Ground Water Report No. 35

STATE OF OREGON

WATER RESOURCES DEPARTMENT

WILLIAM H. YOUNG

Director

GROUNDWATER CONDITIONS IN THE STAGE GULCH AREA UMATILLA COUNTY, OREGON

By

Michael J. Zwart

SALEM, OREGON

December, 1990

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DEFINITIONS OF SELECTED TERMS

Acre-Foot (AF): The volume required to cover one acre to a depth of one foot. This is equal to 43,560 cubic feet or 325,851 gallons.

Alluvium: Deposits of clay, silt, sand and gravel deposited by geologically recent rivers.

Anticline: A geologic structure in which rock strata (layers) are arched upward and dip away in opposite directions from a central axis.

Aquifer: A water-bearing body of naturally occuring earth material that is sufficiently permeable to yield usable quantities of water to wells and/or springs (OAR 690-08-001(1)).

Artesian Aquifer: An aquifer in which groundwater is under sufficient hydrostatic pressure to rise above the bottom of the overlying confining bed, whether or not the water level rises above land surface. Artesian is synonymous with confined.

Basalt: A very fine grained, dark gray, brown to black volcanic rock, typically containing pyroxene, plagioclase, and olivine minerals which are relatively high in iron and magnesium.

Cascading Water: Groundwater that enters a well bore above the static water level and falls down the well.

Cone of Depression: The conical depression in a potentiometric surface or water table that forms around a well as a result of pumping.

Confining Bed: A layer of low permeability material immediately overlying a confined aquifer (OAR 690-09-020(3)).

Critical Groundwater Area Boundary: A line established in a critical groundwater area order on a map that surrounds an area in which one or more of the statutory criteria for critical area declaration are met and which is located either 1) physically by coincidence with natural features such as ground water reservoir boundaries, hydrologic barriers, or recharge or discharge boundaries, or 2) administratively by surrounding an affected area when that area does not coincide with an area bounded by natural features (OAR 690-08-001(2)).

Customary Quantity: The rate or annual amount of appropriation or diversion of water ordinarily used by an appropriator within the terms of that appropriator's water right (OAR-690-08-001(3)).

Fanglomerate: A sedimentary rock of heterogeneous materials that was originally deposited in an alluvial fan and has since been cemented into consolidated rock.

Fault: A fracture or series of fractures in rock 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.

Groundwater Reservoir: A designated body of standing or moving groundwater having exterior boundaries which may be ascertained or reasonably inferred (ORS 537.515(4)).

Hydraulic Conductivity: A measure of the capacity of an aquifer to transmit water. It is expressed as the rate (volume/time) 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 mean 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. Hydraulic Gradient = (Total Head at Point A) - (Total at Point B) + Distance Between A & B.

Interference: The spreading of the cone of depression of a well or group of wells to intersect a surface water body or another well, or the reduction of the ground water gradient and flow as a result of pumping.

Lithology: The character of a rock as defined by its color, mineral composition, and grain size.

Monocline: A local steepening or steplike bend in otherwise gently dipping strata.

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.

Permeability: The ability of a rock or soil to transmit fluid such as water.

Phyric (porphyritic): An igneous rock texture in which larger crystals (phenocrysts) are set in a matrix of finer grained crystals or glass.

Potentiometric Head: The level to which water in an aquifer will rise by hydrostatic pressure, usually expressed as an elevation above sea level.

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.

Specific Yield: The ratio of the volume of water which a saturated rock or soil will yield by gravity to the total volume of rock or soil.

Storage Coefficient: The volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head.

Syncline: A fold in rocks that is concave upward in which strata dip inward from both sides toward the axis of the fold.

Total Head: Total Head = Elevation Head + Pressure Head.

> Elevation Head: The elevation at a point of interest in an aquifer relative to a measuring point (e.g. sea level).
>
> Pressure Head: The height of a column of water that can be supported by the pressure at a point of interest in an aquifer.

Transmissivity: The rate of flow at which water is transmitted through a unit width of aquifer perpendicular to the direction of flow under a unit hydraulic gradient. It equals the hydraulic conductivity multiplied by the saturated thickness of the aquifer. It is usually expressed as gallons per day per foot, or square feet per day. In simple terms, the ability of an aquifer to transmit water.

Vesicular: A textural term for rock characterized by abundant small openings formed by gas bubbles trapped during the solidification of lava.

Water Level: The distance from land surface to the top of the water column in a well. When the well is being pumped, it is called a pumping water level. It is referred to as a static water level in a well that has recovered from pumping.

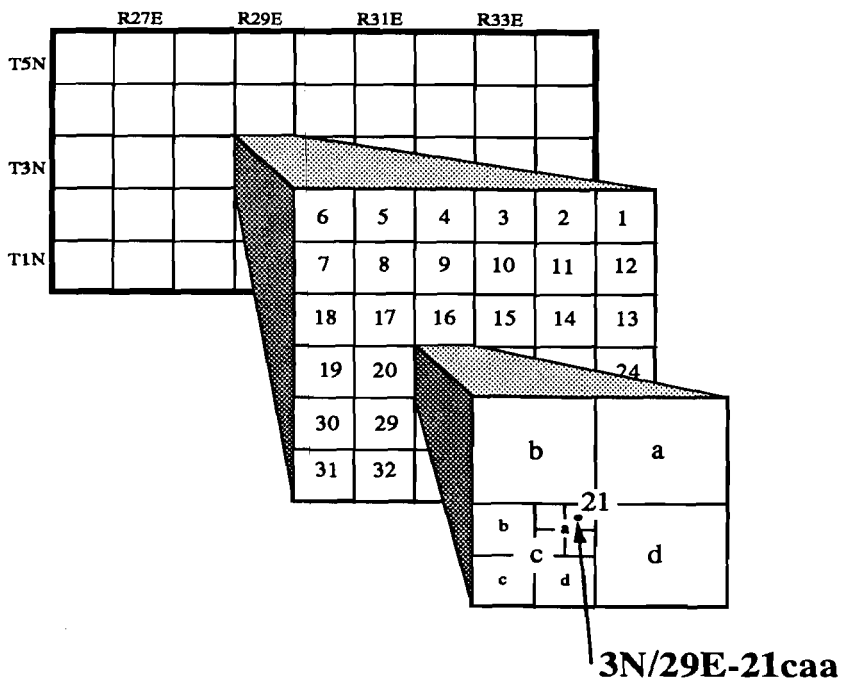
Water Table Aquifer: An aquifer in which the pressure at the upper surface of the water body is atmospheric. Water table is synonymous with unconfined.

Water Use Permit: A document issued by the Oregon Water Resources Department that authorizes the diversion and beneficial use of the public waters of the State.

WELL NUMBERING SYSTEM

The well and spring numbering system used in Oregon is based on the rectangular system used for subdivision of public land. Each well number indicates the geographic location of the well and describes the township, range, and section.

For example, the well number **3N/29E-21caa** indicates a well located within Township **3** North, Range **29** East, and Section **21**. The letters following the section number indicate the well location within the section, as shown below. The first letter (**c**) represents the quarter section (160 acres), the second letter (**a**) the quarter-quarter section (40 acres), and the third letter (**a**) the 10 acre tract. A series number is added following the third letter to distinguish two or more wells within a 10-acre tract.



EXECUTIVE SUMMARY

The Stage Gulch area is located within the Umatilla Basin in north-central Oregon. It includes about 252 square miles and is entirely within Umatilla County. The area abuts the eastern boundary of the Butter Creek Critical Groundwater Area. The cities of Echo, Stanfield, and most of Hermiston are included within the boundaries.

The climate of the area is semiarid. Average annual precipitation is about 8.8 inches in Hermiston, and increases to the east to about 12.8 inches in Pendleton, about five miles east of the Stage Gulch area. Most of the precipitation usually occurs from late fall through winter. The average growing season varies from 158 to 184 days within the area. Irrigated agriculture is an important part of the local economy.

Irrigation from groundwater sources, primarily the basalt groundwater reservoir, increased rapidly in the late 1960's through the late 1970's. Basalt groundwater development for municipal and industrial uses occurred prior to this time. At present, there are water rights for nearly 50,000 acres of primary and supplemental irrigation from all groundwater sources within the Stage Gulch area. Nearly 28,000 of those acres are for irrigation from the basalt reservoir and the remainder are from alluvial aquifers.

The area is located within the southern part of the Columbia Plateau. This region is entirely underlain by a thick sequence of numerous basalt lava flows of the Columbia River Basalt Group. Deposition occurred over a period of several million years beginning during middle Miocene time, about 17

million years ago. Structural uplift of the Blue Mountains during and after the time of basalt deposition has resulted in some folding and faulting of the basalt. The uplift during and between episodes of deposition has caused greater accumulation of basalt in some areas. The basalt is estimated to be thickest, 10,000 or more feet, near the Columbia River. Younger sedimentary and windblown deposits overlie the basalt in most of the area. The sedimentary deposits are also an important groundwater reservoir in the northwestern part of the area and in the Umatilla River valley, where they generally have sufficient saturated thickness to yield significant quantities of water to wells. However, because long-term water level declines are evident only in the basalt, this report focuses on the basalt groundwater reservoir.

Groundwater in the basalt occurs and moves primarily in the interflow zones between individual basalt flows. Most of the groundwater occurs under confined conditions within these zones. In general, the basalt groundwater reservoir is a complex, layered system. Groundwater is able to move horizontally far more easily than vertically. Each interflow zone may have hydraulic and water quality characteristics which differ from the overlying and underlying zones. Structures such as folds and faults can serve as barriers and interrupt the horizontal movement of groundwater. These barriers compartmentalize the groundwater reservoir. Wells on different sides of such barriers typically have greatly reduced interference effects than would be expected in a more homogeneous aquifer system. The groundwater flow system of the area is further complicated by the fact that most large capacity wells penetrate multiple interflow zones to produce a greater quantity of water. Water levels in such wells are composite levels (heads) for those interflow zones penetrated rather than being those of a single aquifer or interflow zone.

Investigations in the basin have resulted in the collection of a great deal of information regarding water levels and pumpage. Annual measurements of water levels, flowmeters, and power meters have been taken every February since 1979. Flowmeters were first required in the Stage Gulch area in 1980. Data from these flowmeters have allowed increasingly better estimates of pumpage from the basalt groundwater reservoir. Estimates indicate that annual pumpage has decreased from nearly 36,200 acre-feet in 1980 to about 30,700 acre-feet in 1989.

A generalized contour map of basalt water level elevations was prepared from measurements made at wells in February 1990. The map represents a surface known as the potentiometric surface. The shape of the potentiometric contours illustrates the direction of groundwater movement and aids in an understanding of recharge and discharge. This movement is generally to the north and west in the Stage Gulch area. Carbon 14 ages of groundwater indicate very slow natural movement of only a few feet per year.

Natural recharge to this groundwater reservoir is limited. It occurs mostly in the higher elevations of the Blue Mountains to the south and east and the extension of the Horse Heaven Hills to the northeast of the Stage Gulch area. The Columbia River is the principal discharge area for the basalt reservoir. Estimates by the U. S. Geological Survey of natural recharge and pumpage indicate that the basalt groundwater reservoir in the Stage Gulch area is overdrawn (Davies-Smith, Bolke, and Collins, 1988).

Water levels in the basalt groundwater reservoir have declined in many parts of the Umatilla Basin in response to pumpage. As part of a previous investigation, Water Resources Department staff prepared a map showing

water level declines in the Umatilla Basin for the period 1965 to 1980 (Oberlander and Miller, 1981). This map indicated that water levels declined 50 feet or more in much of the Stage Gulch area. This area of decline was used, in part, to define the exterior boundaries of the Stage Gulch area. Water levels in the Stage Gulch area continued to decline during the period 1980 to 1990. These declines occurred in spite of reduced pumpage documented in the area during that same period. Further reductions in annual pumpage are necessary to stabilize water levels in the Stage Gulch area.

During the irrigation season, well interference may have a much greater influence on water levels in individual wells than does the annual water level decline. This condition is more extreme where the aquifers are compartmentalized by the presence of groundwater barriers. The water level in one unpumped well fluctuates over 500 feet during the year, yet its decline rate, based on February measurements, is only about 3 feet per year.

The Director of the Oregon Water Resources Department initiated a proceeding for the determination of a critical groundwater area in the Stage Gulch area on January 31, 1985. This action was based on investigations which suggested that water levels were declining and had declined excessively, the available supply of groundwater was being overdrawn, and substantial well interference occurs in some areas. This action prohibited the issuance of new permits to appropriate groundwater from the basalt groundwater reservoir until final resolution of the critical groundwater area proceeding. Critical area statutes (ORS 537.730 to 537.740) require a hearing to declare a critical groundwater area, determine boundaries, set pumpage limits, and prescribe a method for distributing the available groundwater.

INTRODUCTION

Location

The Stage Gulch area includes about 252 square miles in north-central Oregon (Figure 1). It is located within the Umatilla Basin in western Umatilla County. Its western boundary coincides with the eastern boundary of the Butter Creek Critical Groundwater Area. Its other boundaries coincide with section lines. The cities of Stanfield, Echo, and most of Hermiston are included within it (Figure 2). A detailed legal description of the exterior boundaries of the area is given in Appendix A.

Purpose

The Stage Gulch area is the subject of an administrative action taken by the Director of the Oregon Water Resources Department in January 1985 (Appendix A). This action initiated a proceeding for the determination of a critical groundwater area. A hearing is required to resolve the proceeding.

This report updates and summarizes the conditions in the basalt groundwater reservoir in the area. This information should assist the Water Resources Commission to make informed decisions regarding any future actions to be taken by the Department. It should also be useful to well users and drillers who are potentially affected by administrative actions. The report includes compilations of water rights, well records, water level data, water level hydrographs and annual pumpage. A general description of the hydrogeology of the area is provided.

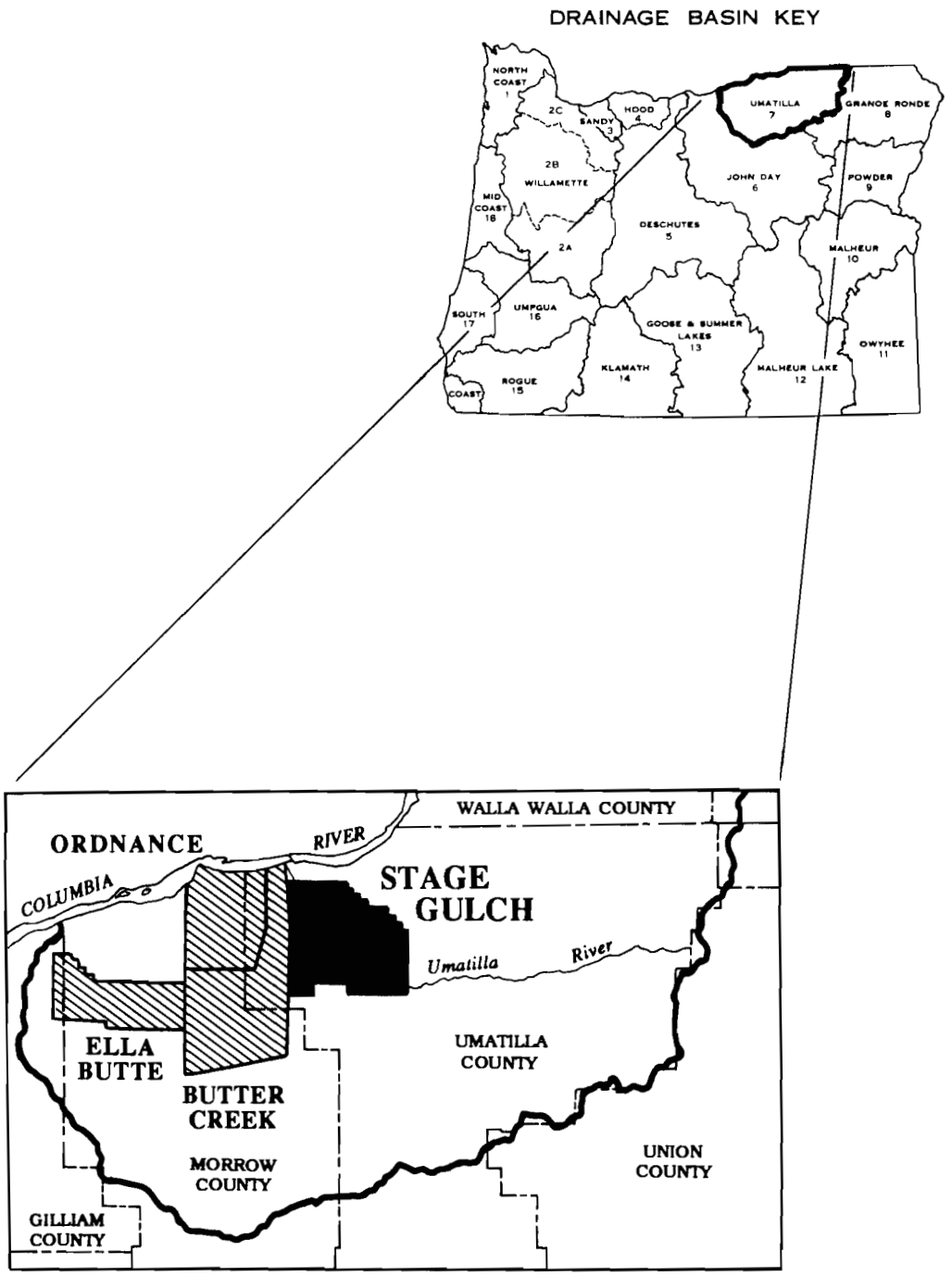


Figure 1. Umatilla Basin showing Location of the Stage Gulch Area and its Relationship to other Areas of Groundwater Control.

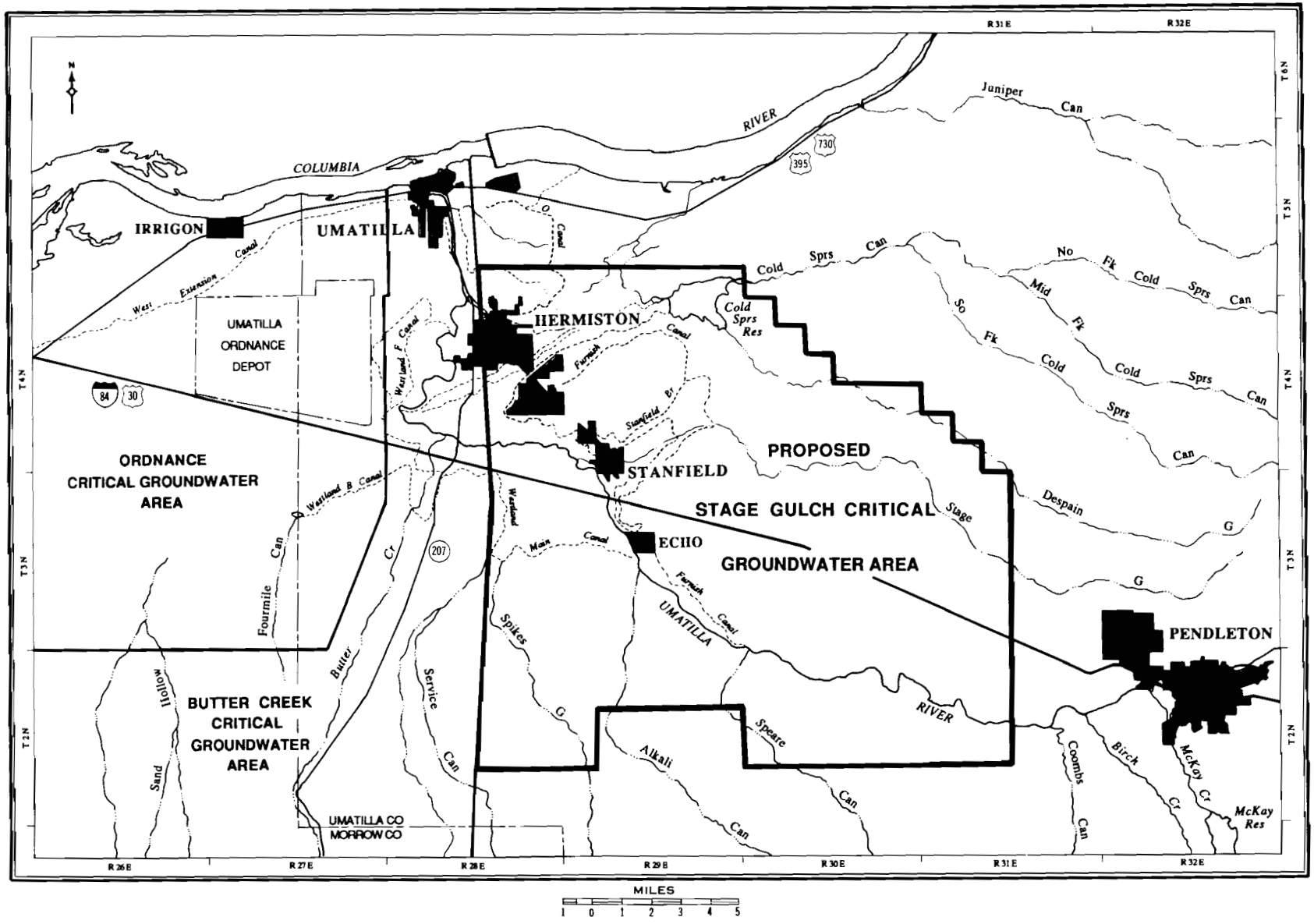


Figure 2. Location Map of the Stage Gulch Area.

Previous Investigations

The geology and groundwater resources of this area have been described in reports by Wagner (1949), Hogenson (1964), Newcomb (1961, 1966, 1967 and 1970) and Robison (1968 and 1971). Regional geologic maps are included in reports by Shannon and Wilson, Inc. (1972), Swanson and others (1981), and Farooqui and others (1981a and1981b).

The Oregon Water Resources Department has performed several investigations in the Umatilla Basin that have resulted in both published and unpublished reports. Groundwater conditions in the Ordnance area were described by Sceva (1966) and McCall (1975). Bartholomew (1975) described the groundwater conditions in the Butter Creek area. This report was updated by Norton and Bartholomew (1984). Groundwater conditions in the Ella Butte area west of the Butter Creek area (Figure 1) were described by Zwart (1988). Reports by Oberlander and Miller (1981) and Zwart (1984) investigated groundwater conditions and more regional water level declines in the basin.

The Water Resources Department entered into a cooperative agreement with the U. S. Geological Survey in 1980. The purpose of the agreement was to describe the basalt hydrology and quantify recharge and pumpage in the Umatilla Basin with the use of a numerical groundwater flow model. The final report for this study became available in 1988 (Davies-Smith, Bolke and Collins).

In 1985, the U. S. Geological Survey completed the data collection phase for the Columbia Plateau Regional Aquifer Systems Analysis (RASA) project in

Oregon, Washington and Idaho. Several of the expected twelve reports resulting from the project will be specific to the Oregon portion of the study area. The first of these discusses 1984 pumpage in Oregon (Collins, 1987). Another report (Drost, Whiteman, and Gonthier, 1990) describes the geology, structure, and thickness of hydrogeologic units in the Columbia Plateau aquifer system.

Groundwater Development

Development of the groundwater resource for irrigation was almost nonexistent in the 1950's. Much of the earliest development was by shallow wells or sumps which penetrated the alluvial aquifer overlying the basalt. Several factors combined to encourage the rapid development of the basalt groundwater reservoir, beginning in the mid-1960's. These included more efficient hard-rock drilling methods, the large production of water available from typical deep basalt wells, new irrigation techniques, favorable crop prices and the availability of relatively inexpensive electrical power. This irrigation boom was initially concentrated in the Butter Creek and Ordnance areas to the west. In the Stage Gulch area, the peak in the development occurred in the middle to late 1970's.

Prior to the January 1985 proclamation, the Water Resources Department had filed about 175 applications to appropriate water from the basalt groundwater reservoir in the Stage Gulch area. Permits or certificates were issued for 169 of these applications. Rights that have not been canceled authorize the primary and supplemental irrigation of nearly 28,000 acres. These rights are tabulated in Appendix B. In addition, four applications to appropriate groundwater

from the basalt are pending in the area as of August 1990. The remaining applications, which are not tabulated, were either withdrawn or rejected. There are additional groundwater rights in the Stage Gulch area for the overlying alluvial groundwater reservoir. These are also tabulated in Appendix B, but the alluvial reservoir will not be discussed in any detail in this report.

The development of the basalt groundwater reservoir, largely for irrigation, has resulted in regional water level declines in basalt wells. The declines are continuing in many wells in the Stage Gulch area in spite of documented reductions in annual pumpage during the 1980's. In recent years, less favorable crop prices and higher power costs have led to reductions in the number of acres under irrigation and in the quantity of water pumped. Some rights of record are not presently being exercised.

Administrative Action

The Director of the Oregon Water Resources Department initiated a proceeding for the determination of a critical groundwater area for the basalt reservoir in the Stage Gulch area on January 31, 1985 (Appendix A). This action was taken as a result of ongoing investigations which gave him reason to believe that:

1) Water levels were declining and had declined excessively,
2) The available groundwater supply was being overdrawn, and
3) Substantial well interference occurred in some areas.

These are several of the statutory criteria, under ORS 537.730, which allow such action to be taken. The proceeding prohibits issuance of new permits for

the basalt groundwater reservoir until final resolution of the question of a critical groundwater area.

The Water Resources Commission has other administrative options to a critical groundwater area. Its authority includes the ability to withdraw groundwater reservoirs from further appropriation pursuant to ORS 536.410, or restrictively classify them for specified new uses pursuant to ORS 536.340. Historically, these authorities were used to manage only surface water resources. They represent relatively new administrative tools with respect to groundwater management. Since its creation in 1985, the Commission has used both the withdrawal and the classification processes to manage groundwater resources. Neither the withdrawal nor classification process can restrict existing authorized groundwater uses. Such reductions in pumpage can only be accomplished through establishment of a critical groundwater area.

PHYSICAL SETTING

Geography

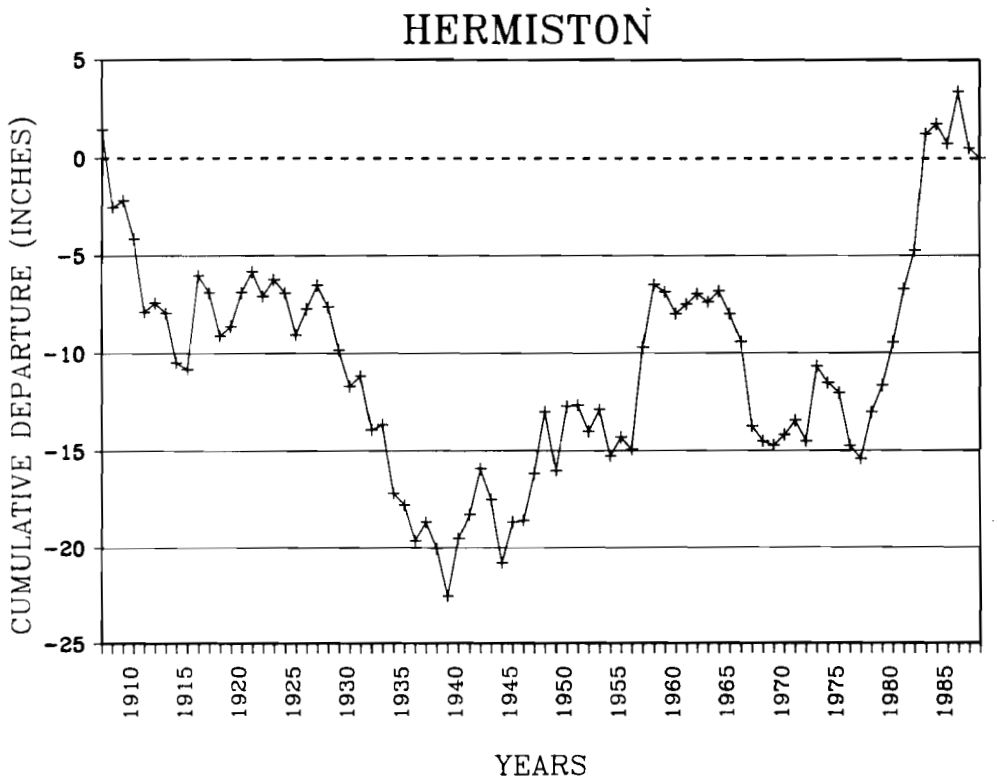
The Stage Gulch area is located within the Columbia Plateau physiographic province. The Columbia Plateau includes thousands of square miles in Washington, Oregon and Idaho. Flood basalt forms the bedrock that underlies the entire province. Higher elevations and greater relief are found in the southern and eastern parts of the Stage Gulch area. These areas include some of the foothills of the Blue Mountains, which lie to the south and east of the area. The elevations range from less than 450 feet near Hermiston to 2000 feet near the southeast corner of the area.

Locally, the Stage Gulch area is within the Umatilla River basin. The Umatilla River and several tributaries flow through the Stage Gulch area. Two larger tributaries, Despain Gulch and Cold Springs Canyon, flow into Cold Springs Reservoir in the northeast corner of the area. Others include Stage Gulch, Alkali Canyon, Speare Canyon, and Mud Spring Canyon. The streams are more deeply incised in the southern and eastern parts of the area, resulting in greater relief and land less suitable for irrigation. The remainder of the area is less well dissected and has lower relief. The greatest concentration of irrigated agriculture is in this area. A series of buttes along the western boundary coincide with a geologic structure known as the Service anticline. These provide the greatest relief in the vicinity and contrast sharply with the nearby lowlands. Umatilla Meadows and Echo Meadows are poorly drained, relatively low relief areas east of Emigrant Buttes, south of the Umatilla River and west of the cities of Echo and Stanfield.

Climate

The climate of the area is fairly typical of the semi-arid continental climate east of the Cascade Range in Oregon. Average annual precipitation at Hermiston is about 8.8 inches (Figure 3). Precipitation increases somewhat to the east and south. In Pendleton, about five miles to the east of the Stage Gulch area, average annual precipitation is about 12.8 inches (Figure 4). The majority of the irrigated lands in the area receives an average of less than ten inches of annual precipitation. Most of the precipitation falls during the winter months as storms move inland from the Pacific Ocean. Summer precipitation is usually from thunderstorms and is, therefore, more localized and sporadic.

Summers are usually warm and dry while winters are cool and moist. July average daily maximum temperature is above 90° F. January average daily maximum and minimum temperatures at Hermiston are about 40° F and 22° F, respectively (Johnsgard, 1963). The climate of the Stage Gulch area is somewhat more moderate than would be predicted for a continental type climate at this latitude. This is due to the proximity of the study area to the Columbia River and the occasional influence of more maritime conditions that exist in western Oregon. The average growing season within the area varies from 158 to 184 days.



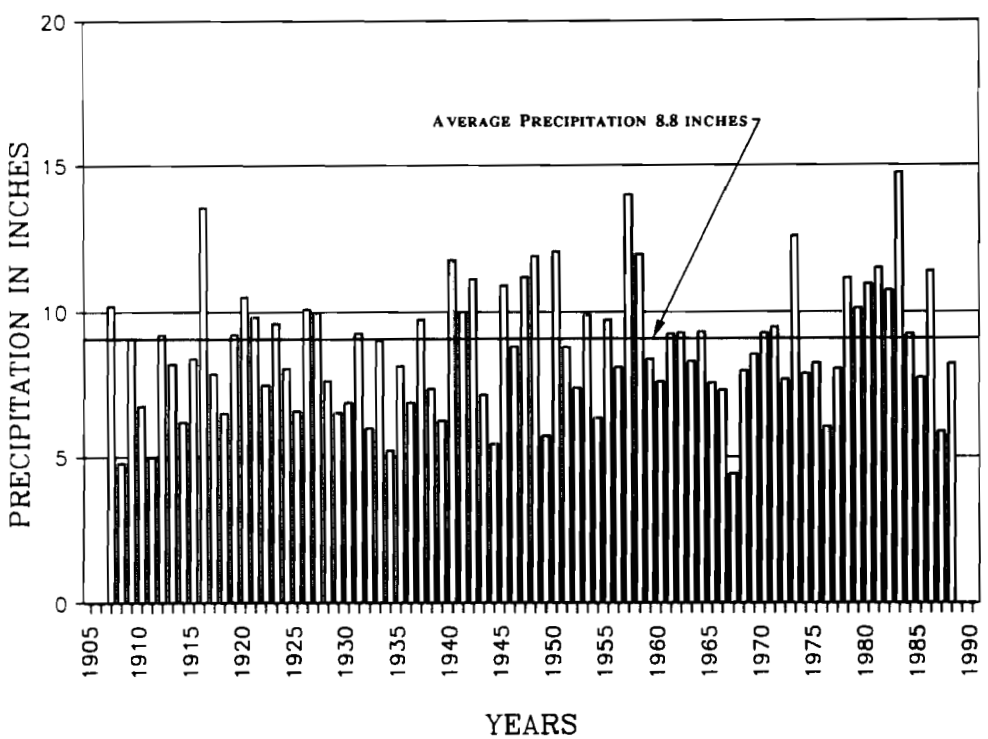
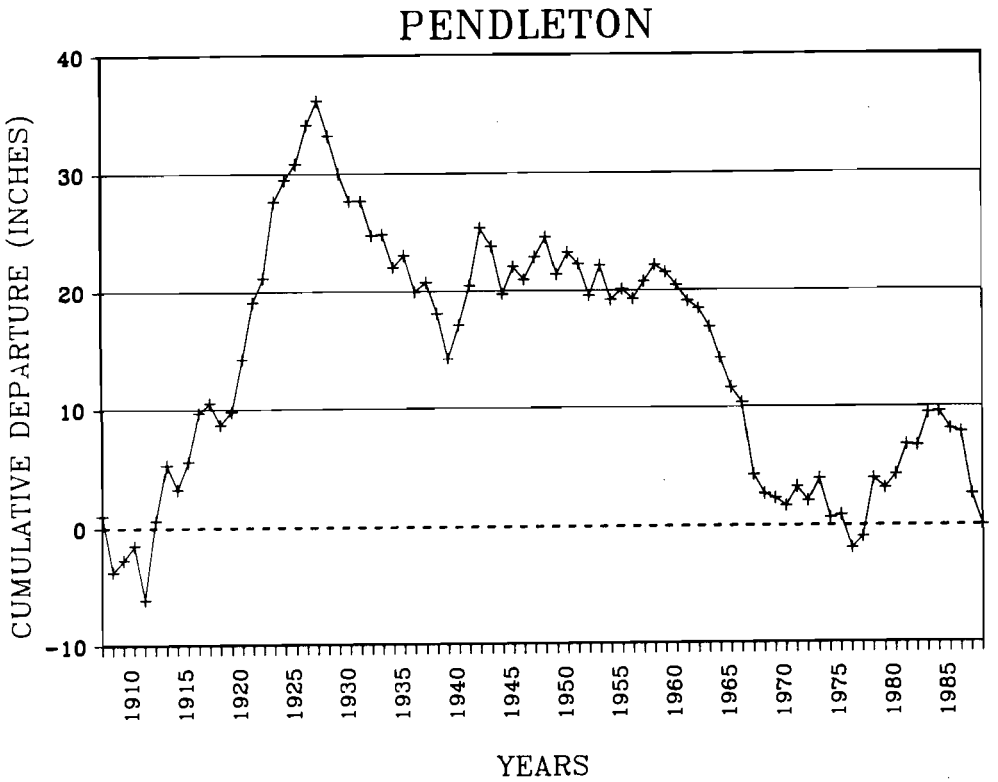


Figure 3. Precipitation and Cumulative Departure from 1907 to 1988 Average Precipitation at Hermiston.



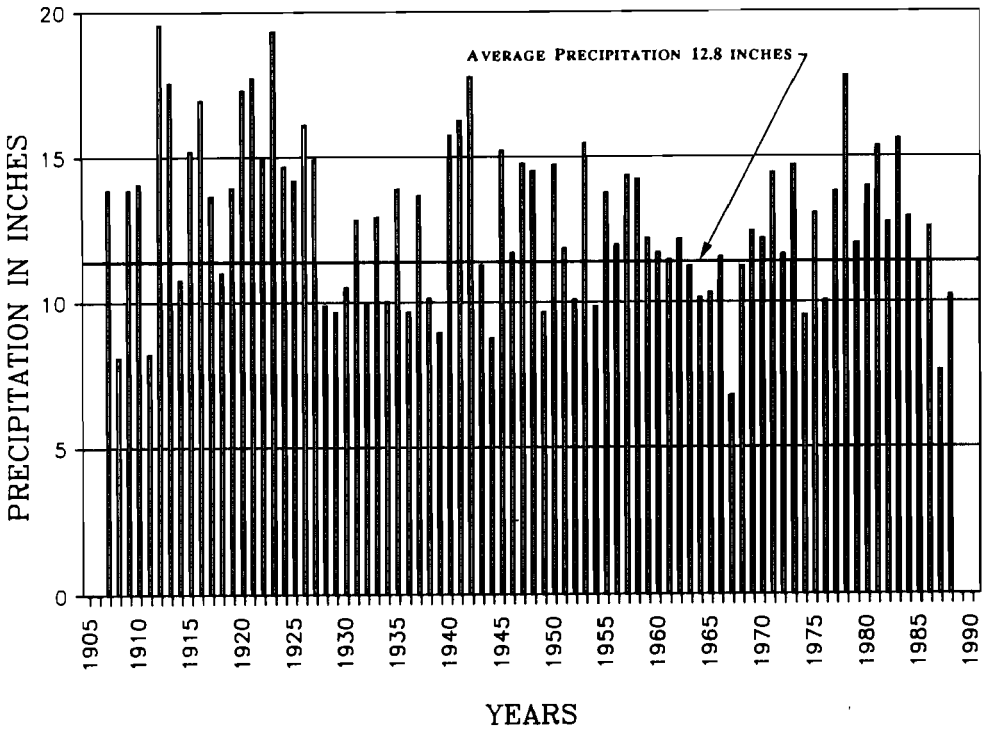


Figure 4. Precipitation and Cumulative Departure from 1907 to 1988 Average Precipitation at Pendleton.

Population

The cities of Stanfield and Echo are located entirely within the Stage Gulch area. Most of the city of Hermiston is within the area. The western part of Hermiston is within the Butter Creek Critical Groundwater Area. Recent estimates for these cities indicate a combined population of about 12,000 (Oregon Blue Book, 1989). The total population of the area, estimated to be about 15,000, includes a substantial residential and suburban population outside the city limits, especially east and north of Hermiston.

Economy

Agriculture dominates the economy of the area. The principal agricultural products are wheat and other small grains, potatoes, corn, alfalfa, melons and livestock. Other major industries in the area include food processing, transportation and tourism.

The Stage Gulch area has excellent access for transportation, which is important to an agriculturally based economy. Interstate Highway 84 bisects the area and provides access to points east and west. A recently completed spur of Interstate Highway 82 connects with Interstate Highway 84 to the west of the area and provides access to the Tri-cities area in Washington and other points north. U. S. Highway 395, State Highways 207 and 32 and other improved county roads also serve the area. In addition, rail transportation is available within the area and there is nearby access to barge transport on the Columbia River.

GEOLOGY

Stratigraphy

Basalt of the Columbia River Basalt Group underlies all of the Stage Gulch area. The basalt consists of a thick sequence of many individual flood basalt flows which were formed from eruptions beginning in lower Miocene time, about 17 million years ago. Episodes of eruptions continued until upper Miocene time, about 6 million years ago. Individual basalt flows vary in thickness, chemistry, texture, magnetic polarity, and areal extent. Flows are typically vesicular and chilled at the basal contact. They become more massive with typical vertical columnar joints in the central part and are often vesicular or weathered at the top.

Inactive periods between eruptive episodes became increasingly frequent and longer in duration as deposition of the Columbia River Basalt Group progressed. Sedimentary deposits, known as interbeds, were sometimes deposited on top of the basalt during these periods of volcanic inactivity. Weathered or vesicular flow tops and bottoms, along with any sedimentary interbeds, are known as interflow zones. Groundwater occurs and moves most readily in the interflow zones due to their generally greater permeability.

The Columbia River Basalt Group is represented by three formations in the Stage Gulch area. They are the Grande Ronde Basalt, Wanapum Basalt and Saddle Mountain Basalt, in order from oldest to youngest (Figure 5). The Grande Ronde Basalt Formation is the thickest and most extensive of the formations. It underlies the entire Stage Gulch area and is not exposed at the surface except in the southern and eastern parts of the area. Elsewhere, it is

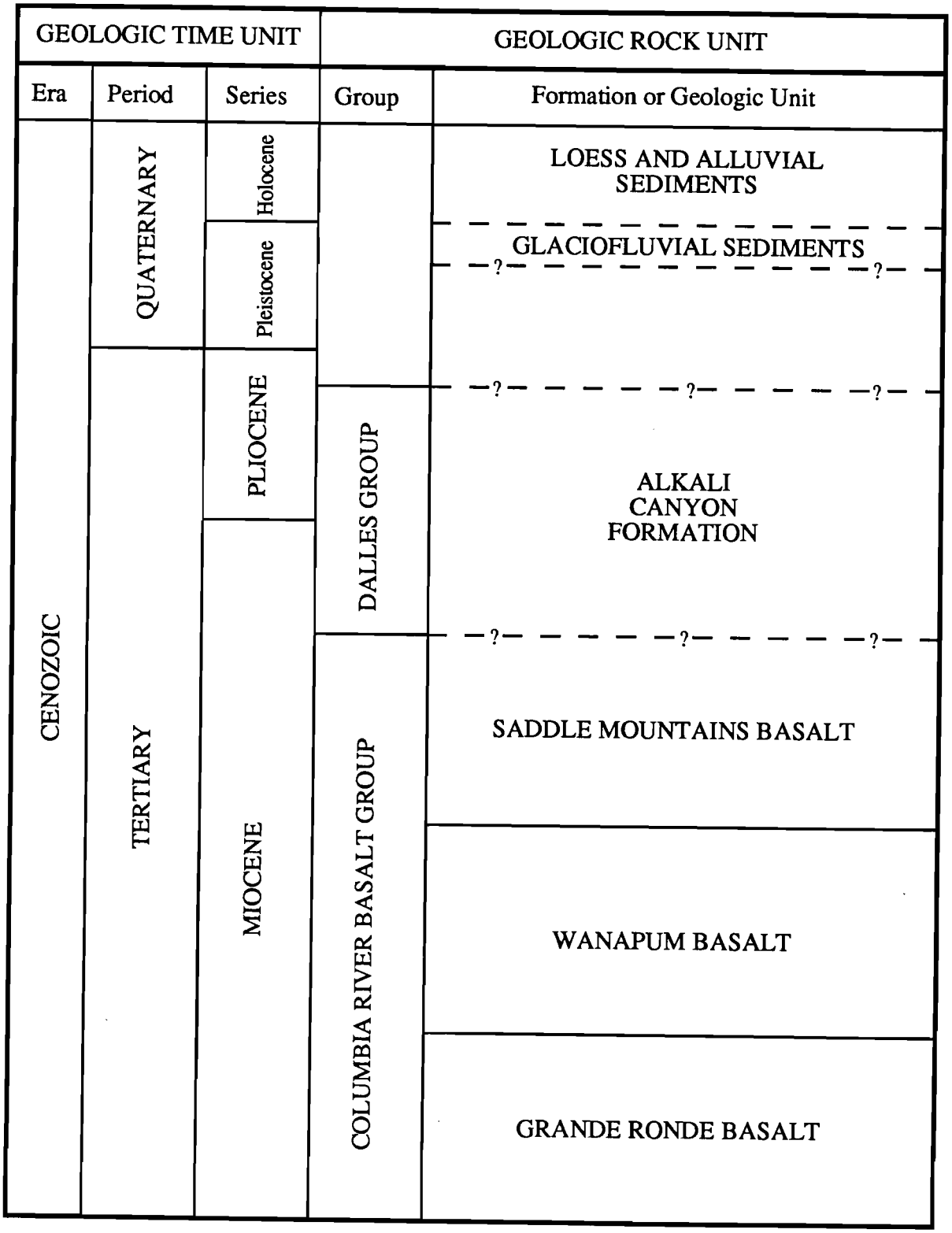


Figure 5. Generalized Stratigraphy of the Stage Gulch Area.

overlain by Wanapum Basalt and Saddle Mountain Basalt. The Saddle Mountain Basalt Formation is limited to the northern and western part of the area. These basalt formations are important as aquifers. Some wells may penetrate one or more of these formations, depending on the location and depth drilled.

The basalt was very fluid lava when it erupted. Individual basalt flows often spread far from the centers of eruption and cover hundreds of square miles. Topography of the land surface at the time of eruption controlled the extent, shape, and thickness of the flows. The basalt flows are thickest where topographic depressions existed and become progressively thinner until they pinch out at higher elevations.

Sedimentary deposits overlie the basalt in nearly all of the Stage Gulch area. Miocene to Pliocene age sediments of the Dalles Group immediately overlie the basalt in much of the Umatilla Basin. The Dalles Group is represented by the Alkali Canyon Formation to the south of the Arlington-Boardman area, and by the McKay Formation in the Pendleton-Pilot Rock area (Farooqui and others, 1981a and 1981b). These deposits were formerly described as fanglomerate (Hogenson, 1964). They generally consist of poorly to well cemented basaltic gravels and interbedded tuffaceous sediments. The above authors do not map Dalles Group rocks within the Stage Gulch area. However, Robison (1971) revised Hogenson's earlier geologic map, extending the mapped area of fanglomerate to the east to include the southern part of the Stage Gulch area. Walker (1977) maps equivalent (Tertiary) age sedimentary rocks east of Service Butte only in the southwestern part of the Stage Gulch area. Deposits of gravel or cobbles, occasionally further described as being cemented, overlie basalt bedrock in the lithologic descriptions of

water well reports for wells in this area. This may be an indication that the Alkali Canyon Formation does occur in the shallow-subsurface to the east of the Service anticline.

Thick deposits of younger sediments occur in the north and west part of the Stage Gulch area. These sediments consist chiefly of Quaternary glaciofluvial deposits of coarse sand and gravel (Hogenson, 1964). Finer grained deposits of silt and sand that also occur in the area are of lacustrine origin and represent a slack-water facies of the glaciofluvial deposits. Alluvial sands and gravels of Quaternary to Recent age have been deposited in the valley and flood plain of the Umatilla River and its tributaries. Both of these types of deposits have sufficient thickness and permeability to serve as important aquifers. Quaternary age windblown deposits of silt to fine sand, known as loess, blanket nearly the entire area. The younger sedimentary and windblown deposits cover much of the underlying basalt bedrock in the area. This has resulted in good exposures of the basalt only in the steeper parts of the Umatilla River valley and at some of the buttes along the western boundary of the area.

Structure

As the basalt flows were being deposited over a relatively long and discontinuous period of eruptions, the Blue Mountains to the south were also being uplifted. This process resulted in the basalt flows dipping slightly to the north in the Umatilla Basin. The older basalt flows generally extend farther to the south than younger flows, as a result of the continuing uplift. The basalt is thickest near the Columbia River, where it is estimated to be over 10,000 feet thick (Davies-Smith, Bolke, and Collins, 1988).

The Blue Mountain uplift, which continued to rise during and after the basalt flows were deposited, folded the basalt units into broad regional anticlines and synclines. Many of the mapped folds are features with fold axes of 40 or more miles in length and flanks that dip very slightly, less than two degrees. The regional folds often trend east-west to northeast-southwest and are subparallel to the deformation trend of the Blue Mountains. The Dalles-Umatilla syncline is one of the regional folds. It closely follows the Columbia River east of The Dalles to near the city of Umatilla (Figure 6). The Rieth anticline is another such fold that trends northeast-southwest near the community of Rieth, just to the southeast of the Stage Gulch area.

Shorter folds are also mapped in the basalt. These often occur as a subparallel anticline and syncline and are more commonly associated with faults. Dips on their flanks are often steeper, as well. One of these is the Service anticline, which is mapped through a series of north-south trending buttes on the west boundary of the Stage Gulch area. Some apparent normal faults are mapped at points along the anticline. At other places, surface exposure is limited, making mapping of the structure difficult. Shannon and Wilson (1972) mapped the Willow Creek monocline to the west of the Service anticline in the Butter Creek and Ella Butte areas. Oberlander and Miller (1981) refined the location of the Willow Creek monocline with the use of water level data. On that basis, they inferred its trend east of the Service anticline in the Stage Gulch area.

Structures such as folds and faults can be important factors in controlling the movement and occurrence of groundwater in basalt aquifers. Groundwater barriers can result from faulting that offsets interflow zones. Stratigraphic pinch-outs of interflow zones can also serve as effective groundwater barriers.

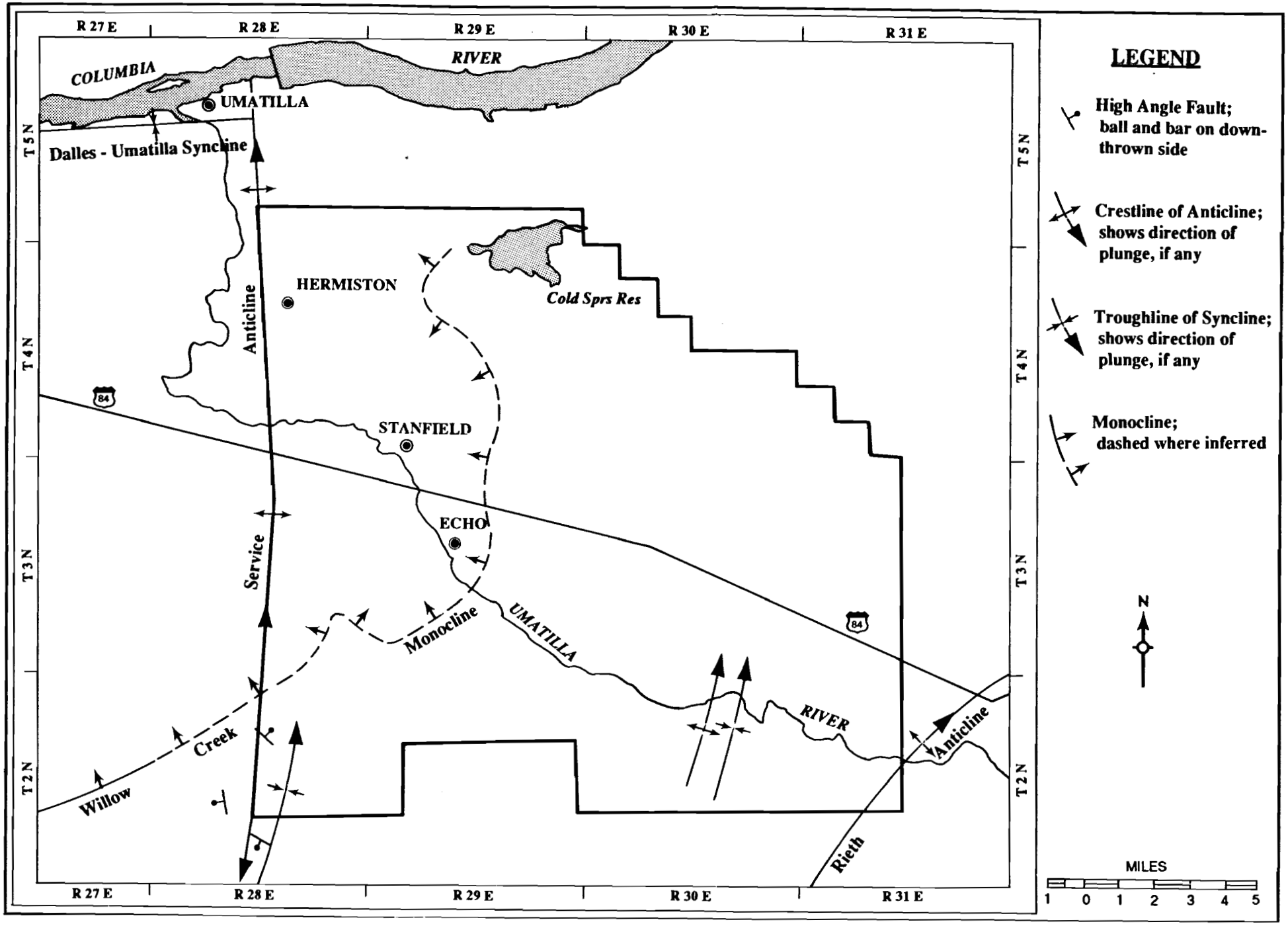


Figure 6. Major Structural Features in the Stage Gulch Area.

These may result from basalt deposition on pre-existing folds. Since the basalt in this area is often not well exposed at the surface, it is possible that some of these structures have not yet been located. The location of previously unmapped structures and stratigraphic changes influencing the basalt aquifers sometimes can be inferred by the response of wells to pumping.

GROUNDWATER

The Hydrologic Cycle and General Groundwater Concepts

The continuous circulation of water in all forms on the earth and in the atmosphere is known as the hydrologic cycle. The cycle has neither a beginning nor an end, but the oceans are conventionally presented as its origin. Radiation from the sun evaporates water from the oceans, lakes and land surface into the atmosphere. The water vapor rises, condenses to form clouds, and falls back to the earth's surface as precipitation. Precipitation that falls upon land areas is the source of essentially all fresh water supplies.

Some precipitation, after wetting the foliage and ground, runs off over the land surface to streams. A portion of this runoff is stored in lakes, ponds, and swampy areas. Other water soaks into the soil. Much of the water that enters the soil is detained in the plant root zone and eventually is drawn back to the surface by plants or by soil capillarity. A portion of it, however, infiltrates below the root zone and continues moving downward until it enters a groundwater reservoir. Groundwater moves through the pores or fractures of saturated subsurface materials and may reappear at the surface in the form of springs and seeps. These discharges of groundwater maintain the flow of streams in dry periods. The streams, carrying both surface runoff and groundwater discharge, eventually lead back to the oceans.

The hydrologic cycle is the system by which water circulates from the oceans through the atmosphere and returns both overland and underground back to the sea through diverse paths. The forces involved in this process include

radiation, gravity, molecular attraction and capillarity. The time required for water to complete a circuit through the cycle can vary considerably, from a few minutes to many millenia, depending on the path taken.

Groundwater is water that has percolated below the soil moisture zone to the zone of saturation. The upper surface of the zone of saturation is the water table. Water-table, or unconfined, aquifers contain groundwater at atmospheric pressure. The configuration of the water table is often a subdued representation of the topography of the land surface. Groundwater moves down gradient from areas of recharge to areas of discharge at relatively lower elevation. As it moves preferentially in the more permeable materials, the groundwater may become confined below less permeable overlying materials. Groundwater in these confined, or artesian, aquifers is under sufficient pressure head to rise above the bottom of overlying confining beds in wells that penetrate such aquifers. The potentiometric surface represents the total head in a confined aquifer and is analogous to the water table in an unconfined aquifer. Groundwater reservoirs may contain an immense quantity of water in storage and may detain the water entering them for long periods of time before the same water is discharged to surface water bodies.

Basalt Groundwater Reservoir

Hydraulic Characteristics

Most groundwater in Columbia River Basalt aquifers occurs and moves in the interflow zones and any relatively permeable sedimentary interbeds. Confined conditions exist in the interflow zones, with the more massive flow

centers and lower permeability interbeds generally serving as confining layers. It is possible that each interflow zone has unique hydraulic properties, groundwater quality, and potentiometric surface. Most permitted basalt wells in this area are relatively deep (generally greater than 400 feet) and penetrate multiple interflow zones to maximize production of water. This factor basically requires consideration of most of the developed basalt thickness as a single groundwater reservoir in the Stage Gulch area.

A small number of permitted basalt wells in the area are relatively shallow, penetrating less than 200 feet of basalt. Water level elevations at these wells are considerably higher than at deeper nearby basalt wells. This is an indication that the shallow interflow zones are associated with higher potentiometric heads and may be in relatively good hydraulic connection with the overlying alluvial aquifer. Records of many wells that penetrate the basalt reservoir in the Stage Gulch area are given in Appendix C.

Static water level measurements for basalt wells represent heads on a generalized potentiometric surface as a result of penetrating multiple interflow zones. Plate 1 is a map of the generalized potentiometric surface in the Stage Gulch area. It was prepared primarily from water level measurements made in February 1990. Winter water level measurements made in prior years were used if February 1990 data were unavailable at some wells. The water levels in wells were converted to elevations above mean sea level by estimating the land surface elevation at wellheads, using 1:24,000 scale topographic maps. Water level measurements for most large basalt wells in the Stage Gulch area are compiled in Appendices C and D.

The shape of the potentiometric surface indicates several features of the basalt

groundwater reservoir. It shows the direction of groundwater movement, which is downgradient in a direction perpendicular to the potentiometric contours. In the Stage Gulch area, the gradient is generally to the west and northwest, which is also the direction of dip of the basalt flows. This also indicates that the recharge area for the basalt is to the south and east of the area, while the major discharge area is to the north and west. The shape of the contours also suggests that the Umatilla River is also a local discharge area for basalt groundwater. The 300 to 600 feet contours are relatively closely spaced in the southwest part of the area. The steep potentiometric gradient there may be the result of either lower transmissivity or a structural or stratigraphic barrier that impedes the movement of groundwater. Oberlander and Miller (1981) used the steep gradient in this area to extrapolate the trend of the Willow Creek monocline east of the Service anticline.

Aquifer Tests

An aquifer test is a procedure in which a well is pumped in a controlled manner for a period of time, usually several hours to several days. The purpose of the test is to determine hydraulic coefficients that indicate how water is stored and transmitted in the aquifer. Water level data are collected at the pumped well and usually one or more observation wells during the pumping (drawdown) phase of the test. Similar data are also collected during the recovery phase of the test, after the pump is shut down. Additional data, such as barometric pressure, pumping rate, water temperature and conductivity are usually collected during such tests. Water samples are often collected during aquifer tests for later chemical analysis of the groundwater.

Personnel of the Water Resources Department have conducted aquifer tests at five locations in the Stage Gulch area. In addition, Department personnel participated in aquifer testing conducted at Circle C Ranch by the consulting firm of CH2M Hill (Oberlander, 1979). Water samples were collected during some of these aquifer tests for radiometric dating of the groundwater using the carbon 14 method.

The water level and discharge data collected during aquifer tests allow determination of the hydraulic characteristics for the basalt groundwater reservoir in the area of the test. Transmissivities and storage coefficients from these tests were commonly calculated using either the Theis or Cooper-Jacob graphical methods. The Theis method involves a curve-matching technique, while the Cooper-Jacob method requires determination of the slopes and intercepts of straight-line segments of semi-log plots of the data (Lohman, 1972). Table 1 is a summary of the hydraulic characteristics determined for the aquifer tests conducted in the Stage Gulch area. Reliable determinations for the transmissivity of the basalt groundwater reservoir range from about 500 square feet per day to over 50,000 square feet per day. Storage coefficients ranged from about 0.0015 to 0.00001, and averaged about 0.0005. These are typical values for confined aquifers and agree well with others determined for basalt aquifers (Gephart and others, 1979). As with the potentiometric surface, the aquifer test results generally reflect composite hydraulic characteristics for the multiple interflow zone combinations in the boreholes. Such characteristics for individual water-bearing zones of the basalt reservoir are not possible to determine with existing wells and pumps in the area.

Table 1. Summary of Transmissivity and Storage Coefficients Determined from Aquifer Tests.

Well Location	Transmissivity, in square feet/day	Coefficient of Storage	Remarks
3N/29E-2add	6000	–	Circle C #4, pumped
3N/29E-7ccb	5390	–	Circle C #3, pumped
3N/29E-11acc	1140	–	Circle C #6, pumped
3N/29E-11ddd	–	–	Circle C #5, pumped
3N/29E-14bac	96000	1.9×10^{-3}	Circle C #8, obs. well, barrier effect noted
3N/29E-12bbc	5490	–	Circle C #7, pumped
4N/29E-36adc	6060	1.1×10^{-5}	Zabransky #3, obs. well
3N/30E-6cbd	–	–	Circle C #2, pumped
3N/30E-7abc	52260	1.3×10^{-3}	Reese #3, obs. well, barrier effect noted
4N/29E-36adc	5930	3.1×10^{-2}	Zabransky #3, obs. well
3N/30E-7bbd	1600	–	Circle C #1, pumped
3N/30E-7abc	9600	8.2×10^{-5}	Reese #3, obs. well
3N/28E-26baa	67770	–	L&L #2, pumped well
3N/28E-23dcb	36660	2.4×10^{-4}	L&L #1, obs. well
3N/28E-28ada	88250	–	RCF #1, obs. well
4N/29E-32bbc	550	–	Stanfield #4, pumped, drawdown
4N/29E-32bbc	990	–	Early* recovery
4N/29E-32bbc	2100	–	Late recovery
4N/29E-30abb	494000	7.9×10^{-4}	Cox #3, obs. well, barrier effect noted
4N/30E-29daa	10100	–	Stage Gulch #3, pumped well, Theis** drawdown
4N/30E-29daa	61400	–	Early drawdown
4N/30E-29daa	8400	–	Middle drawdown
4N/30E-29daa	6600	–	Late drawdown
4N/30E-29daa	35200	–	Early recovery
4N/30E-29daa	15500	–	Middle recovery
4N/30E-29daa	7400	–	Late recovery
4N/30E-28ada	7400	–	Stage Gulch #4, obs. well Theis drawdown
4N/30E-28ada	9000	5.8×10^{-5}	Early drawdown
4N/30E-28ada	5700	8.5×10^{-5}	Late drawdown
4N/30E-28ada	20000	2.3×10^{-5}	Early recovery

Table 1. (Continued)

Well Location	Transmissivity, in square feet/day	Coefficient of Storage	Remarks
4N/30E-28ada	9000	6.0×10^{-5}	Late recovery
4N/30E-32dca	7600	--	Stage Gulch #2, obs. well Theis drawdown
4N/30E-32dca	15500	2.2×10^{-5}	Early drawdown
4N/30E-32dca	5800	4.6×10^{-5}	Late drawdown
4N/30E-32dca	12800	1.9×10^{-5}	Recovery
4N/30E-26cbb	3500	--	Kilgore #1, obs. well Theis drawdown
4N/30E-26cbb	6300	3.9×10^{-5}	Drawdown
4N/30E-26cbb	11100	1.6×10^{-5}	Recovery
2N/28E-1dbb	20000	--	Eagle Ranch #4, pumped well, Theis drawdown
2N/28E-1dbb	19650	--	Drawdown
2N/28E-2bdd	21040	5.8×10^{-4}	Eagle Ranch #7, obs. well drawdown
3N/28E-36dbb	14000	4.4×10^{-5}	Eagle Ranch #3, obs well drawdown
4N/29E-18dcb	380	--	Chowning #2, pumped, drawdown
4N/29E-18dcb	130	--	Early recovery
4N/29E-18dcb	230	--	Late recovery
4N/29E-18ddb	1580	1.1×10^{-3}	Chowning #3, obs. well, Theis early drawdown
4N/29E-18ddb	350	6.7×10^{-4}	Theis late drawdown
4N/29E-18ddb	690	2.2×10^{-3}	Theis recovery
4N/29E-18ddb	500	4.9×10^{-4}	Drawdown
4N/29E-18ddb	1050	1.5×10^{-3}	Recovery
4N/29E-19bcc	7800	1.8×10^{-3}	Gossler obs. well Theis drawdown

*Early, middle or late refers to the relative time in the drawdown or recovery data that the calculations were made.
**Theis refers to one of two methods of data analysis used in the calculations. If no method is indicated, the Cooper-Jacob method was used.

Some of the very high values of calculated transmissivity listed in Table 1 may not be reliable indicators of the actual transmissivity in the area. This is the result of the influence of several groundwater barriers which were interpreted to exist between some observation wells and pumping wells. These barriers are often very efficient in isolating wells on one side from the effects of pumping on the other. They may be associated with faults, folds and/or stratigraphic pinch-outs which can inhibit groundwater movement.

In most places where barriers are interpreted from aquifer tests, such structures have not been previously mapped. One groundwater barrier was identified north of the Eagle Ranch well number 4 (2N/28E-1dbb) where the steep gradient in the potentiometric surface has been previously noted (Plate 1). A barrier was identified west of Stage Gulch Ranch well number 3 (4N/30E-29daa). Two possible barriers were inferred to the north and east of the city of Stanfield well number 4 (4N/29E-32bbc). Another barrier trends nearly east-west between Circle C Ranch wells number 5 (3N/29E-11ddd) and number 8 (3N/29E-14bac) and extends to the northeast between Circle C well number 2 (3N/30E-6cbd) and Reese well number 3 (3N/30E-7abc). These barrier locations, along with the locations of wells used in the aquifer tests, are shown on Plate 4. The barriers identified probably represent only a portion of the total that exist in the Stage Gulch area. Other barriers would likely be identified in the area with additional aquifer testing.

Recharge

Recharge to the basalt groundwater reservoir within the Stage Gulch area is very limited. The low vertical permeability of the basalt, combined with

slight annual precipitation preclude the possibility of significant recharge in the area. In some parts of the area, saturated sedimentary deposits may provide some limited recharge to the underlying basalt, especially if the top of the basalt is weathered or eroded, exposing some edges of basalt flows to the sediments.

As stated earlier, the shape of the potentiometric contours (Plate 1) indicates that the principal area of recharge is to the south and southeast of the Stage Gulch area. Most recharge to the basalt aquifers probably occurs in the Blue Mountains to the south. Precipitation is greater there as a result of the higher elevation. The increased dip of the basalt layers also exposes more interflow zones at land surface there to the relatively more numerous tributaries of the Umatilla River. This provides more opportunity for recharge to occur. Another area of limited recharge may be the extension of the Horse Heaven Hills in Oregon, northeast of the Stage Gulch area (Oberlander and Miller, 1981).

It is difficult to estimate the quantity of recharge that would be available to wells within the Stage Gulch area on an annual basis. Previous estimates of annual recharge to the basalt groundwater reservoir in the larger Umatilla Structural Basin ranged from about 10,000 to over 64,000 acre-feet (Oberlander and Miller, 1981, and Zwart, 1984). Pumpage estimates for this larger area suggested that the basalt groundwater reservoir was being overdrawn by at least 15,000 acre-feet per year (Zwart, 1988). As part of an effort to model the groundwater flow system in this area, Davies-Smith, Bolke and Collins (1988) estimated recharge for the entire modeled area to be about 145.85 cubic feet per second. This equates to approximately 106,000 acre-feet per year. The estimate does not separate recharge to the alluvial aquifer from that for the basalt

aquifers. It also includes an undetermined quantity for the Horse Heaven Hills area of Washington, which would further reduce the quantity available to basalt wells in the Oregon portion of the modeled area.

Carbon 14 determinations for groundwater samples from six basalt wells in the Stage Gulch area are shown on Plate 4. Regional carbon 14 ages of basalt groundwater generally indicate that travel times from areas of recharge are long. An average rate of groundwater flow has been estimated to be on the order of five to ten feet per year, based on these age determinations (Zwart, 1988). Rates of groundwater flow in individual interflow zones may be slower or faster than the above average. Since the wells sampled penetrate multiple interflow zones, the age determinations for the groundwater are a composite for those zones penetrated. Slow rates of groundwater movement are possibly due to low average transmissivity, a generally low hydraulic gradient, or the presence of groundwater barriers. The generally slow rate of groundwater movement is another indication that the recharge rate is low.

Discharge

Natural discharge of groundwater within the Stage Gulch area is low. Prior to development of the groundwater resource, natural recharge and discharge were probably balanced. The major area of discharge for the basalt groundwater reservoir is the Columbia River. The shape of the potentiometric surface contours (Plate 1) indicates that groundwater moves primarily to the west in the Stage Gulch area, rather than directly toward the Columbia River. However, a potentiometric surface map for the larger Umatilla Structural Basin (Oberlander and Miller, 1981) indicates that

groundwater downgradient of the Stage Gulch area flows to the north, toward the Columbia River. The 800 foot contour on that map is U-shaped opening downstream as it crosses the Umatilla River. This suggests that some groundwater discharge to the river is occurring in that part of the Stage Gulch area. The groundwater flow direction for that part of the area, as shown on Plate 1, is toward the Umatilla River, which agrees with this conclusion.

The basalt groundwater reservoir has been extensively developed by wells for irrigation, municipal, domestic and other uses over the last 30 or more years. This has resulted in a relatively large artificial discharge of groundwater within the Stage Gulch area. It is difficult to quantify the pumpage from basalt wells during the early period of this development. The Water Resources Department has required totalizing flowmeters since 1980 for most permitted wells in the Stage Gulch area. Annual pumpage from basalt wells has been estimated for the period 1980 to 1989, primarily with the use of flowmeter data (Table 2). When flowmeter data are missing or believed to be unreliable, data from power meters are used to refine or augment the estimates.

Table 2. Estimated Annual Pumpage, in Acre-feet, from the Basalt Groundwater Reservoir in the Stage Gulch Area, 1980 to 1989.

Year	Acre-feet	Year	Acre-feet
1980	36,200	1985	35,300
1981	34,100	1986	31,300
1982	31,300	1987	30,800
1983	30,000	1988	28,600
1984	31,000	1989	30,700

The pumpage estimates show a general decrease during this period, with nearly 15 percent less water being pumped in 1989 than was pumped in 1980. The reasons for the overall decrease are believed to be largely economic, resulting from lower crop prices and increased production costs, particularly power. Some irrigators have reduced the total acres under irrigation, or ceased irrigating entirely. Other reasons for decreased pumpage may include several successive years of above average precipitation and a move by some irrigators to more efficient irrigation practices. The pumpage of groundwater may not remain at the present level in the Stage Gulch area. The full exercise of current water rights in the area would result in much greater pumpage, to over 80,000 acre-feet per year. As economic conditions change, an increase in annual pumpage is possible.

As discussed earlier, the Stage Gulch area is rather distant from the principal area of recharge in the Blue Mountains. The low vertical permeability of the basalt layers likely precludes significant induced recharge within the area. The area is located closer to natural discharge areas for the basalt groundwater reservoir. Because of this proximity to discharge areas, it is likely that development of the basalt groundwater resource in the Stage gulch area has resulted in a reduction in natural discharge from the basalt aquifers.

Davies-Smith, Bolke and Collins (1988) calibrated a groundwater flow model to both steady-state and transient conditions. Steady-state conditions correspond to the year 1950, which is presumed to be prior to any groundwater pumping. Transient conditions include the period between 1950 and 1982, during which time development of the groundwater resource occurred. Pumpage stress was simulated for each year. They estimated that aquifer discharge to streams decreased by about 41.46 cubic feet per second,

which equates to approximately 30,000 acre-feet per year by the end of this transient analysis period. This estimate includes the alluvial aquifers as well as the basalt, and also includes reductions in discharge from a small portion of Washington State across the Columbia River. It is likely that development of the basalt groundwater reservoir has had some impact on streamflows in the Umatilla Basin, and that this impact will continue or increase.

Water Level Declines

Development places a new discharge stress on a groundwater reservoir. Some declines in water level will result from that stress. The total water level decline, and the area affected by such declines, depends on many factors. These include the hydraulic characteristics of the reservoir, quantity of water pumped, spacing between wells, well construction, and distance to recharge or discharge areas.

Ideally, as development of the resource progresses in the area, water level declines will continue and the area experiencing declines will expand until such time that either recharge or discharge areas are intercepted. With such interception, the declines may induce greater recharge to the groundwater reservoir, but will reduce natural discharge from it. Water levels may then begin to stabilize at lower elevations as the additionally induced recharge, or reduced discharge, balances the quantity of water pumped. If pumpage is great enough to overdraft the groundwater reservoir, water level declines will continue without stabilizing. As a result of compartmentalization and other anisotropy of the basalt groundwater reservoir in the Stage Gulch area, water levels do not respond uniformly to the stress of development.

Water levels in the Stage Gulch area have declined as a result of development. Plate 2 shows water level declines for the period 1965 to 1980. The plate is slightly modified from Oberlander and Miller (1981) and is presented to approximate the total declines documented in the area to that time. By 1980, many of the wells had already experienced water level declines of 50 feet or more, resulting from development of the resource in the 1970's. Two areas of localized declines of over 100 feet are indicated on the map.

Department personnel have made winter water level measurements at selected wells in the entire Umatilla Basin annually since 1979. Most irrigation wells are idle at this time and water levels have recovered to their highest annual levels. Plate 3 shows water level declines in the Stage Gulch area during the period 1980 to 1990, based on these winter measurements. Water level declines continue at nearly all of the observation wells. Most of the declines are between 25 and 60 feet, with over 100 feet at some wells in the southwest part of the area.

Hydrographs of selected wells in the Stage Gulch area are presented in Appendix E. A hydrograph is a graphical representation of the water level in a well versus time. Water level trends in individual wells are easy to visualize with hydrographs. Analysis of the hydrographs indicates that water level declines continue at most wells in the Stage Gulch area without indication that stabilization is occurring.

Well Interference

During the irrigation season, interference between pumping wells has a

much greater influence on water levels in some wells than does the annual water level decline. The Water Resources Department has documented well interference in parts of the Stage Gulch area. These data are not as extensive as those for annual water level declines. This is because summer water level measurements are not made as often as are winter measurements. Wells are frequently pumping, or have been recently pumped, in the summer. Residual drawdown in such wells may mask well interference effects. Therefore, unpumped wells are best suited to document well interference.

The water level in one unpumped well in the Stage Gulch area (3N/30E-6cbd) fluctuates over 500 feet during the year. The decline rate for this well, as determined by February measurements, is only about 3 feet per year, which is slightly less than average for the area. The hydrograph for this well is given in Appendix E. Aquifer testing revealed that this well is located near several groundwater barriers. This probably represents an extreme example of the magnitude of well interference in the area. The Department has responded to other reports of well interference in the Stage Gulch area and discovered greater than 100 feet of interference elsewhere.

Well interference results in increased pumping lifts and other associated costs to well owners. It is more extreme where the aquifers are compartmentalized by the presence of groundwater barriers. The barriers that efficiently isolate wells from the effects of pumping on opposite sides also serve to increase the effects of well interference for wells on the same side. This is because the expansion of the cone of depression of a pumping well is limited in the direction of the groundwater barrier, and the cone must therefore expand in other directions.

Continued Use of the Resource

Future pumpage at or above current rates from the basalt groundwater reservoir in the Stage Gulch area will result in continued water level declines in wells. As water levels decline, pumping costs will progressively increase. In addition, many wells will need to be deepened to continue to pump the customary or permitted quantity of water. Deepened wells will penetrate additional interflow zones which have unknown hydraulic characteristics. These zones may yield groundwater under differing pressure heads from those that overlie them. Water levels may therefore either rise or fall during the deepening operation. Although deepening may result in higher water levels in some wells, continued overdraft of the resource will result in declines that continue after deepening.

Eventually, the water level in some wells will reach or exceed the economic pumping level in the area. The economic pumping level is tied closely to, and therefore will vary with, pumping costs (Appendix F). When this occurs, it is likely that some irrigators will pump less groundwater. Others will likely be forced out of irrigation entirely if no other source of water is available. Annual pumpage in the area will probably decrease to an amount that will produce relatively stable water levels in most wells. Future power costs and crop prices are unpredictable, and because of this, it is uncertain when this situation would occur in the Stage Gulch area. However, in that setting the prior appropriation system would be irrelevant. Only those appropriators who are able to afford the pumping costs in the area would continue to pump.

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APPENDIX A

Stage Gulch Proclamation

BEFORE THE WATER RESOURCES DIRECTOR OF OREGON

UMATILLA COUNTY

IN THE MATTER OF INITIATION OF A CRITICAL GROUND WATER AREA DETERMINATION IN THE STAGE GULCH AREA OF THE UMATILLA STRUCTURAL BASIN	)))))	PROCLAMATION STAGE GULCH

The initiation of a critical ground water area proceeding is hereby proclaimed pursuant to OAR 690-10-050 in the Umatilla Structural Basin. The proposed exterior boundaries of this area, which is within Umatilla County, are described as follows:

Beginning at the northeast corner of Section 36, Township 5 North, Range 29 East, WM; thence south to the southeast corner of Section 36, Township 5 North, Range 29 East, WM; thence east to the northeast corner of Section 6, Township 4 North, Range 30 East, WM; thence south to the southeast corner of Section 6, Township 4 North, Range 30 East, WM; thence east to the northeast corner of Section 8, Township 4 North, Range 30 East, WM; thence south to the southeast corner of Section 8, Township 4 North, Range 30 East, WM; thence east to the northeast corner of Section 16, Township 4 North, Range 30 East, WM; thence south to the southeast corner of Section 16, Township 4 North, Range 30 East, WM; thence east along the section line to the northeast corner of Section 24, Township 4 North, Range 30 East, WM; thence south to the northwest corner of Section 30, Township 4 North, Range 31 East, WM; thence east to the northeast corner of Section 30, Township 4 North, Range 31 East, WM; thence south to the southeast corner of Section 30, Township 4 North, Range 31 East, WM; thence east to the northeast corner of Section 32, Township 4 North, Range 31 East, WM; thence south to the southeast corner of Section 32, Township 4 North, Range 31 East, WM; thence east to the northeast corner of Section 4, Township 3 North, Range 31 East, WM; thence south along the section line to the southeast corner of Section 21, Township 2 North, Range 31 East, WM; thence west along the section line to the southwest corner of Section 19, Township 2 North, Range 30 East, WM; thence north to the southwest corner of Section 7, Township 2 North, Range 30 East, WM; thence west along the section line to the southeast corner of Section 7, Township 2 North, Range 29 East, WM; thence south to the southeast corner of Section 19, Township 2 North, Range 29 East, WM; thence west along the section line to the southwest corner of Section 22, Township 2 North, Range 28 East, WM; thence northerly along a line common with the east boundary of the proposed Butter Creek Critical Ground Water Area through Service Buttes to the center of Section 22, Township 3 North, Range 28 East, WM; thence continuing northerly along a line common with said east Butter Creek boundary through Emigrant Buttes in the east half of Section 3, Township 3 North, Range 28 East, WM; thence continuing northerly along a line common with said east Butter Creek boundary through Hermiston Butte within the northeast quarter of the northwest quarter, Section 10, Township 4 North, Range 28 East, WM; thence continuing northerly along a line common with said east Butter Creek boundary toward Umatilla Butte in the east half of Section 28, Township 5 North, Range 28 East, WM, as far as the north line of Section 33, Township 5 North, Range 28 East, WM; thence east along the section line to the point of beginning.

This initiation of proceedings for the determination of a critical ground water area is brought, on the director's own motion, under ORS 537.730(a), ORS 537.730(b), and ORS 537.730(d). These statutes allow for such action when the director has reason to believe that

> "Ground water levels in the area in question are declining or have declined excessively" per ORS 537.730(a),
>
> "The wells of two or more ground water claimants or appropriators within the area in question interfere substantially with one another" per ORS 537.730(b), or
>
> "The available ground water supply in the area in question is being or is about to be overdrawn" per ORS 537.730(d).

Preliminary investigation, as referenced in "Ground Water Conditions in the Umatilla Structural Basin, An Executive Summary", has disclosed that recharge is being exceeded by pumping demand. Such conditions result in water level declines which will not equilibrate in the future. Water level declines have occurred and are occurring at rates which reflect this condition. Mutual interference between wells has also been disclosed by the preliminary investigation. The magnitude of documented interference is as much as 550 feet during the irrigation season at one location. The information in the studies referenced in the executive summary is the basis for the director's belief that the conditions cited in ORS 537.730(a), (b), and (d) exist in the Stage Gulch area.

The ground water reservoir covered by this proclamation is herein termed the "Basalt Ground Water Reservoir". This reservoir, as further described in the studies referenced in the executive summary, includes all water contained in basalts of the Columbia River Basalt Group, as well as any interbedded sedimentary deposits.

Prior to completion of the proceeding for determination of a critical ground water area, no application for a permit to appropriate water from the Basalt Ground Water Reservoir will be approved or denied.

Dated at Salem, Oregon, this 31st day of January, 1985.

This proclamation is effective immediately.

William H. Young

WILLIAM H. YOUNG
Director

6665C

APPENDIX B

Groundwater Rights

KEY TO ABBREVIATIONS USED

USE

AG - Agriculture

GD - Group Domestic
DO - Domestic

IC - Primary/Supplemental
IR - Irrigation
ID - Irrigation/Domestic
IS - Supplemental Irrigation

IM - Industrial/Manufacturing
CM - Commercial

GR - Groundwater recharge
PA - Pollution abatement

MU - Municipal
QM - Quasi-municipal

P/S

A - Alternate
C - Primary and Supplemental
P - Primary
S - Supplemental

PERMIT/APPLICATION PREFIXES

G - Groundwater
GR - Groundwater registration
T - Transfer
U - Underground

ALLOWED DIVERSION

C - Cubic feet per second
G - Gallons per minute

PRIMARY/SUPPLEMENTAL

Acreage under primary or supplemental irrigation
Parentheses indicate acreage assigned to additional or alternate point(s) of diversion.

BASALT GROUNDWATER RIGHTS IN THE STAGE GULCH AREA
AUGUST 1990

NAME	POD NUM	LOCATION	PRIORITY DATE	APP#	PERMIT#	CERT#	ALLOWED DIVERSION		USE	PRIMARY	SUPPL.	REMARKS
CITY OF ECHO	1	3N/29E-16AA	8/24/1945	U 175	U 168	19613	1.1000	C	MU			
CITY OF HERMISTON	1	4N/28E-10CD	9/28/1945	U 179	U 169	15554	1.0000	C	MU			
CITY OF HERMISTON	1	4N/28E-11CA	6/ 3/1949	U 310	U 282	19619	2.2300	C	MU			
OREGON-WASHINGTON NAVIGATION CO.	1	4N/28E-27DA	2/ 3/1950	U 349	U 324	54117	1.1200	C	IM			
OREGON-WASHINGTON NAVIGATION CO.	2	4N/28E-27DA	2/ 3/1950	U 349	U 324	54117	1.1200	C	IM			
EDWARDS FARMS INC.	1	4N/29E-13CB	2/ 9/1951	U 408	U 378	24159	0.6700	C	IR	65.00		
HELEN R OHLSEN	1	3N/29E- 5BA	3/ 7/1952	U 471	U 427	20814	0.0750	C	IR	6.00		
GENE GRAY ESTATE-C/O MERRITT GRAY	1	4N/29E- 3CC	8/21/1952	U 518	U 473	24272	0.8000	C	IS		64.00	
LEONARD LORENZEN	1	4N/30E-35DC	1/28/1953	U 558	U 506	26074	0.2950	C	IR	23.60		
JOHN/MARY JANE HERSHEY	1	4N/29E- 5DD	6/29/1953	U 614	U 570	26077	0.2500	C	IR	19.80		
FARRIL C BOOTH C/O BEN H PARSONS	1	5N/28E-34AD	7/ 1/1953	U 615	U 571	24583	0.2000	C	MU			
EDWARDS FARMS INC.	1	4N/29E-13DA	8/12/1953	U 622	U 575	24163	2.0000	C	IR	160.00		
CITY OF ECHO	1	3N/29E-16AC	9/24/1953	G 21	G 64	34386	0.8900	C	MU			
EDWARDS FARMS INC.	1	4N/29E-13DA	12/9/1953	U 643	U 591	23939	2.2800	C	IR	182.30		
RALPH A REESE	1	3N/30E- 9CB	9/16/1954	U 746	U 680	24686	0.2500	C	IR	20.57		
PRUDENTIAL INS. CO. OF AMERICA	2	3N/29E- 2AD	3/25/1955	U 802	U 714	56163	1.5000	C	IR	(223.50)		
PRUDENTIAL INS. CO. OF AMERICA	1	3N/29E-11AC	3/25/1955	U 802	U 714	56163	1.5000	C	IR	223.80		T-5679
PRUDENTIAL INS. CO. OF AMERICA	3	3N/29E-12BB	3/25/1955	U 802	U 714	56163	1.5000	C	IR	(223.80)		
PRUDENTIAL INS. CO. OF AMERICA	4	3N/30E- 7CC	3/25/1955	U 802	U 714	56163	1.5000	C	IR	(230.80)		
CUNNINGHAM SHEEP CO.	1	2N/30E- 6AD	6/18/1956	G 396	G1142	28606	0.1000	C	IR	8.20		
CITY OF HERMISTON	1	4N/28E-11CC	2/ 5/1958	G 853	G 763	24702	2.2300	C	MU			
CITY OF STANFIELD	1	4N/29E-32CA	3/ 6/1959	G1409	G1321	37615	1.3400	C	MU			
S.W. & FLORENCE STEWART	1	5N/28E-34AD	4/15/1959	G1438	G1314	49953	0.0600	C	IR	4.90		T-4628
A W BORLAND JR	1	5N/28E-34AD	4/15/1959	G1438	G1314	52830	0.0250	C	IR	2.10		T-4628
F FUCHS	2	5N/28E-34AD	4/15/1959	G1438	G1314	52830	0.0250	C	IR	2.00		T-4628
HERMISTON UNIFIED SCHOOL DIST. 8	1	4N/28E-10AC	11/7/1962	G2480	G2290	33377	0.0400	C	IR	3.20		
LOYALTA INC.	1	4N/29E-29BD	11/7/1962	G2481	G2291	55324	1.1300	C	IR	158.40		
MARSHALL E MEYERS	1	3N/30E- 7BB	4/ 8/1963	G2588	G2415	37252	2.4500	C	IR	413.49		
CITY OF STANFIELD	1	4N/29E-32CC	7/29/1963	G2669	G2474	33488	0.2200	C	MU			
CITY OF STANFIELD	1	4N/29E-32CA	7/29/1963	G2673	G2477	33489	0.3300	C	MU			
LESSIE E TILDEN EST. OF EG TILDEN	1	5N/28E-35CD	7/28/1964	G2931	G2719	38845	0.1000	C	IR	7.80		
LE PEARSON	1	4N/29E-24AC	4/ 8/1965	G3071	G2874	38384	1.3800	C	IR	350.00		

AL H./MABEL J FOWLER	1	4N/28E-11AC	8/30/1965	G3211	G3000	38849	0.0700	C	IS		5.50	
GLENN L ROHDE	1	3N/30E-17AD	10/4/1966	G3691	G3495	55612	0.4500	C	IR	84.70		
POWELL GOODIN FARMS	1	4N/29E- 1AC	10/7/1966	G3697	G3109	38730	1.6700	C	IR	279.70		
CITY OF HERMISTON	1	4N/28E-11BA	5/11/1967	G3927	G3467	38852	4.4600	C	MU			
C & B LIVESTOCK INC.	1	4N/28E-22DB	3/14/1968	G4278	G4027	38288	0.9200	C	IR	73.20		
ELSIE PORTER ROSS JOHNSON	1	2N/30E-10BC	4/10/1969	G4840	G4561	45218	1.2200	C	IR	68.00	29.50	
EARL E/MAOLA R BALDWIN	1	4N/29E- 5CC	2/24/1970	G5115	G4854	42340	0.1500	C	IS		12.21	
GLEN E MALE MARION L MALE	1	5N/29E-32CC	6/22/1970	G5231	G5089	53660	0.0095	C	IR	2.70		
GLENN S CHOWNING	1	4N/29E-18DC	12/28/1970	G5387	G5148	47197	2.4400	C	IS		217.80	
MAURICE L KOESTER	1	4N/29E-17BC	3/25/1971	G5386	G5147	46817	0.8900	C	IS		166.30	
PRUDENTIAL INS. CO. OF AMERICA	1	3N/29E- 2AD	6/ 8/1971	G5541	G4969	56164	12.0000	C	IR	840.31	410.89	T-5541
PRUDENTIAL INS. CO. OF AMERICA	2	3N/29E-12BB	6/ 8/1971	G5541	G4969	56164	12.0000	C	IR	(840.31)	(410.89)	
PRUDENTIAL INS. CO. OF AMERICA	3	3N/30E- 6CB	6/ 8/1971	G5541	G4969	56164	12.0000	C	IR	(840.31)	(410.89)	
PRUDENTIAL INS. CO. OF AMERICA	4	3N/30E- 7CC	6/ 8/1971	G5541	G4969	56164	12.0000	C	IR	(840.31)	(410.89)	
JOHN M/EDITH WESTON	1	4N/29E- 7CA	8/20/1971	G5603	G4935	42977	0.0900	C	IR	7.50		
PAUL H FORREY	1	3N/29E- 5BD	1/27/1972	G5712	G5517	60417	0.0500	C	IR	3.80		
LEON A REESE	1	3N/30E-22CC	2/ 2/1972	G5717	G4955	55613	0.7000	C	IR	118.30		
EDWARD W HOLMES	1	2N/30E- 1CC	2/22/1972	G5732	G4962	44900	0.1100	C	IR	8.60		
DAVID SPARKS	1	3N/28E-34DB	6/12/1972	G5820	G5812	51295	4.8800	C	IR	390.20		
ROBERT U GENTNER	1	2N/30E-11AA	1/22/1973	G5988	G5051	49140	0.1700	C	IR	13.60		
PRUDENTIAL INS. CO. OF AMERICA	1	3N/29E- 2AD	2/16/1973	G5998	G5215	56165	9.3000	C	IR	837.80	206.60	
PRUDENTIAL INS. CO. OF AMERICA	1	3N/29E-11DD	2/16/1973	G5998	G5215	53661	2.9000	C	IR	795.00		T-5681
PRUDENTIAL INS. CO. OF AMERICA	2	3N/29E-12BB	2/16/1973	G5998	G5215	56165	9.3000	C	IR	(837.80)	(206.60)	
PRUDENTIAL INS. CO. OF AMERICA	2	3N/29E-14BC	2/16/1973	G5998	G5215	53661	3.1000	C	IR	(795.00)		T-5681
PRUDENTIAL INS. CO. OF AMERICA	3	3N/30E- 7CC	2/16/1973	G5998	G5215	56165	9.3000	C	IR	(837.80)	(206.60)	
DELBERT KERNS	1	4N/29E- 6AB	5/21/1973	G6133	G5803	44903	0.0500	C	IS		4.20	
AUSTIN A ALFORD	1	4N/29E-33DC	7/ 9/1973	G6216	G5221	44778	0.1200	C	IS		9.57	
DON MILLS	1	4N/29E-27CA	8/13/1973	G6055	G5753	53479	0.9600	C	IS		100.10	
WILLIAM A KOPACZ	1	4N/29E- 9BB	11/ 8/1973	G6344	G5947	46509	0.1800	C	IS		24.30	
LEON A REESE	1	3N/30E- 9CB	11/30/1973	G6359	G5957	52823	1.1400	C	IR	70.80	20.55	
THEODORE A HENDRICKSON	1	2N/30E-10AB	2/21/1974	G6441	G6044		1.1700	C	IC	30.00		
ROBERT E TAYLOR	1	4N/29E-32BA	2/21/1974	G6439	G6042	53483	0.3100	C	IR	24.40		
TRAVELERS INS. CO. REAL EST.	1	3N/28E-35AB	3/26/1974	G6476	G5275	61530	3.0300	C	IR	1345.50		
TRAVELERS INS. CO. REAL EST.	2	3N/28E-35CA	3/26/1974	G6476	G5275	61530	5.2300	C	IR	(1345.50)		
TRAVELERS INS. CO. REAL EST.	3	3N/28E-36AB	3/26/1974	G6476	G5275	61530	4.1300	C	IR	(1345.50)		
TRAVELERS INS. CO. REAL EST.	4	3N/28E-36DB	3/26/1974	G6476	G5275	61530	3.5800	C	IR	(1345.50)		
MILLS MINT FARM INC.	1	4N/29E-11DD	5/ 6/1974	G6524	G6135		0.5000	C	IS		39.00	

H.T. BURNS	1	4N/29E-10CA	6/18/1974	G6575	G6170	53075	2.9000	C	IS		288.10
LAWRENCE B REW REW RANCHES INC	1	3N/31E-19CB	7/19/1974	G6601	G5334	47008	0.0900	C	IR	7.10	
REW RANCHES INC.	1	3N/31E-30AB	7/19/1974	G6603	G5335	54559	1.3000	C	IR	632.00	
YGNACIO PEDRO ARISTEQUI	1	2N/30E- 9BC	8/19/1974	G6626	G6200	53191	0.0200	C	IR	1.20	
TRAVELERS INS. CO. REAL EST.	1	2N/28E- 1BD	9/ 5/1974	G6645	G6069	61532	3.1900	C	IR	606.30	
TRAVELERS INS. CO. REAL EST.	3	2N/28E- 2DA	9/ 5/1974	G6645	G6069	61532	2.0000	C	IR	(606.30	
TRAVELERS INS. CO. REAL EST.	2	2N/28E- 2BD	9/ 5/1974	G6645	G6069	61532	2.2000	C	IR	(606.30)	
RANDOLPH ISZLER	1	4N/29E-10AC	9/ 9/1974	G6648	G6209	47096	0.2800	C	IS		22.00
LOYALTA INC.	1	4N/29E-29BD	9/11/1974	G6654	G8036	53391	2.8400	C	IR	159.10	
TRAVELERS INS. CO. REAL EST.	1	3N/29E-30DD	9/26/1974	G6673	G6010	61531	2.9000	C	IR	294.80	
LAWRENCE B REW, REW RANCHES, INC.	1	3N/31E-30AB	10/21/1974	G6697	G5337	54560	1.3000	C	IR	124.80	
GEORGE ALEX PAULINE ALEX	1	4N/28E- 1BA	10/23/1974	G6700	G6244	56527	0.0100	C	IR	0.80	
FRANK & DOYLENE DYE	1	4N/28E-12DD	12/ 2/1974	G6744	G6268	51220	0.8200	C	IR	65.70	
STEVEN R PICKER	1	4N/29E-10AB	1/ 2/1975	G6774	G5339	52735	0.3100	C	IR	28.40	
DONALD VANDELL	1	5N/29E-31DB	1/27/1975	G6797	G6305	54083	0.1300	C	IS		10.70
HERMISTON CEMETERY DISTRICT 8	1	4N/28E-14CD	4/29/1975	G6917	G6439	46626	0.1800	C	IR	20.23	
MAURICE L KOESTER	1	4N/29E-29DB	8/22/1975	G7086	G6555	54084	0.6700	C	IS		250.30
MAURICE L KOESTER	2	4N/29E-29DD	8/22/1975	G7086	G6555	54084	2.1100	C	IS		(250.30)
ROBERT G SCHILLER	1	2N/28E-10AB	10/15/1975	G7138	G6588	54564	3.3400	C	IR	267.20	
DAVID L STEIN	1	3N/30E-30CA	11/12/1975	G7153	G6600	53178	2.2000	C	IR	400.00	
KENNETH H COPPINGER	1	3N/29E-24AC	12/29/1975	G7195	G6626	49733	7.5500	C	IR	633.00	
KENNETH H COPPINGER	2	3N/29E-24AD	12/29/1975	G7195	G6626	49733	7.5500	C	IR	(633.00)	
TRAVELERS INS. CO. REAL EST.	3	2N/28E- 1BD	3/30/1976	G7311	G7078	61534	3.4000	C	IC	1895.80	
TRAVELERS INS. CO. REAL EST.	6	2N/28E- 2BD	3/30/1976	G7311	G7078	61534	4.6000	C	IC	(1895.80)	
TRAVELERS INS. CO. REAL EST.	7	2N/28E- 2DA	3/30/1976	G7311	G7078	61534	4.6000	C	IC	(1895.80)	
TRAVELERS INS. CO. REAL EST.	4	3N/28E-35AB	3/30/1976	G7311	G7078	61534	4.6000	C	IC	(1895.80)	
TRAVELERS INS. CO. REAL EST.	5	3N/28E-35CA	3/30/1976	G7311	G7078	61534	4.6000	C	IC	(1895.80)	
TRAVELERS INS. CO. REAL EST.	1	3N/28E-36AB	3/30/1976	G7311	G7078	61534	4.6000	C	IC	(1895.80)	
TRAVELERS INS. CO. REAL EST.	2	3N/28E-36DB	3/30/1976	G7311	G7078	61534	4.6000	C	IC	(1895.80)	
TRAVELERS INS. CO. REAL EST.	11	3N/29E-19BD	3/30/1976	G7311	G7078	61534	18.6900	C	IC	(1895.80)	
TRAVELERS INS. CO. REAL EST.	8	3N/29E-20DC	3/30/1976	G7311	G7078	61534	18.6900	C	IC	(1895.80)	
TRAVELERS INS. CO. REAL EST.	9	3N/29E-30DD	3/30/1976	G7311	G7078	61534	18.6900	C	IC	(1895.80)	
TRAVELERS INS. CO. REAL EST.	10	3N/29E-30AD	3/30/1976	G7311	G7078	61534	18.6900	C	IC	(1895.80)	
GENE W MCDONALD	1	5N/28E-36CD	7/14/1976	G7433	G6930	55616	0.2300	C	IR	18.40	
THOMAS E BRANSTETTER	1	3N/30E- 1AC	7/16/1976	G7435	G6932	54085	5.6500	C	IR	451.90	
L & L FARMS	1	3N/28E-23DC	7/19/1976	G7343	G6893	51786	3.0000	C	IR	540.00	
L & L FARMS	1	3N/28E-26AB	7/19/1976	G7441	G6936	51784	3.0000	C	IR	259.70	

FRED ANDREWS	1	3N/28E- 2CD	8/25/1976	G7493	G6969	51696	0.9500	C	IS		76.00	
M S/SHIRLEY R TEMPLE	1	3N/30E-23DD	9/ 9/1976	G7509	G6987	54566	1.3400	C	IR		165.00	
ROBERT ANTONE SCHILLER	1	2N/28E-10AB	10/15/1976	G7543	G7014	54565	1.3600	C	IR	108.80		
H.T. BURNS	1	4N/29E-10DB	11/ 8/1976	G7573	G7032	53077	0.6700	C	IS		297.70	
L & L FARMS	1	3N/28E-23BB	12/ 2/1976	G7598	G7036	51785	3.3000	C	IR	17.30		
KENNETH H COPPINGER	1	3N/29E-23AA	12/15/1976	G7606	G7041	53078	1.5700	C	IR	125.60		
LAWRENCE BEHRENZ	1	4N/29E- 8AC	12/20/1976	G7613	G7059	46630	0.0300	C	IR	3.00		
MILLS MINT FARM INC	1	4N/29E-26DA	1/10/1977	G7640	G7095	53482	0.9400	C	IS		75.00	
CAROLE J HAMILTON	1	5N/28E-34CD	1/20/1977	G7653	G7097	52411	0.0200	C	IR	1.30		
A E STALEY MFG CO.	1	4N/29E-31DA	1/24/1977	G7655	G7099	53079	0.0400	C	IM			
VERNON & IVAN COOK	1	4N/28E-23DC	2/25/1977	G7851	G7183	53255	1.5900	C	IR	519.80		
VERNON & IVAN COOK	3	4N/28E-23AC	2/25/1977	G7851	G7183	53255	1.5700	C	IR	(519.80)		
VERNON & IVAN COOK	2	4N/28E-24DC	2/25/1977	G7851	G7183	53255	2.9700	C	IR	(519.80)		
VERNON & IVAN COOK	4	4N/28E-24AD	2/25/1977	G7851	G7183	53255	0.3700	C	IR	(519.80)		
RAYMOND R PERKINS	1	4N/29E- 7AC	2/25/1977	G7845	G7380	49823	0.1000	C	IR	8.00		
VERNON & IVAN COOK	1	4N/29E-20DC	2/25/1977	G7844	G7182	52574	0.0100	C	IR	0.80		T-5501
TRAVELERS INSURANCE CO.	1	4N/29E-20DC	2/25/1977	G7844	G7182	53662	2.7900	C	IR	222.80		
SEIBEL BROTHERS	1	3N/29E- 9CD	3/14/1977	G7920	G7964		4.5500	C	IS		363.60	
DON & NAOMI BROWN/TRAVELERS INS.	1	3N/29E-30AD	3/14/1977	G7923	G7314	61535	1.6200	C	IR	129.40		
OSU COLUMBIA BASIN CENTER	1	4N/28E-23BD	5/ 9/1977	G8107	G7489	55012	1.8000	C	IS		153.20	
RONALD M KILGORE	1	4N/30E-26CB	5/23/1977	G8181	G7965	53552	4.7800	C	IR	382.50		T-5936,T-6290
GEORGE C SUTTON DONNA J SUTTON	1	5N/29E-31CB	6/ 2/1977	G8188	G7357	52000	0.1000	C	IR	7.80		T-5408
C & B LIVESTOCK INC.	1	4N/28E-22DB	6/16/1977	G8221	G7779	48688	0.4400	C	IR	35.00		
ROGER D. BRYANT BRENDA G. BRYANT	1	4N/28E- 1CB	6/22/1977	G8229	G7824	57624	0.0200	C	IR	1.80		
DOUBLE M RANCH INC.	1	4N/28E-34DB	6/24/1977	G8236	G7614	58968	0.7100	C	IR	57.00		
THOMAS P DAVIDSON	1	4N/29E- 8AC	7/12/1977	G8266	G7613	55013	0.0400	C	IR	3.00		
JOHN R HALLADAY	1	5N/29E-32CA	8/ 9/1977	G8352	G7750	53081	0.1800	C	IS		14.00	
CITY OF STANFIELD	1	4N/29E-32BB	9/22/1977	G8459	G7623		2.2000	C	MU			
GLENN L ROHDE	1	3N/30E-17AD	12/ 6/1977	G8564	G7911	55015	3.3100	C	IR	264.60		
MERLE GEHRKE	4	4N/30E-28AD	2/15/1978	G8647	G7929	52675	28.6100	C	IR	(2289.40)		
MERLE GEHRKE	3	4N/30E-29DA	2/15/1978	G8647	G7929	52675	28.6100	C	IR	(2289.40)		
MERLE GEHRKE	2	4N/30E-32DC	2/15/1978	G8647	G7929	52675	28.6100	C	IR	(2289.40)		
MERLE GEHRKE	1	4N/30E-33CD	2/15/1978	G8647	G7929	52675	28.6100	C	IR	2289.40		
DAVID L STEIN	1	3N/30E-30CA	2/21/1978	G8658	G8041	53187	0.6800	C	IS		123.60	
ZABRANSKY AND SONS INC.	1	4N/29E-24DC	2/27/1978	G8665	G8209	54740	3.4000	C	IR	708.30		
ZABRANSKY AND SONS INC.	2	4N/29E-25BB	2/27/1978	G8665	G8209	54740	1.3000	C	IR	(708.30)		
ZABRANSKY AND SONS INC.	3	4N/29E-36DA	2/27/1978	G8665	G8209	54740	5.0000	C	IR	(708.30)		

J R SIMPLOT CO.	1	4N/28E-26DC	3/22/1978	G8697	G8298	52678	0.0000	C	IR	(18.20)	(192.60)	wastewater
J R SIMPLOT CO.	2	4N/28E-26DC	3/22/1978	G8697	G8298	52678	1,200.	G	IM			
J R SIMPLOT CO.	2	4N/28E-26DC	3/22/1978	G8697	G8298	52678	1,200.	G	IR	18.20	192.60	
ROBERT C/JUDITH M BERTSCH	1	4N/29E-25BA	4/10/1978	G8728	G8092	53744	0.1300	C	IR	10.70		
STEVE/JUDY MILLS	1	3N/29E- 4DD	4/27/1978	G8772	G8126	56282	1.9200	C	IR	153.80		
LEHMAN ENTERPRISES, INC.	1	3N/29E-10AB	4/27/1978	G8772	G8126	54118	1.7500	C	IR	140.20		T-5734
MARSCHALL A MOON	1	4N/29E- 6BA	5/ 5/1978	G8797	G8185	53392	0.1100	C	IR	8.50		
CITY OF ECHO	1	3N/29E-16AA	6/21/1978	G8865	G8546		2.9000	C	MU			
CITY OF ECHO	2	3N/29E-16AD	6/21/1978	G8865	G8546		2.0000	C	MU			
DAVID L STEIN	1	3N/30E-20CC	8/ 2/1978	G8910	G8367	53188	4.3800	C	IR	260.00		
BOB HINES	1	2N/30E- 4DD	10/26/1978	G8987	G8370	53189	0.8900	C	IR	71.00		
ZABRANSKY AND SONS INC.	1	4N/29E-25AD	12/26/1978	G9062	G8446	54741	5.3000	C	IS		925.70	
MIKAMI BROTHERS	1	4N/28E-23CB	1/25/1979	G9110	G8548	53186	0.0700	C	IM			
O CLAYTON ORR	1	5N/29E-31AC	2/ 6/1979	G9121	G8665	54569	0.0500	C	IR	3.90		
L & L FARMS	1	3N/28E-23DC	4/19/1979	G9205	G8570	51783	2.0000	C	IR	287.10		
L & L FARMS	3	3N/28E-23BB	4/19/1979	G9205	G8570	51783	2.0000	C	IR	(287.10)		
L & L FARMS	2	3N/28E-26AB	4/19/1979	G9205	G8570	51783	2.0100	C	IR	(287.10)		
LEON A REESE	1	3N/30E- 9CB	5/10/1979	G9237	G8632	52824	0.4500	C	IR	36.30		
LEON REESE	1	3N/30E-22CC	5/10/1979	G9236	G8633	56073	0.9500	C	IR	75.60		
KEITH D/RACHEL SMITH	1	5N/28E-34CB	6/ 4/1979	G9280	G8630	60720	0.0600	C	IR	4.50		
RALPH R BURKETT	1	4N/29E-33CD	8/10/1979	G9353	G8629	53486	0.0200	C	IR	1.25		
LOYALTA INC.	1	4N/29E-19BC	9/19/1979	G9407	G8802	53394	1.6700	C	IS		156.10	
STEVEN R PICKER DEBORAH L PICKER	1	4N/29E-10AB	9/21/1979	G9410	G8767	52736	0.1300	C	IS		28.40	
OREGON DEPT. OF VETERANS AFFAIRS	1	4N/29E-10AC	1/28/1980	G9525	G8819	53083	0.3800	C	IR	30.00		
RONALD J FLINK	1	4N/28E- 1BD	1/30/1980	G9528	G9188	54747	0.0300	C	IR	2.00		
LAWRENCE R/GLADYS ELAINE MORSE	1	4N/29E-14DB	2/ 5/1980	G9536	G9402	62464	7.3300	C	IS		603.00	
EVELYN S ISOM	1	3N/31E-31BA	3/17/1980	G9620	G9404	55842	0.0900	C	IR	7.20		
J R SIMPLOT CO.	2	4N/28E-26DC	4/23/1980	G9698	G9009	52679	0.0000	C	IS		(218.70)	wastewater
J R SIMPLOT CO.	1	4N/28E-26DC	4/23/1980	G9698	G9009	52679	1,300.	G	IR		218.70	
J R SIMPLOT CO.	1	4N/28E-26DC	4/23/1980	G9698	G9009	52679	1,300.	G	IM			
MERLE A GEHRKE	4	4N/30E-28AD	7/ 1/1980	G9815	G8907		20.1100	C	IC	(280.00)	(1328.40)	
MERLE A GEHRKE	3	4N/30E-29DA	7/ 1/1980	G9815	G8907		20.1100	C	IC	(280.00)	(1328.40)	
MERLE A GEHRKE	2	4N/30E-32DC	7/ 1/1980	G9815	G8907		20.1100	C	IC	(280.00)	(1328.40)	
MERLE A GEHRKE	5	4N/30E-33CD	7/ 1/1980	G9815	G8907		20.1100	C	IC	280.00	1328.40	
HERMISTON SCHOOL DISTRICT 8R	1	4N/28E-11DD	1/12/1981	G10093	G9189	54088	0.1500	C	IR	11.80		
IVAN J COOK	1	4N/29E-11CC	1/29/1981	G10128	G9307	61659	0.6000	C	IR	48.00		
THOMAS C BRANSTETTER	1	3N/30E- 1AC	3/12/1981	G10210	G9285	54086	2.3400	C	IR	186.90		

MILLS MINT FARM INC.	1	4N/29E-11DD	3/30/1981	G10236	G9322	55328	0.4900	C	IS			39.00
KENNETH J GOEDEN	1	4N/29E- 8AC	4/27/1981	G10289	G9308	54751	0.0200	C	IR	1.33		
RONALD A/SUSAN M WILLIAMS	1	5N/29E-31BA	5/14/1981	G10316	G9418	54576	0.1200	C	IR	9.80		
C & B LIVESTOCK INC.	1	4N/28E-22DB	6/26/1981	G10408	G9456	55023	0.6000	C	IR	47.60		
LAWRENCE MORSE	2	4N/29E-12DD	8/ 3/1981	G10479	G9648	62494	2.5000	C	IS			161.10
LAWRENCE MORSE	1	4N/29E-14DA	8/ 3/1981	G10479	G9648	62494	1.5200	C	IS			(161.10)
PATRICK C WALCHLI	1	4N/29E-17AD	10/ 9/1981	G10569	G9809	53490	2.6700	C	IR	153.80		
NORTH HILL WATER CORP.	1	5N/28E-34AD	4/ 2/1982	G10678	G9854		0.2200	C	GD			
H T BURNS INC	1	4N/29E-10BC	6/25/1982	G10758	G9825	61845	1.7800	C	IS			273.60
GILBERT G GETTMAN	1	4N/29E-33DC	7/ 9/1982	G10773	G9955	63697	0.0600	C	IR	4.50		
K NEAL/PAM CHRISTOPHERSON	1	5N/28E-36AC	8/25/1982	G10798	G9903		0.2200	C	IR	19.00		
LEONARD A LORENZEN	1	4N/30E-35DC	3/28/1983	G10908	G10087		8.0700	C	IR	645.40		
RONALD A WILLIAMS	1	5N/29E-31BA	5/ 9/1983	G10953	G10036		0.1100	C	IR	8.60		
KENNETH W/MARGARET A BROWN	1	4N/29E- 7CA	5/31/1983	G10981	G10065	62115	0.3600	C	IR	28.70		
ZABRANSKY AND SONS INC.	1	4N/29E-24AC	6/13/1983	G10991	G10452		0.1700	C	IC	(47.90)		(31.50)
ZABRANSKY AND SONS INC.	3	4N/29E-24DC	6/13/1983	G10991	G10452		0.1700	C	IC	(47.90)		(31.50)
ZABRANSKY AND SONS INC.	2	4N/29E-25BB	6/13/1983	G10991	G10452		0.3900	C	IC	(47.90)		(31.50)
ZABRANSKY AND SONS INC.	5	4N/29E-25AD	6/13/1983	G10991	G10452		0.2600	C	IR	47.90		31.50
ZABRANSKY AND SONS INC.	4	4N/29E-36DA	6/13/1983	G10991	G10452		0.9900	C	IC	(47.90)		(31.50)
HAROLD & ESTHER LEHMAN	1	4N/29E-30AB	7/14/1983	G10944	G10200	60744	1.2300	C	IR	98.50		
CHARLES A BLOODSWORTH	1	5N/29E-31CD	3/28/1984	G11251	G10451		0.5000	C	IR	40.00		
THE TRAVELERS INSURANCE CO.	1	4N/29E-20DC	7/12/1984	G11289	G10429	54753	0.5400	C	IR	43.40		
ROBERT G CAMPBELL	1	4N/28E-24BD	8/15/1984	G11299	G10418	62222	0.7400	C	IR	59.20		

ALLUVIAL GROUNDWATER RIGHTS IN THE STAGE GULCH AREA
AUGUST 1990

NAME	POD NUM	LOCATION	PRIORITY DATE	APP #	PERMIT #	CERT #	ALLOWED DIVERSION		P/S	USE
ROSE ALICE HOOSIER	1	4N/29E-31BC	7/ 1/1918	GR3899	GR3542		50.0000	G	P	ID
MILTON D VERNON	1	4N/28E- 1DD	12/ 3/1951	U 449	U 421	23518	0.0400	C	P	IR
LAVERE L FIFE	1	3N/29E-16BA	4/24/1952	U 492	U 444	24680	0.1300	C	P	IR
BEN DREYER	1	4N/29E-17CC	8/27/1952	U 519	U 489	28026	1.6500	C	P	IR
MILTON/GLADYS CULP	1	4N/29E-18DA	2/16/1953	U 564	U 517	53011	1.0000	C	P	IR
MILTON/GLADYS CULP	1	4N/29E-18DA	3/10/1953	U 564	U 517	53011	0.0100	C	P	IR
J F RILEY	1	3N/29E- 6DD	8/17/1954	G 42	G 44	26080	0.3400	C	S	IS
AGNES WIGHT	1	3N/30E-31CD	4/ 6/1955	G 65	G 10	26079	0.3400	C	P	IR
RUBY V WELCH	1	5N/28E-35CD	1/ 4/1956	G 199	G 110	28723	0.2800	C	P	IR
JOHN F WALCHI	1	4N/29E- 4CA	3/25/1957	G 588	G 481	48308	1.1900	C	P	IR
N WILLARD/LYDIA ROBERTSON	1	4N/28E- 2CB	5/22/1957	G 662	G 628	53010	0.0600	C	P	IR
DALE K KING	1	4N/28E- 1CD	12/20/1957	G 826	G 744	28603	0.1100	C	S	IS
MELVIN G DICK	1	2N/30E- 6AC	7/ 8/1958	G 1047	G 910	30132	0.1500	C	P	IR
GLADYS CRUM	1	4N/29E-31CB	2/ 6/1959	G 1373	G 1293	31284	0.4100	C	S	IS
JOHN F WALCHLI	1	4N/29E- 4CA	2/26/1960	G 1686	G 2221	34392	0.5100	C	P	IR
ROBERT W RHAE	1	3N/29E- 6AC	12/ 5/1960	G 1890	G 1729	33486	0.4500	C	S	IS
OR DEPT OF VET. AFFAIRS	1	3N/29E- 6DD	5/ 8/1968	G 2013	G 1854		0.1300	C	S	IS
OR DEPT OF VET. AFFAIRS	2	3N/29E- 6DC	5/ 8/1968	G 2013	G 1854		0.1300	C	A	IS
WAYNE KEITH MCFAUL	1	3N/29E- 7BD	10/30/1961	G 2141	G 1977	36801	1.7900	C	C	IR
CHARLES HERRICK	1	3N/29E- 5AB	8/28/1963	G 2696	G 2501	35680	0.2700	C	S	IS
JOHN F WALCHLI	1	4N/29E- 4CA	2/10/1964	G 2783	G 2596	36918	1.4200	C	P	IR
FRANCIS F BOWMAN	1	4N/28E-12AA	4/ 2/1964	G 2821	G 2624	49822	0.0200	C	P	IR
SIMPLOT INDUSTRIES INC.	1	4N/28E-27CC	7/27/1964	G 2929	G 2718	51480	0.0100	C	P	IR
HAROLD M TEMPLETON	1	4N/28E- 3AC	4/12/1965	G 3074	G 2876	38385	0.0900	C	P	IR
C. N. MCJUNKIN	1	4N/28E- 2CB	5/20/1965	G 3114	G 2909	52900	0.1000	C	P	IR
THOMAS N ABLE JR	1	4N/28E-13CC	7/12/1965	G 3161	G 2974	43608	0.6700	C	S	IS
THOMAS N ABLE JR	2	4N/28E-13CD	7/12/1965	G 3161	G 2974	43608	0.6700	C	A	IR
CECIL D THOMPSON	1	4N/28E-13CD	7/12/1965	G 3161	G 2974	49215	0.2100	C	S	IS
OR DEPT OF TRANSP. HWY DIV	1	3N/28E- 1AD	1/ 6/1966	G 3334	G 3131	37616	0.0700	C	P	DO
OR DEPT OF TRANSP. HWY DIV	2	3N/28E- 1AD	1/ 6/1966	G 3334	G 3131	37616	0.0700	C	A	DO
HERMAN H/PHYLLIS E SCHULTZ	1	5N/29E-31AC	3/28/1966	G 3433	G 3218	49481	0.1900	C	P	IR
LARRY D EADES	1	4N/29E- 6BD	4/ 6/1966	G 3447	G 3105	35599	0.0800	C	P	IR
LARRY D EADES	2	4N/29E- 6BD	4/ 6/1966	G 3447	G 3105	35599	0.0800	C	A	IR

NAME	POD NUM	LOCATION	PRIORITY DATE	APP #	PERMIT #	CERT #	ALLOWED DIVERSION		P/S	USE
FREDRICK C RYSER	1	4N/29E-31BB	12/ 9/1966	G 3753	G 3543	38732	0.0200	C	P	IR
DON MILLS	1	4N/29E-27BA	1/18/1967	G 3781	G 3566	38733	2.5700	C	S	IS
M L KOESTER	1	4N/29E-17BA	7/25/1967	G 4009	G 3761	38735	2.0800	C	S	IS
HOWARD S/VERNA STONE	1	3N/28E-13AB	2/ 1/1968	G 4207	G 3971	41756	0.8200	C	P	IR
LEE/DORIS FOSTER	1	3/N/29E-6DC	4/ 8/1968	G 4317	G 4075		0.6900	C	S	IR
ROBERT M POLSTON	1	4N/29E-11CB	4/18/1968	G 4333	G 4088	50347	0.0700	C		IS
SHIRLEY DAGGETT	1	4N/29E-32DB	7/ 3/1968	G 4478	G 4220	41150	0.0300	C	P	IR
MARVIN G DALLMAN	1	2N/31E-17AB	11/ 7/1968	G 4676	G 4404	45813	0.3400	C	S	IS
DON MILLS	1	4N/29E-27BD	7/24/1969	G 4946	G 4668	38734	0.7000	C	S	IS
LEE FOSTER	1	3N/29E- 6DD	11/17/1969	G 5038	G 4748	38740	0.7900	C	S	IS
LEE FOSTER	1	3N/29E- 6DD	11/17/1989	G 5038	G 4748	63675	0.4700	C	S	IS
OR DEPT OF VET. AFFAIRS	1	3N/29E- 6DD	11/17/1989	G 5038	G 4748		0.3200	C	S	IS
OR DEPT OF VET. AFFAIRS	2	3N/29E- 6DC	11/17/1989	G 5038	G 4748		0.3200	C	A	IS
ROBERT RHEA	1	3N/29E- 5BB	11/25/1969	G 5043	G 4753	40931	0.6500	C	C	IR
STANFIELD BAPTIST CHURCH	1	4N/29E-32DB	1/15/1970	G 5078	G 4794	41026	0.0300	C	P	IR
A.E. & R.D. WEIR	1	4N/29E-33CA	6/24/1970	G 5233	G 5091	53478	0.7500	C	S	IS
HAROLD O COX	1	4N/29E- 6BA	7/27/1970	G 5259	G 5110	42274	0.0300	C	P	IR
RANDY/DOROTHY SVETICH										
STEPHEN MOUDY	1	4N/29E-10BD	8/23/1971	G 5605	G 5451	54082	0.0800	C	P	IR
ROBERT M POLSTON	1	4N/29E-11CB	2/ 1/1973	G 5991	G 5730		0.0900	C	S	IS
LEON JAY BALL SHARON KAY BALL	1	4N/29E- 6BB	3/ 9/1973	G 6025	G 5732	51693	0.0100	C	P	IR
LEON JAY BALL SHARON KAY BALL	2	4N/29E- 6BB	3/ 9/1973	G 6025	G 5732	51693	0.0250	C	P	IR
LEON JAY BALL SHARON KAY BALL	3	4N/29E- 6BB	3/ 9/1973	G 6025	G 5732	51693	0.0050	C	P	IR
LOWELL S FRANKS	1	4N/29E-29DD	4/27/1973	G 6095	G 5776	47323	0.2400	C	S	IS
ROBERT SPIKE	1	3N/29E- 7CD	5/31/1973	G 6153	G 6097	49556	1.3600	C	S	IS
ROBERT SPIKE	1	3N/29E- 7CD	5/31/1973	G 6153	G 6097	49556	0.0800	C	P	IR
VIRGIL D/GENEVIEVE RHINHART	1	4N/28E- 3AD	7/23/1973	G 6243	G 5888	46820	0.0400	C	P	IR
FRANK MUELLER	1	4N/28E-36AD	8/22/1973	G 6277	G 5909	54733	0.0400	C	P	IR
FRANK MUELLER	1	4N/28E-36AD	8/22/1973	G 6277	G 5909	54733	0.6800	C	S	IS
LARRY/MARJORIE ROFF	1	4N/28E-12AC	9/11/1973	G 6293	G 5223	43324	0.0700	C	S	IS
ALBERT L/JENNIE L CROUSE	1	5N/28E-36AD	9/14/1973	G 6295	G 5921	54837	0.0500	C	P	IR
FRED ANDREWS	1	3N/28E- 2CC	12/11/1973	G 6368	G 5964	51694	0.9500	C	P	IR
MILLS MINT FARM INC.	1	4N/29E-23CA	1/29/1974	G 6413	G 5994	53480	0.9800	C	S	IS

NAME	POD NUM	LOCATION	PRIORITY DATE	APP #	PERMIT #	CERT #	ALLOWED DIVERSION		P/S	USE
CURTIS E HINKLE JERRY TAYLOR	1	5N/29E-32CC	2/ 6/1974	G 6424	G 6791	53388	0.0700	C	P	IR
CURTIS E HINKLE JERRY TAYLOR	2	5N/29E-32CC	2/ 6/1974	G 6424	G 6791	53388	0.0700	C	A	IR
EMERT RANCHES	1	3N/28E-11CC	2/12/1974	G 6429	G 6038	53736	0.9000	C	C	IR
EMERT RANCHES	2	3N/28E-11CA	2/12/1974	G 6429	G 6038	53736	0.9000	C	C	IR
DICK SNOW	2	3N/29E-16BC	3/26/1974	G 6475	G 6099	51826	1.6400	C	A	IR
DICK SNOW	1	3N/29E-17DA	3/26/1974	G 6475	G 6099	51826	1.6400	C	P	IR
ANDERSON LAND & LIVESTOCK	1	4N/29E-28CC	5/16/1974	G 6534	G 6142	53737	0.1400	C	S	IS
THEODORE B BARE	1	4N/29E-33CC	8/13/1974	G 6621	G 6199		0.9000	C	S	IS
JOHN N CORREA	1	3N/28E-11AA	10/ 1/1974	G 6677	G 6229	54557	1.6000	C	S	IS
KENNETH CLARK BOWMAN SR	1	3N/29E- 8DD	10/ 3/1974	G 6681	G 6233		1.3500	C	C	IR
CLAYTON E HORN CAROL L HORN	1	2N/30E- 6AB	1/15/1975	G 6790	G 6672	55965	0.4400	C	P	IR
GLEN T/LUCILLE B ALDRICH	1	4N/28E-12AB	3/27/1975	G 6866	G 6403	46934	0.0300	C	P	IR
ELMER C GILLESPIE	1	4N/28E-12AB	5/19/1975	G 6950	G 6465	46358	0.0900	C	P	IR
TRAVELERS INS. CO. REAL ESTATE INVESTMENT	1	3N/29E- 7CB	6/30/1975	G 7031	G 6095	61533	1.8000	C	P	IR
TRAVELERS INS. CO. REAL ESTATE INVESTMENT	2	3N/29E- 7CC	6/30/1975	G 7031	G 6095	61533	3.0600	C	P	IR
GLENN S CHOWNING	1	4N/29E-19BA	8/ 7/1975	G 6765	G 6285	47198	0.8900	C	S	IS
GLENN S CHOWNING	1	4N/29E-19BA	8/ 7/1975	G 6765	G 6285	51999	0.8900	C	S	IS
FRANK J CORREA	1	3N/28E-12CC	9/17/1975	G 7112	G 6574	52902	1.1500	C	C	IR
THE TRAVELERS INDEMNITY CO.	1	3N/29E-16CD	10/ 1/1975	G 7125	G 6339	60019	1.4800	C	P	IR
THE TRAVELERS INDEMNITY CO.	3	3N/29E-16CD	10/ 1/1975	G 7125	G 6339	60019	1.4800	C	P	IR
CECILIA J CORREA	1	3N/29E- 5CB	10/27/1975	G 7142	G 6592	46100	0.3200	C	S	IS
THEODORE L ISSEL	1	4N/28E- 1BB	12/18/1975	G 7185	G 6617	49564	0.0900	C	P	IR
JOHN N CORREA	1	3N/28E-11AC	5/ 3/1976	G 7353	G 6781	54558	1.6300	C	S	IS
CITY OF HERMISTON	1	4N/28E- 3DB	5/24/1976	G 7380	G 6831		11.0400	C	P	MU
KENNETH L/CAROLYN JEAN BRAY	1	5N/28E-34CB	8/24/1976	G 7492	G 6968	53180	0.0300	C	P	IR
JOHN F WALCHLI	1	4N/29E- 4CA	11/ 8/1976	G 7572	G 7253	58959	5.9700	C	C	IC
MILLS MINT FARM INC.	1	4N/29E-33AD	1/ 7/1977	G 7638	G 7094	53481	2.000	C	S	IS
RON HOLEMAN	1	3N/29E-27BB	2/14/1977	G 7728	G 7367	53080	0.4600	C	P	IR
MILLS MINT FARM INC.	1	4N/29E-33AD	2/23/1977	G 7638	G 7094	53481	5.3500	C	S	IS
HARRISON/MAY L NAILLON	1	4N/28E- 2BA	2/25/1977	G 7852	G 7381		0.0800	C	P	IR
R.E. WAHNER	1	4N/29E-31BC	3/29/1977	G 7965	G 7399	53484	0.0400	C	P	IR

NAME	POD NUM	LOCATION	PRIORITY DATE	APP #	PERMIT #	CERT #	ALLOWED DIVERSION		P/S	USE
BEN/DORIS COOMBES	1	3N/28E-11BA	4/11/1977	G 8015	G 8470	53746	0.8900	C	C	IR
LYLE G & LEITHA TILDEN	1	5N/28E-35CC	5/19/1977	G 8147	G 7620	58066	0.3500	C	P	IR
FRANK LEDBETTER	1	5N/28E-36CB	9/ 2/1977	G 8426	G 7745	56392	0.0600	C	P	IR
FRANK MUELLER	1	4N/28E-36CD	12/12/1977	G 8574	G 7913		1.6400	C	S	IS
GERALDINE E JONES	1	4N/29E- 6BD	7/11/1978	G 8886	G 8303	53745	0.0100	C	S	IS
RON HOLEMAN	1	3N/29E-21DD	10/20/1978	G 8976	G 8369	53082	4.6000	C	A	IR
RON HOLEMAN	1	3N/29E-21DD	10/20/1978	G 8976	G 8369	53082	4.6000	C	P	IR
GEORGE G/NORENE K DODSON	1	4N/29E- 6CB	2/19/1980	G 9552	G 9403	55022	0.0300	C	P	IR
JAMES L/EDNA M SCHELL	1	4N/29E- 6CB	3/26/1980	G 9636	G 9156		0.0250	C	P	IR
RONALD J/BETTY P FURRER	1	4N/29E- 7CD	11/12/1981	G 10593	G 9718		0.1200	C	P	IR
ALBERT L/JENNIE L CROUSE	1	5N/28E-36AD	6/28/1982	G 10761	G 9892		0.1900	C	S	IS
DON PECK	1	4N/29E- 7AA	12/27/1982	G10858	G 9997	63711	0.0300	C	P	IR
DOUBLE M RANCH INC.	1	3N/29E-18BB	1/10/1983	G10864	G10222		1.2000	C	P	IR
RAY BRADY	1	3N/29E- 5AB	7/21/1983	G11032	G10196	63718	0.1900	C	P	IR
HAROLD SADLER	1	4N/28E- 1CD	8/ 1/1983	G11043	G10205	60871	0.0400	C	P	IR
SPIKE RANCH INC.	1	3N/28E-12AB	9/ 8/1983	G11077	G10234	61114	1.5200	C	C	IC
WILLARD F STRATTON	1	5N/29E-31CD	9/27/1983	G11097	G10435	63614	0.9500	C	P	IR
WILLIAM M LANHAM	1	4N/29E- 6BA	9/29/1983	G11108	G10244		0.0400	C	P	IR
WALTER R KLIPPSTEIN	1	4N/29E- 6AC	10/ 5/1983	G11128	G10258	55843	0.0200	C	S	IS
WALTER R KLIPPSTEIN	2	4N/29E- 6AC	10/ 5/1983	G11128	G10258	55843	0.0100	C	S	IS
ROBERT CAMPBELL	1	3N/29E- 5AB	10/ 6/1983	G11132	G10305		0.0600	C	P	IR
JOHN N CORREA	1	3N/28E-11AA	10/14/1983	G11182	G10292		1.3400	C	P	IR
JOHN N CORREA	2	3N/28E-14BB	10/14/1983	G11182	G10292		1.3400	C	C	IC
JOHNNIE M MAYES	1	4N/29E-18AD	2/27/1984	G11237	G10374		0.4000	C	P	IR
CITY OF ECHO	1	3N/29E- 8AC	2/21/1985	G11350	G10538		20.0000	G	P	PA
DAVID C SCHULZ	1	4N/28E- 1BA	8/ 5/1985	G11423	G10556		5.0000	G	P	IR
DON MILLS MINT FARM, INC.	1	4N/29E-33AD	8/30/1985	G11433	G10587		0.1200	C	P	IR
SPIKE RANCH INC.	1	3N/29E- 7CD	11/29/1985	G11457	G10664	61115	2.5000	C	S	IS
DOUBLE M RANCH INC.	1	4N/28E-35AA	12/ 2/1985	G11458	G10709		1.6800	C	C	IC
DOUBLE M RANCH INC.	2	4N/28E-35CC	12/ 2/1985	G11458	G10709		3.2500	C	C	IC
LEROY G HAAGEN	1	5N/28E-35CD	4/ 2/1986	G11502	G10617		6.0000	G	P	GD
LEROY G HAAGEN	1	5N/28E-35CD	4/ 2/1986	G11502	G10617		5.0000	G	P	CM
LEROY G HAAGEN	1	5N/28E-35CD	4/ 2/1986	G11502	G10617		4.0000	G	P	IR

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LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		4.0000	G	A	IR
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		5.0000	G	A	CM
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		6.0000	G	A	GD
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		5.0000	G	A	CM
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		6.0000	G	A	GD
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		4.0000	G	A	IR
LEROY G HAAGEN	1	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	P	IR
LEROY G HAAGEN	2	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	A	IR
LEROY G HAAGEN	3	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	A	IR
BARRETT N ALEXANDER	1	4N/29E-33BB	7/13/1987	G11681	G10778		0.3500	C	P	IR
JOSEPHINE M BEAUCHAMP	1	5N/29E-31CB	9/24/1987	G11702	G10866		2.0000	G	P	IR
TOM ABLE	1	4N/28E-24BA	12/12/1988	G11877	G10891		8.3000	G	P	IR
CITY OF HERMISTON, OREGON	2	4N/28E- 3DB	2/21/1989	G11891	G10935		7.8000	C	A	GR
CITY OF HERMISTON, OREGON	1	4N/28E-11CA	2/21/1989	G11891	G10935		7.8000	C	P	GR

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NAME	POD NUM	LOCATION	PRIORITY DATE	APP #	PERMIT #	CERT #	ALLOWED DIVERSION		P/S	USE
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		4.0000	G	A	IR
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		5.0000	G	A	CM
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		6.0000	G	A	GD
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		5.0000	G	A	CM
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		6.0000	G	A	GD
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		4.0000	G	A	IR
LEROY G HAAGEN	1	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	P	IR
LEROY G HAAGEN	2	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	A	IR
LEROY G HAAGEN	3	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	A	IR
BARRETT N ALEXANDER	1	4N/29E-33BB	7/13/1987	G11681	G10778		0.3500	C	P	IR
JOSEPHINE M BEAUCHAMP	1	5N/29E-31CB	9/24/1987	G11702	G10866		2.0000	G	P	IR
TOM ABLE	1	4N/28E-24BA	12/12/1988	G11877	G10891		8.3000	G	P	IR
CITY OF HERMISTON, OREGON	2	4N/28E- 3DB	2/21/1989	G11891	G10935		7.8000	C	A	GR
CITY OF HERMISTON, OREGON	1	4N/28E-11CA	2/21/1989	G11891	G10935		7.8000	C	P	GR

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NAME	POD NUM	LOCATION	PRIORITY DATE	APP #	PERMIT #	CERT #	ALLOWED DIVERSION		P/S	USE
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		4.0000	G	A	IR
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		5.0000	G	A	CM
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		6.0000	G	A	GD
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		5.0000	G	A	CM
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		6.0000	G	A	GD
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		4.0000	G	A	IR
LEROY G HAAGEN	1	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	P	IR
LEROY G HAAGEN	2	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	A	IR
LEROY G HAAGEN	3	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	A	IR
BARRETT N ALEXANDER	1	4N/29E-33BB	7/13/1987	G11681	G10778		0.3500	C	P	IR
JOSEPHINE M BEAUCHAMP	1	5N/29E-31CB	9/24/1987	G11702	G10866		2.0000	G	P	IR
TOM ABLE	1	4N/28E-24BA	12/12/1988	G11877	G10891		8.3000	G	P	IR
CITY OF HERMISTON, OREGON	2	4N/28E- 3DB	2/21/1989	G11891	G10935		7.8000	C	A	GR
CITY OF HERMISTON, OREGON	1	4N/28E-11CA	2/21/1989	G11891	G10935		7.8000	C	P	GR

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NAME	POD NUM	LOCATION	PRIORITY DATE	APP #	PERMIT #	CERT #	ALLOWED DIVERSION		P/S	USE
BEN/DORIS COOMBES	1	3N/28E-11BA	4/11/1977	G 8015	G 8470	53746	0.8900	C	C	IR
LYLE G & LEITHA TILDEN	1	5N/28E-35CC	5/19/1977	G 8147	G 7620	58066	0.3500	C	P	IR
FRANK LEDBETTER	1	5N/28E-36CB	9/ 2/1977	G 8426	G 7745	56392	0.0600	C	P	IR
FRANK MUELLER	1	4N/28E-36CD	12/12/1977	G 8574	G 7913		1.6400	C	S	IS
GERALDINE E JONES	1	4N/29E- 6BD	7/11/1978	G 8886	G 8303	53745	0.0100	C	S	IS
RON HOLEMAN	1	3N/29E-21DD	10/20/1978	G 8976	G 8369	53082	4.6000	C	A	IR
RON HOLEMAN	1	3N/29E-21DD	10/20/1978	G 8976	G 8369	53082	4.6000	C	P	IR
GEORGE G/NORENE K DODSON	1	4N/29E- 6CB	2/19/1980	G 9552	G 9403	55022	0.0300	C	P	IR
JAMES L/EDNA M SCHELL	1	4N/29E- 6CB	3/26/1980	G 9636	G 9156		0.0250	C	P	IR
RONALD J/BETTY P FURRER	1	4N/29E- 7CD	11/12/1981	G 10593	G 9718		0.1200	C	P	IR
ALBERT L/JENNIE L CROUSE	1	5N/28E-36AD	6/28/1982	G 10761	G 9892		0.1900	C	S	IS
DON PECK	1	4N/29E- 7AA	12/27/1982	G10858	G 9997	63711	0.0300	C	P	IR
DOUBLE M RANCH INC.	1	3N/29E-18BB	1/10/1983	G10864	G10222		1.2000	C	P	IR
RAY BRADY	1	3N/29E- 5AB	7/21/1983	G11032	G10196	63718	0.1900	C	P	IR
HAROLD SADLER	1	4N/28E- 1CD	8/ 1/1983	G11043	G10205	60871	0.0400	C	P	IR
SPIKE RANCH INC.	1	3N/28E-12AB	9/ 8/1983	G11077	G10234	61114	1.5200	C	C	IC
WILLARD F STRATTON	1	5N/29E-31CD	9/27/1983	G11097	G10435	63614	0.9500	C	P	IR
WILLIAM M LANHAM	1	4N/29E- 6BA	9/29/1983	G11108	G10244		0.0400	C	P	IR
WALTER R KLIPPSTEIN	1	4N/29E- 6AC	10/ 5/1983	G11128	G10258	55843	0.0200	C	S	IS
WALTER R KLIPPSTEIN	2	4N/29E- 6AC	10/ 5/1983	G11128	G10258	55843	0.0100	C	S	IS
ROBERT CAMPBELL	1	3N/29E- 5AB	10/ 6/1983	G11132	G10305		0.0600	C	P	IR
JOHN N CORREA	1	3N/28E-11AA	10/14/1983	G11182	G10292		1.3400	C	P	IR
JOHN N CORREA	2	3N/28E-14BB	10/14/1983	G11182	G10292		1.3400	C	C	IC
JOHNNIE M MAYES	1	4N/29E-18AD	2/27/1984	G11237	G10374		0.4000	C	P	IR
CITY OF ECHO	1	3N/29E- 8AC	2/21/1985	G11350	G10538		20.0000	G	P	PA
DAVID C SCHULZ	1	4N/28E- 1BA	8/ 5/1985	G11423	G10556		5.0000	G	P	IR
DON MILLS MINT FARM, INC.	1	4N/29E-33AD	8/30/1985	G11433	G10587		0.1200	C	P	IR
SPIKE RANCH INC.	1	3N/29E- 7CD	11/29/1985	G11457	G10664	61115	2.5000	C	S	IS
DOUBLE M RANCH INC.	1	4N/28E-35AA	12/ 2/1985	G11458	G10709		1.6800	C	C	IC
DOUBLE M RANCH INC.	2	4N/28E-35CC	12/ 2/1985	G11458	G10709		3.2500	C	C	IC
LEROY G HAAGEN	1	5N/28E-35CD	4/ 2/1986	G11502	G10617		6.0000	G	P	GD
LEROY G HAAGEN	1	5N/28E-35CD	4/ 2/1986	G11502	G10617		5.0000	G	P	CM
LEROY G HAAGEN	1	5N/28E-35CD	4/ 2/1986	G11502	G10617		4.0000	G	P	IR

NAME	POD NUM	LOCATION	PRIORITY DATE	APP #	PERMIT #	CERT #	ALLOWED DIVERSION		P/S	USE
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		4.0000	G	A	IR
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		5.0000	G	A	CM
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		6.0000	G	A	GD
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		5.0000	G	A	CM
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		6.0000	G	A	GD
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		4.0000	G	A	IR
LEROY G HAAGEN	1	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	P	IR
LEROY G HAAGEN	2	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	A	IR
LEROY G HAAGEN	3	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	A	IR
BARRETT N ALEXANDER	1	4N/29E-33BB	7/13/1987	G11681	G10778		0.3500	C	P	IR
JOSEPHINE M BEAUCHAMP	1	5N/29E-31CB	9/24/1987	G11702	G10866		2.0000	G	P	IR
TOM ABLE	1	4N/28E-24BA	12/12/1988	G11877	G10891		8.3000	G	P	IR
CITY OF HERMISTON, OREGON	2	4N/28E- 3DB	2/21/1989	G11891	G10935		7.8000	C	A	GR
CITY OF HERMISTON, OREGON	1	4N/28E-11CA	2/21/1989	G11891	G10935		7.8000	C	P	GR

ZWART.1

NAME	POD NUM	LOCATION	PRIORITY DATE	APP #	PERMIT #	CERT #	ALLOWED DIVERSION		P/S	USE
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		4.0000	G	A	IR
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		5.0000	G	A	CM
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		6.0000	G	A	GD
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		5.0000	G	A	CM
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		6.0000	G	A	GD
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		4.0000	G	A	IR
LEROY G HAAGEN	1	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	P	IR
LEROY G HAAGEN	2	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	A	IR
LEROY G HAAGEN	3	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	A	IR
BARRETT N ALEXANDER	1	4N/29E-33BB	7/13/1987	G11681	G10778		0.3500	C	P	IR
JOSEPHINE M BEAUCHAMP	1	5N/29E-31CB	9/24/1987	G11702	G10866		2.0000	G	P	IR
TOM ABLE	1	4N/28E-24BA	12/12/1988	G11877	G10891		8.3000	G	P	IR
CITY OF HERMISTON, OREGON	2	4N/28E- 3DB	2/21/1989	G11891	G10935		7.8000	C	A	GR
CITY OF HERMISTON, OREGON	1	4N/28E-11CA	2/21/1989	G11891	G10935		7.8000	C	P	GR

ZWART.1

NAME	POD NUM	LOCATION	PRIORITY DATE	APP #	PERMIT #	CERT #	ALLOWED DIVERSION		P/S	USE
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		4.0000	G	A	IR
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		5.0000	G	A	CM
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		6.0000	G	A	GD
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		5.0000	G	A	CM
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		6.0000	G	A	GD
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		4.0000	G	A	IR
LEROY G HAAGEN	1	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	P	IR
LEROY G HAAGEN	2	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	A	IR
LEROY G HAAGEN	3	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	A	IR
BARRETT N ALEXANDER	1	4N/29E-33BB	7/13/1987	G11681	G10778		0.3500	C	P	IR
JOSEPHINE M BEAUCHAMP	1	5N/29E-31CB	9/24/1987	G11702	G10866		2.0000	G	P	IR
TOM ABLE	1	4N/28E-24BA	12/12/1988	G11877	G10891		8.3000	G	P	IR
CITY OF HERMISTON, OREGON	2	4N/28E- 3DB	2/21/1989	G11891	G10935		7.8000	C	A	GR
CITY OF HERMISTON, OREGON	1	4N/28E-11CA	2/21/1989	G11891	G10935		7.8000	C	P	GR

ZWART.1

NAME	POD NUM	LOCATION	PRIORITY DATE	APP #	PERMIT #	CERT #	ALLOWED DIVERSION		P/S	USE
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		4.0000	G	A	IR
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		5.0000	G	A	CM
LEROY G HAAGEN	2	5N/28E-35CD	4/ 2/1986	G11502	G10617		6.0000	G	A	GD
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		5.0000	G	A	CM
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		6.0000	G	A	GD
LEROY G HAAGEN	3	5N/28E-35CD	4/ 2/1986	G11502	G10617		4.0000	G	A	IR
LEROY G HAAGEN	1	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	P	IR
LEROY G HAAGEN	2	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	A	IR
LEROY G HAAGEN	3	5N/28E-35CD	5/21/1986	G11502	G10617		6.0000	G	A	IR
BARRETT N ALEXANDER	1	4N/29E-33BB	7/13/1987	G11681	G10778		0.3500	C	P	IR
JOSEPHINE M BEAUCHAMP	1	5N/29E-31CB	9/24/1987	G11702	G10866		2.0000	G	P	IR
TOM ABLE	1	4N/28E-24BA	12/12/1988	G11877	G10891		8.3000	G	P	IR
CITY OF HERMISTON, OREGON	2	4N/28E- 3DB	2/21/1989	G11891	G10935		7.8000	C	A	GR
CITY OF HERMISTON, OREGON	1	4N/28E-11CA	2/21/1989	G11891	G10935		7.8000	C	P	GR

ZWART.1

BASALT APPLICATIONS PENDING IN THE STAGE GULCH AREA
AUGUST 1990

NAME	POD NUM	LOCATION	PRIORITY DATE	APPLICATION	REQUESTED DIVERSION		PROPOSED USE	REMARKS
J.R SIMPLOT CO.	1	4N/28E-26DCB	7/17/84	G-11291	1.811	C	AG/IC	WELL 4
J.R SIMPLOT CO	2	4N/28E-26DCC	7/17/84	G-11291	1.811	C	AG/IC	WELL 6
LEROY G. HAAGEN	1	5N/28E-35CAA	6/19/85	G-11402	2.000	C	QM or GD	
LEROY G. HAAGEN	2	5N/28E-35DAA	6/19/85	G-11402	2.000	C	QM or GD	
FRED WIDMAN	1	3N/29E-15BAC	8/ 5/85	G-11424	46.000	G	IR	
CITY OF HERMISTON	1	4N/28E-10CDD	2/21/89	G-11892	20.000	C	MU	PROPOSED APPROP. OF
CITY OF HERMISTON	2	4N/28E-11CAD	2/21/89	G-11892	20.000	C	MU	ARTIFICALLY RECHARGED
CITY OF HERMISTON	3	4N/28E-11CCD	2/21/89	G-11892	20.000	C	MU	GROUND WATER VIA CITY
CITY OF HERMISTON	4	4N/28E-11BAB	2/21/89	G-11892	20.000	C	MU	WELL 1,2,3,4

ALLUVIAL APPLICATIONS PENDING IN THE STAGE GULCH AREA
AUGUST 1990

NAME	POD NUM	LOCATION	PRIORITY DATE	APPLICATION	REQUESTED DIVERSION		PROPOSED USE	REMARKS
JOHN CORREA	1	3N/28E-11AAB	10/8/85	G-11444	2.050	C	IR	CLOSED (CASED) WELL
JOHN CORREA	2	3N/28E-11AA	10/8/85	G-11444	2.050	C	IS	PIT WELL
WINDBLOWN RANCH	1	4N/29E-19BAA	1/16/90	G-12012	1.000	C	IR	
EARL STEWART	1	4N/28E-1AAD	3/ 6/90	G-12040	0.111	C	IR	
CITY OF STANFIELD	1	4N/29E-32CA	6/28/90	G-12158	0.180	C	IR	

ZWART.4

BASALT APPLICATIONS PENDING IN THE STAGE GULCH AREA
AUGUST 1990

NAME	POD NUM	LOCATION	PRIORITY DATE	APPLICATION	REQUESTED DIVERSION		PROPOSED USE	REMARKS
J.R SIMPLOT CO.	1	4N/28E-26DCB	7/17/84	G-11291	1.811	C	AG/IC	WELL 4
J.R SIMPLOT CO	2	4N/28E-26DCC	7/17/84	G-11291	1.811	C	AG/IC	WELL 6
LEROY G. HAAGEN	1	5N/28E-35CAA	6/19/85	G-11402	2.000	C	QM or GD	
LEROY G. HAAGEN	2	5N/28E-35DAA	6/19/85	G-11402	2.000	C	QM or GD	
FRED WIDMAN	1	3N/29E-15BAC	8/ 5/85	G-11424	46.000	G	IR	
CITY OF HERMISTON	1	4N/28E-10CDD	2/21/89	G-11892	20.000	C	MU	PROPOSED APPROP. OF
CITY OF HERMISTON	2	4N/28E-11CAD	2/21/89	G-11892	20.000	C	MU	ARTIFICALLY RECHARGED
CITY OF HERMISTON	3	4N/28E-11CCD	2/21/89	G-11892	20.000	C	MU	GROUND WATER VIA CITY
CITY OF HERMISTON	4	4N/28E-11BAB	2/21/89	G-11892	20.000	C	MU	WELL 1,2,3,4

ALLUVIAL APPLICATIONS PENDING IN THE STAGE GULCH AREA
AUGUST 1990

NAME	POD NUM	LOCATION	PRIORITY DATE	APPLICATION	REQUESTED DIVERSION		PROPOSED USE	REMARKS
JOHN CORREA	1	3N/28E-11AAB	10/8/85	G-11444	2.050	C	IR	CLOSED (CASED) WELL
JOHN CORREA	2	3N/28E-11AA	10/8/85	G-11444	2.050	C	IS	PIT WELL
WINDBLOWN RANCH	1	4N/29E-19BAA	1/16/90	G-12012	1.000	C	IR	
EARL STEWART	1	4N/28E-1AAD	3/ 6/90	G-12040	0.111	C	IR	
CITY OF STANFIELD	1	4N/29E-32CA	6/28/90	G-12158	0.180	C	IR	

ZWART.4

APPENDIX C

Records of Representative Wells, Basalt Aquifers

Explanation and Key to Abbreviations

Well Number: See page viii for description of well-numbering system. Use of an 'x' as the third letter (e.g. 23 abx) indicates that the location of the well is uncertain within a quarter-quarter section.

Finish: O, open-end casing; X, open hole below casing; L or P: lined or perforated, with interval noted in feet.

Depth to Basalt: Depth to the top of unweathered basalt, in feet, as interpreted from the Water Well Report.

Elevation: Elevation of land surface at well, in feet above mean sea level, as indicated on or interpolated from 1:24,000 scale topographic maps, generally ± five feet.

Water Level: Depth to water below land surface, given in feet and decimal fractions if measured by personnel of the Water Resources Department or U. S. Geological Survey, or in whole feet if reported by well driller or owner. Minus sign (-) indicates water level above land surface.

F, flowing well with unknown static level.

X, see Appendix D for complete record of measurements.

Well Performance: U, unknown test method; A, B, or P: air-tested, bailed, or pumped for indicated time, in hours, when drawdown and yield were measured. Yield, in gallons per minute and drawdown, in feet below static (nonpumping) level at end of test period, as reported by driller, owner, operator, or pump company. Drawdown reported for air-tested wells is not generally reliable.

Use of Water: D, domestic; I, irrigation; N, industrial; P, public supply; S, stock.

Remarks: A well log is a Water Well Report or Record of Well on file at the Water Resources Department. A well inspection is a record of a visit or measurement made by personnel of the Water Resources Department or the U. S. Geological Survey. A water right permit application is an application to the Water Resources Department for a permit to appropriate public waters.

WELL NUMBER	OWNER	YEAR COM-PLETED	WELL DEPTH (feet)	CASING DIAMETER (inches)	CASING DEPTH (feet)	FINISH	DEPTH TO BASALT (feet)	ELEVA-TION (feet)	WATER LEVEL DEPTH (feet)	WATER LEVEL DATE	WELL PERFORMANCE TYPE OF TEST	WELL PERFORMANCE YIELD (gpm)	WELL PERFORMANCE DRAW-DOWN (feet)	USE OF WATER	REMARKS
--- T2N R28E ---															
1 bdd	Travelers Insurance Co.	1975	640	16	57	X	51	930	X		P, 24	1600	40	I	Prior well #4; 320 gpm artesian flow reported on well log;
	Real Estate Investment	1976		12	500	X									well reconditioned
2 bdd	Travelers Insurance Co.	1974	792	16	44	X	37	840	X		P, 24	1060	295	I	Prior well #7; 80 gpm artesian flow reported on well log;
	Real Estate Investment	1976	862												well deepened
2 daa	Travelers Insurance Co.	1975	690	16	21		12	840	X		----	----	----	I	Prior well #8; 2050 gpm artesian
	Real Estate Investment			12	485	X									flow reported on well log
10 abd	Robert Schiller	1976	908	16	52	X	19	885	X		A	3000	----	I	
10 dab	Mabel Vey	1977	231	6	30	X	20	950	42	1/14/77	A	45	----	D	
--- T2N R29E ---															
6 bbx	Herbert Bork	1977	175	8	25	X	15	----	20	2/25/77	A, 6	150	10	D	No well inspection
--- T2N R30E ---															
1 ccb	Edward W. Holmes	1970	298	10	34	X	12	930	X		A, 1	300	130	D/I	
4 ddb	Bob Hines	1978	428	8	20	X	3	1000	X		A	300	----	D/I	
6 add	Cunningham Sheep Co.	1946	233	8	----	----	27	730	F	--/--/46	----	----	----	S	100 gpm artesian flow reported
									F	7/25/78					on well log
									F	7/17/79					
9 bbx	Sidney Gallaway	1973	70	8	46	X	20	----	-35	6/11/73	P, 4	180	160	D/I	No well inspection; 75 gpm artesian flow reported on well log
9 bcb	Ygnacio Pedro Arstequi	1977	130	10	35	X	17	790	-5	12/22/77	A, 1	500	120	I	50 gpm artesian flow reported
									3.9	8/15/78					on well log
9 bcd	Ygnacio Pedro Arstequi	1970	80	10	58	X	42	830	X		A, 1	52	20	D	
10 abc	Theodore Hendrickson	1973	130	8	41	X	23	810	X		A, 1	215	95	D/I	
		1988	250								A, 1	300	----		Well deepened
10 bca	Elsie Porter/	1969	173	8	20	X	15	795	X		A	400	40	D/I	200 gpm artesian flow reported
	Ross Johnson	1969									A	600	60		on well log; well reconditioned

11 aab	Robert U. Gentner	1972	140	8	45	X	35	800	20	12/19/72	A, 1	600	100	D/I	
									42.40	8/15/78					
									69.84	7/25/79					
--- T2N R31E ---															
16 bcx	Dean Forth	1980	185	10	18	X	10	----	20	3/05/80	A	500	----	I	No well inspection
16 cax	Bill Wolf Ranches	1981	350	8	42	X	14	----	120	12/04/81	A, 1	300	100	D/I	No well inspection
20 xxx	John Pickett	1970	547	6	20	X	0	----	390	4/02/70	A, 1	30	150	S	No well inspection
--- T3N R28E ---															
1 add	Oregon Highway Div.	1966	135	10	64	X	64	580	12	6/27/66	P, 4	50	46	I	
				6	76				13.05	7/19/78					
2 cda	Fred Andrews	1975	110	10	92	P 35 - 85	95	590	2	10/29/75	A, 1	400	98	I	Well #2;
		1976	625						210	6/01/76	A, 1	800	190		well deepened
11 cda	Emert Ranches	1977	605	10	78	X	78	----	260	11/25/77	A	400	320	I	No well inspection
14 adx	Double M Ranch	1988	100	6	43	X	78	----	11	9/12/88	A, 1	45	----	D	No well inspection
23 bab	L & L Farms	1976	936	16	60	X	12	640	X		A	2000	----	I	L&L well #3
23 dcb	L & L Farms	1976	1012	16	49	X	30	675	X		A	2000	----	I	L&L well #1
26 baa	L & L Farms	1976	911	16	81	X	38	685	X		A	1000	----	I	L&L well #2
34 dba	David Sparks	1976	830	16	44	X	36	780	425	9/20/76	P, 8	3260	17	I	Maddox well #1
									476.39	2/23/90					
35 baa	Travelers Insurance Co.	1975	875	16	85	X	76	770	X		P, 24	1050	10	I	Prior well #5;
	Real Estate Investment	1976	1055												well deepened;
		1979	1255												well deepened;
		1982													well reconditioned;
35 caa	Travelers Insurance Co.	1974	537	16	58	X	48	780	X		P, 24	1212	213	I	Prior well #6;
	Real Estate Investment	1976	591												well deepened;
		1979	1067												well deepened;
36 abb	Travelers Insurance Co.	1974	931	16	92	X	84	805	X		P, 24	1200	250	I	Prior well #2; 160 gpm artesian
	Real Estate Investment														flow reported on well log;
		1976	1005												well deepened
36 dbb	Travelers Insurance Co.	1974	640	14	112	X	90	855	X		----	----	----	I	Prior well #3; 640 gpm artesian
	Real Estate Investment														flow reported on well log;
		1976	689												well deepened

--- T3N R29E ---

2 add	Prudential Insurance Co. of America	1974	1065	16	570	X	90	830	X		P, 3	4100	92	I	Well #4; 900 gpm artesian flow reported on well log
4 bba	Mills Mint Farm Inc.	1977 1979	760 925	8	85	X	67	640	X		A, 1 A, 1	300 400	383 150	I	Well #2; well deepened
4 ddd	Steve/Judy Mills	1978 1978	1360 1380	14	150	X	15	805	X		A	2000	----	I	Mills well; well deepened
5 acd	Charles Herrick	1969	145	12	40	P 29 - 37	84	636	14	1/15/69	P, 10 B, 1	140 50	120 4	I	Well #2; no well inspection
5 bad	Helen R. Ohlsen	1952	235	6	----	----	----	610	75 10.3	--/--/52 6/27/79				D/I	Unused for long time; incomplete well log
5 bdx	Paul H. Forrey	----	240	6	----	----	----	----	25	2/16/78	----	----	----	I	No well log; well data reported on well inspection
9 cdd	Seibel Brothers	1977	1117	16	20	X	12	655	X		----	----	----	I	
10 abb	Lehman Enterprises	1978 1985	1380	12	138	X	35	799	X		A	1000	----	I	Lehman well; well reconditioned
11 acc	Prudential Insurance Co. of America	---- 1974 1979	675 685 696	10	106	----	121	850	X		----	----	----	I	Well #6; well deepened; well reconditioned and deepened
11 ddd	Prudential Insurance Co. of America	1975	1145	16	403	X	118	900	X		P, 1 P, 2 P, 3	1350 1940 2610	200 274 377	I	Well #5
12 bdc	Prudential Insurance Co. of America	1977 1978 1982	1126 1281	16	100	X	42	855	X		A	3000	----	I	Well #7; well deepened; well reconditioned (twice)
14 bac	Prudential Insurance Co. of America	1978 1979	1492	16	51	X	43	942	X		A P	2000 1700	---- ----	I	Well #8; well reconditioned (twice)
16 aad	City of Echo	1945 1964	520 820	12,10,8	----	----	83	790	X		---- P, 5	---- 300	---- 0	P	Well #2; incomplete well log; well deepened
16 aca	City of Echo	1951	490	16,12	----	----	32	650	X		P, 6	400	60	P	Well #3; incomplete well log
16 ada	City of Echo	1974	600	10	45	X	37	740	X		P, 13	656	18	P/I	Well #4

19 acc	Travelers Insurance Co.	1980	1125	16	100	X	94	745	X		P, 3	3200	40	I	Brown well #4
	Real Estate Investment														
20 dcc	Travelers Insurance Co.	1977	1027	16	177	X	114	810	X		P, 6	2200	18	I	Brown well #1
	Real Estate Investment														
23 adb	Kenneth Coppinger	1976	761	12	37	X	18	905	X		P, 4	1304	145	I	Well #3
24 aad	Kenneth Coppinger	1976	318	10	38	X	16	1001	X		P, 3	550	0	I	Well #2
24 acd	Kenneth Coppinger	1976	1012	16	137	X	16	1090	X		A	1000	----	I	Well #1
30 adb	Travelers Insurance Co.	1977	1012	12	65	X	57	790	212	8/26/77	A	1500	----	I	Brown well #3;
	Real Estate Investment	1977	1100						415	11/30/77	P, 4	1560	10		well deepened
30 dda	Travelers Insurance Co.	1975	660	16	68	X	62	835	X		P, 24	1000	10	I	Brown well #2;
	Real Estate Investment	1976	882												well deepened
--- T3N R30E ---															
1 dba	Thomas C. Branstetter	1976	925	14	36	X	6	1140	X		P, 4	1800	25	I	
6 cbd	Prudential Insurance	1971	675	16	82	X	70	870	X		A, 1	900	292	I	Well #2;
	Co. of America	1971	1052								P, 4	2000	107		well deepened;
		1972	1055												well reconditioned;
		1977	1125								A	2800	----		well reconditioned and deepened;
		1978	1455												well deepened
7 abc	Leon Reese	----	----	----	----	----	----	875	X		----	----	----	----	No well log
7 bbd	Prudential Insurance	1963	980	14	66	X	58	----	X		P, 20	1200	86	I	Well #1;
	Co. of America	1971									A, 1	660	32		well reconditioned;
		1979	1205								P, 4	1810	112		well reconditioned and deepened;
		1984													well reconditioned
7 ccb	Prudential Insurance	1972	1189	20	96	X	88	882	X		P, 0.5	1650	40	I	Well #3
	Co. of America			16	594						P, 1.5	2800	149		
											P, 2.5	3450	188		
		1979		14	597										well reconditioned;
		1982	1196												well reconditioned
9 cba	Leon A. Reese	1967	304	6	20	X	12	970	X		P, 4	100	230	I	
		1967	379								A	175	----		Well deepened;
		1975	598	10	22.5	X					P, 1	300	150		well reconditioned and deepened
9 cbx	Ralph A. Reese	----	140	4.5	----	----	----	----	90	11/27/53	----	----	----	I	Incomplete well log; information
									115	11/20/58					reported during well inspection

17 add	Glen L. Rohde	1976	515	12	92	X	77	960	X		P, 4	508	----	I	
		1977	908								A	2000	----		Well deepened
17 dax	P J Rohde Ranch Inc.	1984	400	6	179	X	164	----	235	4/13/84	A, 1	60	----	D	No well inspection
20 ccc	David L Stein	1978	1107	16	78	X	45	1100	X		A	2000	----	I	Petrik well #2
22 ccx	Leon A Reese	----	235	----	----	----	----	----	----	----	----	----	----	D/I	No log for original well;
		1971	422						176	12/30/71	A , 8	75	----		well reconditioned and deepened
									222	7/26/78					
									229	8/12/78					
22 cca	Leon A Reese	1979	825	12	36	X	15	1130	X		A, 1	400	300	I	2 perforations per ft per aquifer;
				8	518-775	P									
		1981	965								A, 1	500	----		well deepened
23 ddd	M.S. and S.R. Temple	1968	444	12.75	320	X	12	1235	X		P, 10	20	14		
											A, 4	40	----	I	
		1976	593								P, 4	810	19		Well deepened
30 caa	David L Stein	1975	835	12	73	X	46	1100	X		A, 1	500	317	I	Petrik Well #1;
		1975									P, 7.5	540	230		well reconditioned;
		1978	1086								P, 3	1580	9		well deepened
--- T3N R31E ---															
19 cbc	Lawrence B Rew	1972	475	8	24	X	7	1220	X		A, 1	100	135	D	Rew well #2
	Rew Ranches Inc.														
30 abc	Lawrence B Rew	1973	1021	12	53	X	50	1303	X		P, 4	824	3	I	Rew well #1
	Rew Ranches Inc.			10	446						P, 5	732	2		
31 bax	Evelyn S Isom	1963	890	8	33	X	89	1350	446	2/27/63	----	----	----	D	Last two water level readings
		1963	1218						315	10/30/72					are questionable
									149.2	6/26/80					
--- T4N R28E ---															
1 bad	Geo. and Pauline Alex	1974	335	8	137	X	131	500	57	8/19/74	A, 1	150	218	D/I	
									57	7/27/80					
									247.12	12/03/81					
1 bdx	Ronald J Flink	----	203	----	----	----	----	----	----		----	----	----	D	No log for original well; no well
		1979	497						114	8/10/79	A, 1	75	286		inspection; well deepened
											A, 1	60	186		
											A, 1	50	166		

1 cbb	Roger D Bryant Brenda G Bryant	1976	223	6	99	X	92	478	40 70.5 60.02	4/07/76 8/07/78 7/17/79	A, 1	100	80	D	
10 acb	Hermiston Unified School District #8	1963	597	8	88	X	120	470	41	2/16/63	P, 1 P, 7	180 250	39 62	I	Well temporarily abandoned
10 cdd	City of Hermiston	1924	450	8	----	X	20	450	F F	--/--/24 7/17/79	----	----	----	P	Well # 1; not used at present
11 acd	Al H/Mabel J Fowler	1965	110	8	30	X	28	450	20 59.78 11.5	7/26/75 7/26/78 7/17/79	B, 1	70	10	I	Fowler well #2
11 bab	City of Hermiston	1968	1041	24 20	78 310	X	69	447	X		P, 24 P, 1 P, 2	2500 2000 1750	253 168 131	P	Well #4
11 cad	City of Hermiston	1949	900	24 20 18	40 40 59.5	----	44	448	X		----	1245	69	P	Well #2
11 ccd	City of Hermiston	1954	962	20 16	53 93	----	55	450	X		----	----	----	P	Well #3
11 ddx	Hermiston School District 8R	1981 1988	620	8 6 L	111 100-620	X P 600 - 620	72	492	125 125	3/26/81 4/08/88	A, 1 A, 1 A, 1	300 150 200	---- ---- 620	I	No well inspection Well reconditioned
12 ddd	Frank & Doylene Dye	1974	223	6	130	X	173	635	50	10/07/74	A, 1	100	150	D	Well #2
12 ddd	Frank & Doylene Dye	1974	212	8	106	X	99	----	X		A, 1	300	90	I	Well #1; no well inspection
14 cda	Hermiston Cemetery District 8	1974	680	10	124	X	112	585	X		A, 1	400	437	I	
22 dbb	C & B Livestock Inc	1967 1975 1980	311	12	70	X	188	605	194 250 250	9/30/67 8/05/75 3/17/80	P, 11 A, 1 A, 1 A, 1	1200 100 1500 1500	17 50 300 200	I	Well #3; no well inspection well reconditioned Well deepened
23 aca	Vernon & Ivan Cook	1979	1180	14	220	X	190	642	280	10/16/79	P, 2	1800	30	I	No well inspection
23 bdb	Oregon State Univ. Columbia Basin Cntr.	1977	875	10	232	X	97	625	X		A 1.5 A, 6	1000 1000	383 18	I	
23 dcc	Vernon & Ivan Cook	1977	317	8	151	X	143	650	126 210 331	5/09/77 7/13/77 7/11/78	A, 1	50	105	N	POD #1

24 adx	Vernon & Ivan Cook	1980	765	10	234	X	224	663	290	3/08/80	A	300	----	I	POD #4; no well inspection
24 bdd	Robert G. Campbell	1968	652	12	229	X	229	646	X		B, 1.5	20	40	I	
		1969	917								P, 6	1750	92		Well deepened
											P, 3	1650	82		
24 dca	Vernon & Ivan Cook	1977	1137	14	218	X	182	656	287	4/14/77	----	----	----	I	
									300	7/11/78					
									287	7/04/79					
26 cda	J R Simplot Co.	1978	1042	14	187		165	585	X		P	2200	----	N	Well #4
		1984		12.75	500										
				8.625	490-972	P 520-972									Well reconditioned
26 dcx	J R Simplot Co.	1981	985	20	65	X	162	538	289	10/22/81	P, 5	2117	20	----	Well #6; no well inspection
				16	162										
				12	339										
				10	425-542										
27 daa	Union Pacific	1971	569	20	158										
				16	263	X	260	633	X		P, 2	1000	5	N	Hinkle #2
				12	353-459	L					P, 6	1600	10		
											P, 4	1900	19		
27 dac	Union Pacific	1950	547	16	----	----	245	625	X		P, 6	1000	7	N	Hinkle #1
				12							P, 1	1150	10		
34 dbx	Double M Ranch Inc.	1976	461	10	47	X	6	585	250	8/06/76	P, 9	868	0	I	No well inspection
--- T4N R29E ---															
1 acd	Powell Goodin Farms	1966	1025	12	131	X	69	684	X		P, 8	610	140	I	
5 ccb	Earl E/ Maola R Baldwin	1970	200	8	95	X	95	540	X		A, 1	100	80	D/I	
5 dda	John/Mary Jane Hershey	1953	772	10	145	----	145	612	X		P, 3	135	71	I	
				6	90										
6 abb	Delbert Kerns	1970	131	8	76	X	76	460	13	5/11/70	B, 1.5	40	8	D/I	
									12.3	8/08/78					
6 abx	Lois E Lee	1980	125	6	54	X	49	----	12	2/05/80	A, 1	75	88	D	No well inspection
											A, 1	60	63		
6 baa	Marshall A Moon	1978	480	10	74	X	69	470	X		A, 1	500	227	I	
7 acd	Raymond R Perkins	1978	480	8	163	X	173	615	X		A, 1	300	230	I	
											A, 1	150	60		
		1983		6 L	5-300	P 260-300					A, 2	200	----		Well reconditioned

7 cax	John M/ Edith Weston	1971	390	8	157	X	152	615	180 158.8	5/18/71 8/08/78	A, 1	45	100	D	
7 cax	Kenneth W Brown Margaret A Brown	1983 1984	470 600	8 6 L	59.5 1-290	X X	53	626	235 235	5/26/83 3/06/84	A, 2 ----	400 ----	---- ----	D/I	No well inspection; well reconditioned
8 aca	Thomas P Davidson	1976	539	6	125	X	143	627	88 77.4	12/29/76 6/23/80	A, 1	40	112	D	
9 bbx	William A Kopacz	1972	114	16	73.5	X	74	620	65	2/04/72	B, 1	40	5	I	No well inspection
10 aba	Steven R Picker	1974	365	12	132	P 76-130	132	642	30 128.2	3/--/74 7/11/79	B, 1	60	0	D/I	Well #1
10 acx	Randolph Iszler	----	254	8	150	X	----	665	30	----	----	----	----	I	No well log; information from water right permit application and well inspection
10 acx	Oregon Department of Veterans Affairs	1980	310	8	158	X	152	665	60	5/15/80	B, 1.5	250	100	I	
10 bdb	H T Burns	1981	1350	10	178	X	173	660	X		----	----	----	I	Well #3
10 cad	H T Burns	1973	1330	16	163	P 100-155 X	163	679	X		P, 8	1600	23	I	Well #1
10 dbc	H T Burns	1976	465	14 8	30 167	X	315	680	X		P, 6	300	151	I	Well #2
11 ccx	Ivan J Cook	1980	640	10	131	X	123	680	86	10/06/80	A, 2	400	0	I	No well inspection
11 ddx	Mills Mint Farm Inc.	1974	630	10	74	X	69	655	8	3/07/74	A, 1	150	342	I	Well #5; no well inspection
11 ddx	Mills Mint Farm Inc.	1980	600	10	123	P 90-123	90	655	35	2/17/80	P, 4	750	265	I	Cold Springs Canyon well
12 dda	Lawrence Morse	1980	530	12	35	X	30	644	16	5/15/80	P, 8	1500	184	I	Well #3; no well inspection
13 cca	Edwards Farms Inc.	1949	425	6	76	X	78	680	30 35.4	1/--/49 8/09/78	P	300	125	I	Well #1
13 dac	Edwards Farms Inc.	1954	527	16	88	X	111	712	75 240 76.8	12/--/54 8/09/78 6/23/80	----	2000		I	Well #2
14 dac	Lawrence Morse	----	560	16	----	X	----	665	38	----	----	----	----	----	Well #2; no well log; information reported during well inspection

17 add	Patrick C Walchli	1981	1200	18	45		40	694	X		A, 1	2000	----	I	
				16	0-225	L									
		1989	1205												Well reconditioned
17 bca	Maurice L Koester	1969	266	8	100	X	222	670	150	4/25/69	A	350	30	I	
18 dcb	Glenn S Chowning	1970	643	12	200	X	198	660	X		B, 2	50	0	I	Well #2
18 ddb	Glenn S Chowning	----	----	----	----	----	----	672	----		----	----	----	----	Well #3; no well log for initial
		1978	1000											I	drilling; well deepened
19 bcc	Loyalta Inc.	----	----	----	----	----	----	655	----		----	----	----	I	Gossler well; no well log for initial
		1980	1210						X		A, 1	1500			drilling; well deepened;
		1982									A, 1	1500	850		well reconditioned
20 cax	The Travelers Insurance Company	1980	655	6	195	X	189	----	282	9/22/80	A, 1	40	0	D	No well inspection
20 dcb	Vernon and Ivan Cook	1978	1361	14	185	X	110	678	X		P, 4	1970	63	I	
24 acb	LE Pearson	1965	95	16	63	X	95	730	60	3/04/65	B, 1	20	30	I	
		1965	1102	12	298				270	11/24/65	P, 5	678	75		Well deepened
24 cdd	Zabransky and Sons Inc	1976	1340	16	70	X	60	720	X		----	----	----	I	Well #2
25 add	Zabransky and Sons Inc	1979	475	16	35	X	16	710	X		A, 1	1000	300	I	Well #4
25 bba	Robert C Bertsch Judith M Bertsch	1974	200	6	40	X	30	670	X		A, 1	50	95	D	
25 bbd	Zabransky and Sons Inc	1979	1137	----	----	----	----	675	210	2/28/79	----	----	----	I	Well #1; well deepened
									225.00	6/20/79					no well log for initial drilling
26 adc	Mills Mint Farm Inc.	1977	745	10	45		65	661	-9	2/24/77	P, 2	800	175	I	Well #7
				8	178	X			10	7/11/79	P, 5	800	184		
									6.3	3/20/84	P, 7	800	189		
27 cad	Don Mills	1973	400	10	62	X	56	632	13	5/29/73	P, 7	430	252	D/I	Mills well #2
									11	6/23/80					
29 bdb	Loyalta Inc.	1975	1172	18	221	X	207	670	272	3/19/75	P, 4	1557	103	I	Well #2
									401.2	6/24/80	P, 5	1921	138		
29 ddb	Maurice L Koester	1977	925	12	111	X	102	655	X		A, 1	1000	300	I	Well #3;
		1977	950								A, 1	1000	400		well deepened;
		1978		12	126										well reconditioned
30 abb	Harold and Esther Lehman	1977	1071	10	123	X	83	655	X		A	1500	----	I	

31 dab	A E Staley Mfg Co	1977	135	6	64	X	56	584	15	4/15/77	A, 1	80	65	N	
									17.5	8/10/78	A, 1	60	45		
									21.54	7/06/79					
32 bax	Robert E Taylor	----	----	----	----	----	----	652	----		----	----	----	I	No well log or well inspection
32 bbc	City of Stanfield	1977	1161	12	156	X	46	659	X		P, 4	1227	185	P	City well #4
												1000			
32 cac	City of Stanfield	1959	300	16	53		53	591	X		U, 3		230	P	City well #3
				12	70	X									
		1962	701								U, 3	200	185		Well deepened;
		1964	778	8	676-714	X					U, 3	660	20		well deepened
											U, 3	540	12		
		1982		8		P 118-123									well reconditioned
32 cca	City of Stanfield	----	60	6	----	----	----	680	----		----	----	----	P	Depot well; no well log; 60 foot depth reported on water right permit application; 180 foot depth reported at well inspection
			180												
33 cdx	Ralph Burkett	----	----	----	----	----	----	645	----		----	----	----	----	No well log or well inspection
33 dcx	Austin A Alford	----	130	----	----	----	----	638	18	6/23/80	----	----	----	I	No well log; well depth reported
33 dcx	Gilbert G Gettman	----	----	----	----	----	----	635	----		-----	----	----	I	No well log or well inspection
36 adc	Zabransky and Sons Inc	1977	1023	16	79	X	70	796	-11.6	12/30/77	----	----	----	I	Well #3
				12	610-670	P 640-668									
--- T4N R30E ---															
8 adb	Cold Springs Ranches, Inc	1967	968	16	67	X	63	828	X		P,24	880	215	I	
				14	153										
				10	489-570										
26 cbb	Ronald M Kilgore	1978	750	16	48	X	33	1020	X		P, 8	4000	90	I	
28 ada	Merle Gehrke	1978	950	18	23	X	15	905	X		P, 8	4000	90	I	Well #4
29 daa	Merle Gehrke	1978	665	16	32	X	7	820	X		U, 8	5958	90	I	Well #3
												5200	60		
												2461	25		
32 dca	Merle Gehrke	1977	600	16	28	X	8	800	X		P, 8	5100	72	I	Well #2
33 cda	Merle Gehrke	1977	600	16	18	X	8	830	X		P, 8	4000	260	I	Well #1

35 dca	Leonard A Lorenzen Lorenzen Ranches Inc	---- 1976 1985	250 570 850	6.625	----	----	----	950	X		----	----	----	I	No well log for initial drilling; well reconditioned; well reconditioned and deepened
35 dcx	Leonard Lorenzen	1984	462	6	18	X	10	----	78	9/26/84	A, 1	60	430	D	No well inspection
--- T5N R28E ---															
34 aaa	David Whitehead Columbia Engineers Services	---- 1978	164 303	----	----	----	----	540	---- 110	2/14/78	---- A, 1 A	---- 150 75	---- 170 115	---- N	No well log for initial drilling; well deepened
34 ada	S.W./Florence Stewart	1959	159	8	107	X	130	530	85 95.7 88	5/21/59 7/20/78 7/19/79	B, 1	50	10	I	
34 adx	A W Borland Jr	1980	282	6	130	X	125	530	125	7/30/80	A, 1 A, 1	150 45	152 55	I	No well inspection
34 adx	F Fuchs	1982	300	6	139	X	139	530	119	8/05/82	A, 1 A, 1	100 60	---- ----	I	No well inspection
34 adx	North Hill Water Corp	1962	340	8	143	X	143	----	84	9/25/62	B, 1	50	7	P	No well inspection
34 cax	Don Barnes	1979	330	6	135	X	130	----	76	6/02/79	P, 1 P, 1	90 70	280 250	P	No well inspection
34 cbb	Keith D/ Rachel Smith	1979	209	6	100	X	----	515	90		----	----	----	I	No well log; information from water right permit application or well inspection
34 cdb	Carole J Hamilton	1976	300	6	171	X	152	520	55 181.5 117.95	6/25/76 7/18/79 7/15/81	A, 1	45	195	D	
35 cdc	Lessie E Tilden Estate of E G Tilden	1964	207	8	172	X	162	525	85 193.27	5/19/64 7/19/79	B	30	20	I	
36 acx	Leroy A Ness	1981	305	8	134	X	129	----	80	2/26/81	A, 1 A, 1	500 300	---- ----	D	No well inspection
36 acx	K Neal Christopherson Pam Christopherson	----	200	8	----	----	----	----	80		----	----	----	I	No well log or well inspection; information from water right permit application
36 cda	Gene W McDonald	1976	170	8	139	X	133	510	X		A, 1	400	120	D/I	

--- T5N R29E ---

31 acx	O Clayton Orr	1977	120	6	82		X	77	465	24	9/08/77	----	----	----	I	No well log or well inspection
31 bax	Ronald A Williams Susan M Williams	1979	67	10 8	19 67	P	57-67	55	465	15	4/13/79	A, 1	300	----	I	No well inspection
31 ccb	George C Sutton Donna J Sutton	1977	230	8	108		X	102	470	31 31.95 31.85	8/11/77 7/26/78 7/16/79	A, 1	150	194	I	
31 cdx	Charles A Bloodsworth	1984	185	12	87		X	86	465	22	3/09/84	A	1000	185	I	No well inspection
31 dbd	Donald Vandell	1974	201	8	78.5		X	75	470	X		B, 1.5	35	5	I	
32 cab	John R Halladay	1977 1980	170 200	8	63		X	76	470	X		A, 1 A, 1	400 400	134 180	D	 Well deepened
32 ccx	Glen E Male Marion L Male	1970	72	8	58		X	57	475	11	5/19/70	B, 1.5	40	5	D/I	No well inspection
34 abc	Don McEwen	----	428	----	----		----	----	560	----		----	----	----	I	No well log; depth reported on water right permit application

APPENDIX D

Water Level Data

Water level data are reported in feet below land surface datum unless preceded by a minus sign (-), which denotes water level above land surface datum.

Key to abbreviations

(?) Questionable measurement
(E) Estimated
(F) Flowing
(P) Pumping
(R) Recovering
(Rep) Reported
(W) Water Well Report

2/28-1bdd

3/30/75	F	W,?	6/25/79	198.00	P	2/14/86	263.35
6/24/75	258.00		2/28/80	126.85		2/19/87	272.01
7/13/78	182.72	P	3/--/85	224.00	Rep	2/19/88	280.67
3/20/79	119.40		4/17/85	255.26		2/22/89	290.36
						2/23/90	300.92

2/28-2bdd

11/09/74	-58.00	F,W	11/30/78	109.50		7/19/84	215.90
7/09/75	384.00	P	3/14/79	91.25		8/02/84	220.50
8/18/76	320.00		3/20/79	88.90		8/20/84	218.20
12/06/76	297.00		6/25/79	435.35	P	9/05/84	213.60
2/16/77	285.50		2/14/80	102.71		2/16/85	189.34
5/10/77	91.50		6/10/80	457.30	P	2/14/86	213.59
8/10/77	401.00	P	12/10/80	145.45		2/19/87	220.52
11/30/77	109.50		7/21/83	203.00		2/19/88	227.45
12/07/77	84.50		2/15/84	177.21		2/22/89	229.76
5/10/78	91.25		6/21/84	206.70		2/23/90	234.38
7/13/78	413.76	P					

2/28-2daa

4/23/75	-81.00	F,W	2/09/81	81.09		7/26/84	243.90	P
12/10/75	-58.00	F	12/04/81	116.00		8/20/84	253.20	P
8/18/76	-14.00	F	2/24/82	100.89		9/05/84	239.30	P
12/06/76	-18.50	F	2/07/83	121.43		2/16/85	155.00	
2/16/77	-20.75	F	7/21/83	218.30	P	2/14/86	180.42	
7/13/78	115.58	P	2/15/84	134.21		2/19/87	184.30	
2/14/80	26.80	?	6/21/84	239.30	P	2/19/88	197.74	
6/10/80	180.64	P	7/19/84	250.90	P	2/22/89	202.36	
12/10/80	93.79		7/19/84	243.90	P	2/23/90	209.29	

2/28-10abd

8/13/76	133.00	W	6/25/79	181.00		2/14/80	157.03
7/18/78	159.00		10/16/79	177.00		6/16/80	208.23
3/21/79	137.40						

2/30-1ccb

9/17/70	130.00	W	7/25/79	146.71	P	6/30/80	144.60	
7/27/78	173.60	P						

2/30-4ddb

6/28/78	221.00	W	7/21/83	266.81	P	2/19/86	232.16	
6/30/80	206.29		2/09/84	232.74	R	2/20/87	234.47	
2/23/82	226.00		2/15/85	228.70	R	2/20/88	236.78	
2/08/83	233.30							

2/30-9bcd

8/10/70	20.00	W	7/25/79	61.66		6/30/80	61.30	
8/15/78	62.50	R						

2/30-10abc

6/05/73	25.00	W	7/25/79	97.62	P	5/04/88	42.00	W
8/15/78	86.80	P	6/30/80	106.50	P			

2/30-10bca

3/24/69	-6.90	F,W	8/15/78	38.00	P	6/30/80	51.76	P
5/23/69	-6.90	F,W	7/25/79	48.30	P			

2/30-11aab

12/19/72	20.00	W	8/15/78	42.40		7/25/79	69.84	P

3/28-23bab

12/18/76	51.00	W	10/11/79	293.00		8/02/84	322.20
7/13/78	426.00		10/15/79	304.44		8/20/84	332.20
1/01/79	292.89		12/06/79	281.00		9/05/84	332.20
3/06/79	268.20		12/11/79	292.89		3/26/86	304.44
3/21/79	265.20		2/14/80	280.20		2/19/87	316.00
5/01/79	343.70	P,Rep	3/11/80	279.60		2/19/88	322.92
6/25/79	360.64	P	6/10/80	340.64		2/22/89	324.08
8/11/79	304.44	Rep	2/10/81	285.40		2/23/90	325.23
8/21/79	313.20		2/15/84	290.58			

3/28-23dcb

4/20/76	330.00	W	8/21/79	384.26	P	2/09/81	329.82
7/13/78	343.84		10/16/79	356.84		2/15/86	356.39
3/21/79	312.90		12/11/79	334.60		2/15/87	359.85
5/01/79	340.67	P	2/14/80	321.62		2/19/88	366.78
6/25/79	429.15	P	3/11/80	317.87		2/22/89	368.33
7/18/79	379.94	P	6/10/80	359.85	P	2/23/90	367.94
8/11/79	429.15	P					

3/28-26baa

5/07/76	330.00	W	8/19/79	378.36	P,Rep	2/15/84	353.53
7/13/78	357.40		8/21/79	389.91	P	2/18/85	364.50
7/18/78	365.70	P	10/16/79	379.50	P	2/19/86	371.72
3/21/79	327.50		12/11/79	356.41		2/19/87	395.20
5/01/79	352.95	P,Rep	2/11/80	339.09		2/19/88	390.58
6/25/79	379.60	P	2/14/80	337.90		2/22/89	394.05
7/18/79	387.60	P,Rep	6/10/80	381.83	P	2/23/90	392.89
8/11/79	378.36	P	2/10/81	350.82			

3/28-35baa

1/22/75	220.00	W	2/09/81	428.10		9/05/84	502.20	P
2/28/76	400.00	W	1/28/82	447.00	W	2/14/86	462.98	
2/16/79	420.00	W	2/24/82	441.80		2/19/87	466.85	
3/20/79	412.51		2/07/83	446.05		2/19/88	475.69	
12/13/79	436.14		8/02/84	482.62		2/22/89	476.84	
3/11/80	415.40		8/20/84	502.20	P	2/23/90	479.15	
6/10/80	455.75	P						

3/28-35caa

10/15/74	17.00	W	6/10/80	462.70		6/21/84	471.90	P
7/09/75	317.00		2/09/81	432.60		2/16/85	446.51	
2/26/79	420.00	W	12/04/81	454.00		2/14/86	456.00	E
3/20/79	406.08		2/24/82	438.50		2/19/87	467.02	
6/25/79	449.97	P	2/07/83	442.50		2/19/88	472.80	
12/13/79	440.73		7/21/83	475.00	P	2/22/89	473.95	
2/14/80	431.50		2/15/84	437.80		2/23/90	475.11	
3/11/80	419.40							

3/28-36abb

12/20/74	-92.40	W	12/13/79	74.60		2/22/89	201.68
7/09/75	353.00		2/19/88	198.21		2/23/90	206.30
7/13/78	114.25						

3/28-36dbb

9/13/74	-64.68	W	7/13/78	151.37	P	12/10/80	187.18	?
3/09/76	27.50		3/14/79	69.37		2/15/84	229.91	?
8/18/76	208.00	?	3/20/79	68.80		2/16/85	248.39	?
2/16/77	217.50	?	6/25/79	171.00	P	2/14/86	172.16	
5/10/77	148.50	?	12/13/79	95.93		2/19/87	176.78	
8/10/77	222.00	?	2/14/80	84.43		2/19/88	186.02	
12/07/77	89.00							

3/29-2add

3/09/74	-32.30	W	8/23/78	535.32		2/12/80	363.20	?
7/26/78	520.30	P	6/21/79	650.00	P			

3/29-4bba

7/13/77	102.00	W	7/25/78	107.12	P,?	6/28/79	99.03	P,?
6/21/78	99.00		3/15/79	250.00	W			

3/29-4ddd

6/10/78	337.00	W	2/23/82	425.00		7/18/84	542.80	P
7/20/78	294.50		7/20/83	512.80	P	9/04/84	527.80	P
9/04/78	320.00	W	2/14/84	433.11		9/20/84	531.30	P
6/23/80	523.20	P	6/20/84	554.40	P			

3/29-9cdd

4/11/77	254.00	W	2/08/81	302.97		2/19/86	325.20
3/21/79	255.50		2/13/84	311.77		2/20/87	328.25
6/27/79	290.20		8/02/84	357.10		2/19/88	336.32
2/15/80	289.06		8/20/84	361.73		6/23/88	355.15
6/26/80	298.76		9/04/84	358.26		2/22/89	341.24
7/09/80	352.75		2/16/85	318.99		2/23/90	339.16

3/29-10abb

9/04/78	330.00	W	8/01/84	507.45		2/18/85	299.69
2/11/80	274.70		9/20/84	322.60		10/18/85	409.56
2/10/81	315.45					2/25/90	306.21

3/29-11acc

--/--/54	-46.20	W	3/20/79	47.83		2/14/80	76.50
11/14/74	150.00	W	6/21/79	433.10	P	2/29/80	62.62
1/31/79	57.00		7/31/79	341.50	P	2/08/81	76.20

3/29-11ddd

7/10/75	120.20	Rep	12/10/80	155.34		8/16/84	318.78	
10/01/75	40.00	W	2/08/81	139.75		8/24/84	339.57	
8/18/76	300.00		12/05/81	160.54		9/04/84	428.50	P,?
2/16/77	60.33		2/24/82	105.29		9/20/84	255.25	
5/11/77	324.00	P	2/10/83	107.80		2/12/85	123.58	
8/11/77	232.00		7/22/83	226.80	P	2/18/86	133.98	
7/13/78	150.00		2/13/84	114.34		2/19/87	139.75	
2/15/80	130.51	?	2/15/84	115.50		2/17/88	147.84	
4/26/80	312.00	P	8/02/84	412.40		2/23/89	150.15	

3/29-12bdc

3/08/77	74.00	W	8/18/78	403.00		3/01/80	61.95	
6/22/78	369.00		8/23/78	502.98	P	6/13/80	510.00	P,?
6/23/78	379.00		3/20/79	103.40		2/08/81	78.18	
6/30/78	546.80		6/25/79	520.31		5/26/82	450.00	W
7/10/78	513.00	W	7/31/79	515.69	P	6/26/84	611.40	P,?
7/26/78	518.00		2/12/80	380.50	?	7/18/84	657.60	P

3/29-14bac

11/30/78	95.00	W	4/26/80	450.00	P,Rep	5/17/80	85.00	Rep
3/20/79	50.74							

3/29-16aad

6/20/64	315.00	W	3/14/79	402.00		2/13/84	384.83	
8/18/76	417.00		6/27/79	431.03	P	8/02/84	464.52	P
2/16/77	396.00		2/28/80	399.84		8/20/84	458.75	P
5/11/77	404.00		6/26/80	396.40		9/04/84	459.90	P
12/07/77	404.00		12/10/80	420.63		2/15/85	414.86	
2/15/78	397.00		2/12/81	398.69		2/19/86	427.56	
5/10/78	397.50		12/04/81	411.39		2/20/87	439.11	
7/19/78	420.60	P	2/23/82	392.22		2/22/89	434.49	
11/30/78	411.00		2/08/83	383.67				

3/29-16aca

7/20/51	95.00	Rep	6/26/80	251.00		9/04/84	293.70	
7/10/78	228.00		2/13/81	220.00	Rep	2/15/85	259.03	
7/19/78	244.60		12/04/81	279.82		2/19/86	265.96	
8/15/78	243.40		2/13/84	252.10		2/19/88	287.91	
11/16/78	235.15		4/04/84	215.92		2/22/89	300.61	
3/21/79	223.85		8/02/84	293.70		2/23/90	300.61	
7/17/79	264.83		8/20/84	290.20				

3/29-16ada

7/15/74	315.00	W	5/10/78	309.00		8/02/84	186.00	P,?
5/13/76	316.00		7/19/78	396.10	P	2/15/85	195.00	?
8/18/76	334.00		11/30/78	322.00		5/15/86	357.30	
2/16/77	308.00		3/14/79	333.00		2/20/87	356.15	
5/11/77	321.50		6/26/80	344.60		2/19/88	364.23	
8/10/77	370.00		12/10/80	349.00		2/22/89	409.28	P
12/07/77	318.00		2/13/81	167.00	?	2/23/90	381.50	
2/15/78	310.00		2/13/84	356.11				

3/29-19acc

2/14/80	402.65		2/13/84	416.02		2/18/86	432.19	
2/29/80	402.00	W	8/02/84	468.00	P	2/19/87	439.12	
6/10/80	453.00	P	8/20/84	466.80	P	2/19/88	443.74	
1/22/81	406.80	Rep	9/05/84	464.50	P	2/22/89	448.36	
12/05/81	429.00		2/18/85	421.80		2/24/90	449.52	
2/07/83	418.00							

3/29-20dcc

2/27/77	430.00	W	2/08/81	464.76		2/18/85	479.18	
7/13/78	486.11	P	2/25/82	469.94		2/18/86	486.11	
11/16/78	464.20		2/07/83	474.00		2/19/87	483.80	
3/20/79	442.20		7/22/83	497.66		2/20/88	502.28	
6/26/79	490.70	P	2/13/84	472.25		2/22/89	503.83	
2/14/80	456.08		6/20/84	509.20	P	2/24/90	505.17	
6/10/80	503.50	P	7/19/84	518.40	P			

3/29-23adb

12/03/76	48.00	W	3/20/79	53.60		9/06/84	162.20	
4/26/77	164.00		6/26/79	206.50	P	2/18/85	83.65	
6/15/78	117.00		2/15/80	56.35		2/20/86	82.50	
6/30/78	203.78	P	6/25/80	295.00	?	2/20/87	90.00	
7/03/78	203.70		2/08/81	63.44		2/20/88	96.36	
7/13/78	107.90	R	2/13/84	74.99	?	2/23/89	99.82	
7/20/78	104.44		8/03/84	155.30		2/24/90	105.46	
7/27/78	102.13		8/21/84	161.00				

3/29-24aad

1/21/76	137.00	W	2/15/80	160.00	?	2/16/85	133.30	?
7/20/78	17.20	?	6/25/80	32.90	?			

3/29-24acd

2/16/76	215.00	W	3/20/79	243.99		2/16/85	267.30	
6/15/78	282.10		6/26/79	294.81	P	2/20/86	271.23	
6/22/78	282.10		2/15/80	246.93		2/20/87	274.19	
6/30/78	267.84		6/25/80	295.30		2/20/88	279.07	
7/03/78	280.20		2/08/81	251.48		2/23/89	284.31	
7/13/78	278.00	P	2/13/84	217.21	?	2/24/90	287.65	
7/27/78	266.90		8/03/84	286.55				

3/29-30dda

2/26/75	436.00	W	3/20/79	464.50		2/20/88	524.59
7/09/75	462.00	Rep	6/10/80	510.73	P	2/22/89	525.75
2/07/76	436.00	W	2/18/86	509.30		2/24/90	524.59
7/13/78	495.72						

3/30-1dba

9/25/68	268.00	W	6/20/79	274.26	P	8/03/84	270.60	
6/14/78	282.20		2/29/80	250.43		9/06/84	298.40	P
6/21/78	277.30		6/25/80	236.00		2/14/85	266.60	
6/24/78	267.70		2/08/81	254.44		4/17/85	265.44	
7/12/78	249.70		2/24/82	259.10		2/21/86	272.95	
7/27/78	246.70		2/09/83	263.00		2/21/87	273.53	
11/14/78	252.20		7/21/83	268.33		2/22/88	273.01	
3/20/79	260.20		2/11/84	266.02		2/26/89	273.01	
3/28/79	251.00		6/19/84	268.30		2/22/90	282.25	

3/30-6cbd

2/11/71	8.00	W	6/13/80	510.00	E	12/06/84	143.02
5/22/71	43.00	W	7/09/80	584.80		2/13/85	113.94
5/02/72	47.00	W	9/10/80	586.00		3/21/85	111.81
3/04/77	151.00	W	2/08/81	103.27		5/15/85	505.16
6/17/78	507.50		12/05/81	151.12		5/17/85	519.38
6/19/78	521.50		2/24/82	106.84		10/18/85	221.92
7/10/78	480.00		2/09/83	108.90		2/20/86	122.43
7/12/78	405.70		2/10/84	110.62		2/20/87	126.43
11/12/79	155.00		7/24/84	668.00	E	2/21/88	130.01
2/12/80	87.95		8/23/84	670.56	P	2/26/89	133.15
4/26/80	323.00		10/22/84	272.91		2/22/90	145.60
5/17/80	323.00		12/03/84	146.02			

3/30-7abc

6/29/78	349.00		6/21/79	335.00		8/24/84	389.37	E
7/13/78	361.00		6/28/79	366.00		2/12/85	137.42	
7/26/78	380.80		7/12/79	272.00		2/15/86	150.13	
8/03/78	380.00		7/23/79	343.34		2/20/87	136.85	
8/10/78	407.20		2/14/80	120.10		2/21/88	144.12	
12/19/78	214.14		6/12/80	335.25		6/23/88	345.30	
1/30/79	149.13		2/08/81	121.75		2/23/89	146.27	
3/06/79	114.30		2/11/84	123.31		2/22/90	166.45	
3/22/79	100.10							

3/30-7bbd

2/12/63	-20.79	W	2/16/77	29.83		4/26/80	525.00	
2/24/71	8.00	W	5/11/77	340.09		5/14/80	440.00	
9/16/75	263.45		8/10/77	360.85		6/13/80	427.54	
12/10/75	30.59		12/07/77	85.93		7/10/80	440.00	
3/09/76	75.33		2/15/78	54.05		2/08/81	97.21	
6/08/76	280.56		11/30/78	144.35		5/09/84	179.40	
8/18/76	295.64		1/19/79	67.00	W	7/18/84	491.10	
12/06/76	74.99		3/14/79	51.79		2/13/85	101.83	?

3/30-7ccb

5/20/72	-9.24	W	2/24/82	49.17		9/20/84	200.00	E,?
7/27/78	50.00	Rep	5/27/82	177.00	W	2/12/85	114.93	?
3/20/79	134.80	?	2/09/83	131.10	?	2/20/86	66.79	
7/31/79	166.62		7/21/83	343.60	P	2/20/87	72.79	
2/12/80	42.99		2/10/84	56.57		2/21/88	77.31	
6/13/80	178.75		3/08/84	64.11		2/23/89	82.40	
7/09/80	172.00		6/26/84	374.80	P	2/23/90	89.93	
2/08/81	47.65		7/18/84	385.20	P			

3/30-9cba

2/25/67	92.00	W	2/09/83	113.57		2/20/86	117.61	
4/20/67	90.00	W	2/09/84	111.92		2/20/87	120.30	
10/08/75	98.00	W	8/02/84	121.35		2/21/88	123.60	
3/20/79	101.44		8/21/84	233.11	P	2/23/89	126.68	
2/08/81	104.91		9/05/84	250.44	P	2/22/90	131.52	
2/24/82	111.14		2/14/85	114.15				

3/30-17add

12/31/76	63.00	W	6/25/80	102.00		9/06/84	142.50	
6/12/77	86.00	W	2/08/81	110.20		2/14/85	122.91	
6/21/78	114.80		2/24/82	117.13		2/20/86	126.37	
7/13/78	142.50	P	2/09/83	122.33		2/20/87	128.10	
7/26/78	182.10	P	2/09/84	121.17		2/20/88	134.46	
3/20/79	105.60		8/03/84	185.30	P	2/23/89	135.61	
7/10/79	150.60	P	8/22/84	140.20		2/22/90	140.23	
2/14/80	103.27							

3/30-20ccc

10/21/78	241.00	W	2/24/82	235.41		9/06/84	263.70	
3/20/79	226.75		2/09/83	240.61		2/15/85	242.92	
6/21/79	276.40	P	7/21/83	268.33	P	2/19/86	244.08	
2/14/80	226.75		2/09/84	241.19		2/20/87	251.01	
6/25/80	264.00	P	8/03/84	275.30	P	2/20/88	254.47	
2/12/81	231.37		8/21/84	294.90	P	2/23/89	253.32	

3/30-22cca

2/21/79	190.00	W	2/08/81	234.60		2/20/88	342.00	
3/20/79	219.89		9/02/81	305.00	W	2/23/89	343.73	?
7/10/79	234.01		2/22/87	337.96	?	2/22/90	364.52	
6/25/80	220.10							

3/30-23ddd

4/04/68	380.00	W	2/12/81	396.10		2/20/87	415.17	
7/12/76	336.00	W	2/09/84	406.50		2/20/88	421.52	
7/10/79	396.80		8/03/84	414.60		2/23/89	420.94	
2/14/80	389.18	P	8/24/84	419.20		2/22/90	426.14	
6/25/80	409.80	P	2/14/85	396.11				

3/30-30caa

10/21/75	250.00	W	7/20/78	260.25	P	2/12/81	231.83	
11/03/75	250.00	W	7/25/78	271.40	P	2/09/84	242.80	
1/11/78	200.00	W	11/15/78	231.68		2/16/85	242.80	
6/15/78	216.00		3/20/79	226.75		2/21/86	249.73	
6/22/78	274.10		6/21/79	299.82	P	2/20/87	250.89	?
6/30/78	283.60	P	2/15/80	227.90				

3/31-19cbc

10/30/72	315.00	W	7/13/79	335.31		6/26/80	149.20	
10/11/78	369.00							

3/31-30abc

11/05/73	410.00	W	7/18/79	434.86	P	2/09/84	449.87	
9/16/75	423.00		2/14/80	431.34		8/03/84	456.80	P
12/10/75	419.00		3/11/80	434.30		8/22/84	456.80	P
3/09/76	419.00		12/10/80	442.37		2/14/85	449.87	
8/18/76	426.00		2/12/81	449.30		2/15/86	454.49	
12/06/76	426.00		12/05/81	445.25		2/20/87	455.65	
5/11/77	430.00		2/24/82	444.10		2/20/88	461.42	
5/10/78	430.00		2/08/83	446.40		2/23/89	462.58	
7/27/78	431.34		7/21/83	452.18				

4/28-11bab

5/20/68	31.00	W	7/05/78	72.10	R	8/15/79	88.00	
3/15/73	32.00		7/06/78	143.70	P	12/09/79	68.00	
9/15/73	48.00		7/15/78	63.00		2/12/80	65.14	
12/15/73	37.00		7/16/78	72.07		2/09/81	66.00	
2/15/76	37.00		9/15/78	48.00		2/15/84	70.49	R
7/15/76	71.00		12/15/78	71.00		7/23/84	86.34	
12/15/76	49.00		2/15/79	72.00		2/15/85	78.96	R
2/15/77	34.00		3/21/79	78.00	R	2/19/86	62.65	
6/15/77	62.00		5/15/79	85.00		2/19/88	175.00	P,E
12/09/77	25.00		6/15/79	58.00		2/21/89	93.23	
1/15/78	37.00		7/17/79	166.80	P	2/20/90	70.75	
1/20/78	37.00							

4/28-11cad

9/07/49	F	W	3/01/71	32.00		7/23/84	91.51	
3/01/64	12.00		3/01/72	34.00		9/04/84	107.11	
3/01/65	13.00		3/01/73	38.00		2/15/85	83.60	
3/01/66	13.00		3/01/74	41.00		2/19/86	168.80	P
3/01/67	20.00		7/06/78	88.50	R	2/20/87	88.18	
3/01/68	22.00		3/21/79	62.80		2/19/88	91.62	
3/01/69	25.00		7/17/79	210.60	P	2/21/89	97.97	
3/01/70	28.00		2/15/84	77.34		2/20/90	75.97	

4/28-11ccd

10/05/54	12.00	W	3/01/64	21.00		3/15/79	155.00	P
11/18/58	13.00		3/01/65	22.00		3/21/79	69.78	
6/01/61	16.00		3/01/66	23.00		5/15/79	158.00	P
7/11/61	23.00		3/01/67	40.00		7/15/79	183.00	P
8/01/61	26.00		3/01/68	40.00		7/17/79	219.20	P
9/01/61	23.00		3/01/69	40.00		9/15/79	185.00	P
10/11/61	19.00		3/01/70	46.00		11/15/79	136.00	P
11/01/61	17.00		3/01/71	52.00		2/09/81	74.16	
12/11/61	17.00		3/01/72	60.00		12/04/81	83.38	
1/01/62	17.00		3/01/73	64.00		2/25/82	74.16	
2/01/62	17.00		3/01/74	72.00		2/09/83	64.54	
3/01/62	18.00		3/01/75	72.00		2/15/84	84.40	
4/01/62	19.00		5/15/75	144.00	P	7/23/84	102.99	
5/01/62	20.00		11/09/75	137.00	P	8/16/84	97.17	Rep
6/01/62	21.00		7/07/77	178.00	P	9/04/84	115.34	
7/01/62	29.00		11/07/77	166.00	P	2/15/85	89.81	
8/01/62	27.00		3/15/78	147.00	P	2/19/86	84.12	
9/01/62	25.00		7/01/78	178.00	P	2/20/87	96.10	
10/01/62	22.00		7/06/78	93.50	R	2/19/88	99.67	
11/01/62	21.00		8/01/78	192.00	P	2/21/89	105.43	
12/01/62	20.00		12/01/78	150.00	P	2/20/90	83.42	
3/01/63	19.00		1/19/79	158.00	P			

4/28-12ddd

5/09/74	50.00	W	8/23/78	45.50		7/16/79	84.13	P
10/07/74	50.00							

4/28-14cda

10/29/74	213.00	W	7/20/78	260.00	R	2/12/79	237.00	
6/20/78	260.00	P	8/30/78	280.00	P	3/21/79	229.00	P,?
7/12/78	254.80	P	9/01/78	275.00	R	8/18/80	286.10	P
7/16/78	265.00	P	1/15/79	234.00				

4/28-23bdb

4/29/77	262.00	W	8/18/80	330.01		9/06/84	339.94	
7/11/78	292.35		2/09/81	285.60		2/18/85	298.94	
3/21/79	206.26		7/20/83	313.77	P	2/19/86	298.36	
7/04/79	299.50		7/21/83	339.00	R	2/20/87	315.67	
7/17/79	305.29		2/15/84	292.58		2/20/88	323.77	
2/11/80	288.65		7/31/84	336.50		2/22/89	321.46	
2/29/80	277.60		8/17/84	341.10		2/23/90	316.80	

4/28-24bdd

2/20/68	43.00	W	12/06/84	333.91		2/20/87	334.56	
5/15/69	238.00	W	12/11/84	332.50		2/19/88	344.96	
8/23/84	357.18		2/13/85	320.55		2/22/89	342.65	
10/22/84	345.62		2/19/86	316.08				

4/28-26cda

5/16/78	240.00	W	8/28/81	240.00	Rep	5/01/84	265.00	W
7/05/79	370.00	P,?						

4/28-27daa

8/13/71	259.99	W	2/09/81	346.78	?	2/15/84	280.00	Rep
7/12/78	277.24		12/04/81	316.33	?	2/18/85	282.62	
8/18/80	353.90		2/26/82	298.83	?	2/19/86	280.26	
12/10/80	309.92	?	2/09/83	303.71	?			

4/28-27dac

6/21/50	155.00	W	5/10/78	277.00		12/10/80	309.92	
12/03/75	266.00		7/12/78	302.28	R	2/09/81	292.46	
12/04/76	270.00		11/30/78	292.00		2/09/83	299.75	
2/16/77	259.50		3/14/79	268.75		2/15/84	338.30	R
5/11/77	278.00		3/21/79	235.29		8/03/84	376.40	
8/10/77	320.00		7/05/79	308.06		8/24/84	378.70	
11/30/77	292.00		2/11/80	296.04		9/06/84	382.20	
12/07/77	314.00		8/18/80	265.00	?	2/18/85	346.40	

4/29-1acd

9/20/66	250.00	W	6/23/80	119.50		3/01/84	540.00	?
2/13/80	122.30							

4/29-5ccb

2/05/70	60.00	W	7/23/84	94.86		2/19/86	76.24
8/08/78	102.90	R	8/16/84	87.02		2/21/87	75.47
6/20/80	99.35	R	8/29/84	88.60		2/20/88	78.25
8/21/81	66.20		2/18/85	73.83		2/25/89	77.17
2/14/84	74.06					2/24/90	76.91

4/29-5dda

6/25/53	67.00	W	2/17/69	64.00		5/06/75	65.00
11/17/58	68.50	W	5/05/69	66.00		8/05/75	63.50
8/06/63	226.00	P	8/12/63	63.00		10/27/75	63.50
11/05/63	57.50		11/17/69	65.00		2/10/76	64.50
5/04/64	61.50		5/05/70	65.50		5/11/76	69.50
8/10/64	233.00	P	8/04/70	64.50		8/18/76	63.50
11/17/64	62.50		10/26/70	64.50		12/06/76	67.50
2/15/65	63.00		2/22/71	65.54		2/16/77	63.50
5/04/65	61.00		5/11/71	65.46		5/11/77	64.00	?
8/10/65	56.50		10/02/71	62.00		8/10/77	64.00
11/16/65	57.50		1/25/72	64.50		12/08/77	65.50
2/14/66	61.00		4/25/72	66.00		2/15/78	65.50
5/02/66	60.00		11/14/72	68.00		5/10/78	65.50
8/09/66	63.00		2/21/73	69.50		8/08/78	173.77
10/31/66	64.50		5/21/73	71.50		7/12/79	63.79
2/06/67	65.00		8/27/73	68.00		2/13/81	66.20
5/01/67	65.50		2/22/74	65.50		2/14/84	70.02
8/07/67	62.00		5/07/74	69.00		2/18/85	69.10
11/06/67	62.50		5/11/74	65.50		2/19/86	72.57
2/05/68	64.00		8/06/74	63.00		2/20/87	65.60
5/06/68	65.00		11/05/74	63.00		2/20/88	66.07
8/06/68	64.50		2/11/75	63.50		2/25/89	66.79
11/19/68	65.00					2/24/90	72.33

4/29-6baa

4/13/78	23.00	W	7/16/79	44.15	P	6/20/80	31.70	P
7/26/78	19.05							

4/29-7acd

4/20/78	240.00	W	3/21/79	240.77		6/20/80	224.10	W
8/08/78	223.10	P	7/12/79	240.00	?	6/07/83	295.00	W

4/29-10bdb

8/15/81	88.00	W	2/19/86	173.26	?	2/25/89	168.64	?
3/20/84	81.44		2/20/87	173.84	?	2/24/90	195.78	?
2/18/85	166.00	?	2/21/88	179.61	?			

4/29-10cad

6/25/73	309.00	W	8/08/78	96.00	P,?	3/20/84	92.66	?
8/19/76	55.00	?	12/08/78	76.25	?	2/18/85	102.48	?
12/02/76	118.00	?	2/13/80	39.50	?	2/19/86	111.14	?
2/16/77	110.00	?	12/11/80	>320		2/21/87	52.19	?
5/11/77	53.00	?	9/09/81	55.93	?			

4/29-10dbc

4/22/76	74.00	W	11/16/78	188.70		2/14/84	46.17	
8/08/78	69.49		3/01/80	63.87				

4/29-17add

5/10/81	285.00	W	1/30/84	293.67		2/13/85	369.09	?
1/20/84	296.33		1/31/84	293.95		2/19/86	332.13	?
1/25/84	293.09		2/08/84	293.58		2/20/87	361.01	?
1/26/84	293.33		7/31/84	426.84		2/21/88	399.00	E
1/27/84	293.33		8/17/84	424.53		2/25/89	323.50	
1/28/84	293.05		9/06/84	424.53		3/02/89	377.00	W,?
1/29/84	293.32					2/25/90	328.27	

4/29-18dcb

9/25/69	38.00	W	1/20/84	320.60		2/19/86	336.51	
7/19/78	302.00	Rep	1/24/84	320.92		2/20/87	339.97	
8/10/78	329.20		1/25/84	321.95		2/21/88	346.90	
7/04/79	311.80		2/08/84	323.22		2/25/89	343.07	
1/17/84	320.00		2/17/85	199.40	?	2/24/90	347.48	
1/19/84	322.30							

4/29-19bcc

5/16/80	300.00	W	1/27/84	303.96		1/31/84	304.49	
10/06/82	315.00	W	1/28/84	304.36		2/25/89	298.36	
1/25/84	303.57		1/29/84	304.61		2/25/90	302.98	
1/26/84	303.65		1/30/84	304.74				

4/29-20dcb

3/20/78	295.00	P	2/14/80	306.00		6/24/80	351.13	
4/02/78	297.00	W						

4/29-24cdd

10/29/76	280.00	W	2/17/85	308.17		2/20/88	337.00	E
6/29/79	280.00	P	2/19/86	334.85		2/25/89	338.20	E
2/11/84	319.76		2/21/87	338.87		2/24/90	329.66	
8/01/84	355.00	E						

4/29-25add

3/07/79	30.00	W	6/12/80	23.95		2/19/86	25.82	
3/20/79	18.87		2/08/81	30.23		2/21/87	26.96	
3/28/79	20.00		8/01/84	88.95	P	2/20/88	19.26	?
6/20/79	21.63		2/17/85	33.64		2/26/89	35.86	
2/13/80	19.90					2/24/90	38.42	E

4/29-25bba

8/20/74	80.00	W	6/20/79	67.90	P	2/11/84	46.21	
6/21/78	61.00		6/12/80	64.94	P			

4/29-29ddb

4/22/77	70.00	W	3/01/80	300.57	?	2/21/87	342.95	
8/10/78	347.90		3/20/84	132.30	?	2/21/88	348.15	
3/20/79	282.95		2/18/86	335.44		2/26/89	351.04	

4/29-30abb

6/23/77	230.00	W	3/07/79	279.59		2/14/80	210.00	?
7/12/78	168.50	P,?	3/20/79	277.12		3/01/80	295.55	

4/29-32bbc

1/10/78	290.00	W	6/28/79	323.94		7/24/84	351.00	
6/28/78	323.94		2/14/80	292.70		8/16/84	355.60	
7/12/78	311.24	R	6/23/80	312.85		9/04/84	353.30	
11/15/78	287.00		2/10/81	303.70		2/15/85	320.99	
12/04/78	282.00		8/26/81	237.00	R,?	2/22/89	395.90	?
1/08/79	275.40		2/23/82	308.29		4/15/89	380.00	Rep
3/07/79	265.40		2/14/84	314.06		2/23/90	370.49	

4/29-32cac

7/09/59	20.00	R	12/19/69	180.00		6/06/73	192.00	
10/08/62	15.00	R	1/26/70	175.00		7/06/73	195.00	
7/08/63	22.00		2/27/70	170.00		8/17/73	210.00	
8/06/63	37.14		3/20/70	168.00		5/07/74	190.00	
11/05/63	36.39		4/29/70	170.00		8/06/74	219.00	
5/04/64	36.42		5/25/70	175.00		11/05/74	221.00	P
7/15/64	162.00	R,?	6/07/70	179.00		2/11/75	195.00	
11/17/64	155.50		7/10/70	189.00		5/06/75	205.00	P
8/10/65	157.50		8/07/70	193.00		8/05/75	228.00	P
11/16/65	159.00		9/13/70	195.00		10/27/75	218.00	
2/14/66	152.00		10/19/70	191.00		2/10/76	209.00	P
8/09/66	165.00		11/18/70	187.00		5/11/76	210.00	P
11/01/66	155.00		12/16/70	183.00		8/18/76	238.00	P
2/06/67	151.00		1/11/71	178.00		12/07/76	217.00	
5/01/67	148.00		2/12/71	176.00		2/16/77	199.00	
8/07/67	163.00		5/11/71	178.00		5/11/77	217.00	
11/06/67	168.00		10/01/71	195.00		6/15/77	240.00	R
2/05/68	157.00		1/25/72	183.00		6/27/79	110.00	?
5/06/68	161.00		4/05/72	177.00		6/23/80	150.90	?
11/19/68	242.00	P	4/19/72	179.00		2/23/82	134.80	?
1/10/69	170.00		5/08/72	180.00		2/09/83	261.17	
2/17/69	167.00		6/12/72	188.00		2/12/84	280.12	
3/19/69	161.00		7/10/72	192.00		7/24/84	318.22	P
4/23/69	162.00		8/21/72	200.00		8/16/84	325.10	P
5/26/69	171.00		9/11/72	202.00		2/15/85	287.04	P
6/26/69	180.00		10/10/72	200.00		2/19/86	285.88	P
7/22/69	186.00		11/08/72	197.00		2/20/87	295.12	R,?
8/12/69	188.00		1/06/73	188.00		2/19/88	299.74	
9/23/69	191.00		4/06/73	180.00		2/22/89	309.15	
10/22/69	190.00		5/06/73	185.00		2/23/90	311.86	E
11/17/69	185.00							

4/30-8adb

12/02/66	60.00	W	12/05/79	106.30	?	8/01/84	154.80	?
1/09/67	83.00		2/29/80	93.59	?	8/17/84	107.40	?
1/23/73	320.00	Rep,?	6/12/80	119.58	?	9/06/84	98.20	?
9/01/73	125.00	Rep	2/09/81	93.59	?	2/17/85	70.49	?
8/23/78	138.64	?	12/05/81	94.00	?	2/20/86	70.49	?
10/10/78	135.20	?	2/24/82	86.66	?	2/21/87	145.45	
11/13/78	109.70	?	2/09/83	82.00	?	2/20/88	133.44	
3/20/79	98.20	?	2/11/84	80.89	?	2/26/89	121.77	
6/20/79	138.79	?	7/12/84	92.44	?	2/22/90	131.59	

4/30-26cbb

2/27/78	182.00	W	6/20/79	421.10	P	6/05/85	468.69	
6/01/78	341.00	R	12/05/79	179.60		6/06/85	466.38	
6/13/78	366.40	R	2/14/80	172.80		6/07/85	468.69	
6/20/78	350.20		6/12/80	361.07	P	6/11/85	468.69	
6/29/78	370.20		2/08/81	333.00	?	7/18/85	474.38	
7/03/78	368.40		3/21/84	193.80		2/20/86	212.43	
7/12/78	350.60		2/17/85	196.11		2/21/87	211.85	
7/19/78	371.87		4/09/85	222.68		2/20/88	207.81	
7/25/78	357.60		4/17/85	291.98		6/23/88	348.72	P
10/01/78	295.20		5/10/85	417.87		2/26/89	207.81	
11/13/78	205.60		5/15/85	404.93		2/22/90	221.67	
3/20/79	169.50		5/23/85	453.68				

4/30-28ada

1/24/78	98.00	W	1/24/79	98.00		9/06/84	92.79	?
1/28/78	98.00		3/20/79	65.22		2/14/85	92.16	
6/15/78	110.47		3/28/79	63.52		4/09/85	120.38	
6/20/78	131.26	R	2/12/80	67.54		4/18/85	160.51	
6/29/78	134.00	R	2/08/81	77.32		2/21/86	101.31	
7/03/78	133.73	R	2/24/82	84.13		2/22/87	97.87	
7/12/78	177.50	R	4/12/83	118.70		2/22/88	100.03	
7/25/78	184.40	R	2/10/84	92.14		2/26/89	98.82	
8/18/78	128.90	R	6/21/84	141.77	?	2/22/90	107.00	
8/23/78	128.65	R						

4/30-29daa

1/09/78	0.00	W,?	3/28/79	-36.40		2/25/82	-13.99
6/29/78	237.60	P	3/11/80	-34.70		2/09/83	-16.86
7/12/78	222.60	P	2/08/81	-20.80		2/22/87	-3.50
7/25/78	241.10	P					
3/20/79	-33.03						

4/30-32dca

10/18/77	F	W	3/28/79	-51.70		2/22/87	-17.02
3/20/79	-37.31		3/11/80	-18.80		2/22/90	-8.12
3/27/79	-47.90		2/08/81	-32.34			

4/30-33cda

10/04/77	30.00	W	3/11/80	-7.20		12/05/81	24.03
3/20/79	-11.55		6/24/80	60.03		2/24/82	8.06
3/28/79	-10.90		2/08/81	2.07		2/09/83	9.70
9/11/79	179.50		2/12/80	43.58	?	2/22/90	30.68

4/30-35dca

11/20/58	88.50	W	7/27/79	119.99	R	4/29/85	130.70
3/26/76	123.00		6/24/80	114.53		5/15/85	134.94
6/14/78	112.60		2/08/81	116.84		2/21/86	135.99
6/21/78	144.90	P	2/10/84	128.39		2/21/87	138.88
7/12/78	119.50	R	9/06/84	165.30	P	2/21/88	140.03
7/27/78	114.99		2/13/85	127.24		2/26/89	141.19
3/28/79	106.45		4/16/85	135.00		2/22/90	148.70
6/20/79	148.30						

5/28-36cda

7/07/76	50.00	W	8/18/80	100.50		2/25/89	66.79
7/16/79	69.10					2/25/90	66.50

5/29-31dbd

7/26/78	10.10		3/21/84	10.97		2/19/86	11.29
7/16/79	10.25		2/18/85	10.77		2/25/90	11.25

5/29-32cab

2/17/77	16.00	W	7/16/79	50.45	P	9/08/80	10.00	W
7/27/78	32.60	P	6/20/80	44.80	P			

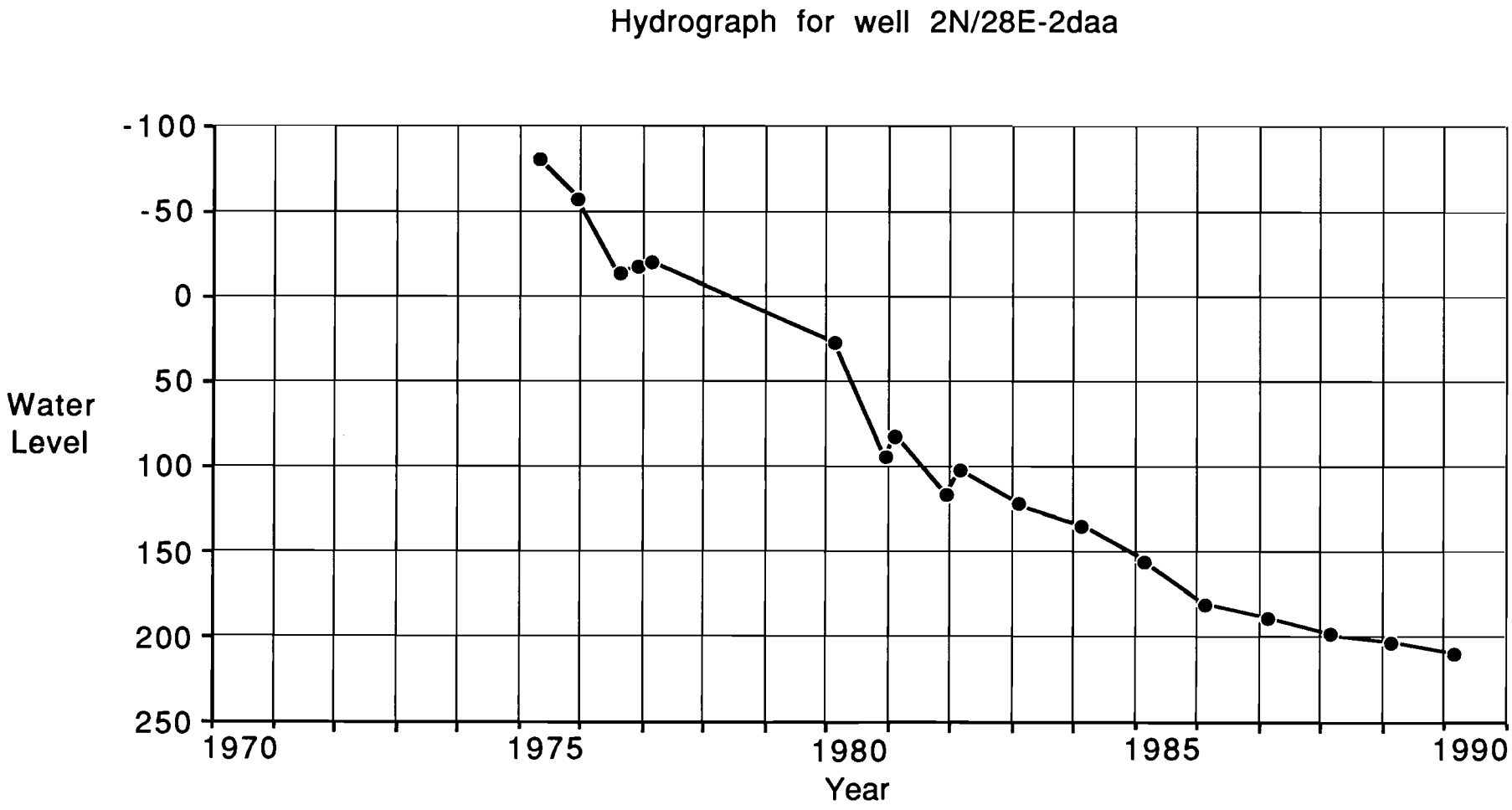
APPENDIX E

Hydrographs of Selected Wells

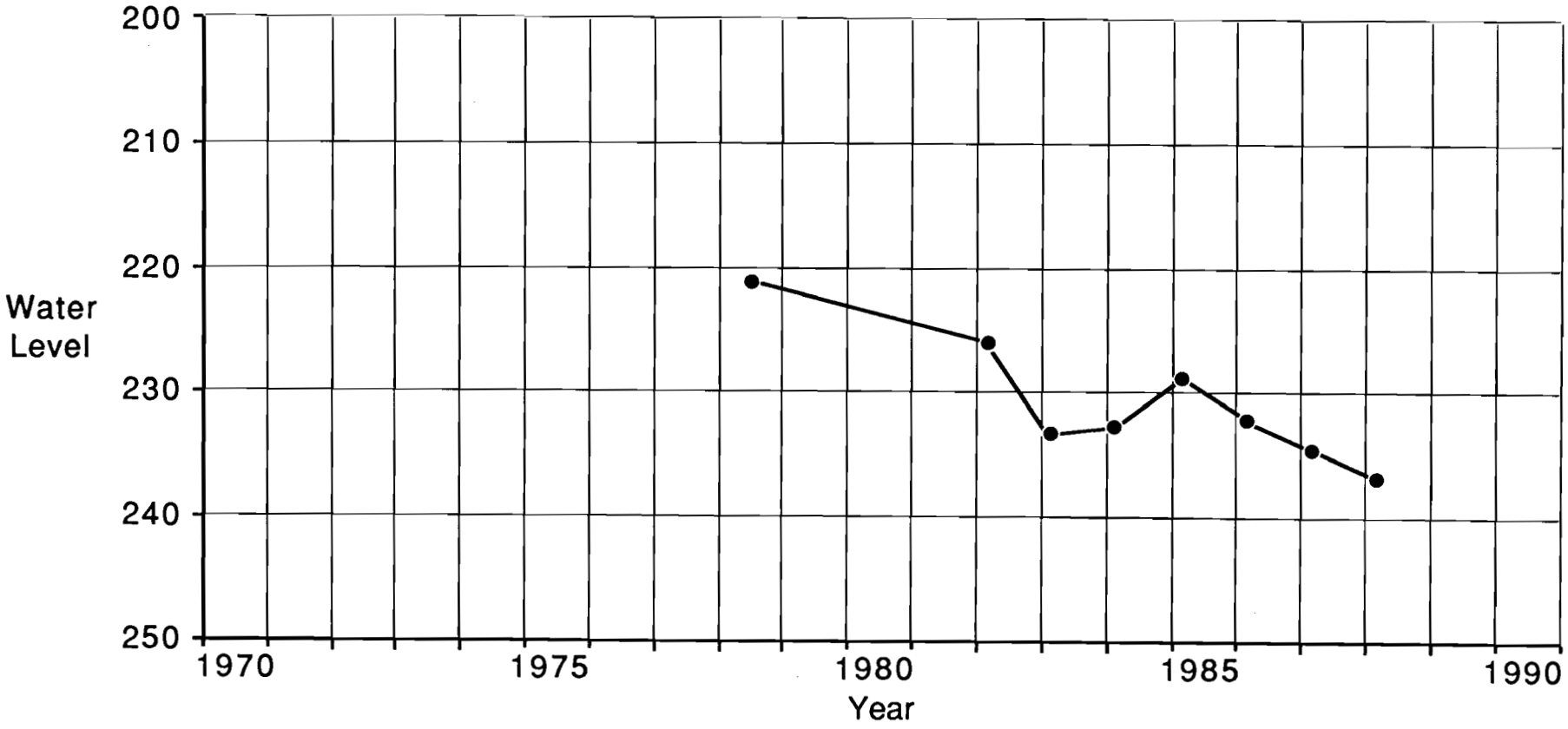
The following hydrographs use several different vertical scales to show greater detail. The scales include total ranges of 50, 100, 200, 350, and 700 feet.

All water levels are in feet below land surface datum. A negative sign indicates water levels above land surface datum.

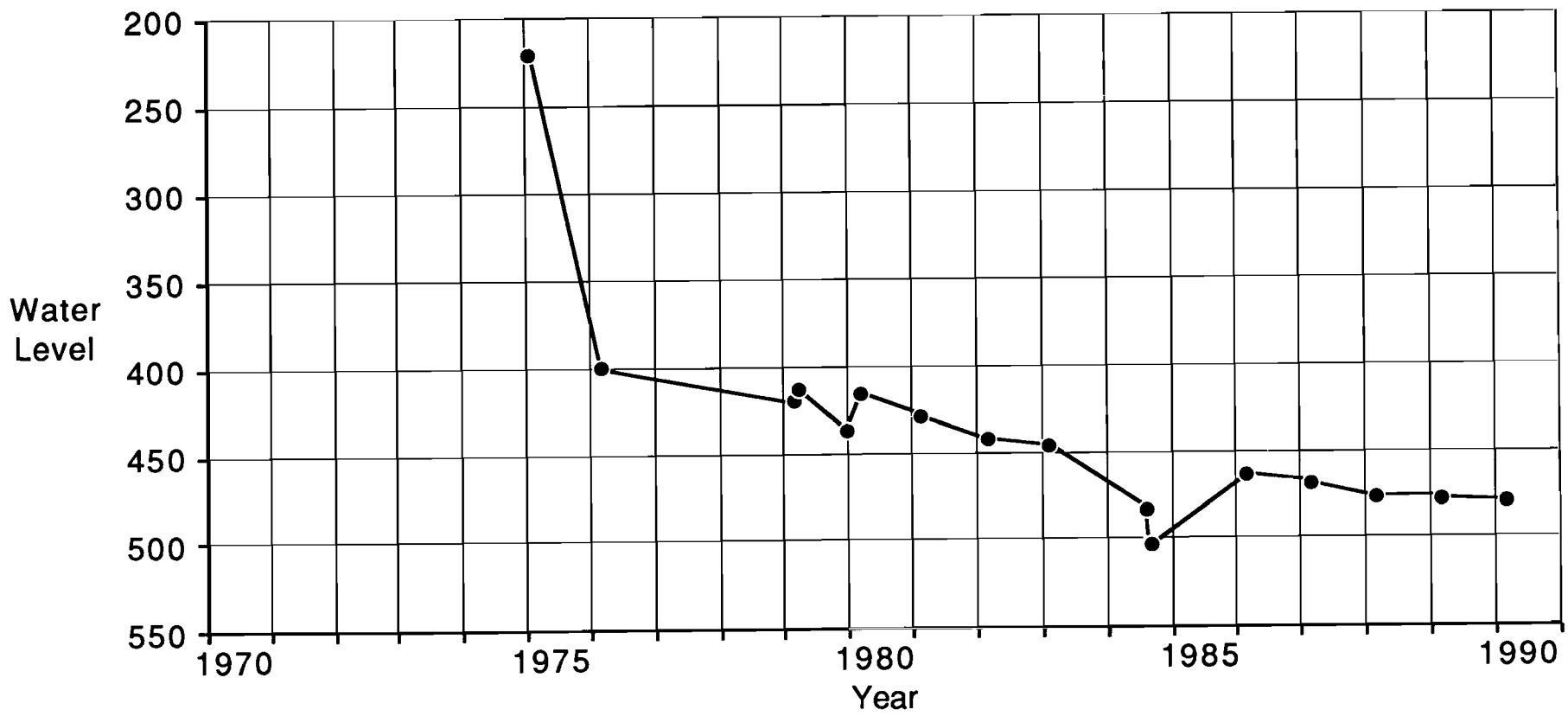
The hydrographs were prepared with static water level data. Measurements made while the well was pumping were omitted, as were others suspected to be in error. Water level data available prior to 1970 were not included to provide a consistent horizontal scale. Complete water level data are given in Appendix D.


Hydrograph for well 2N/28E-2daa
Water Level
-100
-50
0
50
100
150
200
250
1970
1975
1980
1985
1990
Year

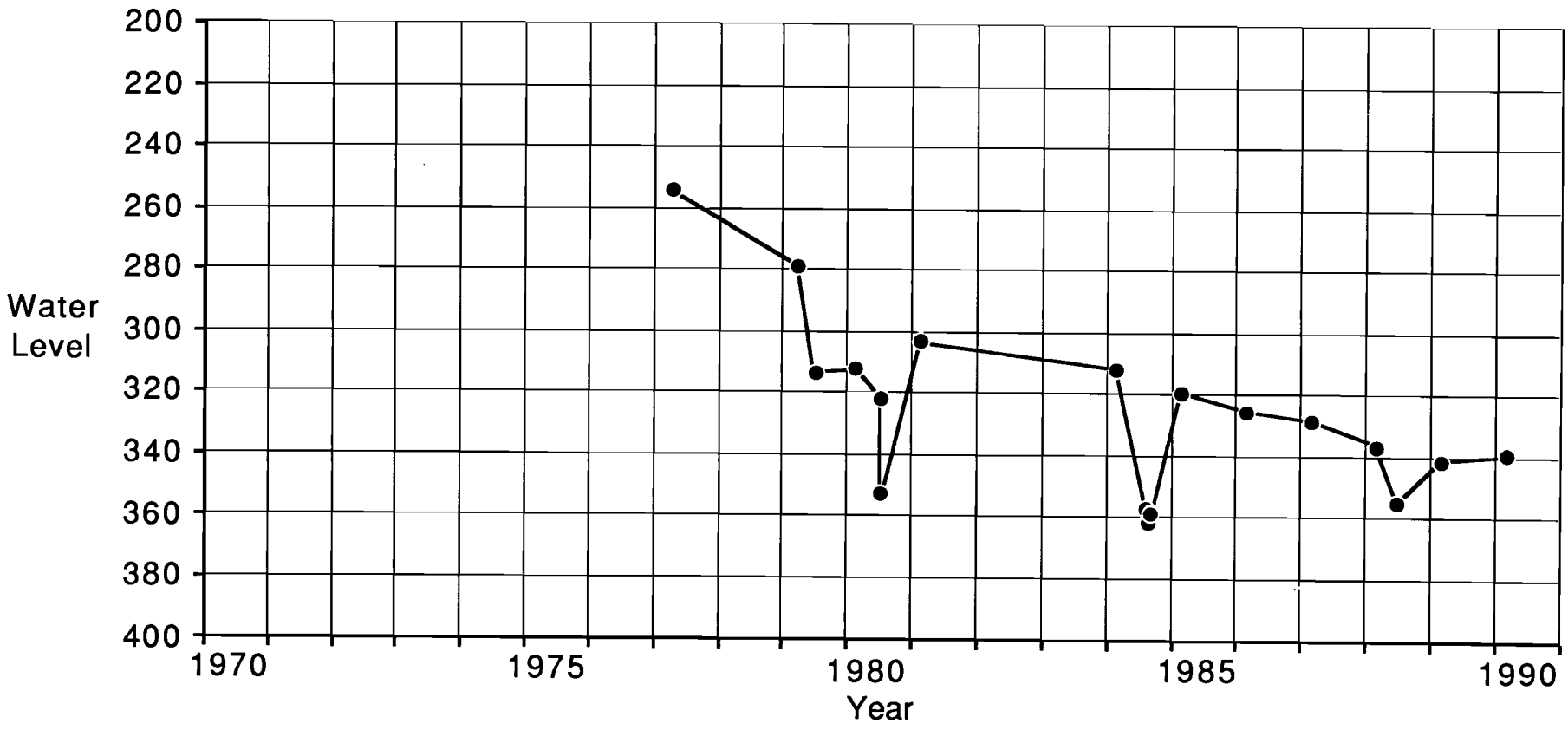
Hydrograph for well 2N/30E-4ddb



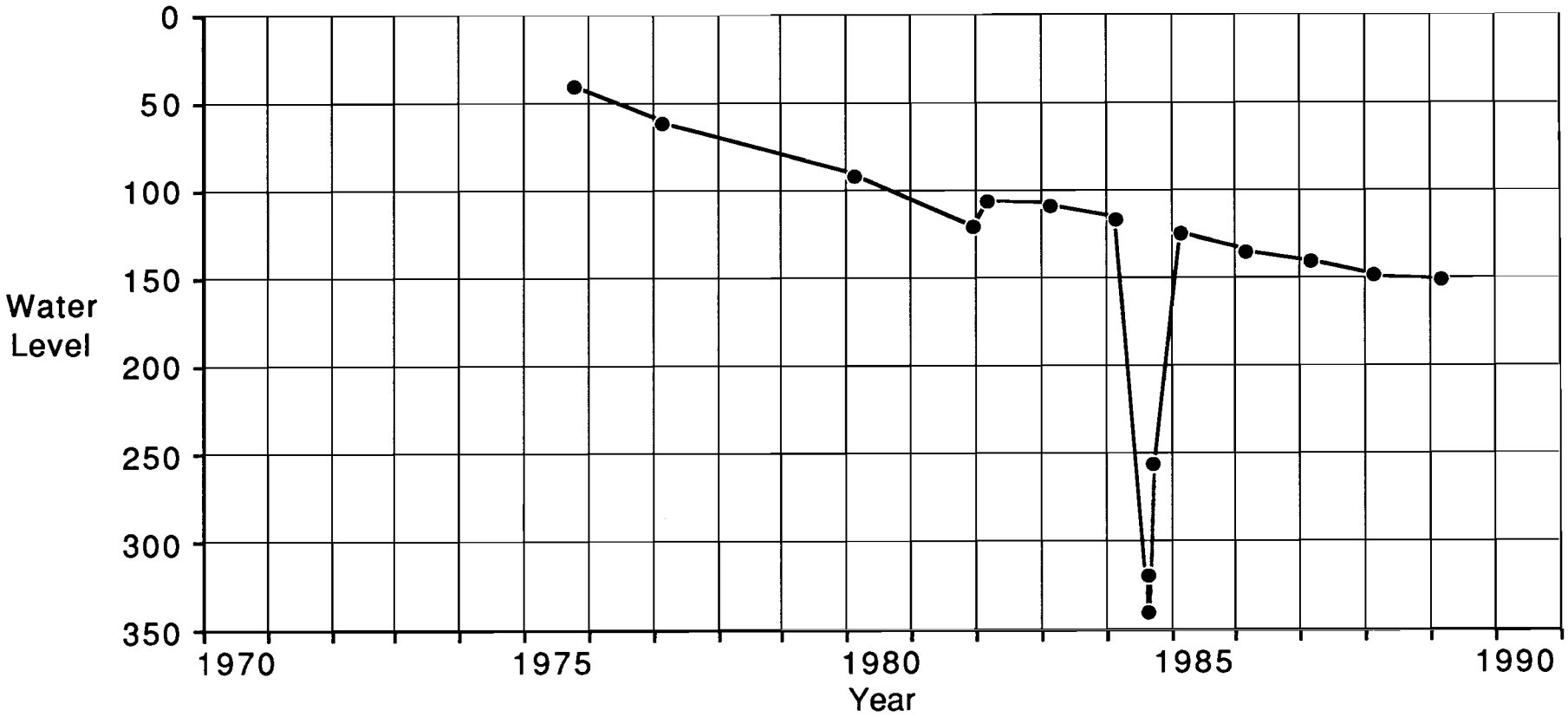
Hydrograph for well 3N/28E-35baa



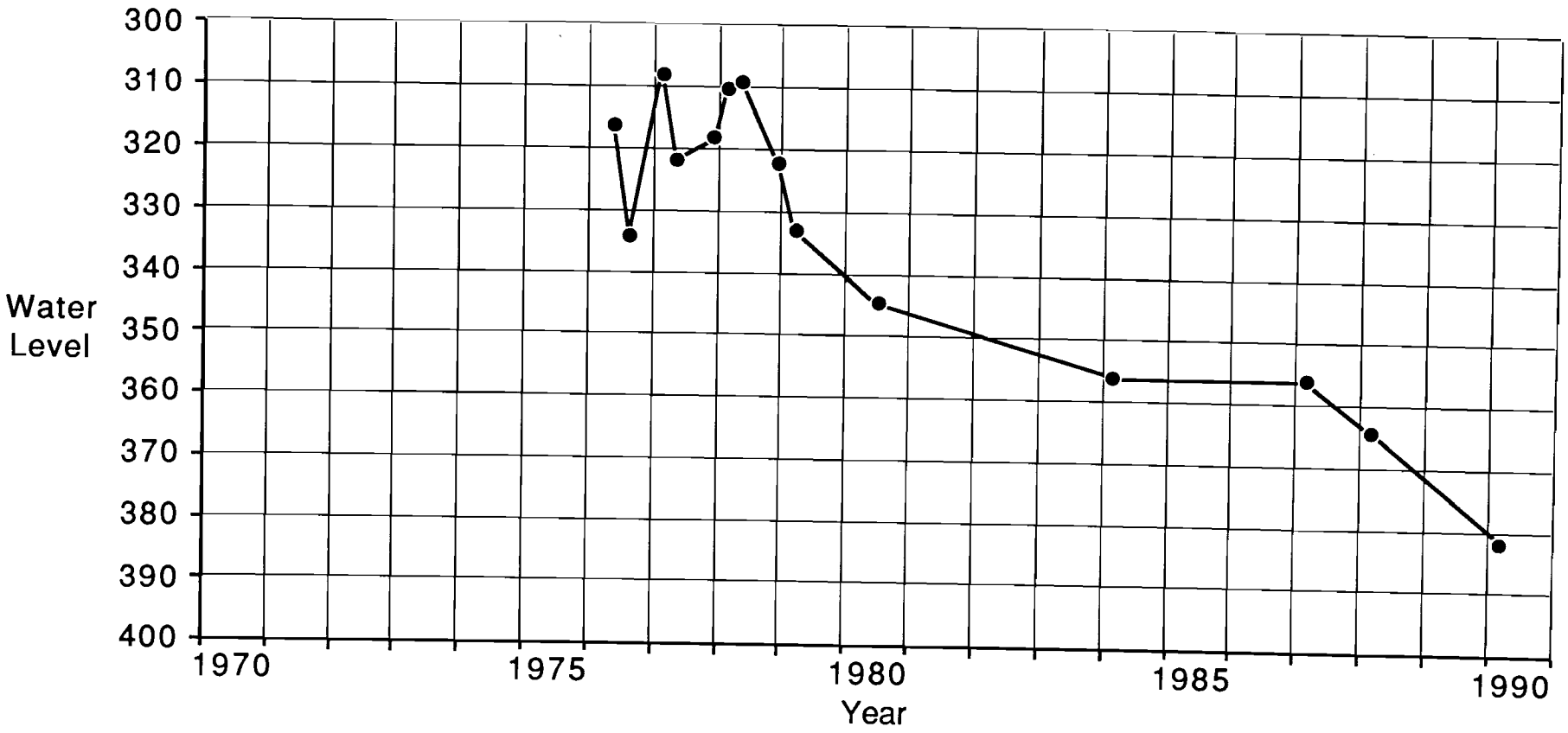
Hydrograph for well 3N/29E-9cdd



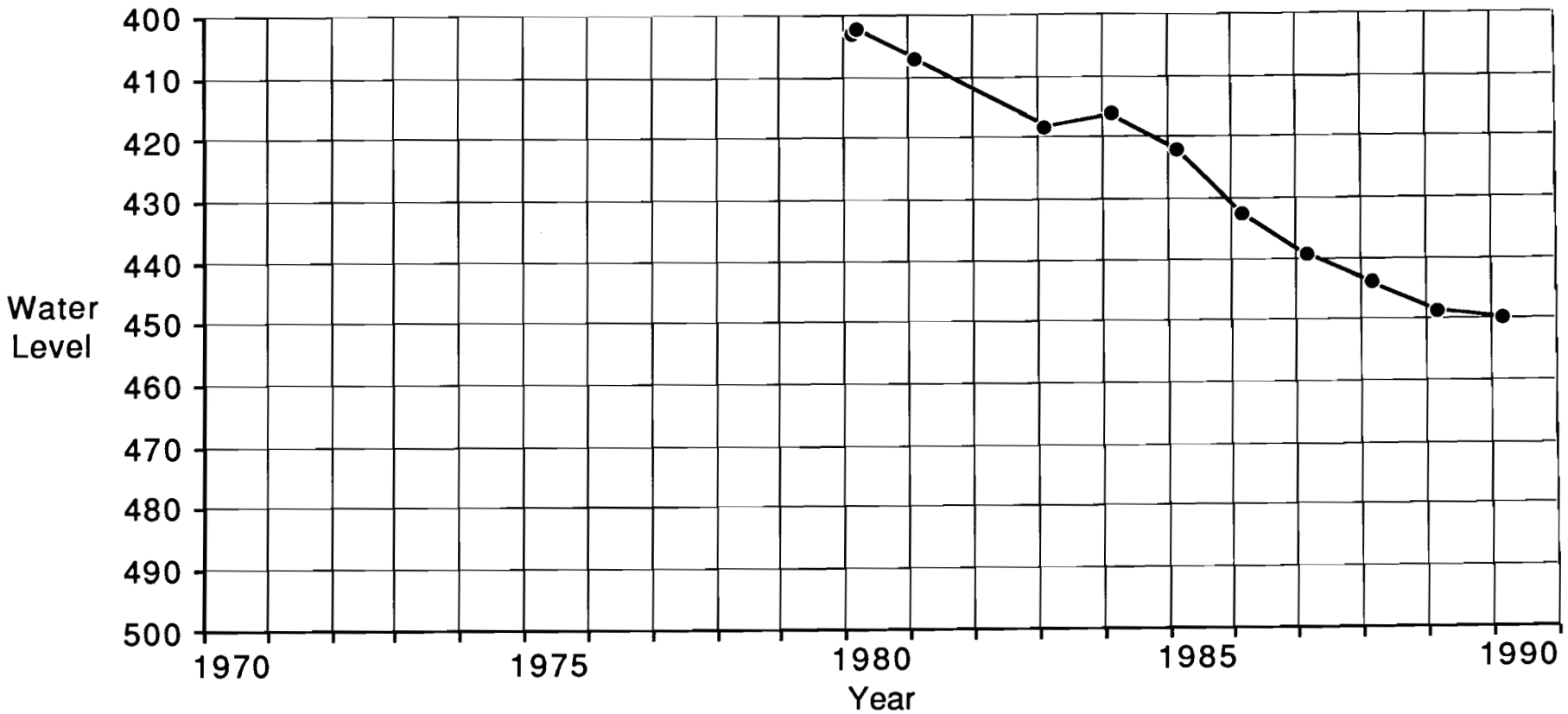
Hydrograph for well 3N/29E-11ddd



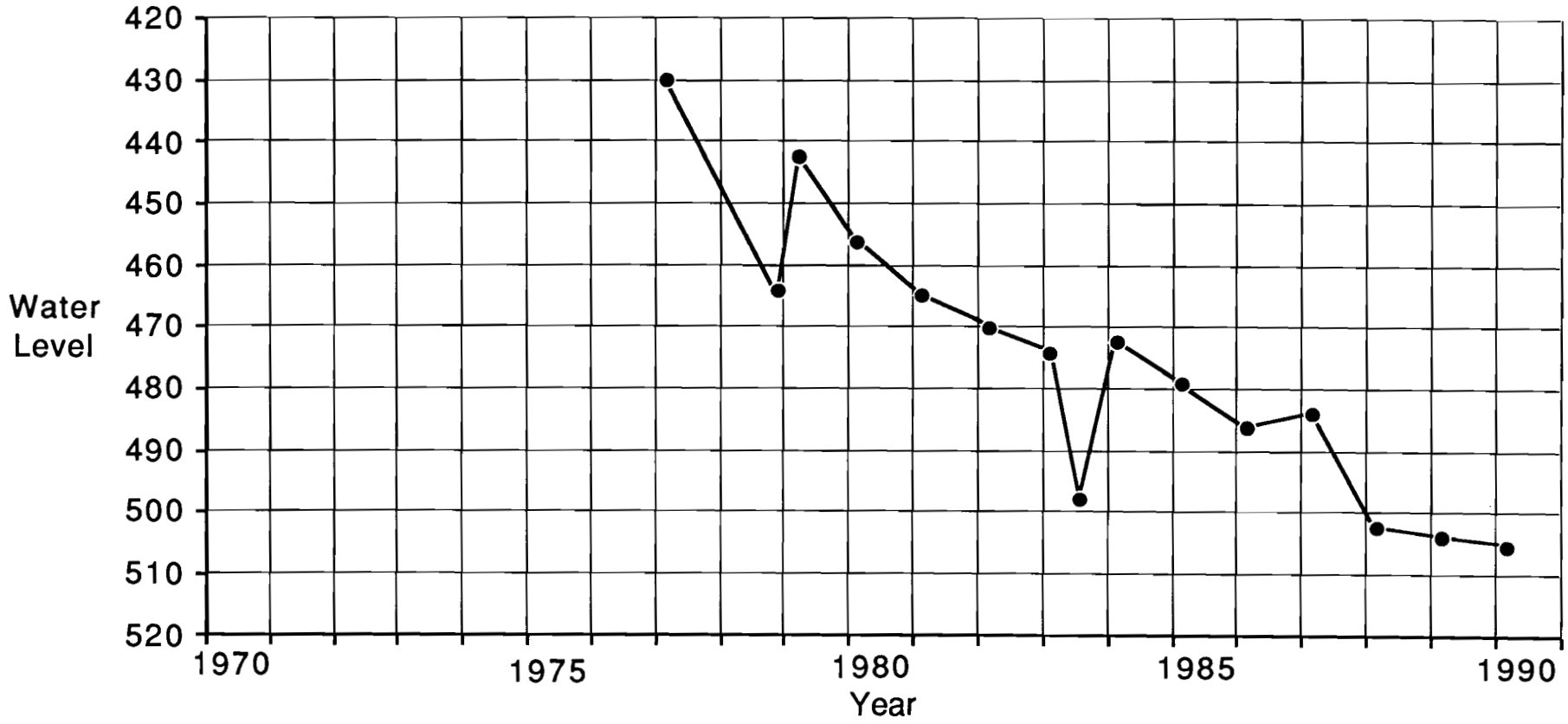
Hydrograph for well 3N/29E-16ada



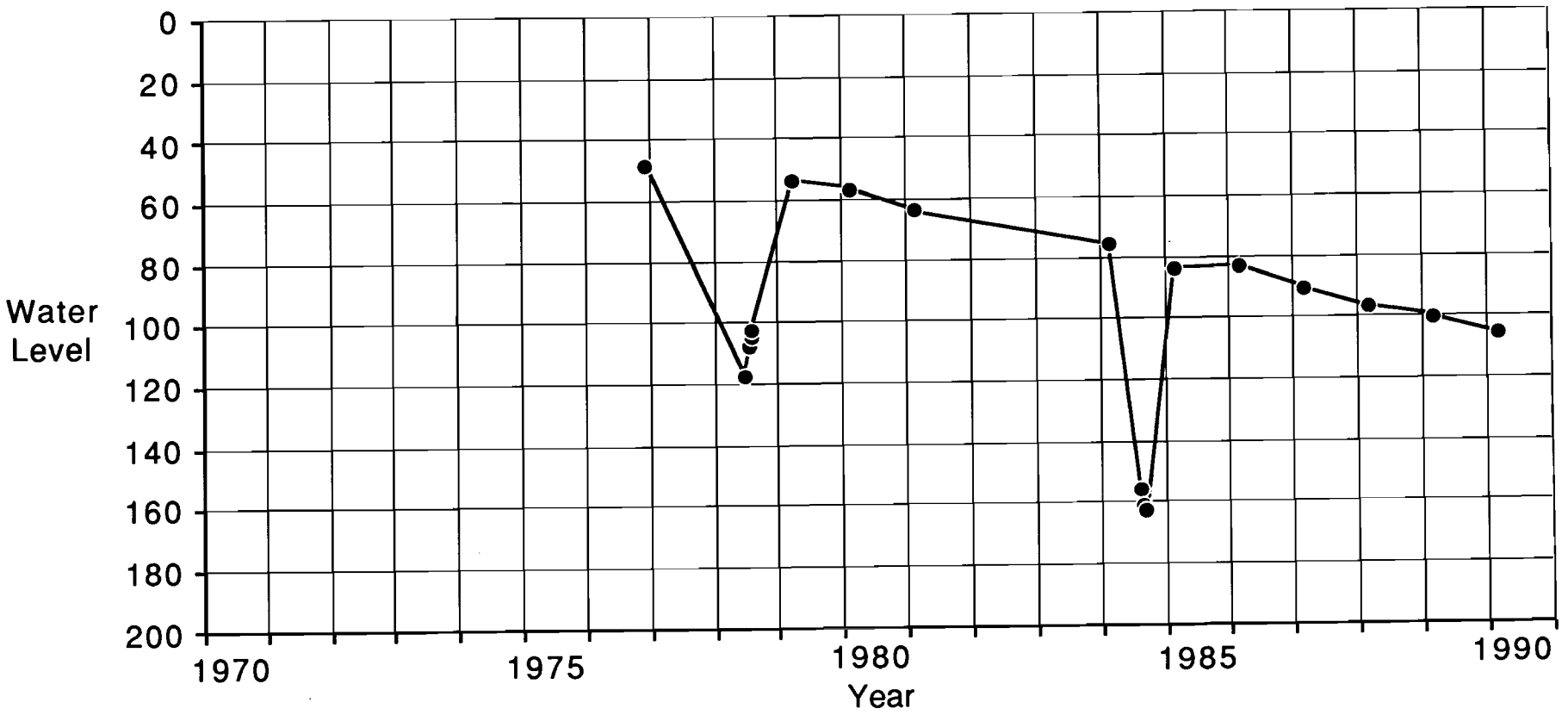
Hydrograph for well 3N/29E-19acc



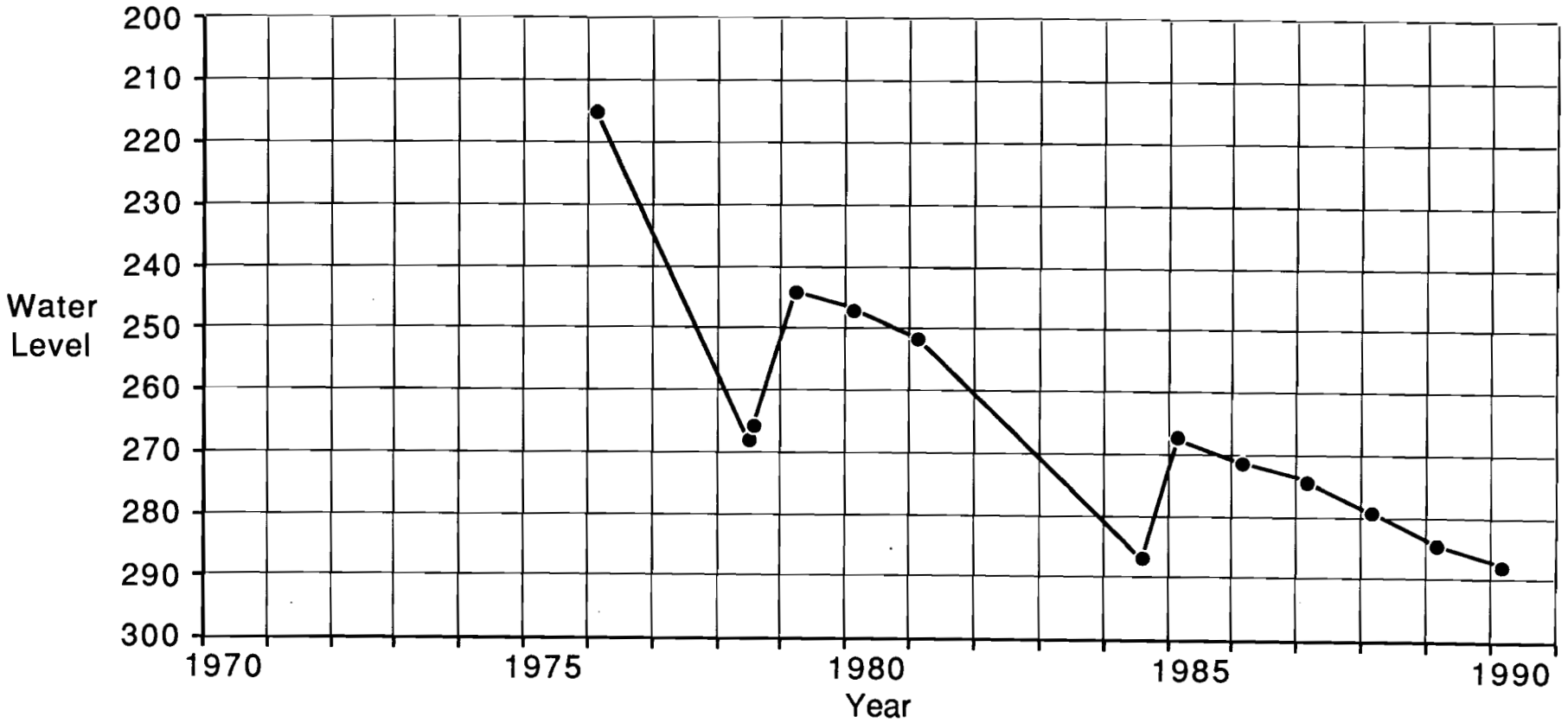
Hydrograph for well 3N/29E-20dcc



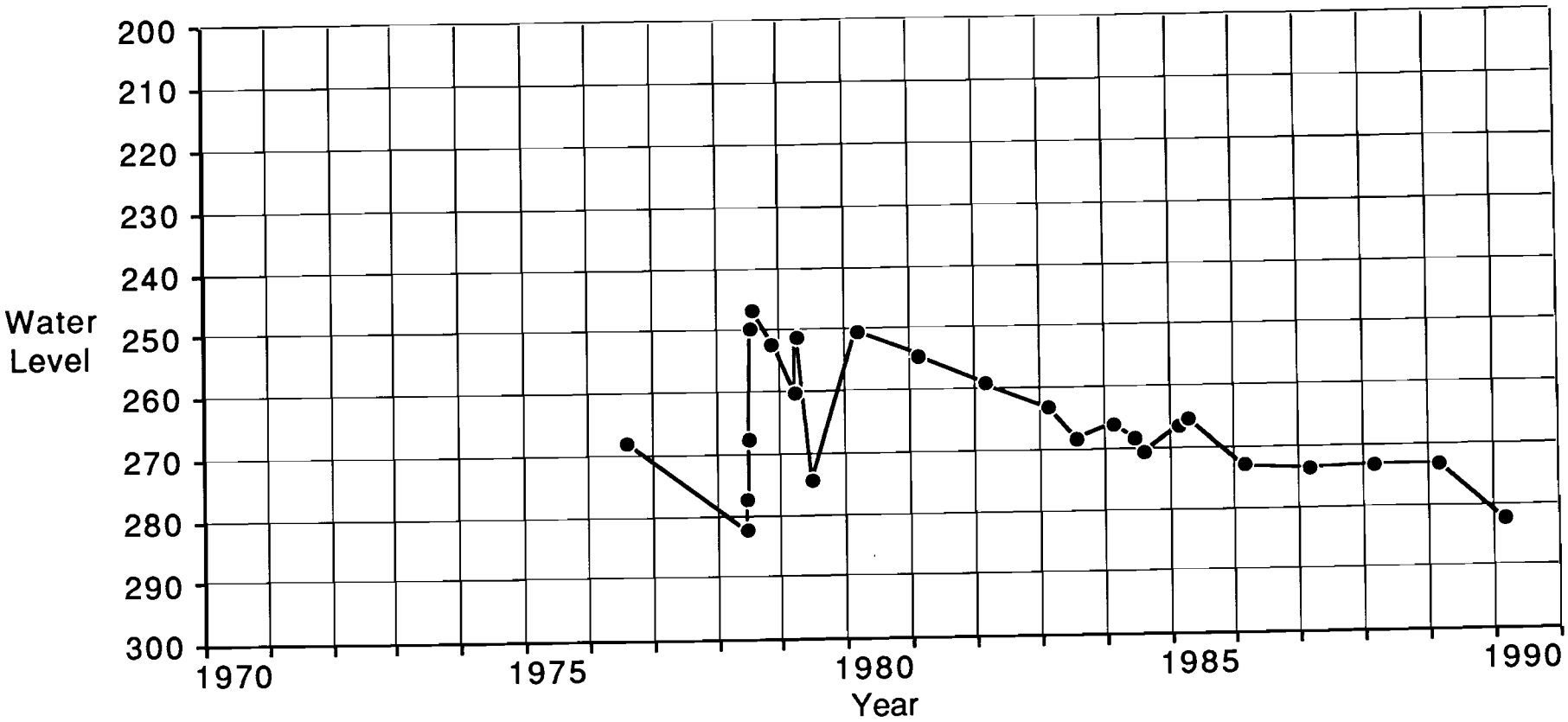
Hydrograph for well 3N/29E-23adb



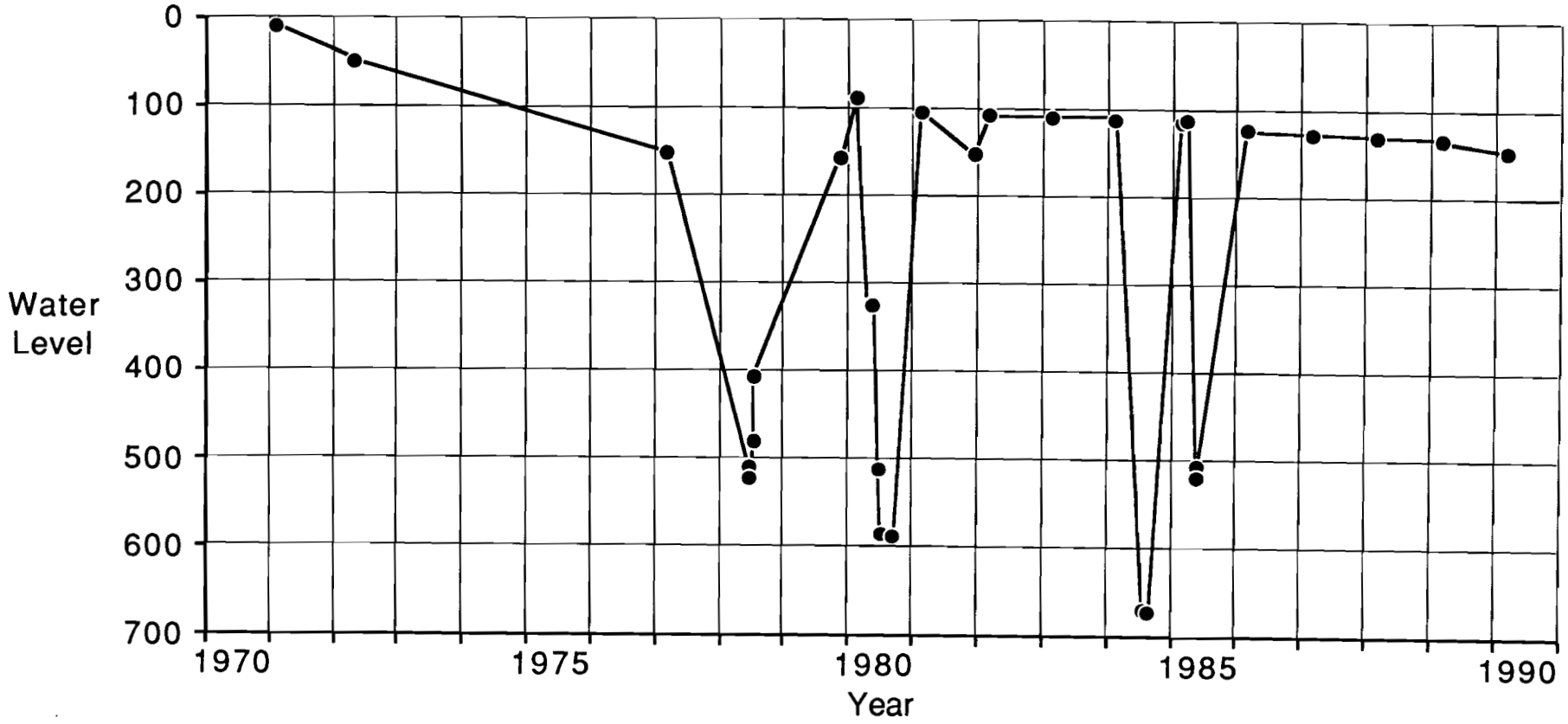
Hydrograph for well 3N/29E-24acd



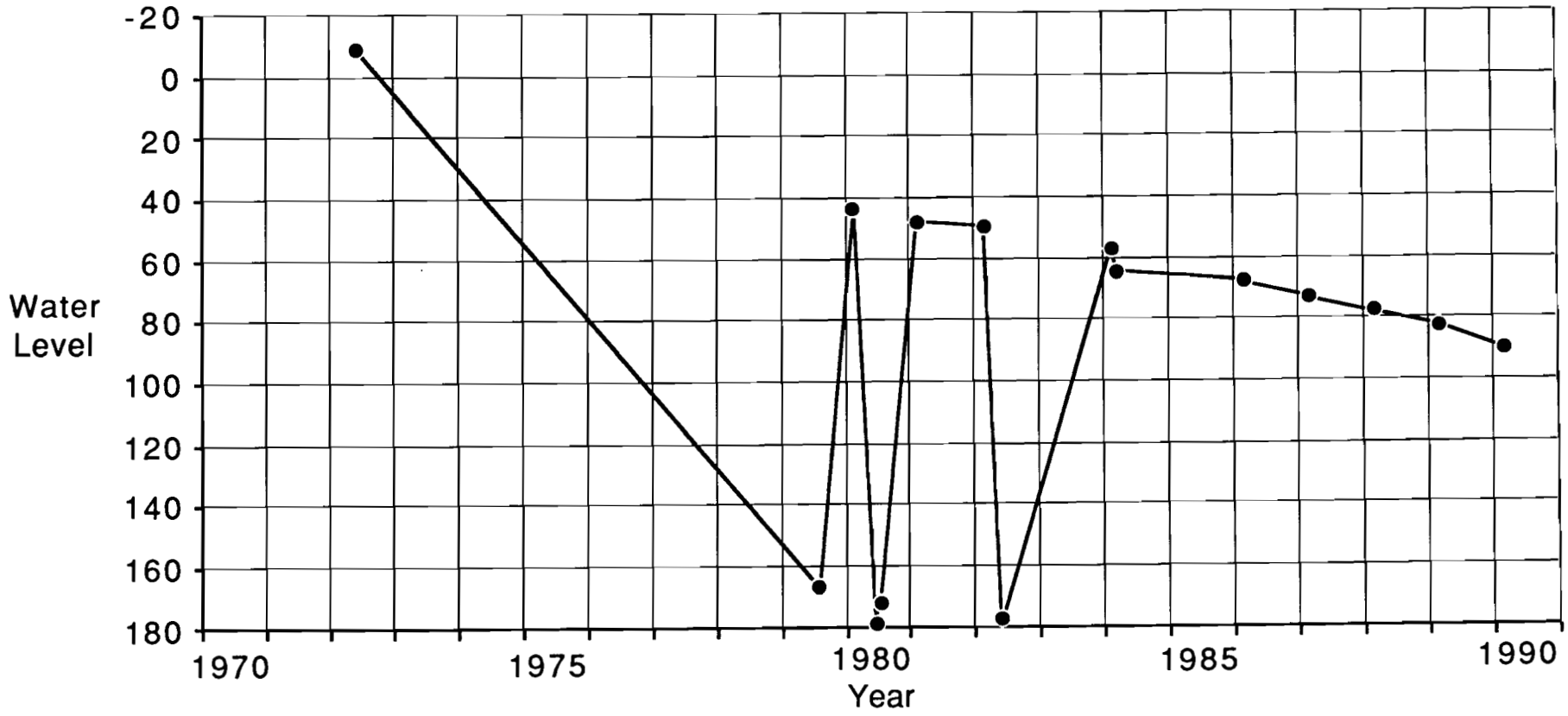
Hydrograph for well 3N/30E-1dba



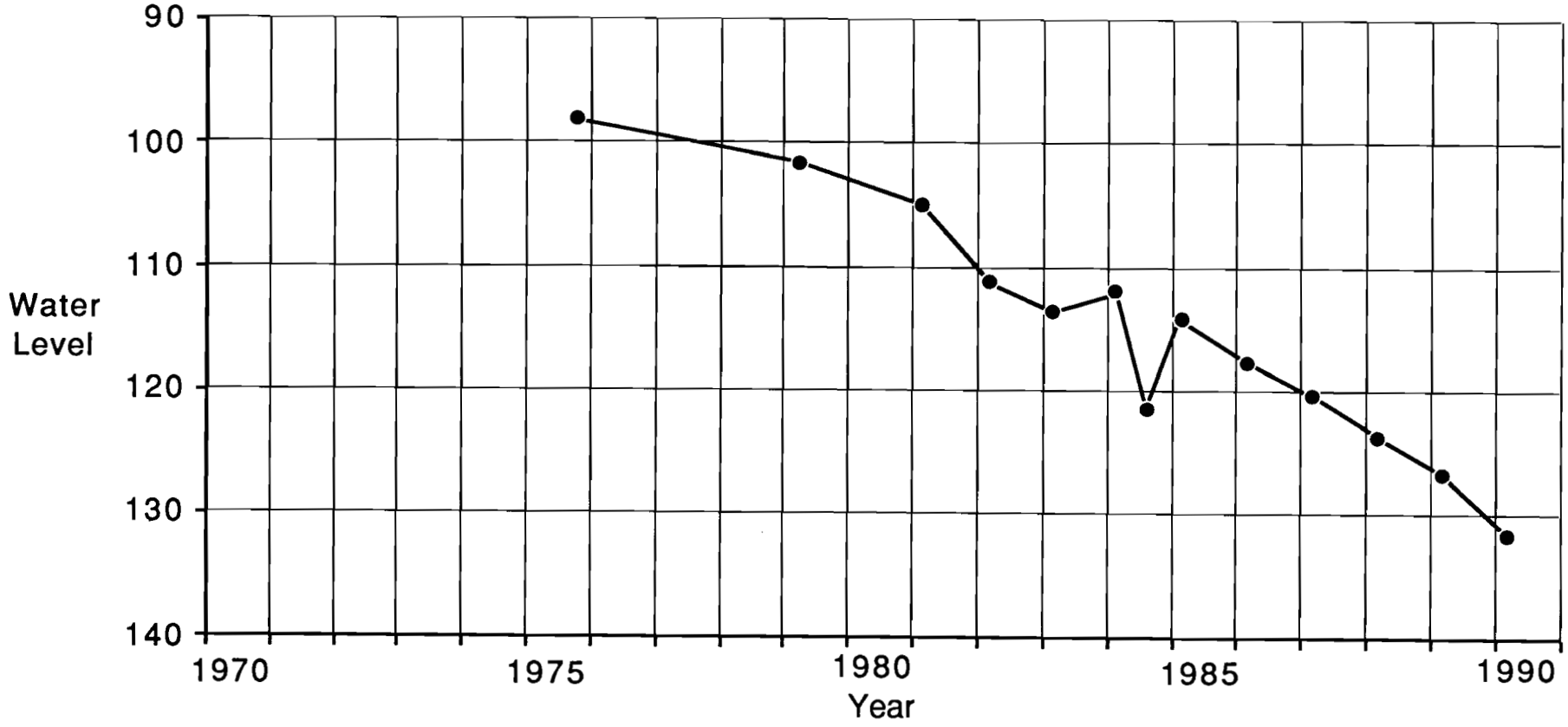
Hydrograph for well 3N/30E-6cbd



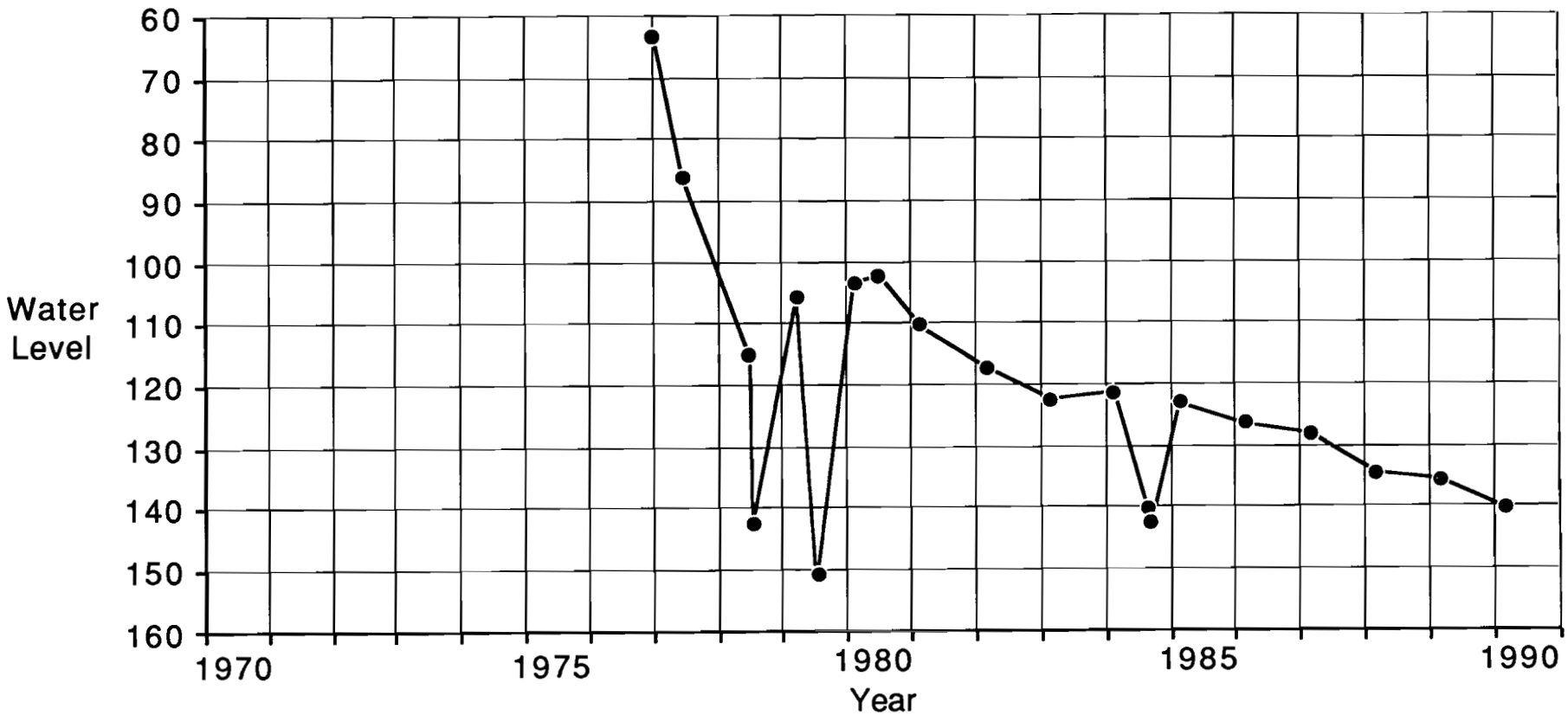
Hydrograph for well 3N/30E-7ccb



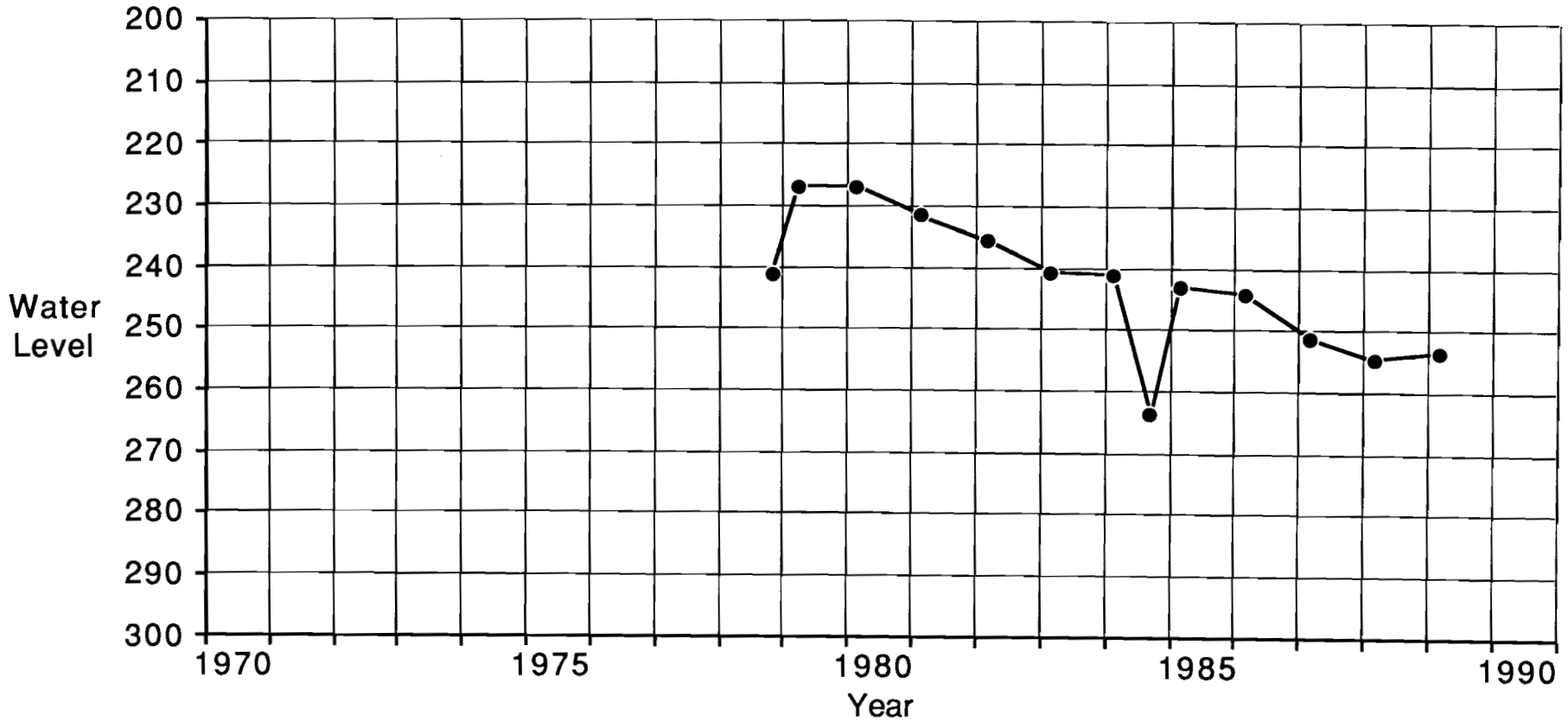
Hydrograph for well 3N/30E-9cba



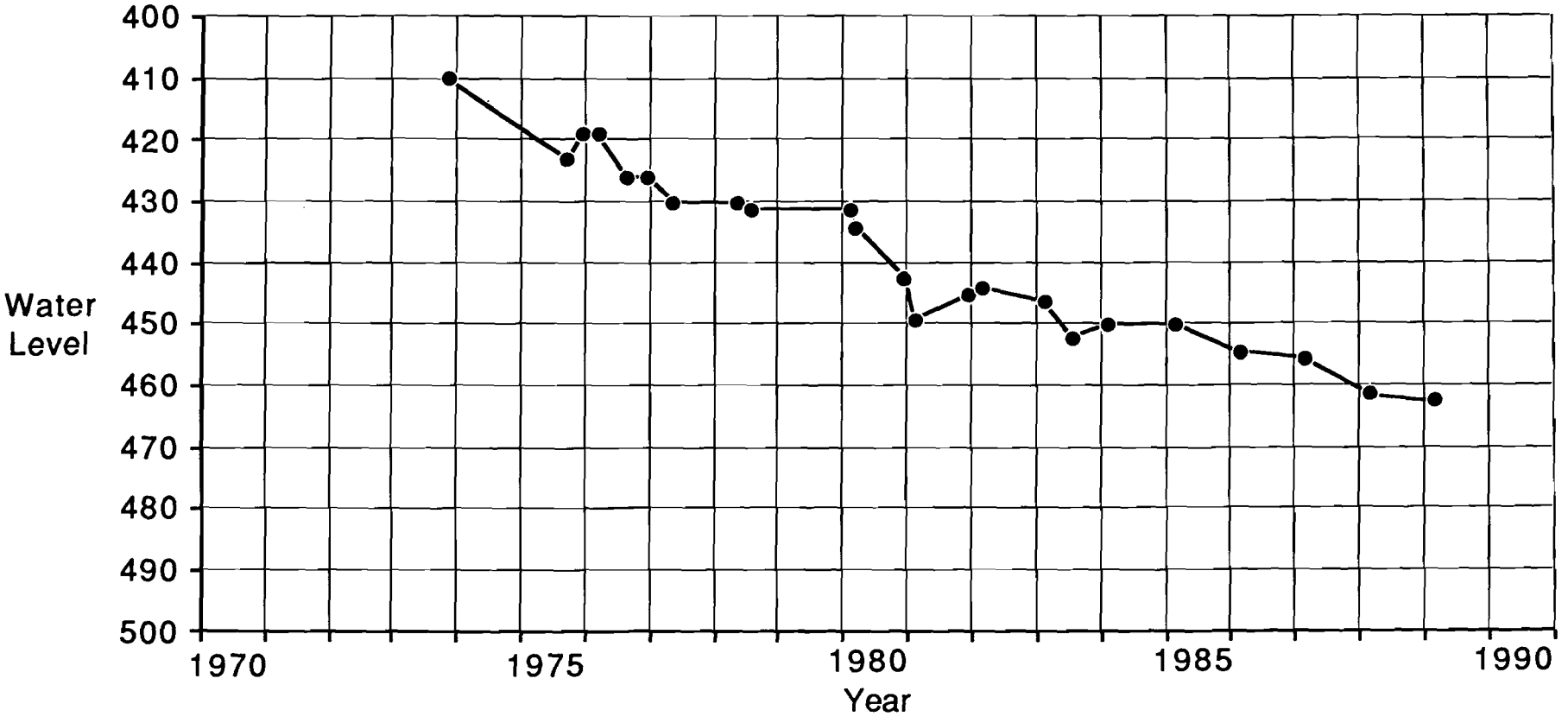
Hydrograph for well 3N/30E-17add



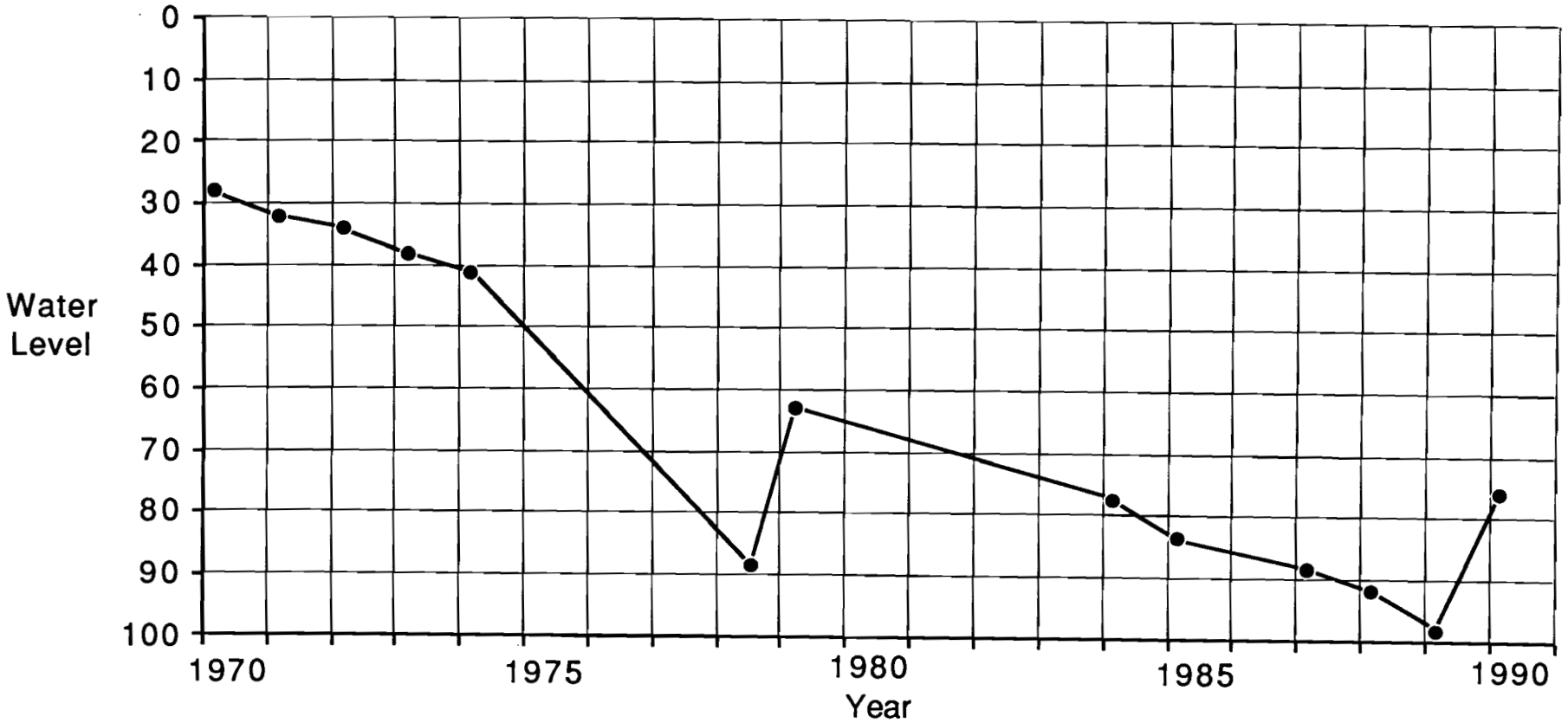
Hydrograph for well 3N/30E-20ccc



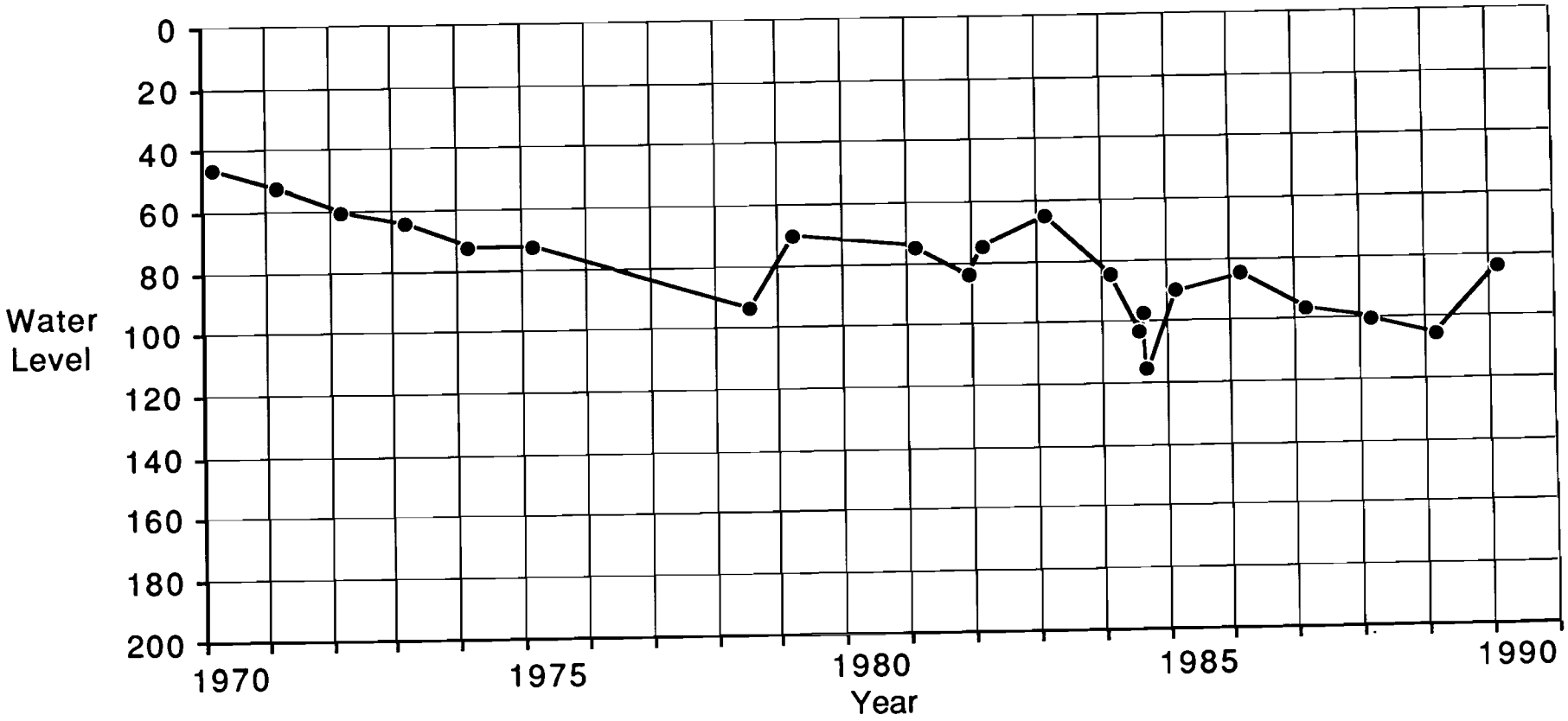
Hydrograph for well 3N/31E-30abc



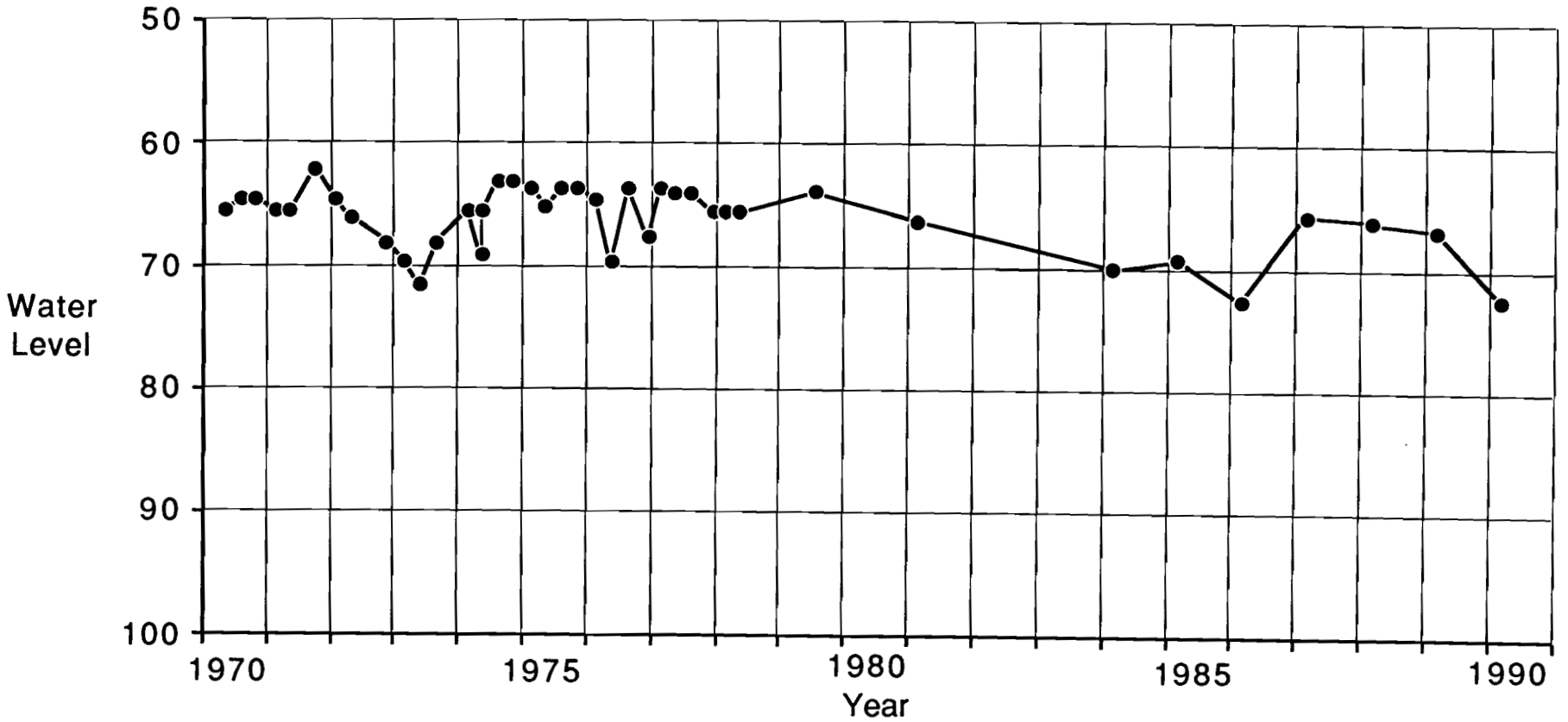
Hydrograph for well 4N/28E-11cad



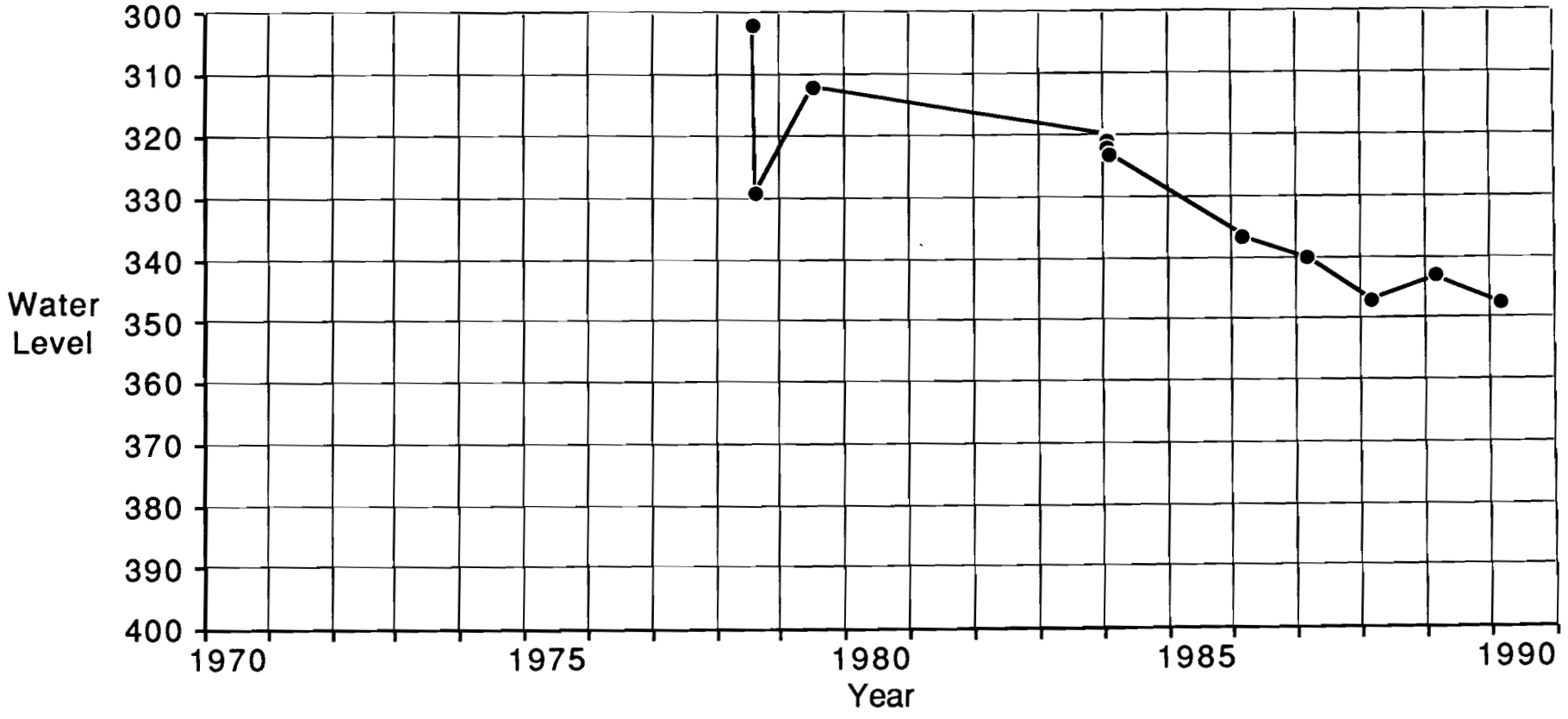
Hydrograph for well 4N/28E-11ccd



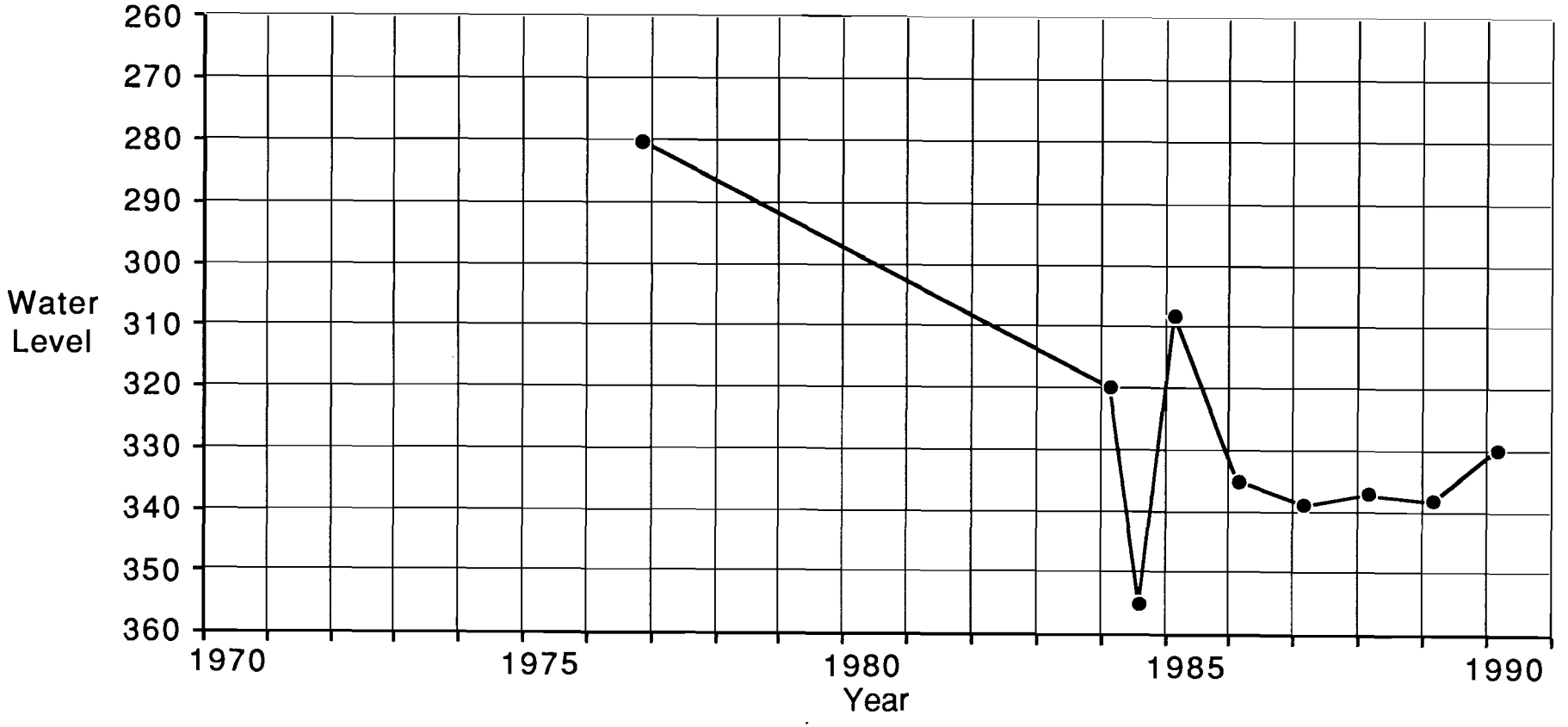
Hydrograph for well 4N/29E-5dda



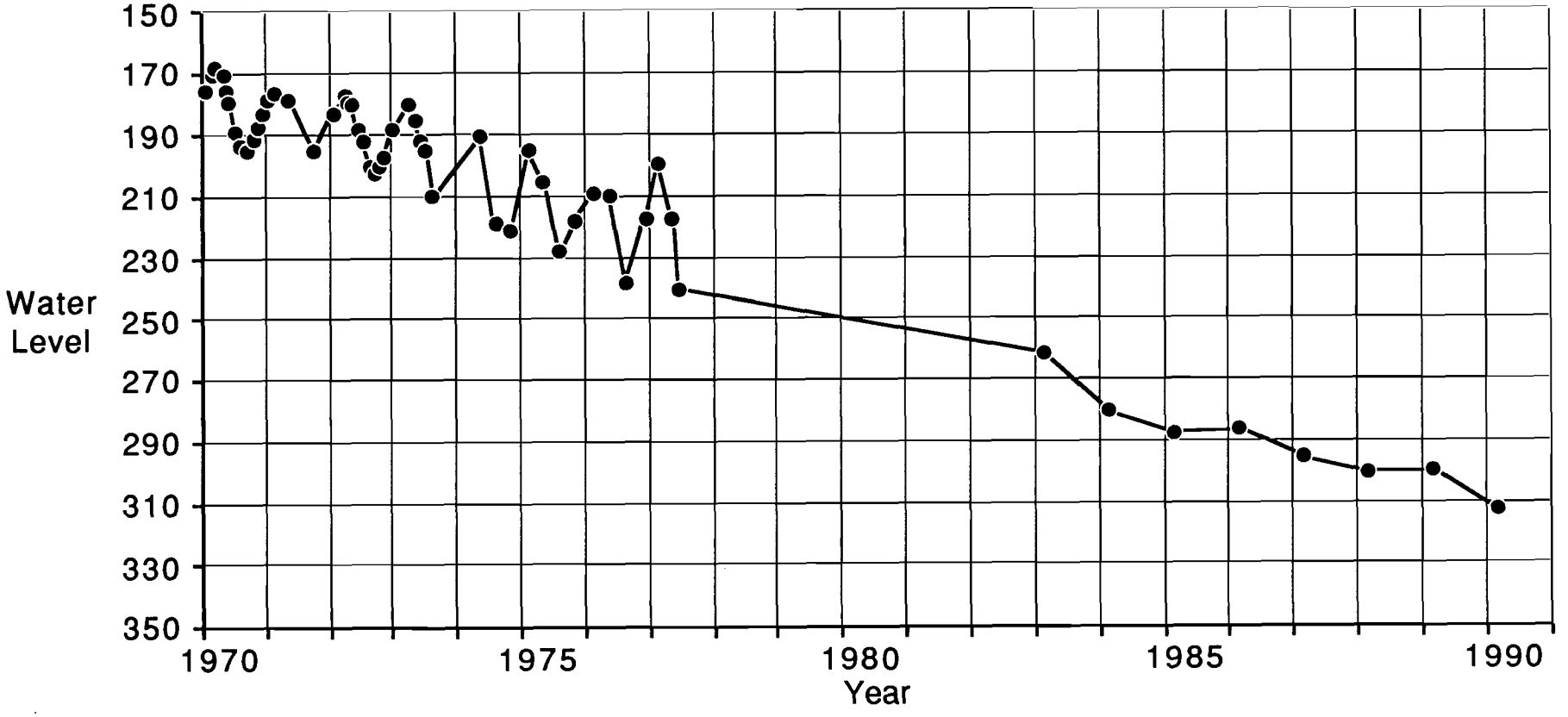
Hydrograph for well 4N/29E-18dcb

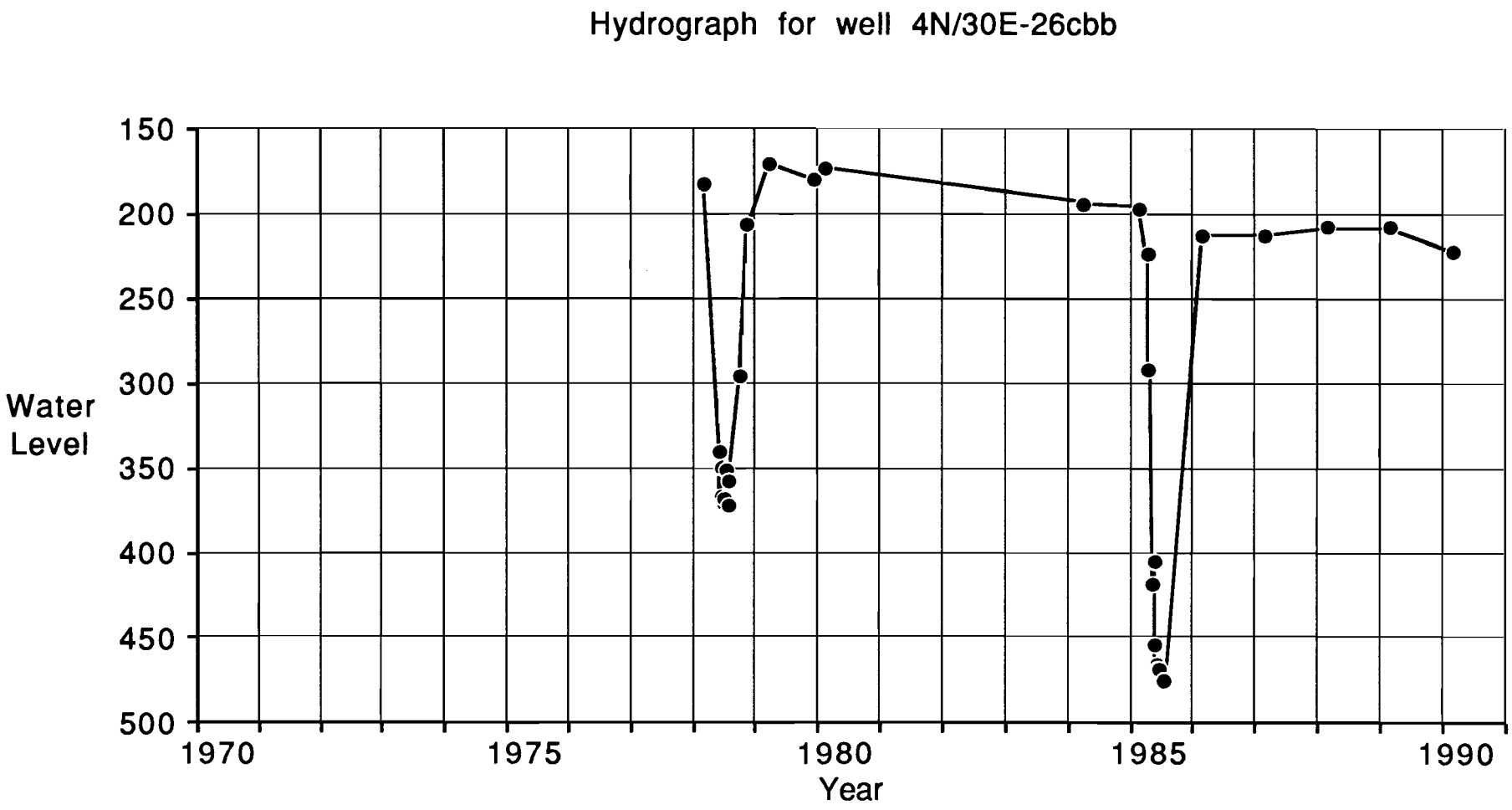


Hydrograph for well 4N/29E-24cdd

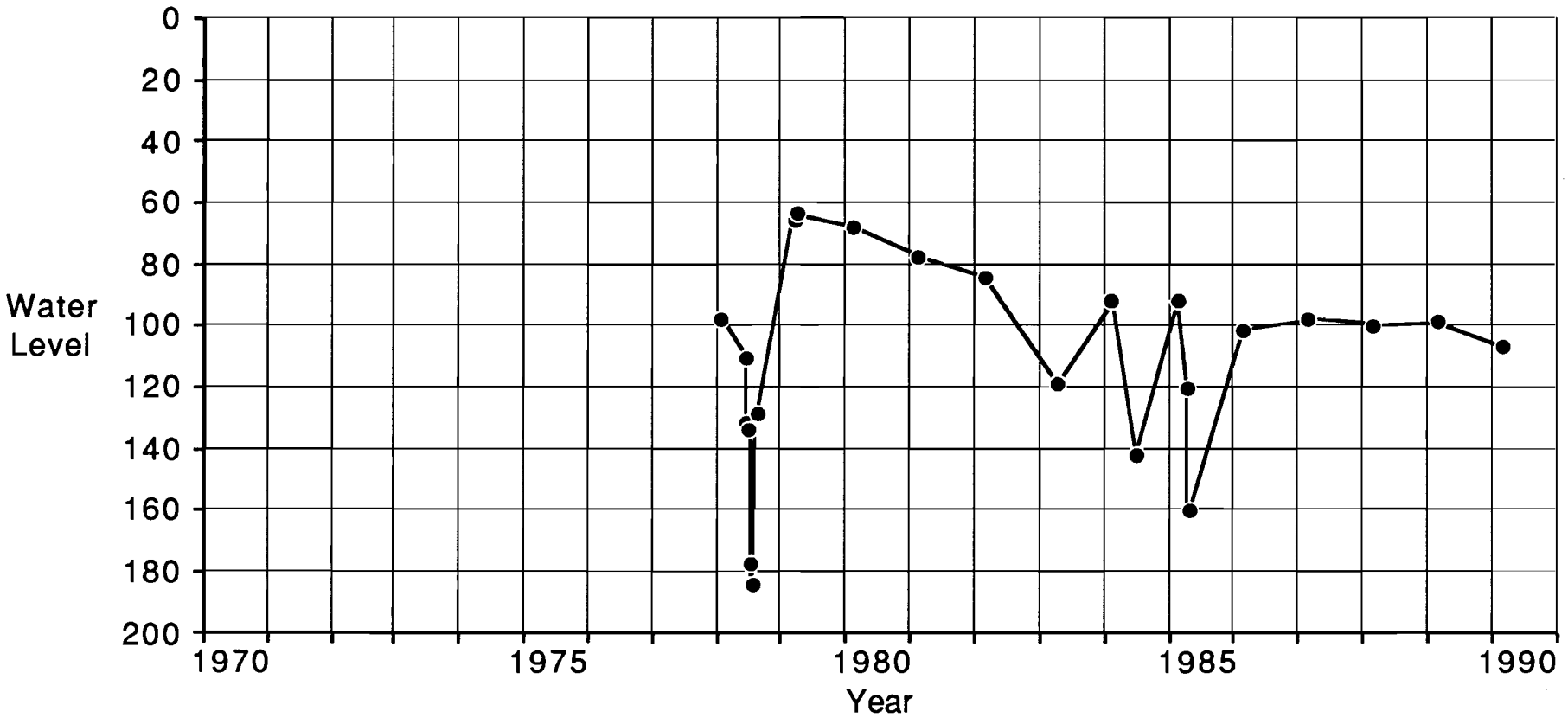


Hydrograph for well 4N/29E-32cac

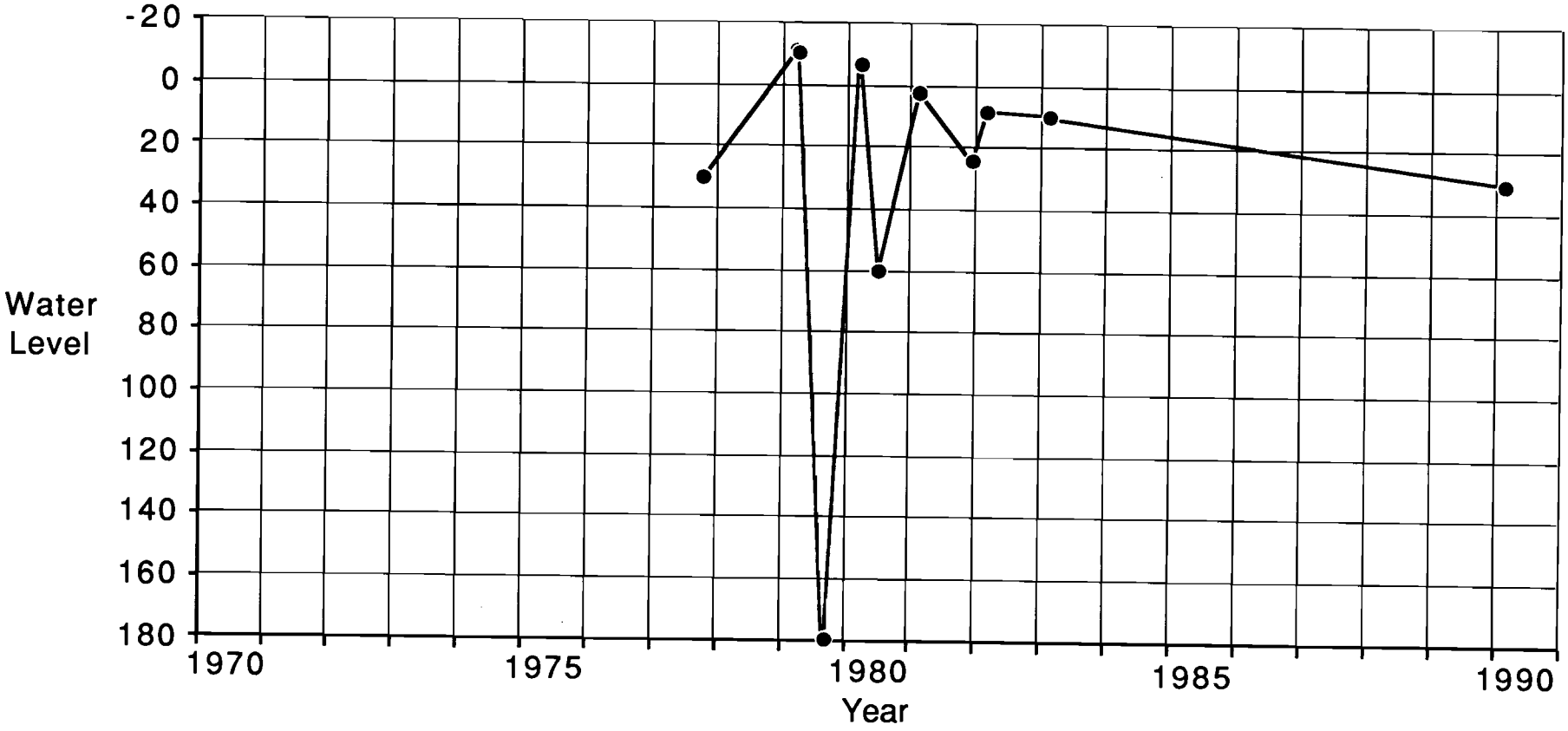



Hydrograph for well 4N/30E-26cbb
Water Level
150
200
250
300
350
400
450
500
1970
1975
1980
1985
1990
Year

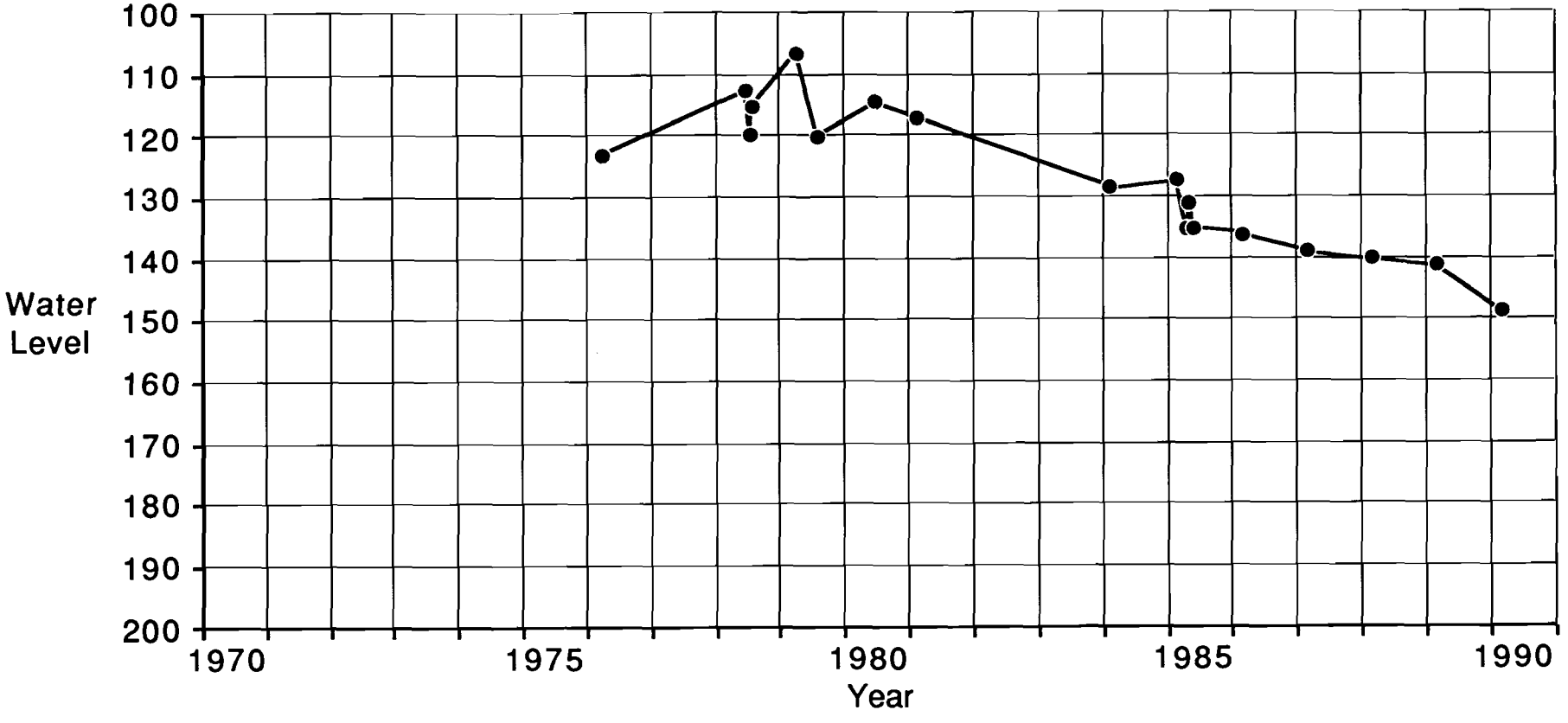
Hydrograph for well 4N/30E-28ada



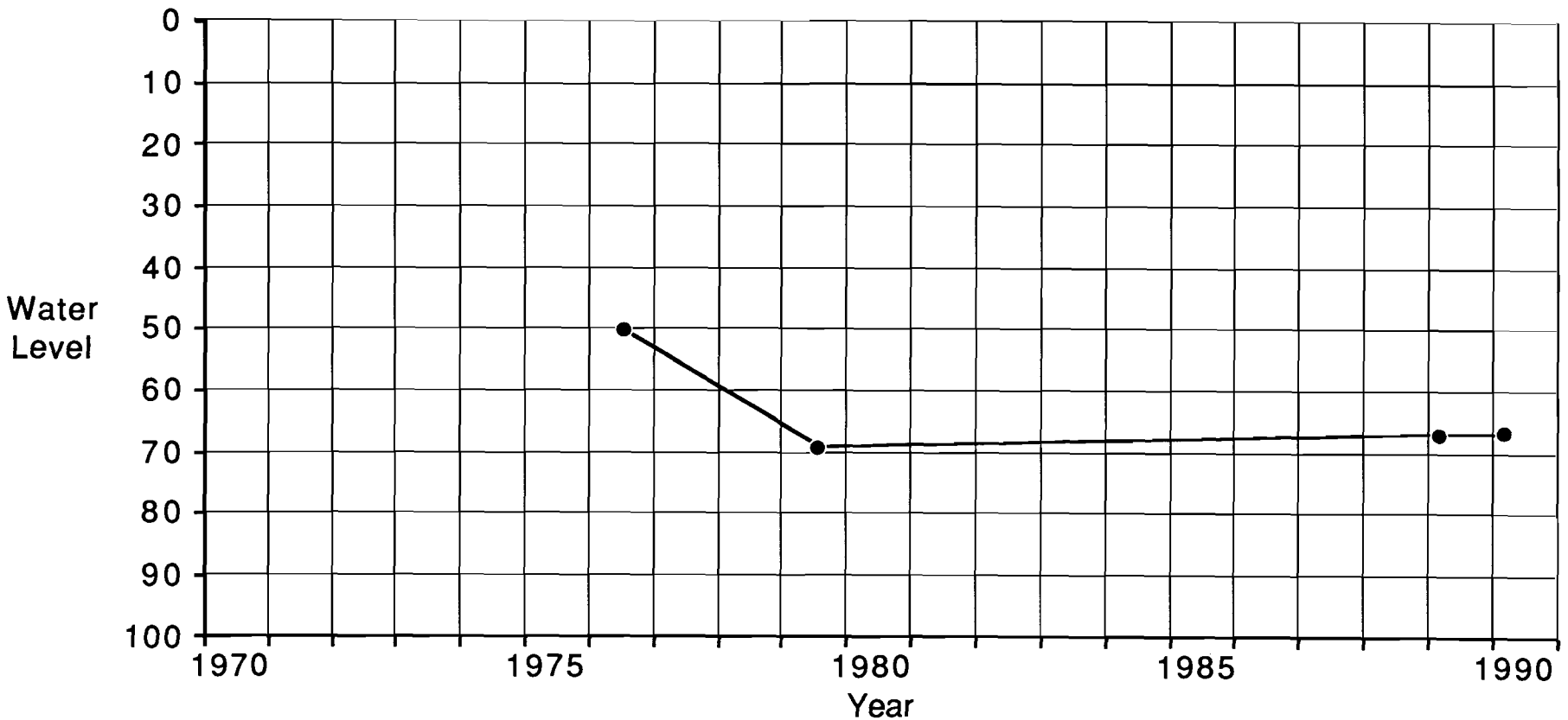
Hydrograph for well 4N/30E-33cda



Hydrograph for well 4N/30E-35dca



Hydrograph for well 5N/28E-36cda



APPENDIX F

Division 8 Rules

Oregon Administrative Rules
Water Resources Department
Chapter 690, Division 08
Definition and Policy Statements
Regarding Statutory Ground Water Terms

690-08-001 A number of terms are used in the statutes, ORS 537.505-.795, prescribing the management of ground water in Oregon. These rules define terms to qualify and clarify the statutes. In all statutes and rules employed in the management of ground water by the Water Resources Department and Commission, the following definitions shall apply, unless the context requires otherwise:

(1) Aquifer: means a water-bearing body of naturally occurring earth materials that is sufficiently permeable to yield useable quantities of water to wells and/or springs.

(2) Critical Ground Water Area Boundary: means a line established in a critical ground water area order on a map that surrounds an area in which one or more of the statutory criteria for critical area declaration are met and which is located either 1) physically by coincidence with natural features such as ground water reservoir boundaries, hydrologic barriers, or recharge or discharge boundaries, or 2) administratively by surrounding an affected area when that area does not coincide with an area bounded by natural features.

(3) Customary Quantity: means the rate or annual amount of appropriation or diversion of water ordinarily used by an appropriator within the terms of that appropriator's water right.

(4) Declined excessively: means any cumulative lowering of the water levels in a ground water reservoir or a part thereof which:

a) Precludes, or could preclude, the perpetual use of the reservoir; or,

b) Exceeds the economic pumping level; or,

c) Constitutes a decline determined to be interfering with

A) A surface water diversion having a priority date senior to the priority dates of the causative ground water appropriations, or

B) A surface water body that has been administratively withdrawn with an effective date senior to the priority dates of the causative ground water appropriations unless the causative ground water appropriations are for uses that are exceptions to the withdrawals, or

C) An adopted minimum stream flow or instream water right, or closure having an effective date senior to the priority dates of the causative ground water appropriations, or

D) A surface water body which has a classification that is senior to the priority date of the causative ground water appropriation(s) and the use or uses to which the ground water is being put are not included in the classification; or,

d) Constitutes a lowering of the annual high water level within a ground water reservoir, or part thereof, greater than 50 feet below the highest known water level; or,

e) Results in ground water pollution; or,

f) Constitutes a lowering of the annual high water level greater than 15% of the greatest known saturated thickness of the ground water reservoir. The saturated thickness shall be calculated using pre-development water levels and the bottom of the ground water reservoir, or the economic pumping level, whichever is shallower.

(5) Economic pumping level: means the level below land surface at which the per-acre cost of pumping equals 70% of the net increase in annual per-acre value derived by irrigating. (The value is to be calculated on a five year running average of the per-acre value of the three, if there are that many, prevalent irrigated crops in the region minus the five year running average of the per-acre value of the three, if there are that many, prevalent regional non-irrigated crops.)

(6) Excessively declining water levels: (Note: "Excessively" as used in ORS 537.730(1)(a) is taken to modify both "are declining" and "have declined") 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.

(7) Overdraw: means to artificially produce water, in any one year period, from a ground water reservoir, or part thereof, at an annual rate that

a) Exceeds the average annual recharge to that ground water supply over the period of record; or,

b) Reduces surface water availability resulting in

A) One or more senior appropriators being unable to use either their permitted or customary quantity of surface water, whichever is less, or

B) Failure to satisfy an adopted minimum streamflow or instream water right with an effective date senior to the causative ground water appropriation(s); or,

c) Reduces the availability of surface waters that have been

A) Withdrawn with an effective date senior to the priority dates of the causative ground water appropriations, or

B) Restrictivley classified with an effective date senior to the priority date(s) of the causative ground water appropriations.

(8) Substantial or undue interference: means the spreading of the cone of depression of a well to intersect a surface water body or another well, or the reduction of the ground water gradient and flow as a result of pumping, which contributes to:

a) a reduction in surface water availability to an extent that

A) One or more senior surface water appropriators are unable to use either their permitted or customary quantity of water, whichever is less, or

B) An adopted minimum streamflow or instream water right with an effective date senior to the causative ground water appropriation(s) cannot be satisfied; or,

b) The ground water level being drawn down to the economic level of the senior appropriator(s); or,

c) One or more of the senior ground water appropriators being unable to obtain either the permitted or the customary quantity of ground water, whichever is less, from a reasonably efficient well that fully penetrates the aquifer where the aquifer is relatively uniformly permeable. However, in aquifers where flow is predominantly through fractures, full penetration may not be required as a condition of substantial or undue interference.

(9) Substantial thermal alteration: means any change in water temperature of a groundwater reservoir, or a part thereof, which:

(a) Precludes, or could preclude, the perpetual heating or cooling use of the groundwater reservoir; or,

(b) Constitutes a change in the mean annual temperature within a groundwater reservoir, or part thereof, greater than 25 percent of the highest recorded naturally occurring Celsius (C) temperature.

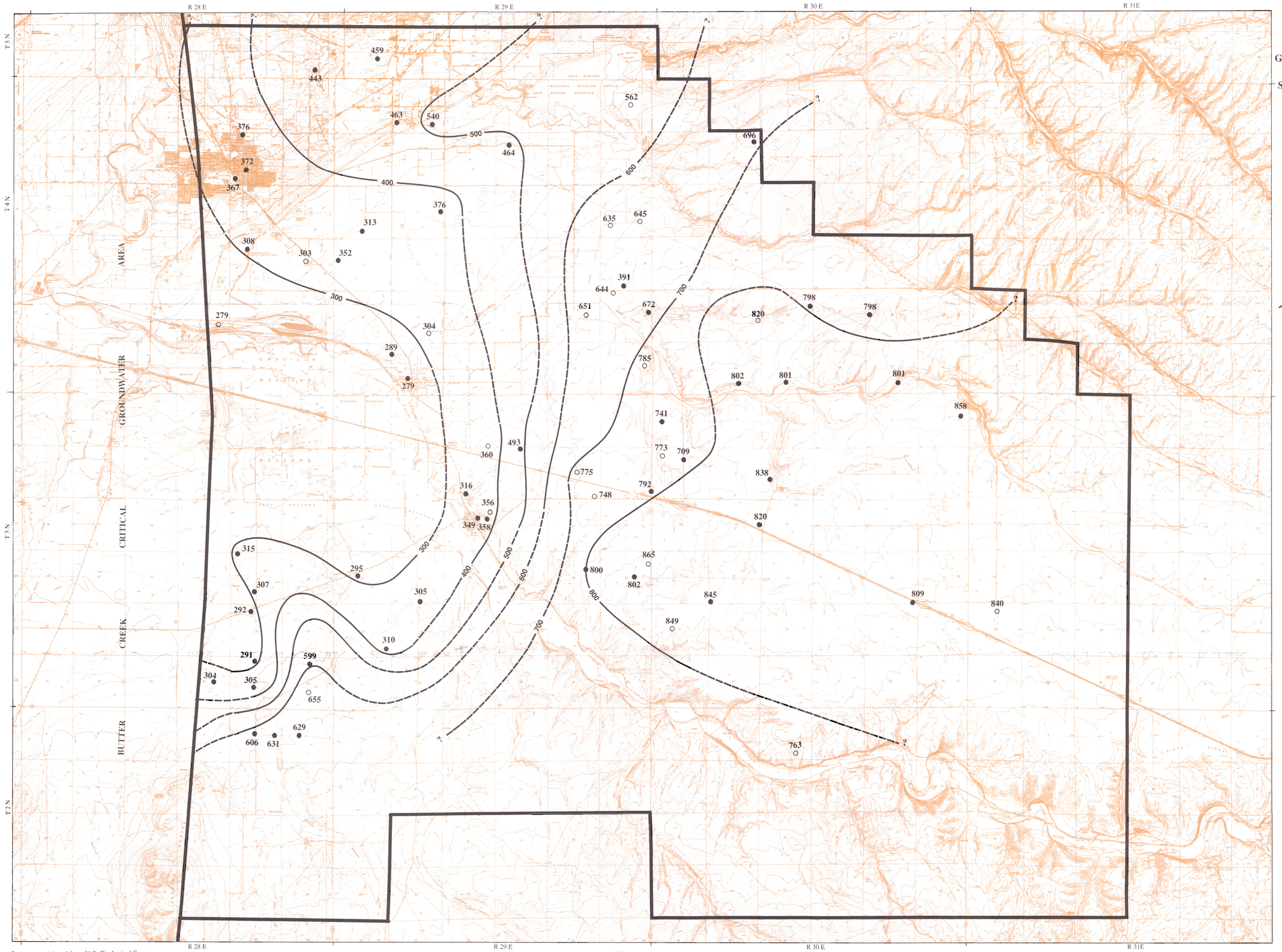
(10) Substantial thermal interference: means the spreading of the radius of thermal impact of a low-temperature geothermal production well or low-temperature geothermal injection well to intersect a surface water body or another well, or the reduction of temperature or heat flow as a result of pumping or injection, which contributes to change in groundwater or surface water temperature to an extent that one or more senior appropriators of the low-temperature resource are unable to use water for the purpose(s) designated in the associated water right.

(11) Wasteful use (of ground water): means any artificial discharge or withdrawal of ground water from an aquifer that is not put to a beneficial use described in a permit or water right, including leakage from one aquifer to another aquifer within a well bore.

Plate 1

GENERALIZED POTENTIOMETRIC SURFACE OF BASALT AQUIFERS IN THE STAGE GULCH AREA

FEBRUARY 1990



N

EXPLANATION

800 Approximate elevation of the potentiometric surface, in feet above mean sea level. Dashed where inferred. Contour interval is 100 feet.

306 Well location and approximate elevation of the water level, in feet above mean sea level, as measured in February, 1990. Open circles indicate that the elevation is inferred from prior measurements

Base map produced from U.S. Geological Survey 1: 24, 000 quadrangle maps

Contour Interval - 20 Feet

Scale 1:62,500

1 0 1 Kilometers

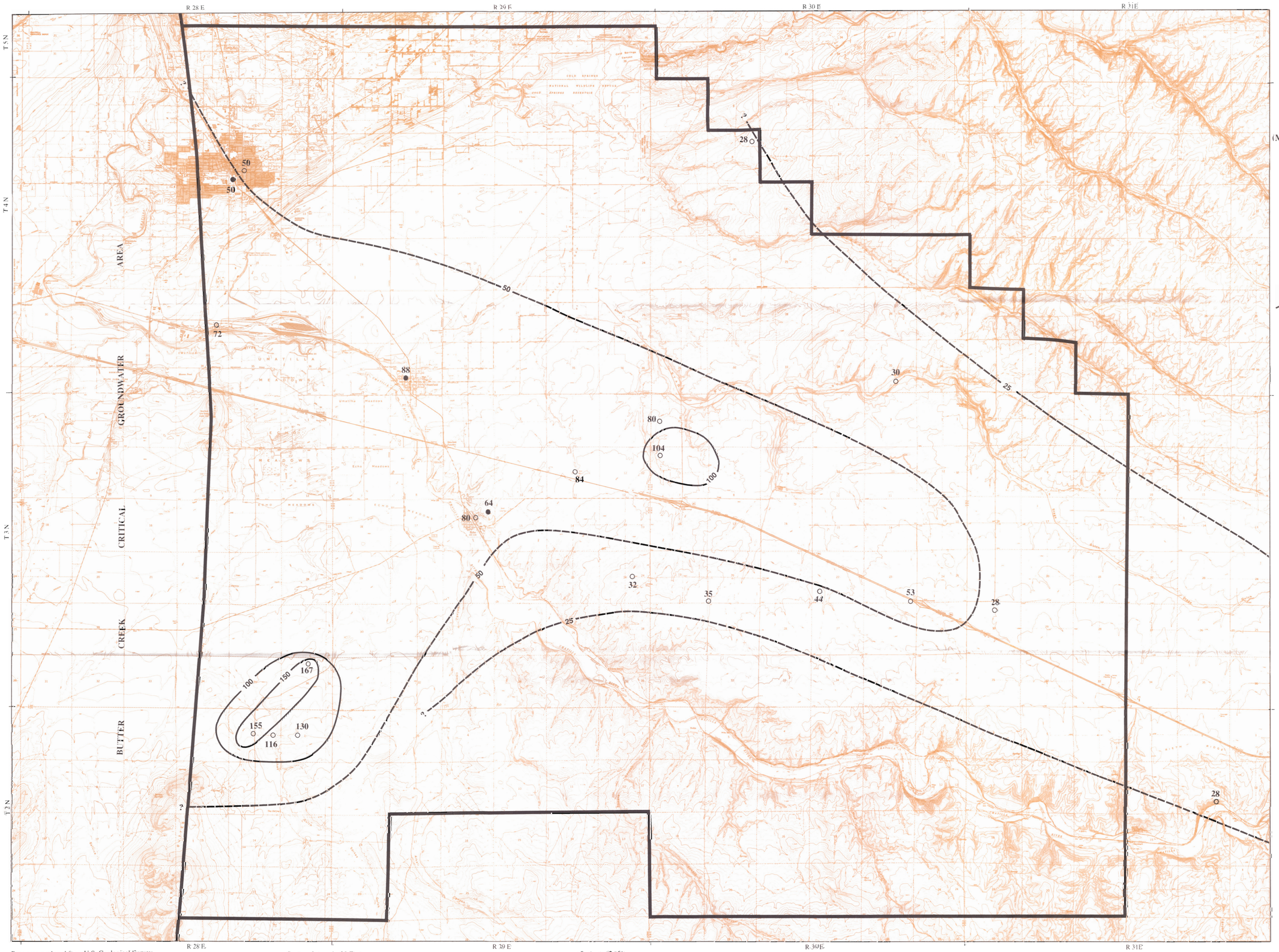
1 0 1 Miles

OREGON WATER RESOURCES DEPARTMENT 1990
Groundwater Report No. 35

Plate 2

WATER LEVEL DECLINE IN THE STAGE GULCH AREA 1965 TO 1980

(Modified from Oberlander and Miller, 1981)



EXPLANATION

25 — Approximate water level decline, in feet. Dashed where inferred. Contour interval is 25 and 50 feet.

64 — Well location and approximate decline of the water level, in feet. Open circles represent water level decline inferred from measurements made in other years.

Base map produced from U.S. Geological Survey 1: 24, 000 quadrangle maps

Contour Interval - 20 Feet

Scale 1:62,500

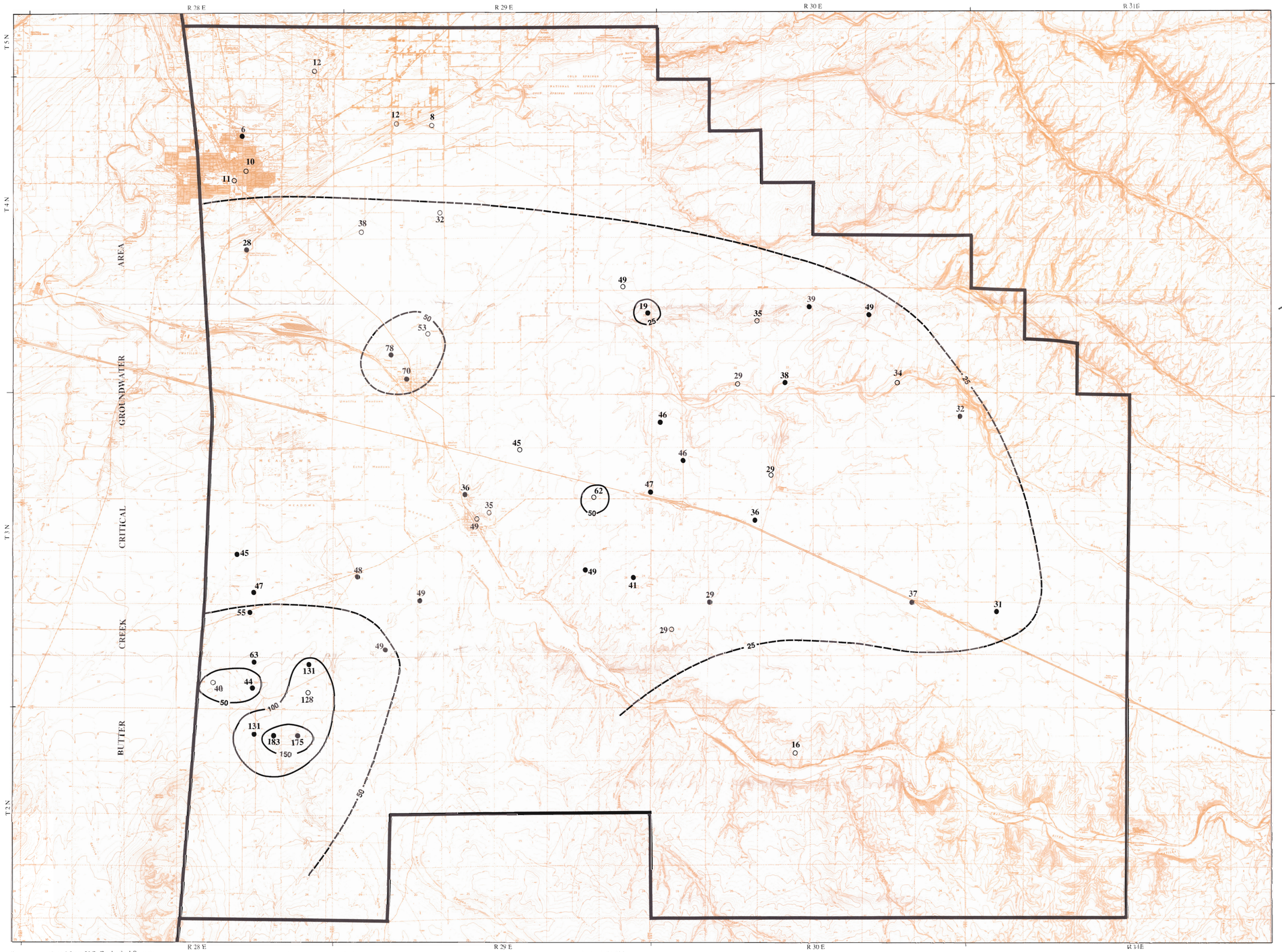
Kilometers

Miles

OREGON WATER RESOURCES DEPARTMENT 1990
Groundwater Report No. 35

Plate 3

WATER LEVEL DECLINE IN THE STAGE GULCH AREA 1980 TO 1990



N

EXPLANATION

50 — Approximate water level decline, in feet. Dashed where inferred. Contour interval is 25 and 50 feet.

● Well location and approximate decline of the water level, in feet. Open circles represent water level decline inferred from measurements made in other years.

Base map produced from U.S. Geological Survey 1: 24, 000 quadrangle maps

Contour Interval - 20 Feet

Scale 1:62,500

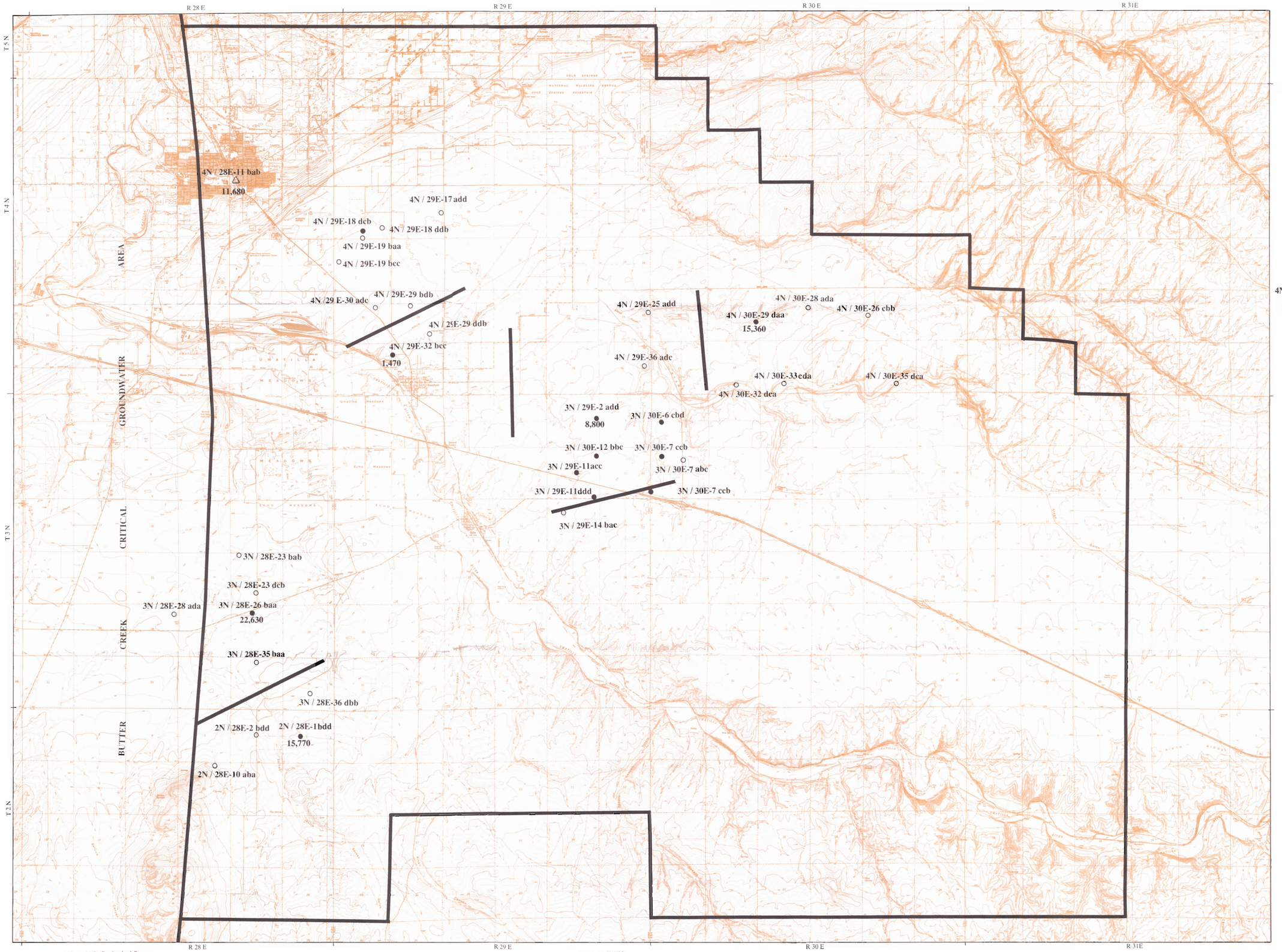
1 0 1 Kilometers

1 0 1 Miles

OREGON WATER RESOURCES DEPARTMENT 1990
Groundwater Report No. 35

Plate 4

AQUIFER TEST LOCATIONS, GROUNDWATER AGE DETERMINATIONS AND GROUNDWATER BARRIER LOCATIONS IN THE STAGE GULCH AREA



N

EXPLANATION

4N / 30E-29 daa
15,360 — Location and number of pumped well and carbon 14 age of groundwater, if determined, of water sample collected during aquifer test, in years before present

○ Observation well location and number

△ Location and number of well and carbon 14 age determination of groundwater sample, in years before present

Inferred location of groundwater barrier

Base map produced from U.S. Geological Survey 1: 24, 000 quadrangle maps

Contour Interval - 20 Feet

Scale 1:62,500

1 0 1 Kilometers

1 0 1 Miles

OREGON WATER RESOURCES DEPARTMENT 1990
Groundwater Report No. 35