30 days)
		Total (sum)	5,396.42	12.02						N.A.	2.618	Total Acres: Pro-Rated Pumping Rate (all seasons)
		Primary (total rate*(p-acres/t-acres))	0.00	0.00						N.A.	0.000	Primary Acres: Pro-Rated Pumping Rate (all season)
		Supplemental (total rate*(s-acres/t-acres))	5,396.42	12.02						N.A.	2.618	Supplemental Acres: Pro-Rated Pumping Rate (all season)

Plate Number 1

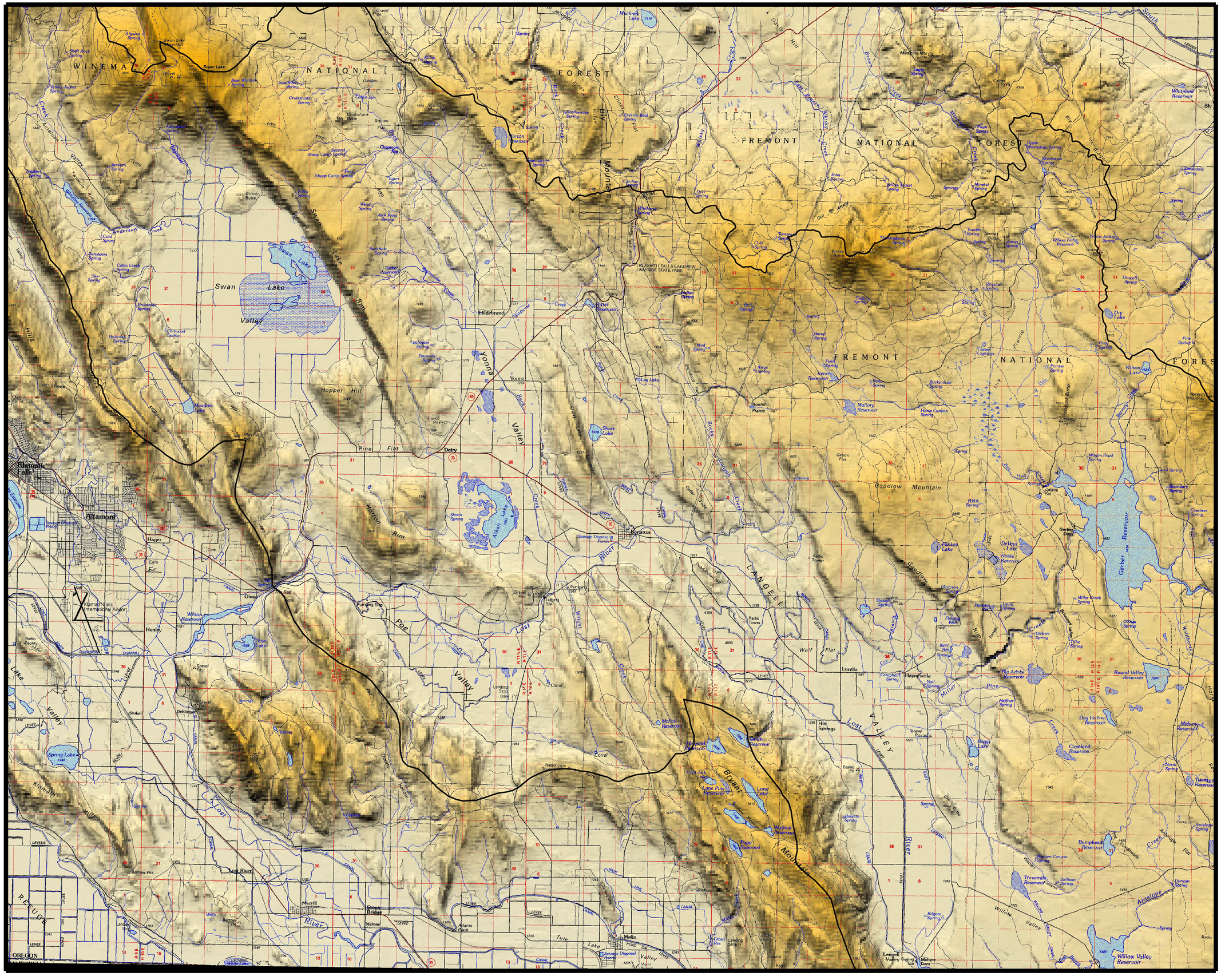
Geography of the Eastern Lost River Sub-basin

Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon

Oregon Water Resources Department
Salem, Oregon (2004)

Ground Water Report No 41

Gerald H. Grondin



Explanation

Sub-basin Boundary

Shaded relief base from U.S. Geological Survey

Geographic base from U.S. Geological Survey Klamath Falls 1991 42121-A1-TM-100 Scale 1:100,000

Elevations on the base map are in meters
1 meter = 3.281 feet

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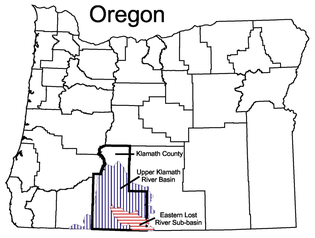


5 0 5 10 15 20 25 Miles

Scale 1:62,500

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

Plate Number 2

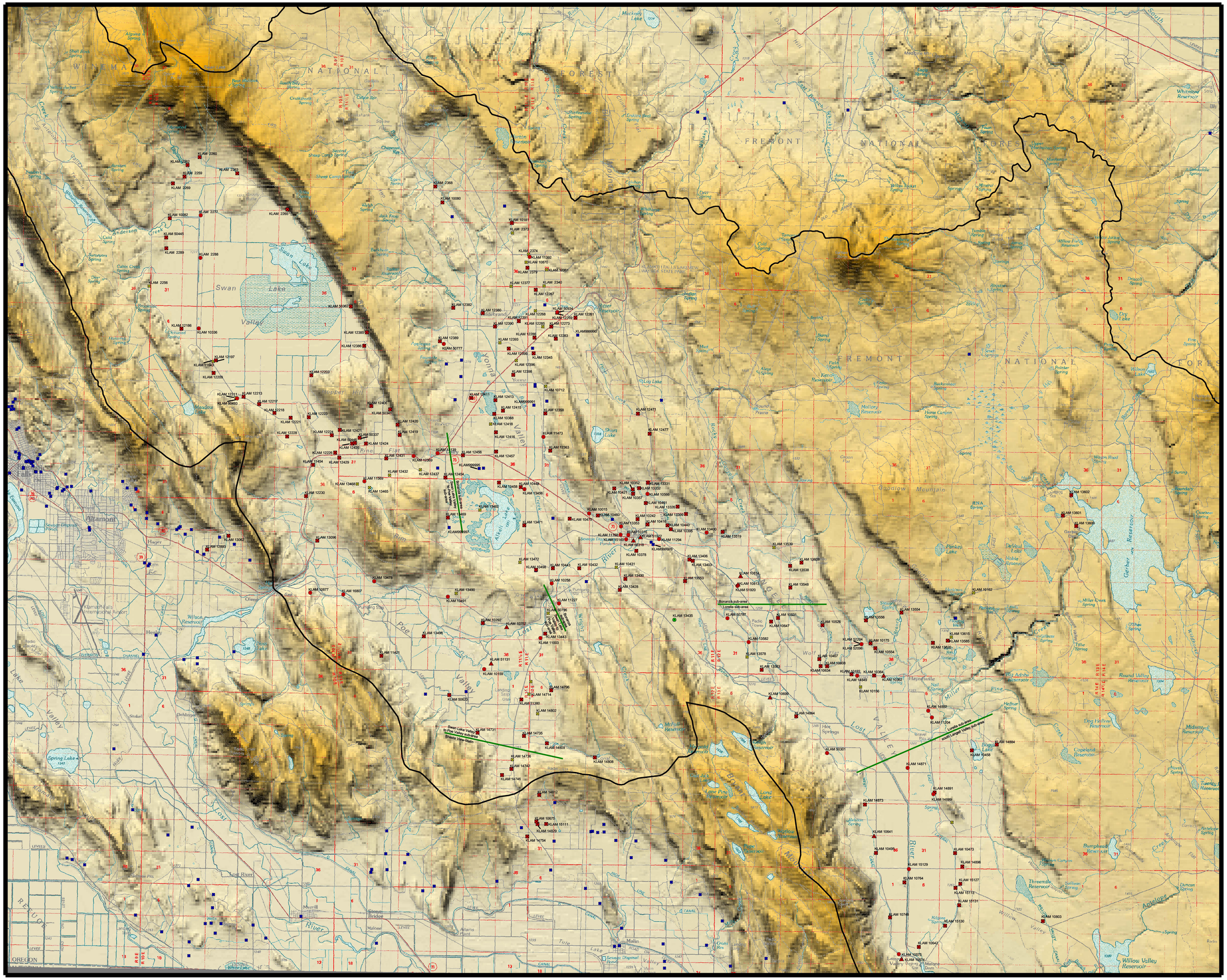
Eastern Lost River Sub-basin Project Wells

Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon

Oregon Water Resources Department
Salem, Oregon (2004)

Ground Water Report No 41

Gerald H. Grondin



Explanation

- Recorder Well Sites
- Monthly Measurement Well Sites
- Synoptic Measurement Well Sites
- Geologic Information Well Sites
- State Observation Well Site
- Other Located Well Sites
- Water Well Report Number (well log)
- Sub-Area Boundaries (approximate)
- Sub-basin Boundary

Note for Water Well Report Number
KLAM = County Identification
Number = Well Report Number

numbers beginning with 9 means
no report, project assigned number

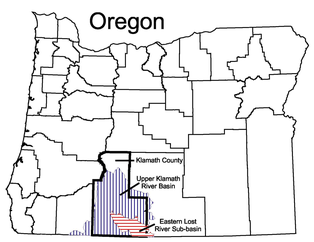
Shaded relief base from
U.S. Geological Survey

Geographic base from
U.S. Geological Survey
Klamath Falls 1991
42121-A1-TM-100
Scale 1:100,000

Elevations on the base map
are in meters
1 meter = 3.281 feet

N

Oregon



5 0 5 10 15 20 25 Miles

Scale 1:62,500

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Plate Number 3

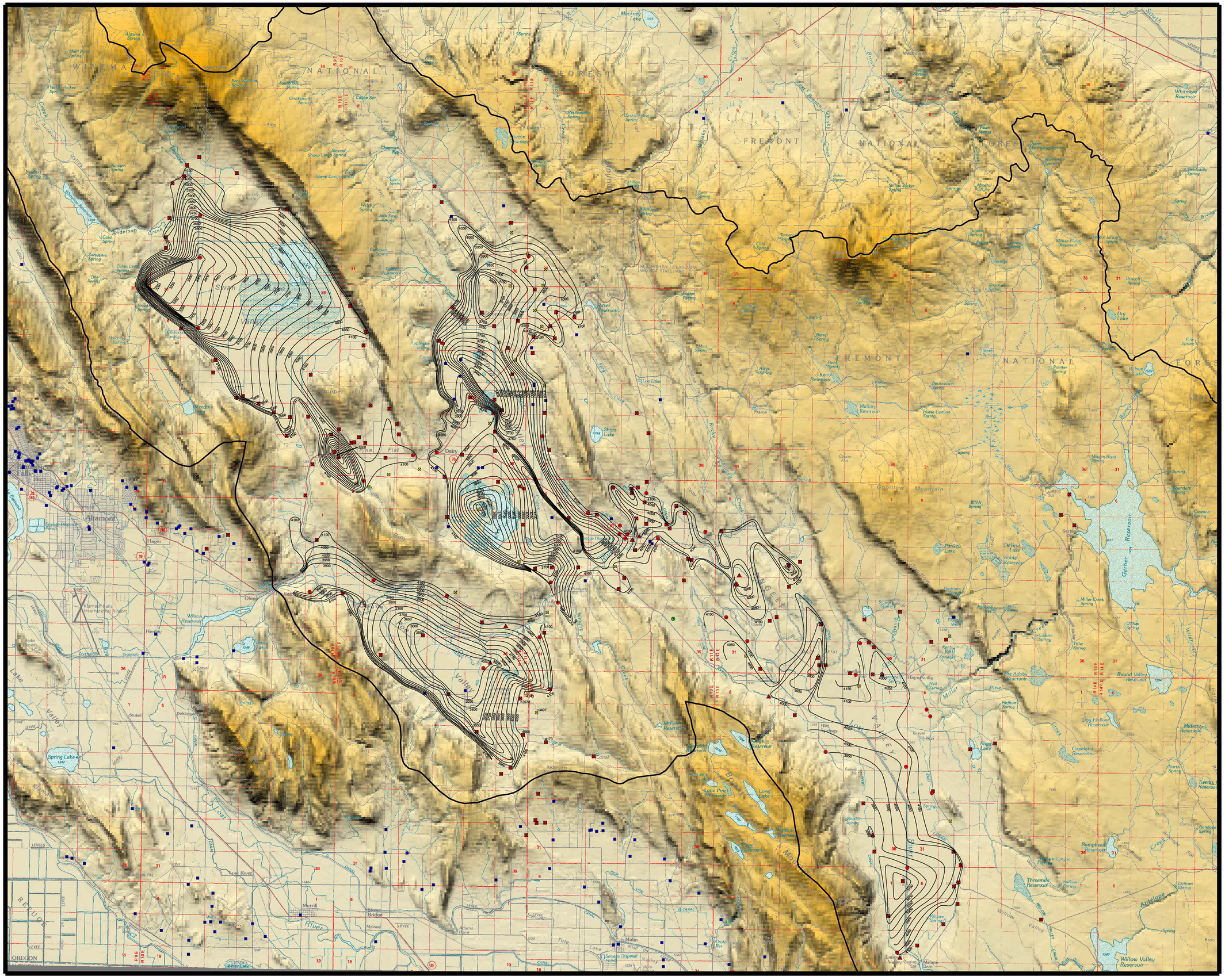
Top of Basalt Below Basin Fill Sedimentary Deposits in the Eastern Lost River Sub-basin

Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon

Oregon Water Resources Department
Salem, Oregon (2004)

Ground Water Report No 41

Gerald H. Grondin



Explanation

- Top of Basalt Elevation (50-foot contours)
- Recorder Well Sites
- Monthly Measurement Well Sites
- Synoptic Measurement Well Sites
- Geologic Information Well Sites
- State Observation Well Site
- Other Located Well Sites
- Sub-basin Boundary

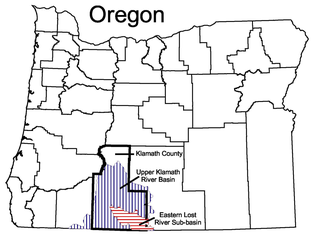
Shaded relief base from
U.S. Geological Survey

Geographic base from
U.S. Geological Survey
Klamath Falls 1991
42121-A1-TM-100
Scale 1:100,000

Elevations on the base map
are in meters
1 meter = 3.281 feet

N

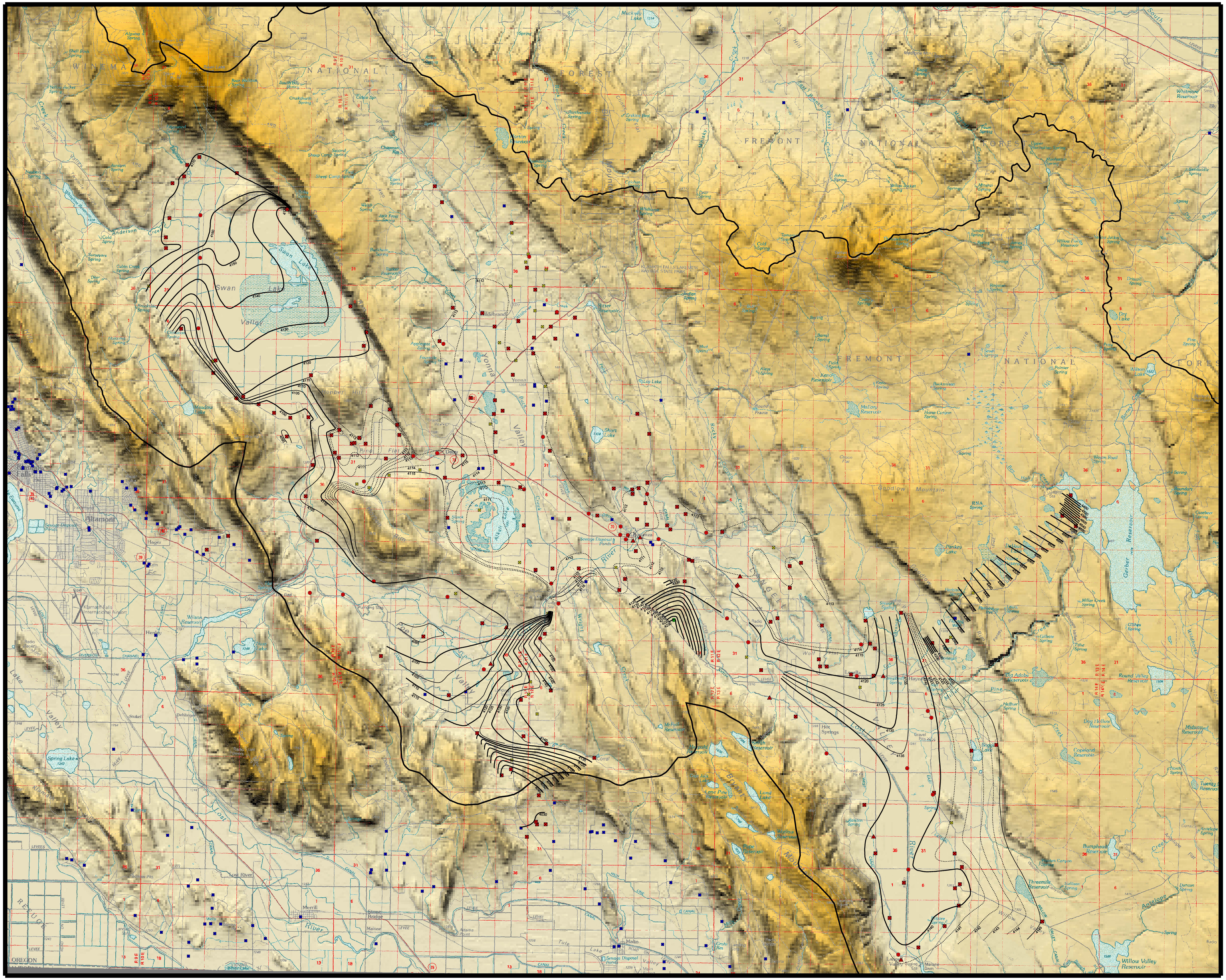
Oregon



5 0 5 10 15 20 25 Miles

Scale 1:62,500

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.



5 0 5 10 15 20 25 Miles

Scale 1:62,500

Plate Number 4

Eastern Lost River Sub-basin Potentiometric Map Basalt Ground Water Elevations in March 1999

Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon

Oregon Water Resources Department
Salem, Oregon (2004)

Ground Water Report No 41

Gerald H. Grondin

Explanation

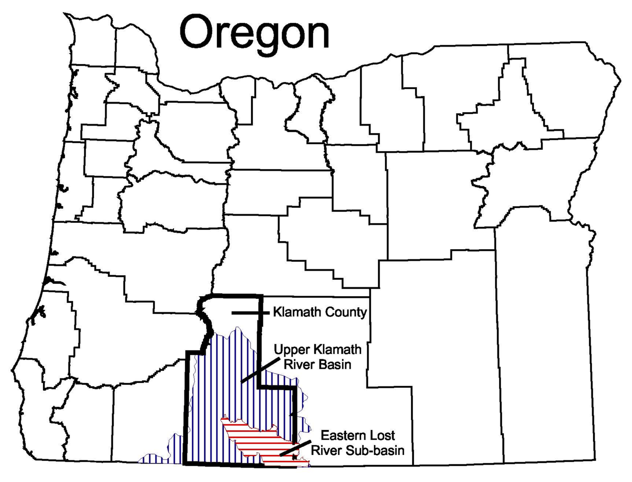
- 1-Foot Water Level Contours
- 5-Foot Water Level Contours
- 10-Foot Water level Contours
- 20-Foot Water Level Contours
- Recorder Well Sites
- Monthly Measurement Well Sites
- Synoptic Measurement Well Sites
- Geologic Information Well Sites
- State Observation Well Site
- Other Located Well Sites
- Sub-basin Boundary

Shaded relief base from
U.S. Geological Survey

Geographic base from
U.S. Geological Survey
Klamath Falls 1991
42121-A1-TM-100
Scale 1:100,000

Elevations on the base map
are in meters
1 meter = 3.281 feet

N



STATE OF OREGON
WATER RESOURCES DEPARTMENT
WRD

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

Plate Number 5

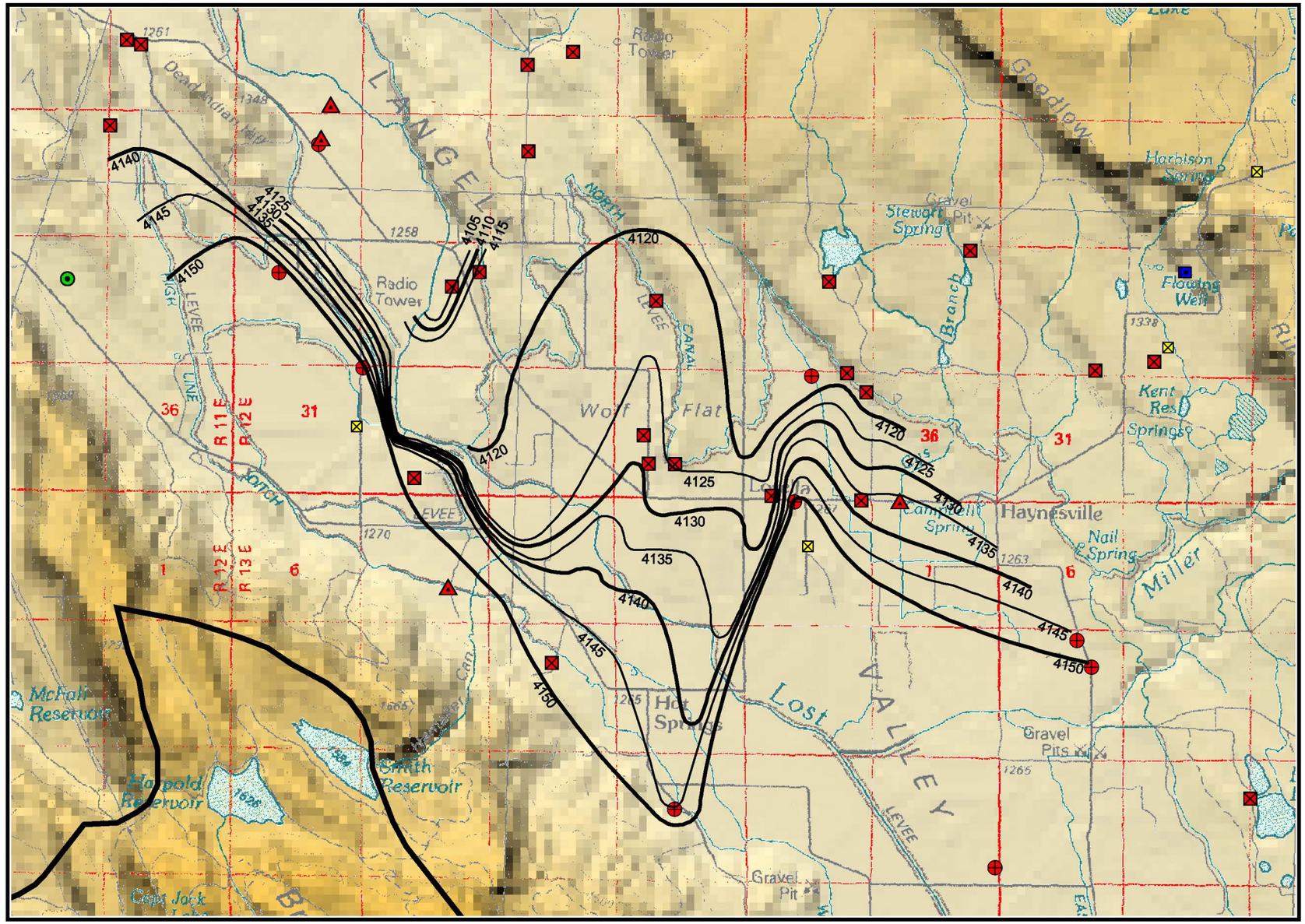
Lorella Sub-area Potentiometric Map Canal Influenced Basalt Ground Water Elevations in March 1999

Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon

Oregon Water Resources Department
Salem, Oregon (2004)

Ground Water Report No 41

Gerald H. Grondin



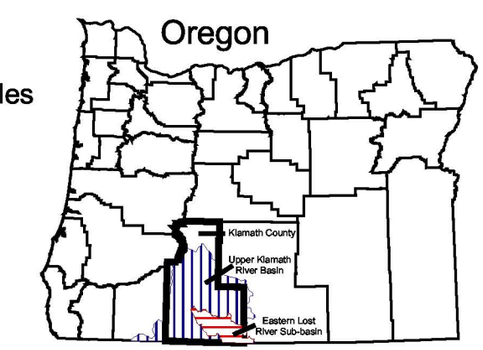
Explanation

- 5-Foot Water Level Contours (canal influenced ground water)
- 10-Foot Water Level Contours (canal influenced ground water)
- 20-Foot Water Level Contours (canal influenced ground water)
- Recorder Well Sites
- Monthly Measurement Well Sites
- Synoptic Measurement Well Sites
- Geologic Information Well Sites
- State Observation Well Site
- Other Located Well Sites
- Sub-basin Boundary

N

1 0 1 2 3 4 Miles

Scale 1:62,500



Shaded relief base from U.S. Geological Survey

Geographic base from U.S. Geological Survey Klamath Falls 1991 42121-A1-TM-100 Scale 1:100,000

Elevations on the base map are in meters
1 meter = 3.281 feet

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