

MA #172756
AWMP Plan # 04119
Due Date 10/31/04

malh

Animal Waste Management Plan

AUGUST 2004

MAAG FEEDLOT, INC.

Operated by:

ROBERT D. & MARY ANN MAAG
5244 MAAG ROAD
VALE, OREGON 97918
(541) 473-2108

Facility Address:

5244 MAAG ROAD-FEEDLOT 1
5160 MAAG ROAD-FEEDLOT 2
VALE, OREGON 97918

Operation:

Beef & Dairy Replacement Feedlot
Large Federal CAFO

As owner and operator of Maag Feedlot Inc. I intend to manage in accordance with the practices and operation and maintenance described in this Animal Waste Management Plan.

Signature Robert D Maag

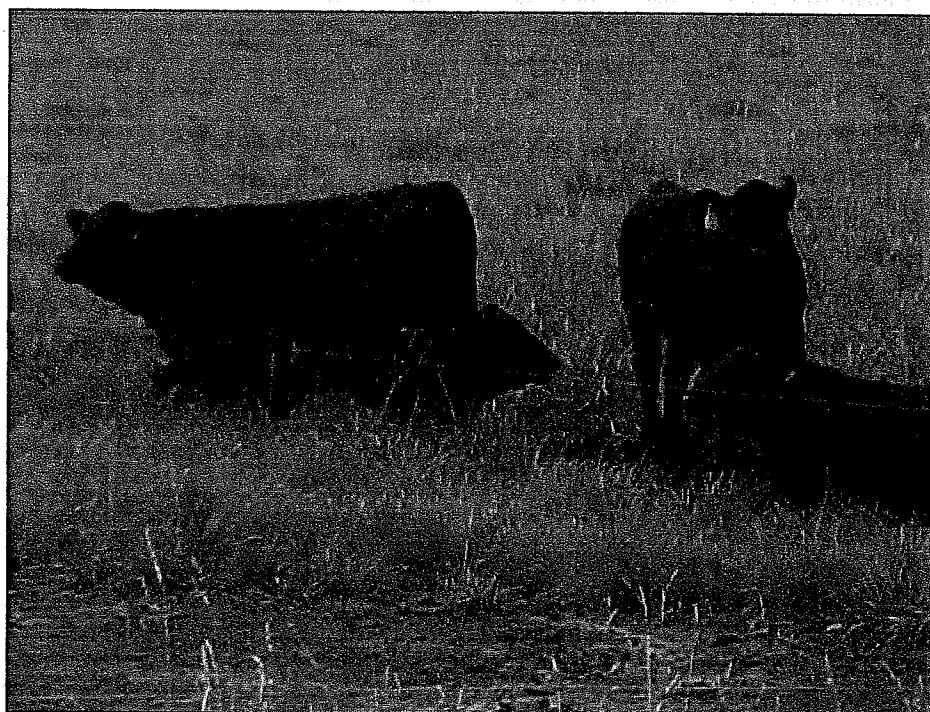
Date 9-13-2004

Signature Mary Ann Maag

Date 9-13-'04



Feedlot #1 - Looking South toward Feedlot #2



Registered Black Angus on Pasture

GENERAL NARRATIVE DESCRIPTION

Maag Feedlot Inc. is located in Jamieson, Malheur County, Oregon. Feedlot #1 is located at 5244 Maag Road and Feedlot #2 is located at 5160 Maag Road. Maag Feedlot Inc. is a corporation owned by Robert D. & Mary Ann Maag and it operates on land owned individually by Robert D. & Mary Ann Maag. Maag Feedlot is a year around operation. The majority of animals are dairy replacement heifers that are fed for JVB Dairy, Lone, Oregon. These animals are received after weaning and fed until they are heavy springers. The heifers are then returned to the dairy of origin. JVB Dairy supplies its own bulls for breeding purposes. Maag Feedlot also feeds beef animals. These animals are purchased from private sources, livestock auctions, or are the cutbacks from the Maag Angus Ranch purebred herd. These animals are finished and sent to slaughter at Tyson, Inc. in Boise, Idaho. Other animals are sent to slaughter at Swift, in Nampa, Idaho. Maag Feedlot also feeds the purebred Black Angus herd. These animals are fed in the feedlot during certain times of the year but are primarily pastured on private ground. A production sale is held annually in March to sell the bulls and some females. Maag Feedlot does not own the cattle that are fed. The population in the feedlot varies during the year but generally does not fall below 1900 head.

Manure Collection Methods

All cattle are confined in earthen pens. Wheat straw is sometimes used during colder weather for additional bedding. The manure is collected in the pens where it is dehydrated and used as bedding for the cattle. Beginning in the spring & continuing throughout the summer the pens are cleaned and the excess dry manure is hauled out of the pens to a drying area. Some manure is left in the pens, mounded and packed for bedding in the fall. In the fall after the crops are removed the excess dried manure is used as a soil amendment on certain selected open fields. The manure is hauled and spread with a Toft

manure spreader truck that evenly covers the area. The manure is spread on different fields according to their nutrient needs. Robert Maag owns approximately 600 acres of farmland that are available for spreading.

Feedlot #1 has two small evaporation ponds that are maintained to catch contaminated runoff that may occur during a large storm event. All liquid in the ponds evaporates by fall. Earthen berms are maintained around the feedlot to reduce potential for runoff during a storm. Two larger ponds are maintained to catch any additional runoff and irrigation waste water. A pump and lift system has been developed to pump water to be reused for irrigation purposes. This water does not run off the property.

Feedlot #2 has a large evaporation pond located at the bottom of the pens to catch contaminated runoff that may occur during a large storm event. An additional larger storage pond is available to catch any additional runoff. A manure pump is also owned to pump any excess water onto fields. The larger storage pond also has a pump and lift system developed to reuse water for irrigation purposes. The water does not run off the property.

Manure Storage Facilities and Transfer

The manure generated at the facility is handled in a dry solid form. Dry manure is scraped, hauled, and stacked in a large drying area and then land applied after the growing season. All manure will be contained within the facilities. Clean water is diverted around the system, except in extreme conditions, when some rainfall enters the feedlots.

Evaporation ponds are available to catch contaminated rainwater that falls on the pens. All liquid that is collected in the evaporation ponds evaporates due to the dry climate (9.97" average annual rainfall, 40.23" average annual evaporation). Solids that are collected in the ponds are cleaned out as needed. The solids are applied to open crop ground.

The solid manure is stored within the dry lots. Solid manure is transported to fields using a Toft full cover manure spreader. No manure is being exported to others at this time.

Corn silage is stored in silage pits. Feedlot #1 stores silage in a concrete floor pit and Feedlot #2 stores silage in a sealed asphalt floor pit. Each pit is covered with plastic & tires to limit shrinkage. Hay is stacked in separate stackyards located apart from each other. The hay is covered with tarps to prevent spoilage. Liquid supplement and whey are contained in storage tanks that are inspected and maintained by Performix and Evans Grain. Other feed commodities are stored in a cinderblock building, grainaries, and concrete bunkers. All leachate and contaminated runoff is contained and evaporated.

Manure Utilization

The land available for manure application is owned and/or leased by Robert D. & Mary Ann Maag. There are approximately 280 acres adjacent to the operation and an additional 300 acres that are located approximately 25 miles from the feedlot. Currently, 95 acres of alfalfa which yields 9-11 tons per acre, 186 acres of corn silage which yields 35-40 tons per acre, 15 acres of corn grain which yields 5 tons per acre, 66 acres of onions which yields 25-30 tons per acre, and 219 acres of pasture which feeds 2.5 animals per acre. The crops are used as feed in a high roughage ration for the cattle. Additional feedstuffs are imported to the feedlot.

Manure is applied via an 8 ton full coverage Toft manure spreader with a spread width of 8-10 feet. Density of coverage is controlled with speed and gear ratio. Dry manure is spread on open ground in the fall and infrequently on pasture. Fields selected for manure application are determined by field soil tests included in this report. All manure applied is worked into the soil after application. No onion acres or grain corn acres were used in manure calculations in this report at this time.

Manure is not only used for nutrient benefits, but also to improve soil tilth via the inputs of organic material. This plan is balanced for nitrogen production and use.

SPECIFIC DESCRIPTIONS AND CALCULATIONS

Land Application Areas

Aerial photos showing numbered field locations for all manure application acreage and surface water features, a topography map and a schematic of the feedlot headquarters are included in this Animal Waste Management Plan.

There are 6 soil types found on the property including, 1 Ahtanum silt loam, 12A Garbutt silt loam, 15 Harana silt loam, 27 Powder silt loam, 31 Stanfield silt loam, 34 Umapine silt loam.

Map Unit: 1 AHTANUM SILT LOAM

Description Category: SOI

The Ahtanum soil is over 60 inches deep to bedrock, a hardpan is at 20 to 40 inches. It is silty, somewhat poorly drained and occurs on floodplains. This soil is alkaline and saline. This soil is subject to flooding. A water table is present during winter and spring. This is a hydric soil.

Map Unit: 12A GARBUTT SILT LOAM, 0 TO 2 PERCENT SLOPES

Description Category: SOI

The Garbutt soil is over 60 inches deep to bedrock. It is silty, well drained and occurs on fans and terraces. This soil is alkaline. Water erosion is a potential hazard.

Map Unit: 15 HARANA SILTY CLAY LOAM

Description Category: SOI

The Harana soil is over 60 inches deep to bedrock. It is silty, moderately well drained and occurs on floodplains and fans. Permeability is slow. This soil is subject to flooding.

Map Unit: 27 POWDER SILT LOAM

Description Category: SOI

The Powder soil, rarely flooded phase, is over 60 inches deep to bedrock. It is silty, well drained and occurs on floodplains. This soil is subject to flooding. A water table is present during the winter and spring. Water and wind erosion are potential hazards.

Map Unit: 31 STANFIELD SILT LOAM

Description Category: SOI

The Stanfield soil is over 60 inches deep to bedrock, a cemented pan is at 20 to 40 inches. It is silty, moderately well drained and occurs on terraces. This soil is alkaline. A water table is present during the late winter, spring and early summer. Wind erosion is a potential hazard.

Map Unit: 34 UMAPINE SILT LOAM

Description Category: SOI

The Umapine soil, drained phase, is over 60 inches deep to bedrock. It is silty, moderately well drained and occurs on terraces and floodplains. This soil is subject to flooding. A water table is present during the winter and spring. Wind erosion is a potential hazard.

A soils map for all manure application areas are included in this Animal Waste Management Plan.

Manure and Waste Volumes

Calculated volumes of all manure, bedding, wash water, silage leachate, and contaminated storm water have been completed using an excel worksheet based from the NRCS Agricultural Waste Field Handbook. The worksheet is included in this Animal Waste Management Plan.

Nutrient Content of Manure, Little and Process Waste Water

The same excel worksheet was used to estimate volume of manure. On farm manure test results are used in the worksheet to estimate manure nutrient content.

Farm Nutrient Balance

The excel worksheet also includes calculated data for nutrient balance for the operation. Maag Feedlot is balancing for nitrogen which is the most limiting nutrient as determined by the NRCS Phosphorus Index, which indicated a Site Vulnerability Class of MEDIUM.

Application Schedule and Limitations

Solid manure is applied and incorporated into the soil primarily in the fall and early spring of each year. Manure applied to the corn ground is incorporated and planted, if applied in the spring. Manure applied to corn ground in the fall is incorporated, then the soil is worked for the corn which is planted the following spring. Manure applied to pasture ground is harrowed into the pasture. Manure applied to other ground is incorporated and planted.

Irrigation water from Vale Oregon Irrigation District, Warm Springs Irrigation District, and from irrigation wells is used on all of the manure application acreage. Siphon irrigation is used from April through October. To reduce potential for runoff and leaching, irrigation water is applied at approximately 1 inch per application. Irrigation waste water is channeled into settling ponds and pumped to the top ditches for reuse. This method utilizes water and contains runoff.

An area of concern has been addressed that needs notation. There are two draws located on either side of Feedlot #1 that are not owned by Robert Maag. The natural flow of water has been diverted toward Robert Maag and earthen burms have been built to buffer the feedlot. A plan has been filed with NRCS to fortify these buffer zones. Ron Jones has been informed of these existing conditions.

Animal Mortality Management

Deceased animals are removed from the facilities by Darling International, a local contracted company.

Record Keeping and Reporting

Soil samples will be taken in each field, once every 5 years. A manure sample will be taken yearly just prior to field application. Protocol for sampling and testing soil, manure and crops are included in this Animal Waste Management Plan. A soil sample for all fields is included in this plan.

Maag Feedlot records date and amount of manure applied to each field. As a large Federal CAFO, the following inspections will occur and records kept:

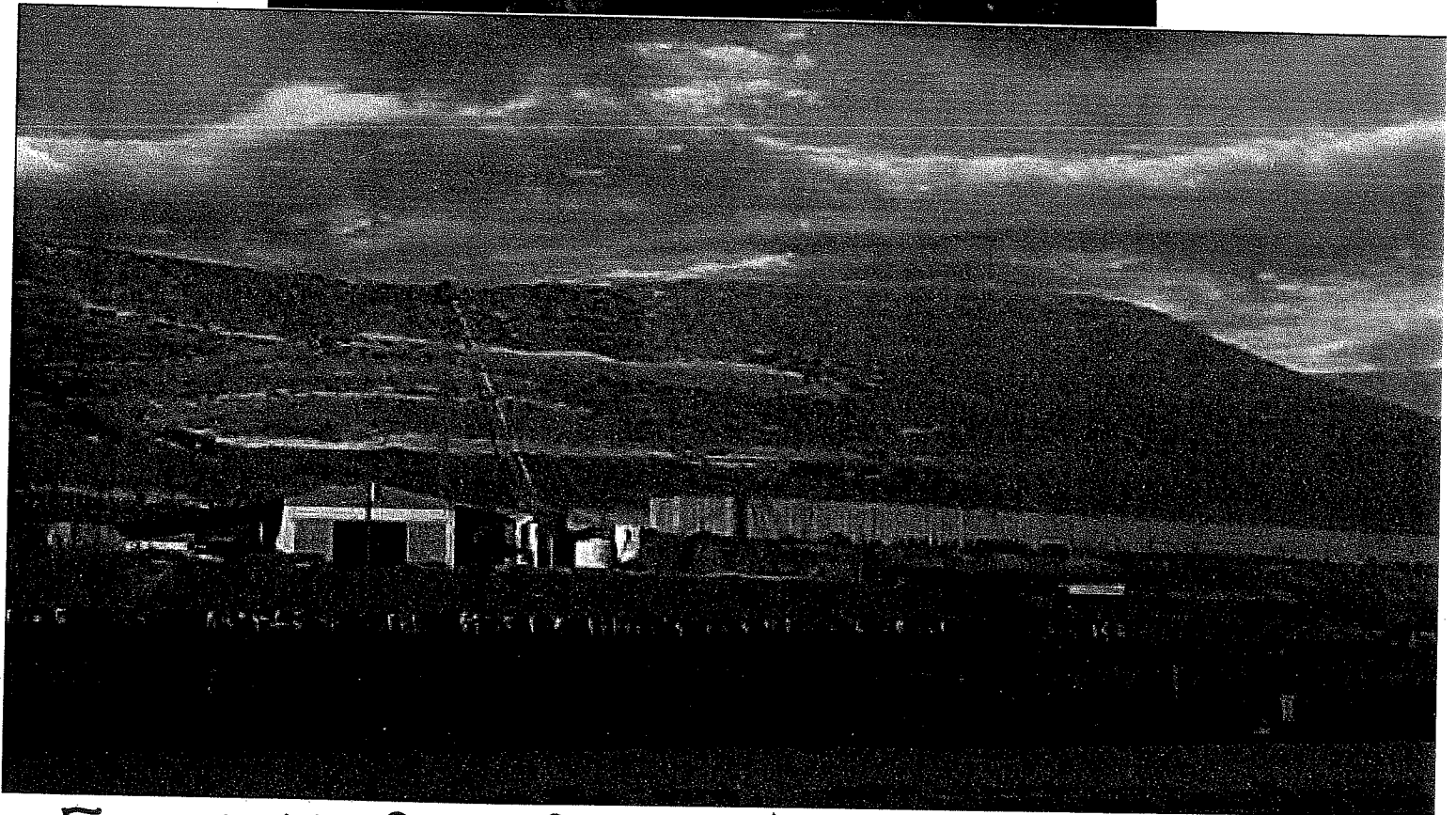
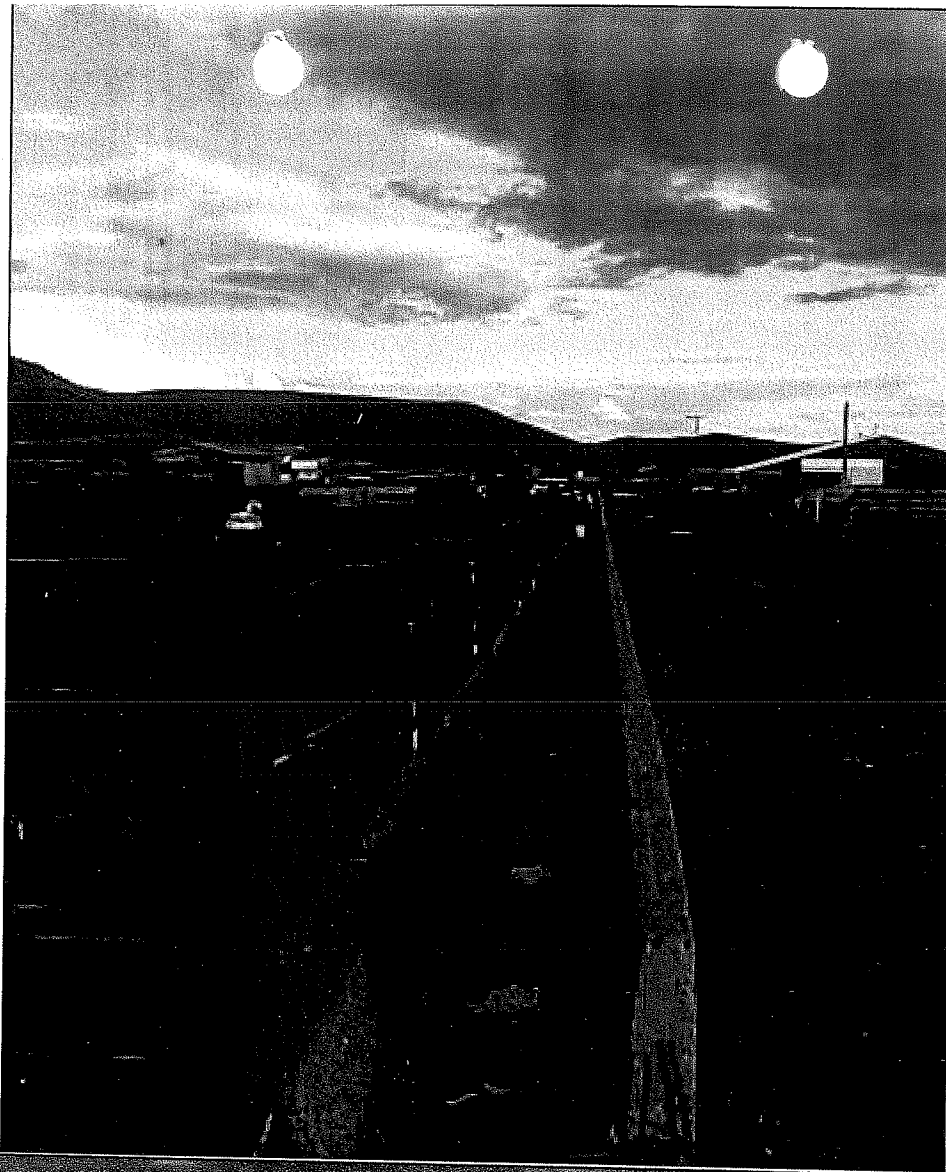
<u>INSPECTIONS:</u>	FREQUENCY OF INSPECTIONS	ITEM(S) TO BE INSPECTED
	DAILY	• Water lines
	WEEKLY	• Storm water diversions • Run-off diversions • Waste transport • Storage structures • Storage structure volume
	PERIODIC	• Application equipment leaks

Record results of:

- 1) Daily inspections.
- 2) Weekly inspections.
- 3) Periodic inspections.
- 4) Corrective actions taken, explain those not corrected.
- 5) Expected crop yields (if not in the plan).
- 6) Weather conditions at the time of manure, litter or process water application and 24 hours before and after application.
- 7) Total amount of manure or wastewater transferred to other persons, including date and amount of each transfer and the name and address of each recipient. Nutrient content data will be given to the recipient.

Maag Feedlot will report any discharge within 24 hours to the Oregon Department of Agriculture. Annual reports including amount of manure and wastewater applied and exported will be submitted each year.

Feedlot #1
Feed
Bunks



Feedlot #1 - Cattle Pens, Feeding Facilities, Stacked Hay

PHOSPHORUS INDEX WORKSHEET - EASTERN OREGON

October 2001

Highest P test
Typical practicesProducer: MaagCounty: MalheurTract No. 2196Field No(s). 14Date: 6/17/04Soil Map Unit(s): 34-umapunaSoil Test P: 58 ppmLab. Method: OlsonSample Depth: 0-12"

Crop Rotation: _____

Nutrient Application Method(s) _____

Planner: _____

Notes: _____

TRANSPORT FACTORS	Factor Weight	PHOSPHORUS LOSS RATING					Weighted Rating Value	
		None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Current	Planned
Soil Erosion - tons/ac/yr (RUSLE and/or WEQ)	1.50	* < 1 catch basins (0)	1 - 3 (1.5)	4 - 6 (3.0)	7 - 15 (6.0)	> 15 (12.0)	<u>0</u>	_____
Soil Erosion from Sprinkler Irrigation	0.25	* No sprinkler irrigation (0)	Application rate < infiltration rate OR No visible runoff at field borders (0.25)	Application rate = infiltration rate OR Little to no visible runoff at field borders (0.5)	Application rate > infiltration rate OR Visible runoff at field borders (2.0)	Application rate > infiltration rate OR Excessive runoff visible at field borders. Rills and gullies present. (4.0)	<u>0</u>	_____
Soil Erosion from Surface Irrigation - tons/ac/yr (SISL)	1.00	* < 1 catch basins (0)	1 - 3 OR tail water return flow in place (1.0)	4 - 6 (2.0)	7 - 15 (4.0)	> 15 (8.0)	<u>0</u>	_____
Runoff Class	1.00 - nonirrigated 0.50 - irrigated	Negligible (0)	* Very low or low (0.5 IRR, 1.0 NIRR)	Medium (1.0 IRR, 2.0 NIRR)	High (2.0 IRR, 4.0 NIRR)	Very High (4.0 IRR, 8.0 NIRR)	<u>0.5</u>	_____
Distance to Perennial Surface Waters / Buffer Widths	0.50	* > 500 feet OR buffer > 30 ft. wide (or meets NRCS standards) next to surface waters (0)	300 - 500 feet OR buffer 20 - 30 ft. wide next to surface waters (0.5)	200 - 299 feet OR buffer 10 - 19 ft. wide next to surface waters (1.0)	100 - 199 feet AND buffer < 10 ft. wide next to surface waters (2.0)	No buffer next to surface waters OR Return flow from surface irrigation occurs with no buffer (4.0)	<u>0</u>	_____

PHOSPHORUS INDEX WORKSHEET - EASTERN OREGON

October 2001 2

Subsurface Drainage	0.50	No tile drains * (0)	Tile drains present Soil Test P (Olsen) < 40 ppm (0.5)	Tile drains present Soil Test P (Olsen) 40 - 120 ppm (1.0)	Tile drains present Soil Test P (Olsen) 121 - 170 ppm (2.0)	Tile drains present Soil Test P (Olsen) > 170 ppm (4.0)	Transport Factors Subtotal (TFS)
							0.5

Tract 296 Fields 14

PHOSPHORUS LOSS RATING							Weighted Rating Value	
SOURCE FACTORS	Factor Weight	None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Current	Planned
Soil Test P - 0-12" ppm (Olsen NaHCO ₃)	1.00	(Soil Test P - 20) x 0.10 = <u>58</u> - 20 x 0.10 = <u>3.8</u> Assign 0 points if Soil Test P < 20 ppm					<u>3.8</u>	
Commercial P Fertilizer Application Rate	1.00	no phosphorus is applied based on soil test lbs/ac P ₂ O ₅ x 0.02 = <u>0</u> x 0.02 = <u>0</u>						<u>0</u>
Commercial P Fertilizer Application Method	1.00	None Applied *	Placed with planter OR Injected deeper than 2 inches OR Incorporated by plowing (1.0)	Incorporated deeper than 3 inches by disking, chiseling, etc. (2.0)	Incorporated less than 3 inches deep by harrowing, etc. (4.0)	Surface applied - not incorporated prior to irrigation or winter precipitation (8.0)	<u>0</u>	
Organic P Source Application Rate	1.00	lbs/ac P ₂ O ₅ x 0.02 = <u>140</u> x 0.02 = <u>2.8</u>						<u>2.8</u>
Organic P Source Application Method	1.00	None Applied (0)	Injected deeper than 2 inches OR Incorporated immediately (1.0)	Incorporated deeper than 3 inches by disking, chiseling, etc. within 5 days of application (2.0)	Incorporated less than 3 inches deep by harrowing, etc. within 21 days of application (4.0)	Surface applied - not incorporated prior to irrigation or winter precipitation (8.0)	<u>1.0</u>	

Total Rating Value TFS x SFS	Site Vulnerability Class
---------------------------------	--------------------------

Current		Planned	
Transport Factors Subtotal (TFS)		<u>0.5</u>	
Source Factors Subtotal (SFS)		<u>7.6</u>	

OREGON

October 2001

< 30	Low
30 – 100	Medium
100 – 400	High
> 400	Very High

PHOSPHORUS INDEX WORKSHEET – EASTERN

2

Total Rating Value (TFS x SFS)	3.8	
Site Vulnerability Class	Low	

WATER, WASTE, AND NUTRIENT COMPUTATIONS

Number of Animals

	Animals	Avg. Weight lb	Total 1000# Animal Units	Confinement Period (Days)
1	3000	850	2550	365
2	0	0	0	0
Total	3000	850	2550	

Solid Storage (Feedlot pen size)

Feedlot 1	20	Acres
Feedlot 2	12	Acres
	0	Acres

Total acres

32

Evaporation Ponds for storm runoff

	Length in feet	Width in feet	Depth in feet	Total cubic feet	Acre Inches of Storage
Feedlot 1 a	100	50	10	50000	13.77
Feedlot 1 b	150	50	10	75000	20.66
Feedlot 1 c	150	100	15	225000	61.98
Feedlot 1 d	200	100	15	300000	82.64
Feedlot 2 a	750	50	7	262500	72.31
Feedlot 2 b	100	75	6	45000	12.40
Feedlot 2 c	150	75	15	168750	46.49
Total				1126250	310.26

Manure Produced

Total weight and volume of manure produced during confinement

*Estimated values from NRCS Agricultural Waste Management Handbook)

	lb/day/Animal Unit	Total Weight ton (as excreted)	Total Weight ton (at application)
1	51.2	23827	7148
2	0.0	0	0
Total		23827	7148

	Cu ft/day/Animal Unit	Total Volume Cu ft
1	0.82	763215
2	0	0
Total		763215

Total Nutrient Production

*Estimated values from NRCS Agricultural Waste Management Handbook

	Nutrients Produced lb/day	Total Nutrients Produced lb
Nitrogen	0.17	155435
Phosphorus	0.04	37230
Potassium	0.26	241995

Nutrient Losses

*Estimate from NRCS ORAWM Program and OSU Extension Publication EC 1094

Loss	Remaining N	Remaining P	Remaining K
Storage	50%	70%	60%
Application	70%	100%	100%
Denitrification	95%	100%	100%

Loss	Remaining N lbs	Remaining P lbs	Remaining K lbs	
Storage	77718	26061	145197	
Application	54402	26061	145197	
Denitrification	51682	26061	145197	Available for crop production

Nutrients Utilized

*Estimate from NRCS ORAWM Program

Crop	Acres	Yield Units per acre	Yield	N Utilized (lbs/acre)	P Utilized (lbs/acre)	K Utilized (lbs/acre)
Alfalfa	66	ton	9	405	91	293
Corn, silage	186	ton	32	246	128	294
Pasture	219	ton	4	179	49	137
				0	0	0
Total	471					

Volume and Nutrients Exported

0% of manure is exported to neighboring farmers

Exported tons	N exported lbs	P exported lbs	K exported lbs
0	0	0	0

Nutrients remaining for crop production on farm **after** export

Remaining N lbs	Remaining P lbs	Remaining K lbs
51682	26061	145197

Crop Utilization

Crop	Acres needed	lbs of N applied	lbs of P applied	lbs of K applied
Alfalfa	66	26730	6006	19338
Corn, silage	186	45756	23808	54684
Pasture	219	39201	10731	30003
	0	0	0	0
Total	471	111687	40545	104025

Gross Nutrient Balance	Acres	lbs of N	lbs of P	lbs of K
	0	-60005	-14484	41172

Climatic and Hydrologic Data

Climatic Station- Malheur Branch Experiment Station

25 year- 24 hour storm rainfall inches

Month	Average Monthly in Inche Precipitation-			% Lot Runoff Factors	
	Precipitation	Evaporation	Evaporation	Concrete*	Unpaved
January	1.26	0.74	0.52	100	0
February	0.98	1.09	-0.11	100	0
March	0.92	2.06	-1.14	100	0
April	0.70	3.79	-3.09	100	0
May	0.98	5.12	-4.14	100	0
June	0.83	6.08	-5.25	100	0
July	0.19	7.62	-7.43	100	0
August	0.38	6.51	-6.13	100	0
September	0.49	4.03	-3.54	100	0
October	0.71	1.98	-1.27	100	0
November	1.21	0.50	0.71	100	0
December	1.32	0.71	0.61	100	0
Annual	9.97	40.23			

*No concrete lot runoff contributing to the manure system.

storage needed to contain the entire 25 year 24 hour event onsite

acre inches

acre feet

cubic feet of storage

minus existing storage=

Needed Storage

P.O. Box 1020
211 Highway 95
Parma, ID 83660

WESTERN LABORATORIES, INC.

John P. Taberna, Soil Scientist

208-722-6564
800-658-3858
FAX 208-722-6550

Compost, Manure & Humus Testing

Dealer No: Paid

Name: Robert Maag

5244 Hill Rd.

Vale

OR

97918

Grower: Robert D. Maag

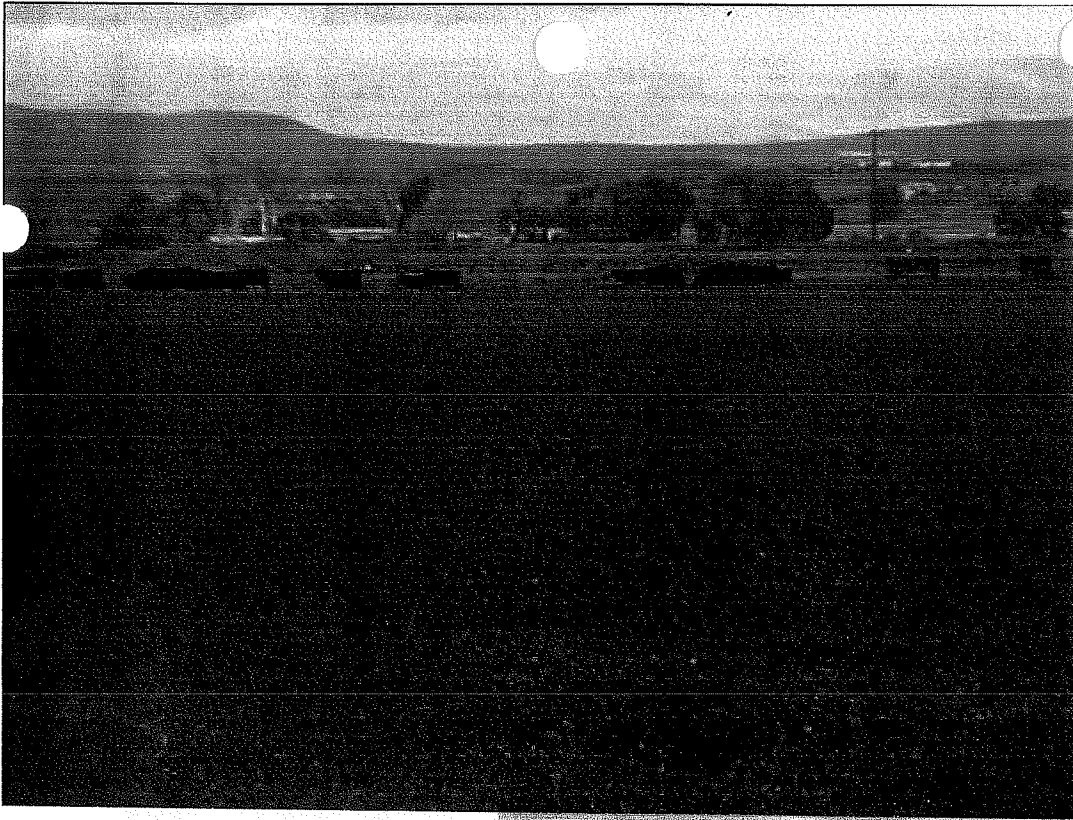
Field ID: Manure

Reported: 6/24/2004

Lab No: 303760

Test #: 15

	100% DRY	AS SPREAD	POUNDS/TON
pH	9.3		
EC - mmhos (SS)	4.4		
Dry Matter- Percent	93.06		
Moisture - Percent	6.94		
Carbon - Percent	29.0		
Nitrogen - Percent	1.67	1.55	31
Nitrates-PPM			
Phosphorus - Percent	0.40	0.370	7.400
Potassium - Percent	2.60	2.420	48.400
Calcium - Percent	1.70	1.580	31.600
Magnesium - Percent	0.48	0.450	9.000
Sodium - Percent	0.47	0.440	8.800
sulfur- percent	0.56	0.520	10.400
		OUNCES	OUNCES/TON
Zinc - ppm	86.0	12.810	0.030
Copper - ppm	18.0	2.680	0.010
Manganese - ppm	274.0	40.800	0.080
Iron - ppm	5088.0	757.580	1.520
Boron - ppm	48.3	7.190	0.010
Carbon to Nitrogen Ratio	Ideal 20:1	17:1	
Compost Maturity	MATURE		



Alfalfa Hay -
4th Cutting
Growing
(Cattle on
Pasture in
Background)

Vale 
Farm 

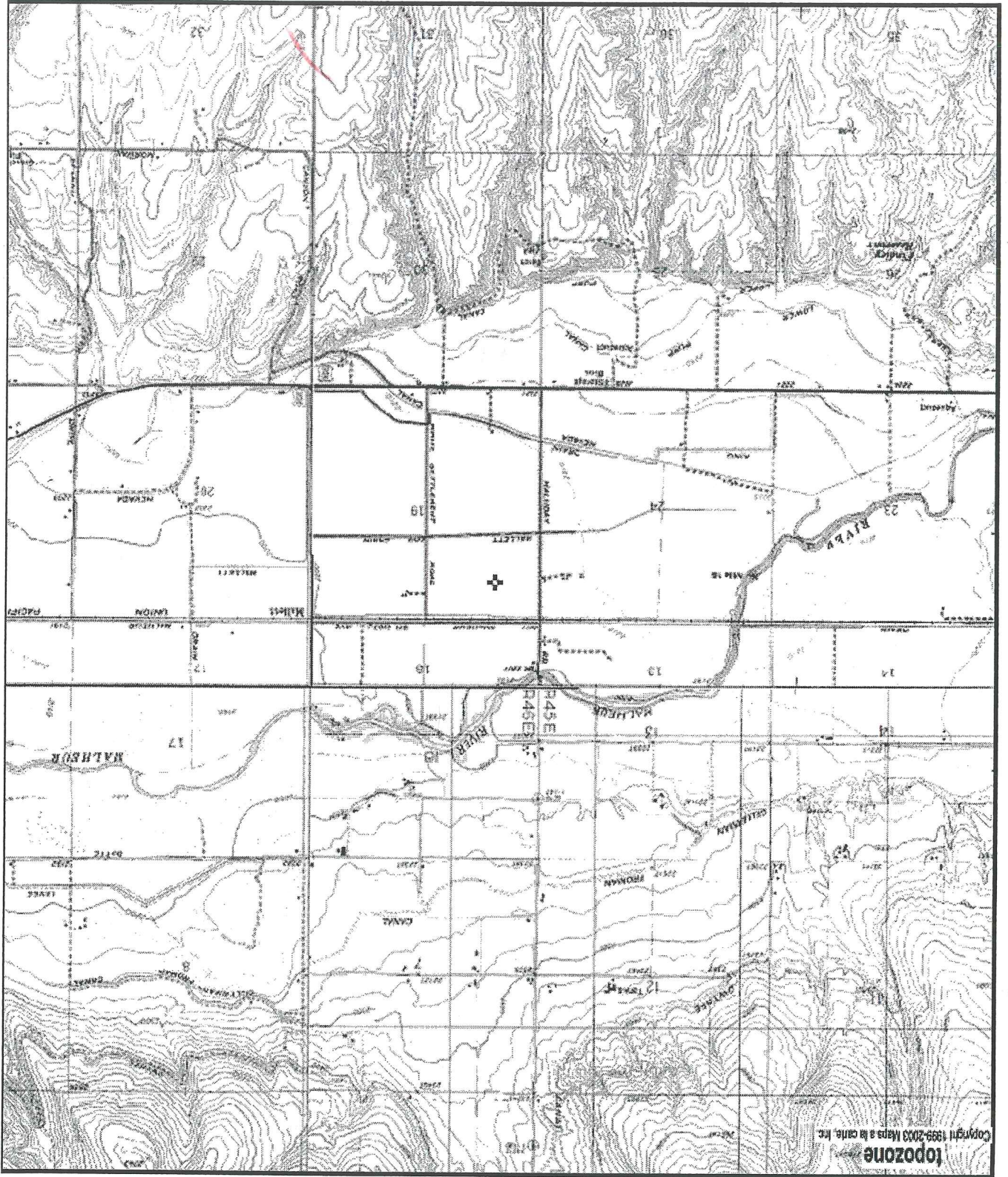



Yellow Onions -
Ready to
be
Harvested



Cattle Grazing

Vale Farm

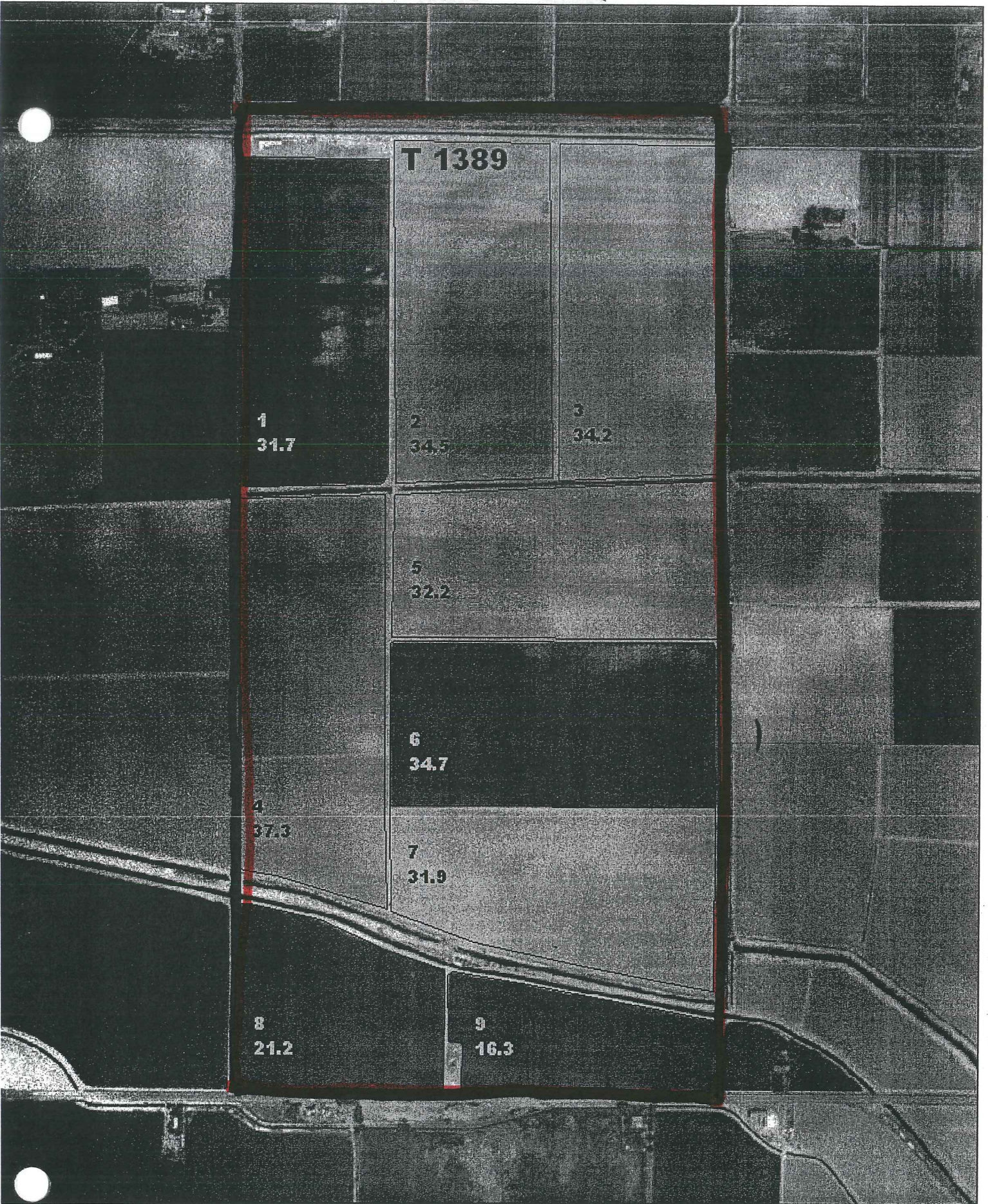


0 0.5 1 1.5 2 2.5 mi
0 0.7 1.4 2.1 2.8 3.5 km

Map center is UTM 11 488606E 4871194N (WGS84/NAD83)
Vale East quadrangle
Projection is UTM Zone 11 NAD83 Datum

M=15.857
G=-0.099





Map of Tract #1389
Malheur County



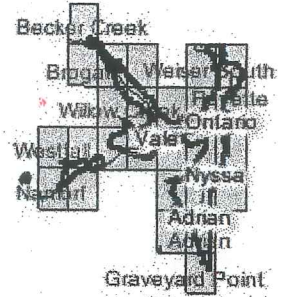
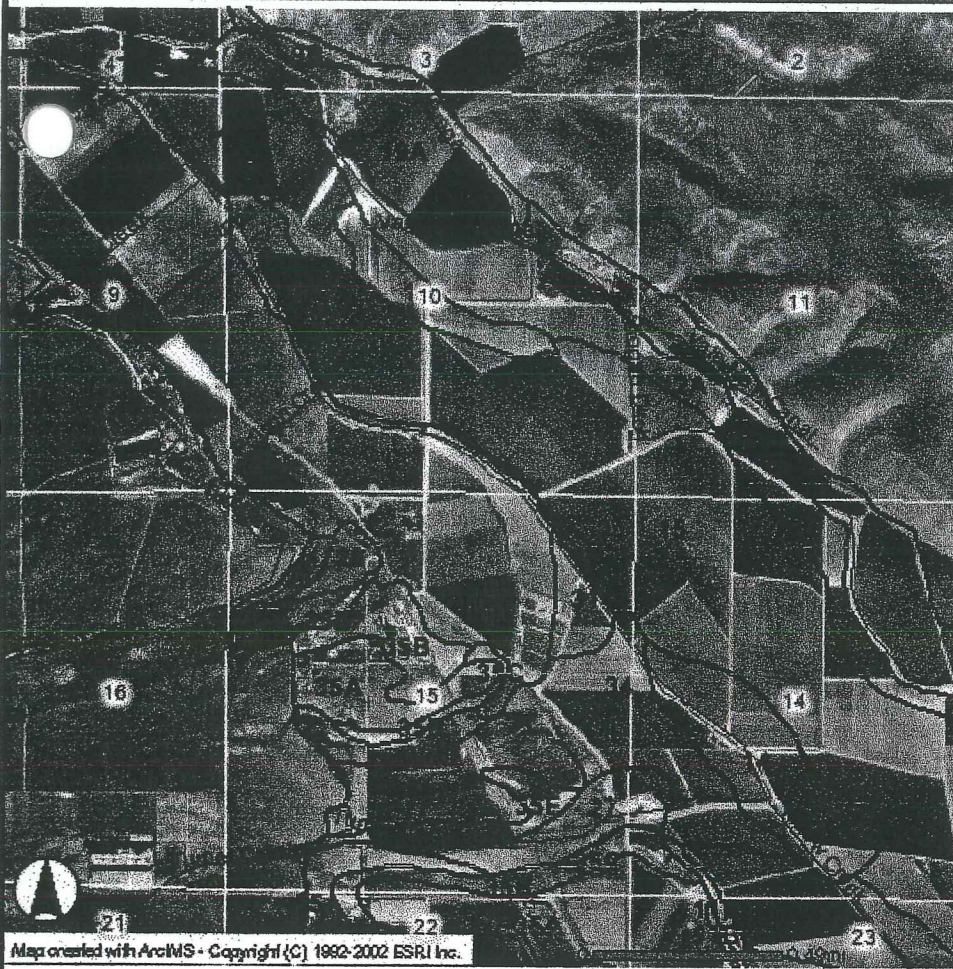
0.0
HEL, NHEL

Calculated Acres
Status - NH
Wetland



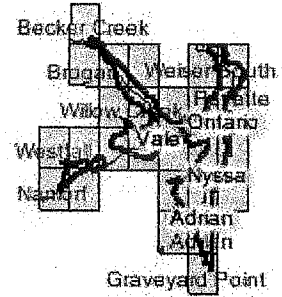
Map Printed: Jan 11, 2004

ArcIMS HTML Viewer Map



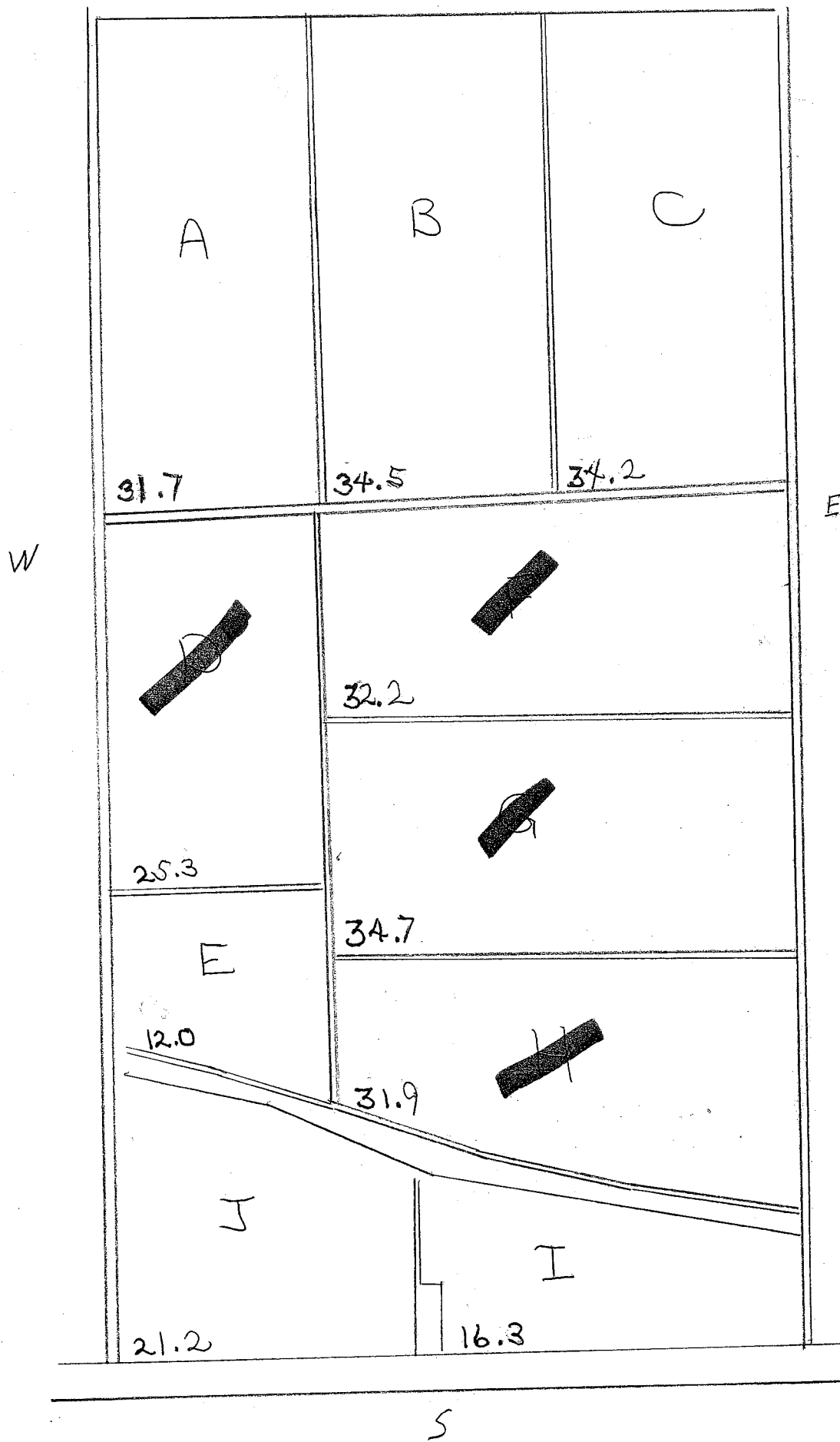
- Legend**
- soils
 - plss
 - streams
 - airphoto.sid

ArcIMS HTML Viewer Map



- Legend**
- soils
 - plss
 - streams
 - airphoto.sid

Map created with ArcIMS - Copyright (C) 1992-2002 ESRI Inc.



updated
2004

Western Laboratories, Inc.

211 Highway 95 • P.O. Box 1020 • Parma, ID 83660
800-658-3858 • FAX 208-722-6550
http://www.westernlaboratories.com

Dealer: 2-4 Tim
Reported: 9/24/2002
Test #: 1

Grower: Robert D. Maag

Field ID: Pennington #2

Lab #
27750
SV #

John P. Taberna
Soil Scientist

COMMERCIAL SOIL REPORT

pH	Soluble Salts	Lime
WATER	ECe	PERCENT
7.4	0.85	.2
Slightly Basic	Good	Very Low

Organic Matter	Nitrates	Phosphorus
PERCENT	ppm	BICARB
1.3	60	11
Low	Very High	Low

Potassium	Calcium	Aluminum	Magnesium
ppm	ppm	ppm	ppm
208	2436	2.4	521
Medium	Medium	OK	Medium

Sodium	Chlorides	Zinc	Manganese
ppm	ppm	ppm	ppm
129		2.5	7
Medium		Good	High

Iron	Copper	Sulfate	Boron
ppm	ppm	ppm	ppm
226	0.6	22	0.4
High	Low	Adequate	Low

Texture	Sandy Loam
Cation Exchange Capacity	11 Low
% Base Saturation	100 Very High

BASES	IDEAL	YOURS
Calcium (Ca)	65 - 80%	111
Magnesium (Mg)	10 - 20%	39
Potassium (K)	2 - 6%	5
Sodium (Na)	< 5%	5
Aluminum (Al)	< 8 ppm	2.4
Hydrogen (H)	< 15%	

IDEAL MICRONUTRIENT LEVEL	YOURS
Zinc (Zn)	1.5 - 3.0 2.5
Manganese (Mn) - pH > 7	5 - 20 7
Manganese (Mn) - pH < 7	10 - 55
Copper (Cu)	1.0 - 2.5 .6
Iron (Fe) - pH > 7	5 - 35 226
Iron (Fe) - pH < 7	15 - 135
Boron (B)	8 - 1.5 .4

Nutrient Suggestions in Pounds per Acre		
Crop	Alfalfa	Alfalfa
Yield Goal	8	10
Past Crop	Onions	
Acres	32	
Nitrogen		
Phosphate	232	312
Potash	152	242
Sulfates	20	36
El Sulfur	24	
Gypsum		
Lime		
Magnesium		
Zinc	2	5
Iron		
Manganese		2
Copper	2	3
Boron	2	3

Your Applications	
Pre-Plant	Post-Emerge
300	
150	
100	
2	
2	
2	

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	3:1	OK	
Ca:Mg	8-20:1	5:1	Low	Add Calcium
Ca:K pH > 7	15:1	12:1	OK	
Ca:K pH < 7	10:1	:1		
Ca:P pH > 7	150:1	221:1	High	Add Phosphorus
Ca:P pH < 7	40:1	:1		
P:Zn	15:1	4:1	OK	
P:Mn	4:1	2:1	OK	
P:Cu	25:1	18:1	OK	
Zn:Cu	2:1	4:1	High	Add Copper
Mn:Zn	3:1	3:1	OK	
Mn:Cu	5:1	12:1	High	Add Copper
K:B	200:1	520:1	High	Add Boron
Mg:K	2:1	3:1	High	Add Potassium

	1st Foot	2nd Foot	3rd Foot	4th Foot
Nitrates - ppm	60			
Ammonium - ppm				

East Alfalfa
West corn
Middle field

Stubble field

SPRAY

35 ALFALFA

Mike

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Dealer: 2-4 Tim
 Reported: 9/30/2003
 Test #: 1

Grower: Robert D. Maag
 Field ID: 2-4-0

Lab #:
36671

SV #:

COMMERCIAL SOIL REPORT

pH	Soluble Salts	Organic Matter	Lime
SOIL	ECe	PERCENT	PERCENT
8.4	0.41	1.6	0.5
Moderately Basic	841	51,200	16,000

Nitrates - N	Ammonium - N	Phosphorus
ppm	ppm	BICARB BRAY
18		17
POUNDS PER ACRE FOOT		
58		54

Potassium	Calcium	Magnesium	Sodium
ppm	ppm	ppm	ppm
506	2907	446	248
MILLI-EQUIVALENTS PER 100 GRAMS			
1.30	14.54	3.72	1.08
POUNDS PER ACRE FOOT			
1,619	9,302	1,427	794

Zinc	Iron	Manganese	Copper
ppm	ppm	ppm	ppm
2.6	3	6	0.3
POUNDS PER ACRE FOOT			
8.32	9.60	19.20	0.96

Sulfate - S	Boron	Texture
ppm	ppm	
25	1.6	Sandy Loam
POUNDS PER ACRE FOOT		
80.00	5.12	

Cation Exchange Capacity - CEC	12
Analyzed CEC	
Sum of Cations - CEC	21
Calculated CEC	

Percent Base Saturation	172
-------------------------	-----

BASES	IDEAL	YOURS
Calcium - % of CEC	65-80%	121
Magnesium - % of CEC	10-20%	31
Potassium - % of CEC	2-6%	10.8
Sodium - % of CEC	< 5%	9
Hydrogen - % of CEC	< 15%	

Nutrient Suggestions In Pounds per Acre		
Crop	Pasture	Pasture
Yield Goal	5	10
Past Crop	Onions	
Acres	24	
Nitrogen	35	135
Phosphate		4
Potash		
Sulfates		
Elemental Sulfur	157	
Gypsum		
Lime		
Magnesium		
Zinc		
Iron		
Manganese		
Copper		2
Boron		1

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	1:1	OK	
Ca:Mg	6-20:1	7:1	OK	
Ca:K pH >7	15:1	6:1	OK	
Ca:K pH <7	10:1	:1		
Ca:P pH >7	100:1	171:1	High	Watch P
Ca:P pH <7	40:1	:1		
P:Zn	15:1	7:1	OK	
P:Mn	4:1	3:1	OK	
P:Cu	25:1	57:1	High	Watch Cu
Zn:Cu	2:1	9:1	High	Watch Cu
Mn:Zn	3:1	2:1	OK	
Mn:Cu	5:1	20:1	High	Watch Cu
K:B	200:1	316:1	High	Watch B
Mg:K	2:1		Low	Watch Mg

05/05/2004 05:38 FAX

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Growth: Robert D. Maag

Field ID: E

Dealer: 2-4 Tim
Reported: 5/5/2004
Test #: 2

Lab #:

42120

SV #:

COMMERCIAL SOIL REPORT

pH	Soluble Salts	Organic Matter	Lime
8.2	0.17		
Moderately Basic	349		

Nitrates - N	Ammonium - N	Phosphorus
ppm	ppm	ppm
6	1	9
POUNDS PER ACRE FOOT		
16	3	29

Potassium	Calcium	Magnesium	Sodium
ppm	ppm	ppm	ppm
489			
MILLI-EQUIVALENTS PER 100 GRAMS			
1.20			
POUNDS PER ACRE FOOT			
1.501			

Zinc	Iron	Manganese	Copper
ppm	ppm	ppm	ppm
POUNDS PER ACRE FOOT			

Sulfate - S	Boron	Texture
ppm	ppm	
POUNDS PER ACRE FOOT		

Cation Exchange Capacity - CEC	Analyzed CEC
Sum of Cations - CEC	1
Calculated CEC	

Percent Base Saturation		?
BASES	IDEAL	YOURS
Calcium - % of CEC	65-80%	
Magnesium - % of CEC	10-20%	
Potassium - % of CEC	2-6%	?
Sodium - % of CEC	< 5%	
Hydrogen - % of CEC	< 15%	

Nutrient Suggestions in Pounds per Acre		
Crop	Pasture	Pasture
Yield Goal	5	10
Past Crop	Pasture	
Acres	12	
Nitrogen	78	178
Phosphate		68
Potash		
Sulfates		
Elemental Sulfur		
Gypsum		
Lime		
Dolomite		
Magnesium		
Zinc		
Iron		
Manganese		
Copper		
Boron		

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	?:1		
Ca:Mg	6-20:1	?:1		
Ca:K pH >7	15:1	0:1	OK	
Ca:K pH <7	10:1	?:1		
Ca:P pH >7	100:1	0:1	OK	
Ca:P pH <7	40:1	?:1		
P:Zn	15:1	?:1		
P:Mn	4:1	?:1		
P:Cu	25:1	?:1		
Zn:Cu	2:1	?:1		
Mn:Zn	3:1	?:1		
Mn:Cu	5:1	?:1		
K:B	200:1	?:1	OK	
Mg:K	2:1	0:1	Low	Watch Mg

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Dealer: 2-4

Tim

Reported: 9/30/2003

Test #: 1

Grower: Robert D. Maag

Field ID: ~~B~~ F

Lab #:

36674

SV #:

COMMERCIAL SOIL REPORT

pH		Soluble Salts	Organic Matter	Lime
SOIL	BUFFER	EC	PERCENT	PERCENT
8.3		0.65	1.7	0.5
Moderately Basic		1,333	54,400	16,000

Nitrates - N		Ammonium - N	Phosphorus	
ppm		ppm	BICARB	BRAY
39			17	
POUNDS PER ACRE FOOT				
125			54	

Potassium	Calcium	Magnesium	Sodium
ppm	ppm	ppm	ppm
393	2608	333	444
MILLI-EQUIVALENTS PER 100 GRAMS			
1.01	13.04	2.78	1.93
POUNDS PER ACRE FOOT			
1,258	8,346	1,066	1,421

Zinc	Iron	Manganese	Copper
ppm	ppm	ppm	ppm
0.8	3	8	0.3
POUNDS PER ACRE FOOT			
2.56	9.60	25.60	0.96

Sulfate - S	Boron	Texture	
ppm	ppm	Sandy Loam	
35	1.9		
POUNDS PER ACRE FOOT			
112.00	6.08		

Cation Exchange Capacity - CEC Analyzed CEC	12
Sum of Cations - CEC Calculated CEC	19

Percent Base Saturation	156
-------------------------	-----

BASES	IDEAL	YOURS
Calcium - % of CEC	65-80%	109
Magnesium - % of CEC	10-20%	23
Potassium - % of CEC	2-6%	8.4
Sodium - % of CEC	< 5%	16.1
Hydrogen - % of CEC	< 15%	

Nutrient Suggestions In Pounds per Acre		
Crop	Corn Silage	Corn Silage
Yield Goal	35	40
Past Crop	Onions	
Acres	31	
Nitrogen	140	180
Phosphate	109	144
Potash		47
Sulfates		
Elemental Sulfur	225	
Gypsum		
Lime		
Magnesium		
Zinc	7	9
Iron		
Manganese		
Copper	1	2
Boron		

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	1:1	OK	
Ca:Mg	6-20:1	8:1	OK	
Ca:K pH >7	15:1	7:1	OK	
Ca:K pH <7	10:1	:1		
Ca:P pH >7	100:1	153:1	High	Watch P
Ca:P pH <7	40:1	:1		
P:Zn	15:1	21:1	High	Watch Zn
P:Mn	4:1	2:1	OK	
P:Cu	25:1	57:1	High	Watch Cu
Zn:Cu	2:1	3:1	High	Watch Cu
Mn:Zn	3:1	10:1	High	Watch Zn
Mn:Cu	5:1	27:1	High	Watch Cu
K:B	200:1	207:1	High	Watch B
Mg:K	2:1	1:1	Low	Watch Mg

80
120
40

225

7

1

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Dealer: 2-4

Tim

Reported: 9/24/2003

Test #: 1

Grower: Robert D. Magg

Field ID: 

Lab #:

36386

SV #:

COMMERCIAL SOIL REPORT

pH		Soluble Salts	Organic Matter	Lime
SOIL	BUTTER	1 Ca	PERCENT	PERCENT
8.2		0.30	1.5	0.2
		515	48,000	6,400

Nitrate - N	Ammonium - N	Phosphorus	
ppm	ppm	DICARB	BRAY
4	1	17	
POUNDS PER ACRE FOOT			
13	3	54	

Potassium	Calcium	Magnesium	Sodium
ppm	ppm	ppm	ppm
505	2840	464	125
MILLI-EQUIVALENTS PER 100 GRAMS			
1.29	14.20	3.87	0.54
POUNDS PER ACRE FOOT			
1,616	9,088	1,485	400

Zinc	Iron	Manganese	Copper
ppm	ppm	ppm	ppm
0.8	3	3	0.5
POUNDS PER ACRE FOOT			
2.56	9.60	9.60	1.60

Sulfate - S	Boron	Texture
ppm	ppm	Loam
18	1.0	
POUNDS PER ACRE FOOT		
57.60	3.20	

Cation Exchange Capacity - CEC	16
Analyzed CEC	
Sum of Cations - CEC	20
Calculated CEC	

Percent Base Saturation		124
BASES	IDEAL	YOURS
Calcium - % of CEC	65-80%	89
Magnesium - % of CEC	10-20%	24
Potassium - % of CEC	2-6%	8.1
Sodium - % of CEC	< 5%	3.4
Hydrogen - % of CEC	< 15%	

Nutrient Suggestions in Pounds per Acre		
Crop	Corn Silage	Alfalfa
Yield Goal	35	8
Past Crop	Ear Corn	
Acres	34	
Nitrogen	262 ⁵⁰	94
Phosphate	109 ⁰⁰	184
Potash		
Sulfates	17	28
Elemental Sulfur	64 ⁶⁴	
Gypsum		
Lime		
Magnesium		
Zinc	7	9
Iron		
Manganese	6	7
Copper		2
Boron	1	1

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	0:1	OK	
Ca:Mg	6-20:1	6:1	OK	
Ca:K pH >7	15:1	6:1	OK	
Ca:K pH <7	10:1	:1		
Ca:P pH >7	100:1	167:1	High	Watch P
Ca:P pH <7	40:1	:1		
P:Zn	15:1	21:1	High	Watch Zn
P:Mn	4:1	6:1	High	Watch Mn
P:Cu	25:1	34:1	High	Watch Cu
Zn:Cu	2:1	2:1	OK	
Mn:Zn	3:1	4:1	High	Watch Zn
Mn:Cu	5:1	6:1	High	Watch Cu
K:B	200:1	505:1	High	Watch B
Mg:K	2:1	1:1	Low	Watch Mg

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Dealer: 2-4

Tim

Reported: 9/24/2002

Test #: 1

Grower: Robert D. Maag

Field ID: Pennington 28

Lab #:

27750

SV #:

John P. Taberna
Soil Scientist

COMMERCIAL SOIL REPORT

pH	Soluble Salts	Lime
WATER SMP pH	ECe	PERCENT
7.4	0.85	.2
Slightly Basic	Good	Very Low

Organic Matter	Nitrates	Phosphorus
PERCENT	ppm	BICARB BRAY
1.3	60	11
Low	Very High	Low

Potassium	Calcium	Aluminum	Magnesium
ppm	ppm	ppm	ppm
208	2436	2.4	521
Medium	Medium	Ok	Medium

Sodium	Chlorides	Zinc	Manganese
ppm	ppm	ppm	ppm
129		2.5	7
Medium		Good	High

Iron	Copper	Sulfate	Boron
ppm	ppm	ppm	ppm
226	0.6	22	0.4
High	Low	Adequate	Low

Texture	Sandy Loam
Cation Exchange Capacity	11 Low
% Base Saturation	100 Very High

BASES	IDEAL	YOURS
Calcium (Ca)	65 - 80%	111
Magnesium (Mg)	10 - 20%	39
Potassium (K)	2 - 6%	5
Sodium (Na)	< 5%	5
Aluminum (Al)	< 6 ppm	2.4
Hydrogen (H)	< 15%	

IDEAL MICRONUTRIENT LEVEL	YOURS
Zinc (Zn)	1.5 - 3.0 2.5
Manganese (Mn) - pH > 7	5 - 20 7
Manganese (Mn) - pH < 7	10 - 55
Copper (Cu)	1.0 - 2.5 .6
Iron (Fe) - pH > 7	5 - 35 226
Iron (Fe) - pH < 7	15 - 135
Boron (B)	8 - 1.5 .4

Crop	Alfalfa	Alfalfa
Yield Goal	8	10
Past Crop	Onions	
Acres	32	
Nitrogen		
Phosphate	232	312
Potash	152	242
Sulfates	20	36
El Sulfur	24	
Gypsum		
Lime		
Magnesium		
Zinc	2	5
Iron		
Manganese		2
Copper	2	3
Boron	2	3

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	3:1	OK	
Ca:Mg	6-20:1	5:1	Low	Add Calcium
Ca:K pH > 7	15:1	12:1	OK	
Ca:K pH < 7	10:1	1:1		
Ca:P pH > 7	150:1	221:1	High	Add Phosphorus
Ca:P pH < 7	40:1	1:1		
P:Zn	15:1	4:1	OK	
P:Mn	4:1	2:1	OK	
P:Cu	25:1	18:1	OK	
Zn:Cu	2:1	4:1	High	Add Copper
Mn:Zn	3:1	3:1	OK	
Mn:Cu	5:1	12:1	High	Add Copper
K:B	200:1	520:1	High	Add Boron
Mg:K	2:1	3:1	High	Add Potassium

	1st Foot	2nd Foot	3rd Foot	4th Foot
Nitrates - ppm	60			
Ammonium - ppm				

Your Applications	
Pre-Plant	Post-Emerge
	28
	100
	75
	100
	28

East Alfalfa
West corn
Middle field stubble field
TO ALFALFA
SPRAY 35 ALFALFA
mike

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Dealer: 2-4
 Reported: 5/5/2004
 Test #: 2

Grower: Robert D. Meag
 Field ID: 1

SV #:

COMMERCIAL SOIL REPORT

pH	Soluble Salts	Organic Matter	Lime
7.8	0.40	3.2	
Moderately Basic	820		
Nitrate - N	Ammonium - N	Phosphorus	
5	1	3.2	
16	3	102	
Potassium	Calcium	Magnesium	Sodium
675			
MILLI-EQUIVALENTS PER 100 GRAMS			
1.73			
POUNDS PER ACRE FOOT			
2,160			
Zinc	Iron	Manganese	Copper
POUNDS PER ACRE FOOT			

Sulfate - S	Boron
POUNDS PER ACRE FOOT	

Cation Exchange Capacity - CEC	Texture
Analyzed CEC	
Sum of Cations - CEC	2
Calculated CEC	

Percent Base Saturation		?
BASES	IDEAL	YOURS
Calcium - % of CEC	65-80%	
Magnesium - % of CEC	10-20%	
Potassium - % of CEC	2-6%	?
Sodium - % of CEC	< 5%	
Hydrogen - % of CEC	< 15%	

Test #		Nutrient Suggestions In Pounds per Acre	
ert D. Maag		Pasture	Pasture
Crop		5	10
Yield Goal			Pasture
Past Crop			16
Acres			178
Nitrogen		78	
Phosphate			
Potash			
Sulfates			
Elemental Sulfur			
Gypsum			
Lime			
Dolomite			
Magnesium			
Zinc			
Iron			
Manganese			
Copper			
Boron			
			Recommended

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:P	10:1	2:1		
Ca:Mg	6-20:1	1		
Ca:K pH > 7	15:1	0:1	OK	
Ca:K pH < 7	10:1	1		
Ca:P pH > 7	100:1	0:1	OK	
Ca:P pH < 7	40:1	1		
P:Zn	16:1	2:1		
P:Mn	4:1	2:1		
P:Cu	25:1	1		
Zn:Cu	2:1	1		
Mn:Zn	3:1	1		
M:Cu	5:1	1		
K:B	200:1	2:1	OK	
Mg:K	2:1	0:1	Low	Watch Mg

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Dealer: 2-4

Tim

Reported: 5/5/2004

Test #: 2E

Grown: Robert D. Maag

Field ID: J

Lab #1

42118

SV #:

COMMERCIAL SOIL REPORT

pH	Soluble Salts	Organic Matter	Lime
SOIL	ECe	PERCENT	PERCENT
7.8	0.49		
Moderately Basic	1.005		

Nitrates - N	Ammonium - N	Phosphorus
ppm	ppm	MGARS
8	2	20
POUNDS PER ACRE FOOT		
19	6	93

Potassium	Calcium	Magnesium	Sodium
ppm	ppm	ppm	ppm
721		527	358
MILLI-EQUIVALENTS PER 100 GRAMS			
1.85		4.39	1.50
POUNDS PER ACRE FOOT			
2,307		1,686	1,148

Zinc	Iron	Manganese	Copper
ppm	ppm	ppm	ppm
POUNDS PER ACRE FOOT			

Sulfate - S	Boron	Texture
ppm	ppm	
16		
POUNDS PER ACRE FOOT		
51.20		

Cation Exchange Capacity - CEC	
Analyzed CEC	
Sum of Cations - CEC	8
Calculated CEC	

Percent Base Saturation		?
BASES	IDEAL	YOURS
Calcium - % of CEC	65-80%	
Magnesium - % of CEC	10-20%	?
Potassium - % of CEC	2-6%	?
Sodium - % of CEC	< 5%	?
Hydrogen - % of CEC	< 15%	

Nutrient Suggestions In Pounds per Acre		
Crop	Pasture	Pasture
Yield Goal	5	10
Past Crop	Pasture	
Acres	21	
Nitrogen	71	171
Phosphate		
Potash		
Sulfates		8
Elemental Sulfur		
Gypsum	1040	
Lime		
Dolomite		
Magnesium		
Zinc		
Iron		
Manganese		
Copper		
Boron		

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	0:1	OK	
Ca:Mg	6-20:1	0:1	Low	Watch Ca
Ca:K pH >7	15:1	0:1	OK	
Ca:K pH <7	10:1	:1		
Ca:P pH >7	100:1	0:1	OK	
Ca:P pH <7	40:1	:1		
P:Zn	15:1	? :1		
P:Mn	4:1	? :1		
P:Cu	25:1	? :1		
Zn:Cu	2:1	:1		
Mn:Zn	3:1	:1		
Mn:Cu	5:1	:1		
K:B	200:1	? :1	OK	
Mg:K	2:1	1:1	Low	Watch Mg



Cattle
}

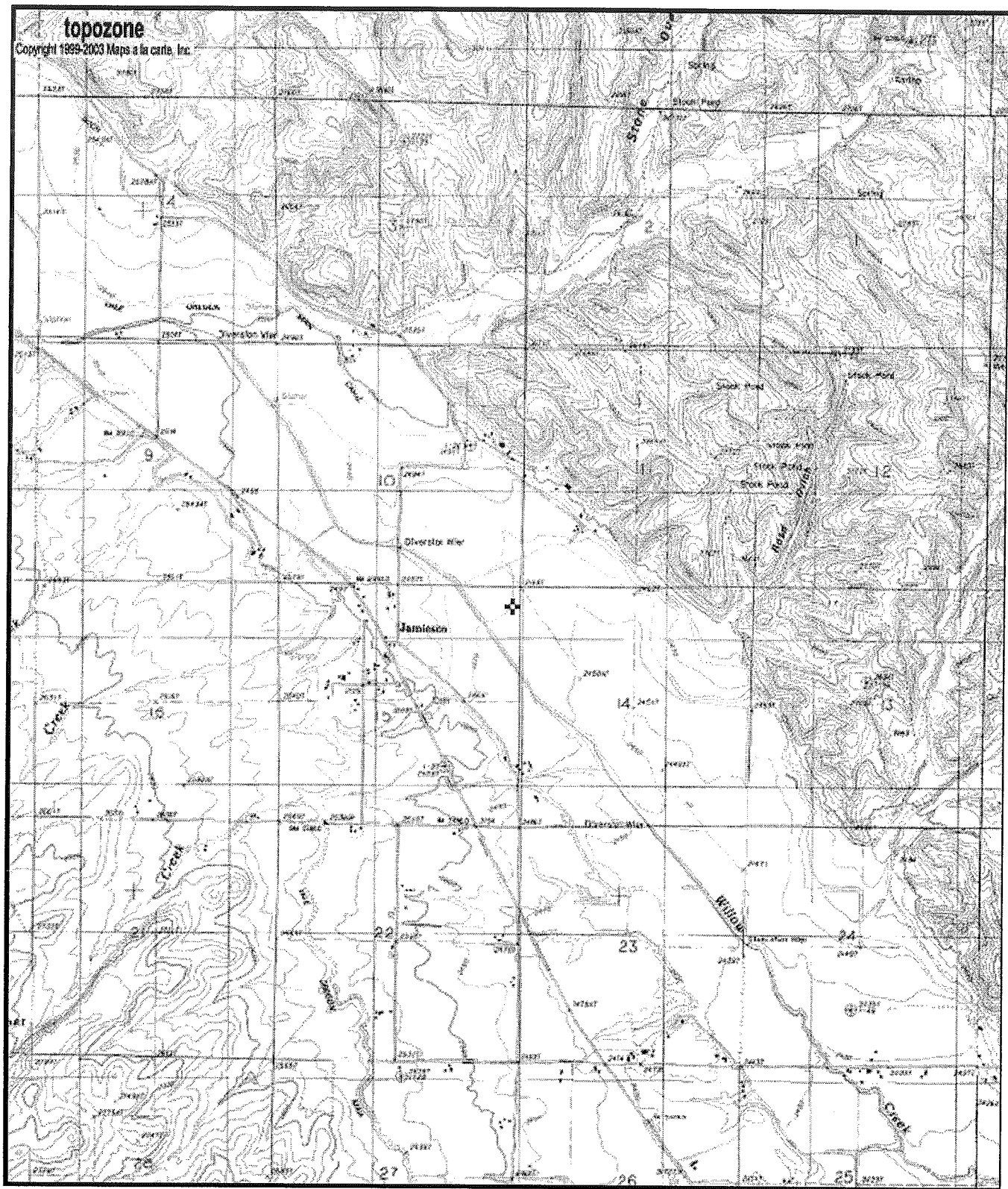


Jamieson ↗
Farm →
↘



on ~
Pasture

corn Silage -
Ready to
be Chopped



0 0.7 1.4 2.1 2.8 3.5 km
0 0.5 1 1.5 2 2.5 mi

Map center is UTM 11 465838E 4892460N (WGS84/NAD83)

Jamieson quadrangle

Projection is UTM Zone 11 NAD83 Datum



M=15.991
G=-0.298



Map of Tract #2196
Malheur County

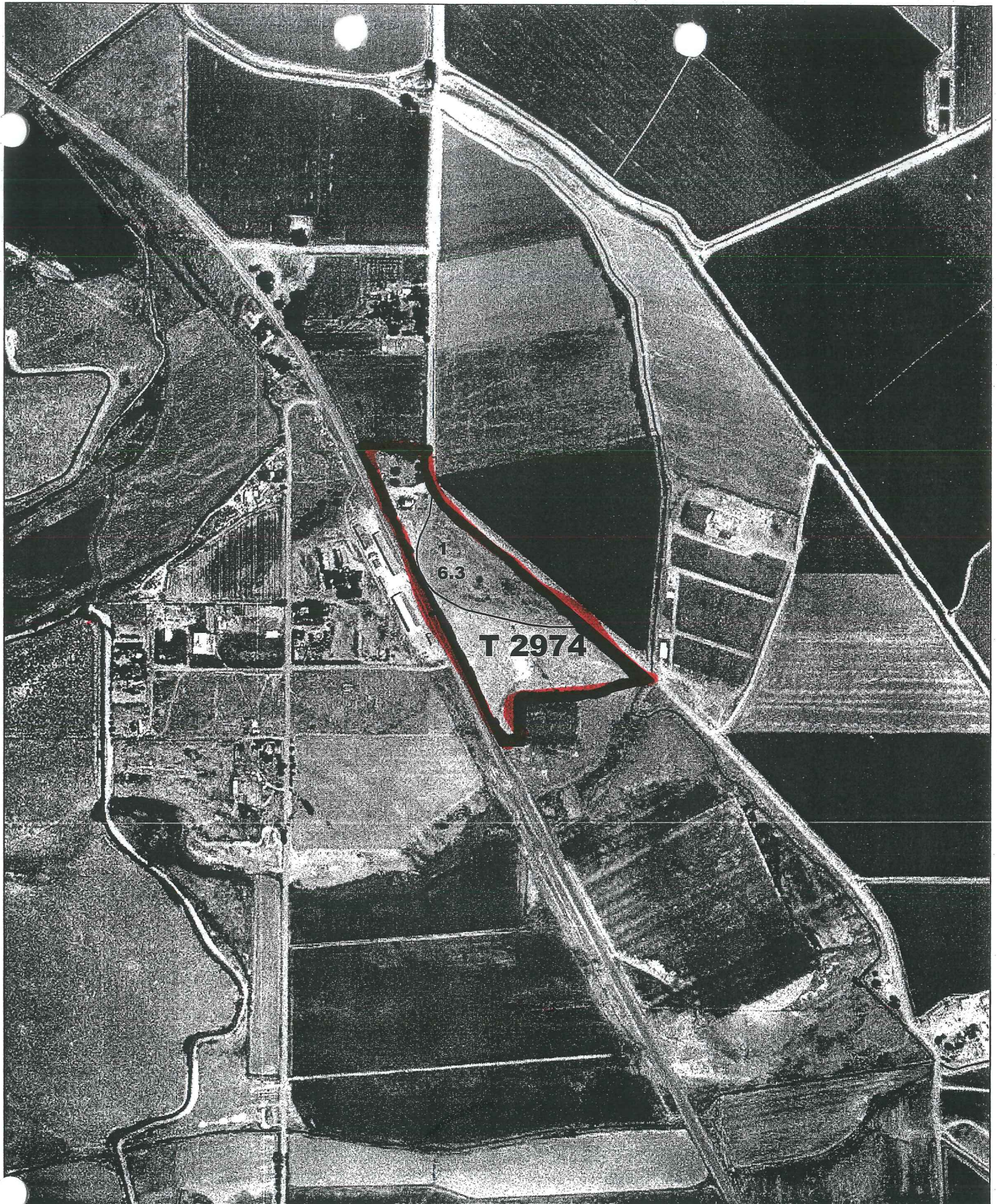
400 0 400 800 Feet

0.0
HEL, NHEL

Calculated Acres
Status - NHEL
Wetland



Map Printed: Mar 11, 2004



Map of Tract #2974
Malheur County

400 0 400 800 Feet

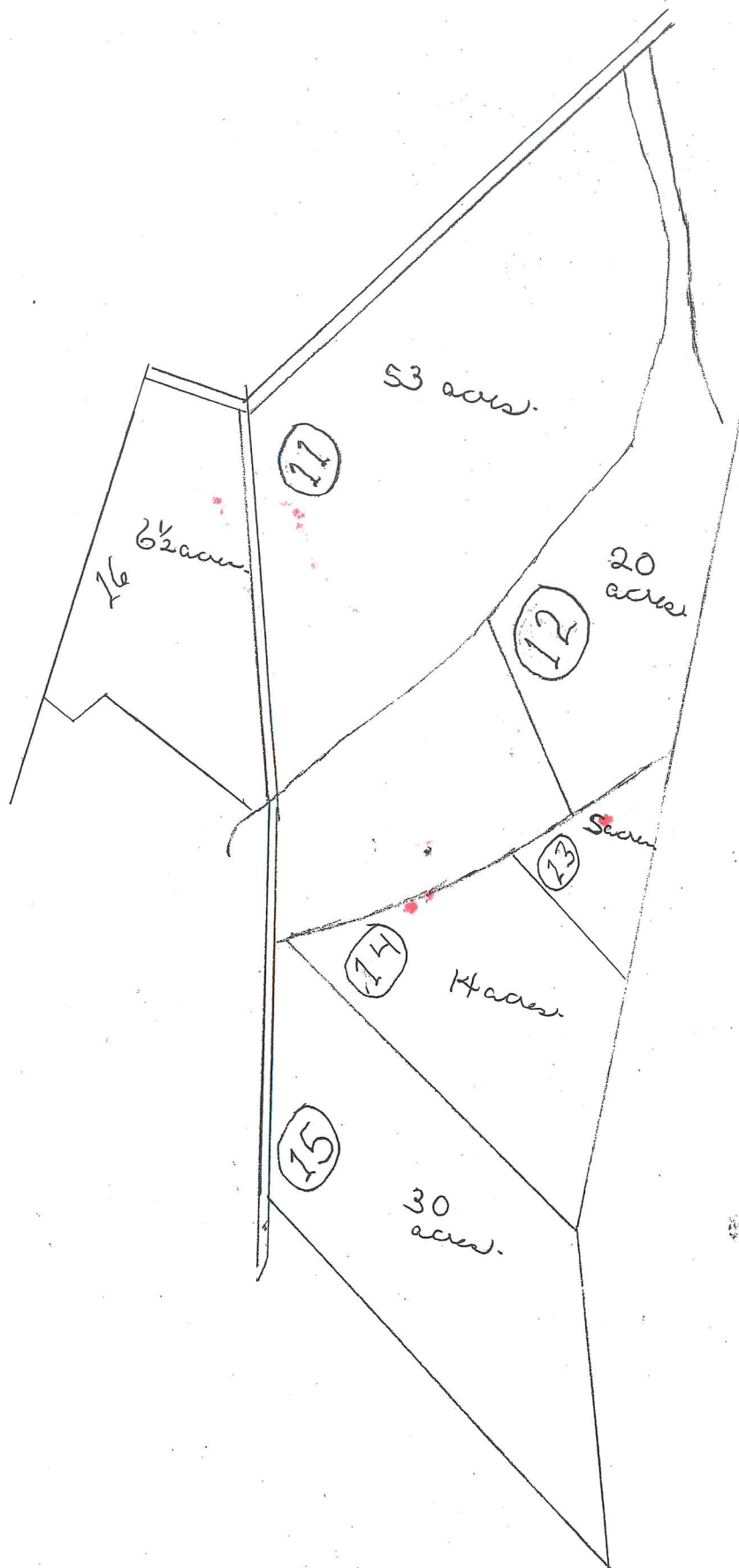
0.0
HEL, NHEL
●

Calculated Acres
Status - NHEL
Wetland



Map Printed: Mar 18, 2004

1 acre
+ 17 1/2 hall



2004

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Dealer: 2-4

Tim

Reported: 5/3/2004

Test #: 2

Grower: Robert D Maag

Lab #:

42060

SV #:

COMMERCIAL SOIL REPORT

Field ID: 11

pH		Soluble Salts	Organic Matter	Lime
SOIL	BUFFER	ECe	PERCENT	PERCENT
7.8		0.09		
Moderately Basic		185		

Nitrates - N		Ammonium - N		Phosphorus	
ppm		ppm		MGARS	BRAY
9		2		41	
POUNDS PER ACRE FOOT					
29		6		131	

Potassium	Calcium	Magnesium	Sodium
ppm	ppm	ppm	ppm
582			
MILLI-EQUIVALENTS PER 100 GRAMS			
1.49			
POUNDS PER ACRE FOOT			
1,862			

Zinc	Iron	Manganese	Copper
ppm	ppm	ppm	ppm
POUNDS PER ACRE FOOT			

Sulfate - S	Boron	Texture
ppm	ppm	
POUNDS PER ACRE FOOT		

Cation Exchange Capacity - CEC	
Analyzed CEC	
Sum of Cations - CEC	1
Calculated CEC	

Percent Base Saturation		?
BASES	IDEAL	YOURS
Calcium - % of CEC	65-80%	
Magnesium - % of CEC	10-20%	
Potassium - % of CEC	2-8%	?
Sodium - % of CEC	< 5%	
Hydrogen - % of CEC	< 15%	

Nutrient Suggestions In Pounds per Acre		
Crop	Pasture	Pasture
Yield Goal	5	10
Past Crop	Pasture	
Acres	53	
Nitrogen	60	160
Phosphate		
Potash		
Sulfates		
Elemental Sulfur		
Gypsum		
Lime		
Dolomite		
Magnesium		
Zinc		
Iron		
Manganese		
Copper		
Boron		

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	2:1		
Ca:Mg	6-20:1	:1		
Ca:K pH >7	15:1	0:1	OK	
Ca:K pH <7	10:1	:1		
Ca:P pH >7	100:1	0:1	OK	
Ca:P pH <7	40:1	:1		
P:Zn	15:1	?:1		
P:Mn	4:1	?:1		
P:Cu	25:1	?:1		
Zn:Cu	2:1	:1		
Mn:Zn	3:1	:1		
Mn:Cu	5:1	:1		
K:B	200:1	?:1	OK	
Mg:K	2:1	0:1	Low	Watch Mg

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Dealer: 2-4

TL

Reported: 5/4/2004

Test #: 2

Grower: Robert Maag

Field ID: 12

Lab #:

42095

SV #:

COMMERCIAL SOIL REPORT

pH		Soluble Salts	Organic Matter	Lime
SOIL	BUFFER	ECE	PERCENT	PERCENT
8.1		0.28		
MODERATELY		574		
BASE				

Nitrates - N	Ammonium - N	Phosphorus	
ppm	ppm	BICARB	GRAY
10	4	42	
POUNDS PER ACRE FOOT			
32	13	134	

Potassium	Calcium	Magnesium	Sodium
ppm	ppm	ppm	ppm
501			
MILLI-EQUIVALENTS PER 100 GRAMS			
1.28			
POUNDS PER ACRE FOOT			
1603			

Zinc	Iron	Manganese	Copper
ppm	ppm	ppm	ppm
POUNDS PER ACRE FOOT			

Sulfate - S	Boron	Texture
ppm	ppm	
POUNDS PER ACRE FOOT		

Cation Exchange Capacity - CEC	
Analyzed CEC	
Sum of Cations - CEC	1
Calculated CEC	

Percent Base Saturation		?
BASES	IDEAL	YOURS
Calcium - % of CEC	65-80%	
Magnesium - % of CEC	10-20%	
Potassium - % of CEC	2-6%	?
Sodium - % of CEC	< 5%	
Hydrogen - % of CEC	< 15%	

Crop	Nutrient Suggestions in Pounds per Acre	
	Pasture	Pasture
Yield Goal	5	10
Past Crop	Pasture	
Acres	20	
Nitrogen	50	150
Phosphate		
Potash		
Sulfates		
Elemental Sulfur		
Gypsum		
Lime		
Dolomite		
Magnesium		
Zinc		
Iron		
Manganese		
Copper		
Boron		

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	?:1		
Ca:Mg	6-20:1	:1		
Ca:K pH >7	15:1	0:1	OK	
Ca:K pH <7	10:1	:1		
Ca:P pH >7	100:1	0:1	OK	
Ca:P pH <7	40:1	:1		
P:Zn	15:1	?:1		
P:Mn	4:1	?:1		
P:Cu	25:1	?:1		
Zn:Cu	2:1	:1		
Mn:Zn	3:1	:1		
Mn:Cu	5:1	:1		
K:B	200:1	?:1	OK	
Mg:K	2:1	0:1	Low	Watch Mg

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Dealer: 2-4 Tin

Reported: 5/4/2004

Test #: 2E

Grower: Robert Maag

Field ID: 13

Lab #:

42096

SV #:

COMMERCIAL SOIL REPORT

pH	Soluble Salts	Organic Matter	Lime
SOIL RUFFLEH	LOOS	PERCENT	PERCENT
8.4	0.21		
	433		

Nitrate - N	Ammonium - N	Phosphorus
ppm	ppm	BICARB
4	1	7
POUNDS PER ACRE FOOT		
13	3	22

Potassium	Calcium	Magnesium	Sodium
ppm	ppm	ppm	ppm
413			
MILLI-EQUIVALENTS PER 100 GRAMS			
1.06			
POUNDS PER ACRE FOOT			
1.322			

Zinc	Iron	Manganese	Copper
ppm	ppm	ppm	ppm
POUNDS PER ACRE FOOT			

Sulfate - S	Boron	Texture
ppm	ppm	
11		
POUNDS PER ACRE FOOT		
35.20		

Cation Exchange Capacity - CEC	
Analyzed CEC	
Sum of Cations - CEC	
Calculated CEC	1

Percent Base Saturation		?
BASES	IDEAL	YOURS
Calcium - % of CEC	65-80%	
Magnesium - % of CEC	10-20%	
Potassium - % of CEC	2-6%	?
Sodium - % of CEC	< 5%	
Hydrogen - % of CEC	< 15%	

Nutrient Suggestions in Pounds per Acre		
Crop	Pasture	Pasture
Yield Goal	5	10
Past Crop	Pasture	
Acres	5	
Nitrogen	82	182
Phosphate	14	84
Potash		
Sulfates		18
Elemental Sulfur		
Gypsum		
Lime		
Dolomite		
Magnesium		
Zinc		
Iron		
Manganese		
Copper		
Boron		

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	0:1	OK	
Ca:Mg	6-20:1	:1		
Ca:K pH >7	15:1	0:1	OK	
Ca:K pH <7	10:1	:1		
Ca:P pH >7	100:1	0:1	OK	
Ca:P pH <7	40:1	:1		
P:Zn	15:1	? :1		
P:Mn	4:1	? :1		
P:Cu	25:1	? :1		
Zn:Cu	2:1	:1		
Mn:Zn	3:1	:1		
Mn:Cu	5:1	:1		
K:B	200:1	? :1	OK	
Mg:K	2:1	0:1	Low	Watch Mg

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Dealer 2-4 *repeat*
Reported 10/1/2001 *in 2004*
Test # 1

Lab #:

18297

SV #:

John P. Taberna
Soil Scientist

COMMERCIAL SOIL REPORT

Grower: Robert D Maag

Field ID: 3-14 *field 14*

pH		Soluble Salts		Lime	
Actual	Method	EC	Reactions	ppm	Very Low
7.9		1.19		2	
Moderately Basic					
Organic Matter		Nitrates		Phosphorus	
ppm	ppm	ppm	ppm	ppm	ppm
2.2	10	70			
Medium	Low	Very High			
Potassium		Calcium		Aluminum	
ppm	ppm	ppm	ppm	ppm	ppm
555	3999	0.5	347		
High	Medium	Or	Low		
Sodium		Chlorides		Zinc	
ppm	ppm	ppm	ppm	ppm	ppm
120		0.3	4		
Medium		Low	Adequate		
Iron		Copper		Sulfate	
ppm	ppm	ppm	ppm	ppm	ppm
19	0.2	5	0.7		
Adequate	Very Low	Low	Adequate		

Texture		Loam	
Cation Exchange Capacity	13	Medium	
% Base Saturation	19	Very High	
BASES		IDEAL	YOURS
Calcium (Ca)	65 - 80%	154	
Magnesium (Mg)	10 - 20%	22	
Potassium (K)	2 - 6%	1	
Sodium (Na)	< 5%	4	
Aluminum (Al)	< 6 ppm	5	
Hydrogen (H)	< 15%		

IDEAL MICRONUTRIENT LEVEL		YOURS
Zinc (Zn)	15 - 30	3
Manganese (Mn) - pH > 7	5 - 20	4
Manganese (Mn) - pH < 7	10 - 55	
Copper (Cu)	1.0 - 2.5	2
Iron (Fe) - pH > 7	5 - 35	19
Iron (Fe) - pH < 7	15 - 35	
Boron (B)	8 - 15	7

Nutrient Suggestions in Pounds per Acre		
Crop	Corn Silage	Corn Silage
Yield Goal	35	40
Past Crop	Corn Silage	
Acres	14	
Nitrogen	244	284
Phosphate		
Potash		
Sulfates	43	50
El Sulfur	180	
Gypsum		
Lime		
Magnesium		
Zinc	9	11
Iron		
Manganese	4	5
Copper	2	2
Boron	1	2

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	5:1	OK	
Ca:Mg	8-20:1	12:1	OK	
Ca:K pH > 7	15:1	7:1	OK	
Ca:K pH < 7	10:1	1		
Ca:P pH > 7	150:1	57:1	OK	
Ca:P pH < 7	40:1	1		
P:Zn	15:1	21:1	High	Add Zinc
P:Mn	4:1	13:1	High	Add Manganese
P:Cu	25:1	81:1	High	Add Copper
Zn:Cu	2:1	4:1	High	Add Copper
Mn:Zn	3:1	0:1	OK	
Mn:Cu	5:1	6:1	High	Add Copper
K:B	200:1	537:1	High	Add Boron
Mg:K	2:1	1:1	Low	Add Magnesium

	1st Foot	2nd Foot	3rd Foot	4th Foot
Nitrates - ppm	10			
Ammonium - ppm				

Field # 14

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Dealer: 2-4

Tim

Reported: 4/15/2004

Test #: 1

Grower: Robert D Maag

Field ID: East of Feedlot

Lab #:

41715

SV #:

COMMERCIAL SOIL REPORT

pH		Soluble Salts	Organic Matter	Lime
SOIL	BUFFER	ECe	PERCENT	PERCENT
8.4		0.21	4.6	0.5
Moderately Basic		431	147,200	16,000

Nitrates - N		Ammonium - N		Phosphorus	
ppm		ppm		BICARB	BRAY
19		7		58	
POUNDS PER ACRE FOOT					
61		22		186	

Potassium	Calcium	Magnesium	Sodium
ppm	ppm	ppm	ppm
874	2812	400	95
MILLI-EQUIVALENTS PER 100 GRAMS			
2.24	14.06	3.33	0.41
POUNDS PER ACRE FOOT			
2,797	8,998	1,280	304

Zinc	Iron	Manganese	Copper
ppm	ppm	ppm	ppm
1.4	6	4	0.4
POUNDS PER ACRE FOOT			
4.48	19.20	12.80	1.28

Sulfate - S	Boron	Texture
ppm	ppm	
19	1.4	Silt Loam
POUNDS PER ACRE FOOT		
60.80	4.48	

Cation Exchange Capacity - CEC Analyzed CEC	19
Sum of Cations - CEC Calculated CEC	20

Percent Base Saturation		106
BASES	IDEAL	YOURS
Calcium - % of CEC	65-80%	74
Magnesium - % of CEC	10-20%	18
Potassium - % of CEC	2-6%	11.8
Sodium - % of CEC	< 5%	2.2
Hydrogen - % of CEC	< 15%	

Nutrient Suggestions in Pounds per Acre		
Crop	Corn Silage	Corn Silage
Yield Goal	35	40
Past Crop	Ear Corn	
Acres	14	
Nitrogen	186	226
Phosphate		
Potash		
Sulfates	15	22
Elemental Sulfur	61	
Gypsum		
Lime		
Dolomite		
Magnesium		
Zinc	5	6
Iron		
Manganese	4	5
Copper	1	1
Boron		1

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	1:1	OK	
Ca:Mg	6-20:1	7:1	OK	
Ca:K pH >7	15:1	3:1	OK	
Ca:K pH <7	10:1	:1		
Ca:P pH >7	100:1	48:1	OK	
Ca:P pH <7	40:1	:1		
P:Zn	15:1	41:1	High	Watch Zn
P:Mn	4:1	15:1	High	Watch Mn
P:Cu	25:1	145:1	High	Watch Cu
Zn:Cu	2:1	4:1	High	Watch Cu
Mn:Zn	3:1	3:1	OK	
Mn:Cu	5:1	10:1	High	Watch Cu
K:B	200:1	624:1	High	Watch B
Mg:K	2:1	0:1	Low	Watch Mg

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Reported: 5/3/2004
Test #: 2
Grower: Robert D Maag

Lab #:

42059

SV #:

COMMERCIAL SOIL REPORT

Field ID: 15

pH		Soluble Salts	Organic Matter	Lime
SOIL	BUFFER	EC	PERCENT	PERCENT
7.4		0.10		
Slightly Basic		205		

Nitrates - N		Ammonium - N	Phosphorus	
ppm		ppm	BICARB	GRAY
8		2	18	
POUNDS PER ACRE FOOT				
26		6	58	

Potassium	Calcium	Magnesium	Sodium
ppm	ppm	ppm	ppm
434			
MILLI-EQUIVALENTS PER 100 GRAMS			
1.11			
POUNDS PER ACRE FOOT			
1,389			

Zinc	Iron	Manganese	Copper
ppm	ppm	ppm	ppm
POUNDS PER ACRE FOOT			

Sulfate - S	Boron	Texture
ppm	ppm	
POUNDS PER ACRE FOOT		

Cation Exchange Capacity - CEC	
Analyzed CEC	
Sum of Cations - CEC	1
Calculated CEC	

Percent Base Saturation		?
BASES	IDEAL	YOURS
Calcium - % of CEC	65-80%	
Magnesium - % of CEC	10-20%	
Potassium - % of CEC	2-6%	?
Sodium - % of CEC	< 5%	
Hydrogen - % of CEC	< 15%	

Nutrient Suggestions in Pounds per Acre		
Crop	Pasture	Pasture
Yield Goal	5	10
Past Crop	Pasture	
Acres	30	
Nitrogen	64	164
Phosphate		
Potash		
Sulfates		
Elemental Sulfur		
Gypsum		
Lime		
Dolomite		
Magnesium		
Zinc		
Iron		
Manganese		
Copper		
Boron		

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	?:1		
Ca:Mg	6-20:1	:1		
Ca:K pH >7	15:1	0:1	OK	
Ca:K pH <7	10:1	:1		
Ca:P pH >7	100:1	0:1	OK	
Ca:P pH <7	40:1	:1		
P:Zn	15:1	?:1		
P:Mn	4:1	?:1		
P:Cu	25:1	?:1		
Zn:Cu	2:1	:1		
Mn:Zn	3:1	:1		
Mn:Cu	5:1	:1		
K:B	200:1	?:1	OK	
Mg:K	2:1	0:1	Low	Watch Mg

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Dealer: 2-4

Tim

Reported: 5/3/2004

Test #: 2

Grower: Robert D Maag

Field ID: 16

Lab #:

42061

SV #:

COMMERCIAL SOIL REPORT

pH		Soluble Salts	Organic Matter	Lime
SOIL	BUFFER	EC	PERCENT	PERCENT
7.2		0.10		
Neutral Soil		205		

Nitrates - N		Ammonium - N	Phosphorus	
ppm		ppm	DICARB	GRAY
11		3	18	
POUNDS PER ACRE FOOT				
35		10	51	

Potassium	Calcium	Magnesium	Sodium
ppm	ppm	ppm	ppm
424			
MILLI-EQUIVALENTS PER 100 GRAMS			
1.09			
POUNDS PER ACRE FOOT			
1,357			

Zinc	Iron	Manganese	Copper
ppm	ppm	ppm	ppm
POUNDS PER ACRE FOOT			

Sulfate - S	Boron	Texture
ppm	ppm	
POUNDS PER ACRE FOOT		

Cation Exchange Capacity - CEC	
Analyzed CEC	
Sum of Cations - CEC	1
Calculated CEC	

Percent Base Saturation		?
BASES	IDEAL	YOURS
Calcium - % of CEC	65-80%	
Magnesium - % of CEC	10-20%	
Potassium - % of CEC	2-6%	?
Sodium - % of CEC	< 5%	
Hydrogen - % of CEC	< 15%	

Nutrient Suggestions in Pounds per Acre		
Crop	Pasture	Pasture
Yield Goal	5	10
Past Crop	Pasture	
Acres	6.5	
Nitrogen	50	150
Phosphate		12
Potash		
Sulfates		
Elemental Sulfur		
Gypsum		
Lime		
Dolomite		
Magnesium		
Zinc		
Iron		
Manganese		
Copper		
Boron		

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	?:1		
Ca:Mg	6-20:1	:1		
Ca:K pH >7	15:1	0:1	OK	
Ca:K pH <7	10:1	:1		
Ca:P pH >7	100:1	0:1	OK	
Ca:P pH <7	40:1	:1		
P:Zn	15:1	?:1		
P:Mn	4:1	?:1		
P:Cu	25:1	?:1		
Zn:Cu	2:1	:1		
Mn:Zn	3:1	:1		
Mn:Cu	5:1	:1		
K:B	200:1	?:1	OK	
Mg:K	2:1	0:1	Low	Watch Mg



Map of Tract #2192
Malheur County



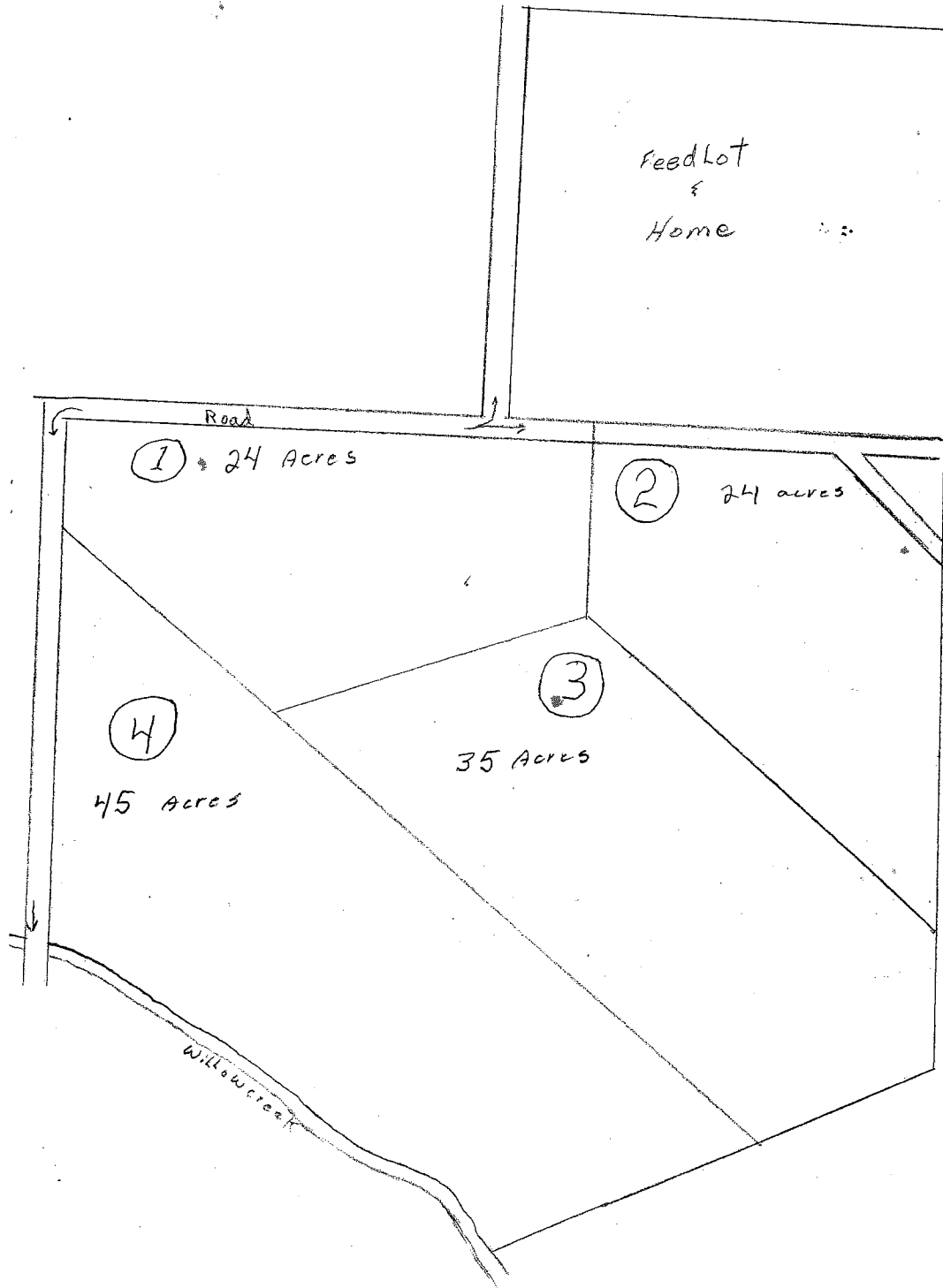
0.0
HEL, NHEL
●

Calculated Acres
Status - NHEL
Wetland



Map Printed: Mar 18, 2004

Amieson - EW Pr, city



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Dealer: 2-4

Tim

Reported: 10/3/2003

Test #: 1

Grower: Robert D. Maag

Field ID: Home #1

Lab #:

36835

SV #:

COMMERCIAL SOIL REPORT

pH		Soluble Salts	Organic Matter	Lime
SOIL	BUFFER	LCe	PERCENT	PERCENT
7.5		0.17	1.3	0.3
Sodium Base		349	41,600	9,600

Nitrates - N	Ammonium - N	Phosphorus	
ppm	ppm	BICARB	BRAY
3	1	32	
POUNDS PER ACRE FOOT			
10	3	102	

Potassium	Calcium	Magnesium	Sodium
ppm	ppm	ppm	ppm
341	2856	333	145
MILLI-EQUIVALENTS PER 100 GRAMS			
0.87	14.28	2.78	0.63
POUNDS PER ACRE FOOT			
1.091	9.139	1.066	464

Zinc	Iron	Manganese	Copper
ppm	ppm	ppm	ppm
1.3	3	1	0.2
POUNDS PER ACRE FOOT			
4.16	9.60	3.20	0.64

Sulfate - S	Boron	Texture
ppm	ppm	
14	0.4	Loam
POUNDS PER ACRE FOOT		
44.80	1.28	

Cation Exchange Capacity - CEC	14
Analyzed CEC	
Sum of Cations - CEC	19
Calculated CEC	

Percent Base Saturation		133
BASES	IDEAL	YOURS
Calcium - % of CEC	65-80%	102
Magnesium - % of CEC	10-20%	20
Potassium - % of CEC	2-6%	6.2
Sodium - % of CEC	< 5%	4.5
Hydrogen - % of CEC	< 15%	

Nutrient Suggestions in Pounds per Acre		
Crop	Corn Silage	Corn Silage
Yield Goal	35	40
Past Crop	Alfalfa	
Acres	24	
Nitrogen	266	306
Phosphate		24
Potash	44	99
Sulfates	25	32
Elemental Sulfur	66	
Gypsum		
Lime		
Magnesium		
Zinc	5	7
Iron		
Manganese	10	11
Copper	2	2
Boron	2	2

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	0:1	OK	
Ca:Mg	6-20:1	9:1	OK	
Ca:K pH >7	15:1	8:1	OK	
Ca:K pH <7	10:1	1:1		
Ca:P pH >7	100:1	89:1	OK	
Ca:P pH <7	40:1	1:1		
P:Zn	15:1	25:1	High	Watch Zn
P:Mn	4:1	32:1	High	Watch Mn
P:Cu	25:1	160:1	High	Watch Cu
Zn:Cu	2:1	7:1	High	Watch Cu
Mn:Zn	3:1	1:1	OK	
Mn:Cu	5:1	5:1	OK	
K:B	200:1	853:1	High	Watch B
Mg:K	2:1	1:1	Low	Watch Mg

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Order # 2-4

Reported 10/1/2001

Test # 1

Grower Robert D Maag

Field ID ~~2~~ Field # 20

Lab #:

18298

SV #:

COMMERCIAL SOIL REPORT

pH		Soluble Salts	Lime
WATER	SMP pH	ECe	PERCENT
7.9		1.69	.2
Moderately Basic		Typical	Very Low

Organic Matter	Nitrates	Phosphorus	
PERCENT	ppm	BICARB	BRAY
1.8	11	38	
Medium	Medium	High	

Potassium	Calcium	Aluminum	Magnesium
ppm	ppm	ppm	ppm
436	3952	0.5	324
Medium	Medium	OK	Low

Sodium	Chlorides	Zinc	Manganese
ppm	ppm	ppm	ppm
166		0.3	3
Medium		Low	Adequate

Iron	Copper	Sulfate	Boron
ppm	ppm	ppm	ppm
17	0.2	12	0.7
Adequate	Very Low	Adequate	Adequate

Texture	LOAM
Cation Exchange Capacity	14 Medium
% Base Saturation	17.4 Very High

BASES	IDEAL	YOURS
Calcium (Ca)	65 - 80%	141
Magnesium (Mg)	10 - 20%	19
Potassium (K)	2 - 6%	3
Sodium (Na)	< 5%	5
Aluminum (Al)	< 6 ppm	5
Hydrogen (H)	< 15%	7

IDEAL MICRONUTRIENT LEVEL	YOURS
Zinc (Zn)	1.5 - 3.0 3
Manganese (Mn) - pH > 7	5 - 20 3
Manganese (Mn) - pH < 7	10 - 55
Copper (Cu)	1.0 - 2.5 2
Iron (Fe) - pH > 7	5 - 35 17
Iron (Fe) - pH < 7	15 - 135
Boron (B)	8 - 1.5 7

Nutrient Suggestions in Pounds per Acre		
Crop	Corn Silage	Corn Silage
Yield Goal	35	40
Past Crop	Corn Silage	
Acres	29	
Nitrogen	240	280
Phosphate		
Potash		4
Sulfates	29	36
El Sulfur	175	
Gypsum		
Lime		
Magnesium		
Zinc	9	11
Iron		
Manganese	6	7
Copper	2	2
Boron	1	2

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	5:1	OK	
Ca:Mg	6:20	12:1	OK	
Ca:K pH > 7	15:1	9:1	OK	
Ca:K pH < 7	10:1	1		
Ca:P pH > 7	150:1	104:1	OK	
Ca:P pH < 7	40:1	1		
P:Zn	15:1	12:1	OK	
P:Mn	4:1	3:1	High	Add Manganese
P:Cu	25:1	44:1	High	Add Copper
Zn:Cu	12:1	4:1	High	Add Copper
Mn:Zn	3:1	0:1	OK	
Mn:Cu	5:1	8:1	High	Add Copper
K:B	200:1	422:1	High	Add Boron
Mg:K	2:1	1:1	Low	Add Magnesium
	1st Foot	2nd Foot	3rd Foot	4th Foot
Nitrates - ppm	11			
Ammonium - ppm				

John P. Taberna
Soil Scientist

Your Applications

Pre-Plant Post-Emerge

100

6

4

1

1

Western Laboratories, Inc.

211 Highway 95 • P.O. Box 1020 • Parma, ID 83660

800-658-3858 • FAX 208-722-6550

<http://www.westernlaboratories.com>**COMMERCIAL SOIL REPORT**

Dealer: 2-4

Tim

Reported: 4/5/2004

Test #: 1

Grower: Robert D Maag

Field ID: 3

Lab #:

41264

SV #:

pH		Soluble Salts	Organic Matter	Lime
SOIL	BUFFER	ECe	PERCENT	PERCENT
8.0		0.22	5.8	3.5
Moderately Basic		451	185,600	112,000

Nitrates - N	Ammonium - N	Phosphorus	
ppm	ppm	BICARB	BRAY
9	1	22	
POUNDS PER ACRE FOOT			
29	3	70	

Potassium	Calcium	Magnesium	Sodium
ppm	ppm	ppm	ppm
359	4630	643	209
MILLI-EQUIVALENTS PER 100 GRAMS			
0.92	23.15	5.36	0.91
POUNDS PER ACRE FOOT			
1.149	14.816	2.058	669

Zinc	Iron	Manganese	Copper
ppm	ppm	ppm	ppm
3.7	8	2	1.4
POUNDS PER ACRE FOOT			
11.84	25.60	6.40	4.48

Sulfate - S	Boron	Texture
ppm	ppm	
25	2.9	Silty Clay Loam
POUNDS PER ACRE FOOT		
80.00	9.28	

Cation Exchange Capacity - CEC	28
Analyzed CEC	
Sum of Cations - CEC	30
Calculated CEC	

Percent Base Saturation		108
BASES	IDEAL	YOURS
Calcium - % of CEC	65-80%	83
Magnesium - % of CEC	10-20%	19
Potassium - % of CEC	2-6%	3.3
Sodium - % of CEC	< 5%	3.2
Hydrogen - % of CEC	< 15%	

Nutrient Suggestions in Pounds per Acre		
Crop	Corn Silage	Corn Silage
Yield Goal	35	40
Past Crop	Ear Corn	
Acres	35	
Nitrogen	244	284
Phosphate	69	104
Potash	26	81
Sulfates	3	10
Elemental Sulfur	243	
Gypsum		
Lime		
Dolomite		
Magnesium		
Zinc		
Iron		
Manganese	8	9
Copper		
Boron		

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	0:1	OK	
Ca:Mg	6-20:1	7:1	OK	
Ca:K pH >7	15:1	13:1	OK	
Ca:K pH <7	10:1	:1		
Ca:P pH >7	100:1	210:1	High	Watch P
Ca:P pH <7	40:1	:1		
P:Zn	15:1	6:1	OK	
P:Mn	4:1	11:1	High	Watch Mn
P:Cu	25:1	16:1	OK	
Zn:Cu	2:1	3:1	High	Watch Cu
Mn:Zn	3:1	1:1	OK	
Mn:Cu	5:1	1:1	OK	
K:B	200:1	124:1	OK	
Mg:K	2:1	2:1	OK	

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Field ID: 2-45

SV#

Your Applications	
Pre-Plant	Post-Emerge

pH		Soluble Salts	Lime
FIELD	LABORATORY	PERCENT	REQUIREMENT
7.8		0.70	.2
Moderately		Good	Very Low

Organic Matter	Nitrates	Phosphorus	
ppm	ppm	ppm	ppm
2.4	7	30	
Medium	Low	High	

Potassium	Calcium	Aluminum	Magnesium
ppm	ppm	ppm	ppm
460	3562	0.7	501
High	Medium	Ok	Medium

Sodium	Chlorides	Zinc	Manganese
ppm	ppm	ppm	ppm
215		0.6	7
Medium		Low	High

Iron	Copper	Sulfate	Boron
23	0.5	7	0.5
Adequate	Low	Low	Adequate

Texture	Silt Loam	
Cation Exchange Capacity	24	High
% Base Saturation	100	100

BASE6	IDEAL	YOURS
Calcium (Ca)	65 - 80%	74
Magnesium (Mg)	10 - 20%	17
Potassium (K)	2 - 6%	5
Sodium (Na)	< 5%	4
Aluminum (Al)	< 6 ppm	7
Hydrogen (H)	< 15%	

IDEAL MICRONUTRIENT LEVEL	YOURS
Zinc (Zn)	15 - 30
Manganese (Mn) - pH >7	5 - 20
Manganese (Mn) - pH <7	10 - 55
Copper (Cu)	10 - 25
Iron (Fe) - pH >7	5 - 35
Iron (Fe) - pH <7	15 - 135
Boron (B)	8 - 15

Crop	Corn Silage	Corn Silage
Yield Goal	35	40
Past Crop	Ear Corn	
Acres	45	
Nitrogen	255	295
Phosphate	5	40
Potash		
Sulfates	39	46
El Sulfur	136	
Gypsum		
Lime		
Magnesium		
Zinc	8	10
Iron		
Manganese		
Copper	1	
Boron	2	2

Ratio	Ideal	Yours	Evaluation	Recommended Actions
N:S	10:1	8:1	OK	
Ca:Mg	6-20:1	7:1	OK	
Ca:K pH >7	15:1	8:1	OK	
Ca:K pH <7	10:1	1:1		
Ca:P pH >7	<50:1	112:1	OK	
Ca:P pH <7	40:1	1:1		
P:Zn	15:1	10:1	OK	
P:Mn	4:1	5:1	High	Add Manganese
P:Cu	25:1	63:1	High	Add Copper
Zn:Cu	2:1	7:1	High	Add Copper
Mn:Zn	3:1	0:1	OK	
Mn:Cu	5:1	14:1	High	Add Copper
K:B	200:1	394:1	High	Add Boron
Mg:K	2:1	1:1	Low	Add Magnesium

	1st Foot	2nd Foot	3rd Foot	4th Foot
Nitrates - ppm	7			
Ammonium - ppm				

Batch Ticket - Batch # 32
Acct # 46476 ()
Maag, Robert D
5244 Hill Rd
Jale, OR 97918
PA #139718 Exp: 12/31/01

Comments Field: 0 Yr: 03 Acres: 107.00 Crop: CORN
3 Fields Jamison

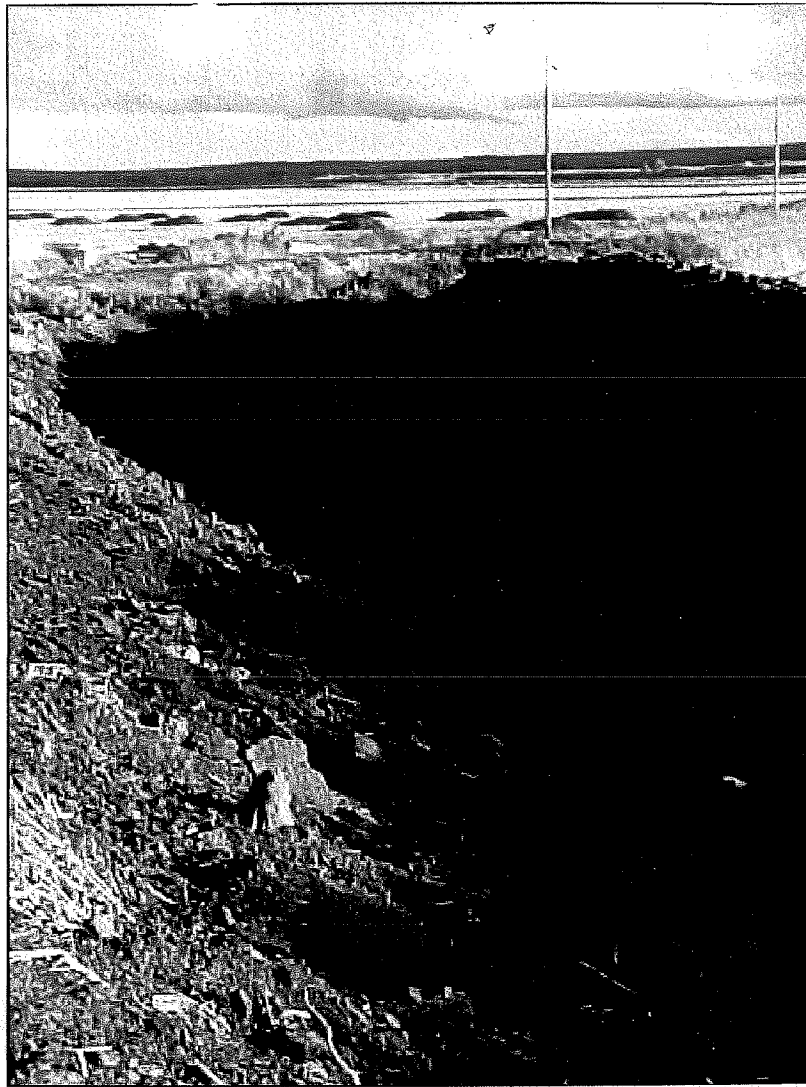
Gross Weight of Blend: 63063 Lbs Cu Ft/Acre: 9.36
Appl. Rate of Blend: 589.37 Lbs/A Calculated Density: 62.96 Lbs/Cu Ft
Form Group: J)P/21%/Urea *Includes Fertilizer items only

3 FULL BATCHES 11.89 ACRES/BATCH		Total Prod (CALC)	
Product	RATE	SCALE	Rate/A (Lbs.)
1 21-0-0-24	2199 2366	2199	185. 19791
			LB
1 11-52-0	2286 4652	4485	192. 20574
			LB
1 46-0-0	1034 5686	5519	87. 9386
			LB
1 Zinc (R/T 10%)	84	5603	7. 756
			LB
1 Sulfur	1321	6924	111. 11889
			LB
1 Boron	83	7007	7. 747
			LB
7 Spreading (John)	11.889 Acre		1.000 0
			Acre

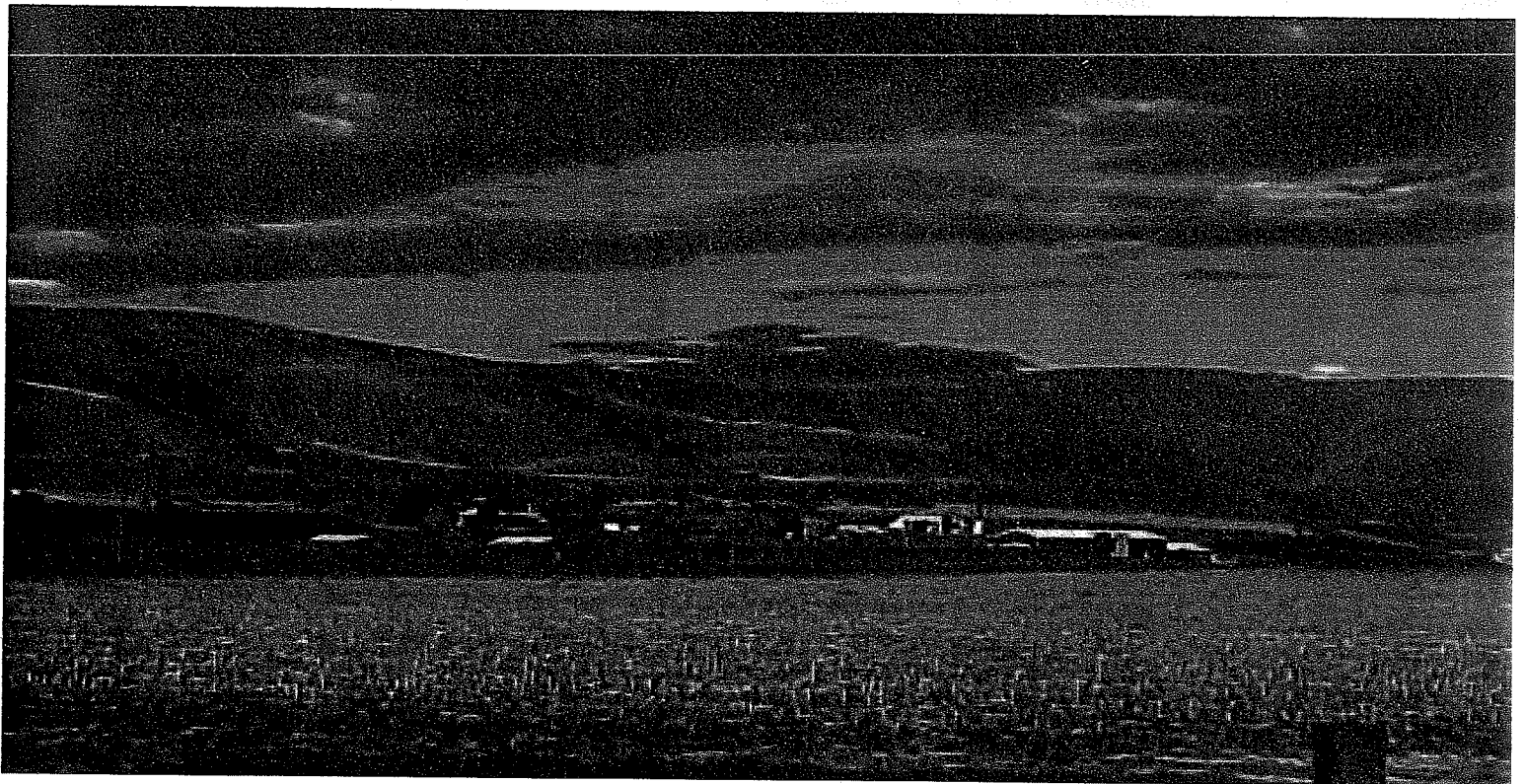
Batch Check			
1.	2.	3.	
4.	5.	6.	
7.	8.	9.	

Bill

Guaranteed Analysis of Blended Fertilizer		TPF SUPPLIED	RECOMMENDED TPF
Total Nitrogen (N)%	33.934	200.000	60.000
Available Phos. Acid (P2O5)%	16.967	100.000	100.000
Soluble Potash (K2O)%	0.000	0.000	0.000
Sulfur (S)%	7.533	44.396	0.000
Boron (B)%	0.170	1.000	1.000
Zinc (Zn)%	0.048	5.000	5.000
Page 1		October 21, 2003	08:30 am



Feedlot #1 - Wastewater storage pond - dry, cleaned



Feedlot #1 - looking NE across harvested corn field

**ANIMAL WASTE MANAGEMENT PLAN
MINIMUM REQUIRED ELEMENT**

OPERATION AND MAINTANENCE

MAAG FEEDLOT, INC.

Name of Operation

Mark all that apply to your operation.



Animal Access Lanes or Walkways

Damaged components will be repaired or replaced as needed. Debris and excess manure will be removed from roadway surfaces, road ditch and drainage areas. Maintain drainage area capacities. Maintain good vegetative cover on all slopes and watercourses.



Culverts

Inspect annually or after large rainfall event. All foreign objects restricting water flow will be removed. Damaged sections will be repaired or replaced. Erosion around inlet or outlet will be corrected.



Feedlot Pens

(ODA does not advise long-term manure storage in open feedlot pens, even in low rainfall areas. Research is currently underway to determine environmental impacts of such practices.)

Maintaining a firm, dry feedlot surface is an important factor in good animal health and the environment. Diversion ditches or berms should direct clean water flow away from feedlot pens and holding areas. Storm water runoff from pens will be collected and stored appropriately. Dry manure will be contained within the pen until removed for storage or field application. Manure accumulations created by manure packs or mounding will be managed such that a pollution hazard is not created. Short-term mounding may be used in conjunction with quick clean-ups used to reduce manure pack from around aprons and under fences. Manure will be removed annually from pens. When removing manure from pens, care is taken to maintain the integrity of the compacted protective seal or "hard pan".



Fencing

Fences will be inspected periodically. Broken or decayed posts will be replaced. Sagging wire will be tightened. Broken wire will be spliced or replaced. Broken or missing insulators for electric fencing will be replaced. Vegetation will be controlled under the fences. Electric fencing will be sufficiently charged to detour animals.



Irrigation Water Management

Irrigation water application will be at rates that minimize transport of sediment, nutrients, and chemicals to surface water and ground water. Equipment modifications and/or soil amendments such as polyacrylamides and mulches should be considered to reduce erosion if needed.

☐ Filter Strips NA

Maintain vigorous growth of vegetative covering. This includes reseeding, fertilization and application of herbicides when necessary. Periodic mowing, harvesting or grazing may also be needed to control height. Remove all foreign debris that hinders system operation. Limit the traffic from filter strip area. Limit livestock usage to vegetative growth periods when the animals will not damage vegetative root system or compact the soil. Eradicate or otherwise remove all rodents or burrowing animals. Immediately repair any damage.

☒ Manure Application Equipment

All manure application equipment (including but not limited to sprinklers, big gun irrigators, spreaders and/or tank wagons) will be operated and maintained according to the manufacturer's manual. Equipment found to be broken or worn will be replaced. Equipment will be calibrated to ensure recommended rates are applied. Liquids will be drained from sprinklers or big guns prior to freezing weather. When system is flushed, rinse water is used following waste, and liquid and sediment is applied agronomically. Nozzles will be checked periodically and if worn, nozzles will be replaced. Minimize exposure to animal and organic wastes and manure gasses. Wear protective clothing when appropriate. When cleaning equipment after nutrient application, remove and save wastes in an appropriate manner. Avoid applying manure near surface water by establishing buffer strips and set backs, and use extreme care to avoid contaminating ground water.

☐ Manure Effluent and Irrigation Transfer Lines. NA

Manure, effluent and irrigation lines shall be flushed with clean water periodically to prevent particle buildup and plugging. Manure flushed from the lines will be applied agronomically so that surface and groundwater will be protected. Manure, effluent and irrigation lines shall be inspected periodically for leaks or worn out nozzles, and repairs or replacements made as needed. Special inspection shall be done to pressure relief valves, risers and control valves. Shut off valves will be inspected annually. Avoid unnecessary travel over pipelines that will damage their integrity. Equipment found to be broken or worn will be replaced. Water will be drained during cold weather to prevent frozen or broken lines. These lines can explode if not properly maintained and may cause human injury.

☐ Pumps NA

Pumps will be maintained in accordance with manufacturer's operation and maintenance manual. Effluent will be drained from pumps prior to freezing weather. Pumps will be inspected periodically to identify and remove debris wrapped around impeller or worn parts. Appropriate action will be taken to repair any worn parts. Liquids will be drained from pump prior to freezing weather to prevent breakage. It is recommended to have a spare pump or back up system in case a pump must be removed for an extended time for repair.

☒ Trough or Tank

Watering facility will be inspected periodically. Damaged tank/trough will be repaired or replaced. Float valves will be maintained in good working order. Area immediately surrounding the trough/tank will be maintained in a stable condition. Watering facilities will not be allowed to overflow if additional liquid will affect waste storage capacities.

☒ Evaporation Waste Storage Pond

Prior to the storage season, empty the pond to provide storage capacity for the accumulation of wastewater and precipitation during the winter storage period. Sludge and accumulated solids will

be removed from the pond periodically when buildup limits storage capacity in the pond. Depth markers are installed to assure maximum volume will be maintained and checked weekly. A 2-foot free board will be maintained to prevent spillage.

Maintain all pumps, pipeline, valves, and electrical and mechanical equipment in good operating condition following the manufacturer's recommendations. Immediately repair any vandalism, vehicular, or livestock damage to any earth fill. Immediately remove any obstructions or blockage of spillways, trash racks or pipe inlets. Settlement or cracks in earthen sections should be investigated to determine cause and immediately repaired. Maintain vigorous growth of vegetative coverings on the dikes to eliminate soil erosion. Eradicate or otherwise remove all rodents or burrowing animals and repair any damage caused by their activity. Fences and/or warning signs should be maintained as necessary to unauthorized human or livestock entry. Operate systems in a manner that minimizes odor and drift.





Signature of Legally Authorized Representative: Robert D. Maag

Print Name: Robert D. Maag Date: 9-13-2004



Oregon

Theodore R. Kulengoski, Governor

Department of Agriculture

635 Capitol Street NE

Salem, OR 97301-2532



June 14, 2005

Robert D. & Mary Ann Maag
Maag Feedlot Inc.
5244 Maag Road
Vale, Oregon 97918

RE: Additional AWMP documents

Dear Mr. & Mrs. Maag:

On September 13, 2004, the Oregon Department Of Agriculture received the Animal Waste Management Plan you provided. After reviewing your plan I found three items missing. There was no protocol included for how you will test soils or manure generated at your facility. There were no forms showing how you will keep inspection records or corrective actions you might take required by Large Federal CAFO's.

I have included an acceptable protocol for testing soils and manure with this letter. There are also some sample forms you can use for the record keeping requirements. Please attach these protocols and record keeping forms to the working copy of the plan you have. I will add a copy to your plan on file in our office in Salem. With the addition of this amendment I will forward a request to our Salem office to give final approval to your plan.

Sincerely,

Ron Jones

LWQS

PH: 541-889-4042

Attachments = manure sampling protocol
ODA soil sampling protocol
sample record keeping forms

ODA Soil Sampling Standard Methodology

March, 2001

This document is intended to describe a standard procedure for collecting, storing, and shipping soil samples collected by ODA staff and/or contractors. All ODA staff involved in soil sampling should have received training in Departmental protocols for soil sampling. The procedures described are intended to be used for non-hazardous samples that are not going to be analyzed for volatile constituents. Soil samples collected with the methods described can not be considered undisturbed samples.

Considerations for Choosing Laboratory Analyses

Before conducting any soil sampling, first decide what parameters you will be looking for and how they should be analyzed. This is important for choosing an appropriate analytical laboratory, for budgeting, and for knowing how soon the laboratory must receive your samples. Most of the sampling done by CAFO/NRD staff involves looking for nitrogen compounds, phosphorus compounds, potassium compounds, bacteria, and organic matter or total organic carbon. This section will focus on the analytical techniques for these compounds, and how to decide which chemical species to look for. If you are planning on analyzing for other compounds, consult with the NRD technical staff.

Nitrogen compounds: The nitrogen compounds we are usually concerned with are nitrate (NO_3), nitrite (NO_2), ammonia (NH_3), ammonium (NH_4), and total Kjeldahl nitrogen (organic nitrogen compounds, typically NH_2). Typically, the older the manure source, the more likely that the nitrogen will be in the form of nitrate. Manure starts as being mostly NH_2 to NH_4 , and eventually oxidizes to NO_2 and NO_3 .

Analysis of total Kjeldahl nitrogen (TKN) is standardized, so telling a laboratory you want a TKN analysis will get you about the same thing every time. The same is true for ammonia and ammonium. However for nitrate and nitrite, there are two widely used methods to choose from. EPA Method 300, which is an ion chromatography method, and EPA Method 353.2, which uses cadmium reduction. These analyses report nitrate and nitrite combined, or separately. You can specify how you'd like the results presented. However, if you do want nitrite reported separate from nitrate, then the sample must be analyzed (using either method) within 48 hours after collection. EPA Method 300 has a 48 hour holding time whether or not speciation of NO_2/NO_3 is requested, so usually EPA Method 353.2 is the better choice for nitrate/nitrite analyses.

Phosphorus compounds: In most cases, we are concerned with all phosphorus compounds that are not tied up with silicate minerals (e.g., apatite). However, standard total phosphorus analyses use an acid digestion, which will liberate phosphorus tied up in minerals. Because of this, the preferred method is AOAC Official Method 977.01. This method uses a water extraction of phosphorus, so that mineralized forms are not brought into solution. If the laboratory can not do this method, then request a weak acid extraction, which would use citric or acetic acid. Make sure the laboratory can supply a reference for any alternative method they propose, other than AOAC Official Method 977.01. If you are sure that there will be no significant mineral phosphorus component in the sample, then the laboratory can use a more traditional total

phosphorus (TP) analysis. The NRD hydrogeologist or hydrologist can give you advice on whether there is a potential for the presence of mineral phosphorus.

Potassium compounds: Sampling and analysis for potassium compounds has a lot in common with analyzing for phosphorus compounds. Standard analyses also use an acid extraction, which can liberate silicate-bound potassium. Generally we want to detect all water soluble forms of potassium. To avoid sampling mineral forms of potassium, request a STLC (soluble threshold limit test) extraction analysis, instead of EPA Method 3010. STLC is routinely done for toxic metals, but can also be performed successfully for potassium.

Bacteria sampling: Appropriate bacteria sampling and analysis is dependant mostly on getting the sample to the laboratory immediately. For identifying issues relating to manure, either fecal coliform or E. coli sampling is valid, but in both cases the samples should be analyzed by the laboratory the same day they are collected. Make sure the lab can give you a population count of the bacteria, a presence/absence analysis is usually not meaningful for the purposes of our investigation. Also, make sure the lab can analyze soil samples for bacteria - it is not commonly as available as analysis of water samples.

Hand Auger Sampling

Hand auger sampling is done by advancing the auger to approximately six inches below the desired depth of sampling, and then removing soil from the central portion of the auger barrel. The soil from the central part of the barrel should be used as the sample, because it is less likely to have been contaminated from material sloughing off the walls of the boring. Ideally, the sample should be placed in a laboratory supplied container, however new sealable plastic bags can be used if laboratory containers are not available. Whenever possible, take two samples at each sampling location. These should be labelled as 'A' and 'B' samples, so that you have a back up sample if something happens to one of them, or if you want to augment regular quality assurance/quality control procedures. Both 'A' and 'B' samples should be sent to the laboratory, but not necessarily analyzed. This is discussed further in the Sample Handling and Documentation section of this methodology.

Always backfill hand augered borings after sampling is finished. Do not advance hand augered borings into groundwater (including perched water), unless groundwater samples are needed.

Trowel or Shovel Sampling

Trowels, shovels, and other implements can also be used to obtain soil samples. Usually these are not very efficient for sampling below about one foot, and they are not accurate for sampling at a designed depth. They are appropriate for shallow soil sampling. When using these types of implements, follow the decontamination procedures described below. Remove all soil from the excavated area before obtaining a sample, so that the sample will be representative of the desired area.

Equipment Decontamination (Decon)

Decontamination is important to prevent false positive or erroneous analytical results for soil sampling. Generally decontamination involves removing as much of the soil from the sampling equipment as possible before using the equipment on another sample. Usually this can be done with tap water, an approved detergent, a brush, two buckets, plastic sheeting or some other portable clean surface, and deionized (or distilled) water in a spray bottle. Sampling equipment should be rinsed with deionized water after being washed and scrubbed with a detergent solution, especially if any metals will be the sample analytes. The scrub brush size must be appropriate to clean all surfaces that may contact samples, including the barrel of the auger. Sampling equipment should be decontaminated before each use, even if the equipment has been in clean storage. Sampling equipment should also be decontaminated before replacing equipment into the field vehicle between sample points and at the end of the day. Choose an area to do decon in advance, being careful to avoid areas where small spills of detergent or wash water would be a problem. Use plastic sheeting or other portable clean surface for holding decontaminated equipment between uses. Decontamination methods should be appropriate for the planned analytes. For example, if the analysis will be for sodium, then you should not use a detergent containing sodium carbonate. Many common detergents contain either sodium carbonate or some type of phosphorus compound, so be careful not to use these when sodium or phosphorus are the analytes. Other commercially available detergents - like Liquinox - should be used instead. If there are any questions as to the appropriateness of detergent, contact the appropriate ODA technical staff for assistance.

Sampling Strategies

Various methods can be used to determine how many samples to take, and where to take them. Economic limitations must also be considered, especially when the intended chemical analyses will be expensive. Most sampling schemes employed by ODA staff will be simple "Judgemental" schemes, where there will be some visible or olfactory evidence to justify sampling. Statistically valid sampling schemes are discussed in two EPA documents, "Preparation of Soil Sampling Protocols: Sampling Techniques and Strategies" and "Site Characterization for Subsurface Remediation." Comprehensive statistically relevant sampling plans should be peer-reviewed by ODA technical staff.

Sample Handling and Documentation

Sterile, clean sampling containers should be obtained from the lab complete with any specific instructions relating to the planned analytes. Make sure to follow the laboratory's guidance on holding times and quality assurance/quality control for each planned analyte.

After obtaining a sample, it should be labelled immediately to reduce the possibility of misidentification. The label should include the sample number (including 'A' and 'B' designations), date and time of collection, the collector's initials, and some name reference to the geographic location of the sampling. This information should also go into field notes taken during the sampling. The sample should then be placed in a chilled container, preferably with "blue ice" as opposed to wet ice. If wet ice is used, seal the samples in closeable plastic bags (providing a double seal against moisture) before storing. A chain-of-custody form must

accompany all samples collected, and must be signed by all parties who handle the samples. This form is needed to document where the samples have been and who has handled them. Information from the sample label should be repeated on a chain-of-custody form, along with laboratory instructions. Make sure to indicate which samples you want analyzed - typically you will not have the 'B' samples analyzed immediately, if at all. These are usually kept as a back-up. Ideally, the samples should be hand-delivered to a laboratory, however in many instances they will have to be shipped. Most of the time companies like UPS and Federal Excess will not sign chain-of-custody forms. In this case, provide a signed seal over every access to the shipping container. Make sure the laboratory receiving the samples documents the condition of the seal.

Along with information specific to each sample, field logs should contain a detailed description of where and when each sample was taken. This description should include sample depth, sampling equipment used, sampling location justification, approximate distances from reference points (this is usually best accomplished with a sketch), whether the samples had any obvious odors or discoloration, and what weather conditions were like during the field work. Sampling location justification should include a description of the area where the sample was taken, including any discoloration or obvious odors. Photographs of the sampling locations and their surroundings should also be taken.

Appendix A: Soil Sampling Procedure

The following procedure may be used as a step-by-step soil sampling procedure. If it should become necessary to deviate from this procedure in a way that may invalidate the sampling results, contact appropriate ODA technical staff for recommendations on modifications to the procedure.

1. Before going to the field location, inventory sampling equipment to ensure all necessary equipment is available (a sample list is available in Appendix B).
2. At the field location, select appropriate location for decontamination station. Ideally, this location will be proximal to sampling locations, but will have a very low risk of becoming contaminated due to site conditions (e.g., wind, traffic, etc.).
3. Set up decontamination station. Be careful not to contaminate the station. This area will allow you to store decontaminated equipment until ready for use.
 - a. Fill sprayer with demineralized (deionized) water.
 - b. Mix soap solution (Liquinox® or other approved soap) as directed by the label.
 - c. If bacteria sampling will occur, prepare the sterilizing agent as directed on the label or in Appendix E.
4. Decide why sampling will occur, and select appropriate analytes (see Appendix C).
5. Map out the location of the sampling sites, showing their locations relative to permanent landmarks and/or GPS coordinates. If you are doing sampling to establish an area-wide soil condition assessment (e.g., finding out if land application of manure has exceeded agronomic rates throughout a field), then state how many samples per unit area, and draw a dimensionless map of their locations.
6. Perform initial decontamination of equipment for appropriate analytes (i.e., you do not need to disinfect the equipment if bacteria will not be analyzed).
7. Decontamination procedure:
 - a. Clean as much soil off the auger as possible utilizing mechanical agitation (e.g., dry brush, garden spade, tapping barrel lightly on rock, etc.).
 - b. Use tap water to remove more dirt if desired.
 - c. Scrub sampling equipment with soapy water (including all areas where the equipment is touched by the technician). Ensure scrub brushes fit in all orifices and cracks of equipment.
 - d. Perform tap water rinse.
 - e. Shake to remove excess water.
 - f. If sampling for bacteria, apply sterilizing agent and satisfy contact times described on label or in department approved procedures.
 - g. Perform demineralized water rinse, then shake off excess water.

- h. Place decontaminated equipment on a clean (i.e., area known to be free of contamination) surface until equipment is to be used.
8. To collect a soil sample:
- a. Auger or dig to six inches above the desired sample interval.
 - b. Decontaminate the equipment used, and put on clean gloves.
 - c. Auger or dig to collect the sample.
 - d. Adjacent to the decontamination station, place the sample in a laboratory supplied or approved sampling container. Split the sample for all analytes except bacteria.
 - e. Once the sample is sealed (for additional security, seal sample containers with adhesive that bears your signature), label the sample. Information should include sample number (including A or B for split samples), sample technician, date, and farm name. Your field log should include this information, plus complete location descriptions and time of sampling. If storage on ice is required, place sample containers in sealed zip-lock bags.
 - f. Place the sample in the shipping or handling container. Ensure laboratory recommendations are followed (e.g., ice).
 - g. If another sample is to be taken from the same hole, return to step 6 and continue. If sampling is completed for this hole, decontaminate sampling equipment.
9. If other holes are to be sampled, return to step 6 and continue. If sampling is completed for this operation, decontaminate and store sampling equipment using the decontamination procedure. If equipment has not been allowed to air dry before storage, ensure the storage area is well ventilated, and that equipment can thoroughly dry in this location. (Note: Ensure contaminated equipment is never stored in your clean equipment storage area of your vehicle. If this occurs, decontaminate this area and allow it to air dry before returning sample equipment.)
10. Once sampling is complete, clean up the decontamination station and backfill the auger hole.
- a. For disposable equipment, decontaminate any gross contamination before cleaning re-usable equipment.
 - b. For re-usable equipment, ensure that the outsides of the containers are decontaminated when necessary. The insides of the containers need only be cleaned using subsequent steps of the decontamination procedure (e.g., the soapy water bucket should be rinsed with tap-water, washed with any disinfectant used, rinsed with demineralized water, and allowed to air dry. The tap-water equipment need only be washed with any disinfectant used, rinsed with demineralized water, and allowed to air dry. And so on.).
 - c. Unless label restrictions indicate otherwise, all fluids may be safely disposed of by pouring them onto the land surface (preferably in a grassy area where runoff to a drainage is unlikely). Most fluids may also be poured down drains connected to sanitary sewers or septic systems. DO NOT POUR DISINFECTANTS INTO

SEPTIC SYSTEMS. Septic systems rely on beneficial bacteria for proper operation.

- d. If any equipment is not dry when placed in storage, ensure it is placed in a well ventilated storage area in the vehicle.
- e. For disposable equipment:
 - i. Remove excess water.
 - ii. Place all disposable items in the center of the decontamination pad (i.e. the plastic sheeting).
 - iii. Remove gloves and place in center.
 - iv. Making sure you do not touch the upper surface of the decontamination pad (the bottom has not been impacted by sampling), fold the pad over onto itself, and place the entire assembly into a large garbage bag. Seal the garbage bag, and dispose of in any trash receptacle. If necessary, the sealed sack allows you to transport the trash in your vehicle without contaminating your “clean” equipment storage.
- f. When backfilling, make sure the soil put into the hole is compacted as much as possible.

Appendix B: Sample Equipment List

The following is an example of a typical equipment list for soil sampling. Personal preference may result in substitution or addition of equipment.

1. Hand auger with appropriate extensions and barrels.
2. Gardening trowel.
3. Shovel.
4. Lab supplied sample (wide-mouth) jars.
5. Adhesive sample labels that allow assignment of sample number, date, time, person conducting sampling, and farm name.
6. Chain of custody forms that contain sufficient blocks to establish that hold-time criteria are not exceeded.
7. One or more buckets for wash water.
8. Round scrub brush that fits into auger barrels.
9. Liquinox soap (or other soap that meets chemical criteria).

10. Demineralized water in spray rig for final rinse.
11. Chlorine bleach or other effective disinfectant.
12. Plastic sheeting to act as clean area (may want to include rocks to hold sheeting down in windy conditions).
13. Equipment that allows adequate field location of sample sites (e.g., GPS unit, compass, tape measure).
14. Camera.
15. Write-in-the-Rain notebook with pen that writes in the rain on both labels and the notebook.
16. Trash sacks for disposal of used supplies.
17. Ice chest and ice for sample preservation.
18. Security seals for containers to be shipped.
19. Box of latex gloves.

Appendix C: Soil Sampling Depth Matrix

Soil sampling occurs primarily for one of three reasons: 1) to determine that wastes are being applied at agronomic rates; 2) to ascertain whether or not deep leaching of waste constituents are occurring; and 3) to determine if wastes have run off to an area where wastes are prohibited. The following table provides guidance on sampling depth and pollutants of concern.

REASON FOR SAMPLING	SAMPLE DEPTHS	ANALYTES
Determination of agronomic application.	6 inch sample	Mineralizable N test or TKN, ammonium, and nitrate; ortho-phosphorus; and potassium.
Suspicion of deep leaching.	1 foot, 3 feet, and deepest rooting depth if significantly different than 3 feet.	Ammonium, nitrate+nitrite, ortho-phosphorus, and potassium.
Wastes suspected in prohibited area.	Collect visibly impacted soils. If soils are not visibly impacted, collect 6 inch sample. If deep leaching is suspected, also follow above guidance.	Use the determination of agronomic application analytes above for 6 inch and shallower samples, plus add total organic carbon. For deeper samples use the analytes above for suspected deep leaching.

Normally, bacteria analysis of soils will not be required. If soil areas are periodically subject to concentrated flow that may result in suspension of sediment in a water column, bacteria analysis may be appropriate. For unusual sampling situations, contact appropriate ODA technical staff for advice on sampling methodology.

Appendix D: Recommended Analytic Methods

The following is a list of the recommended methods of analysis for **soil samples only**. Some of the methods discussed can be used for water samples, but the rationale used in this document for choosing an analytical method is meant only for soil samples.

Nitrogen compounds: Analyses for total Kjeldahl nitrogen (TKN), ammonia, and ammonium are mostly standardized, so any method a reputable lab chooses should be fine. Nitrate and nitrite, have two widely used methods to choose from. EPA Method 300, which is an ion chromatography method, and EPA Method 353.2, which uses cadmium reduction. These analyses report nitrate and nitrite combined, or separately. You can specify how you'd like the results presented. However, if you do want nitrite reported separate from nitrate, then the sample must be analyzed (using either method) within 48 hours after collection. EPA Method 300 has a 48 hour holding time whether or not speciation of NO₂/NO₃ is requested, so usually EPA Method 353.2 is the better choice for nitrate/nitrite analyses.

Phosphorus compounds: In most cases, we are concerned with all phosphorus compounds that are not tied up with silicate minerals (e.g., apatite). Use AOAC Official Method 977.01. which is a water extraction of phosphorus, so that mineralized forms are not brought into solution. If the laboratory can not do this method, then request a weak acid extraction, which would use citric or acetic acid. Make sure the laboratory can supply a reference for any alternative method they propose, other than AOAC Official Method 977.01. If you are sure that there will be no significant mineral phosphorus component in the sample, then the laboratory can use a more traditional total phosphorus (TP) analysis. Analyses for phosphate (PO₄) are fairly standardized, so any method a reputable lab chooses should be fine.

Potassium compounds: Sampling and analysis for potassium compounds has a lot in common with analyzing for phosphorus compounds. Standard analyses also use an acid extraction, which can liberate silicate-bound potassium. Generally we want to detect all water soluble forms of potassium. To avoid sampling mineral forms of potassium, request a STLC (soluble threshold limit test) extraction analysis, instead of EPA Method 3010.

Bacteria sampling: Appropriate bacteria sampling and analysis is dependant mostly on getting the sample to the laboratory immediately. For identifying issues relating to manure, either fecal coliform or E. coli sampling is valid, but in both cases the samples should be analyzed by the laboratory the same day they are collected. Make sure the lab can give you a population count of the bacteria, a presence/absence analysis is usually not meaningful for the purposes of our investigation. Also, make sure the lab can analyze soil samples for bacteria - it is not commonly as available as analysis of water samples.

Appendix E: Recommended Disinfectants

All disinfectants should be used in accordance with the label instructions. General disinfectants (e.g., chlorine bleach) may also be used with concentrations and contact times as specified in this appendix. The only other disinfectant currently recommended for use is Virkon S, which is also used by the Animal Health division.

APPENDIX E - ANIMAL WASTE SAMPLING

Animal waste analysis is a key component of nutrient management. Complete analyses provide critical information about the animal waste composition, including pH and nutrient content. Actual nutrient content of animal waste varies with the type of animal, feed, storage system, and method of animal waste application. You should sample animal waste stored on site each time it is to be removed (for land application on or off site). Sample daily spread operations (if you land-apply daily) several times throughout the year to obtain a good estimate of nutrient content.

Description

Animal waste sampling is relatively simple, but must be done properly for reliable results. The sampling method differs based on the type of animal waste you generate at your farm (e.g., liquid, semi-solid, solid). Animal waste sampling generally consists of two to seven steps, depending on the type of animal waste. Although the number of steps varies based on the physical state of the animal waste, all of the methods rely on collecting a representative animal waste sample for analysis. Where bedding is collected with the animal waste, include both bedding and animal waste in the sample. Also, conduct sampling as close to the time of land application as possible. Specific techniques for gathering poultry litter, liquid animal waste, semi-solid animal waste, and solid animal waste samples are described below; you can use these to help develop sampling procedures at your farm. Remember that you should sample and analyze all animal waste at your farm. Work with your state and local agricultural Cooperative Extension Offices to ensure that you develop the proper procedures for your conditions and animal waste management methods.

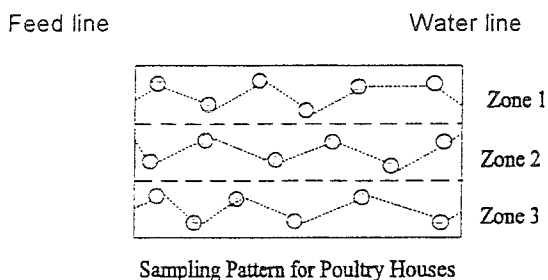
Before sampling, know where the samples are to be shipped, how to pack and ship the sample, and what to use as sample containers. Many laboratories will furnish the proper sample containers for a small charge. Samples should never be collected and shipped in glass bottles, and they should be shipped on wet ice unless otherwise instructed by the laboratory. Contact your state or local agricultural Cooperative Extension Office for a list of laboratories that can perform your analyses. You should also wear gloves at all times, to protect yourself and the sample from contamination.

The test should analyze for such parameters as percentage of dry matter, ammonium-nitrogen, total-nitrogen, phosphorus (P or P_2O_5), and potassium (K or K_2O). Request results in the same units as your calibrated animal waste application system (see Appendix J for more information about calibrating animal waste spreaders and irrigators). For example, if your animal waste application is measured in tons per acre, request that your analysis be reported as pounds of nutrient per ton of animal waste.

Instructions for Collecting Poultry Litter Samples

Poultry litter is a mixture of poultry animal waste and the bedding (e.g., sawdust or rice hull) from houses used to raise broilers, turkeys, and other birds. You will need a clean 5-gallon bucket, a narrow, square-ended spade (or a soil spade), and a 1-quart plastic freezer bag to collect and store your sample. The five steps to collecting a representative poultry litter sample are described below.

Step 1: Mentally divide the poultry house into three zones of equal size. Within each zone, you'll take six cores (i.e., samples) as shown in the diagram below.



Step 2: Take the first core within 1 foot of the feed line using your spade. Clear a small trench the width of the spade to the depth of the litter and remove a 1-inch slice, making sure to get equal amounts of litter from all depths. Empty the sample into your bucket.

Step 3: Repeat the process, gathering six cores from each zone, taking your last core within each zone within 1 foot of the water line. Walk the length of the building in each zone in a zigzag pattern taking cores with the spade at random points along your path (as shown in the diagram above). Take a representative number of cores under feeders and waterers. If the bucket becomes full before all 18 samples are taken, dump the contents onto a plastic sheet and continue sampling.

Step 4: After collecting samples from all three zones, crumble and thoroughly mix all of the litter in the bucket. It may be easier to pour the material onto a piece of plastic, or plywood, or into a wheelbarrow to facilitate mixing. Thorough mixing is critical to ensure that the analyzed sample is representative of the entire house.

Step 5: After the litter is well mixed, fill your plastic freezer bag with a subsample (i.e., a small sample) from your composite. Fill the bag only two-thirds full and squeeze the air out before sealing. Keep the sample cool (on ice if possible) until it is shipped.

Instructions for Collecting Liquid Animal Waste Samples

Liquid animal waste is typically stored in tanks, lagoons, or ponds. For tanks, collect only one sample, but collect several subsamples of liquid animal waste to get a representative sample from lagoons and ponds. You will need a clean 5-gallon bucket, a plastic cup, wire, and a long pole to collect liquid animal waste samples from lagoons and ponds. Sample containers are required to collect liquid animal waste samples from all sources. The two steps to collect a representative liquid animal waste sample are described below.

Step 1: For lagoons and ponds, collect several samples from around the shore of the lagoon or pond and mix them together in a clean 5-gallon bucket. You can collect the samples by wiring a plastic cup to the end of a long pole. When taking the sample, turn the cup upside down and push it a few feet below the surface. Then turn the cup right side up and pull out the sample.

If you store your liquid waste in tanks, your tanks must be well agitated before sampling. Often the only practical time to do this is as you are pumping the animal waste into your spreader.

Step 2: Fill a sample container with your sample, making sure to leave 2 inches of air space. Tightly seal the container and keep cool (on ice if possible) until it is shipped.

Instructions for Collecting Semi-Solid Animal Waste Samples

Collecting a representative sample of semi-solid animal waste is best done using a simple sampling device. You will need a 2-inch PVC pipe, nylon rope, a rubber ball, a dowel, a clean 5-gallon bucket, and sample containers. The seven steps to collecting a representative semi-solid animal waste sample are described below.

Step 1: Get a length of 2-inch PVC pipe long enough to reach well into your animal waste storage facility. Cut a notch 2 inches long and 1/4 inch wide at one end of the pipe. Cut a length of nylon rope 2 feet longer than the PVC pipe and tie a knot at one end. Drill a hole through a 2.5 inch rubber ball. Thread the rope through the ball until it is snug against the end knot. Tie a second knot to hold the ball at the end of the rope. Thread the rope through the PVC pipe and pull it until the ball plugs the end of the pipe. Slip your end of the rope into the notch and tie a knot; this will create a "latch" to keep the pipe sealed after you collect the sample. Tie a short dowel to the free end of the rope to serve as a hand grip. Cut a length of 1-inch PVC pipe and seal one end. Use this pipe to push samples out of the tube.

Step 2: With the ball sealing the end of the pipe, push the pipe through the top layer of animal waste to form a sample hole.

Step 3: Release the rope from the notch so that the ball dangles freely from the end of the pipe. Push the pipe into the sample hole in the animal waste crust. Make sure the ball does not block the pipe opening.

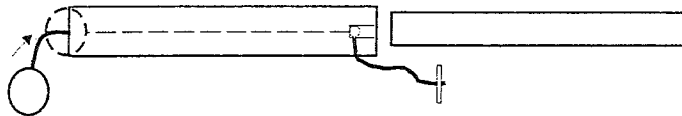
Step 4: Ease the pipe back slightly and pull the rope until the ball seals the end of the pipe. Slip the rope in the notch to anchor the ball in place and withdraw the pipe.

Step 5: Pour the sample into a clean 5-gallon bucket. You may need the 1-inch PVC pipe to force the sample from the pipe. Two people will need to operate a long pipe. To avoid backwash, keep the bottom of the pipe lower than your end.

Step 6: Repeat this process at several locations around the pit.

Step 7: Mix samples thoroughly in the bucket, then fill your sample container with the mix, leaving 2 inches of air space. Tightly seal the container and keep the sample cool (on ice if possible) until it is shipped.

A diagram of the sampling apparatus is shown below.



Sample Apparatus for Semi-Solid Animal Waste

Instructions for Collecting Solid Animal waste

Collecting a representative sample of solid animal waste is best done using a simple sampling device. You will need thin-walled metal tubing (1-inch diameter), a drill, a dowel or short metal rod, a clean 5-gallon bucket, and sample containers. The four steps to collecting a representative solid animal waste sample are described below.

Step 1: Cut a 3-foot length of thin-walled metal tubing and sharpen the bottom edge. Near one end, drill

through the tubing and slide in a dowel or short metal rod to make a handle. Cut a 4-foot length of broomstick to force samples from the tube.

Step 2: Push and twist the tubing all of the way into the animal waste pile. Use the broomstick to push the animal waste into a clean 5-gallon bucket.

Step 3: Repeat Step 2 at several random locations around the pile. It is recommended that the more samples the better, so try to get at least 20 samples.

Step 4: Mix samples in the 5-gallon bucket, and fill the sample container with the mix, leaving 2 inches of air space. Tightly seal the container and keep the sample cool (on ice if possible) until it is shipped.

Animal Waste Sample Analyses

Contact your state or local agricultural Cooperative Extension Office for a list of available laboratories that can analyze your animal waste samples. Some Cooperative Extension Offices may even provide free analysis (e.g., in Maryland).

Label, package, and ship your samples to your contracted laboratory. The laboratory should be able to provide their proper protocol for packaging and shipping samples.

Your animal waste sample is typically analyzed for the following constituents:

- Nitrogen;
- Phosphorus;
- Potassium;
- pH;
- Moisture content;
- Calcium;
- Manganese;
- Magnesium;
- Sulfur;
- Zinc; and
- Copper.

The first step in interpreting analytical results of an animal waste test is to check the units used to report the results. They may be reported as percent nutrient (%) or parts per million (ppm), or, on rare occasions, on a dry-weight basis. (Most animal waste is measured on a wet-weight [i.e., as-is] basis.) The phosphorus and potassium may be reported on an elemental basis (P and K) rather than the phosphate (P_2O_5) and potash (K_2O) basis, which is typical of fertilizers. You will need to convert your animal waste test results into the proper fertilizer units for calculating your animal waste application rate.

Animal waste is an excellent fertilizer if it is spread uniformly on a field and at the proper rate. A pound of animal waste phosphate or potash has a nutrient value equivalent to that of commercial fertilizer. Although it has a value as a fertilizer, typically 50 to 80% of the total nitrogen applied is available to crops.

Inspection record sheet

A Check mark indicates a daily inspection was performed. . . A Plus sign indicates a weekly inspection was performed. . . . Astrix indicates that a problem was found, see

coments section for that date

<u>Daily inspections</u>	<u>Weekly Inspections</u>	<u>Periodical inspections</u>
Water lines	Storm water Diversions Runnoff Diversions waste transport system Storage Structures Storage structure content level	Application Equipment

Month _____

Date and Inspections performed

Problems and solutions

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Manure application record sheet

Field I.D.
Year

Nitrogen requirement for field
Phosphorus requirement for field

lb/ach
lb/ach

Application basis (Circle one)
Nitrogen Phosphorus

[illegible]