

MA No. 183760

log No. 14012

Cream Line Milk Co.

AWMP

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ODA - AREA V

March 2014

Table of Contents

Section 1

Operator Certification
Manure Management
Crop System
Record Keeping and Reporting

Section 2

Maps

Section 3

Operation and Maintenance

Section 4

Nutrient Removal of Forges
Manure Nutrient Analysis
Phosphorous Index
Irrigation Worksheet

Section 5

Soil Sample Results
Soil Survey
RULSE Calculations

Section 6

Animal Mortality Management
Sampling Soil
Sampling Manure
Equipment Calibration

Section 7

ORAWM
VTA

Farm Contact Information:

Cream Line Milk Co
Tyler and Erica Carroll
50924 Umapine Road
Milton-Freewater, OR 97862
509-386-1161

Physical Location:

Cream Line Milk Co
50924 Umapine Road
Milton-Freewater, OR 97862
509-386-1161

**Animal Feeding Operation:
Type and Size:**

Medium Confined CAFO
Dairy – 350 mature and 625 young stock

Owner/Operator

As the owner/operator of this AWMP, I, as the decision maker, have been involved in the planning process and agree that the items/practices listed in each element of this AWMP are needed. I understand that I am responsible for keeping all the necessary records associated with the implementation of this AWMP.

Signature: _____

Name: _____


Tyler or Erica Carroll for Cream Line Milk Co

Date: _____

3-4-14

Cream Line Milk Co is owned and operated by Tyler and Erica Carroll. The dairy facility is located at 50924 Umapine Road in Milton-Freewater. The land base available for manure application consists of 158.6 acres. Currently the facility is permitted for 605 dairy animals with a herd composition of 180 mature animals and 425 young stock. This AWMP has been written with an increase in herd size. The proposed increased herd consists of 975 dairy animals with a herd composition of 350 mature animals and 625 young stock.

Manure Management

Sampling

Soil samples will be collected and analyzed for nitrogen and phosphorous a minimum of every five (5) years from ground that has been fertilized with manure.

Frozen Soil Application Procedures

Manure and wastewater will be applied to land that is not saturated at agronomic rates. In the event that an application needs to take place on frozen soil¹, use the following guidelines:

- Apply only enough wastewater or solids containing manure to address storage limitations until suitable soil conditions for application are available.
- Minimize applications to 5 wet tons per acre or less of solids containing manure and 6,788 gallons (.25 inch) per acre or less of wastewater.
- Apply to alternating strips to reduce the risk of contaminated runoff reaching surface water sources.
- Apply to field of established hay, pasture, or fields containing at least 90% cover and are the furthest from open water sources.
- Do not apply wastewater or solids containing manure within 200 feet of surface water sources, drainage ways, wells, or inlets to subsurface drainage systems.
- Runoff control systems such as earthen dikes must be in place where applications will be made to fields with slopes greater than 5%.

Manure and Wastewater Application Setbacks

Time of Year/Dates	Solid Manure	Liquid Manure/Processed Waste Water
Dry Season (April-October)	25'	25'
Wet Season (November-March)	50'	50'

Liquid Manure

Liquid manure and process wastewater is currently stored in a 1,500 gallon below ground concrete tank adjacent to the milk house. Cream Line Milk Co plans to construct Waste Storage Facility Nos. 1 and 2 (WSF #1 and WSF #2). Runoff generated from the

¹ Oregon CAFO Permit definition of frozen soil: soil that has a soil temperature of 32° Fahrenheit or less in any three continuous inches of the top twelve inches of soil.

open lots in CAFO 1 Production Area will be collected in WSF #1 and #2. Roof surface area runoff is included in the collected runoff volume calculations. However, the facility may choose to install gutter diversion devices to direct roof runoff out of the runoff collection area.

Liquid manure, process wastewater and open lot runoff from CAFO 1 Production Area is applied to the land application fields with either with the use of a 4,600 gallon Honey Wagon or through the irrigation system.

CAFO 1 Storm Water and Processed Waste Water Generated Annually

Source Surface Area	Quantity (gal)
Paved Lot (5,160 ft ²)	12,993
Unpaved Lot (80,840 ft ²)	18,972
Solid Storage (in Lots) (85,000 ft ²)	19,951
Parlor/Wash Water	255,500
Total	307,416

Open lot runoff generated from CAFO 2 Production Area flows to the perennial pasture in Field 14, which functions as a vegetated treatment area (VTA) for the lot runoff.

Solid Manure

The solid manure is stored in the dry lots where the animals are housed when they are not grazing. ORAWM estimates the open lots provide 310 days of storage. The solid manure is periodically mounded up in the lots to also serve as the bedding. The calves are bedded with straw. Up to all solids are exported off farm.

Grazing

All animals are on pasture at some point during the year. The following table shows the stocking rate and duration for each of the different animal groups. The heifers are housed off site from April through October.

Grazing

Animal	No. of Animals	% Time on Pasture	Duration	Pastures
Milk Cows	300	30	September 1- November 1	2-3
Milk Cows	300	50	April 15-August 30	1-6 and 8-14
Milk Cows	300	30	November 2-April 15	2 and 3
Dry Cows	50	70	November-March	1 & 4
Heifers	225	70	November-March	8-14

Crop System

The land base consists of 158.6 acres that are divided up into 14 fields. The fields are currently planted into either orchard grass (89.5 acres) or wheat (69.1 acres). Soils will be sampled to a depth of the first twelve inches at a minimum of once every five years and analyzed for nitrogen and phosphorous.

Land Base

Field Number	Acres	Crop	Target Yield (T/ac) % DM	N Removed (Lbs/acre)	P ₂ O ₅ Removed (Lbs/acre)	Total N Removed (Lbs)	Total P ₂ O ₅ Removed (Lbs)
1	7.6	Pasture	6.5 / 85	320	101	2,432	768
2	7.1	Pasture	6.5 / 85	320	101	2,272	717
3	7.0	Pasture	6.5 / 85	320	101	2,240	707
4	4.9	Pasture	6.5 / 85	320	101	1,568	495
5	12.7	Pasture	6.5 / 85	320	101	4,064	1,283
6	14.6	Pasture	6.5 / 85	320	101	4,672	1,475
7	69.1	Wheat	3.0 / 80	130	61	12,023	5,597
8	9.1	Pasture	6.5 / 85	320	101	2,912	919
9	6.6	Pasture	6.5 / 85	320	101	2,112	667
10	7.1	Pasture	6.5 / 85	320	101	2,272	717
11	6.2	Pasture	6.5 / 85	320	101	1,984	626
12	2.0	Pasture	6.5 / 85	320	101	640	202
13	1.9	Pasture	6.5 / 85	320	101	608	192
14	2.7		Pasture	320	101	864	273
Total	158.6				Total	40,663	14,638

Manure Storage-

Storage Type:	Capacity	Estimated Storage Period
Solid Storage	63,750 ft ³ or 2,608 tons	310 days
Liquid Storage	39,432 cubic feet	110 days

Nutrient Balance

See ORAWM, Section 7.

Record Keeping and Reporting

Monitoring:

At a minimum of once of every five years collect and analyze representative soil samples for phosphorus and nitrogen content from all fields where manure, litter and other process wastewaters are applied.

The following documents provide protocols for testing: manure, litter and process waste water; measuring crop nutrient removals; soil testing to evaluate nutrient application and crop uptake, and calculating manure application rates.

1. PNW 570-E, Monitoring Soil Nutrients Using a Management Unit Approach
2. E306, Manure Sampling & Analysis
3. EM 8768, Calculating Dairy Manure Nutrient Application Rates.
4. EM 8832-E, Post-harvest Soil Nitrate Testing for Manured Copping Systems West of the Cascades

Inspections:

- a) Periodically inspect:
 - a. Storm water diversion devices, runoff diversion structures, animal waste storage structures, and devices channeling contaminated storm water to wastewater and manure storage and containment structures.
 - b. Water lines, including drinking water or cooling lines.
 - c. Liquid impoundments for manure and process wastewater.
- b) When equipment is in use, periodically inspect the equipment used for land application of manure, litter, or process wastewater.

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.

Section 1. Background and Site Information

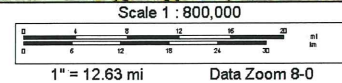
Location Map for Cream Line Dairy



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Section 2. Manure and Wastewater Handling and Storage

2.1. Map of CAFO1 Production Area

Owner/Operator: Tyler Carroll

Farm Name: Cream Line Dairy

County: Umatilla

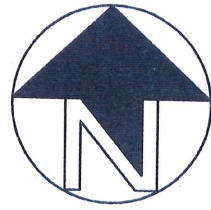
State: Oregon

Approximate Acres: 13.5

Date: April 2012

Location: Section 25, T6N, R34E from the W.M.

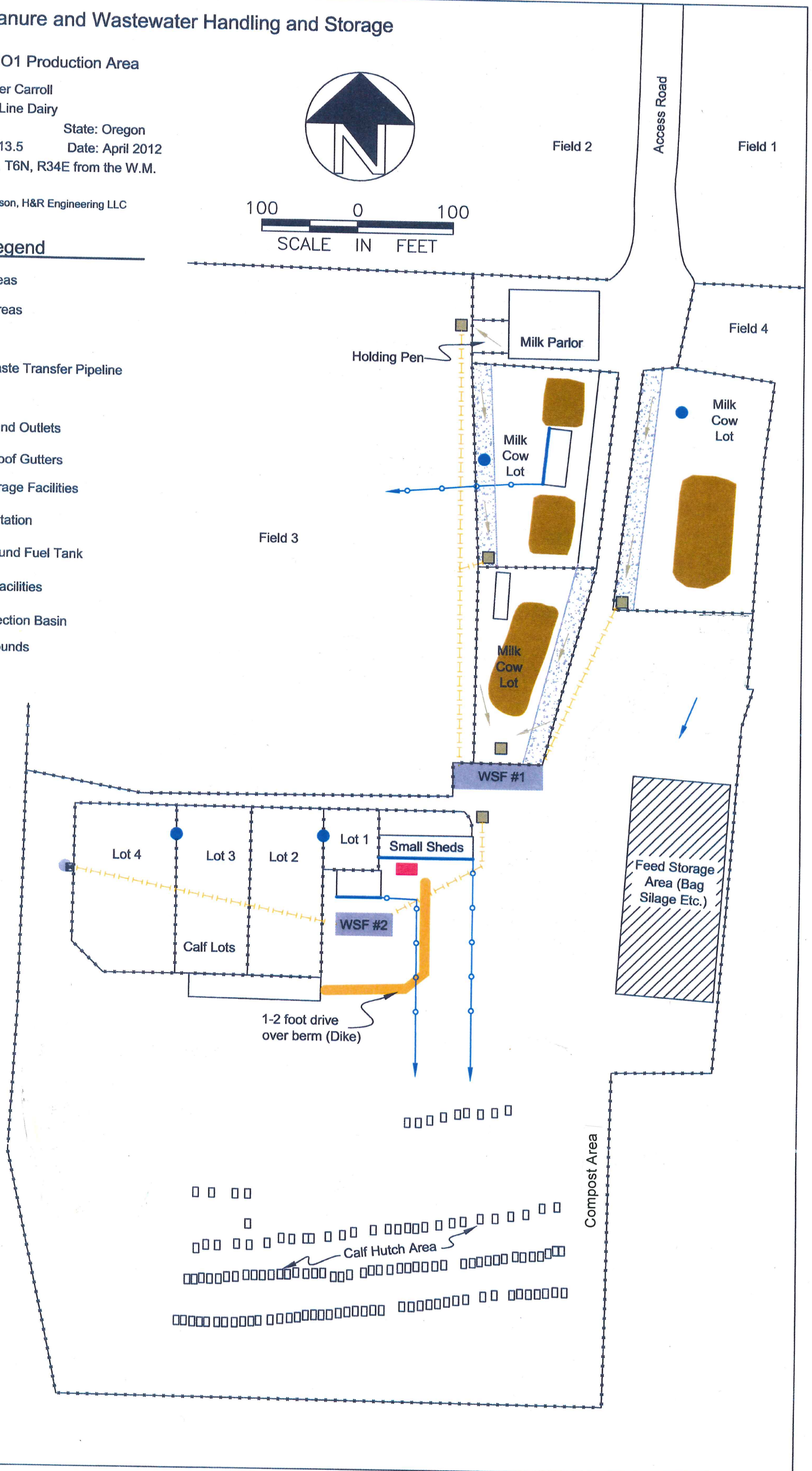
Assisted By: Bruce D. Wilson, H&R Engineering LLC



100 0 100
SCALE IN FEET

Map Legend

- Paved Areas
- Roofed Areas
- Fence
- Buried Waste Transfer Pipeline
- Drainage
- Underground Outlets
- Existing Roof Gutters
- Waste Storage Facilities
- Pumping Station
- Above Ground Fuel Tank
- Watering Facilities
- Catch/Collection Basin
- Manure Mounds

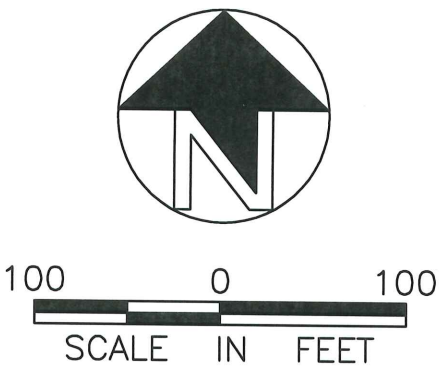


Section 2. Manure and Wastewater Handling and Storage

2.1. Map of CAFO2 Production Area

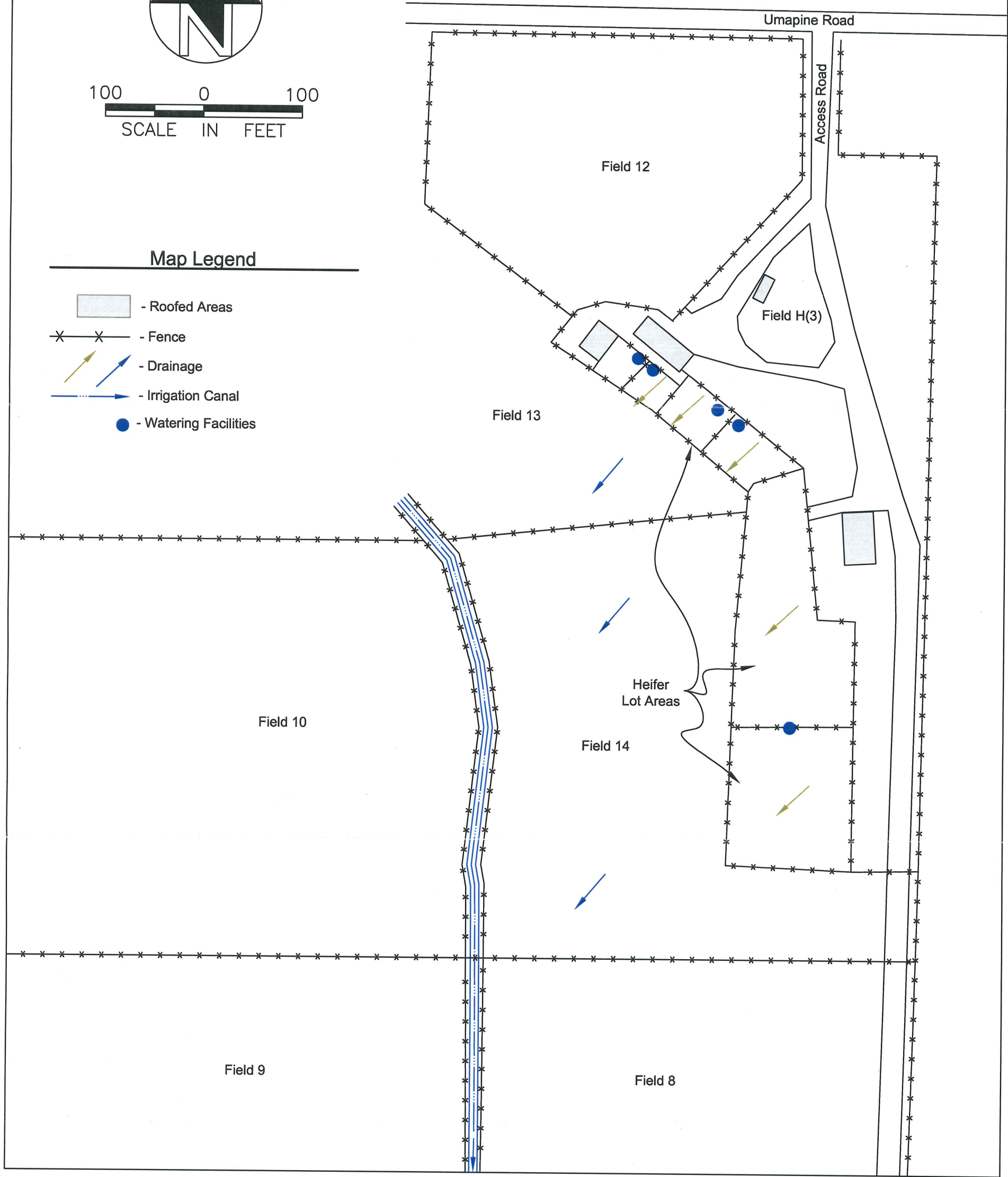
Owner/Operator: Tyler Carroll
Farm Name: Cream Line Dairy
County: Umatilla State: Oregon
Approximate Acres: 1.3 Date: April 2012
Location: Section , T N, R W from the W.M.

Assisted By: Bruce D. Wilson, H&R Engineering LLC



Map Legend

- Roofed Areas
- Fence
- Drainage
- Irrigation Canal
- Watering Facilities



Section 4. Land Treatment

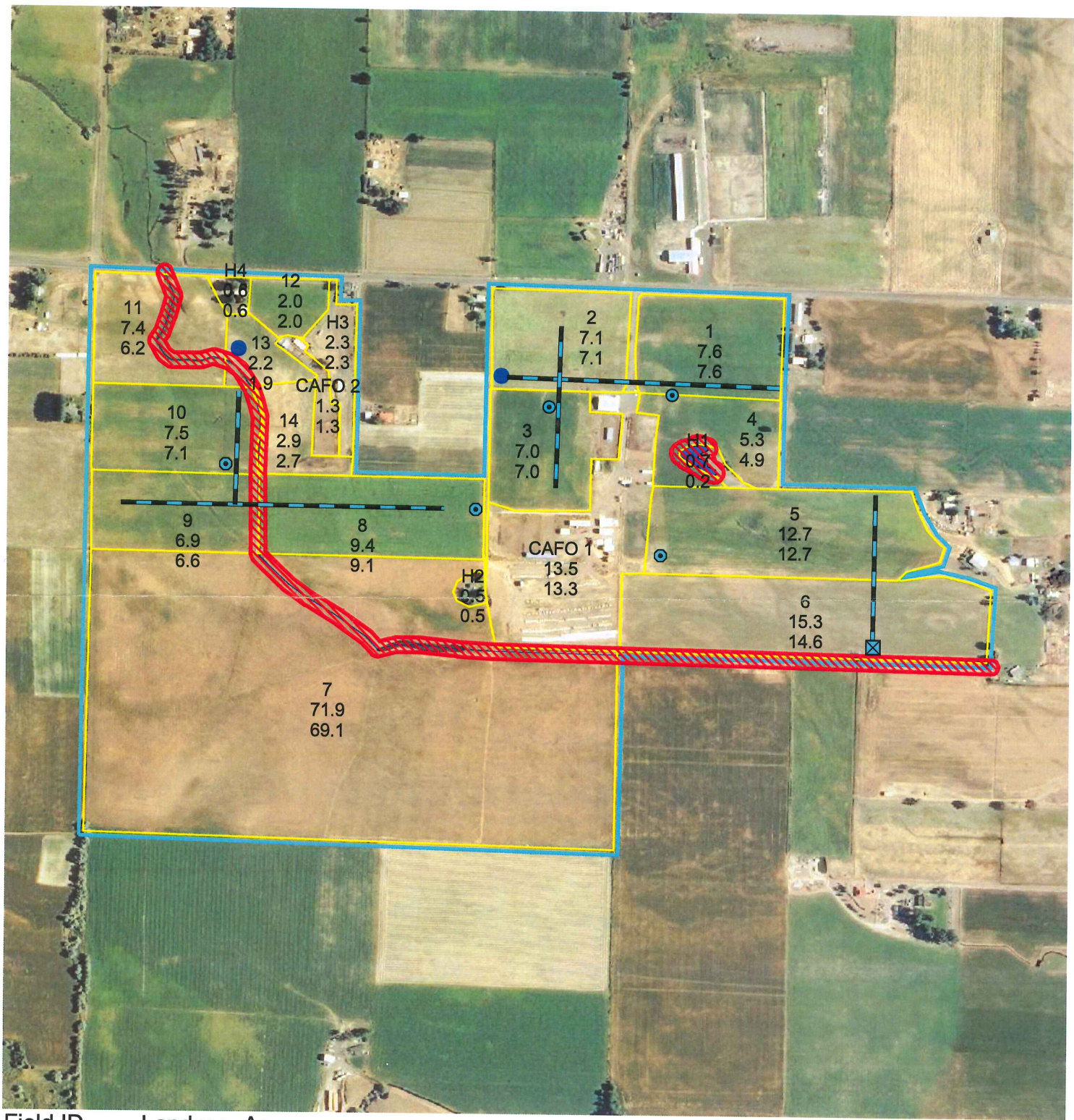
4.1 Map(s) of Fields and Conservation Practices

Land Treatment Area Map

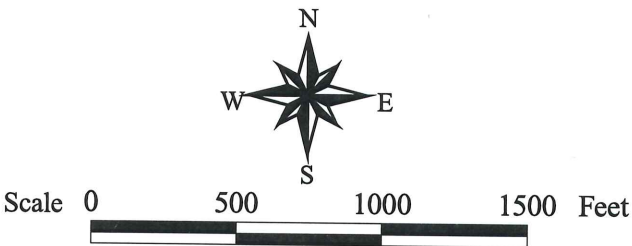
for

Cream Line Dairy

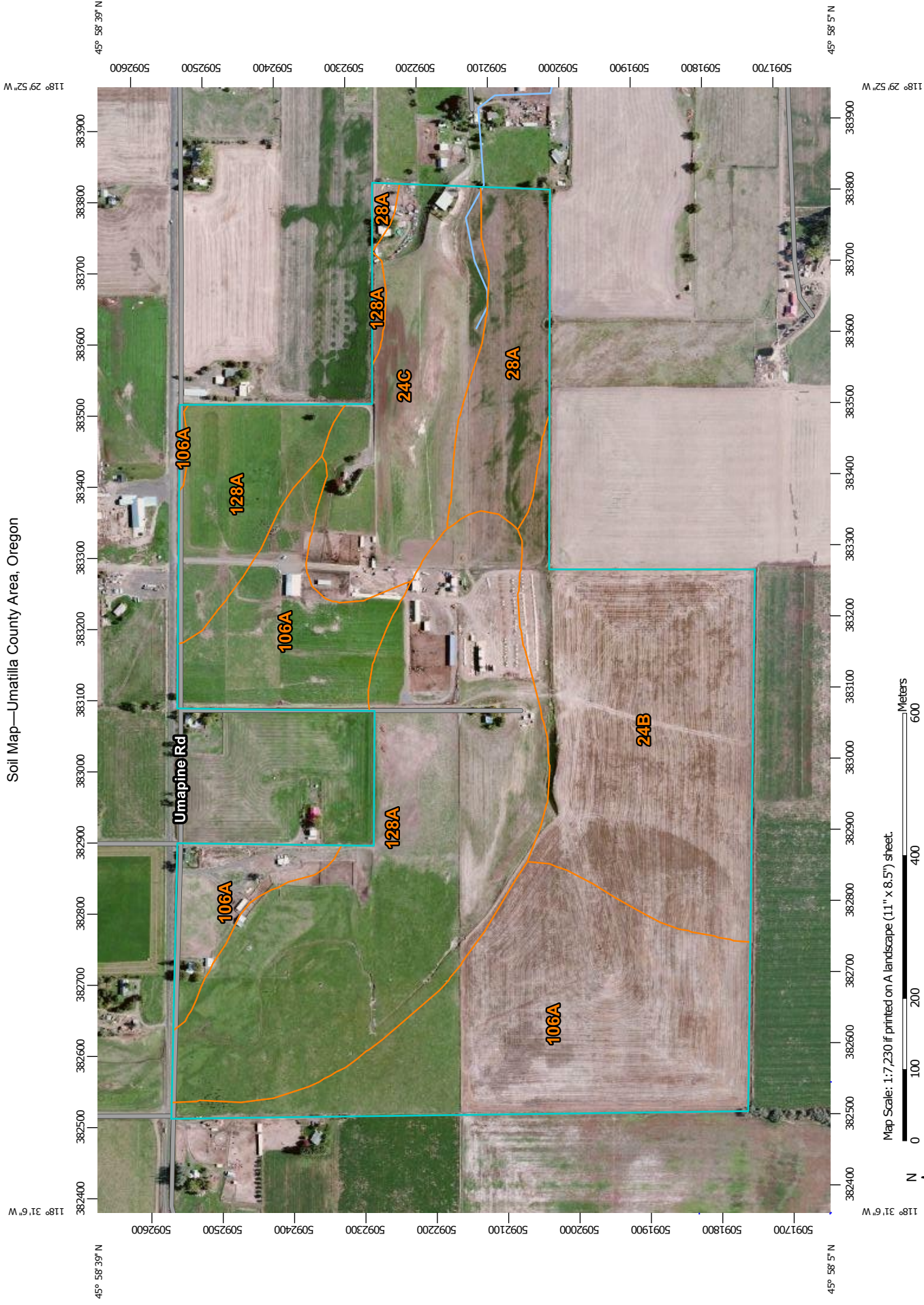
Section 25, Township 6 North, Range 34 East from the Willamette Meridian



Field ID	Landuse, Acres	Map Legend	
CAFO 1	Headquarters, 14.8 Acres	Field Name Acres Spreadable Acres	- Field Boundary, Field ID, Acres
CAFO 2			
1-6, 8-14	Irrigated Pasture, 116.3 Acres		- 25 foot Vegetated Setback
7	Irrigated Cropland, 71.9 Acres		- Buried Irrigation Pipeline
H1-H4	Farmsteads, 4.1 Acres		- Watering Facility
			- Well
			- Pump



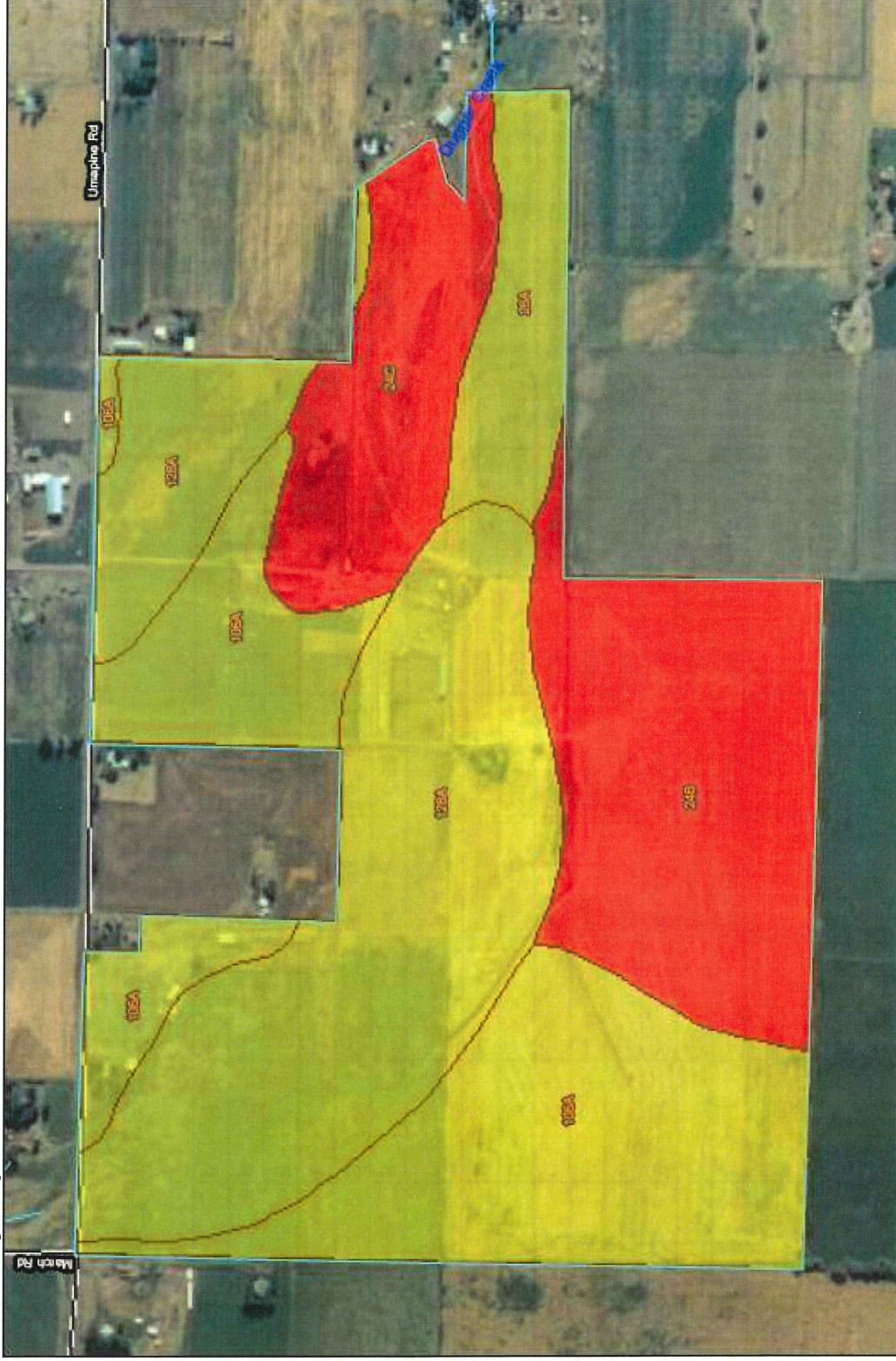
Soil Map—Umatilla County Area, Oregon



Map Unit Legend

Umatilla County Area, Oregon (OR667)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
24B	Ellisforde silt loam, 1 to 7 percent slopes	37.3	19.7%
24C	Ellisforde silt loam, 7 to 20 percent slopes	22.1	11.6%
28A	Freewater gravelly silt loam, 0 to 3 percent slopes	12.6	6.6%
106A	Umapine silt loam, reclaimed, 0 to 3 percent slopes	56.1	29.6%
128A	Yakima silt loam, 0 to 3 percent slopes	61.3	32.4%
Totals for Area of Interest		189.4	100.0%

Flood Boundary Map



Flood Boundary Map Legend and Information

MAP LEGEND

Area of Interest (AOI)



Area of Interest (AOI)

Soils

Soil Ratings



None



Very Rare



Rare



Occasional



Frequent



Very Frequent

Political Features

Municipalities



Cities



Urban Areas

Water Features



Water



Oceans



Streams and Canals

Transportation



Rails

Roads



Interstate Highways



US Routes



State Highways



Local Roads



Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 10N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Date(s) aerial images were photographed: 5/23/1994; 6/20/1994

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Operation and Maintenance

Wastewater Collection Tank

Inspect the wastewater collection tank weekly to insure structural integrity. If the structural integrity of the tank is compromised, immediately empty the tank to determine the cause and make necessary repairs before putting the tank back into service. Do not allow equipment that exceeds the design limit of the tank on or within 20 feet of the structure.

Keep pumps, agitators, piping, valves and all other electrical and mechanical equipment in good condition by following the manufacturer's recommendations. Maintain grounding rods and wiring for all electrical equipment in good condition. Immediately remove all foreign debris within the structure that may cause damage to pumps or agitators.

Pump the wastewater collection tank completely empty during the summer months and cleanout any debris and other solid materials that may have accumulated in the tank. Inspect the tank for structural damage and if structural damage to the tank is discovered, see the services of a qualified engineer to assess the damage and recommend necessary repairs before putting the tank back into service.

Do not dispose of animal carcasses in the wastewater collection tank. \It is against the law to do so.

Maintain all fences, railings, and/or warning signs to provide warning and /or prevent unauthorized human or livestock entry. Immediately repair vandalism, vehicular or livestock damage to the structure, earthen areas surrounding the structure, or any appurtenances. Maintain lids, grates and shields on openings.

Provide proper ventilation before entering the tank, for any reason what so ever. Provide and use self – contained breathing apparatus (scuba) equipment when entering a tank. No persons should enter the tank unless safety ropes are used and someone else capable of providing rescue assistance is outside the tank.

Do not assume any tanks, including open top tanks, are well ventilated.

Waste Storage Ponds

Emptying of the waste storage pond should begin in the spring and continue through the spring and summer months as weather conditions permit. To function properly and have the greatest management flexibility, the waste storage ponds must be as empty as possible in the fall before the fall and winter weather begins. Any annual sludge buildup in the waste storage ponds must be removed to maintain design capacity and applied to land application areas.

Inspect the waste storage ponds weekly to insure structural integrity. If the structural integrity of a waste storage pond embankment is compromised, immediately draw the liquid level down below the damaged area to determine the cause. Seek the services of

a qualified engineer to assess the damage and recommend necessary repairs before allowing wastewater levels above the damaged area.

Pump the wastewater storage pond to the lowest level possible during the summer months and inspect the embankments for structural damage. If structural damage to the embankment of a wastewater storage pond is discovered, seek the services of a qualified engineer to assess the damage and recommend necessary repairs before allowing wastewater levels above the damaged area.

Do not permit livestock access to the pond or on pond embankments. Control undesirable vegetation growth by spraying or mowing. Control rodents as necessary. Check elevations of earthfills periodically and restore to grade and shape as necessary. Fill and reseed eroded embankment areas or repair with well-graded rock riprap. Safety feature such as signs and fences should be kept in good order.

Do not dispose of animal carcasses in any settling basin or wastewater storage pond. It is against the law to do so.

Vegetated Treatment Area (VTA)

Maintain vigorous permanent vegetation (apply supplemental nutrients and/or irrigation as needed), control undesired weed species, graze and/or mechanically harvest periodically, and inspect and repair VTA after storm events (if channelization forms dispersion structures may need to be installed).

Solids Storage Facility

Emptying of the solids storage facilities should begin in the spring and continue through the spring and summer months as weather conditions permit. To function properly and have the greatest management flexibility, the solids storage facilities must be as empty as possible in the fall before the fall and winter weather begins.

Periodically inspect concrete and asphalt slabs, walls and curbs and repair or replace broken sections as needed. Cleanup any spillage of manure and organics from outside of the solids storage area and place them back in the solids storage facility.

Maintain all fences, railings, and/or warning signs to provide warning and/or prevent unauthorized human or livestock entry. Immediately repair vandalism, vehicular or livestock damage to the structure, earthen areas surrounding the structure, or any appurtenances.

Building Roofs

Inspect building roofs annually as a minimum. Repair and/or replace all rusted sections and secure loose sections as needed. Immediately replace all broken trusses, rafters, beams, and poles as needed. Immediately determining the cause and necessary modifications(s) to prevent reoccurring structural failure is essential.

Composting Facility

Take a representative sample of the raw compost mixture and have a laboratory determine the moisture, pH, carbon and nitrogen content.

The carbon to nitrogen ratio should range between 25 and 40 to 1. Make adjustments as needed to the ingredients of the raw compost mixture as necessary to achieve a carbon to nitrogen ratio within the acceptable range.

The moisture content should be between 40 and 60 percent. Add water or drier material to adjust the moisture content. Care must be taken to see that the carbon to nitrogen ratio of the mix is still in the 25 – 40 to 1 range after adjusting the moisture content.

The pH preferably should range between 6.5 and 8 however composting may be achieved between a pH of 5.5 and 9.0.

Check pile temperature using thermometer probe on a daily basis. The pile temperature should be checked at a point one-third the distance for the outside of the pile to center of the mass. Initially it will take approximately 2 to 3 days for the compost to get above 105 degrees F. Compost temperatures should peak between 130 and 140 degrees F in 5 and 7 days. When the temperature of the compost material falls below 110 degrees F the compost needs to be aerated by turning or other means. Failure to achieve the desired temperatures may result in the incomplete destruction of pathogens and weed seeds and can cause fly and odor problems.

Odors given off by the composting operation is a good indicator of how the compost operation is proceeding. Foul odors may mean that the process has turned from aerobic to anaerobic. Anaerobic conditions are the result of insufficient oxygen in the compost. This may be caused by excessive moisture in the compost or the need for turning or aerating of the compost material.

For a well-managed windrow or static pile composting operation, the composting time during the summer months should range from 14 days to a month. To ensure finished compost, observe that the composted material has little or no trace of the original raw material and has little odor. The material should be black to brown in color. Particle size should be consistent and soil-like in texture.

All materials that are not considered feedstock for the composting process (i.e. plastic ear tags, plastic gloves, etc...) are to be collected and transported to a permitted landfill by a garbage collection service or other means. It is anticipated that there will be no other material that will require offsite disposal.

Periodically inspect concrete and asphalt slabs, walls and curbs and repair or replace broken sections as needed. Cleanup any spillage of composted material from outside of the composting area and place them back in the composting facility.

Maintain all fences, railings, and/or warning signs to provide warning and/or prevent unauthorized human or livestock entry. Immediately repair vandalism, vehicular or livestock damage to the structure, earthen areas surrounding the structure, or any appurtenances.

Calf Hutch Area

Calves are kept in covered hutches with a small fenced area at the entrance of the hutch. From mid September through mid June bedding is used to keep the calves warm and dry. Approximately once per month the hutches are moved, old bedding is scraped up and added to the compost area, and new bedding is placed in the hutches. The bedding absorbs nutrients excreted from the calves in the months when precipitation is higher than evaporation. From mid June through mid September bedding is not used as it attracts flies. Hutches are moved and scraped 3-4 times per month. Potential nutrient movement through the soil profile is mitigated by the high rate of evaporation during these months, the covered hutches, and the hutch maintenance schedule.

Fences

Do not allow livestock access to open watercourses and drainage ways. Provide off stream watering facilities where possible and limit access to designated watering areas.

Inspect fences periodically and repair or replace broken or decayed posts and tighten sagging wire as needed. Broken wire can be spliced or replaced. Replace broken or missing insulators on electric fences as needed and repair or replace inoperative electric fence controllers.

Insure gates and other appurtenances are in good working order. Replace or repair components as needed.

Irrigation System

Maintain traveling gun type sprinklers (and hose reel, if used) by oiling and greasing moving parts and the engine in accordance with the manufacturer's recommendations to help ensure trouble free operation. Prevent livestock access to equipment during operation. Clean plugged nozzles and replace if worn or defective. Promptly repair all leaks by replacing valves, fittings, gaskets, and worn or damaged parts.

Livestock Watering Facilities

Check all above ground connections, valves, gates, rodent guards, inlets and outlets to make sure they are functioning properly. Check troughs and tanks for leaks or cracks and repair or replace immediately, if necessary.

Make certain the area adjacent to the trough is well protected with gravel, paving, or good cover. Be sure that the outlet pipe has a free outlet and is not causing any serious erosion problems. Check periodically to see if debris has fallen into the trough or tank, which may restrict inflow or planned functions of the outflow system.

Clean the entire system periodically and remove moss, algae growth, and/or sludge. Chemicals such as copper sulfate and chlorine can be used to prevent moss and algae growth. Local rules and regulations are to be followed when using chemicals to make sure they are safe for animals.

Where necessary maintain coverings and insulation to prevent damage from freezing.

Eradicate or otherwise remove all rodents or burrowing animals. Immediately repair any damage caused by their activity. Immediately repair any vandalism, vehicular or livestock damage.

Pipelines

Flush pipelines used for liquid waste applications with clean water following waste application, or as needed, to prevent particle buildup.

Drain the pipeline and components in areas that are subject to freezing. If parts of the pipeline cannot be drained, a non-toxic antifreeze solution may be added.

Check to make sure all valves and air vents are set at the proper operating condition so they can provide protection to the pipeline.

Inspect pipelines for sign of failure. Inspect risers and valves periodically for leaks or worn gaskets. Repair or replace pipeline, risers and valves as needed.

Eradicate or otherwise remove all rodents or burrowing animals. Immediately repair any damage caused by their activities.

Pumps

Operate and maintain pumps in accordance with good judgment and manufacture's manuals and recommendations.

Drain liquid manure from pumps during cold weather to prevent freezing. If parts of the system cannot be drained, a non-toxic antifreeze solution may be added.

Inspect pumps periodically and remove debris wrapped around shafts and impellers. Maintain foot valves and check valves for proper operation.

For proper operation of electric motors and controls, maintain lubrication for all bearings, keep electric panel free from obstructions and debris. Maintain electrical safety devices, assure all electrical contacts are tight, and lock main electrical switch to "OFF" position during non-use season. Maintain adequate shade and ventilation for pump motors.

For proper operation of pumps, maintain lubrication for all bearings and pump shafts, assure belts are adjusted properly, maintain safety covering devices on open shafts and belt drives, check to make sure all safety valves and devices are set at proper operating

conditions so they may provide protection to the pump and power unit. For centrifugal pumps, periodically measure tolerance between pump impeller and pump casing (i.e. wearing) and replace wear ring as needed to help restore new pump operating characteristics.

Use portable pressure gauge (preferably a liquid filled gauge) to monitor pump performance.

Operate and maintain agitators in accordance with the manufacture's manual and recommendations. Inspect all plumbing annually as a minimum. Replace, tighten, or repair broken or loose connections and lines as needed.

Wells

Protect the area immediately surrounding the well from being damaged by agriculture machinery, vehicles, or livestock. All fences, railings, and/or warning signs shall be maintained to provide warning and/or prevent unauthorized human or livestock entry.

Eradicate or otherwise remove all rodents or burrowing animals. Immediately repair any damage caused by their activity. Immediately repair any vandalism, vehicular, or livestock damage.

Check metal surfaces for rust and other damage especially sections in contact with earth fill and other materials. Repair or replace damaged section and apply paint as a protective covering.

Keep all surface water from entering or accumulating at the immediate vicinity of the well site.

Chemical Handling Checklist

The following measures shall be taken to prevent chemicals from contaminating process water or storm water storage and treatment systems:

1. Make sure all chemicals are stored in proper containers. Expired chemicals and empty containers are to be properly disposed of in accordance with state and federal regulations. Pesticides and associate refuse are to be disposed of in accordance with the FIFRA label.
2. Chemical storage areas are to be self-contained with no drains or other pathways that will allow spilled chemicals to exit the storage area.
3. Chemical storage areas are to be covered to prevent chemical contact with rain or snow.
4. Emergency procedures and equipment are to be in place to contain and clean up chemical spills.
5. Chemical handling and equipment wash areas are to be designed and constructed to prevent contamination of surface waters, waste water, and storm water storage and treatment systems.

UTILIZATION AREA

AMOUNT OF MANURE TO APPLY FOR CROPS GROWN

The timing and frequency of applications of wastewater and solids containing manure for utilization by crops shown in the table below are based on information provided in Oregon State University Extension publications listed in Section 5.

The formulas for determining the total nutrient application rate per unit yield for each crop shown in the table below are as follows:

Total N to apply in pounds = N in pounds per yield unit from the table for the crop grown X percent (%) dry matter (DM) of harvested crop/100 X planned or measured yield per yield unit

Total P₂O₅ to apply in pounds = P in pounds per yield unit from the table for the crop grown X 2.291 P₂O₅/P X percent (%) dry matter (DM) of harvested crop/100 X planned or measured yield per yield unit

Total K₂O to apply in pounds = K in pounds per yield unit from the table for the crop grown X 1.205 K₂O/K X percent (%) dry matter (DM) of harvested crop/100 X planned or measured yield per yield unit

The following table shows the crops that may be grown on this farm:

FRUIT OR VEGETABLES	Yield Unit	lb/Unit	% DM	Nutrient Removal (lb/yield unit)		
				N	P	K
Beans, dry edible	cwt	100	100	3.13	0.45	0.85
Caneberries	ton	2000	100	11.43	7.42	11.43
Corn, Sweet	ton	2000	100	17.80	4.8	11.6
Mixed Vegetables & Fruit	ton	2000	100	8.33	2.08	10.20
Onions	cwt	100	100	0.30	0.06	0.22
Orchard, Fruit	ton	2000	100	13.00	2.00	16.00
Pea, edible	ton	2000	100	73.60	8.00	18.00
Potatoes	ton	2000	100	6.60	1.20	10.33

UTILIZATION AREA

GRAIN, SEED OR OIL CROPS	Yield Unit	lb/Unit	% DM	Nutrient Removal (lb/field unit)			
				N	P	K	
Barley	bushels	48	100	0.87	0.16	0.21	
Beets, sugar	ton	2000	100	4.00	0.60	2.78	
Canola	ton	2000	100	70.00	12.00	18.00	
Corn, grain shelled	bushels	56	100	0.90	0.16	0.22	
Crimson Clover seed	lb	1	100	0.05	0.01	0.02	
Fescue Seed, Straw Removed	cwt	100	100	10.03	1.08	8.33	
Fescue, seed (Fine or Tall)	lb	1	100	0.02	0.00	0.00	
Grass Seed	cwt	100	100	1.60	0.20	0.40	
Grass Seed, Straw Removed	ton	2000	100	33.90	5.50	34.40	
Oats, grain	bushels	32	100	0.62	0.11	0.16	
Orchardgrass seed	lb	1	100	0.016	0.002	0.004	
Pumpkins	ton	2000	100	4.00	1.40	6.60	
Red Clover seed	lb	1	100	0.05	0.01	0.02	
Ryegrass Seed	cwt	100	100	1.60	0.20	0.40	
Ryegrass, Perennial Seed	lb	1	100	0.02	0.002	0.004	
Wheat, Soft White for grain	bushels	60	100	1.00	0.24	0.21	
Wheat, Soft White Straw Removed	ton	2000	100	43.40	8.90	20.90	
Wheat, Hard Red for grain	bushels	60	100	1.60	0.37	0.31	
Wheat, Soft White Straw Removed	ton	2000	100	83.40	17.10	37.10	

UTILIZATION AREA

HAY AND PASTURE CROPS	Yield Unit	lb/Unit	% DM	Nutrient Removal (lb/yard unit)		
				N	P	K
Alfalfa, Hay	ton	2000	100	64.00	8.00	42.00
Alta Fescue Hay/Pasture	ton	2000	100	33.00	6.90	37.60
Grass Legume Hay/Pasture	ton	2000	100	33.90	5.50	34.40
Meadow Fescue Hay/Pasture	ton	2000	100	41.60	8.80	47.40
Oats Hay/Pasture	ton	2000	100	60.00	10.20	14.80
Orchardgrass Hay/Pasture	ton	2000	100	53.20	8.60	18.60
Perennial Hay/Pasture (Low Intensity)	ton	2000	100	32.00	6.00	38.00
Perennial Hay/Pasture (Low-Med Intensity)	ton	2000	100	38.00	6.00	38.00
Perennial Hay/Pasture (Medium Intensity)	ton	2000	100	48.00	7.00	38.00
Perennial Hay/Pasture (Med- High Intensity)	ton	2000	100	58.00	8.00	40.00
Perennial Hay/Pasture (High Intensity)	ton	2000	100	64.00	8.00	40.00
Ryegrass Hay	ton	2000	100	33.40	5.40	28.40
Ryegrass, Perennial Pasture	ton	2000	100	58.00	8.00	48.00
Tall Fescue Hay/Pasture	ton	2000	100	39.40	4.00	40.00

SILAGE AND HAYLAGE CROPS	Yield Unit	lb/Unit	% DM	Nutrient Removal (lb/yard unit)		
				N	P	K
Corn for Silage	ton	2000	100	25.00	4.00	20.00
Crimson Clover forage	ton	2000	100	40.00	4.41	32.98
Field Pea, Forage	ton	2000	100	73.60	8.00	18.00
Oat haylage	ton	2000	100	60.00	10.20	14.80
Oats & Peas/ Green Beans	ton	2000	100	32.03	5.58	18.65
Red Clover forage	ton	2000	100	40.00	4.41	32.98
Ryegrass Haylage	ton	2000	100	50.00	8.00	42.67
Sorghum-Sudan Haylage	ton	2000	100	54.33	6.33	58.00
Triticale Haylage	ton	2000	100	49.00	6.80	11.40
Wheatgrass Hay/Pasture	ton	2000	100	28.40	5.40	53.60

Manure Nutrient Analyses

Manure Source	Dry Matter (%)	Total N	NH ₄ -N	Total P ₂ O ₅	Total K ₂ O	Avail. P ₂ O ₅	Avail. K ₂ O	Units	Analysis Source and Date
Milk Cow Lots	48.7	9.3		5.9	19.5	5.9	19.5	Lb/Ton	AgSource Labs 2/20/12, Umatilla, OR
Calf Lots	75.0	65.2		30.8	26.8	30.8	26.8	Lb/Ton	ORAWMver 3.8, estimated values
Calf Manure Stack	80.0	65.3		24.9	22.6	24.9	22.6	Lb/Ton	ORAWMver 3.8, estimated values
WSF # 1	0.2	2.8		0.8	4.3	0.8	4.3	Lb/1000Gal	AgSource Labs 2/28/12, Umatilla, OR
WSF #2	0.2	2.8		0.8	4.3	0.8	4.3	Lb/1000Gal	AgSource Labs 2/28/12, Umatilla, OR
Dry Cow Heifer Lots	58.2	32.6		16.4	49.4	16.4	49.4	Lb/Ton	AgSource Labs 2/20/12, Umatilla, OR
Grazed Pasture		35.1	7.0	17.7	25.7	17.7	25.7	Lb/1000Gal	MMP Defaults

(1) Entered analysis may be the average of several individual analyses.

(2) Oregon assumes that 100% of manure phosphorus and 100% of manure potassium is crop available. First-year per-acre nitrogen availability for individual manure applications is given in the Planned Nutrient Applications table. For more information about nitrogen availability in Oregon, see Waste Utilization Jobsheet 633 OR-JS, Oregon USDA-NRCS, May 2003 (<http://efotg.sc.egov.usda.gov/references/public/OR/633js042707.pdf>).

Typical Nutrient Retention After Application Losses

Application Method	Percent of original nutrient content of manure retained after application losses		
	N	P ₂ O ₅	K ₂ O
Injection	95%	100%	100%
Sprinkling	75%	100%	100%
Broadcast (Incorporated 1 day after application)	90%	100%	100%
Broadcast (Incorporated 4 days after application)	80%	100%	100%
Broadcast (Incorporated 7 or more days after application)	70%	100%	100%

Phosphorus Index

The Oregon Department of Agriculture Confined Animal Feeding Program and the Oregon Natural Resources Conservation Service (NRCS) Nutrient Management conservation practice standard 590 all require that a phosphorus (P) index be prepared to determine the potential for phosphorus transport off of the fields used for manure application.

The P index ratings for all fields are shown in the table below and are based on the Eastern Oregon phosphorus index described on page 163. The P index ratings indicate that there is currently a low risk of phosphorus transport from fields 1, 2, 3, 4, 5, 7 and 12, a medium risk of phosphorus transport from fields 6, 8, 9, 10, 11, 13 and 14. There are no fields with a high risk for phosphorus transport. Based on the application plan for manure over the next 4 years, the P index ratings indicate that there will be a low risk of phosphorus transport from fields 1, 2, 3, 4, 5 and 12 a medium risk of phosphorus transport from fields 6, 7, 8, 9, 10, 11, 13 and 14. There will be no fields with a high risk of phosphorus transport after 4 years of manure application..

The RUSLE2 and WEPS calculations indicate that the erosion in the fields where manure will be applied is below the average annual soil loss tolerance (T) except for field 7 which has an estimated wind erosion rate of 6 tons/acre/year. Erosion will not contribute significantly to phosphorus transport. Slight adjustments in tillage can be made to leave more residue on the surface in field 7 to reduce estimated wind erosion to the soil loss tolerance (T) which is 5 tons/acre/year.

According to the Oregon NRCS Nutrient Management conservation practice standard 590, fields ranked in the medium or low risk category may receive organic (manure) or inorganic (commercial fertilizer) applications at nitrogen-based rates.

Oregon Phosphorus Index (East)

Field	Crop Year	Transport Factor Sum	Source Factor Sum	P Index w/o P Apps	P Index w/ P Apps	P Loss Risk
CAFO (1)	2013	Not Applicable				
CAFO (1)	2014	Not Applicable				
CAFO (1)	2015	Not Applicable				
CAFO (1)	2016	Not Applicable				
CAFO (2)	2013	Not Applicable				
CAFO (2)	2014	Not Applicable				
CAFO (2)	2015	Not Applicable				
CAFO (2)	2016	Not Applicable				
1	2013	0.50	14.13	1.00	7.06	Low
1	2014	0.50	14.40	1.00	7.20	Low
1	2015	0.50	14.44	1.00	7.22	Low
1	2016	0.50	14.08	1.00	7.04	Low
2	2013	1.00	16.08	3.70	16.08	Low
2	2014	1.00	16.11	3.70	16.11	Low
2	2015	1.00	16.10	3.70	16.10	Low
2	2016	1.00	15.75	3.70	15.75	Low
3	2013	1.00	15.75	3.70	15.75	Low
3	2014	1.00	16.11	3.70	16.11	Low
3	2015	1.00	16.13	3.70	16.13	Low
3	2016	1.00	15.75	3.70	15.75	Low
4	2013	1.00	14.44	2.00	14.44	Low
4	2014	1.00	14.32	2.00	14.32	Low

Field	Crop Year	Transport Factor Sum	Source Factor Sum	P Index w/o P Apps	P Index w/ P Apps	P Loss Risk
4	2015	1.00	14.44	2.00	14.44	Low
4	2016	1.00	13.72	2.00	13.72	Low
5	2013	1.50	12.45	1.20	18.68	Low
5	2014	1.50	13.17	1.20	19.76	Low
5	2015	1.50	13.17	1.20	19.76	Low
5	2016	1.50	12.81	1.20	19.22	Low
6	2013	4.50	11.81	1.80	53.14	Medium
6	2014	4.50	12.75	1.80	57.37	Medium
6	2015	4.50	12.39	1.80	55.76	Medium
6	2016	4.50	12.09	1.80	54.38	Medium
7	2013	4.50	0.40	1.80	1.80	Low
7	2014	4.50	9.04	1.80	40.67	Medium
7	2015	4.50	8.70	1.80	39.17	Medium
7	2016	4.50	8.70	1.80	39.17	Medium
8	2013	4.50	9.56	0.00	43.02	Medium
8	2014	4.50	10.40	0.00	46.80	Medium
8	2015	4.50	10.17	0.00	45.75	Medium
8	2016	4.50	9.25	0.00	41.62	Medium
9	2013	5.00	11.11	0.00	55.53	Medium
9	2014	5.00	9.72	0.00	48.61	Medium
9	2015	5.00	10.15	0.00	50.77	Medium
9	2016	5.00	9.80	0.00	49.00	Medium
10	2013	4.50	10.61	0.00	47.74	Medium
10	2014	4.50	10.23	0.00	46.02	Medium
10	2015	4.50	10.01	0.00	45.04	Medium
10	2016	4.50	10.35	0.00	46.56	Medium
11	2013	4.50	11.56	0.00	52.00	Medium
11	2014	4.50	9.88	0.00	44.45	Medium
11	2015	4.50	9.63	0.00	43.32	Medium
11	2016	4.50	10.13	0.00	45.61	Medium
12	2013	2.00	12.32	0.00	24.64	Low
12	2014	2.00	10.16	0.00	20.32	Low
12	2015	2.00	11.42	0.00	22.84	Low
12	2016	2.00	11.90	0.00	23.80	Low
13	2013	4.50	11.60	0.00	52.20	Medium
13	2014	4.50	9.53	0.00	42.91	Medium
13	2015	4.50	10.39	0.00	46.74	Medium
13	2016	4.50	10.72	0.00	48.25	Medium
14	2013	4.50	10.99	0.00	49.46	Medium
14	2014	4.50	9.56	0.00	43.02	Medium
14	2015	4.50	10.52	0.00	47.34	Medium
14	2016	4.50	10.59	0.00	47.66	Medium

Field	Crop Year	Transport Factor Sum	Source Factor Sum	P Index w/o P Apps	P Index w/ P Apps	P Loss Risk
H (1)	2013			Not Applicable		
H (1)	2014			Not Applicable		
H (1)	2015			Not Applicable		
H (1)	2016			Not Applicable		
H (2)	2013			Not Applicable		
H (2)	2014			Not Applicable		
H (2)	2015			Not Applicable		
H (2)	2016			Not Applicable		
H (3)	2013			Not Applicable		
H (3)	2014			Not Applicable		
H (3)	2015			Not Applicable		
H (3)	2016			Not Applicable		
H (4)	2013			Not Applicable		
H (4)	2014			Not Applicable		
H (4)	2015			Not Applicable		
H (4)	2016			Not Applicable		

Notes:

Oregon Phosphorus Index (East) Risk Interpretation

P Index rating	Interpretation	Recommended Nutrient Limitation
PI Score <30	Low potential for P movement from this site given current management practices and site characteristics. There is a low probability of an adverse impact to surface waters from P losses on this site. Soil test P and P losses are likely to increase in future due to N-based nutrient management from animal manure.	Nitrogen
PI Score 30-100	Medium potential for P movement from this site given current management practices and site characteristics. Practices should be introduced to reduce P losses by surface runoff, subsurface flow, and erosion. Soil test P and P losses are likely to increase in future due to N-based nutrient management from animal manure.	Nitrogen
PI Score >100-400	High potential for P movement from this site given current management practices and site characteristics. All practicable management practices to reduce P losses through surface runoff, subsurface flow, or erosion should be implemented.	Phosphorus
PI Score >400	Very high potential for P movement from this site given current management practices and site characteristics. Active remediation techniques should be implemented in an effort to reduce the P loss potential from this site.	No manure

5.5. Additional Field Data Required by Risk Assessment Procedure

Field	Distance to Water (Feet)	Buffer Width (Feet)	Type of Artificial Drainage
CAFO (1)	25	None	None
CAFO (2)	200	None	None
1	1,250	None	None
2	1,250	None	None
3	700	None	None
4	800	None	None
5	360	None	None
6	15	None	None
7	15	None	None
8	15	None	None
9	15	None	None
10	15	None	None
11	15	None	None
12	250	None	None
13	15	None	None
14	15	None	None
H (1)		None	None
H (2)		None	None
H (3)		None	None
H (4)		None	None

SOILS-

Refer to Section 5 of the Cream Line Dairy Comprehensive Nutrient Management Plan (CNMP) for soils information.

CROPS-

CROP	MATURE ROOT DEPTH (INCHES)	MAXIMUM ALLOWED DEPLETION	CRITICAL PERIOD
Grass Pasture/Hay	30	50%	July

Above data are from EM8713, *Western Oregon Irrigation Guides*, June 1998, OSU: Corvallis, OR and NRCS *Irrigation Guide (National Engineering Handbook, Part 652)*.

IRRIGATION WATER SUPPLY-

Description of Oregon Water Right:	Certificate 1692, 5512, 7119, 31114, 41012
Description of Irrigation Water Supply (Well, Stream, Irrigation District, etc.):	Wells and Irrigation District
Supply Flowrate (gpm or cfs):	1.17 CFS or 523 GPM
Annual Volume Available (Acre-ft.):	279 AF
Water Delivery Schedule:	On Demand
Method(s) of Water Measurement:	Unknown

IRRIGATION SYSTEM-

System	System Capacity (gpm)	Nozzle Size (in)	Pressure (psi)	Spacing (ft)	Application Rate (in/hr)	System Efficiency (%)
Sideroll (Wheeline) or Handline Sprinkler	50-231	11/64 and 3/16	50-60	60	0.25 to 0.3	70

IRRIGATION WATER MANAGEMENT OPERATIONS:

Irrigation Water Management Worksheet						
Crop Name:	Hay/Pasture Land					
Managed Rooting Depth:	30 inches					
Management Allowed Depletion, MAD:	50 %					
Irrigated Acres:	93.3					
Soil Name:	Ellisforde, Umapine, Yakima					
Soil Depth (inches):	48					
Available Water Capacity (in/in):	0.17					
Soil Intake Rate (in/hr) :	0.5					
IRRIGATION REQUIREMENT HOW MUCH water to apply?	Month					
	April	May	June	July	August	Sept
Total Plant Available Water Capacity (in): Soil or Root Depth * Available Water Capacity	5.10	5.10	5.10	5.10	5.10	5.10
Net Irrigation Application (in): Total Plant Available Water Capacity * MAD	2.55	2.55	2.55	2.55	2.55	2.55
Irrigation System Application Rate (in/hr): Determined based on the type of Irrigation System	0.38	0.38	0.38	0.38	0.38	0.38
IRRIGATION TIMING WHEN to apply water?						
Net Irrigation Water Requirement (in): (From OSU Extension Miscellaneous Pub 8530, 1992)	5.00	6.02	6.97	7.83	6.93	4.61
Average Daily Crop Water Use (in/day):	0.17	0.19	0.23	0.25	0.22	0.15
Irrigation Frequency (days): Net Irrigation Application / Daily Crop Water Use	15	13	11	10	12	17
Irrigation System Set Time (hours):	7.5	7.5	7.5	7.5	7.5	7.5
Actual Net Irrigation Application (in): Gross Application * System Application Efficiency	2.00	2.00	2.00	2.00	2.00	2.00
Actual Irrigation Frequency (days): Actual Net Irrigation Application / Daily Crop Water Use	12	11	9	8	9	13
IRRIGATION SYSTEM CAPACITY						
System Application Efficiency (%): Water Required / Water Applied	70	70	70	70	70	70
Gross Irrigation Application (in): System Application Rate * System Set Time	2.85	2.85	2.85	2.85	2.85	2.85
Volume of Water per Irrigation (acre-in): Gross Irrigation Application * Irrigated Acres	266	266	266	266	266	266
Irrigation System Operation (hours/day):	16	16	16	16	16	16
Required System Flow Rate (gpm): (Equation 2)	627	684	836	941	836	579
Compare Required system flow rate with Measured flow noted on Irrigation Application Record						

6.3. Soil Test Data¹

Field	Test Year	OM (%)	P Test Used	P	K	Mg	Ca	Na	Units	Soil pH	Buffer pH	CEC (meq/100g)	NO ₃ -N (ppm)	EC (mmhos/cm)
CAFO (1)									ppm					
CAFO (2)									ppm					
1	2012	2.7	Olsen	40	756				ppm	7.5			110.0	
2	2012	2.8	Olsen	57	1,005				ppm	7.5			167.0	
3	2012	2.8	Olsen	57	1,005				ppm	7.5			167.0	
4	2012	2.7	Olsen	40	756				ppm	7.5			110.0	
5	2012	2.4	Olsen	28	508				ppm	6.9			80.0	
6	2012	1.5	Olsen	24	686				ppm	8.1			22.0	
7	2012	1.5	Olsen	24	686				ppm	8.1			22.0	
8	2012	2.7	Olsen	20	760				ppm	7.5			77.0	
9	2012	2.7	Olsen	20	760				ppm	7.5			77.0	
10	2012	2.7	Olsen	20	760				ppm	7.5			77.0	
11	2012	2.7	Olsen	20	760				ppm	7.5			77.0	
12	2012	2.7	Olsen	20	760				ppm	7.5			77.0	
13	2012	2.7	Olsen	20	760				ppm	7.5			77.0	
14	2012	2.7	Olsen	20	760				ppm	7.5			77.0	
H (1)									ppm					
H (2)									ppm					
H (3)									ppm					
H (4)									ppm					

1) When soil test K levels exceed 800ppm, the potential for grass tetany in lactating ruminants may be a concern. See Section 7, Feed Management for guidance on addressing this issue.

5.2. The predominate soil types located in the fields for the Cream Line Dairy are shown in the table below.

Soil Information

Field	Soil Survey	Map Unit	Soil Component Name	Surface Texture	Slope Range (%)	OM Range (%)	Bedrock Depth (in.)	Drainage	Annual Flooding	Hydro-logic Group
CAFO (1)	667	128A	Yakima	SIL	0-3%	2-3%		Well	Rare	B
CAFO (2)	667	128A	Yakima	SIL	0-3%	2-3%		Well	Rare	B
1	667	128A	Yakima	SIL	0-3%	2-3%		Well	Rare	B
2	667	106A	Umapine	SIL	0-3%	0.5-1%		SPoor	Rare	C
3	667	106A	Umapine	SIL	0-3%	0.5-1%		SPoor	Rare	C
4	667	24C	Ellisforde	SIL	7-20%	1-2%		Well	None	B
5	667	24C	Ellisforde	SIL	7-20%	1-2%		Well	None	B
6	667	28A	Freewater	GR-SIL	0-3%	1-2%		SEWell	Rare	B
7	667	24B	Ellisforde	SIL	1-7%	1-2%		Well	None	B
8	667	128A	Yakima	SIL	0-3%	2-3%		Well	Rare	B
9	667	106A	Umapine	SIL	0-3%	0.5-1%		SPoor	Rare	C
10	667	128A	Yakima	SIL	0-3%	2-3%		Well	Rare	B
11	667	128A	Yakima	SIL	0-3%	2-3%		Well	Rare	B
12	667	106A	Umapine	SIL	0-3%	0.5-1%		SPoor	Rare	C
13	667	128A	Yakima	SIL	0-3%	2-3%		Well	Rare	B
14	667	128A	Yakima	SIL	0-3%	2-3%		Well	Rare	B
H (1)	667	24C	Ellisforde	SIL	7-20%	1-2%		Well	None	B
H (2)	667	128A	Yakima	SIL	0-3%	2-3%		Well	Rare	B
H (3)	667	106A	Umapine	SIL	0-3%	0.5-1%		SPoor	Rare	C
H (4)	667	106A	Umapine	SIL	0-3%	0.5-1%		SPoor	Rare	C

Following are descriptions and rating tables for agricultural uses of the soils:

General Description of the Soil Map Units:

Map Unit Description (Brief, Generated)—Umatilla County Area, Oregon Cream Line Dairy

Map Unit Description (Brief, Generated)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

The Map Unit Description (Brief, Generated) report displays a generated description of the major soils that occur in a map unit. Descriptions of non-soil (miscellaneous areas) and minor map unit components are not included. This description is generated from the underlying soil attribute data.

Additional information about the map units described in this report is available in other Soil Data Mart reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description (Brief, Generated)

Umatilla County Area, Oregon

Map Unit: 24B—Ellisforde silt loam, 1 to 7 percent slopes

Component: Ellisforde (85%)

The Ellisforde component makes up 85 percent of the map unit. Slopes are 1 to 7 percent. This component is on terraces, valleys. The parent material consists of silty loess over calcareous, lacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R008XY1100R Loamy 10-12 Pz ecological site. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 10 percent.

Map Unit: 24C—Ellisforde silt loam, 7 to 20 percent slopes

Component: Ellisforde (75%)

The Ellisforde component makes up 75 percent of the map unit. Slopes are 7 to 20 percent. This component is on terraces, valleys. The parent material consists of silty loess over calcareous, lacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is

well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R008XY110OR Loamy 10-12 Pz ecological site. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 10 percent.

Map Unit: 28A—Freewater gravelly silt loam, 0 to 3 percent slopes

Component: Freewater (90%)

The Freewater component makes up 90 percent of the map unit. Slopes are 0 to 3 percent. This component is on flood plains, valleys. The parent material consists of mixed, very gravelly alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4s. Irrigated land capability classification is 3s. This soil does not meet hydric criteria.

Map Unit: 106A—Umapine silt loam, reclaimed, 0 to 3 percent slopes

Component: Umapine (80%)

The Umapine component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on terraces, valleys. The parent material consists of silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. A seasonal zone of water saturation is at 36 inches during January, February, March, April, May, June, November, December. Organic matter content in the surface horizon is about 1 percent. This component is in the R011XY003OR Sodic Bottom ecological site. Nonirrigated land capability classification is 4s. Irrigated land capability classification is 3w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 15 percent. The soil has a slightly saline horizon within 30 inches of the soil surface. The soil has a moderately sodic horizon within 30 inches of the soil surface.

Map Unit: 128A—Yakima silt loam, 0 to 3 percent slopes

Component: Yakima (80%)

The Yakima component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on flood plains, valleys. The parent material consists of mixed alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. A seasonal zone of water saturation is at 60 inches during January, February, March. Organic matter content in the surface horizon is about 2 percent. This component is in the R010XY120OR Loamy Fan 9-12 Pz ecological site. Nonirrigated land capability classification is 4s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria.

Data Source Information

Soil Survey Area: Umatilla County Area, Oregon
Survey Area Data: Version 7, Feb 9, 2010

Report—Physical Soil Properties

Physical Soil Properties—Umatilla County Area, Oregon														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
	In	Pct	Pct	Pct	g/cc	micro m/sec	in/in	Pct	Pct	Kw	Kf	T		
24B—Ellisforde silt loam, 1 to 7 percent slopes														
Ellisforde	0-10	-14-	-72-	10-14- 18	1.10-1.30	4.00-14.00	0.15-0.19	0.0-2.9	1.0-2.0	.49	.49	5	5	56
	10-28	-14-	-72-	10-14- 18	1.30-1.45	4.00-14.00	0.16-0.20	0.0-2.9	0.5-1.0	.49	.49			
	28-60	-29-	-57-	10-14- 18	1.50-1.75	1.40-4.00	0.18-0.23	0.0-2.9	0.0-0.5	.43	.43			
24C—Ellisforde silt loam, 7 to 20 percent slopes														
Ellisforde	0-10	-14-	-72-	10-14- 18	1.10-1.30	4.00-14.00	0.15-0.19	0.0-2.9	1.0-2.0	.49	.49	5	5	56
	10-28	-14-	-72-	10-14- 18	1.30-1.45	4.00-14.00	0.16-0.20	0.0-2.9	0.5-1.0	.49	.49			
	28-60	-29-	-57-	10-14- 18	1.50-1.75	1.40-4.00	0.18-0.23	0.0-2.9	0.0-0.5	.43	.43			
28A— Freewater gravelly silt loam, 0 to 3 percent slopes														
Freewater	0-4	-34-	-59-	5- 8- 10	1.10-1.30	4.00-14.00	0.15-0.20	0.0-2.9	1.0-2.0	.20	.37	3	8	0
	4-20	-45-	-43-	8-12- 15	1.10-1.30	4.00-14.00	0.09-0.14	0.0-2.9	1.0-2.0	.15	.32			
	20-60	-95-	- 1-	0- 4- 8	1.60-1.70	141.00-705.00	0.04-0.06	0.0-2.9	0.0-0.5	.05	.17			

Physical Soil Properties— Umatilla County Area, Oregon														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/in	Pct	Pct					
106A— Umatilla silt loam, reclaimed, 0 to 3 percent slopes														
Umatilla	0-7	-14-	-73-	10-13- 15	1.30-1.40	4.00-14.00	0.18-0.20	0.0-2.9	0.5-1.0	.55	.55	5	4L	86
	7-60	-14-	-71-	10-15- 20	1.30-1.40	4.00-14.00	0.18-0.21	0.0-2.9	0.0-0.5	.64	.64			
128A—Yakima silt loam, 0 to 3 percent slopes														
Yakima	0-10	-34-	-58-	5- 9- 12	1.10-1.30	4.00-14.00	0.19-0.23	0.0-2.9	2.0-3.0	.43	.43	3	5	56
	10-22	-34-	-59-	5- 8- 10	1.10-1.35	4.00-14.00	0.18-0.22	0.0-2.9	1.0-2.0	.32	.43			
	22-60	-96-	- 2-	0- 3- 5	1.45-1.75	141.00-705.00	0.03-0.04	0.0-2.9	0.0-1.0	.10	.20			

Data Source Information

Soil Survey Area: Umatilla County Area, Oregon
Survey Area Data: Version 7, Feb 9, 2010

Report—Water Features

Water Features—Umatilla County Area, Oregon									
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding		Flooding	
				Upper limit	Lower limit	Surface depth	Duration	Frequency	Frequency
				F_t	F_t	F_t			
24B—Ellisforde silt loam, 1 to 7 percent slopes									
Ellisforde	B	—	Jan-Dec	—	—	—	—	None	—
24C—Ellisforde silt loam, 7 to 20 percent slopes									
Ellisforde	B	—	Jan-Dec	—	—	—	—	None	—
28A—Freewater gravelly silt loam, 0 to 3 percent slopes									
Freewater	B	—	January	—	—	—	—	None	Rare
	B	—	February	—	—	—	—	None	Rare
	B	—	March	—	—	—	—	None	Rare
	B	—	April	—	—	—	—	None	Rare
	B	—	May	—	—	—	—	None	Rare
	B	—	October	—	—	—	—	None	Rare
	B	—	November	—	—	—	—	None	Rare
	B	—	December	—	—	—	—	None	Rare

Water Features— Umatilla County Area, Oregon										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Surface depth	Ponding		Flooding	
				Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
106A—Umapine silt loam, reclaimed, 0 to 3 percent slopes										
Umapine	C	—	January	2.0-4.0	>6.0	—	—	None	—	Rare
	C	—	February	2.0-4.0	>6.0	—	—	None	—	Rare
	C	—	March	2.0-4.0	>6.0	—	—	None	—	Rare
	C	—	April	2.0-4.0	>6.0	—	—	None	—	Rare
	C	—	May	2.0-4.0	>6.0	—	—	None	—	Rare
	C	—	June	2.0-4.0	>6.0	—	—	None	—	Rare
	C	—	November	2.0-4.0	>6.0	—	—	None	—	Rare
	C	—	December	2.0-4.0	>6.0	—	—	None	—	Rare
128A—Yakima silt loam, 0 to 3 percent slopes										
Yakima	B	—	January	4.0-6.0	>6.0	—	—	None	—	Rare
	B	—	February	4.0-6.0	>6.0	—	—	None	—	Rare
	B	—	March	4.0-6.0	>6.0	—	—	None	—	Rare
	B	—	April	—	—	—	—	None	—	Rare
	B	—	May	—	—	—	—	None	—	Rare
	B	—	December	—	—	—	—	None	—	Rare

Data Source Information

Soil Survey Area: Umatilla County Area, Oregon
Survey Area Data: Version 7, Feb 9, 2010

Report—Irrigated and Nonirrigated Yields by Map Unit Component

Irrigated and Nonirrigated Yields by Map Unit Component—Umatilla County Area, Oregon									
Map symbol and soil name	Land capability		Alfalfa hay		Corn		Pasture		
	Irrigated	Nonirrigated	Irrigated	Nonirrigated	Irrigated	Nonirrigated	Irrigated	Nonirrigated	
			Tons		Bu		AUM		
24B—Ellisforde silt loam, 1 to 7 percent slopes									
Ellisforde	2e	3e	8.00	—	—	—	13.0	—	—
24C—Ellisforde silt loam, 7 to 20 percent slopes									
Ellisforde	4e	3e	8.00	—	—	—	13.0	—	—
28A—Freewater gravelly silt loam, 0 to 3 percent slopes									
Freewater	3s	4s	6.50	—	—	—	16.0	—	—
106A—Umapine silt loam, reclaimed, 0 to 3 percent slopes									
Umapine	3w	4s	7.00	—	150	—	18.0	—	—
128A—Yakima silt loam, 0 to 3 percent slopes									
Yakima	2s	4s	8.00	—	150	—	12.0	3.0	

Data Source Information

Soil Survey Area: Umatilla County Area, Oregon
 Survey Area Data: Version 7, Feb 9, 2010

RUSLE2 Profile Erosion Calculation Record

Info: Permanent high production irrigated pasture is maintained with annual no-till planting into the existing orchardgrass stand with ryegrass and brassica. Liquid manure applications are made prior to the first spring grazing and after each grazing period. Estimate 2% solids in liquids and apply 10,000 gallons/acre. 8.3lb/gal. x 1000gal. x 2% x 50% effect factor = 83lbs/1000gal. x 10 = 830lbs/application. Livestock are rotated using portable fencing. Evaluation is for fields 4 & 5 (7-20% slopes) and are applicable to all fields.

File: profiles\Carroll Heifer Ranch; Irr.Pasture, CMZ50

Access Group: R2_NRCS_Fld_Office

Inputs:

Location			Soil	Slope length (horiz)	Avg. slope steepness, %
Oregon\Umatilla County\OR_Umatilla_Req_13	24C ELLISFORDE SILT LOAM, 7 TO 20 PERCENT SLOPES\ELLISFORDE silt loam 75%	170			

14

Management	Vegetation	Yield units	Yield (# of units)
CMZ 50\c.Other Local Mgt Records\Carroll Heifer Ranch; Permanent Irr. Pasture interseeded/manure appl. 12 month grz, CMZ50	Tall fescue pasture, regrowth after grazing	lb	1500.0
CMZ 50\c.Other Local Mgt Records\Carroll Heifer Ranch; Permanent Irr. Pasture interseeded/manure appl. 12 month grz, CMZ50	Tall fescue pasture, regrowth after grazing	lb	1500.0
CMZ 50\c.Other Local Mgt Records\Carroll Heifer Ranch; Permanent Irr. Pasture interseeded/manure appl. 12 month grz, CMZ50	Tall fescue pasture, regrowth after grazing	lb	1500.0
CMZ 50\c.Other Local Mgt Records\Carroll Heifer Ranch; Permanent Irr. Pasture interseeded/manure appl. 12 month grz, CMZ50	Tall fescue pasture, regrowth after grazing	lb	1500.0
CMZ 50\c.Other Local Mgt Records\Carroll Heifer Ranch; Permanent Irr. Pasture interseeded/manure appl. 12 month grz, CMZ50	Tall Fescue pasture, senesc to regrowth	pounds	250.00
CMZ 50\c.Other Local Mgt Records\Carroll Heifer Ranch; Permanent Irr. Pasture interseeded/manure appl. 12 month grz, CMZ50	Tall Fescue pasture, senesc to regrowth	pounds	250.00
CMZ 50\c.Other Local Mgt Records\Carroll Heifer Ranch; Permanent Irr. Pasture interseeded/manure appl. 12 month grz, CMZ50	Tall Fescue pasture, senesc to regrowth	pounds	250.00
CMZ 50\c.Other Local Mgt Records\Carroll Heifer Ranch; Permanent Irr. Pasture interseeded/manure appl. 12 month grz, CMZ50	Tall Fescue pasture, senesc to regrowth	pounds	250.00
CMZ 50\c.Other Local Mgt Records\Carroll Heifer Ranch; Permanent Irr. Pasture interseeded/manure appl. 12 month grz, CMZ50	Tall Fescue pasture, senesc to regrowth	pounds	250.00

<i>Contouring</i>	<i>Strips/barriers</i>	<i>Diversion/terrace, sediment basin</i>	<i>Subsurface drainage</i>	<i>Adjust res. burial level</i>	<i>General yield level</i>	<i>Rock cover, %</i>
a. rows up-and-down hill	(none)	(none)	(none)	Normal res. burial	Set by user	0

Outputs:

<i>T value</i>	<i>Soil loss erod. portion</i>	<i>Detachment on slope</i>	<i>Soil loss for cons. plan</i>	<i>Sediment delivery</i>	<i>Net C factor</i>	<i>Net K factor</i>	<i>Crit. slope length</i>	<i>Surf. cover after planting, %</i>
5.0	0.21	0.21	0.21	0.21	0.0039	0.49		

<i>Date</i>	<i>Operation</i>	<i>Vegetation</i>	<i>Surf. res. cov. after op, %</i>
3/15/0	Manure spreader, liquid		4.9
3/15/0	Begin new growth	Tall fescue pasture, regrowth after grazing	4.9
5/15/0	Graze, rotational	Tall fescue pasture, regrowth after grazing	7.6
5/16/0	Manure spreader, liquid		7.2
7/15/0	Graze, rotational	Tall fescue pasture, regrowth after grazing	9.5
7/16/0	Manure spreader, liquid		9.0
9/15/0	Graze, rotational	Tall fescue pasture, regrowth after grazing	11
9/16/0	Manure spreader, liquid		10
10/15/0	Graze, rotational	Tall Fescue pasture, senesc to regrowth	12
10/16/0	Manure spreader, liquid		11
11/15/0	Graze, rotational	Tall Fescue pasture, senesc to regrowth	9.0
12/15/0	Graze, rotational	Tall Fescue pasture, senesc to regrowth	7.5
1/15/1	Graze, rotational	Tall Fescue pasture, senesc to regrowth	6.5
2/15/1	Graze, rotational	Tall Fescue pasture, senesc to regrowth	5.6

FUEL USE EVALUATION:

<i>Fuel type for entire run</i>	<i>Equiv. diesel use for entire simulation</i>	<i>Energy use for entire simulation</i>	<i>Fuel cost for entire simulation, US\$/ac</i>
(none)	6.2	850000	18.45

SCI and STIR Output

<i>Soil conditioning index (SCI)</i>	<i>Avg. annual slope STIR</i>	<i>Wind & irrigation-induced erosion for SCI, t/ac/yr</i>
1.4	5.36	0

Wind erosion not present with permanent pasture. Wind Erosion Prediction System (WEPS) evaluation not necessary.

The **SCI** is the **Soil Conditioning Index** rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The **STIR** value is the **Soil Tillage Intensity Rating**. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.

RUSLE2 Profile Erosion Calculation Record

Info: Field 7, neighboring field where solids are applied by Tyler Carroll before or after winter wheat.

File: profiles\Field 7: Cream Line Dairy

Access Group: R2_NRCS_Fld_Office

Inputs:

Location	Soil	Slope length (horiz)	Avg. slope steepness, %
Oregon\Umatilla County\OR_Umatilla_Req_13	24B ELLISFORDE SILT LOAM, 1 TO 7 PERCENT SLOPES\ELLISFORDE silt loam 85%	300	3.5

Management	Vegetation	Yield units	Yield (# of units)
CMZ 50\c.Other Local Mgt Records\Field 7; Cream Line Dairy	Wheat, winter, CMZ 50 hi ppt, 7-10 in. spac. late plant	bu	100.00
CMZ 50\c.Other Local Mgt Records\Field 7; Cream Line Dairy	Wheat, spring, CMZ 47, 7 in. spac.	bu	85.000

Contouring	Strips/barriers	Diversion/terrace, sediment basin	Subsurface drainage	Adjust res. burial level	General yield level	Rock cover, %
a. rows up-and-down hill	(none)	(none)	(none)	Normal res. burial	Set by user	0

Outputs:

T value	Soil loss erod. portion	Detachment on slope	Soil loss for cons. plan	Sediment delivery	Net C factor	Net K factor	Crit. slope length	Surf. cover after planting, %
5.0	1.1	1.1	1.1	1.1	0.055	0.49		

Date	Operation	Vegetation	Surf. res. cov. after op, %
9/1/0	Manure spreader, solid and semi-solid		90
9/5/0	Plow, moldboard		4.8
9/15/0	Cultivator, field w/ spike points		12
9/25/0	Rodweeder		14
10/1/0	Fert applic. anhyd knife 12 in		15
10/1/0	Harrow, coiled tine		15
10/10/0	Drill or airseeder, double disk	Wheat, winter, CMZ 50 hi ppt, 7-10 in. spac. late plant	13
8/1/1	Harvest, killing crop 50pct standing stubble		92
10/15/1	Plow, moldboard		5.2
4/1/2	Cultivator, field w/ spike points		8.9
4/5/2	Cultivator, field w/ spike points		12
4/10/2	Fert applic. anhyd knife 12 in		14
4/15/2	Drill or airseeder, double disk	Wheat, spring, CMZ 47, 7 in. spac.	12
8/1/2	Harvest, killing crop 50pct standing stubble		86

SCI and STIR Output

<i>Soil conditioning index (SCI)</i>	<i>Avg. annual slope STIR</i>	<i>Wind & irrigation-induced erosion for SCI, t/ac/yr</i>
0.22	141	0

The **SCI** is the **Soil Conditioning Index** rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The **STIR** value is the **Soil Tillage Intensity Rating**. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.

Animal Mortality Facility (No) (PS316)

Field(s): CAFO 1

Status: Existing

Units: 1 No.

Description: A straw bale wall composting storage area is used to process animal carcasses into stable organic matter to be used as a soil amendment and nutrients for crop and hay land fields. The facility will have a capacity of approximately 3,000 cubic feet or 30 tons that will provide a treatment and storage area for animal carcasses.

Operation and Maintenance: The animal mortality facility shown on the facility map has a design capacity of 3,000 cubic feet or 30 tons to store and dispose of animal mortalities by composting. Refer to Section 3 for guidance on what steps to take for a catastrophic animal mortality event.

Having dead animals sent to an acceptable disposal site is the best method to deal with animal mortalities. A list of landfills and phone numbers can be found on the internet at <http://www.deq.state.or.us/lq/sw/disposal/permittedfacilities.htm>. If a local landfill is not permitted to accept animal carcasses, the Oregon Department of Environmental Quality (DEQ) may grant an exception. Phone numbers to local DEQ offices can be found in most phone books or on the internet at <http://www.deq.state.or.us/about/locations.htm>.

Under no circumstances are animal mortalities to be disposed of in any type of liquid manure storage facility.

Currently animal mortalities for this operation are being disposed of by composting in an animal mortality facility. See description above.

Acceptable methods and guidance for disposing of animal mortalities are:

Composting- Composting animal mortalities requires a composting plan be prepared and submitted to the Oregon Department of Agriculture, Natural Resources Division. A composting plan consists of a site plan drawing of the composting facility, a description of how any runoff from the facility will be contained, a description of the composting process to be used and how the compost will be used. The composting facility for animal mortalities must have a concrete floor or similar impervious surface to prevent nutrient leaching. A roof covering the animal mortality composting facility is recommended to control moisture added by rainfall and rainfall runoff. Assistance to develop a composting plan is available from the Natural Resources Division of the Oregon Department of Agriculture, (503) 986-4700. A permit is also needed from the Department of Environmental Quality (DEQ) if animal mortalities will be imported from other farms for composting.

Rapid composting of dead animals occurs when the carbon to nitrogen (C:N) ratio of the compost mix ranges between 10 and 20 to 1. To achieve the recommended C:N ratio, build the initial compost pile by placing 18 inches of sawdust or other bulking agent on the floor of the composting area. The bulking agent should extend beyond the perimeter of the animal to be composted by at least 2 feet. If using a compost bin the bulking material should extend at least 1 foot beyond the perimeter of the animal being composted. Using a bulking agent such as sawdust will absorb any liquids as the animal decomposes during the composting process.

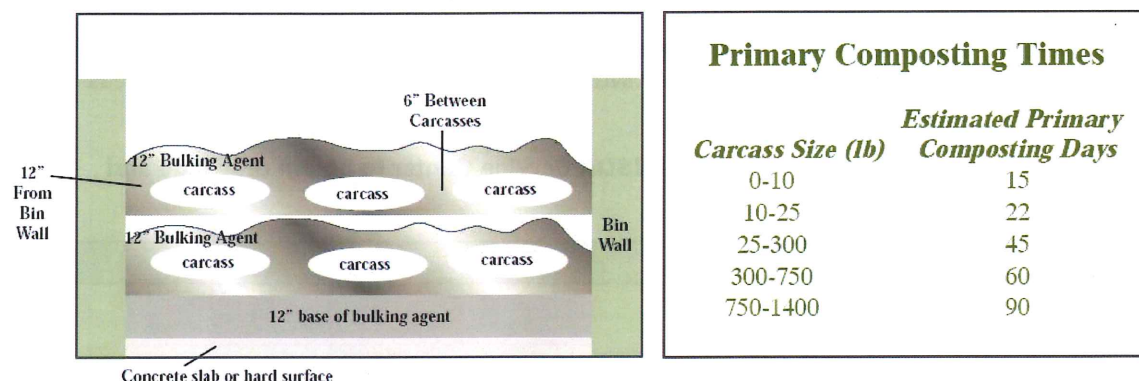
Once the bulking agent has been placed on the floor of the composting area, place the animal carcass on top. To decrease composting time and prevent bloating the body cavity should be cut open. Cover the carcass with 1 to 3 feet of separated manure solids or other material that has a moisture content between 30 to 60 percent and a C:N ratio of not more than 30 to 1. Use 1 foot of material for small carcasses and 3 feet for large carcasses such as cattle. Be careful not to add material that is too wet as it will hinder the composting process and cause odors. Small animals can be layered in a compost pile by placing 12 inches of the bulking agent between layers as shown in the figure below. Be sure the total height of the compost pile does not exceed 7 feet in height as it may spontaneously combust causing a fire.

The first heating or primary composting cycle will take approximately 15 to 90 days depending on the size of the animal being composted. Refer to the table below for estimated primary composting times. Check pile temperature using thermometer probe on a daily basis. The pile temperature should be checked at multiple points around the compost pile and at a point approximately 3 feet into the pile. The temperature of the compost pile should reach 130 degrees Fahrenheit (F) within a few days. Temperatures should peak between 130 and 150 degrees F in 3 to 4 days. When the temperature of the compost pile falls below 130 degrees F, the compost needs to be aerated by turning or other means. Be sure carcasses remain covered with the bulking agent after being aerated. It is important to maintain a temperature above 130 degrees F for at least 7 days during the

primary composting cycle as failure to do so may result in the incomplete destruction of pathogens and can cause fly and odor problems. After aerating the compost pile, the secondary composting times will be similar to the first.

CAUTION: It is unclear whether prions that are the proteins that cause Bovine Spongiform Encephalitis (BSE or Mad Cow Disease) are destroyed in the composting process. Animals showing signs of Mad Cow Disease and those with anthrax should not be composted and must be reported to the Oregon Department of Agriculture, Animal Health and Identification Division at (503) 986-4680 for guidance on disposal.

After aerating the compost pile by turning or other means, be sure to check the moisture content and add water if necessary being careful not to add too much water. The compost pile should feel moist to the touch but you should not be able to squeeze any water out of it.



Odors given off by the composting operation is a good indicator of how the compost operation is proceeding. Foul odors may mean that the process has turned from aerobic to anaerobic. Anaerobic conditions are the result of insufficient oxygen in the compost. This may be caused by excessive moisture in the compost or the need for turning or aerating of the compost pile.

After the composting process is finished, it may be used as a bulking agent for a new compost pile. A rule of thumb is to use 50 percent of the composted material for a bulking agent but you may want to use more or less depending on how degraded the bulking agent is in the finished compost. Using finished compost in a new compost pile reduces the amount of bulking agent needed for the new pile and provides microbial inoculants to get the composting process started.

Finished compost can also be applied to crop and pasture land fields for utilization of the nutrients and organics in the composted material. Compost from animal mortalities should not be applied to crops that will be consumed directly by humans. The nutrient content of the composted material should be determined and application equipment calibrated to ensure nutrients contained in the composted material are not over applied.

Natural Disposal- To allow nature to take its course the dead animal needs to be transported to a location at least ½ mile from any off-farm dwelling and at least ¼ mile from any water way in accordance with ORS 601.140. Once this criteria is met the carcass can be left to degrade naturally with the help of scavengers. This method is not an acceptable means of disposal for a large number of animal mortalities or for byproducts generated during butchering.

Landfill- Dead animals may be transported to a permitted landfill that accepts animal carcasses for disposal. Be sure to call the chosen landfill first to insure a landfill will accept your animal carcasses. Refer to the website given previously for permitted landfills to call. Contact the landfill operator and the DEQ at (800) 452-4011 if the landfill you would like to use is not a permitted facility to see if an exception may be granted for the disposal of animal carcasses.

Incineration- Dead animals may be burned as a method of disposal and as a method to control diseases. The economics of incineration and availability of incineration units usually make this option undesirable. A permit is needed from the Oregon Department of Environmental Quality (DEQ) Air Quality program to operate an incineration unit. Contact your DEQ at (800) 452-4011 for guidance on incineration of animal carcasses.

Burial- Dead animals may be buried in accordance with ORS 601.090(7) as a method of disposal. Large animals such as an adult cow will require a hole approximately 2 feet by 7 feet by 8 feet deep. Be sure to select a site that doesn't have a water table to insure the bottom of the hole will be dry. The animal carcass should be covered with hydrated lime and covered with at least 4 feet of soil mounded 2 feet above the natural ground line to allow for

settling as the carcass decomposes. Burial sites should be located at least 500 feet down slope from surface waters or wells.

Burial is not an acceptable method of disposal for animal byproducts generated from butchering. Burial of large numbers of animal mortalities is not acceptable unless performed in accordance with a Catastrophic Animal Mortality Management Plan. Burial of imported animal mortalities is subject to disposal regulations and the Oregon Department of Environmental Quality (DEQ), the Oregon Department of Agriculture (ODA) and the local land use planning authority should be contacted.

Periodically inspect concrete and asphalt slabs, walls and curbs and repair or replace broken sections as needed. Immediately move any animal mortalities and refuse from outside of the facility and place them back in the facility.

Maintain all fences, railings, and/or warning signs to provide warning and/or prevent unauthorized human or livestock entry. Immediately repair vandalism, vehicular or livestock damage to the structure, earthen areas surrounding the structure, or any appurtenances.

Specification: Prior to construction contact the local USDA Service Center to obtain drawings and specifications for this practice.

Sampling Soil

Spring Soil Samples:

- Spring soil samples are to be collected the last 2 weeks of March or the first 2 weeks of April when soils are not saturated
- Soil samples are to be collected on fields that have not received manure applications within the last 30 days.
- Collect several samples (about 10 one-fourth cup samples) of soils from just below the thin sod layer to a depth of 12 inches and add to bucket.
- Mix the samples in the bucket and remove quantity required by lab for analysis and place into a sample bag.
- The bag should be labeled with:
 - Farm or operator name
 - Sample date
 - Field name
 - Sample depth (0 to 12 inches)
- Keep soil sample cool (small cooler with some ice) in the field until sample can be put in refrigerator or into freezer. Soil can be stored in refrigerator for up to 1 week or can be stored in a freezer for longer periods.
- Ship samples to lab.

Fall Soil Samples

- Fall soil samples are to be collected during the last 2 weeks in September or the first 2 weeks in October on soils that are not saturated.
- Soil samples are to be collected on fields that have received normal manure applications during the current year.
- Sample soils and ship as outlined in the spring soil sample section above.

SAMPLING LIQUID MANURE

Liquid manure samples submitted for analysis should meet the following requirements:

- Manure samples submitted to a laboratory should represent the average composition of the material that will be applied to the field.
- Place sample in a sealed, clean plastic container with about a 1-pint volume. Glass is not suitable because it is breakable and may contain contaminants.
- Leave at least 1 inch of air space in the plastic container to allow for expansion caused by the release of gas from the manure material.
- Refrigerate or freeze samples that cannot be shipped on the day they are collected, minimizing chemical reactions and pressure buildup from gases.

Following are guidelines for obtaining liquid manure samples:

Wastewater: Premixing the surface liquid in the storage structure is not needed, provided it is the only component that is being pumped. Operators with multistage systems should draw samples from the storage structure they intend to pump for application to crops.

Samples should be collected using a clean, plastic container similar to the one shown in figure for liquid manure sampling on the next page. One pint of material should be taken from at least eight sites around the storage structure and then mixed in the larger clean, plastic container. Effluent should be collected at least 6 feet from the storage structure's edge at a depth of about a foot. Shallower samples from storage structure may be less representative than deep samples because oxygen transfer near the surface sometimes alters the chemistry of the solution. Floating debris and scum should be avoided.

One pint of mixed material should be sent to the lab. Galvanized containers should never be used for collection, mixing, or storage due to the risk of contamination from metals like zinc in the container. These recommendations are adequate for making applications that draw the liquid level in the storage structure down a few feet. If an entire storage structure is to be emptied, more frequent sampling with many more sampling points is recommended.

Slurry: Manure materials applied as a slurry from a storage structure should be mixed prior to sampling. A liquid sampling device can be used to obtain a sample from agitated storage structure. If you wish to sample a storage structure without agitation, you must use a composite sampling device as the one shown in the figure on the next page.

Samples should be collected from approximately eight areas around the storage structure and mixed thoroughly in a clean, plastic container. An 8- to 10-foot section of 0.5- to 0.75-inch plastic pipe can also be used: extend the pipe into the pit with ball plug open, pull up the ball plug (or press your thumb over the end to form an air lock), and remove the pipe from the manure, releasing the air lock to deposit the manure in the plastic container.

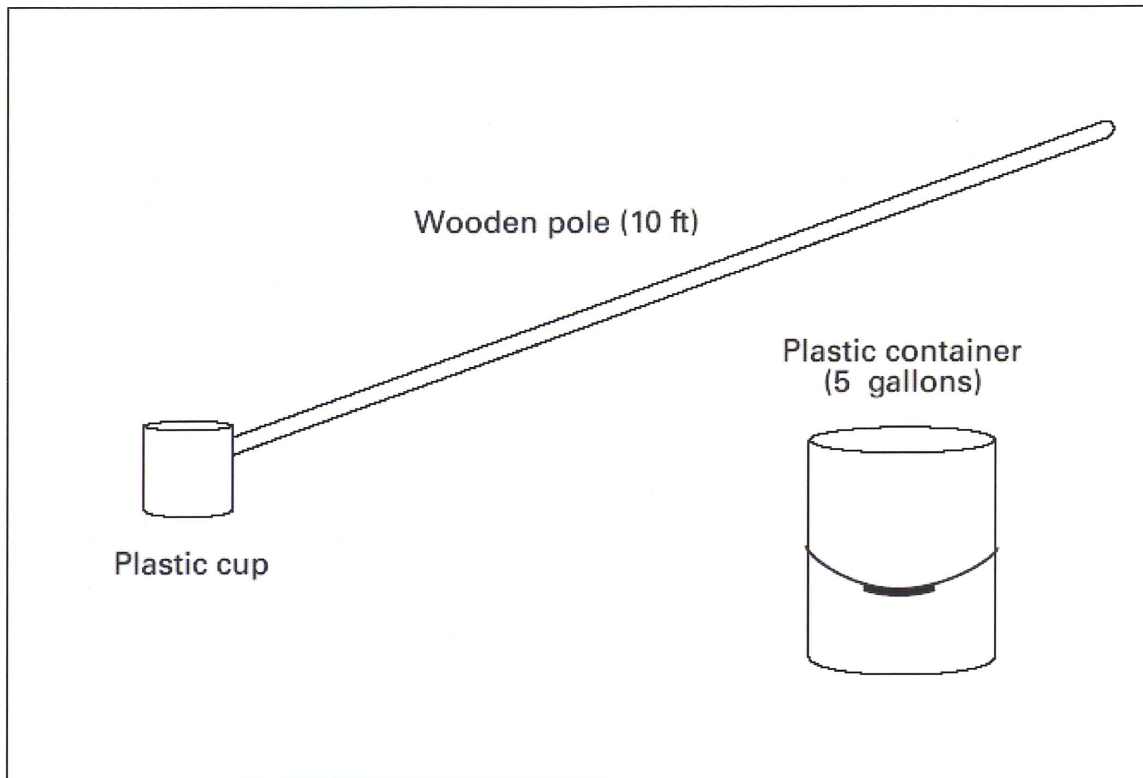
One pint of mixed material should be sent to the lab. Galvanized containers should never be used for collection, mixing, or storage due to the risk of contamination from metals like zinc in the container.

Sludge: Sludge is somewhat more difficult to obtain a representative sample. Two common methods are used.

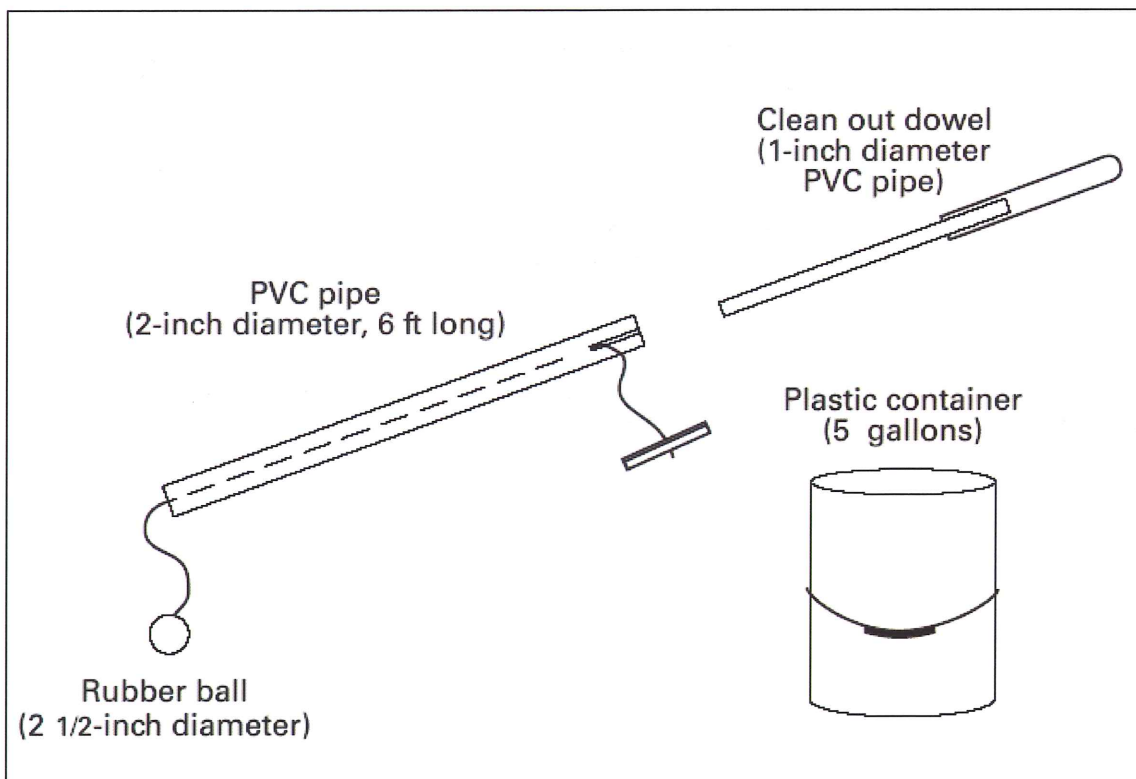
One method requires pumping the storage structure down to the sludge layers. Then, during sludge agitation, a composite sampling device as shown in the figure on the next page can be used to obtain a sample.

The other method requires insertion of a probe to the bottom of the storage structure to obtain a column of material. The sludge component of this column is then released into a clean plastic bucket, and several (12-20) other sampling points around the storage structure are likewise collected to obtain a composite, representative sample.

For analysis, most labs require at least 1 pint of material in a plastic container. The sample should not be rinsed into the container because doing so dilutes the mixture and distorts nutrient evaluations. However, if water is typically added to the manure prior to land application, a proportionate quantity of water should be added to the sample.



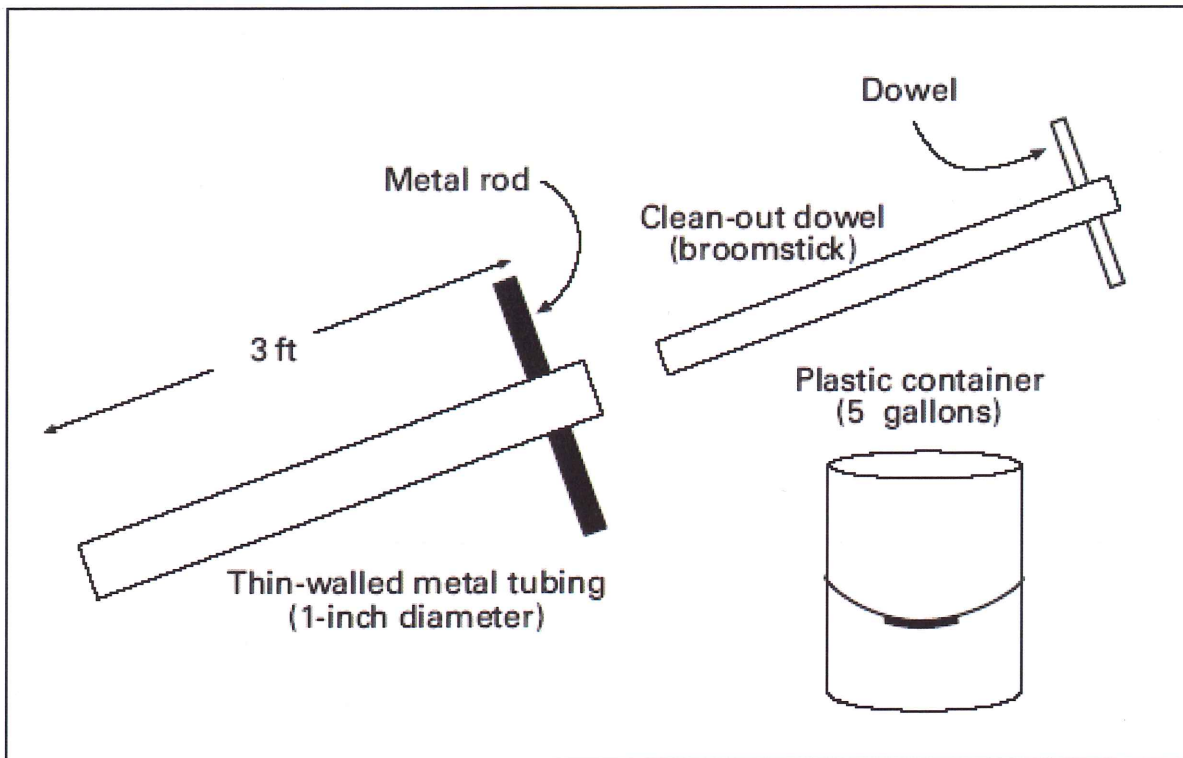
Typical Sampling Equipment for Liquids



Typical Sampling Equipment for Obtaining Composite Samples

SAMPLING SOLID MANURE

Solid manure samples should represent the manure's average moisture content. A 1-quart sample is adequate for analysis. Samples should be taken from approximately eight different areas in the manure pile at a depth of 18 inches, placed in a clean plastic container, and thoroughly mixed. Approximately 1 quart of the mixed sample should be placed in a plastic bag, sealed, and shipped directly to the lab. It is recommended to ship the samples early in the week so it doesn't sit in a post office or shipping area of the laboratory for several days. Samples stored for more than two days should be refrigerated. The figure below shows a device that can be constructed and used for sampling solid manure.



Typical Solids Sampling Equipment

APPLICATION EQUIPMENT CALIBRATION

The worksheets on the following pages can be used to calibrate manure application equipment so that manure is applied at the proper rate to achieve the planned application rates.

SPREADER EQUIPMENT CALIBRATION

(Using Bucket, Pan or Tarp)

Name: _____ Date: _____

[illegible]

SPREADER EQUIPMENT CALIBRATION **(Using a Full Spreader Load)**

Name: _____ Date: _____

Perform the following operations to calibrate the solids spreader equipment:					
✓ Determine the weight of the waste material loaded in the spreader by using truck scales to weigh the spreader equipment when it is empty and full.					
✓ Spread the loaded spreader on the field using consistent speed and spreader settings to cover the field uniformly. Spread in a rectangular pattern so the area calculation will be simple. Record engine rpm and gear settings used.					
✓ Measure the length and width covered by the full load and compute the application rate in tons per acre using this worksheet.					
Data and Calculations:					
Steps	ID of Calibration Test				
	A	B	C	D	E
1. Date of calibration test-					
2. Engine RPM during spreading -					
3. Gear selected during spreading -					
4. Weight of empty spreader (lb) =					
5. Weight of loaded spreader (lb) =					
6. Weight of Waste in spreader (lb) - line 5 – line 4 =					
7. Length of spreading area (ft) =					
8. Width of spreading area (ft) =					
9. Area spread (sq ft) - line 7 x line 8 =					
10. Waste applied (lb/sq ft) – line 6 ÷ line 9=					
11. Convert to tons per acre - Line 10 x 21.78=					
12. Average Application Rate (tons per acre) – Sum of values in cells A11 through F11 divided by the total number of calibrations completed =					
Additional Notes:					

TANK EQUIPMENT CALIBRATION

(Using a Full Tank Load)

Name: _____ Date: _____

Perform the following operations to calibrate the tank equipment:					
✓ Determine the maximum capacity of the tank equipment from the manufacturer's maintenance manual or the owners manual for the equipment.					
✓ Fill the tank and reduce the volume of the tank by the appropriate amount if the tank is not filled to its maximum capacity. Normally a tank spreader is only filled to about 80 percent of its maximum capacity and therefore the maximum rated capacity of the tank should be multiplied by 0.8 to reflect the volume of the loaded tank during the calibration exercise.					
✓ Spread the loaded tank on the field using consistent speed and settings to cover the field uniformly. Try to spread in a rectangular pattern so the area calculation will be simple. Record engine rpm and gear settings used.					
Data and Calculations:					
Steps	ID of Calibration Test				
	A	B	C	D	E
1. Date of calibration test-					
2. Engine RPM during spreading-					
3. Gear selected during spreading-					
4. Maximum rated capacity of tank (gallons) =					
5. Volume of filled tank (gallons)- Line 4 x _____ % of tank filled ÷ 100% =					
6. Length of spreading area (ft) =					
7. Width of spreading area (ft) =					
8. Area spread (sq ft)- line 6 x line 7 =					
9. Waste applied (gal/sq ft)- line 5 ÷ line 8 =					
10. Convert to gallons per acre - Line 9 x 43,560 =					
11. Average Application Rate (gallons per acre) – Sum of values in cells A10 through F10 divided by the total number of calibrations completed =					
Additional Notes:					

TRAVELING BIG GUN SPRINKLER CALIBRATION

Name: _____ Date: _____

Perform the following operations to calibrate the traveling big gun sprinkler:								
☒ Use 5 to 10 catch cans to collect the sprinkler-irrigated waste. Use straight-sided buckets for catch cans. Two pound coffee cans work well. Make sure all of the catch cans have the same diameter.								
☒ Place one of the catch cans on a level surface and fill it with water to a known depth (1-3 inches). Pour the water from the catch can into a large measuring cup. Determine how many measuring cups of water are equal to an inch of water in the catch can.								
☒ Place at least five catch cans across the towpath of the big gun sprinkler. Try to space the catch cans uniformly from the center of the towpath to the outer edge of the wetted area of the sprinkler. Stake the catch can in place or put a rock in the bottom of the catch can to keep it upright. Allow the traveling big gun sprinkler to completely pass over the catch cans. Use the measuring cup previously used to calibrate the catch cans to measure the amount of liquid collected in each can and convert the volume to inches. Be sure to add together the amount measured from the catch cans that would receive overlap from the adjacent towpath. For example, if catch can #4 will receive liquids from the adjacent towpaths, add the amount from container #4 on the left to container #4 on the right side to compute the total amount applied at the location of container #4 on the right and left sides of the towpath.								
Catch Can Calibration: Example: 1 inch = $\frac{5}{0.2}$ Cups 1 cup = 0.2 Inches Your Catch 1 inch = _____ Cups Cans: 1 cup = _____ Inches								
Travel Rate Setting During Test:					Data and Calculations:			
Catch Can ID	Volume of Liquid							
	Cups	Inches	Cups	Inches	Cups	Inches	Cups	Inches
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
Average =								

OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM)

2/18/14

Version 4.7

CLIENT: **Cream Line Dairy**

ASSISTED BY:

ANIMAL WASTE MANAGEMENT SYSTEM INVENTORY

ANIMAL INVENTORY

Type of Animal		Number of Animals	Average Weight (lbs.)	Animal Units (1,000 lb.)	Milk Production in Pounds/Cow/Day=					50	Manure CF/D/AU	Annual			
					Nutrient Production							Days Confined	Days Grazed	Days Off Farm	
					(lbs./day/1000 lb. Animal Unit)			(lbs./day)							
					N	P	K	N	P						K
MILKER (Jersey)	↕	300	750	225.0	0.75	0.12	0.43	167.63	27.74	97.54	1.69	228	137	0	
MILKER (DRY)	↕	50	850	42.5	0.30	0.04	0.10	12.75	1.79	4.25	0.92	259	106	0	
HEIFERS (12-24 Months)	↕	225	500	112.5	0.27	0.05	0.12	29.93	5.12	13.50	0.90	45	106	214	
CALVES (1-12 Months)	↕	400	250	100.0	0.42	0.05	0.11	42.00	5.40	11.00	1.34	365	0	0	
	↕														
	↕														
	↕														
	↕														
	↕														
	↕														
	↕														
	↕														
Totals/Averages-		975	588	480.0	0.53	0.08	0.26	252.3	40.0	126.3	1.4				

GRAZING PERIOD

Type of Animal	Percent of Month and Number of Animals Grazing												
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AU-YR.
MILKER (Jersey)	30%	30%	30%	30%	30%	30%	40%	50%	50%	50%	50%	30%	
	300	300	300	300	300	300	300	300	300	300	300	300	1,013
MILKER (DRY)	0%	70%	70%	70%	70%	70%	0%	0%	0%	0%	0%	0%	
	50	50	50	50	50	50	50	50	50	50	50	50	149
HEIFERS (12-24 Months)	0%	70%	70%	70%	70%	70%	0%	0%	0%	0%	0%	0%	
	0	225	225	225	225	225	0	0	0	0	0	0	394
CALVES (1-12 Months)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	400	400	400	400	400	400	400	400	400	400	400	400	0
													0
													0
													0
													0
													0
													0
													0
Total AUM's Available>	0	0	0	0	0	0	0	0	0	0	0	0	0
Total AUM's Needed>>>	68	176	176	176	176	176	90	113	113	113	113	68	1,555
Total AUM's>>>>>>>>>>	-68	-176	-176	-176	-176	-176	-90	-113	-113	-113	-113	-68	-1,555

Version 4.7

CLIENT: **Cream Line Dairy**

ASSISTED BY:

Weather Station		Milton Freewater		
	25Yr-24Hr	1.80	Lot Runoff Factors as a Percent of Monthly Precipitation	
	RCN=	95.00		
	Average Monthly Inches			
Month	Precipitation	Evaporation	Paved	Unpaved
October	1.16	2.75	30%	5%
November	1.62	1.26	38%	0%
December	1.73	0.84	27%	0%
January	1.64	0.87	27%	0%
February	1.17	1.31	25%	0%
March	1.41	2.54	23%	0%
April	1.20	3.90	20%	5%
May	1.28	5.30	32%	10%
June	1.15	6.66	35%	5%
July	0.37	8.86	32%	0%
August	0.44	7.93	28%	0%
September	0.73	5.07	35%	10%
Annual	13.9	47.29		

[illegible][illegible]

Field Number	Acres	Crop	Percent Dry Matter (DM)	Yield Units	Target Yield	Nutrients Removed in Pounds per Acre		
						Nitrogen N	Phosphorous P2O5	Potassium K2O
1-6, 8-14	89.5	Perennial Hay/Pasture(Med-High Intensity)	85%	Ton	6.50	320	101	266
7	69.1	Wheat, Spring Soft White Straw Removed	80%	Ton	3.00	130	61	75
Off Farm								
Total Acres-	158.6							

Version 4.7

CLIENT: **Cream Line Dairy**

ASSISTED BY:

BEDDING VOLUME

[illegible]

SOLIDS SEPARATION FACTOR

[illegible]

OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM)

2/18/14

Version 4.7

CLIENT: Cream Line Dairy
ASSISTED BY: 0

ANIMAL WASTE MANAGEMENT SYSTEM PRODUCTION

MONTHLY VOLUMES

Month	Runoff in Cubic Feet				Facility Water Use Cubic Feet	Manure		Bedding		Solids Separated		Solids in Liquids		Total Solids	Total Liquids
	Roof Area Square Feet	Paved Slab Area Square Feet	Unpaved Lot Area Square Feet	Silage Pit Surface Area, SF		Solids Cubic Feet	Liquids Cubic Feet	Cubic Feet	Pounds	Cubic Feet	Pounds	Cubic Feet	Pounds	Cubic Feet	Cubic Feet
	0	5,160	80,840	0											
October	0	150	391	0	2,901	1,640	11,961	3,224	8,060	15,572	560,606	1,253	45,109	15,572	4,694
November	0	265	0	0	2,807	1,632	11,621	3,120	7,800	15,156	545,605	1,217	43,816	15,156	4,289
December	0	201	0	0	2,901	1,686	12,009	3,224	8,060	15,661	563,791	1,258	45,277	15,661	4,360
January	0	190	0	0	2,901	1,686	12,009	3,224	8,060	15,661	563,791	1,258	45,277	15,661	4,349
February	0	126	0	0	2,620	1,523	10,846	2,912	7,280	14,145	509,231	1,136	40,895	14,145	3,882
March	0	139	0	0	2,901	1,686	12,009	3,224	8,060	15,661	563,791	1,258	45,277	15,661	4,298
April	0	103	404	0	2,807	1,443	10,581	3,120	7,800	14,045	505,633	1,099	39,555	14,045	4,414
May	0	176	862	0	2,901	1,342	9,906	3,224	8,060	13,455	484,370	1,018	36,639	13,455	4,957
June	0	173	387	0	2,807	1,299	9,587	3,120	7,800	13,021	468,745	985	35,457	13,021	4,353
July	0	51	0	0	2,901	1,342	9,906	3,224	8,060	13,455	484,370	1,018	36,639	13,455	3,970
August	0	53	0	0	2,901	1,342	9,906	3,224	8,060	13,455	484,370	1,018	36,639	13,455	3,972
September	0	110	492	0	2,807	1,587	11,575	3,120	7,800	15,070	542,522	1,213	43,654	15,070	4,622
Annual	0	1,737	2,536	0	34,158	18,209	131,916	37,960	94,900	174,356	6,276,826	13,729	494,235	174,356	52,160
Annual Gallons	0	12,993	18,972	0	255,500	136,205	986,730	283,941		1,304,185		102,691		1,304,185	390,156

DAILY NUTRIENT PRODUCTION

Type of Animal	Pounds/Day of Nutrients from LIQUIDS			Pounds/Day of Nutrients from SOLIDS			Pounds/Day of Nutrients from GRAZING			Grazing Manure	Confined Manure
	N	P2O5	K2O	N	P2O5	K2O	N	P2O5	K2O	Gallons/Yr	Cubic Feet/Yr
MILKER (Jersey)	2.82	0.69	3.98	247.79	118.06	414.40	167.63	63.56	117.53	389,188	86,490
MILKER (DRY)	0.11	0.02	0.09	19.89	8.02	19.06	12.75	4.09	5.12	30,914	10,139
HEIFERS (12-24 Months)	0.25	0.06	0.28	46.69	22.99	60.54	29.93	11.73	16.27	80,052	4,587
CALVES (1-12 Months)	0.35	0.07	0.22	65.54	24.26	49.33	0.00	0.00	0.00	0	48,910
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Total-										500,154	150,125

OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM)

2/18/14

Version 4.7

CLIENT: Cream Line Dairy
ASSISTED BY: 0

ANIMAL WASTE MANAGEMENT SYSTEM PRODUCTION

MONTHLY NUTRIENT PRODUCTION

Month	Pounds of Nutrients from LIQUIDS			Pounds of Nutrients from SOLIDS			Pounds of Nutrients from GRAZING			Total Pounds of Nutrients from ALL SOURCES		
	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
October	75	18	96	8,025	3,563	11,112	1,559	591	1,093	9,660	4,171	12,302
November	73	17	94	7,769	3,486	10,899	2,405	904	1,507	10,247	4,408	12,499
December	75	18	97	8,028	3,602	11,262	2,485	934	1,557	10,588	4,555	12,916
January	75	18	97	8,028	3,602	11,262	2,485	934	1,557	10,588	4,555	12,916
February	68	16	87	7,251	3,254	10,172	2,244	844	1,406	9,564	4,114	11,666
March	75	18	97	8,028	3,602	11,262	2,485	934	1,557	10,588	4,555	12,916
April	64	15	81	7,023	3,093	9,511	2,012	763	1,410	9,099	3,871	11,002
May	58	13	71	6,489	2,831	8,543	2,598	985	1,822	9,145	3,829	10,436
June	56	13	69	6,280	2,739	8,268	2,514	953	1,763	8,850	3,706	10,100
July	58	13	71	6,489	2,831	8,543	2,598	985	1,822	9,145	3,829	10,436
August	58	13	71	6,489	2,831	8,543	2,598	985	1,822	9,145	3,829	10,436
September	73	17	93	7,767	3,448	10,754	1,509	572	1,058	9,348	4,037	11,905
Annual	810	191	1,024	87,666	38,881	120,131	27,492	10,386	18,375	115,968	49,458	139,530

OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM)

Version 4.7

2/18/14

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ASSISTED BY: 0

ANIMAL WASTE MANAGEMENT SYSTEM APPLICATION

MANAGEMENT CRITERIA FOR TRACTOR SPREADER APPLICATION OF SOLIDS

To apply 174,356 cubic feet of solids generated from the operation it will take approximately 876 trips annually. Based on applying NITROGEN, N 													
Field Number	Acres	Crop	Tractor Spreader Capacity		Spread Width Feet	NITROGEN, N Concentration in Storage Facility		Pounds of Nutrients to be Applied	Number of Applications Needed to meet Crop Demand	Tons per Acre of Solids to Apply	Travel Length per Load Needed in Feet	Loads per Acre	Assumed Solids Density lbs/CF
			Bushels	CF		PPM	Lbs/Ton						
1-6, 8-14	89.5	Perennial Hay/Pasture(Med-High Intensity)	160	199	15	10,475	20.95	320	1.00	24.0	433	7	36
7	69.1	Wheat, Spring Soft White Straw Removed	160	199	15	10,475	20.95	130	1.00	9.8	1065	3	36

MANAGEMENT CRITERIA FOR BIG GUN SPRINKLER APPLICATION OF LIQUIDS

To apply 202,405 gallons of liquids generated from the operation it will take approximately 11 hours of pumping annually. Based on applying NITROGEN, N 													
Field Number	Acres	Crop	Sprinkler Flowrate GPM	Wetted Diameter Feet	Portion of Wetted Diameter Receiving Liquids	NITROGEN, N Concentration in Storage Facility		Pounds of Nutrients to be Applied	Number of Applications Needed to meet Crop Demand	Inches of Liquids to Apply	Application Rate in Inches/Hour	Set Time Needed in Hours	Travel Rate Needed in Feet/Minute
						PPM	Lbs/1000Gal						
1-6, 8-14	89.5	Perennial Hay/Pasture(Med-High Intensity)	300	250	1/2 Circle 	336	2.80	320	1.00	6.18	1.45	10.48	0.31
7	69.1	Wheat, Spring Soft White Straw Removed	300	250	1/2 Circle 	336	2.80	130	1.00	2.51	1.45	4.26	0.77
													
													
													
													
													
													
													

OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM)

Version 4.7

2/18/14

CLIENT: Cream Line Dairy
ASSISTED BY: 0

ANIMAL WASTE MANAGEMENT SYSTEM APPLICATION

MANAGEMENT CRITERIA FOR TANK WAGON APPLICATION OF LIQUIDS

To apply 202,405 gallons of liquids generated from the operation it will take approximately 51 trips annually. Based on applying NITROGEN, N at agronomic rates use the application depths, travel lengths, and loads per acre listed below for each crop.											
Field Number	Acres	Crop	Tank Wagon Capacity Gallons	Spread Width Feet	NITROGEN, N Concentration in Storage Facility		Pounds of Nutrients to be Applied	Number of Applications Needed to meet Crop Demand	Inches of Liquids to Apply	Travel Length per Load Needed in Feet	Loads per Acre
					PPM	Lbs/1000Gal					
1-6, 8-14	89.5	Perennial Hay/Pasture(Med-High Intensity)	4,000	15	336	2.80	320	1.00	2.88	149	19.5
7	69.1	Wheat, Spring Soft White Straw Removed	4,000	15	336	2.80	130	1.00	1.17	366	7.9

COMPUTED NUTRIENT CONCENTRATIONS IN STORAGE

Storage Facility	Annual Volume Production	Units	Concentration of Nutrients in Storage			
			N	P ₂ O ₅	K ₂ O	Units
Tank Manure Analysis	202,405	Gallons	2.80	0.80	4.30	lbs/1,000 Gal
Solids Storage Manure Analysis	1,569	Tons	20.95	11.15	34.45	lbs/Ton

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2/18/14

Version 4.7

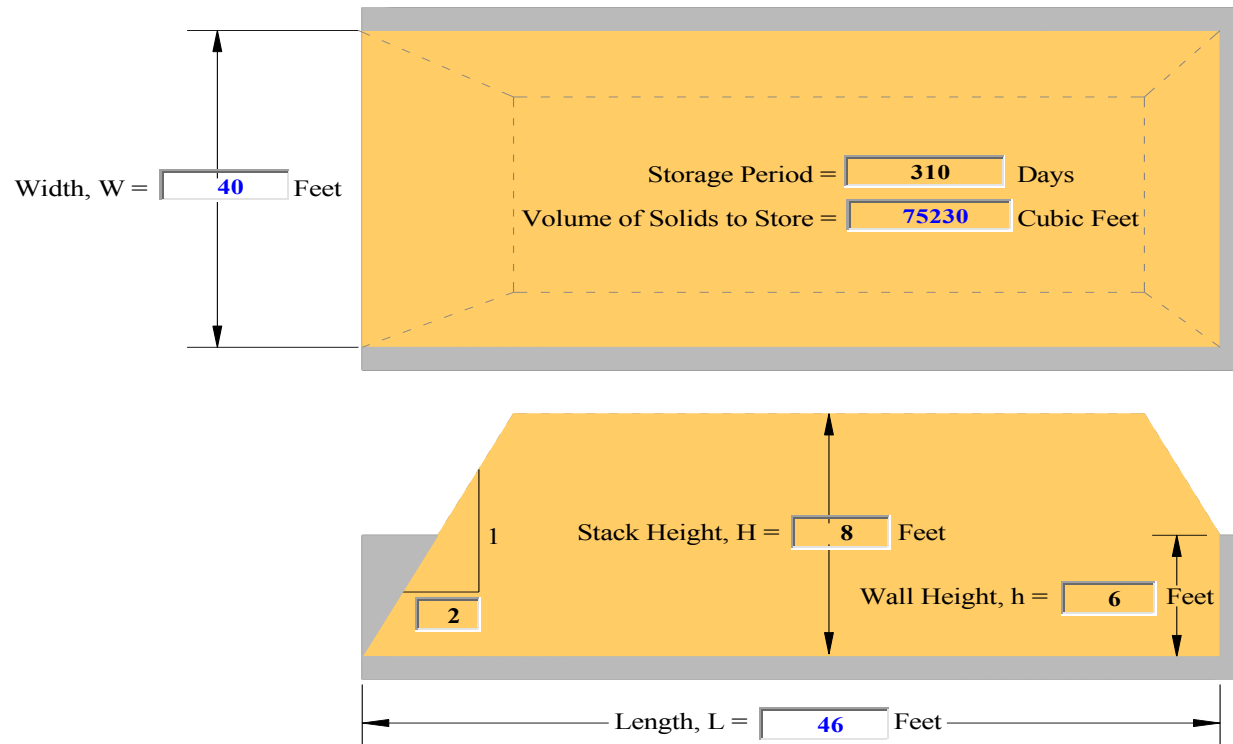
CLIENT: Cream Line Dairy
ASSISTED BY: 0

ANIMAL WASTE MANAGEMENT SYSTEM STORAGE

SOLIDS STACKING FACILITY

MONTHLY SOLIDS VOLUME STACKED IN FACILITY

Solids Storage Facility Parameters	Value	Month	Number of Days	Manure CF	Bedding CF	Solids to Store CF	Solids to Store Tons	Normal Runoff CF
Storage Period, Days=	310	October	31	12510	3,063	7,786	280	420
Stacking Width, W in Feet=	40	November	30	12192	2,964	7,578	273	0
Stacking Height, H in Feet=	8.00	December	31	12598	3,063	7,830	282	0
Wall Height, h in Feet=	6.00	January	31	12598	3,063	7,830	282	0
Stack Side Slope (X:1)=	2.00	February	28	11379	2,766	7,073	255	0
Existing Storage, Cubic Feet=	63,750	March	31	12598	3,063	7,830	282	0
Surface Area of Existing Storage, SF=	85,000	April	30	11081	2,964	7,023	253	434
25 Year-24 Hour Storm Runoff, CF=	9,358	May	31	10392	3,063	6,727	242	926
Volume Needed, Cubic Feet=	75,230	June	30	10057	2,964	6,510	234	416
Design Volume, Cubic Feet=	11,770	July	31	10392	3,063	6,727	242	0
Is Facility Covered?	NO	August	31	10392	3,063	6,727	242	0
		September	30	12106	2,964	7,535	271	528
		Annual	365	138,294	36,062	87,178	3,138	2,725



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2/18/14

Version 4.7

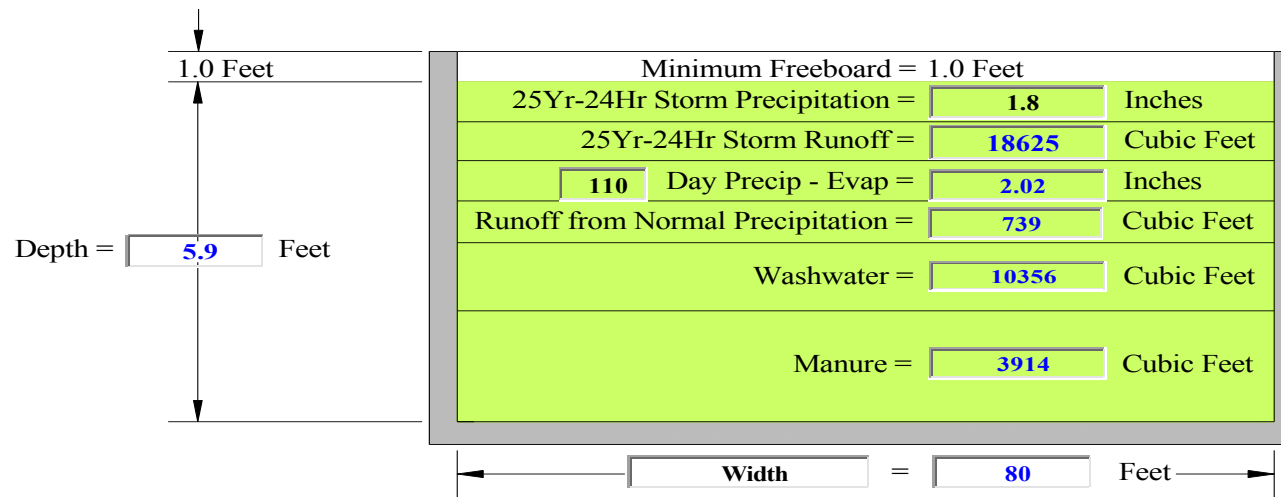
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ANIMAL WASTE MANAGEMENT SYSTEM STORAGE

TANK

MONTHLY INFLOWS INTO TANK

Tank Parameters	Value	Month	Number of days	Rain-Evap on Tank CF	Rain-Evap on Existing Storage, CF	Normal Runoff CF	Washwater CF	Solids CF	Waste to Store CF	Waste to Store Gallons
Storage Period, Days=	110	October	31	0	-1,325	960	2,901	1,253	3,789	28,345
Tank Width, Feet=	80	November	30	0	300	265	2,807	1,217	4,589	34,330
Tank Length, Feet=	0	December	31	0	742	201	2,901	1,258	5,101	38,160
Existing Storage, Cubic Feet=	1,500	January	31	0	642	190	2,901	1,258	4,991	37,334
Surface Area of Existing Storage, SF=	10,000	February	28	0	-117	126	2,620	1,136	3,765	28,167
25 Year-24 Hour Storm Runoff, CF=	18,625	March	31	0	-942	139	2,901	1,258	3,357	25,109
Volume Needed, Cubic Feet=	39,432	April	30	0	-2,250	942	2,807	1,099	2,598	19,433
Design Volume, Cubic Feet=	37,932	May	31	0	-3,350	1,965	2,901	1,018	2,534	18,952
Is Tank Covered?	NO	June	30	0	-4,592	977	2,807	985	177	1,326
Tank Dimensions?	Rectangular	July	31	0	-7,075	51	2,901	1,018	-3,105	-23,229
		August	31	0	-6,242	53	2,901	1,018	-2,270	-16,980
		September	30	0	-3,617	1,130	2,807	1,213	1,533	11,470
		Annual	365	0	-27,825	6,998	34,158	13,729	27,059	202,419



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Version 4.7

2/18/14

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ANIMAL WASTE MANAGEMENT SYSTEM UTILIZATION

NUTRIENTS AVAILABLE AFTER STORAGE

Nutrient Source	Type of Operation	Pounds of Nutrients Available			Percent Nutrients Retained After Storage			Pounds of Nutrients Retained After Storage		
	Dairy	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
Liquids	Tank Manure Analysis	810	191	1,024	70%	85%	85%	567	162	870
Solids	Solids Storage Manure Analysis	87,666	38,881	120,131	75%	90%	90%	65,750	34,993	108,118
Grazing	NONE	27,492	10,386	18,375	100%	100%	100%	27,492	10,386	18,375

NUTRIENTS AVAILABLE AFTER APPLICATION

Nutrient Source	Type of Application System	Pounds of Nutrients Available			Percent Nutrients Retained After Application			Pounds of Nutrients Retained After Application		
		N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
Liquids	Sprinkling	567	162	870	75%	100%	100%	425	162	870
Solids	Broadcast (Incorporated 7 or more days after application)	65,750	34,993	108,118	70%	100%	100%	46,025	34,993	108,118
Grazing	Grazing	27,492	10,386	18,375	85%	100%	100%	23,368	10,386	18,375

NUTRIENTS AVAILABLE AFTER DENITRIFICATION

Nutrient Source	Location	Pounds of Nutrients Available			Percent Nutrients Retained After Denitrification			Pounds of Nutrients Retained After Denitrification		
	East of Cascade Mountains	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
Liquids	Moderately Well Drained	425	162	870	91%	100%	100%	387	162	870
Solids	Moderately Well Drained	46,025	34,993	108,118	91%	100%	100%	41,883	34,993	108,118
Grazing	Moderately Well Drained	23,368	10,386	18,375	91%	100%	100%	21,265	10,386	18,375
TOTAL-								63,535	45,541	127,363

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Version 4.7

2/18/14

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ANIMAL WASTE MANAGEMENT SYSTEM UTILIZATION

PERCENT OF MANURE TO BE APPLIED TO FIELD AND UTILIZATION ACRES NEEDED BASED ON							NITROGEN, N				
Field Number	Acres	Crop	LIQUIDS			SOLIDS			GRAZING		
			Percent to be Applied	Pounds of Nutrients to be Applied	Acres Needed for Utilization of Nutrients	Percent to be Applied	Pounds of Nutrients to be Applied	Acres Needed for Utilization of Nutrients	Percent to be Applied	Pounds of Nutrients to be Applied	Acres Needed for Utilization of Nutrients
1-6, 8-14	89.5	Perennial Hay/Pasture(Med-High Intensity)	100%	387	1	15%	6,282	20	100%	21,265	66
7	69.1	Wheat, Spring Soft White Straw Removed	0%	0	0	20%	8,377	64	0%	0	0
Off Farm			0%	0		65%	27,224		0%	0	
TOTALS-	158.6		100%	387	1	100%	41,883	84	100%	21,265	66

NUTRIENT BALANCE BASED ON AVAILABLE ACRES

Field Number	Acres	Crop	NUTRIENTS APPLIED			-	NUTRIENTS REMOVED			=	NUTRIENT BALANCE		
			Nitrogen, N Lbs/Acre	Phosphorous, P ₂ O ₅ Lbs/Acre	Potassium, K ₂ O Lbs/Acre		Nitrogen, N Lbs/Acre	Phosphorous, P ₂ O ₅ Lbs/Acre	Potassium, K ₂ O Lbs/Acre		Nitrogen, N Lbs/Acre	Phosphorous, P ₂ O ₅ Lbs/Acre	Potassium, K ₂ O Lbs/Acre
1-6, 8-14	89.5	Perennial Hay/Pasture(Med-High Intensity)	312	176	396		320	101	266		-8	75	130
7	69.1	Wheat, Spring Soft White Straw Removed	121	101	313		130	61	75		-9	40	237
Off Farm													

Cream Line Milk Co; CAFO 2 Pens; 25-yr, 24-hr Storm Event Runoff Volume and VTA Calculation

**NRCS National Engineering Handbook part 650
Engineering Field Handbook Ch. 2 Estimating Runoff**

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S}$$

P =	1.8
CN =	90
S = (1000/CN) - 10	1.111111111
Numerator	2.489382716
Denominator	2.688888889
Q =	0.925803489
Surface Area (acres)	1.02
Surface Area (SF)	44393
Runoff Volume (ac-ft)	0.08
Runoff Volume (CF)	3,425

**Nitrogen application onto Field 14
from pen runoff from the 25-yr, 24-hr storm event.**

Runoff V (gallons)	25620.28
# N/1,000 gallons	5
Total N in 25/24 event	128.10
VTA acres	2.7
# N/acre	47.44