Steve Schaffeld

Feedlot

184938
#08061

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NATURAL RESOURCES
DIVISION

Animal Waste Management Plan

Summary of CAFO Operation

Specific Descriptions & Calculations

Record Keeping & Reporting Requirements

Large CAFO Additional Requirements

Miscellaneous

Contact Name, Address, Phone Number

Facility Address

Type of Operation

Number and size of animals by species

Manure, litter and process waste system- provide a general narrative description of each

Collection- How is manure, litter and process waste removed from housing, confinement lot? How is clean water diverted from storage?

Storage- Types and size of manure, litter and process waste storage tanks, ponds

Transfer- How is manure, litter and process waste moved to storage, application areas?

Use- How is manure, litter and process waste treated (composted, separated, anaerobic digestion or storage, aeration)? How is manure, litter and process waste water used on crops? If export is utilized, describe that process

Animal Waste Management Plan

July 11, 2008

Steve Schaffeld Feedlot

Operated by:

Steve Schaffeld
5045 South Road K
Vale, Oregon 97918
(541) 473-3883

184 978
08061

Facility Address:
5017 South Road K
Vale, Oregon

Operation:

Beef Feedlot
Medium Federal CAFO

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

Signature Steve Schaffeld Date 7/11/08

GENERAL NARRATIVE DESCRIPTION

Steve Schaffeld Feedlot is located at 5017 South Road K in Vale, Oregon and is owned by John Schaffeld. The operation is a beef back grounding feedlot and is set on 400 acres available for manure application in Malheur County. The beef feedlot is in full operation from October through April at which time, animal numbers may reach 500 head. The cattle are of mixed breeds. A majority of young animals are brought on to the feedlot each fall at a weight of approximately 550 pounds. Most animals are shipped off the operation in the spring at approximately 825 pounds. The average weight of the animals during the confinement period is 685 pounds.

Manure Collection Methods

All cattle are confined in earthen pens. The manure is collected in the pens where it dehydrated and used as bedding for the cattle. When the cattle are removed from the facility, the pens are cleaned and the dry manure is used as a soil amendment. Some manure is left in the pens, mounded and packed for bedding in the fall.

No ponds are maintained to catch contaminated runoff because of the dry climate and flat pens that may occur during a large winter storm event. All liquid in the pens evaporates by fall. Earthen berms and grass filter strips are maintained around the pens to reduce potential for runoff during a storm.

Manure Storage Facilities and Transfer

The manure generated at the facility is handled in a dry solid form. Dry manure is scraped and stacked within feedlots during the confinement period, and then land applied during 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.

No ponds are necessary to catch contaminated rainwater that falls on the pens because of the dry climate and flat pens. All liquid that is collected in the pens evaporates due to the dry climate (9.97" average annual rainfall, 40.23" average annual evaporation). Solids that are collected in the pens are cleaned out every five years, or as needed. The solids are applied to crop ground.

The solid manure is stored within the dry lots. Solid manure is transported to fields using a 10 yard dump truck.

Manure Utilization

The land available for manure application is owned and/or leased by Steve Schaffeld. There are 400 acres adjacent to the operation. Currently, 140 acres of alfalfa which yields 7 tons per acre, 12 acres of corn silage which yields 25 tons (as-fed) per acre, 70 acre of corn grain which yields 4.5 tons per acre, and the 35 acre of wheat yields 110 bushels 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 a dump truck and land plane. Dry manure will be spread in a wheat-corn silage-corn grain rotation. No manure is applied to the alfalfa at this time. Approximately 25% of the dry manure is used for winter bedding.

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.

ANIMAL WASTE MANAGEMENT PLAN
MINIMUM REQUIRED ELEMENT

OPERATION AND MAINTANENCE

Steve Schaffeld Feedlot
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.

☐ Dry Stack Storage Facility
Solid manure storage facility will be inspected annually. Broken slabs and curbs will be repaired. Repair or replace rusted or damaged areas on roof structure. Broken gutters and/or downspouts will be repaired or replaced. Check for adequacy and function of drain away from downspouts. Check floor, side and back walls for soundness. Manure solids and leachate will not escape through cracks in the facility.

☑ 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

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 waters 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.

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

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: _____

Print Name: D Schofield Date: 7/11/08

Narrative of production area & land application locations

Aerial photo/topographical map showing numbered fields, production area, clean water diversions, surface water features Soil maps of all application fields & map unit descriptions

Manure, Litter and Process Waste Volumes

Manure, litter and process waste output collected & stored in this system. Bedding added & collected. Processed & wash water collected. Silage & feed processing leachate

Contaminated Storm Water

Direct rainfall into storage, slab or lot runoff collected, overflow from gutters or diversions

Nutrient Content of Manure, Litter & Processed Waste

Content & volume of nutrients in manure, litter & process waste generated. Actual test values are required of large CAFOs

Farm Nutrient Balance

Show amount of nutrients (N,P,K) generated, lost in storage, lost in application, or exported off farm annually. Nutrient applications must balance to most limiting nutrients as determined by NRCS Agronomy Tech Note 26 & NRCS Phosphorus Index. Include all acres required to balance nutrients owned or leased by the operator

Application Schedule & Limitations

Show scheduled applications of solids & liquids. Include date, amount & method of application to identified fields, describe calibration of equipment used to apply manure, litter & processed waste. Describe limitations to applications, indicate buffer areas & management to avoid frozen or saturated soils. Justify buffer width & management. Calculate the minimum storage required for liquids & solids. Indicate timing & application rates of irrigation water, irrigation must not allow leaching of soluble nutrients or runoff

Animal Mortality Management

Describe how the farm handles mortalities

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 2 soil types found on the property including, 35A & 35B Virtue Silt Loam. A soils map and soil map unit descriptions 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. OSU book values 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. Steve Schaffeld 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 spring and late summer 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 bedded for the corn which is planted the following spring. Manure applied to the wheat ground is incorporated and planted.

Irrigation water from Vale Oregon Irrigation District is used on all of the manure application acreage. Sprinkler and gated pipe irrigation is used from April through September. To decrease non-point source pollution of surface and groundwater resources, irrigation water is applied at the volume, frequency and application rate in a planned conservation management system. An irrigation system adapted for the site conditions (soil, slope, crop grown, climate, and water quantity) will be available and capable of applying water to meet the intended purpose. Water will not be applied at rates of more than 2 inches per application or at rates that exceed soil infiltration or crop ET. No tile lines or other form of artificial drainage are used on the property.

A 30 foot vegetated buffer along the Vale Oregon Irrigation Ditch is in place that does not receive manure application. This area is naturally vegetated with grasses.

Animal Mortality Management

Deceased animals are removed from the facilities and put on the desert for scavengers following state rules.

WATER, WASTE, AND NUTRIENT COMPUTATIONS

Number of Animals

	Animals	Avg. Weight lb	Total 1000# Animal Units	Confinement Period (Days)
1	500	685	342.5	180
2			0	
Total	**500**	**685**	**342.5**	

Solid Storage (Feedlot pen size)

Pens 1-2 3 acres

Evaporation Ponds for storm runoff

Total weight and volume of manure produced during confinement

*Estimated values from NRCS Agricultural Waste Management Handbook)

Manure Produced

	lb/day/Animal Unit	Total Weight ton (as excreted)	Total Weight ton (at application)
1	58.2	1794	538
2		0	0
Total		**1794**	**538**

	Cu ft/day/Animal Unit	Total Volume Cu ft
1	0.93	57335
2		0
Total		**57335**

Total Nutrient Production

*Estimated values from NRCS Agricultural Waste Management Handbook

	Nutrients Produced lb/day	Total Nutrients Produced lb
Nitrogen	0.30	18495
Phosphorus	0.10	6165
Potassium	0.20	12330

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	9248	4316	7398	
Application	6473	4316	7398	
Denitrification	**6150**	**4316**	**7398**	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	140	ton	7			
Corn, silage	12	ton	25	175	100	225
Corn, grain	70	ton	4.5	144	54	41
Wheat, grain	35	bushel	110	176	93	41
Total	**257**					

Volume and Nutrients Exported

25%	Left in pens for winter bedding

Exported tons	N exported lbs	P exported lbs	K exported lbs
135	**1537**	**1079**	**1850**

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

Remaining N lbs	Remaining P lbs	Remaining K lbs
4612	**3237**	**5549**

Crop Utilization

Crop	Acres needed	lbs of N applied	lbs of P applied	lbs of K applied
Alfalfa	0	0	0	0
Corn, silage	55	9625	5500	12375
Corn, grain	60	8640	3240	2460
Wheat, grain	90	6160	8370	3690
Total	**205**	**24425**	**17110**	**18525**

Gross Nutrient Balance	Acres	lbs of N	lbs of P	lbs of K
	52	**-19813**	**-13873**	**-12977**

Climatic and Hydrologic Data
Climatic Station- Malheur Branch Experiment Station
25 year- 24 hour storm rainfall = 1.8 inches

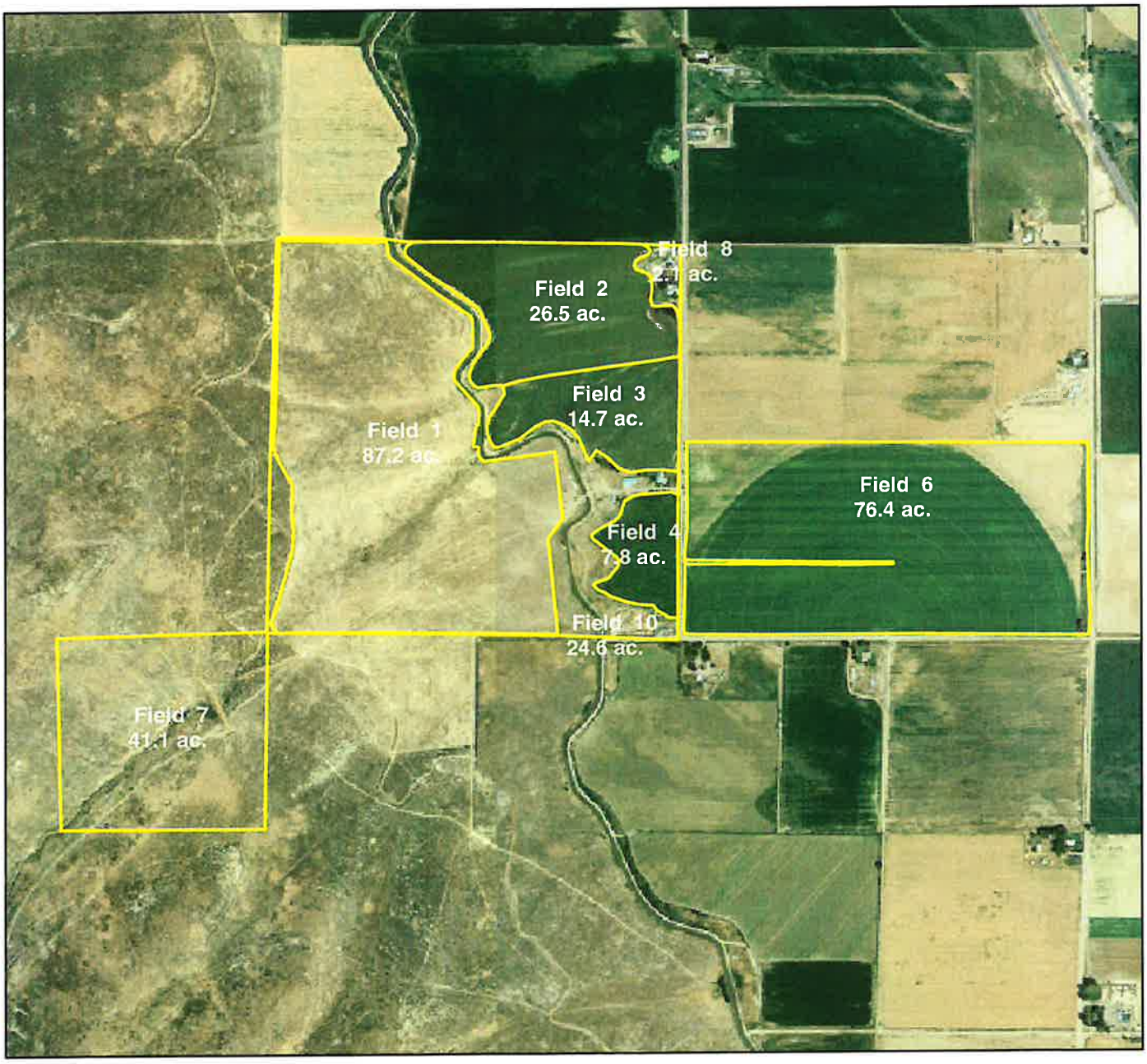
	Average Monthly in Inches		% Lot Runoff Factors	
Month	Precipitation	Evaporation	Concrete*	Unpaved
January	1.26	0.74	100	0
February	0.98	1.09	100	0
March	0.92	2.06	100	0
April	0.70	3.79	100	0
May	0.98	5.12	100	0
June	0.83	6.08	100	0
July	0.19	7.62	100	0
August	0.38	6.51	100	0
September	0.49	4.03	100	0
October	0.71	1.98	100	0
November	1.21	0.50	100	0
December	1.32	0.71	100	0
Annual	**9.97**	**40.23**		

*No concrete lot runoff contributing to the manure system.

Steve Schaffeld - Soil Map T 2205

District: MALHEUR SOIL & WATER CONSERVATION DISTRICT

Assisted By: Lance Phillips



Legend

T2205_CAFO Maps

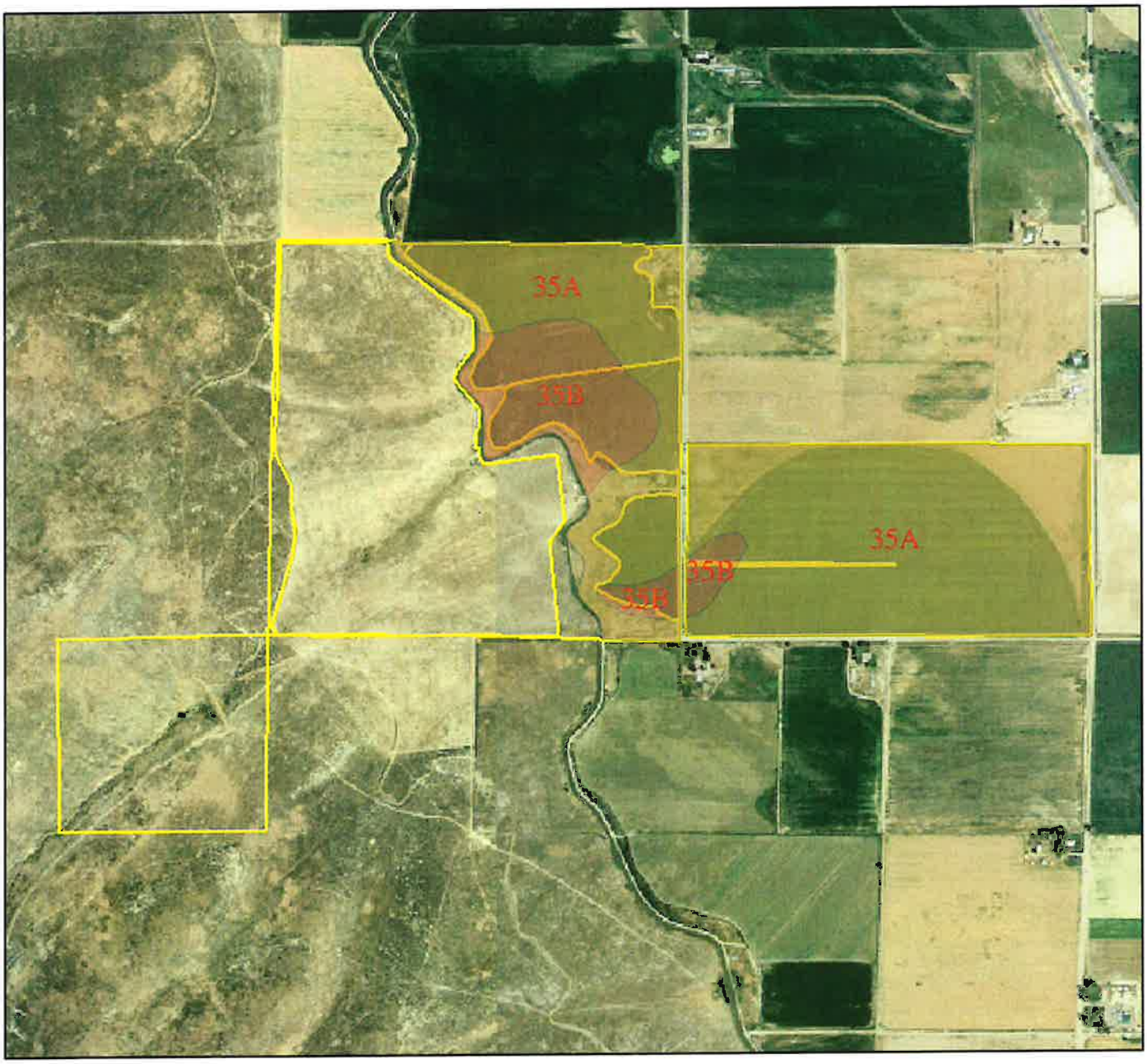
N

1,100 0 1,100 2,200 3,300

Steve Schaffeld - Soil Map T 2205

District: MALHEUR SOIL & WATER CONSERVATION DISTRICT

Assisted By: Lance Phillips



Legend

T2205_CAFO Maps

musym

35A

35B

N

1,100 0 1,100 2,200 3,300

Non-Technical Descriptions

Soil Survey Area: Malheur County, Oregon, Northeastern Part
Survey Status: Maintenance needed
Correlation Date: 12/01/1975
Distribution Date: 08/13/2002

Map Unit: 35A VIRTUE SILT LOAM, 0 TO 2 PERCENT SLOPES
Description Category: SOI
The Virtue soil is over 60 inches deep to bedrock, a hardpan is at 20 to 40 inches. It is silty, well drained and occurs on fans and terraces. Water erosion is a potential hazard.

Map Unit: 35B VIRTUE SILT LOAM, 2 TO 5 PERCENT SLOPES
Description Category: SOI
The Virtue soil is over 60 inches deep to bedrock, a hardpan is at 20 to 40 inches. It is silty, well drained and occurs on fans and terraces. Water erosion is a potential hazard.

Map Unit: 35C VIRTUE SILT LOAM, 5 TO 8 PERCENT SLOPES
Description Category: SOI
The Virtue soil is over 60 inches deep to bedrock, a hardpan is at 20 to 40 inches. It is silty, well drained and occurs on fans and terraces. Water erosion is a potential hazard.

USDA United States Department of Agriculture

Natural Resources Conservation Service

Soils Report

Irrigated Capability Class - Dominant Condition

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations that show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels -- capability class, subclass, and unit. Only class and subclass are included in this dataset.

Capability classes, the broadest groups, are designated by numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Soil Survey: Malheur County, Oregon, Northeastern Part
Survey Status: Maintenance needed
Correlation Date: 12/01/1975
Distribution Date: 08/13/2002

Map Symbol	Soil Name	Rating
35A	VIRTUE SILT LOAM, 0 TO 2 PERCENT SLOPES	3
35B	VIRTUE SILT LOAM, 2	3

Soils Report

Manure and Food Processing Wastes - Dominant Condition

Manure is the excrement of livestock and poultry. The consistency of manure is labile. It changes in storage or treatment, and it depends upon the bedding used and upon whether the manure is diluted or allowed to dry. Food processing wastes consist of damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. Most wastes produced in the processing of milk, cheese, and meat are liquids. Paunch manure is an exception.

Manure and food processing wastes have a variable nitrogen content. The material is either solid, slurry, or liquid. A high nitrogen content limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with lye used in food processing, are outside the meaning of manure and food processing wastes.

The limitations are considered not limiting if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome. A somewhat limiting limitation indicates soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations. A very limiting limitation indicates soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are very limiting.

Soil Survey: Malheur County, Oregon, Northeastern Part
Survey Status: Maintenance needed
Correlation Date: 12/01/1975
Distribution Date: 08/13/2002

Map Symbol	Soil Name	Rating	Dominant Component(s) and Reason(s)
35A	VIRTUE SILT LOAM, 0 TO 2 PERCENT SLOPES	Somewhat limited	Component - VIRTUE (83%) • Depth to cemented pan • Restricted permeability • Droughty
35B	VIRTUE SILT LOAM, 2 TO 5 PERCENT SLOPES	Somewhat limited	Component - VIRTUE (83%) • Depth to cemented pan • Restricted permeability • Droughty
35C	VIRTUE SILT LOAM, 5 TO 8 PERCENT SLOPES	Somewhat limited	Component - VIRTUE (83%) • Depth to cemented pan • Restricted permeability • Droughty

USDA United States Department of Agriculture

Natural Resources Conservation Service

Soils Report

HEL Classification

Highly Erodible land (HEL) Classification is defined by the Sodbuster, Conservation Reserve, and Conservation Compliance parts of the Food Security Act of 1985 and the Food, Agriculture, Conservation, and Trade Act of 1990. Determinations of highly erodible land are based on an erodibility index as defined in the National Food Security Act Manual.

Soil Survey: **Malheur County, Oregon, Northeastern Part**
Survey Status: **Maintenance needed**
Correlation Date: **12/01/1975**
Distribution Date: **08/13/2002**

Map Symbol	Soil Name	Rating
35A	VIRTUE SILT LOAM, 0 TO 2 PERCENT SLOPES	Not highly erodible land
35B	VIRTUE SILT LOAM, 2 TO 5 PERCENT SLOPES	Not highly erodible land
35C	VIRTUE SILT LOAM, 5 TO 8 PERCENT SLOPES	Not highly erodible land

USDA United States Department of Agriculture

Natural Resources Conservation Service

Soils Report

Depth to Soil Restrictions - Dominant Soil(Duripan)

Depth to Restriction (selected type) such as bedrock, cemented pan, or abrupt textural change, that is nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly reduce the movement of water and air through the soil or that otherwise provides an unfavorable root environment.

Soil Survey: Malheur County, Oregon, Northeastern Part
Survey Status: Maintenance needed
Correlation Date: 12/01/1975
Distribution Date: 08/13/2002

Map Symbol	Soil Name	Rating
35A	VIRTUE SILT LOAM, 0 TO 2 PERCENT SLOPES	66
35B	VIRTUE SILT LOAM, 2 TO 5 PERCENT SLOPES	66
35C	VIRTUE SILT LOAM, 5 TO 8 PERCENT SLOPES	66

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)	0	0
						Transport Factors Subtotal (TFS)	5.25	5.25

Tract _____ Fields _____

SOURCE FACTORS	Factor Weight	None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	**Weighted Rating Value** Current	Planned
		PHOSPHORUS LOSS RATING						
Soil Test P – 0-12" ppm (Olsen $NaHCO_3$)	1.00	(Soil Test P – 20) x 0.10 (_____ - 20) x 0.10 = _____ (Soil Test P) Assign 0 points if Soil Test P < 20 ppm						
Commercial P Fertilizer Application Rate	1.00	lbs/ac P_2O_5 x 0.02 67 (lbs/ac P_2O_5) x 0.02 = 1.35					1.35	1.35
Commercial P Fertilizer Application Method	1.00	None Applied (0)	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)	1.0	1.0
Organic P Source Application Rate	1.00	lbs/ac P_2O_5 x 0.02 13 (lbs/ac P_2O_5) x 0.02 = .25					.25	.25
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)	2.0	2.0

Total Rating Value TFS x SFS	**Site Vulnerability Class**		**Current**	**Planned**
		Transport Factors Subtotal (TFS)	5.25	5.25
		Source Factors Subtotal (SFS)	4.6	4.6

PHOSPHORUS INDEX WORKSHEET – **EASTERN** OREGON

Producer: STEVE SCHAFFIELD County: MALHEUR Tract No. 2205 Field No(s). 1-10 Date: 7-8-08

Soil Map Unit(s): 35A & 35B Soil Test P: _____ ppm Lab. Method: _____ Sample Depth: _____

Crop Rotation: ALFALFA - CORN - WHEAT Nutrient Application Method(s) _____

Planner: _____ Notes: _____

		PHOSPHORUS LOSS RATING					Weighted Rating Value	
TRANSPORT FACTORS	Factor Weight	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 (0)	1 – 3 (1.5)	4 – 6 (3.0)	7 – 15 (6.0)	> 15 (12.0)	3	3
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)	.25	.25
Soil Erosion from Surface Irrigation – tons/ac/yr (SISL)	1.00	< 1 (0)	1 – 3 OR tail water return flow in place (1.0)	4 – 6 (2.0)	7 – 15 (4.0)	> 15 (8.0)	1.0	1.0
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)	1.0	1.0
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)	< 100 feet AND No buffer next to surface waters OR Return flow from surface irrigation occurs with no buffer (4.0)	0	0

PHOSPHORUS INDEX WORKSHEET – **EASTERN**

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

Total Rating Value (TFS **x** SFS)	24.15	24.15
Site Vulnerability Class	Low	Low

Agronomy Technical Note 26 - Appendix 4

Soils Data for the Eastern Oregon Phosphorus Index

SOIL SURVEY AREA NO.	SOIL SURVEY AREA NAME	MAP UNIT SYMBOL	COMPONENT NAME	COMP. PCT.	HYD. GROUP	SLOPE LOW (%)	SLOPE HIGH (%)	P INDEX RUNOFF CLASS	SURFACE TEXTURE	Kw	Kf
OR642	Malheur	1A	AHTANUM	85	D	0	2	medium	SIL	0.55	0.55
OR642	Malheur	3A	BULLY	85	B	0	2	low	SIL	0.43	0.43
OR642	Malheur	4A	CENCOVE	85	B	0	2	low	FSL	0.20	0.20
OR642	Malheur	4B	CENCOVE	85	B	2	5	low	FSL	0.20	0.20
OR642	Malheur	4C	CENCOVE	85	B	5	8	medium	FSL	0.20	0.20
OR642	Malheur	4D	CENCOVE	85	B	8	12	medium	FSL	0.20	0.20
OR642	Malheur	5A	CHILCOTT	85	D	0	2	medium	SIL	0.49	0.49
OR642	Malheur	5B	CHILCOTT	85	D	2	5	medium	SIL	0.49	0.49
OR642	Malheur	5C	CHILCOTT	85	D	5	12	high	SIL	0.49	0.49
OR642	Malheur	7A	FALK VARIANT	85	B	0	2	low	FSL	0.24	0.24
OR642	Malheur	8A	FELTHAM	85	B	0	2	low	LFS	0.20	0.20
OR642	Malheur	8B	FELTHAM	85	B	2	5	low	LFS	0.20	0.20
OR642	Malheur	8C	FELTHAM	85	B	8	12	medium	LFS	0.20	0.20
OR642	Malheur	9B	FELTHAM	85	B	2	5	low	SL	0.28	0.28
OR642	Malheur	9C	FELTHAM	85	B	5	8	medium	SL	0.28	0.28
OR642	Malheur	9D	FELTHAM	85	B	8	12	medium	SL	0.28	0.28
OR642	Malheur	10A	FELTHAM VARIANT	85	A	0	2	negligble	LFS	0.20	0.20
OR642	Malheur	11A	FROHMAN	85	C	0	2	medium	SIL	0.49	0.49
OR642	Malheur	11B	FROHMAN	85	C	2	5	medium	SIL	0.49	0.49
OR642	Malheur	11C	FROHMAN	85	C	5	8	high	SIL	0.49	0.49
OR642	Malheur	11D	FROHMAN	85	C	8	12	high	SIL	0.49	0.49
OR642	Malheur	11E	FROHMAN	85	C	12	20	high	SIL	0.49	0.49
OR642	Malheur	11F	FROHMAN	85	C	20	40	very high	GR-SIL	0.37	0.49
OR642	Malheur	12A	GARBUTT	85	B	0	2	low	SIL	0.49	0.49
OR642	Malheur	12B	GARBUTT	85	B	2	5	low	SIL	0.49	0.49
OR642	Malheur	12C	GARBUTT	85	B	5	8	medium	SIL	0.49	0.49
OR642	Malheur	12D	GARBUTT	85	B	8	12	medium	SIL	0.49	0.49
OR642	Malheur	13A	GREENLEAF	85	B	0	2	low	SIL	0.49	0.49
OR642	Malheur	13B	GREENLEAF	85	B	2	5	low	SIL	0.49	0.49
OR642	Malheur	14A	HARANA	85	B	0	2	low	SIL	0.32	0.32
OR642	Malheur	15A	HARANA	85	B	0	2	low	SICL	0.32	0.32
OR642	Malheur	15B	HARANA	85	B	2	5	low	SICL	0.32	0.32
OR642	Malheur	16A	HARANA	85	B	0	2	low	SICL	0.32	0.32
OR642	Malheur	17A	KIESEL	85	C	0	2	medium	SIL	0.43	0.43
OR642	Malheur	17B	KIESEL	85	C	2	5	medium	SIL	0.43	0.43
OR642	Malheur	18A	KIMBERLY	85	B	0	2	low	FSL	0.32	0.32
OR642	Malheur	19A	MCLOUGHLIN	85	B	0	2	low	SIL	0.55	0.55
OR642	Malheur	19B	MCLOUGHLIN	85	B	2	5	low	SIL	0.55	0.55
OR642	Malheur	19C	MCLOUGHLIN	85	B	5	8	medium	SIL	0.55	0.55
OR642	Malheur	20A	NOTUS	60	C	0	2	medium	COSL	0.28	0.28
OR642	Malheur	20A	FALK VARIANT	40	B	0	2	low	FSL	0.24	0.24
OR642	Malheur	21A	NYSSA	85	C	0	2	medium	SIL	0.37	0.37
OR642	Malheur	21B	NYSSA	85	C	2	5	medium	SIL	0.37	0.37
OR642	Malheur	21C	NYSSA	85	C	5	8	high	SIL	0.37	0.37
OR642	Malheur	21D	NYSSA	85	C	8	12	high	SIL	0.37	0.37
OR642	Malheur	21E	NYSSA	85	C	12	20	high	SIL	0.37	0.37
OR642	Malheur	22A	NYSSA	85	C	2	5	medium	SIL	0.37	0.37
OR642	Malheur	22C	NYSSA	85	C	5	8	high	SIL	0.37	0.37
OR642	Malheur	22D	NYSSA	85	C	8	12	high	SIL	0.37	0.37
OR642	Malheur	22E	NYSSA	85	C	12	20	high	SIL	0.37	0.37
OR642	Malheur	23A	NYSSA	50	C	0	2	medium	SIL	0.37	0.37

Data is from the NASIS database as of 7/2001

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Soils Data for the Eastern Oregon Phosphorus Index

SOIL SURVEY AREA NO.	SOIL SURVEY AREA NAME	MAP UNIT SYMBOL	COMPONENT NAME	COMP. PCT.	HYD. GROUP	SLOPE LOW (%)	SLOPE HIGH (%)	P INDEX RUNOFF CLASS	SURFACE TEXTURE	Kw	Kf
OR642	Malheur	23A	MALHEUR	40	C	0	2	medium	SIL	0.49	0.49
OR642	Malheur	23B	NYSSA	45	C	2	5	medium	SIL	0.37	0.37
OR642	Malheur	23B	MALHEUR	40	C	2	5	medium	SIL	0.49	0.49
OR642	Malheur	23C	NYSSA	45	C	5	8	high	SIL	0.37	0.37
OR642	Malheur	23C	MALHEUR	40	C	5	8	high	SIL	0.49	0.49
OR642	Malheur	24A	OTOOLE	85	C	0	2	medium	SIL	0.43	0.43
OR642	Malheur	25A	OWYHEE	85	B	0	2	low	SIL	0.49	0.49
OR642	Malheur	25B	OWYHEE	85	B	2	5	low	SIL	0.49	0.49
OR642	Malheur	25C	OWYHEE	85	B	5	8	medium	SIL	0.49	0.49
OR642	Malheur	25D	OWYHEE	85	B	8	12	medium	SIL	0.49	0.49
OR642	Malheur	25E	OWYHEE	85	B	12	20	medium	SIL	0.49	0.49
OR642	Malheur	26A	PODEN	85	B	0	2	low	SIL	0.28	0.28
OR642	Malheur	28A	QUINCY	85	A	0	2	negligble	LFS	0.32	0.32
OR642	Malheur	28B	QUINCY	85	A	2	5	negligble	LFS	0.32	0.32
OR642	Malheur	28C	QUINCY	85	A	8	12	very low	FS	0.17	0.17
OR642	Malheur	30A	SAGEHILL	85	B	0	2	low	FSL	0.37	0.37
OR642	Malheur	30B	SAGEHILL	85	B	2	5	low	FSL	0.37	0.37
OR642	Malheur	30C	SAGEHILL	85	B	5	8	medium	FSL	0.37	0.37
OR642	Malheur	31A	STANFIELD	85	C	0	2	medium	SIL	0.55	0.55
OR642	Malheur	32A	TRUESDALE	85	C	0	2	medium	FSL	0.24	0.24
OR642	Malheur	32B	TRUESDALE	85	C	2	5	medium	FSL	0.24	0.24
OR642	Malheur	32C	TRUESDALE	85	C	5	8	high	FSL	0.24	0.24
OR642	Malheur	32D	TRUESDALE	85	C	8	12	high	FSL	0.24	0.24
OR642	Malheur	33A	TURBYFILL	85	B	0	2	low	FSL	0.28	0.28
OR642	Malheur	33B	TURBYFILL	85	B	2	5	low	FSL	0.28	0.28
OR642	Malheur	33C	TURBYFILL	85	B	5	8	medium	FSL	0.28	0.28
OR642	Malheur	33D	TURBYFILL	85	B	8	12	medium	FSL	0.28	0.28
OR642	Malheur	35A	VIRTUE	85	C	0	2	medium	SIL	0.32	0.32
OR642	Malheur	35B	VIRTUE	85	C	2	5	medium	SIL	0.32	0.32
OR642	Malheur	35C	VIRTUE	85	C	5	8	high	SIL	0.32	0.32
OR642	Malheur	44A	WINGDALE	85	D	0	2	medium	SIL	0.28	0.28
OR642	Malheur	45A	JETT	85	B	0	2	low	SIL	0.24	0.24
OR642	Malheur	52A	WINGVILLE	85	D	0	2	medium	SIL	0.28	0.28
OR642	Malheur	53A	JUNTURA	85	D	0	2	medium	SIL	0.32	0.32
OR642	Malheur	62A	VEAZIE	45	B	0	3	low	GR-L	0.28	0.37
OR642	Malheur	68A	NEWELL	85	B	0	3	low	SIL	0.37	0.37
OR642	Malheur	75A	HOOPAL	85	D	0	2	medium	SIL	0.43	0.43
OR642	Malheur	80A	POWVAL	85	B	0	3	low	SIL	0.37	0.37
OR642	Malheur	81A	WELCH	85	D	0	2	medium	SIL	0.32	0.32
OR642	Malheur	84A	JOEVAR	85	B	0	3	low	SIL	0.37	0.37
OR642	Malheur	87A	LAWEN	85	B	0	3	low	FSL	0.17	0.17
OR642	Malheur	132A	TURBYFILL	85	B	0	2	low	FSL	0.28	0.28
OR642	Malheur	132B	TURBYFILL	85	B	2	5	low	FSL	0.28	0.28
OR642	Malheur	132BC	TURBYFILL	85	B	5	8	medium	FSL	0.28	0.28
OR642	Malheur	200A	TUCKER	85	C	0	2	medium	SIL	0.43	0.43
OR642	Malheur	201A	ZOLA	85	C	0	2	medium	L	0.32	0.32
OR642	Malheur	205A	TUCKER	45	C	0	2	medium	SIL	0.43	0.43
OR642	Malheur	205A	ZOLA	40	C	0	2	medium	SIL	0.37	0.37
OR642	Malheur	208A	WELCH	50	D	0	2	medium	SIL	0.32	0.32
OR642	Malheur	208A	ZOLA	40	C	0	2	medium	L	0.32	0.32
OR642	Malheur	209A	WITHERS	85	C	0	2	medium	SICL	0.37	0.37

Data is from the NASIS database as of 7/2001

ANIMAL WASTE MANAGEMENT PLAN
MINIMUM REQUIRED ELEMENT

ANIMAL MORTALITY

Management of Animal Mortalities for: Steve Schaffeld Feedlot
NAME OF OPERATION

Animal mortalities will be disposed of in a manner that will comply with local, state and federal regulations. Please mark and describe the method(s) of animal mortality management used on this operation:

☐ REMOVAL SERVICE: _____

☐ COMPOSTED: _____

☐ INCINERATED: _____

☐ BURIED: _____

☑ OTHER: left on desert for scavengers

Signature of Legally Authorized Representative: _____

Print Name: D Schaffeld Date: 7/11/08

Record Keeping and Reporting Requirements

Testing-Monitoring

Include the protocol for testing manure, litter and process waste

Include the protocol for testing and measuring crop nutrient removals

Include the protocol for soil testing to evaluate nutrient application and crop uptake

Record Keeping- Include the following

Date and amount of manure, litter and process waste applied by field. Calculate N & P applied.

Manure, litter and process waste volume exported

Reporting to Oregon Department of Agriculture

Any discharge within 24 hours

Amount of manure, litter and process waste applied annually

Amount of manure, litter and process waste exported annually

ANIMAL WASTE MANAGEMENT PLAN
MINIMUM REQUIRED ELEMENT

RECORD KEEPING AND REPORTING TO OREGON DEPARMENT OF AGRICULTURE

RECORD KEEPING:

a) Applications of manure, litter and process waste will be kept, including the date and the amount of N and P applied during each application.
b) Records of exporting manure, litter and process waste will also be kept.

REPORTING TO OREGON DEPARTMENT OF AGRICULTURE (ODA):

a) Any discharge will be reported orally to ODA within 24 hours. Within 5 days, a written statement describing this discharge will also be submitted to ODA.
b) The amount of manure, litter and process waste applied will be reported annually.
c) The amount of manure, litter and process waste exported will be reported annually.

Signature of Legally Authorized Representative: _____

Print Name: D Schfeld Date: 7/11/08

Record Keeping and Reporting:

Soil samples will be taken in each field, once every five years. Whenever exporting waste off site, a manure samples will be taken and provided to the export recipient. Copies of the manure samples will also be kept on file as a part of this Animal Waste Management Plan. Protocol for sampling and testing soil, manure, and crops are included in this Animal Waste Management Plan.

Steve Schaffeld Feedlot records date and amount of manure applied to each field. Steve Schaffeld Feedlot will also record the date and amount of any waste exported off site. Steve Schaffeld Feedlot will report any discharge within 24 hours to the Oregon Department Of Agriculture. Annual reports will include the amount of manure applied annually and will be submitted each year.

Manure application record sheet

Field I.D.	________	Nitrogen requirement for field	lb/ac/y
Year	________	Phosphorus requirement for field	lb/ac/y

Application basis (Circle one)
Nitrogen Phosphorus

Date	Amount	X	nitrogen content per unit	=	Nitrogen applied		amount applied x phosphous content per unit	=	Phosphorus Applied	Total N Applied	Total P applied
				=				=			
				=				=			
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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 deconned before each use, even if the equipment has been in clean storage. Sampling equipment should also be deconned 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 carefull 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 deconned 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. <u>Decontamination procedure:</u>
    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 disinfect 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 (PO_4) 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.

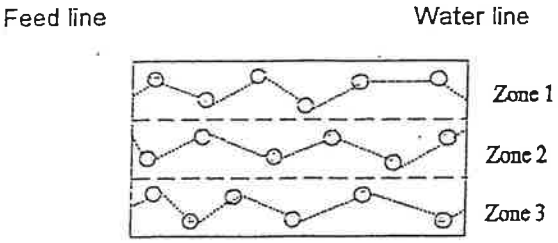
Before sampling, know where the samples are to be shipped, how to pack and ship the sample, and what to use as sample containers. Many laboratories will furnish the proper sample containers for a small charge. Samples should never be collected and shipped in glass bottles, and they should be shipped 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.



Sampling Pattern for Poultry Houses

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.

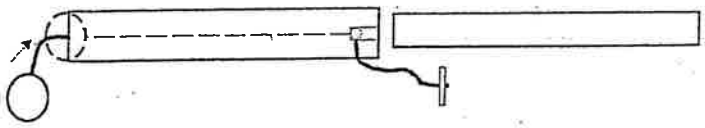
Step 4: Ease the pipe back slightly and pull the rope until the ball seals the end of the pipe. Slip the rope in the notch to anchor the ball in place and withdraw the pipe.

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.

The plan copy for the operator could include identified sections to store soil and manure, litter and process waste test reports, field application records, crop yield records, and other records related to the plan