Oregon
Theodore R. Kulongoski, Governor

Department of Agriculture
635 Capitol Street NE
Salem, OR 97301-2532

April 17, 2009

Derek Pearson
4607 Power Road
Ontario, Oregon 97914

RE: Animal Waste Management Plan (AWMP) review; MA #100017

Dear Mr. Pearson:

On December 18, 2008, the Oregon Department of Agriculture (department) received an AWMP for your beef feedlot facility located at 4607 Power Road, Ontario, Oregon. We have completed our review of your AWMP, and our conclusion follows.

AWMP Status: Approved.
The AWMP you provided was logged into our files as #08109. The AWMP has been reviewed and is hereby approved. Please find enclosed the AWMP review memo.

Construction Status: None proposed at This Time.
All construction of substantial manure system structures requires department approval prior to construction. Please apply to the department for construction approval if you plan to build manure storage facilities.

Permit Status: Active Medium Federal CAFO.
Your beef feedlot facility is permitted for 500 head. This number is based on a herd composition of 500 beef feeder animals, with an average weight during confinement of 650 pounds.

The department appreciates the effort put forth to complete your AWMP. If you have any questions, please contact Ron Jones, the area Livestock Water Quality Specialist, (541) 889-4042.

Sincerely,

Ray Jaindl

Ray Jaindl, Administrator
Natural Resources Division
PH: (503) 986-4700
FX: (503) 986-4730

Enclosures: AWMP Review Memo

cc: Ron Jones, Area LWQS

RJ/rj/cd

MEMORANDUM

To: Ray Jaindl

From: Ron Jones

Subject: AWMP approval for Derek Pearson Feedlot
MA #1000017

Date: March 24, 2009

The Derek Pearson Feedlot is owned and operated by Derek Pearson. This beef feedlot facility is located in Ontario, Oregon, and is currently permitted for 500 animals. On 12/10/2008, Mr. Pearson submitted an AWMP for his facility. The AWMP was logged into our files as AWMP #08109.

The AWMP was reviewed according to OAR Chapter 340 Division 51 and department policy documents.

AWMP Minimum Required Elements	Notes
1. Summary of CAFO Operation	
a) Contact name, address, phone number	Included
b) Facility address	Included
c) Type of operation	Included
(i) Number and size of animals by species, expansion?	Included
d) Manure, litter and process waste system – provide a general narrative description of each	
(i) Collection – How is manure, litter and process waste removed from housing, confinement lots? How is clean water diverted from storage?	Included
(ii) Storage – Types and size of manure, litter and process waste storage tanks, ponds.	Included
(iii) Transfer – How is manure, litter and process waste moved to storage, application areas?	Included
(iv) 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.	Included
2. Specific descriptions and calculations	
a) A description of production area and land application locations	Included

AWMP Minimum Required Elements	Notes
(i) Aerial photo or topographical map showing numbered field locations, production area facilities, clean water diversions, and surface water features.	Included
(ii) Soil maps of all application fields, including those not owned, and map unit descriptions. Indicate areas with application limitations.	Included
b) Manure, litter and process waste volumes	
(i) Manure (feces and urine), litter and process waste output that is collected and stored in this system.	Included
(ii) Bedding added and collected.	Included
(iii) Process and wash water collected, include footbath use when appropriate.	N/A
(iv) Silage and feed processing leachate.	Included
c) Contaminated storm water	
(i) Direct rainfall into storage.	Included
(ii) Slab or lot runoff collected.	Included
(iii) Overflow from gutters or other diversions.	N/A
d) Nutrient content of manure, litter and process waste water	
(i) Content and volume of nutrients in manure, litter and process waste generated – can come from NRCS Animal Waste Field Handbook (chapter 4)), land grant university publications, or analyses of manure, litter and process waste. Actual test values are required of large CAFOs.	Included
e) Farm nutrient balance	
(i) Show amount of nutrients (N, P, K) generated, lost in storage, lost during application, used by crops, and/or exported off the farm on an annual basis.	Included
(ii) Nutrient application must balance to most limiting nutrient as determined by NRCS Agronomy Technical Note #26 and the NRCS Phosphorus Index.	Included
(iii) Include all acres required to balance nutrients owned or leased by the operator.	Included
f) Application schedule and limitations	
(i) Show scheduled applications of solids and liquids. Include date, amount and method of application to identified fields. Describe calibration of equipment used to apply manure, litter and process waste water.	Included
(ii) Describe limitations to manure, litter and process waste applications. Indicate buffer areas and management to avoid saturated soils. Justify buffer width and management. If application to frozen soil is planned, include field descriptions, specific management/structural practices, monitoring and record keeping.	Included
(iii) Using agronomic rates, application limitations, and scheduled applications, calculate the minimum storage required for liquids and solids.	Included

AWMP Minimum Required Elements	Notes
(iv) How is irrigation water managed relative to manure, litter and process waste water application? Include general timing and application rates of irrigation water. Irrigation water management must not allow leaching of soluble nutrients or runoff.	Included
g) Animal mortality management	
(i) Describe how the farm handles mortalities.	Included
h) Operation and maintenance	
(i) Include operation and maintenance narrative for structural and mechanical components included in this plan.	Included
3. Record keeping and reporting requirements	
a) Testing – Monitoring	
(i) Include the protocol for testing manure, litter and process waste.	Included
(ii) Include the protocol for testing and measuring crop nutrient removals.	Included
(iii) Include the protocol for soil testing to evaluate nutrient application and crop uptake.	Included
b) Record keeping. Include the following:	
(i) Date and amount of manure, litter and process waste applied by field. Calculate N and P applied.	Included
(ii) Manure, litter and process waste volume exported.	N/A
c) Reporting to Oregon Department of Agriculture	
(i) Any discharge within 24 hours.	Included
(ii) Amount of manure, litter and process waste applied annually.	Included
(iii) Amount of manure, litter and process waste exported annually.	N/A
4. Additional requirements for Large CAFOs	**Medium**
a) Inspections	
(i) Check storm water diversions, runoff diversions, waste transport, storage structures, storage structure volume weekly.	
(ii) Check water lines daily.	
(iii) Check for application equipment leaks periodically.	
b) Record keeping	
(i) Results of daily inspections.	
(ii) Results of weekly inspections.	

AWMP Minimum Required Elements	Notes
(iii) Results of periodic inspections.	
(iv) Corrective actions taken, explain those not corrected.	
(v) Expected crop yields if not in the plan.	Included

Recommendations

The AWMP provided by Mr. Pearson is considered complete. Based on my working knowledge of the Derek Pearson Feedlot and the information provided, I recommend approval of this AWMP.

Derek Pearson

Feedlot

Animal Waste Management Plan

Summary of CAFO Operation

Specific Descriptions & Calculations

Record Keeping & Reporting Requirements

Large CAFO Additional Requirements

Miscellaneous

Animal Waste Management Plan

July 17, 2008

Derek Pearson Feedlot

Operated by:

Derek Pearson
4607 Power Road
Ontario, Oregon 97914
(080 739-2193

Facility Address:
4607 Power Road
Ontario, Oregon 97914

Operation:

Beef Feedlot
Medium Federal CAFO

1000017
#08109

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

Signature Derek B Pearson Date 12-10-08

GENERAL NARRATIVE DESCRIPTION

Derek Pearson Feedlot is located at 4607 Power Road in Ontario, Oregon and is owned by Derek Pearson. The operation is a beef back grounding feedlot and is set on 70 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 500 pounds. Most animals are shipped off the operation in the spring at approximately 800 pounds. The average weight of the animals during the confinement period is 650 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.

Two small evaporation ponds are maintained to catch contaminated runoff that may occur during a large winter storm event. All liquid in the ponds 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.

Two 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 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 450 cubic foot manure spreader rented from a neighbor.

Corn silage is stored in a 30' x 150' concrete bunker. All leachate and contaminated runoff is contained and evaporated.

Manure Utilization

The land available for manure application is owned by Derek Pearson. There are 75 acres adjacent to the operation. Currently, 50 acres of alfalfa which yields 5 tons per acre, 25 acres of corn silage which yields 25 tons (as-fed) 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 450 cubic foot solid manure spreader. Dry manure will be spread in a wheat-corn silage-corn grain rotation. Manure is applied to the alfalfa at this time if necessary.

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.

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
MINIMUM REQUIRED ELEMENT

OPERATION AND MAINTANENCE

Derek Pearson 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: Derek S Pearson

Print Name: Derek S. Pearson Date: 7-20-08

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 4 soil types found on the property including, 12B Garbutt silt loam, 21B & D Nyssa Silt Loam, 35A & B Virtue Silt Loam, and 36F Xeric. 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. Derek Pearson 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.

Irrigation water from Owyhee Irrigation District is used on all of the manure application acreage. Siphon 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 Owyhee 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 buried following Oregon state guidelines.

WATER, WASTE, AND NUTRIENT COMPUTATIONS

Number of Animals

	Animals	Avg. Weight lb	Total 1000# Animal Units	Confinement Period (Days)
1	500	650	325	180
2			0	
Total	**500**	**650**	**325**	

Solid Storage (Feedlot pen size)

Pens 1-8 15 acres

Evaporation Ponds for storm runoff

Pond 1 100'X20'X5'= 2.25 acre feet

Pond 2 Same as #1

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	1702	511
2		0	0
Total		**1702**	**511**

	Cu ft/day/Animal Unit	Total Volume Cu ft
1	0.93	54405
2		0
Total		**54405**

Total Nutrient Production

*Estimated values from NRCS Agricultural Waste Management Handbook

	Nutrients Produced lb/day	Total Nutrients Produced lb
Nitrogen	0.30	17550
Phosphorus	0.10	5850
Potassium	0.20	11700

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	8775	4095	7020	
Application	6143	4095	7020	
Denitrification	**5835**	**4095**	**7020**	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	50	ton	5	210	50	210
Corn, silage	25	ton	25	200	100	200
Corn, grain		ton				
Wheat, grain		bushel				
Total	**75**					

Volume and Nutrients Exported

25%	Of the manure is retained in the pens for winter bedding.

Exported tons	N exported lbs	P exported lbs	K exported lbs
128	**1459**	**1024**	**1755**

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

Remaining N lbs	Remaining P lbs	Remaining K lbs
4377	**3071**	**5265**

Crop Utilization

Crop	Acres needed	lbs of N applied	lbs of P applied	lbs of K applied
Alfalfa	50	10500	2500	10500
Corn, silage	25	5000	2500	5000
Corn, grain		0	0	0
Wheat, grain		0	0	0
Total	**75**	**15500**	**5000**	**15500**

Gross Nutrient Balance	Acres	lbs of N	lbs of P	lbs of K
	0	**-11123**	**-1929**	**-10235**

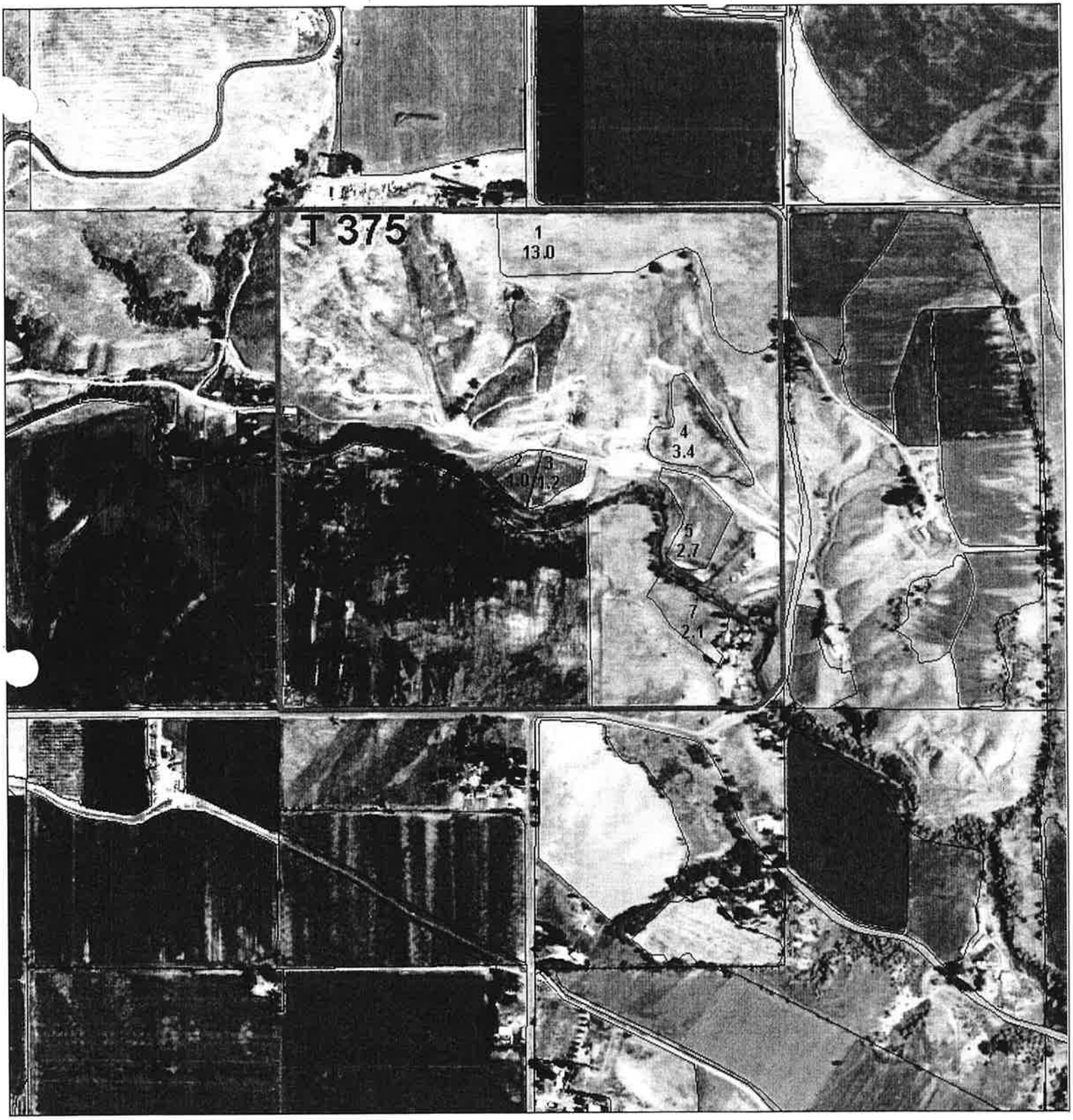
Climatic and Hydrologic Data

Climatic Station- Malheur Branch Experiment Station

25 year- 24 hour storm rainfall = 1.8 inches

Month	Average Monthly in Inches Precipitation	Evaporation	% Lot Runoff Factors 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.



USDA

Tract # 375

Malheur FSA

0.0 Calculated Acres
Status: NHEL

Wetland Acres

N

April 01, 2008

400 200 0 400 800 1,200

Feet

This acreaage is for FSA program purposes only
No warrenty is made for any other use.

Disclaimer: Wetland identifiers do not represent the size, shape or specific determination of the area. Refer to your original determination (CPA-026 and attached maps) for exact wetland boundaries and determinations, or contact NRCS.

T 375 Soils Map

Date: 7/17/2008

Assisted By: Sunseri, Anthony M

Legend

Soils Map

- 12B, GARBUTT SILT LOAM, 2 TO 5 PERCENT SLOPES
- 21A, NYSSA SILT LOAM, 0 TO 2 PERCENT SLOPES
- 21B, NYSSA SILT LOAM, 2 TO 5 PERCENT SLOPES
- 21D, NYSSA SILT LOAM, 8 TO 12 PERCENT SLOPES
- 25A, OWYHEE SILT LOAM, 0 TO 2 PERCENT SLOPES
- 25E, OWYHEE SILT LOAM, 12 TO 20 PERCENT SLOPES
- 35A, VIRTUE SILT LOAM, 0 TO 2 PERCENT SLOPES
- 35B, VIRTUE SILT LOAM, 2 TO 5 PERCENT SLOPES
- 35C, VIRTUE SILT LOAM, 5 TO 8 PERCENT SLOPES
- 35D, VIRTUE SILT LOAM, 8 TO 12 PERCENT SLOPES
- 36F, XERIC TORRIORTHENTS, VERY STEEP

Tract 375

210 0 210 420 630 840 Feet

N

Soils Inventory Report

Map Unit Symbol	Map Unit Name	Acres	Percent
12B	GARBUTT SILT LOAM, 2 TO 5 PERCENT SLOPES	4.9	3%
21A	NYSSA SILT LOAM, 0 TO 2 PERCENT SLOPES	33.6	22%
21B	NYSSA SILT LOAM, 2 TO 5 PERCENT SLOPES	9.9	6%
21D	NYSSA SILT LOAM, 8 TO 12 PERCENT SLOPES	6.8	4%
25A	OWYHEE SILT LOAM, 0 TO 2 PERCENT SLOPES	0.1	0%
25E	OWYHEE SILT LOAM, 12 TO 20 PERCENT SLOPES	0.7	0%
35A	VIRTUE SILT LOAM, 0 TO 2 PERCENT SLOPES	10.8	7%
35B	VIRTUE SILT LOAM, 2 TO 5 PERCENT SLOPES	21.3	14%
35C	VIRTUE SILT LOAM, 5 TO 8 PERCENT SLOPES	3.2	2%
35D	VIRTUE SILT LOAM, 8 TO 12 PERCENT SLOPES	21.5	14%
36F	XERIC TORRIORTHENTS, VERY STEEP	41.6	27%
	Total:	154.4	

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

Map Unit: 12B GARBUTT SILT LOAM, 2 TO 5 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: 21B NYSSA SILT LOAM, 2 TO 5 PERCENT SLOPES
Description Category: SOI
The Nyssa soil is over 60 inches deep to bedrock, a hardpan is at 20 to 40 inches. It is silty, well drained and occurs on terraces. This soil is alkaline. Water erosion is a potential hazard.

Map Unit: 21D NYSSA SILT LOAM, 8 TO 12 PERCENT SLOPES
Description Category: SOI
The Nyssa soil is over 60 inches deep to bedrock, a hardpan is at 20 to 40 inches. It is silty, well drained and occurs on terraces. This soil is alkaline. Water erosion is a potential hazard.

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: 36F XERIC TORRIORTHENTS, VERY STEEP
Description Category: SOI
Xeric Torriorthents are over 60 inches deep to bedrock. They are silty to clayey, well drained and occur on plateaus. Permeability is variable. Water erosion is a potential hazard.

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
OR641	Malheur, NE	1	AHTANUM	80	D	0	2	medium	SIL	0.55	0.55
OR641	Malheur, NE	2	BALDOCK	85	C	0	2	medium	SIL	0.32	0.32
OR641	Malheur, NE	3	BULLY	80	B	0	2	low	SIL	0.43	0.43
OR641	Malheur, NE	4A	CENCOVE	80	B	0	2	low	FSL	0.20	0.20
OR641	Malheur, NE	4B	CENCOVE	80	B	2	5	low	FSL	0.20	0.20
OR641	Malheur, NE	4C	CENCOVE	85	B	5	8	medium	FSL	0.20	0.20
OR641	Malheur, NE	4D	CENCOVE	85	B	8	12	medium	FSL	0.20	0.20
OR641	Malheur, NE	5B	CHILCOTT	75	D	2	5	medium	SIL	0.49	0.49
OR641	Malheur, NE	5C	CHILCOTT	75	D	5	12	high	SIL	0.49	0.49
OR641	Malheur, NE	7	FALK VARIANT	83	B	0	2	low	FSL	0.24	0.24
OR641	Malheur, NE	8A	FELTHAM	76	B	0	2	low	LFS	0.20	0.20
OR641	Malheur, NE	8C	FELTHAM	80	B	8	12	medium	LFS	0.20	0.20
OR641	Malheur, NE	9B	FELTHAM	73	B	2	5	low	SL	0.28	0.28
OR641	Malheur, NE	9C	FELTHAM	76	B	5	8	medium	SL	0.28	0.28
OR641	Malheur, NE	9D	FELTHAM	80	B	8	12	medium	SL	0.28	0.28
OR641	Malheur, NE	10	FELTHAM VARIANT	75	A	0	2	negligble	LFS	0.20	0.20
OR641	Malheur, NE	11A	FROHMAN	93	C	0	2	medium	SIL	0.49	0.49
OR641	Malheur, NE	11B	FROHMAN	93	C	2	5	medium	SIL	0.49	0.49
OR641	Malheur, NE	11C	FROHMAN	93	C	5	8	high	SIL	0.49	0.49
OR641	Malheur, NE	11D	FROHMAN	93	C	8	12	high	SIL	0.49	0.49
OR641	Malheur, NE	11E	FROHMAN	96	C	12	20	high	SIL	0.49	0.49
OR641	Malheur, NE	12A	GARBUTT	77	B	0	2	low	SIL	0.49	0.49
OR641	Malheur, NE	12B	GARBUTT	87	B	2	5	low	SIL	0.49	0.49
OR641	Malheur, NE	13A	GREENLEAF	90	B	0	2	low	SIL	0.49	0.49
OR641	Malheur, NE	13B	GREENLEAF	85	B	2	5	low	SIL	0.49	0.49
OR641	Malheur, NE	14	HARANA	75	B	0	2	low	SIL	0.32	0.32
OR641	Malheur, NE	15	HARANA	75	B	0	2	low	SICL	0.32	0.32
OR641	Malheur, NE	16	HARANA	75	B	0	2	low	SICL	0.32	0.32
OR641	Malheur, NE	17	KIESEL	78	C	0	2	medium	SIL	0.43	0.43
OR641	Malheur, NE	18	KIMBERLY	82	B	0	2	low	FSL	0.32	0.32
OR641	Malheur, NE	19A	MCLOUGHLIN	80	B	0	2	low	SIL	0.55	0.55
OR641	Malheur, NE	19B	MCLOUGHLIN	90	B	2	5	low	SIL	0.55	0.55
OR641	Malheur, NE	19C	MCLOUGHLIN	95	B	5	8	medium	SIL	0.55	0.55
OR641	Malheur, NE	20	NOTUS	55	C	0	2	medium	COSL	0.28	0.28
OR641	Malheur, NE	20	FALK VARIANT	25	B	0	2	low	FSL	0.24	0.24
OR641	Malheur, NE	21A	NYSSA	59	C	0	2	medium	SIL	0.37	0.37
OR641	Malheur, NE	21B	NYSSA	68	C	2	5	medium	SIL	0.37	0.37
OR641	Malheur, NE	21C	NYSSA	65	C	5	8	high	SIL	0.37	0.37
OR641	Malheur, NE	21D	NYSSA	60	C	8	12	high	SIL	0.37	0.37
OR641	Malheur, NE	21E	NYSSA	55	C	12	20	high	SIL	0.37	0.37
OR641	Malheur, NE	22A	NYSSA	78	C	0	2	medium	SIL	0.37	0.37
OR641	Malheur, NE	22B	NYSSA	80	C	2	5	medium	SIL	0.37	0.37
OR641	Malheur, NE	22C	NYSSA	85	C	5	8	high	SIL	0.37	0.37
OR641	Malheur, NE	22D	NYSSA	85	C	8	12	high	SIL	0.37	0.37
OR641	Malheur, NE	22E	NYSSA	85	C	12	20	high	SIL	0.37	0.37
OR641	Malheur, NE	23A	NYSSA	55	C	0	2	medium	SIL	0.37	0.37
OR641	Malheur, NE	23A	MALHEUR	30	C	0	2	medium	SIL	0.49	0.49
OR641	Malheur, NE	23B	NYSSA	55	C	2	5	medium	SIL	0.37	0.37
OR641	Malheur, NE	23B	MALHEUR	30	C	2	5	medium	SIL	0.49	0.49
OR641	Malheur, NE	23C	NYSSA	55	C	5	8	high	SIL	0.37	0.37
OR641	Malheur, NE	23C	MALHEUR	30	C	5	8	high	SIL	0.49	0.49

Data is from the NASIS database as of 7/2001

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
OR641	Malheur, NE	24	OTOOLE	83	C	0	2	medium	SIL	0.43	0.43
OR641	Malheur, NE	25A	OWYHEE	80	B	0	2	low	SIL	0.49	0.49
OR641	Malheur, NE	25B	OWYHEE	85	B	2	5	low	SIL	0.49	0.49
OR641	Malheur, NE	25C	OWYHEE	85	B	5	8	medium	SIL	0.49	0.49
OR641	Malheur, NE	25D	OWYHEE	85	B	8	12	medium	SIL	0.49	0.49
OR641	Malheur, NE	25E	OWYHEE	85	B	12	20	medium	SIL	0.49	0.49
OR641	Malheur, NE	26	PODEN	90	B	0	2	low	SIL	0.28	0.28
OR641	Malheur, NE	27	POWDER	85	B	0	2	low	SIL	0.37	0.37
OR641	Malheur, NE	28A	QUINCY	80	A	0	2	negligble	LFS	0.32	0.32
OR641	Malheur, NE	28B	QUINCY	80	A	2	5	negligble	LFS	0.32	0.32
OR641	Malheur, NE	30A	SAGEHILL	80	B	0	2	low	FSL	0.37	0.37
OR641	Malheur, NE	30B	SAGEHILL	80	B	2	5	low	FSL	0.37	0.37
OR641	Malheur, NE	30C	SAGEHILL	80	B	5	8	medium	FSL	0.37	0.37
OR641	Malheur, NE	31	STANFIELD	83	C	0	2	medium	SIL	0.55	0.55
OR641	Malheur, NE	32A	TRUESDALE	80	C	0	2	medium	FSL	0.24	0.24
OR641	Malheur, NE	32B	TRUESDALE	80	C	2	5	medium	FSL	0.24	0.24
OR641	Malheur, NE	32C	TRUESDALE	80	C	5	8	high	FSL	0.24	0.24
OR641	Malheur, NE	32D	TRUESDALE	80	C	8	12	high	FSL	0.24	0.24
OR641	Malheur, NE	33A	TURBYFILL	80	B	0	2	low	FSL	0.28	0.28
OR641	Malheur, NE	33B	TURBYFILL	80	B	2	5	low	FSL	0.28	0.28
OR641	Malheur, NE	34	UMAPINE	85	C	0	2	medium	SIL	0.55	0.55
OR641	Malheur, NE	35A	VIRTUE	83	C	0	2	medium	SIL	0.32	0.32
OR641	Malheur, NE	35B	VIRTUE	83	C	2	5	medium	SIL	0.32	0.32
OR641	Malheur, NE	35C	VIRTUE	83	C	5	8	high	SIL	0.32	0.32

PHOSPHORUS INDEX WORKSHEET – **EASTERN** OREGON

Producer: DEREK PEARSON County: Malheur Tract No. _____ Field No(s). All Date: 7-17-08

Soil Map Unit(s): 125 Soil Test P: _____ ppm Lab. Method: _____ Sample Depth: _____

Crop Rotation: _____ Nutrient Application Method(s) BROADCAST

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)	3.0	3.0
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)	0	0
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)	2.0	2.0
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)	.5	.5

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)	6.5	6.5

Tract _____ Fields _____

SOURCE FACTORS	Factor Weight	**PHOSPHORUS LOSS RATING** None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	**Weighted Rating Value** Current	Planned
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 $\frac{95}{\text{lbs/ac } P_2O_5}$ x 0.02 = .5					.5	.5
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 $\frac{40}{\text{lbs/ac } P_2O_5}$ x 0.02 = .8					.8	.8
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)	1.0	1.0

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

	Current	**Planned**
Transport Factors Subtotal (TFS)	6.5	6.5
Source Factors Subtotal (SFS)	3.3	3.3

PHOSPHORUS INDEX WORKSHEET – **EASTERN**

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

Total Rating Value (TFS x SFS)	21	21
Site Vulnerability Class	Low	Low

ANIMAL WASTE MANAGEMENT PLAN
MINIMUM REQUIRED ELEMENT

ANIMAL MORTALITY

Management of Animal Mortalities for: **Derek Pearson 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: following state guidelines

☐ OTHER: _____

Signature of Legally Authorized Representative: Derek S Pearson

Print Name: Derek S Pearson Date: 12-10-05

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: Derek S Pearson

Print Name: Derek S. Pearson Date: 7-21-08

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.

Derek Pearson Feedlot records date and amount of manure applied to each field. Derek Pearson Feedlot will also record the date and amount of any waste exported off site. Derek Pearson 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. ______
Year ______

Nitrogen requirement for field [lb/ac/y]
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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OD[illegible]Soil Sampling Standard Meth[illegible]logy
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 wa[illegible]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 analy of soils will not be required. If soil ar 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.

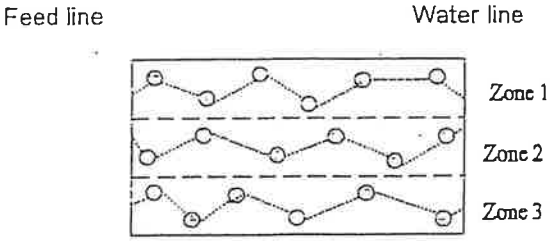
Before sampling, know where the samples are to be shipped, how to pack and ship the sample, and what to use as sample containers. Many laboratories will furnish the proper sample containers for a small charge. Samples should never be collected and shipped in glass bottles, and they should be shipped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

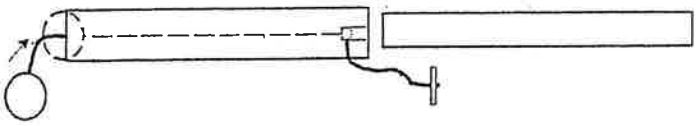
Step 4: Ease the pipe back slightly and pull the rope until the ball seals the end of the pipe. Slip the rope in the notch to anchor the ball in place and withdraw the pipe.

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