Animal Waste Management Plan
for
Fir Ridge- Cloverdale Farm

c/o Scott Ruby
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Fir Ridge-
Cloverdale
Farm

2016

Animal Waste Management Plan

Fir Ridge-
Cloverdale
Farm

2016

Animal Waste Management Plan

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GENERAL INFORMATION

Oregon Department of Agriculture **CAFO Division** **Animal Waste Management Plan** **Signature Sheet**	**ODA USE ONLY** MA#_____ AWMP#_____ Approved Date_____ Received Date_____

Facility Name: **Fir Ridge- Cloverdale Farm**

Facility Address: **37400 Hwy 101 S**

Cloverdale, OR 97112

Operated by: **Scott Ruby**

Mailing Address: **37955 Fir Ridge Road**

Scio, OR 97374

Complete if different than the Operator

Owned by: **Scott Ruby**

Mailing Address: **37955 Fir Ridge Road**

Scio, OR 97374

☐**As the Operator of** **Fir Ridge- Cloverdale Farm**, **I agree to manage this facility in accordance with the existing Animal Waste Management Plan (AWMP) #_____ on file with ODA and maintain those practices as described in the plan. This signed AWMP is incorporated into the CAFO NPDES General Permit by reference (Permit Condition S3.A.2.).**

☐**If changes are made to the animal population, facilities and/or management of the CAFO, a new AWMP must be submitted to ODA for approval at least 45 days before the modification is implemented unless a different schedule is allowed by ODA in writing (Permit Condition S3.D.1 and 2).**

Operator's Signature	**Date**

Operator's Name (Please Print)

Scott Ruby

GENERAL INFORMATION

GENERAL INFORMATION

BACKGROUND AND SITE INFORMATION

Animal Feeding Operation: Medium Confined CAFO

Type & Size: Dairy – 515 animals

Latitude/Longitude: N45.18993^0, W123.91397^0

Fir Ridge- Cloverdale Farm is located approximately a 2.5 miles southwest of Cloverdale, Oregon in Tillamook County, Oregon.

Fir Ridge- Cloverdale Farm is owned and managed by Scott Ruby who is planning to have dairy livestock at this facility consisting of 310 Holstein and 140 Jersey milk and dry cows and 45 heifers and calves. A request for modification of permitted animal numbers from a maximum of 450 to 495 dairy animals is located in Section 5.

All of the animals on Fir Ridge- Cloverdale Farm are out on pasture for varying times throughout the year as weather conditions permit. The animals will spend more time in the livestock barns and less time on the hay and pasture fields in the winter months and more time on the hay and pasture fields in the spring, summer and fall months and less time in the livestock barns.

Fir Ridge- Cloverdale Farm consists of two adjacent facilities which will be used, in conjunction with one another to best manage the dairy animal housing needs at various growth stages and the fields at those facilities for maximizing forage composition and yield. The dairy facility shown as HQ1 on the field map houses the milking operation. The dry cow and heifer facility shown as HQ2 on the field map houses the dry cows, heifers and calves.

Mortalities that occur during the year on the Fir Ridge- Cloverdale Farm are disposed of by a service provided by the Tillamook County Creamery Association.

Manure Handling

Wastewater generated by the dairy facilities is collected in a below ground concrete tank and pumped to a solid/liquid separation facility where approximately 40 percent of the solids are removed from the wastewater. Wastewater from the solid/liquid separation facility is directed to a wastewater storage pond until weather conditions allow application to the hay and pasture fields. Stored wastewater containing manure is applied to fields at agronomic rates by various methods including a big gun traveler or a tank wagon.

Solid manure is generated by the solid/liquid separation facility at the HQ1 location and the dry cow and heifer facility at the HQ2 location. This manure will be stored onsite at the HQ1 and HQ2 facilities until weather conditions allow application to the hay and pasture fields at agronomic rates.

GENERAL INFORMATION

Forage

Fir Ridge- Cloverdale Farm owns 364.3 contiguous acres for the dairy farm facilities described above and the hay and pasture land fields used to produce forage for the dairy livestock. These acres consist of 17.3 acres for the dairy farm facilities, shops and houses and 347 acres of irrigated hay and pasture land used to produce forage for the dairy livestock. The crop rotation for the Fir Ridge- Cloverdale Farm consists of 5 to 7 years of perennial grass that is harvested by grazing livestock and for hay. The estimated yields for the irrigated grass harvested by grazing livestock and as hay is 6 tons per acre at 100% dry matter. Actual yield varies from year to year depending upon weather conditions and specific field management. Pastures are well managed and in good condition.

Nutrient Management

Performance based nutrient management will be employed to insure nutrient balance on all fields. Forage yield will be tracked annually and used to determine the rate of manure application on a per field basis. Manure will be tested periodically and tested values will guide application rates.

Applications of wastewater and solids containing manure are planned on a nitrogen basis on all fields based on the fields having a medium phosphorus index rating. The soil phosphorus concentrations in the crop, hay and pasture fields will be monitored using soil tests. Some solids containing manure are exported off farm that will help keep soil concentrations of phosphorus from increasing significantly in the future. It is estimated that the dairy does not produce enough manure to meet the nutrient demand for the crop, hay and pasture land fields.

GENERAL INFORMATION

MANURE STORAGE AND NUTRIENT BALANCE SUMMARY

Manure Storage-

Storage Type:	Capacity	Estimated Storage Period
Wastewater Storage Pond-	2.19 AF	40 Days
Tanks-	21,456 CF	9 Days
Dry Storage-	30,000 CF	123 Days

Nutrient Balance-

Nutrients Generated:	N Generated (lbs) after Losses	P_2O_5 Generated (lbs) after Losses
Solid Manure-	13,162 lbs	5,213 lbs
Liquid Manure-	38,472 lbs	28,637 lbs
Pasture Manure-	38,116 lbs	21,584 lbs
Total-	**89,750 lbs**	**55,434 lbs**

Exported Nutrients:	N Exported (lbs) after Losses	P_2O_5 Exported (lbs) after Losses
Solid Manure-	9,477 lbs	3,753 lbs
Liquid Manure-	11,315 lbs	20,619 lbs
Total-	**20,792 lbs**	**24,372 lbs**

Crop Nutrient Removal:	N Utilized (lbs)	P_2O_5 Utilized (lbs)
Total-	**126,776 lbs**	**40,061 lbs**

Net Nutrients:	Nutrients Generated after Losses(lbs.)	Nutrients Removed by Crop and Exported after Losses (lbs)	Net Nutrient Balance after Losses (lbs)
Nitrogen (N)-	89,750 lbs	147,568 lbs	-57,818 lbs
Phosphate (P_2O_5)-	55,434 lbs	64,433 lbs	-8,999 lbs

System Losses:	Nutrients Generated (lbs)	Nutrients Remaining after Losses (lbs)	Nutrients Lost in System (lbs)
Nitrogen (N)-	160,643 lbs	89,750 lbs	70,893 lbs
Phosphate (P_2O_5)-	57,520 lbs	55,434 lbs	2,086 lbs

GENERAL INFORMATION

EMERGENCY RESPONSE PLAN

In Case of an Emergency Storage Facility Spill, Leak or Failure

Implement the following first containment steps:

a. Stop all other activities to address the spill.
b. Stop the flow. For example, use skid loader or tractor with blade to contain or divert spill or leak.
c. Call for help and excavator if needed.
d. Complete the clean-up and repair the necessary components.
e. Assess the extent of the emergency and request additional help if needed.

In Case of an Emergency Spill, Leak or Failure during Transport or Land Application

Implement the following first containment steps:

a. Stop all other activities to address the spill and stop the flow.
b. Call for help if needed.
c. If the spill posed a hazard to local traffic, call for local traffic control assistance and clear the road and roadside of spilled material.
d. Contain the spill or runoff from entering surface waters using straw bales, saw dust, soil or other appropriate materials.
e. If flow is coming from a tile, plug the tile with a tile plug immediately.
f. Assess the extent of the emergency and request additional help if needed.

Contacts to be made by the owner or operator within 24 hours

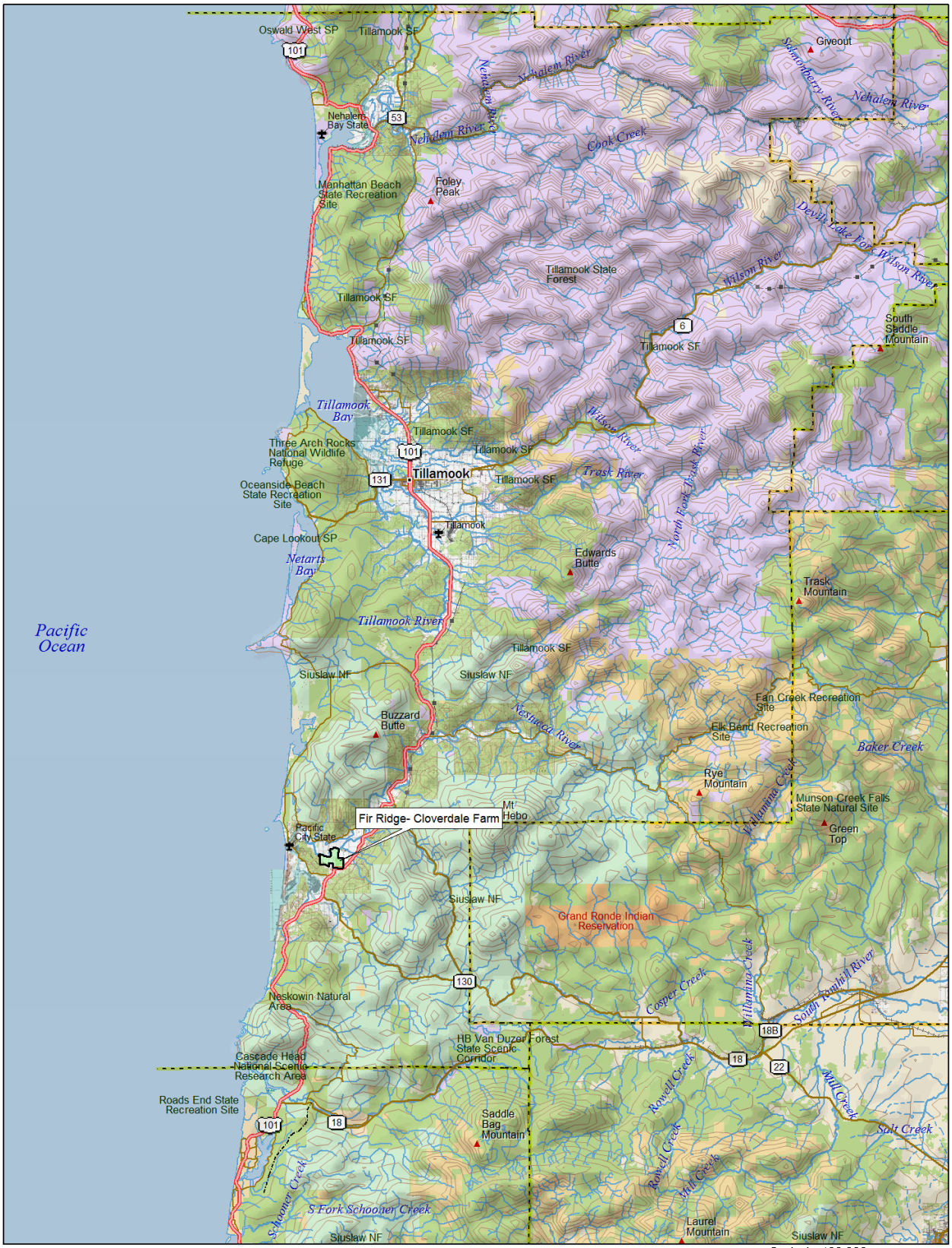
Organization	Phone Number
Oregon Dept. of Agriculture Natural Resources Division 635 Capitol St., N.E. Salem, OR 97301-2532	(503) 986-4700 TTD (503) 986-4762
Oregon Emergency Response System (OERS)	(800) 452-0311
County Environmental Health Department	(503) 842-3943
County Roads Department	

Be prepared to provide the following information:

a. Your name and contact information.
b. Farm location (driving directions) and other pertinent information.
c. Description of emergency.
d. Estimate of the amounts, area covered, and distance traveled.
e. Whether manure has reached surface waters or major field drains.
f. Whether there is any obvious damage: employee injury, fish kill, or property damage.
g. Current status of containment efforts.

GENERAL INFORMATION

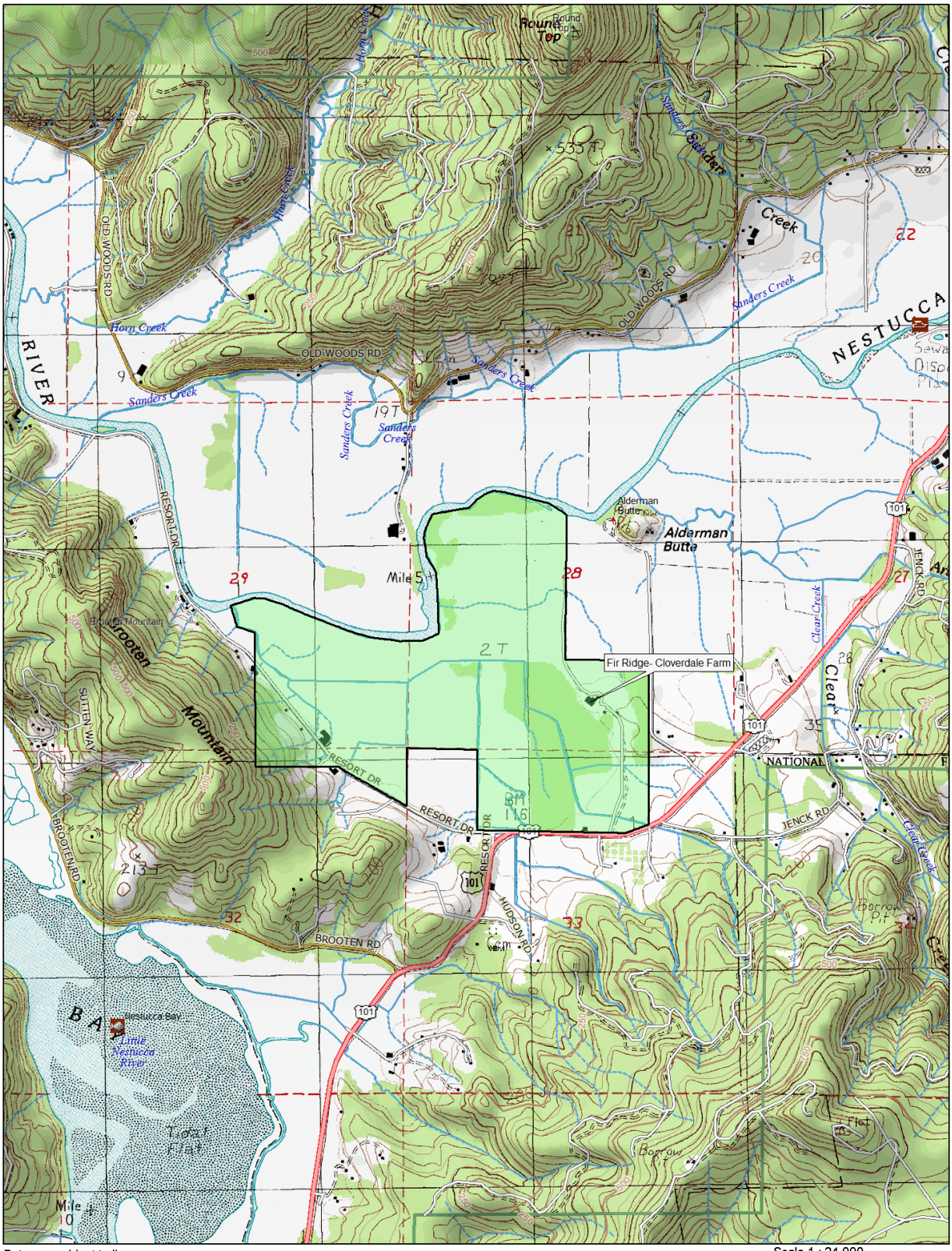
LOCATION MAP FOR FIR RIDGE- CLOVERDALE FARM



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GENERAL INFORMATION

TOPOGRAPHY MAP FOR FIR RIDGE- CLOVERDALE FARM



PRODUCTION AREA

ANIMAL NUMBERS

Fir Ridge- Cloverdale Farm is currently permitted for 450 animals and is planning to have a maximum of 495 animals on this dairy. The planned number of animals for Fir Ridge- Cloverdale Farm consists of 450 milk and dry cows and 45 heifers and calves. A request for modification of permitted animal numbers is located in Section 5.

This plan was written based on the 495 animals and land base described herein.

ANIMAL MORTALITY MANAGEMENT

Currently animal mortalities for the Fir Ridge- Cloverdale Farm are being disposed of by a service provided by the Tillamook Creamery Association. Other approved methods of dealing with mortalities may be employed by Fir Ridge- Cloverdale Farm as needed.

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.html. 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.html.

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

COLLECTION OF MANURE, PROCESS WATER AND RUNOFF

Manure, wood shavings/manure used for bedding and wasted feed is collected in the barns. The estimated volume of Manure bedding and wasted feed that will be collected annually was generated using the ORAWM workbook located in Section 5.

Leachate and rainfall runoff from the silage storage areas is directed to catch basins that drain to wastewater collection facilities via underground pipelines. The estimated volumes of leachate and rainfall runoff from the silage and solid storage areas that will be collected annually were generated using the ORAWM workbook located in Section 5.

Rainfall runoff from roofs is collected using gutters and downspouts and directed to drainage ditches using underground pipelines.

All process water from the dairy operation is directed to catch basins that drain to wastewater collection facilities. The estimated volume of process water that will be collected annually was generated using the ORAWM workbook located in Section 5.

TREATMENT FACILITIES

A solid/liquid separation facility shown on the Production Area Map on page 2-9will be used to separate solids from the wastewater produced from dairy operation at the HQ1 location. The separated solids are stored in the covered solids storage facility shown on the Production Area Map on page 2-9 until they can be applied to the hay and pasture fields at agronomic rates or exported off farm or recycled for bedding.

PRODUCTION AREA

STORAGE FACILITIES

The wastewater and solids collection and storage facilities for the dairy operation at the HQ1 location are shown on the Production Area Map on page 2-9. Manure, manure used for bedding and wasted feed is collected and stored as a dry pack in the livestock barns at the HQ2 dry cow facility shown on the Production Area Map on page 2-10. The only wastewater produced at this location is rainfall runoff from a concrete slab area and rainfall directly into an open underground storage tank. Capacities and estimate volumes to store for the waste storage facilities can be found on the Manure Storage and Nutrient Balance Summary on page 1-5.

TRANSFER OF MANURE, PROCESS WATER AND RUNOFF

Wastewater, manure, wood shavings/manure used for bedding and wasted feed from the livestock barns for the dairy operation at the HQ1 location is directed to the central collection tank where it is pumped to the solid/liquid separation facility to separate solids from the wastewater. Wastewater from the solid/liquid separation facility is directed to the wastewater storage pond and separated solids are transferred to the solids storage area shown on the Production Area Map on page 2-9. Wastewater can be transferred from the wastewater storage pond to the storage tanks at the dry cow facility at the HQ2 location since manure is handled as a dry pack at the dry cow facility and no wastewater is produced.

Wastewater stored in the wastewater storage pond and wastewater storage tanks is pumped to the hay and pasture fields using underground pipelines or transported using tank wagons to be utilized as a source of nutrients. Traveling big gun irrigation systems and tank wagons with a spreader bar are used to apply the wastewater at agronomic rates to the hay and pasture fields.

Solids stored in the solids storage facility shown on the Production Area Map on page 2-9 and in the livestock barns as a dry pack shown on the Production Area Map on page 2-10 are hauled to the hay and pasture fields and applied at agronomic rates using a solids spreader to be utilized as a source of nutrients.

PRODUCTION AREA

OPERATION AND MAINTENANCE CONSIDERATIONS

WASTEWATER COLLECTION AND STORAGE TANKS-

The wastewater collection and storage tanks shown on the Production Area Maps on page 2-9 and 2-10 are used to store wastewater containing manure generated by the Fir Ridge- Cloverdale Farm. The wastewater collection tanks are used as temporary storage only and are not included in the storage period calculations. The storage capacity and estimated storage period for the wastewater storage tanks are shown on the ORAWM workbook storage worksheet located in Section 5. Emptying of the wastewater storage tanks should begin in the spring and continue through the spring and summer months as weather conditions permit applying wastewater in accordance with the guidance given in Section 3, Manure Utilization. To function properly and have the greatest management flexibility, the wastewater storage tanks must be as empty as possible in the fall before the fall and winter rainy season begins. Any annual buildup of solids in the wastewater storage tanks must be removed to maintain design capacity and applied to land application areas in accordance with guidance given in Section 3, Manure Utilization.

Inspect all tanks weekly to insure structural integrity. If the structural integrity of a 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 tanks on or within 20 feet of the structure.

Inspect all uncovered tanks on a biweekly basis to insure at least 1 foot of freeboard is being maintained to accommodate excess rainfall such as a 25 year-24hour storm and prevent overtopping of the tank.

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 and storage tanks completely empty during the summer months and cleanout any debris and other solid materials that may have accumulated in the tanks. Inspect the tanks for structural damage and if structural damage to a tank is discovered seek the services of a qualified engineer to assess the damage and recommend necessary repairs before putting the tank back into service. Follow the guidance given in Section 3, Manure Utilization, when applying wastewater to fields.

Do not dispose of animal carcasses in any wastewater collection or storage 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 tank, including open top tanks, are well ventilated.

PRODUCTION AREA

WASTEWATER STORAGE POND-

The wastewater storage pond shown on the Production Area Map on page 2-9 is used to store wastewater containing manure generated by the Fir Ridge- Cloverdale Farm. The storage capacity and estimated storage period for the wastewater storage pond is shown on the Manure Storage and Nutrient Balance Summary on page 1-5.

Emptying of the wastewater storage pond should begin in the spring and continue through the spring and summer months as weather conditions permit applying wastewater in accordance with the guidance given in Section 3, Manure Utilization. To function properly and have the greatest management flexibility, the wastewater storage pond must be as empty as possible in the fall before the fall and winter rainy season begins. Any annual sludge buildup in the wastewater storage pond must be removed to maintain design capacity and applied to land application areas in accordance with guidance given in Section 3, Manure Utilization.

Inspect the wastewater storage ponds weekly to insure structural integrity and that at least 1 foot-6 inches of freeboard is being maintained to accommodate excess rainfall such as a 25 year-24 hour storm and prevent overtopping embankment. If the structural integrity of a wastewater storage pond's embankment is found to be 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. Follow the guidance given in Section 3, Manure Utilization, when applying wastewater to fields.

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 restored to grade and shape as necessary. Fill and reseed eroded embankment areas or repair with well graded rock riprap. Safety features such as signs and fences should be kept in good repair.

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

SOLIDS STORAGE FACILITY-

The solids storage facility shown on the Production Area Map on page 2-9 is used to store solids containing manure generated by the Fir Ridge- Cloverdale Farm. The storage capacity and estimated storage period for the solids storage facility is shown on the Manure Storage and Nutrient Balance Summary on page 1-5.. Emptying of the solids storage facility should begin in the spring and continue through the spring and summer months as weather conditions permit applying solids in accordance with the guidance given in Section 3, Manure Utilization. To function properly and have the greatest management flexibility, the solids storage facility must be as empty as possible in the fall before the fall and winter rainy season begins.

PRODUCTION AREA

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, poles as needed. Immediately determining the cause and necessary modification(s) to prevent reoccurring structural failure is essential.

FENCES-

Do not allow livestock access to open water courses and drainageways. 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 SYSTEMS-

Maintain sprinkler irrigation systems 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, worn or damaged parts.

Prompt repair or replacement of damaged or worn components is necessary. Check to make sure all application components i.e. water control structures, gates, valves, ditches, etc. are functional and are in good operating condition.

Maintain screening and filtering facilities.

Maintain vigorous vegetative growth where applicable.

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 by 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 signs 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 activity.

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.

SOLID/LIQUID SEPARATION FACILITY-

Inspect the solid/liquid separation facility daily to ensure the facility is operating properly and there has been no damage to structural components. Clean screens and outlets if they have become clogged or their capacity is not adequate for proper operation of the facility.

Prevent any spillage or leakage onto roadways when transferring solids from the solid/liquid separation facility to the solids storage area and to utilization areas.

WELL(S)-

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.

Do not allow any foreign debris to accumulate and maintain soil and vegetative covering in the immediate vicinity of the well.

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

Check metal surfaces for rust and other damage especially sections in contact with earthfill and with 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.

Immediately repair any vandalism, vehicular, or livestock damage.

PRODUCTION AREA

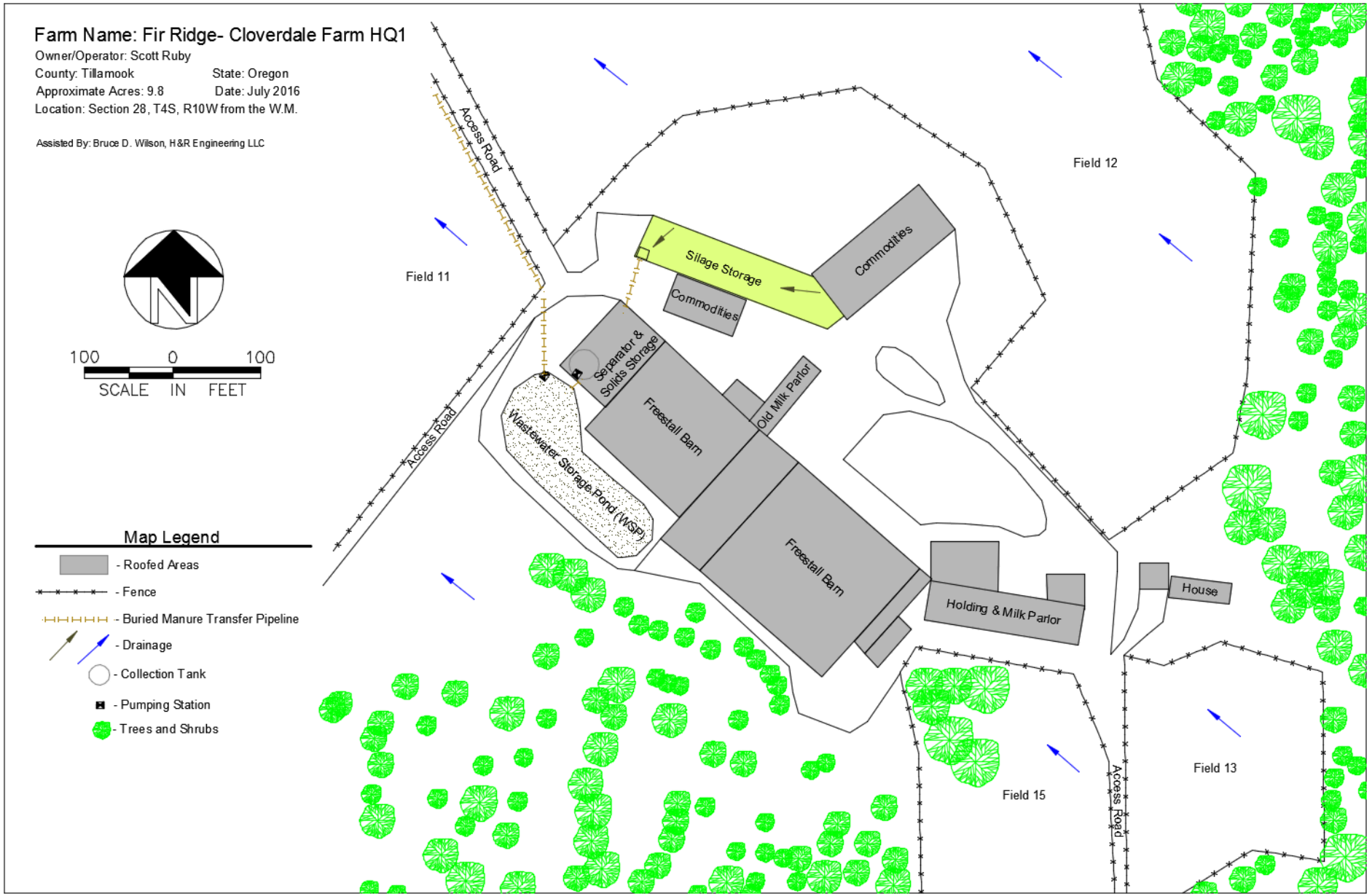
CHEMICAL HANDLING CHECKLIST-

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.

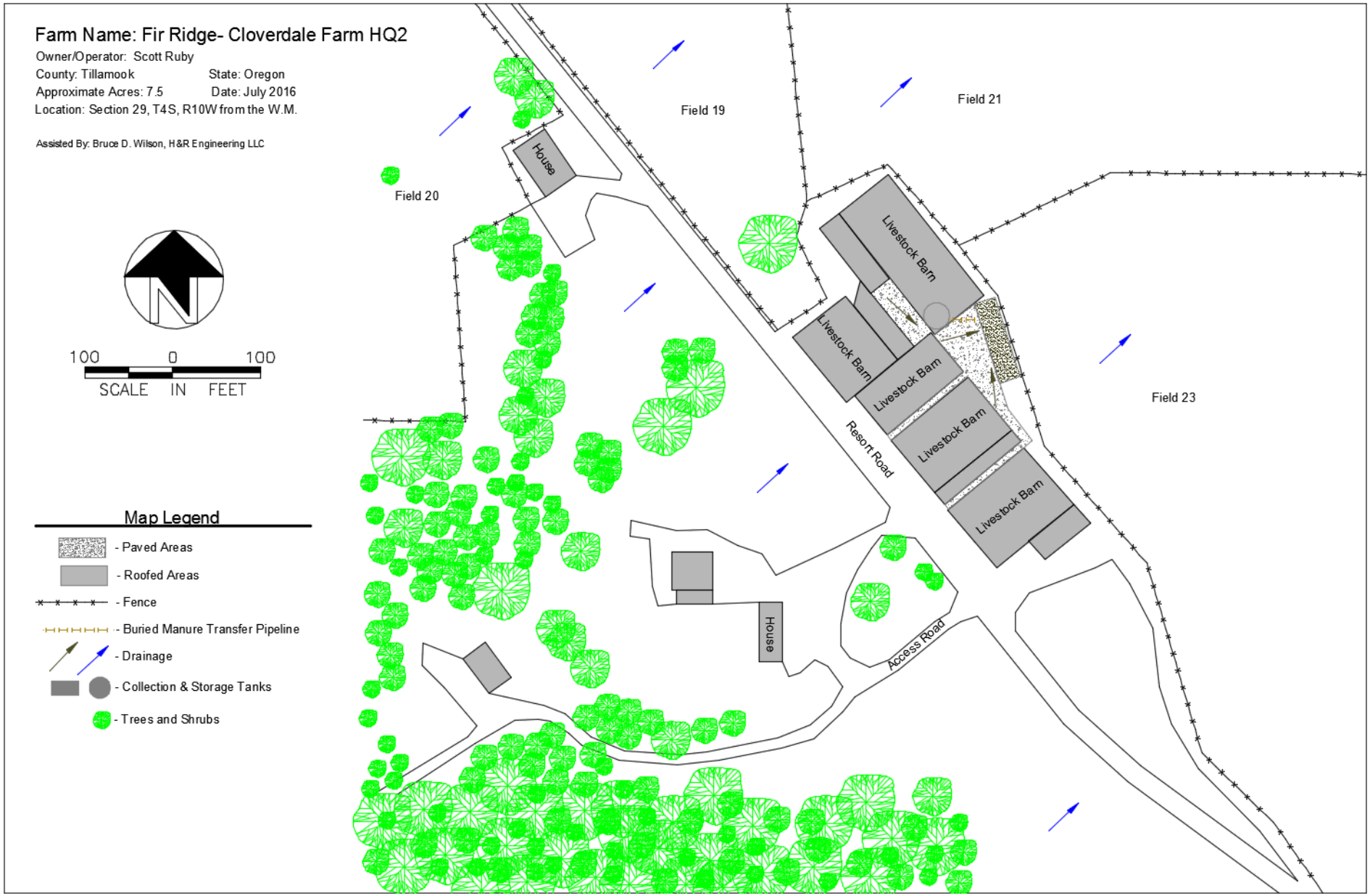
PRODUCTION AREA

PRODUCTION AREA MAP FOR FIR RIDGE- CLOVERDALE FARM HQ1 DAIRY



PRODUCTION AREA

PRODUCTION AREA MAP FOR FIR RIDGE- CLOVERDALE FARM HQ2 DRY COW FACILITY



MANURE UTILIZATION

CROPPING SYSTEM

The acres of crop land area available for utilization of the nutrients and organics contained in the wastewater and solids produced from the Fir Ridge- Cloverdale Farm is shown on the utilization worksheet in ORAWM located in Section 5. Yield data and nutrient utilization rates for the crops grown are also shown on the inventory worksheet in ORAWM located in Section 5.

Irrigated and nonirrigated crop yield data from the Natural Resources Conservation Service Soil Survey referenced in Section 5 indicates the yield data used in developing this plan is within the range of the given crop yields for Fir Ridge- Cloverdale Farm.

Traveling big gun irrigation systems are used to irrigate and apply wastewater containing manure and other organics produced from the Fir Ridge- Cloverdale Farm to the crop land fields. These systems use single large sprinkler nozzles usually mounted on a cart with wheels that is attached to a high density polyethylene pipeline that is rolled up on a large reel that provides a constant travel speed for the sprinkler. These systems apply water depending on the nozzle size, operating pressure and travel used and have an efficiency of 65 to 75 percent. Traveling big gun sprinkler systems must be well managed to prevent excess percolation, surface runoff, wind drift and evaporation losses.

Other types of irrigation systems that will be used to irrigate crops must be well managed to prevent excess percolation, surface runoff and erosion, wind drift and evaporation losses.

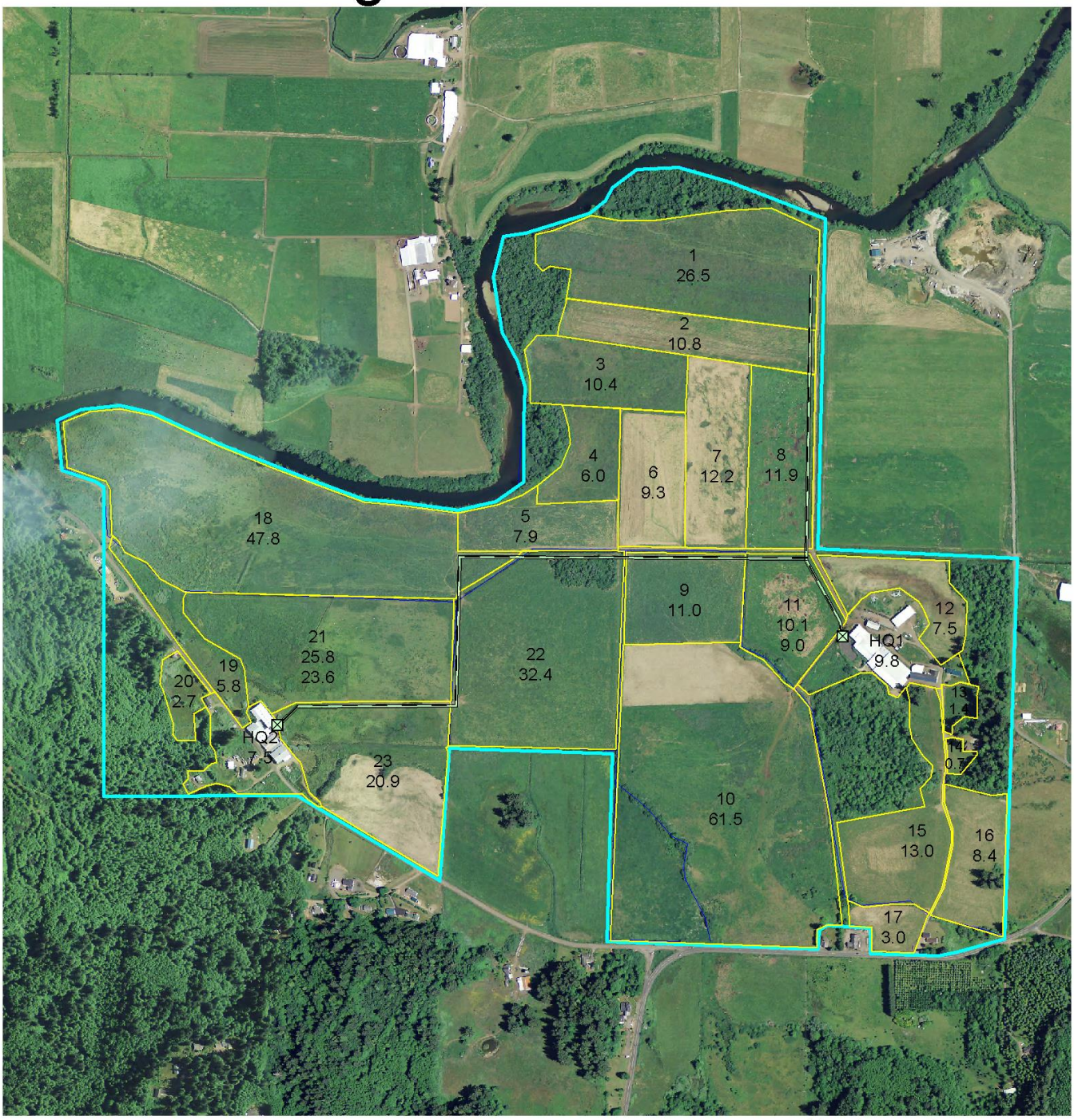
The amount of irrigation water to apply based on the net irrigation requirements for the crop being grown can be found in the tables starting on page 3-29.

MANURE UTILIZATION

MANURE UTILIZATION

FIELD MAP(S)

Fir Ridge- Cloverdale Farm



MANURE UTILIZATION

APPLICATION

The manure and irrigation application systems will be calibrated in accordance with guidance starting on page 3-4 to insure the applications of manure, bedding and runoff from the waste storage facilities are in accordance with agronomic rates.

No application of wastewater or solids containing manure is to be made to the field setback areas shown on the Setback Map on page 3-7. Applications of wastewater and solids containing manure should be made in accordance with guidance starting on page 3-4 to reduce the risk of contaminated runoff to surface water sources and leaching of contaminants to ground water sources.

The phosphorus runoff rating for each of the farm fields is based on the Western Oregon Phosphorus Index and is shown in the table on page 4-20. Wastewater, solids and commercial fertilizer for any field with a high runoff rating must be applied on a phosphorus basis. Wastewater, solids and commercial fertilizer for any field with a low or medium runoff rating can be applied on a nitrogen basis. No applications of manure or commercial fertilizer containing phosphorus are to be made on a field with a very high phosphorus runoff rating.

GENERAL CONSIDERATIONS FOR MAKING MANURE APPLICATIONS

Manure applications may be made at any time of the year provided certain factors have been considered. However, the overriding factor one should use in considering whether or not to apply nutrients to a crop, irrespective of the nutrient source, is the agronomic need of the crop at the time of application. The following guidelines are to be considered once the decision has been made to make a manure application.

- **Consider using T-Sum 200 to determine when manure applications are to begin** as long as you can comply with all other permit and AWMP requirements. Calculations for T-Sum 200 are outlined in OSU Extension Fertilizer Guide for Pastures (OSU FG63, 2000). T-Sum 200 is based on accumulated heat units and is an accurate guide to estimate plant activity. Research has shown that T-Sum 200 is the earliest date when plant roots begin to grow in the spring and thus are receptive to applied nutrients.

  Surface air temperature is monitored and the daily minimum and maximum air temperatures are summed and divided by two to get the average daily air temperature then converted to centigrade (F degrees minus 32 times 0.556). Manure applications may begin once 200 heat units have been accumulated. The average date of T-Sum 200 for Fir Ridge- Cloverdale Farm is February 2 based on the Oregon State University Degree-Day Calculator. However, one must still apply manure at agronomic rates based on the estimated growth potential of the crop and anticipated climatic events.

  Based on crop nutrient uptake patterns, manure applications should stop when the crop is done growing for the year and before the first significant rainfall event that is expected to result in saturated soils or surface runoff.

MANURE UTILIZATION

- **Fields that are subsurface (TILE) drained require additional precautions** when manure is applied. Any pre-application tillage should leave as much residue as possible on the soil surface. Water control structures installed in subsurface drainage systems should be managed to prevent discharge of manure and wastewater during periods of application.
- **Be aware of the location of sensitive areas, concerns of neighbors or concerns of the public**, which require special application procedures. To reduce odor problems, apply wastewater and solids containing manure in mid-morning when temperatures are warming and air is rising rather than in the afternoon or evening when air is cooling and settling. Avoid applications during periods of fog.
- **Calibrate application equipment** to insure uniform distribution and accurate application rates in accordance with guidance given in the Considerations for Manure Applications starting on page 3-5. Refer to page 3-17 for guidance on the calibration of application equipment.
- **Maintain setbacks for manure application from any surface waters.** The management goal is not to allow manure to enter surface waters at any time. The following table shows minimum setback requirements for manure applications:

Manure type	Application Equipment	Season	
		Wet	Dry
Liquid	Big gun	100 feet	35 feet
Solid	Spreader	100 feet	35 feet

Note:

a. Setbacks are the distance between open waterways and manure application area.
b. Setback requirements will generally increase for manures which are applied aerially (such as a traveling big gun) versus manures applied lower to the ground (such as a splash bar) due to potential for drift from wind or splashing.

- **Record applications, transfers or exports of nutrients (manure and fertilizer)** and maintain them for at least 5 years. The CAFO Recordkeeping Calendar or the tools and forms referenced in Section 5 may be used to record this information.

MANURE UTILIZATION

CONSIDERATIONS FOR DRY SEASON MANURE APPLICATIONS:

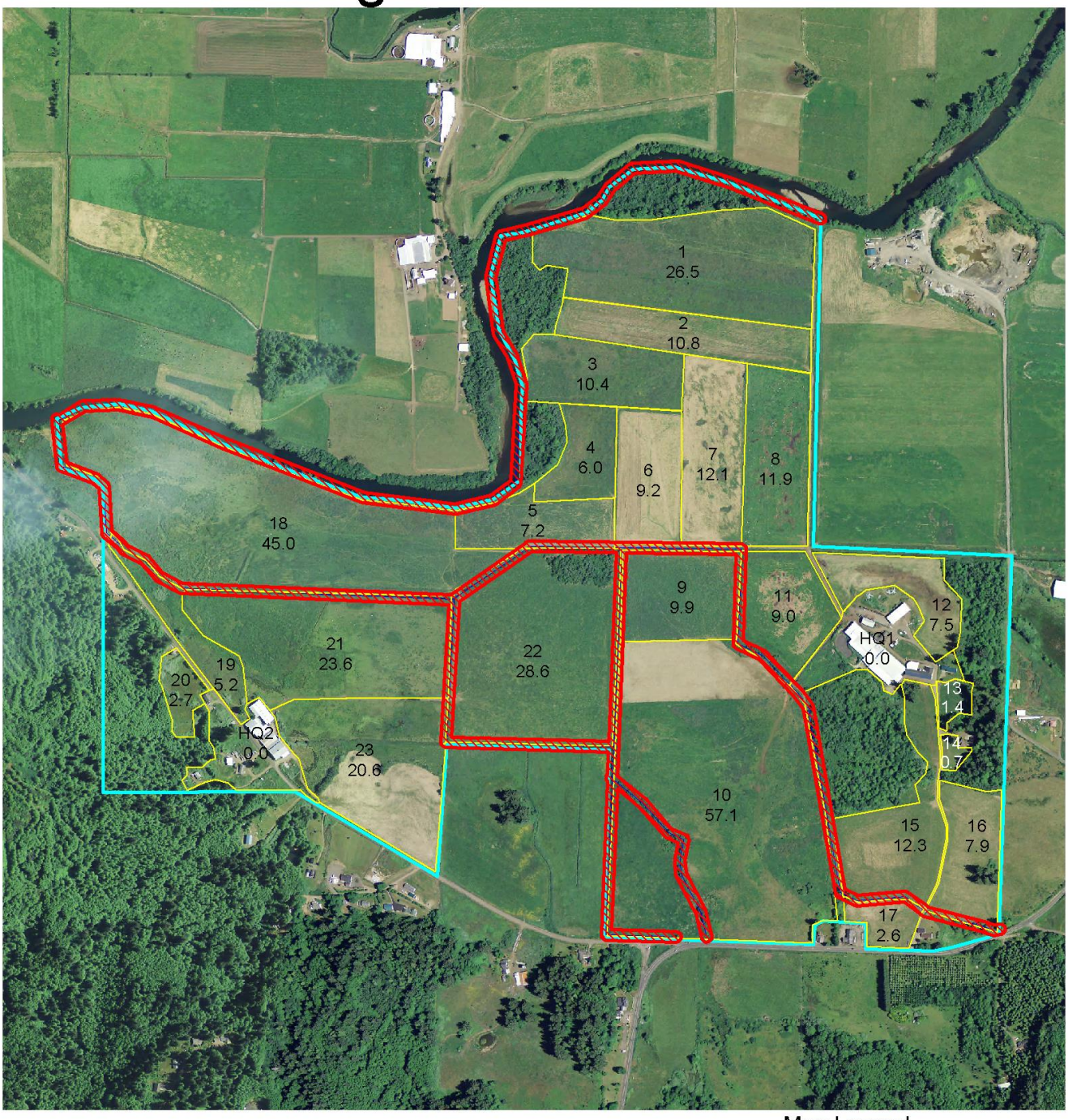
Apply wastewater and solids containing manure at **agronomic rates** shown on the table on page 3-21 using the following guidelines:

- Consider using T-Sum 200 as a guideline to begin making manure applications.
- Apply to land being prepared for crops. Till manure into soil within 3 days of application if possible or apply to actively growing crops such as grass, clover or alfalfa after cutting.
- ***Do not apply*** during rainfall events that are expected to result in saturated soils or surface runoff.
- ***Maintain the setback distances*** described on page 3-5 and shown on the Setback Map on page 3-7 when making applications of liquids or solids containing manure.
- ***Record applications, transfers or exports*** of nutrients (manure and fertilizer) and maintain them for at least 5 years. The CAFO Recordkeeping Calendar or the tools and forms referenced in Section 5 may be used to record this information.

MANURE UTILIZATION

SETBACK MAP(S) FOR FIR RIDGE- CLOVERDALE FARM

Fir Ridge- Cloverdale Farm



MANURE UTILIZATION

CONSIDERATIONS FOR WET SEASON MANURE APPLICATIONS:

Only apply manure during this time period if the following guidelines CAN be met. Call the ODA CAFO Program at (503) 986-4700 for guidance if a manure application is needed and the following guidelines CAN NOT be met:

- Apply manure only to actively growing crops such as grass, clover or alfalfa.
- Minimize application rates by using the maximum travel rates for the application equipment.
- ***Maintain the setback distances*** described in the table on page 3-5 and shown on the Setback Map on page 3-7 when making applications of liquids or solids containing manure.
- ***Do not apply*** during rainfall events that are expected to result in saturated soils or surface runoff.
- ***Do not apply*** to saturated or flooded soils. It is recommended that application(s) be limited to soils (areas) where the flooding frequency class rating is None, Very Rare or Rare.
- ***Do not apply*** to slopes greater than 5%. See the Soil Map in Section 4 for the location of soil map units with slopes greater than 5%.
- ***Applications of wastewater or solids containing manure to frozen soils should be avoided***. Do the following if an application of wastewater or solids containing manure is to be made to frozen soils:
  - 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 (0.25 inches) per acre or less of wastewater.
  - Apply to alternating strips to reduce the risk of contaminated runoff reaching surface water sources.
  - Apply to fields 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, drainageways, 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%.
- ***Record applications, transfers or exports*** of nutrients (manure and fertilizer) and maintain them for at least 5 years. The CAFO Recordkeeping Calendar or the tools and forms referenced in Section 5 may be used to record this information.
- ***Do not apply*** manure or commercial fertilizer to fields receiving applications unless the nutrients applied in the manure are less than the annual application of nutrients planned in the nutrient budget for the fields.

MANURE UTILIZATION

MANURE AND SOIL SAMPLING FREQUENCY

If no samples of liquids and solids containing manure have been taken, take a sample of liquids and solids during applications in early spring **once a year for three consecutive years** to develop a cumulative manure analysis history as a basis for nutrient allocation to the fields**.** If there is a sampling history of liquids and solids containing manure, take a sample of liquids and solids during applications in early spring **once every 5 years or whenever a significant change in animal numbers or in the manure handling system occurs.** Have each sample analyzed for Total Nitrogen (TKN), Ammonium Nitrogen (NH_4-N), Phosphorus (P) and Potassium (K) plus percent moisture. Ask the lab to report results in pounds per ton for the solids containing manure and in pounds per thousand gallons for liquids containing manure. Analyses of solids and liquids containing manure should be performed by a laboratory that meets the requirements and performance standards of the Manure Testing Laboratory Certification Program (MTLCP), http://www.mda.state.mn.us/licensing/pestfert/manurelabs.htm.

Collect soil samples from all fields receiving solids or liquids containing manure **within a 5 year period** in the fall (September 15-October 15) in accordance with **Pacific Northwest (PNW) Extension publication 570-E, "Monitoring Soil Nutrients Using a Management Unit Approach"** referenced in Section 5. Have the soil samples analyzed for Total Nitrogen (TKN) and Phosphorus (P) and ask the lab to report results in parts per million (ppm). Soil test analyses should be performed by laboratories that meet the requirements and performance standards of the North American Proficiency Testing Program (NAPT) Proficiency Assessment Program (PAP); http://www.naptprogram.org/pap/.

HOW TO SAMPLE LIQUID MANURE

Obtain a composite following one of the procedures listed below and thoroughly mix. Using a plunger, an up-and-down action works well for mixing liquid manure in a five-gallon bucket. Fill a one-quart plastic bottle not more than three-quarters full with the composite sample. Store sample in freezer if not delivered to the lab immediately.

Procedure 1. Sampling from storage- Agitate storage facility thoroughly before sampling. Collect at least five samples from the storage facility or during loading using a five-gallon bucket. Place a sub sample of the composite sample in a one-quart plastic container. Sampling a liquid manure storage facility without proper agitation (2-4 hrs. minimum) is not recommended due to nutrient stratification, which occurs in liquid systems. If manure is sampled from a lagoon that was not properly agitated, typically the nitrogen and potassium will be more concentrated in the top liquid, while the phosphorus will be more concentrated in the bottom solids.

Procedure 2. Sampling during application- Place buckets around field to catch manure from spreader or irrigation equipment. Combine and mix samples into one composite sub sample in a one-quart plastic container.

MANURE UTILIZATION

HOW TO SAMPLE SOLID MANURE

Collect a composite sample by following one of the procedures listed below. A method for mixing a composite sample is to pile the manure and then shovel from the outside to the inside of the pile until well mixed. Fill a one-gallon plastic heavy-duty zip lock bag approximately one-half full with the composite sample, squeeze out excess air, close and seal. Store sample in freezer if not delivered to the laboratory immediately.

Procedure 1. Sampling while loading - Recommended method for sampling from a stack or bedded pack. Take at least ten samples while loading several spreader loads and combine to form one composite sample. Thoroughly mix the composite sample and take an approximately one pound sub sample using a one-gallon plastic bag. Sampling directly from a stack or bedded pack is not recommended.

Procedure 2. Sampling during spreading - Spread a tarp in field and catch the manure from one pass. Sample from several locations and create a composite sample. Thoroughly mix the composite sample together and take a one-pound sub sample using a one-gallon plastic bag.

Procedure 3. Sampling daily haul - Place a five-gallon bucket under the barn cleaner 4-5 times while loading a spreader. Thoroughly mix the composite sample together and take a one-pound sub sample using a one-gallon plastic bag. Repeat sampling 2-3 times over a period of time and test separately to determine variability.

Procedure 4. Sampling poultry in-house - Collect 8-10 samples from throughout the house to the depth the litter will be removed. Samples near feeders and waterers may not be indicative of the entire house and sub samples taken near here should be proportionate to their space occupied in the whole house. Mix the samples well in a five-gallon pail and take a one-pound sub sample, place it in a one-gallon zip lock bag.

Procedure 5. Sampling stockpiled litter - Take ten sub samples from different locations around the pile at least 18 inches below the surface. Mix in a five-gallon pail and place a one-pound composite sample in a gallon zip lock bag.

Sample Identification and Delivery

Identify the sample container with information regarding the farm, animal species and date. This information should also be included on the sample information sheet along with application method, which is important in determining first year availability of nitrogen.

Keep all manure samples frozen until shipped or delivered to a laboratory. Ship early in the week (Mon.-Wed.) and avoid holidays and weekends.

MANURE UTILIZATION

MANURE TESTS

Fir Ridge- Cloverdale Farm — LIQUID MANURE ANALYSIS

Testing performed by AgSource Labs, Umatilla, Oregon

Report	Date	Sample I.D.	Lbs/1,000 gallons				%	%
			Total N	P_2O_5	K_2O	NH_4-N	Moisture	Solids
2016								
M6594	07/16/2016	Wastewater	21.91	11.09	20.57	12.25	96.72	3.28

Fir Ridge- Cloverdale Farm — SOLID MANURE ANALYSIS

Testing performed by AgSource Labs, Umatilla, Oregon

Report	Date	Sample I.D.	Lbs/Ton				%	%
			Total N	P_2O_5	K_2O	NH_4-N	Moisture	Solids
2016								
M6595	07/16/2016	Solids Stack	7.60	3.01	4.05	0.86	75.23	24.77

Manure analyses should be performed by a laboratory that meets the requirements and performance standards of the Manure Testing Laboratory Certification Program (MTLCP), http://www.mda.state.mn.us/licensing/pestfert/manurelabs.htm.

Manure should be analyzed annually for a minimum of three (3) consecutive years to develop a cumulative manure analysis history as a basis for nutrient allocation to the fields.

MANURE UTILIZATION

MANURE UTILIZATION

HOW TO SAMPLE SOILS

Current soil tests must be used in the development and editing of nutrient management plans. A current soil test is one that is no older than 5 years that is used to represent the nutrient status of the entire field. Soil analysis must be performed by laboratories successfully meeting the requirements and performance standards of the North American Proficiency Testing Program-Performance Assessment Program (NAPT-PAP). Results of these analysis will be used to determine application rates for manure, litter, and process wastewater. Guidance for soil sampling can be found in the Pacific Northwest (PNW) Extension publication 570-E, "Monitoring Soil Nutrients Using a Management Unit Approach". Oregon State University Extension publication EC1478, "Soil Test Interpretation Guide" provides guidance on how to determine soil nutrient concentrations and how to adjust soil pH to improve nutrient availability.

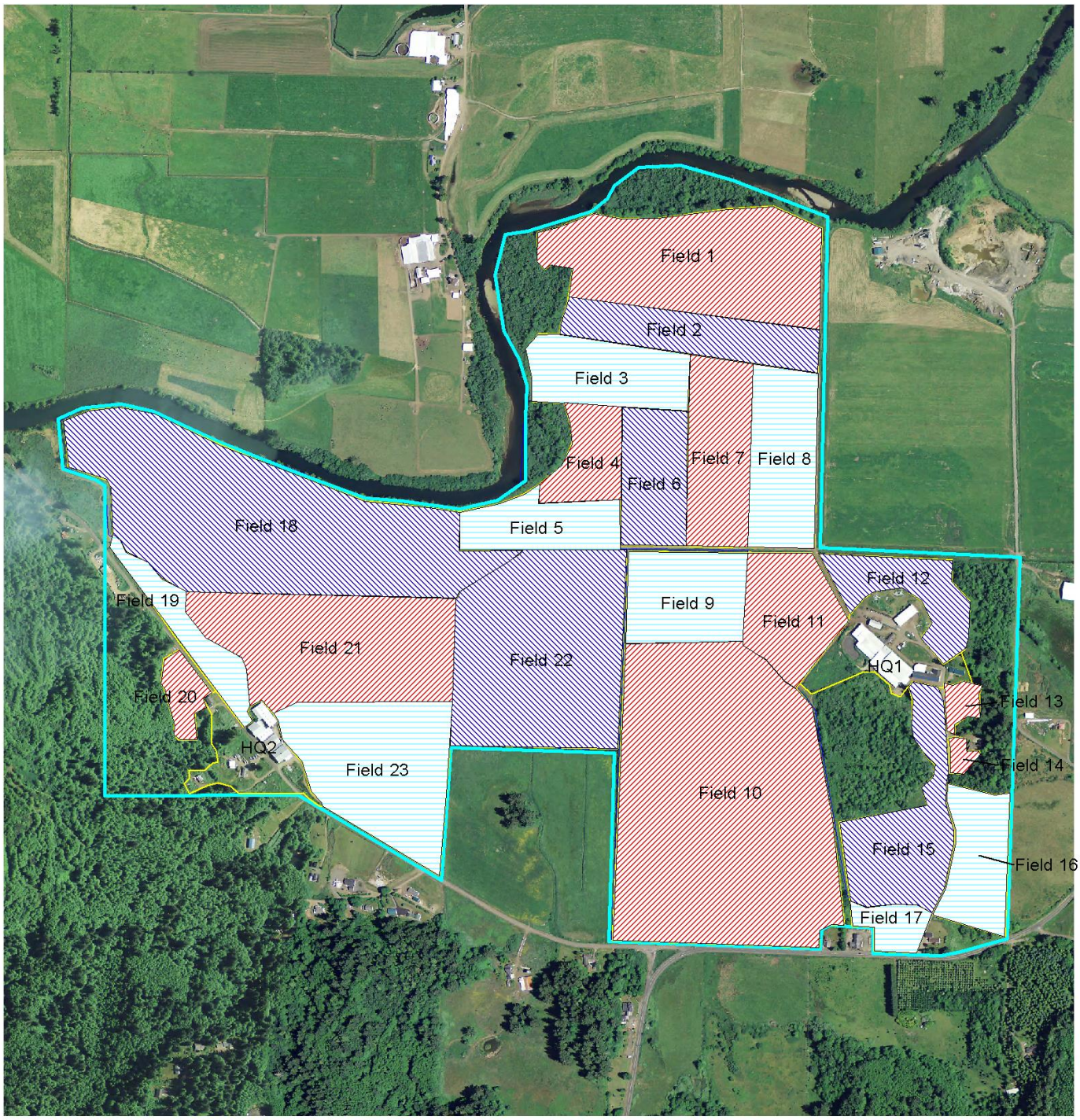
Field Area. A composite soil sample should represent a uniform field area. Each area should have similar crop and fertility history. Soil characteristics (color, slope, texture, drainage) should be similar. Exclude small areas within a field that are obviously different. The field area represented by a single composite sample should represent no more than 40 irrigated acres or 100 dry land acres.

Sampling Depth. Laboratory tests are calibrated to specific depths. It is vital to collect samples from appropriate depths. Sampling depth for most soils is the rooting depth in 6-inch intervals. In Oregon, as a minimum, soil samples should be collected from the 0-12" depth and from the 12-24" depth. The 0-6" surface soil samples are normally used for conventional tests of organic matter, nitrogen, phosphorus, potassium, pH and salt levels. Additionally, subsurface samples from the 6-24" depth are needed to estimate nitrogen availability for crops.

Post Harvest Soil Testing for Evaluating Nutrient Applications. Refer to Pacific Northwest (PNW) Extension publication 570-E, "Monitoring Soil Nutrients Using a Management Unit Approach" in Section 5 for guidance on how to evaluate nutrient applications and crop uptake of nutrients.

MANURE UTILIZATION

SOIL SAMPLING FREQUENCY MAP FOR FIR RIDGE- CLOVERDALE FARM



MANURE UTILIZATION

SOIL TESTS

Fir Ridge- Cloverdale Farm **SOIL TEST RESULTS**

Testing performed by AgSource Laboratory, Umatilla, Oregon

Report	Test Date	Field	Depth	NO3-N ppm	NH4-N ppm	P ppm	K ppm	Ca meq	Mg meq	TB meq	pH	SMP	OM %
2015													
AS3512	11/03/2015	Field 1	12"	NA	NA	90	878	25.3	11.1	NA	5.0	5.4	NA
AS3513	11/03/2015	Field 2	12"	NA	NA	4	68	11.5	5.1	NA	4.5	4.6	NA
AS3513	11/03/2015	Field 3	12"	NA	NA	2	431	3.9	2.4	NA	4.6	4.9	NA
AS3513	11/03/2015	Field 4	12"	NA	NA	110	901	25.9	11.8	NA	5.0	5.5	NA
AS3513	11/03/2015	Field 5	12"	NA	NA	90	846	26.1	11.5	NA	5.0	5.4	NA
AS3512	11/03/2015	Field 6	12"	NA	NA	90	878	25.3	11.1	NA	5.0	5.4	NA
AS3513	11/03/2015	Field 7	12"	NA	NA	4	68	11.5	5.1	NA	4.5	4.6	NA
AS3513	11/03/2015	Field 8	12"	NA	NA	2	431	3.9	2.4	NA	4.6	4.9	NA
AS3512	11/03/2015	Field 9	12"	NA	NA	90	878	25.3	11.1	NA	5.0	5.4	NA
AS3513	11/03/2015	Field 10	12"	NA	NA	4	68	11.5	5.1	NA	4.5	4.6	NA
AS3512	11/03/2015	Field 11	12"	NA	NA	90	878	25.3	11.1	NA	5.0	5.4	NA
AS3513	11/03/2015	Field 12	12"	NA	NA	110	901	25.9	11.8	NA	5.0	5.5	NA
AS3513	11/03/2015	Field 13	12"	NA	NA	90	846	26.1	11.5	NA	5.0	5.4	NA
AS3512	11/03/2015	Field 14	12"	NA	NA	90	878	25.3	11.1	NA	5.0	5.4	NA
AS3513	11/03/2015	Field 15	12"	NA	NA	110	901	25.9	11.8	NA	5.0	5.5	NA
AS3513	11/03/2015	Field 16	12"	NA	NA	110	901	25.9	11.8	NA	5.0	5.5	NA
AS3512	11/03/2015	Field 17	12"	NA	NA	90	878	25.3	11.1	NA	5.0	5.4	NA
AS3513	11/03/2015	Field 18	12"	NA	NA	4	68	11.5	5.1	NA	4.5	4.6	NA
AS3512	11/03/2015	Field 19	12"	NA	NA	90	878	25.3	11.1	NA	5.0	5.4	NA
AS3513	11/03/2015	Field 20	12"	NA	NA	110	901	25.9	11.8	NA	5.0	5.5	NA
AS3513	11/03/2015	Field 21	12"	NA	NA	90	846	26.1	11.5	NA	5.0	5.4	NA
AS3512	11/03/2015	Field 22	12"	NA	NA	90	878	25.3	11.1	NA	5.0	5.4	NA
AS3513	11/03/2015	Field 23	12"	NA	NA	2	431	3.9	2.4	NA	4.6	4.9	NA

Soil test analyses should be performed by laboratories that meet the requirements and performance standards of the North American Proficiency Testing Program (NAPT) Proficiency Assessment Program (PAP); http://www.naptprogram.org/pap/.

MANURE UTILIZATION

MANURE UTILIZATION

HOW TO CALIBRATE APPLICATION EQUIPMENT

Calibration of application equipment is a critical part of nutrient management. Calibration should be completed at least annually to insure manure and fertilizer will be uniformly applied. There are two basic approaches for calibrating a manure spreader – the load area and the weight area methods. The load area method is more accurate and can be used for both liquid and solid manure. The weight area method works only with solid or semi-solid manure.

Irrigation System Calibration

Place 3-5 buckets throughout the irrigation spray pattern and collect samples while operating the pump at a given rpm and pressure (for a traveling gun record the travel speed also). At the end of the planned sample period measure the amount of liquid collected in inches (average the samples). The following chart shows how many gallons per acre applied per inch of liquid applied:

Inches Liquid Manure Applied via Irrigation:	Gallons per Acre:
0.20	5,431
0.30	8,146
0.40	10,862
0.50	13,577
0.75	20,366
1.00	27,154
1.25	33,943
1.50	40,731

Soft Hose Injection System with Irrigation Hose:

Alternative 1. Use a flow meter mounted on the injector system and calculate the distance and width to determine amount applied over a measured area. Example the flow meter measures 1,000 gallons over a distance of 600 feet and 10 feet wide.

Formula:

Application Rate (7,260 gallons/acre) = (Gallons Applied (1,000 gal) X 43,560 sq. ft/acre) divided by (Distance traveled (600 ft) X Application width (10 ft))

Alternative 2. (Requires a 10-20 gallon graduated measuring container)

Step 1) In the field, measure the flow out of one injector for 5 seconds into the graduated measuring container and record gallons, repeat three (3) times and average the results.

Step 2) Multiply the average amount collected from one injector by the number of injectors (equals amount applied for the whole system for 5 seconds).

Step 3) Multiply the results of Step 2 times 12 to get gallons per minute.

Step 4) Place the injector in the soil at the planned depth and operating speed and record the distance traveled in 1 minute (average 3 different measurements).

Step 5) Determine the effective application width (number of injectors X injector spacing in feet).

MANURE UTILIZATION

Step 6) Multiply the effective width times the distance traveled in 1 minute (this gives the square feet covered in 1 minute).

Step 7) Divide the result of Step 6 by 43,560 (this gives the acres covered in 1 minute).

Step 8) Divide the results of Step 3 (gallons per minute) by the results of Step 7 (acres covered in 1 minute) - (this gives the gallons applied per acre.

For example:
Step 1) Collect an average of 6 gallons from one injector for 5 seconds.

Step 2) Applicator has 8 injectors (8 injectors X 6 gallons per injector = 48 gallons for 5 seconds)

Step 3) 48 gallons in 5 seconds X 12 = 576 gallons/minute applied

Step 4) Average distance covered in 1 minute was 250 feet

Step 5) Average width of the applicator is 12 feet.

Step 6) 12 feet wide X 250 feet long = 3000 square feet

Step 7) 3000 square feet divided by 43,560 square feet/acre = .0688 acres covered in 1 minute

Step 8) 576 gallons/minute divided by .0688 acres/minute = 8,372 gallons/acre.

Manure Spreader/Tanker Calibration
There are several methods that can be used to calibrate the application rate of a manure spreader. The two best methods are the load-area method and the weight-area method. It is desirable to repeat the calibration procedure 2 to 3 times and average the results to establish a more accurate calibration.

Before calibrating a manure spreader, the spreader settings such as splash plates should be adjusted so that the spread is uniform. Most spreaders tend to deposit more manure near the middle than at the edge of the spread pattern. Overlapping can make the overall application more uniform. Calibrating application rates when overlapping is involved requires measuring the width of two spreads and dividing by two to get the effective spread width.

Calibration should take place annually or whenever manure is being applied from a different source or consistency.

MANURE UTILIZATION

Load-Area Method:
The load-area method is the most accurate and can be used for both liquid and soild manure. The load area method is a 3-step process:

Step 1) Determine the amount of manure in the spreader. The most accurate way to determine the amount of manure in a spreader is weighting the spreader when it is empty and again when it is full. For a reliable estimate of spreader capacity, weigh several representative loads (at least five) to determine the average gross weight. Subtract the empty spreader weight. Then, calculate the average net loaded weight.

Step 2) Determine the area of spread using the method at the right. Width measurements near the beginning and end of the spread pattern should be avoided because the spreader may not be operating at full capacity.

Step 3) Calculate the application rate. The application rate is calculated using the formula for either liquid or solid manure.

> **Formula for Solid Manure Equals Tons/Acre**
> (Average Loaded Weight (lbs) x 21.81) divided by (Distance Traveled (ft) x Width of Spread (ft))
>
> **Formula for Liquid Manure Equals Gal/Acre**
> (Tank Volume (gal) x 43,560) divided by (Distance Traveled (ft) x Width of Spread (ft))

Weight-Area Method:
The weight-area method can only be used with solid or semi-solid manure. When a scale is not available, the application rate of a box spreader can be determined by collecting manure on a tarp or piece of heavy material. The weight area method is less accurate than the load area method.

This method consists of eight steps:
Step 1) Prepare/cut three 56-inch square tarps or pieces of heavy material (this size equals 1/2,000 of an acre). The pounds of manure collected on 56 inches square equals tons applied per acre.

Step 2) Weigh one of the clean tarps and a large bucket on a platform scale. Record the weight.

Step 3) Anchor the three tarps in the field ahead of the spreader near the beginning, middle, and end of the area that will be spread with one load.

Step 4) Drive over the three tarps at a normal speed to collect a representative manure sample.

Step 5) Fold and place the first tarp into the empty bucket without spilling the manure. Weigh the bucket, tarp, and manure. Subtract the weight of the clean tarp and bucket recorded in step 2.

MANURE UTILIZATION

Step 6) Repeat the process for each of the two remaining tarps.
Calculate the average weight (pounds) of the manure collected. This value equals tons of manure applied per acre.

Factor for converting pounds to tons and square feet to acres (21.8 = 43,560 sq ft per acre divided by 2,000 lbs/ton).

The factor for converting square feet to acres = 43,560 sq ft per acre.

Step 7) Determining Area of Spread.
The “area of spread” is the length and width of the ground covered with one load of manure. The area of spread is affected by speed and equipment settings. Spreaders discharge manure at varying rates depending on travel and PTO speed, gear box settings, and discharge openings. It is important to adjust the spreader so the pattern is as uniform as possible. Accurately measuring the length and width of this area is essential. To determine width, measure two adjacent spreads and divide by two to find the “effective” spread width. This accounts for overlap, which is often needed for a more uniform application. The length of spread is determined using the following three values:

1. Desired manure application rate based on soil and manure tests,
2. Width of the manure spread, and
3. Manure spreader holding capacity (weight and/or volume).

From these values, calculate the distance or lengths of spread using these formulas:

Formula: Solid Manure Equals Feet/Load
(Average Load Weight (lbs) x 21.81) divided by (Spread Width (ft) x App. Rate (tons/ac))

Formula: Liquid Manure Equals Feet/Load
(Tank Volume (gal) x 43,560) divided by (Spread Width (ft) x Desired App. Rate (gal/ac))

Step 8) Spread a load. If the distance traveled does not equal the calculated distance, adjust the speed or equipment settings.

MANURE UTILIZATION

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 P_2O_5 to apply in pounds = P in pounds per yield unit from the table for the crop grown X 2.291 P_2O_5/P X percent (%) dry matter (DM) of harvested crop/100 X planned or measured yield per yield unit

Total K_2O to apply in pounds = K in pounds per yield unit from the table for the crop grown X 1.205 K_2O/K X percent (%) dry matter (DM) of harvested crop/100 X planned or measured yield per yield unit

The following tables show the crops that may be grown on this farm:

				Nutrient Removal (lb/yield unit)		
FRUIT OR VEGETABLES	**Yield Unit**	**lb/Unit**	**% DM**	**N**	**P**	**K**
Beans, dry edible	cwt	100	100	3.13	0.45	0.85
Blueberries	ton	2000	100	2.14	0.20	3.54
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	0.18	0.04	0.13
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
Squash	ton	2000	100	3.2	1.02	1.71

MANURE UTILIZATION

GRAIN, SEED OR OIL CROPS	Yield Unit	lb/Unit	% DM	Nutrient Removal (lb/yield 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
Bluegrass, Seed	cwt	100	100	2.88	0.43	1.98
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
Oats, grain	bushels	32	100	0.62	0.11	0.16
Orchardgrass seed	lb	1	100	0.016	0.002	0.004
Peppermint for Oil	ton	2000	100	4.20	1.80	2.80
Peppermint for Oil, Leaves and Stems Removed	ton	2000	100	87.2	36.8	57.8
Pumpkins	ton	2000	100	4.00	1.40	6.60
Rapeseed	bushels	50	100	1.38	0.30	0.30
Red Clover seed	cwt	100	100	4.55	1.00	2.00
Ryegrass Seed	cwt	100	100	7.5	0.94	1.88
Ryegrass Seed, Straw Removed	Ton	2000	100	30.0	18.8	37.6
Ryegrass, Perennial Seed	lb	1	100	0.02	0.002	0.004
Triticale, Haylage	ton	2000	100	14.7	2.04	3.42
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, Hard Red Straw Removed	ton	2000	100	53.36	10.96	23.76

MANURE UTILIZATION

HAY AND PASTURE CROPS	Yield Unit	lb/Unit	% DM	Nutrient Removal (lb/yield unit) N	P	K
Alfalfa, Hay	ton	2000	100	54.4	6.8	35.7
Alfalfa, Seed	cwt	100	100	6.12	0.70	2.34
Alta Fescue Hay/Pasture	ton	2000	100	32.98	6.88	37.60
Grass Legume Hay/Pasture	ton	2000	100	33.92	5.30	7.56
Meadow Fescue Hay/Pasture	ton	2000	100	41.56	8.70	47.43
Oats Hay/Pasture	ton	2000	100	26.01	10.20	14.79
Orchardgrass Hay/Pasture	ton	2000	100	53.21	8.58	18.62
Perennial Grass Hay/Pasture	ton	2000	100	58.00	8.00	40.00
Reed Canary Grass	ton	2000	100	27.03	3.57	41.57
Ryegrass Hay	ton	2000	100	33.41	5.44	28.39
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/yield unit) N	P	K
Alfalfa/Grass Haylage	ton	2000	100	15.60	1.02	6.84
Corn for Silage	ton	2000	100	7.50	1.20	6.00
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	12.8	2.24	7.44
Oats & Peas/ Green Beans	ton	2000	100	32.03	5.58	18.65
Perennial Grass Haylage	ton	2000	100	15.00	2.40	12.78
Red Clover forage	ton	2000	100	40.00	4.41	32.98
Ryegrass Haylage	ton	2000	100	15.00	2.40	12.78
Sorghum-Sudan Haylage	ton	2000	100	16.32	1.92	17.4
Triticale Haylage	ton	2000	100	14.70	2.04	3.42
Wheatgrass Hay/Pasture	ton	2000	100	49.59	6.21	68.76

MANURE UTILIZATION

				Nutrient Removal (lb/yield unit)		
OTHER CROPS	**Yield Unit**	**lb/Unit**	**% DM**	**N**	**P**	**K**
Filberts	ton	2000	100	41.7	7.30	39.29
Hops, Cones	bale	200	100	9.00	0.96	5.00
Natural Area (Trees and Grass)	ton	2000	100	10.52	1.56	9.20
Nursery Stock	ton	2000	100	8.33	2.08	10.20
Poplars, Pulpwood	ton	2000	100	0.30	0.09	0.12

MANURE UTILIZATION

Fir Ridge- Cloverdale Farm

SOLID MANURE APPLICATION CHART

MANURE ANALYSIS (As received lb/ton)

	Total N	NH4-N	P_2O_5	K_2O
Test Date: Average	7.60	0.86	3.01	4.02
Type: Solids Pile				

Manure Nutrient Content

Thickness to apply (in)	Manure Applied (T/A)	Total N (lb/A)	Available N (lb/A)	P_2O_5 (lb/A)	K_2O (lb/A)
0.013	1.00	8	1	3	4
0.026	2.00	15	2	6	8
0.039	3.00	23	3	9	12
0.052	4.00	30	3	12	16
0.066	5.00	38	4	15	20
0.079	6.00	46	5	18	24
0.092	7.00	53	6	21	28
0.105	8.00	61	7	24	32
0.118	9.00	68	8	27	36
0.131	10.00	76	9	30	40
CUSTOM:					
Spreader 1	12.1	92	10	37	49
Spreader 2	18.2	138	16	55	73
Spreader 3	36.4	277	31	110	146

SOLID MANURE SPREADER 2 CALIBRATION

SPREADER VOLUME AND WEIGHT CALCULATIONS

Stack height above sideboard = 1 ft
Length = 15.3 ft
Depth = 2 ft
Width = 5.4 ft

Spreader Volume = 231 ft3
Weight of Manure = 12,543 lbs

MANURE DENSITY CALCULATIONS

BUCKET

Top Diam 11 Height 13.75 Volume 0.756 ft3

Weight 41 lbs

Manure Density = 54 lbs/ft3

SPREAD AREA CALCULATIONS

Spread Width = 15 ft

Application Area

Spread Length = 1,000 ft

Area Spread = 15,000 ft2 or 0.34 acre

Manure Rate Spread = 0.84 lbs/ft2
36,424 lbs/acre
18.2 ton/acre

SOLID MANURE SPREADER 1 CALIBRATION

SPREADER VOLUME AND WEIGHT CALCULATIONS

Stack height above sideboard = 1 ft
Length = 15.3 ft
Depth = 2 ft
Width = 5.4 ft

Spreader Volume = 231 ft3
Weight of Manure = 12,543 lbs

MANURE DENSITY CALCULATIONS

BUCKET

Top Diam 11 ght 13.75 Volume 0.756 ft3

Weight 41 lbs

Manure Density = 54 lbs/ft3

SPREAD AREA CALCULATIONS

Spread Width = 15 ft

Application Area

Spread Length = 1,500 ft

Area Spread = 22,500 ft2 or 0.52 acre

Manure Rate Spread = 0.56 lbs/ft2
24,283 lbs/acre
12.1 ton/acre

SOLID MANURE SPREADER 3 CALIBRATION

SPREADER VOLUME AND WEIGHT CALCULATIONS

Stack height above sideboard = 1 ft
Length = 15.3 ft
Depth = 2 ft
Width = 5.4 ft

Spreader Volume = 231 ft3
Weight of Manure = 12,543 lbs

MANURE DENSITY CALCULATIONS

BUCKET

Top Diam 11 Height 13.75 Volume 0.756 ft3

Weight 41 lbs

Manure Density = 54 lbs/ft3

SPREAD AREA CALCULATIONS

Spread Width = 15 ft

Application Area

Spread Length = 500 ft

Area Spread = 7,500 ft2 or 0.17 acre

Manure Rate Spread = 1.67 lbs/ft2
72,848 lbs/acre
36.4 ton/acre

MANURE UTILIZATION

Fir Ridge- Cloverdale Farm

LIQUID MANURE APPLICATION CHART

MANURE ANALYSIS
(As received lb/1000 gal)

		Total N	NH4-N	P_2O_5	K_2O
Test Date:	Average	21.91	12.25	11.09	20.97

Location: Wastewater

Manure Nutrient Content

Thickness to apply (inch)	Manure Applied (gallons)	Total N (lb/A)	Available N (lb/A)	P_2O_5 (lb/A)	K_2O (lb/A)
0.25	6,789	149	83	75	142
0.50	13,577	297	166	151	285
0.75	20,366	446	249	226	427
1.00	27,154	595	333	301	569
1.25	33,943	744	416	376	712
1.50	40,731	892	499	452	854
1.75	47,520	1041	582	527	996
2.00	54,308	1190	665	602	1139
CUSTOM:					
Tank Wagon	3,630	80	44	40	76
Big Gun	12,144	266	149	135	255
Spreader Bar	20,364	446	249	226	427

EQUIPMENT CALIBRATION CALCULATIONS

TANK WAGON MANURE SPREADER CALIBRATION

Volume of Wagon = 3,000 gallons OR 401 ft3

Spread Length = 600 ft

Spread Width = 60 ft

Application Area

Area Spread = 36,000 ft2 OR 0.83 acre

NOTE: Area spread is the total area covered by the tank wagon application.

APPLICATION RATE = 3,630 gal/acre OR 0.13 in/acre

NOTE: Inch/acre should be close to amount collected in a rain gauge or pan

BIG GUN TRAVELOR APPLICATION RATE CALCULATIONS

Nozzle Diameter 1.00 inch Wetted Dia 330 feet

Pump Pressure 80 psi Flow Rate 230 gpm

Hose Speed = 24 sec/foot

= 2.5 feet/minute

= 150 feet/hour

Spread Width = 330 ft

Application Area

Length of Pull = 1,200 ft

Area Spread = 396,000 ft2 OR 9.09 acre

NOTE: Area spread is the total area covered by the big gun application.

APPLICATION RATE = 12,144 gal/acre OR = 0.45 inch/acre

NOTE: Inch/acre should be close to amount collected in a rain gauge or pan

SPREADER BAR APPLICATION RATE CALCULATIONS

Spreader Bar Width- 12 ft

Flowrate- 279 gpm

Time to Apply- 5 Hrs

Spread Width = 120 ft

Application Area

Spread Length= 1,492 ft

Area Spread = 179,040 ft2 OR 4.11 acre

NOTE: Area spread is the total area covered by the spreader bar application.

APPLICATION RATE = 20,364 gal/acre OR = 0.75 inch/acre

NOTE: Inch/acre should be close to amount collected in a rain gauge or pan

MANURE UTILIZATION

IRRIGATION WATER MANAGEMENT

The application of Irrigation Water Management to the irrigated fields as shown on the Field Map will manage soil moisture to promote the desired crop response, optimize the available water supplies, minimize irrigation induced erosion, decrease non-point source pollution of surface and groundwater sources, manage salts in the crop root zone and manage the crop micro climate. Irrigation water is supplied by wells and surface water sources using pumps through an underground pvc pipelines to sprinkler irrigation systems. The average amount of irrigation water to be applied per application and total annual amount needed for irrigated crops with guidance on when and how much irrigation water to apply can be found starting on page 3-29.

Permits: Under Oregon law all water is publicly owned and anyone planning to store or divert surface or groundwater for the purpose of irrigation must obtain a permit or water right from the Oregon Water Resources Department. These permits or water rights must be obtained prior to the use of the water. It is the responsibility of the Farmer to file for the necessary permits or water rights.

Permits or water rights are not needed to apply wastewater as a nutrient source.

Irrigation Water Flows, Volumes, and Relationships

Equation 1-

$$Q \times T = D \times A$$

where:

Q = flow rate (acre-in/hr or cfs)
T = time (hr)
D = gross depth applied (in)
A = area (acres)

Equation 2-

$$Q = \frac{453 \times A \times D}{F \times H}$$

where:

Q = flow rate (gpm)
A = area (acres)
D = gross application depth (in)
F = irrigation period (days)
H = hours of operation per day

Water Flow Rates:

1 cubic foot per second (cfs)
= 448.8 gallons per minute
1 cfs for 1 hour = 0.99 acre-inch
1 cfs for 24 hr = 1.98 acre-ft
1,000 gpm = 2.23 cfs
1,000 gpm for 24 hr = 4.42 ac-ft
1 gpm/acre = 0.053 ac-in/ac/day
1 cfs = 40 miner's inches in OR, No CA
1 cfs = 50 miner's inches in ID, WA
1 miner's inch = 11.22 gpm in OR
1 miner's inch = 9 gpm in ID, WA
1 cfs = 28.32 liters/sec
1 cubic meter/sec = 35.3 cfs
1 liter/sec = 15.85 gpm

Q x **T = D** x **A** *where:*

Q = cfs, T = hr; D = inches depth; A = acres

Gpm for 5 ft/s velocity in PVC pipe:

6"	8"	10"	12"	14"
480	800	1250	1750	2150

NRCS *Natural Resources Conservation Service*

Water Volumes & Weights:

1 cubic foot = 7.48 gallons
= 62.4 lb = 28.3 liters
1 acre-foot = 43,560 cubic feet
(1 acre covered 1 ft deep)
12 acre-in = 1 acre-ft = 325,829 gal
1 million gallons = 3.07 acre-ft
1 acre-ft = 1,234 cubic meters
1 cu meter = 1,000 liters = 35.3 cu ft

Pressure and Pressure Head:

1 psi = 2.31 ft of pressure head
1 atmosphere (sea level)
= 14.7 psi = 33.9 ft of head

Lengths and Areas:

1 mile = 5,280 ft = 1.61 km
1 meter = 3.28 ft = 39.37 inches
1 acre = 43,560 square ft
1 hectare = 2.47 acres

Pump Power Requirement

$$Horsepower = \frac{Pump\ Head\ in\ ft \times gpm}{39.6 \times \%\ Pump\ Efficiency}$$

MANURE UTILIZATION

SOILS-

Based on the Natural Resources Conservation Service National Engineering Handbook, Part 652, National Irrigation Guide, the irrigated soils on this farm have an average water holding capacity of 0.19 to 0.60 inches per inch of soil depth and a soil intake rate of 0.45 inches per hour.

CROPS-

CROP	MATURE ROOT DEPTH (INCHES)	MAXIMUM ALLOWED DEPLETION	CRITICAL PERIOD
Grass Hay/Pasture	**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 62192
Description of Irrigation Water Supply (Well, Stream, Irrigation District, etc.):	Big Nestucca River
Supply Flowrate (gpm or cfs):	597 gpm or 1.33 cfs
Annual Volume Available (Acre-ft.):	266 AF
Water Delivery Schedule:	On Demand
Method(s) of Water Measurement:	NA

IRRIGATION SYSTEM-

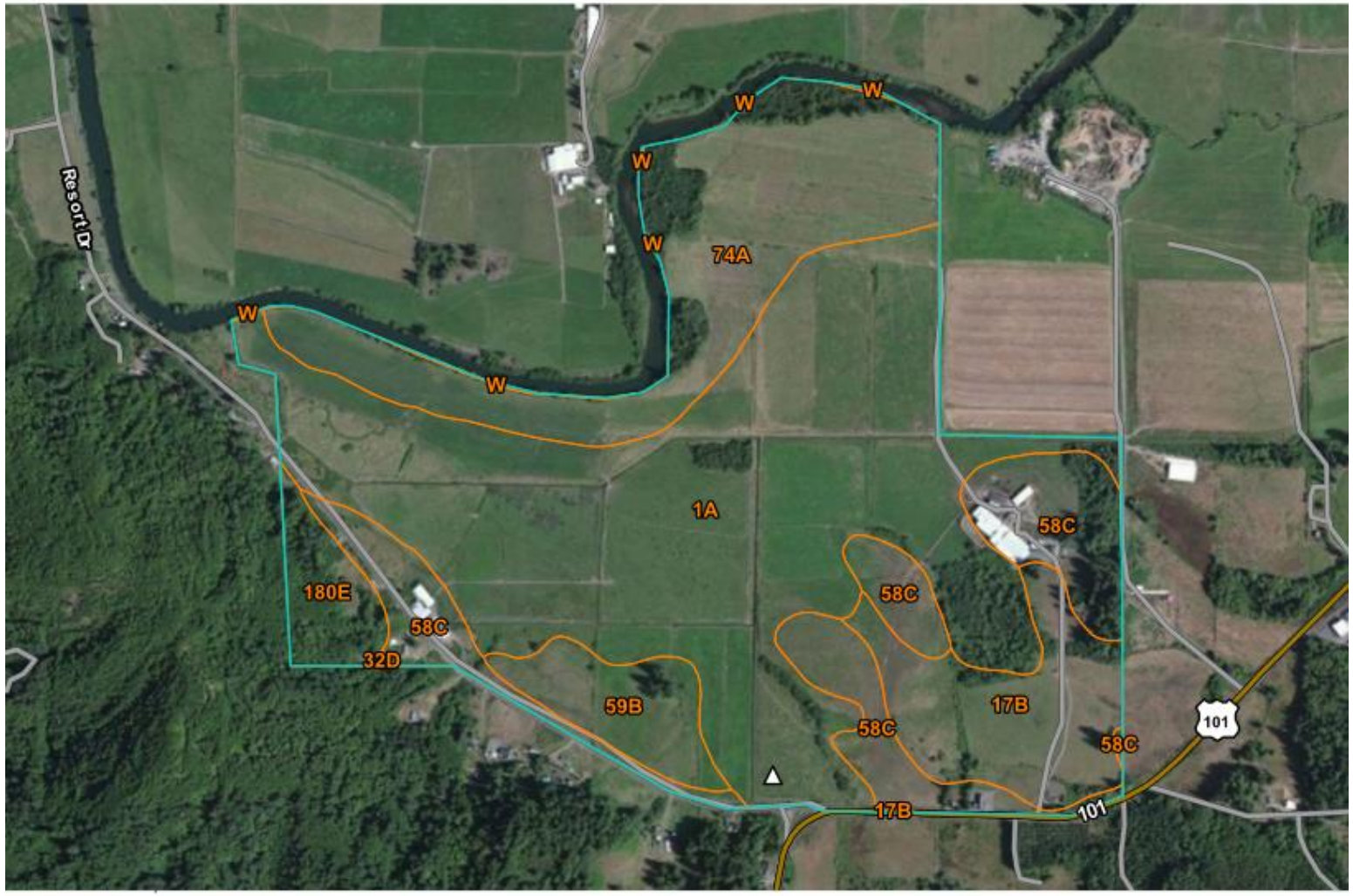
System	System Capacity (gpm)	Nozzle Size (in)	Pressure (psi)	Spacing (ft)	Application Rate (in/hr)	System Efficiency (%)
Traveling Big Gun Sprinkler	335	1.1	80 to 90	180 to 240	0.4 to 0.5	65

MANURE UTILIZATION

Irrigation Water Management Worksheet						
Crop Name:	**Hay/Pasture Land**					
Managed Rooting Depth (inches):	**30**					
Management Allowed Depletion, MAD:	**50%**					
Irrigated Acres:	**347**					
Soil Name:	**Brenner, Nehalem, Chitwood, Knappa**					
Soil Depth (inches):	**60**					
Available Water Capacity (in/in):	**0.20**					
Soil Intake Rate (in/hr) :	**0.45**					
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	6.0	6.0	6.0	6.0	6.0	6.0
Net Irrigation Application (in): Total Plant Available Water Capacity * MAD	3.0	3.0	3.0	3.0	3.0	3.0
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)	**0.35**	**2.17**	**2.64**	**3.70**	**3.03**	**2.09**
Average Daily Crop Water Use (in/day):	0.01	0.07	0.09	0.12	0.10	0.07
Irrigation Frequency (days): Net Irrigation Application / Daily Crop Water Use	30	31	30	25	31	30
Irrigation System Set Time (hours):	**12**	**12**	**12**	**12**	**12**	**12**
Actual Net Irrigation Application (in): Gross Application * System Application Efficiency	**3.19**	**3.19**	**3.19**	**3.19**	**3.19**	**3.19**
Actual Irrigation Frequency (days): Actual Net Irrigation Application / Daily Crop Water Use	**30**	**31**	**30**	**27**	**31**	**30**
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	4.56	4.56	4.56	4.56	4.56	4.56
Volume of Water per Irrigation (acre-in): Gross Irrigation Application * Irrigated Acres	1582	1582	1582	1582	1582	1582
Irrigation System Operation (hours/day):	16	16	16	16	16	16
Required System Flow Rate (gpm): (Equation 2)	**1,493**	**1,445**	**1,493**	**1,675**	**1,445**	**1,493**
Compare **Required** system flow rate with **Measured** flow noted on **Irrigation Application Record**						

SOIL AND RISK ASSESSMENT

SOIL MAP FOR FIR RIDGE- CLOVERDALE FARM



Map Scale: 1:13,600 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 200 400 800 1200

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84

SOIL AND RISK ASSESSMENT

Map Unit Legend

Tillamook County, Oregon (OR057)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
1A	Brenner silt loam, 0 to 1 percent slopes	229.9	49.5%
17B	Chitwood-Hebo complex, 0 to 5 percent slopes	42.5	9.2%
32D	Munsoncreek-Flowerpot complex, 5 to 30 percent slopes	0.3	0.1%
58C	Knappa medial silt loam, 3 to 15 percent slopes	67.5	14.5%
59B	Chitwood-Knappa medial silt loams, 0 to 7 percent slopes	20.9	4.5%
74A	Nehalem silt loam, 0 to 3 percent slopes	87.4	18.8%
180E	Salander-Necanicum complex, 30 to 60 percent slopes	14.8	3.2%
W	Water	0.7	0.2%
Totals for Area of Interest		**464.0**	**100.0%**

SOIL AND RISK ASSESSMENT

SOIL REPORTS

Map Unit Description

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.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. Soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately.

The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

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

Report—Map Unit Description

Tillamook County, Oregon

1A—Brenner silt loam, 0 to 1 percent slopes

Map Unit Setting
National map unit symbol: 27z0
Elevation: 10 to 200 feet
Mean annual precipitation: 80 to 100 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 160 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Brenner and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brenner

Setting
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile
Ap - 0 to 7 inches: silt loam
A - 7 to 12 inches: silty clay loam
Bw1 - 12 to 18 inches: silty clay loam
Bw2 - 18 to 26 inches: silty clay loam
BC - 26 to 40 inches: silty clay loam
Cg1 - 40 to 55 inches: silty clay
Cg2 - 55 to 60 inches: silty clay

Properties and qualities
Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 0 to 7 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water storage in profile: High (about 11.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Other vegetative classification: Poorly Drained (G004AY018OR), Sitka spruce/salmonberry-wet (903)

17B—Chitwood-Hebo complex, 0 to 5 percent slopes

Map Unit Setting
National map unit symbol: 27w0
Elevation: 20 to 300 feet
Mean annual precipitation: 80 to 100 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 160 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Chitwood and similar soils: 50 percent
Hebo and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chitwood

Setting
Landform: Stream terraces, fluviomarine terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium and/or fluviomarine deposits derived from sedimentary rock

Typical profile
Ap - 0 to 7 inches: medial silt loam
A - 7 to 11 inches: silt loam
BA - 11 to 19 inches: silty clay loam
Bw - 19 to 29 inches: silty clay
BC - 29 to 60 inches: silty clay loam

Properties and qualities
Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 11 to 19 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very high (about 12.4 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Other vegetative classification: Somewhat Poorly Drained (G004AY017OR), Sitka spruce/salmonberry-wet (903)

Description of Hebo

Setting
Landform: Depressions on stream terraces, drainageways on fluviomarine terraces
Landform position (three-dimensional): Tread, riser
Down-slope shape: Concave, linear
Across-slope shape: Linear
Parent material: Mixed alluvium and/or fluviomarine deposits derived from sedimentary rock

Typical profile
Ap - 0 to 4 inches: silty clay loam
BA - 4 to 10 inches: silty clay
Bg1 - 10 to 18 inches: clay
Bg2 - 18 to 26 inches: clay
BCg - 26 to 35 inches: silty clay
2Cg - 35 to 60 inches: clay loam

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 0 to 4 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water storage in profile: High (about 10.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Other vegetative classification: Poorly Drained (G004AY018OR), Sitka spruce/salmonberry-wet (903)

32D—Munsoncreek-Flowerpot complex, 5 to 30 percent slopes

Map Unit Setting
National map unit symbol: 27zw
Elevation: 50 to 1,800 feet
Mean annual precipitation: 80 to 110 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 120 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition
Munsoncreek and similar soils: 65 percent
Flowerpot and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

SOIL AND RISK ASSESSMENT

Description of Munsoncreek

Setting
Landform: Mountain slopes, hillslopes
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Mountainbase, mountaintop, base slope, interfluve
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Colluvium and residuum derived from sedimentary rock

Typical profile
Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 10 inches: medial silt loam
AB - 10 to 18 inches: silty clay loam
Bw1 - 18 to 28 inches: silty clay loam
Bw2 - 28 to 41 inches: silty clay loam
Bw3 - 41 to 58 inches: extremely paragravelly silty clay loam
Cr - 58 to 68 inches: weathered bedrock

Properties and qualities
Slope: 5 to 30 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 11.4 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Other vegetative classification: Sitka spruce/salmonberry-wet (903)

Description of Flowerpot

Setting
Landform: Mountain slopes, hillslopes
Landform position (two-dimensional): Toe slope, summit
Landform position (three-dimensional): Mountain base, mountaintop, interfluve, base slope
Down-slope shape: Concave
Across-slope shape: Linear, concave
Parent material: Colluvium and residuum derived from sedimentary rock

Typical profile
Oi - 0 to 1 inches: slightly decomposed plant material
A1 - 1 to 8 inches: medial silty clay loam
A2 - 8 to 14 inches: silty clay loam
AB - 14 to 22 inches: silty clay loam
Bw - 22 to 30 inches: silty clay loam
Bg - 30 to 52 inches: silty clay loam
BC - 52 to 60 inches: silty clay loam

Properties and qualities
Slope: 5 to 30 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 14 to 22 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very high (about 13.1 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C/D
Other vegetative classification: Sitka spruce/salmonberry-wet (903)

58C—Knappa medial silt loam, 3 to 15 percent slopes

Map Unit Setting
National map unit symbol: 27wg
Elevation: 20 to 550 feet
Mean annual precipitation: 80 to 100 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 160 to 260 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Knappa and similar soils: 85 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Knappa

Setting
Landform: Stream terraces, fluviomarine terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium and/or fluviomarine deposits derived from sedimentary rock

Typical profile
Ap - 0 to 9 inches: medial silt loam
A - 9 to 20 inches: silt loam
Bw1 - 20 to 25 inches: silty clay loam
Bw2 - 25 to 45 inches: silty clay loam
Bw3 - 45 to 60 inches: silty clay loam

Properties and qualities
Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very high (about 13.8 inches)

Interpretive groups
Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Other vegetative classification: Well Drained <15% Slopes (G004AY014OR), Sitka spruce/salmonberry-wet (903)

Minor Components

Hebo
Percent of map unit: 5 percent
Landform: Depressions on fluviomarine terraces
Other vegetative classification: Poorly Drained (G004AY018OR)

59B—Chitwood-Knappa medial silt loams, 0 to 7 percent slopes

Map Unit Setting
National map unit symbol: 27wh
Elevation: 20 to 300 feet
Mean annual precipitation: 80 to 100 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 160 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Chitwood and similar soils: 45 percent
Knappa and similar soils: 40 percent
Minor components: 6 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chitwood

Setting
Landform: Stream terraces, fluviomarine terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium and/or fluviomarine deposits derived from sedimentary rock

Typical profile
Ap - 0 to 7 inches: medial silt loam
A - 7 to 11 inches: silt loam
BA - 11 to 19 inches: silty clay loam
Bw - 19 to 29 inches: silty clay
BC - 29 to 60 inches: silty clay loam

Properties and qualities
Slope: 0 to 7 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 11 to 19 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very high (about 12.4 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Other vegetative classification: Somewhat Poorly Drained (G004AY017OR), Sitka spruce/salmonberry-wet (903)

Description of Knappa

Setting
Landform: Stream terraces, fluviomarine terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium and/or fluviomarine deposits derived from sedimentary rock

Typical profile
Ap - 0 to 9 inches: medial silt loam
A - 9 to 20 inches: silt loam
Bw1 - 20 to 25 inches: silty clay loam
Bw2 - 25 to 45 inches: silty clay loam
Bw3 - 45 to 60 inches: silty clay loam

Properties and qualities
Slope: 0 to 7 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very high (about 13.8 inches)

Interpretive groups
Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Other vegetative classification: Well Drained <15% Slopes (G004AY014OR), Sitka spruce/salmonberry-wet (903)

Minor Components

Hebo
Percent of map unit: 6 percent
Landform: Depressions on fluviomarine terraces
Other vegetative classification: Poorly Drained (G004AY018OR)

74A—Nehalem silt loam, 0 to 3 percent slopes

Map Unit Setting
National map unit symbol: 27z5
Elevation: 10 to 200 feet
Mean annual precipitation: 80 to 100 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 160 to 260 days
Farmland classification: Farmland of statewide importance

SOIL AND RISK ASSESSMENT

Map Unit Composition
Nehalem, occasional flooding, and similar soils: 80 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nehalem, Occasional Flooding

Setting
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile
Ap - 0 to 9 inches: silt loam
A - 9 to 16 inches: silt loam
Bw - 16 to 48 inches: silt loam
BC - 48 to 60 inches: silt loam

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: High (about 11.6 inches)

Interpretive groups
Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Other vegetative classification: Well Drained <15% Slopes (G004AY014OR), Sitka spruce/salmonberry-wet (903)

Minor Components

Brenner
Percent of map unit: 3 percent
Landform: Depressions on flood plains
Other vegetative classification: Poorly Drained (G004AY018OR)

180E—Salander-Necanicum complex, 30 to 60 percent slopes

Map Unit Setting
National map unit symbol: n8dq
Elevation: 50 to 1,800 feet
Mean annual precipitation: 80 to 110 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 120 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition
Salander and similar soils: 60 percent
Necanicum and similar soils: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

SOIL AND RISK ASSESSMENT

Description of Salander

Setting
Landform: Mountain slopes
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Lower third of mountainflank, center third of mountainflank
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Parent material: Colluvium and resdiuum derived from igneous rock

Typical profile
Oi - 0 to 2 inches: slightly decomposed plant material
A1 - 2 to 14 inches: medial loam
A2 - 14 to 25 inches: medial loam
Bw1 - 25 to 41 inches: medial loam
Bw2 - 41 to 52 inches: paragravelly medial loam
Bw3 - 52 to 66 inches: paragravelly medial clay loam

Properties and qualities
Slope: 30 to 60 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very high (about 19.9 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Other vegetative classification: Sitka spruce/oxalis, swordfern-moist (902)

Description of Necanicum

Setting
Landform: Mountain slopes
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Lower third of mountainflank, upper third of mountainflank
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Colluvium derived from igneous rock

Typical profile
Oi - 0 to 1 inches: slightly decomposed plant material
A1 - 1 to 10 inches: very gravelly medial loam
A2 - 10 to 18 inches: very gravelly medial loam
Bw1 - 18 to 27 inches: very gravelly medial loam
Bw2 - 27 to 49 inches: extremely cobbly medial loam
Bw3 - 49 to 71 inches: extremely cobbly medial loam

Properties and qualities
Slope: 30 to 60 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.8 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Other vegetative classification: Sitka spruce/oxalis, swordfern-moist (902)

W—Water

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Data Source Information

Soil Survey Area:	Tillamook County, Oregon
Survey Area Data:	Version 7, Sep 18, 2015

SOIL AND RISK ASSESSMENT

SOIL AND RISK ASSESSMENT

PREDICTED SOIL EROSION

USDA NRCS Natural Resources Conservation Service

RUSLE2 Worksheet Erosion Calculation Record

Info:

Owner name	*Tract #*	*Field name*
Fir Ridge Holstein Farm	**86**	**1-5**

Location	*Soil*	*T value, t/ac/yr*	*Slope length (horiz), ft*	*Avg. slope steepness, %*
Oregon\Tillamook County\OR_Tillamook_R80-90	74A Nehalem silt loam, 0 to 3 percent slopes\Nehalem silt loam 80%	5.0	900	3.0

Alternatives:

Description	*Management*	*Contouring*	*Strips / barriers*	*Diversion/terrace, sediment basin*	*Cons. plan. soil loss*	*Soil conditioning index (SCI)*	*STIR value*	*Wind & irrigation-induced erosion for SCI, t/ac/yr*	*Equiv. diesel use, gal/ac*	*Energy use, BTU/ac*	*Fuel cost, US$/ac*
Erosion on Grass Hay/Pasture	a.Single Year/Single Crop Templates\A_Pasture; fall planted, 5 yrs rotational grazing, manure application, CMZ 71	a. rows up-and-down hill	(none)	(none)	2.0	0.61	37.5	0	20	2700000	58.9

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.

SOIL AND RISK ASSESSMENT

USDA NRCS Natural Resources Conservation Service

RUSLE2 Worksheet Erosion Calculation Record

Info:

Owner name	*Tract #*	*Field name*
Fir Ridge Holstein Farm	**86, 213**	**6-11, 18, 21-23**

Location	*Soil*	*T value, t/ac/yr*	*Slope length (horiz), ft*	*Avg. slope steepness, %*
Oregon\Tillamook County\OR_Tillamook_R80-90	1A Brenner silt loam, 0 to 1 percent slopes\Brenner silt loam 85%	5.0	900	1.0

Alternatives:

Description	*Management*	*Contouring*	*Strips / barriers*	*Diversion/terrace, sediment basin*	*Cons. plan. soil loss*	*Soil conditioning index (SCI)*	*STIR value*	*Wind & irrigation-induced erosion for SCI, t/ac/yr*	*Equiv. diesel use, gal/ac*	*Energy use, BTU/ac*	*Fuel cost, US$/ac*
Erosion on Grass Hay/Pasture	a.Single Year/Single Crop Templates\A_Pasture; fall planted, 5 yrs rotational grazing, manure application, CMZ 71	a. rows up-and-down hill	(none)	(none)	0.69	0.71	37.5	0	20	2700000	58.9

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.

SOIL AND RISK ASSESSMENT

RUSLE2 Worksheet Erosion Calculation Record

Info:

Owner name	*Tract #*	*Field name*
Fir Ridge Holstein Farm	**86, 213**	**12, 13, 19**

Location	*Soil*	*T value, t/ac/yr*	*Slope length (horiz), ft*	*Avg. slope steepness, %*
Oregon\Tillamook County\OR_Tillamook_R80-90	58C Knappa medial silt loam, 3 to 15 percent slopes\Knappa medial silt loam 85%	5.0	600	7.0

Alternatives:

Description	*Management*	*Contouring*	*Strips / barriers*	*Diversion/terrace, sediment basin*	*Cons. plan. soil loss*	*Soil conditioning index (SCI)*	*STIR value*	*Wind & irrigation-induced erosion for SCI, t/ac/yr*	*Equiv. diesel use, gal/ac*	*Energy use, BTU/ac*	*Fuel cost, US$/ac*
Erosion on Grass Hay/Pasture	a.Single Year/Single Crop Templates\A_Pasture; fall planted, 5 yrs rotational grazing, manure application, CMZ 71	a. rows up-and-down hill	(none)	(none)	5.0	0.37	37.5	0	20	2700000	58.9

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.

SOIL AND RISK ASSESSMENT

RUSLE2 Worksheet Erosion Calculation Record

Info:

Owner name	*Tract #*	*Field name*
Fir Ridge Holstein Farm	**86**	**14-17**

Location	*Soil*	*T value, t/ac/yr*	*Slope length (horiz), ft*	*Avg. slope steepness, %*
Oregon\Tillamook County\OR_Tillamook_R80-90	17B Chitwood-Hebo complex, 0 to 5 percent slopes\Chitwood medial silt loam 50%	5.0	900	5.0

Alternatives:

Description	*Management*	*Contouring*	*Strips / barriers*	*Diversion/terrace, sediment basin*	*Cons. plan. soil loss*	*Soil conditioning index (SCI)*	*STIR value*	*Wind & irrigation-induced erosion for SCI, t/ac/yr*	*Equiv. diesel use, gal/ac*	*Energy use, BTU/ac*	*Fuel cost, US$/ac*
Erosion on Grass Hay/Pasture	a.Single Year/Single Crop Templates\A_Pasture; fall planted, 5 yrs rotational grazing, manure application, CMZ 71	a. rows up-and-down hill	(none)	(none)	3.2	0.51	37.5	0	20	2700000	58.9

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.

SOIL AND RISK ASSESSMENT

RUSLE2 Worksheet Erosion Calculation Record

Info:

Owner name	*Tract #*	*Field name*
Fir Ridge Holstein Farm	**213**	**20**

Location	*Soil*	*T value, t/ac/yr*	*Slope length (horiz), ft*	*Avg. slope steepness, %*
Oregon\Tillamook County\OR_Tillamook_R80-90	180E Salander-Necanicum complex, 30 to 60 percent slopes\Salander slightly decomposed plant material 60%	5.0	500	7.0

Alternatives:

Description	*Management*	*Contouring*	*Strips / barriers*	*Diversion/terrace, sediment basin*	*Cons. plan. soil loss*	*Soil conditioning index (SCI)*	*STIR value*	*Wind & irrigation-induced erosion for SCI, t/ac/yr*	*Equiv. diesel use, gal/ac*	*Energy use, BTU/ac*	*Fuel cost, US$/ac*
Erosion on Grass Hay/Pasture	a.Single Year/Single Crop Templates\A_Pasture; fall planted, 5 yrs rotational grazing, manure application, CMZ 71	a. rows up-and-down hill	(none)	(none)	5.0	0.76	37.5	0	20	2700000	58.9

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.

SOIL AND RISK ASSESSMENT

OREGON PHOSPHORUS INDEX

FIELD SUMMARY & WESTERN OREGON P INDEX

Enter data in gray cells and select best choice from drop down menus.
Cells with blue font are completed automatically.

Grower:	Fir Ridge- Cloverdale Farm
Application Plan by:	Bruce Wilson, H&R Engineering LLC
Date:	August 24, 2016

	Field	1	2	3	4	5	6	7	8
	Acres	26.5	10.8	10.4	6.0	7.9	9.3	12.2	11.9
	Soil	74A, Nehalem	74A, Nehalem	74A, Nehalem	74A, Nehalem	74A, Nehalem	1A, BRENNER	1A, BRENNER	1A, Brenner
	Soil test date	November 3, 2015	November 3, 2015	November 3, 2015	November 3, 2016	November 3, 2015	November 3, 2015	November 3, 2015	November 3, 2015
	Bray 1 P (ppm)	90	4	2	110	90	90	4	2
	Acetate K (ppm)	878	68	431	901	846	878	68	431
	pH	6.0	4.5	4.6	5.0	5.0	6.0	4.5	4.6
	SMP	6.4	4.6	4.9	5.5	5.4	6.4	4.6	4.9
	TRANSPORT FACTORS								
	Sheet & rill erosion (tons/ac-yr)	1-3	1-3	1-3	1-3	1-3	<1	<1	<1
	Irrigation erosion (tons/ac-yr)	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff
	Runoff Class	low	low	low	low	low	medium	medium	medium
	Flooding Frequency	occasional	occasional	occasional	occasional	occasional	frequent	frequent	frequent
	Distance to stream (ft)	<100 ft	300-500 ft	<100 ft	<100 ft	<100 ft	<100 ft	<100 ft	<100 ft
	Buffers	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.
	Drainage	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles
	SOURCE FACTORS								
	Commercial P2O5 rate (lbs/ac)	0	0	0	0	0	0	0	0
	Commercial P2O5 method	None applied	None applied	None applied	None applied	None applied	None applied	None applied	None applied
	Commercial P2O5 timing	None applied	None applied	None applied	None applied	None applied	None applied	None applied	None applied
	Organic P2O5 rate (lbs/ac)	47	47	47	47	47	47	47	47
	Organic P2O5 method	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days
	Organic P2O5 timing	All months possible	All months possible	All months possible	All months possible	All months possible	All months possible	All months possible	All months possible
	SCORE	18.7	13.7	13.7	20.7	18.7	19.7	14.7	14.7
	P RUNOFF RISK RATING	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium

COMMENTS

SOIL AND RISK ASSESSMENT

FIELD SUMMARY & WESTERN OREGON P INDEX

Enter data in gray cells and select best choice from drop down menus.
Cells with blue font are completed automatically.

Grower: Fir Ridge- Cloverdale Farm
Application Plan by: Bruce Wilson, H&R Engineering LLC
Date: August 24, 2016

Field	9	10	11	12	13	14	15	16
Acres	11.0	61.5	10.1	7.5	1.4	0.7	13.0	8.4
Soil	74A, Nehalem	74A, Nehalem	74A, Nehalem	74A, Nehalem	74A, Nehalem	1A, BRENNER	1A, BRENNER	1A, Brenner
Soil test date	November 3, 2015	November 3, 2015	November 3, 2015	November 3, 2016	November 3, 2015	November 3, 2015	November 3, 2015	November 3, 2015
Bray 1 P (ppm)	90	4	90	110	90	90	110	110
Acetate K (ppm)	878	68	878	901	846	878	901	901
pH	6.0	4.5	6.0	5.0	5.0	6.0	5.0	5.0
SMP	6.4	4.6	6.4	5.5	5.4	6.4	5.5	5.5
TRANSPORT FACTORS								
Sheet & rill erosion (tons/ac-yr)	<1	<1	<1	4-6	4-6	4-6	4-6	4-6
Irrigation erosion (tons/ac-yr)	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff
Runoff Class	low	low	low	low	low	medium	medium	medium
Flooding Frequency	occasional	occasional	occasional	occasional	occasional	frequent	frequent	frequent
Distance to stream (ft)	<100 ft	<100 ft	<100 ft	<100 ft	>500 ft	>500 ft	<100 ft	<100 ft
Buffers	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.
Drainage	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles
SOURCE FACTORS								
Commercial P2O5 rate (lbs/ac)	0	0	0	0	0	0	0	0
Commercial P2O5 method	None applied	None applied	None applied	None applied	None applied	None applied	None applied	None applied
Commercial P2O5 timing	None applied	None applied	None applied	None applied	None applied	None applied	None applied	None applied
Organic P2O5 rate (lbs/ac)	47	47	47	47	47	47	47	47
Organic P2O5 method	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days
Organic P2O5 timing	All months possible	All months possible	All months possible	No app. Nov. thru Jan.	All months possible	All months possible	All months possible	All months possible
SCORE	17.2	12.2	17.2	18.2	20.2	22.7	24.7	24.7
P RUNOFF RISK RATING	Medium	Low	Medium	Medium	Medium	Medium	Medium	Medium

COMMENTS

SOIL AND RISK ASSESSMENT

FIELD SUMMARY & WESTERN OREGON P INDEX

Enter data in gray cells and select best choice from drop down menus.
Cells with blue font are completed automatically.

Grower:	Fir Ridge- Cloverdale Farm
Application Plan by:	Bruce Wilson, H&R Engineering LLC
Date:	August 24, 2016

Field	17	18	19	20	21	22	23	
Acres	11.0	61.5	10.1	7.5	1.4	0.7	13.0	
Soil	74A, Nehalem	74A, Nehalem	74A, Nehalem	74A, Nehalem	74A, Nehalem	1A, BRENNER	1A, BRENNER	TILLAMOOK COUNTY
Soil test date	November 3, 2015	November 3, 2015	November 3, 2015	November 3, 2016	November 3, 2015	November 3, 2015	November 3, 2015	
Bray 1 P (ppm)	90	4	90	110	90	90	2	
Acetate K (ppm)	878	68	878	901	846	878	431	
pH	6.0	4.5	6.0	5.0	5.0	6.0	4.6	
SMP	6.4	4.6	6.4	5.5	5.4	6.4	4.9	
TRANSPORT FACTORS								
Sheet & rill erosion (tons/ac-yr)	4-6	<1	4-6	4-6	<1	<1	<1	<1
Irrigation erosion (tons/ac-yr)	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	not irrigated
Runoff Class	low	low	low	low	low	medium	medium	none
Flooding Frequency	occasional	occasional	occasional	occasional	occasional	frequent	frequent	none
Distance to stream (ft)	<100 ft	<100 ft	<100 ft	300-500 ft	<100 ft	<100 ft	<100 ft	>500 ft
Buffers	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.
Drainage	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles
SOURCE FACTORS								
Commercial P2O5 rate (lbs/ac)	0	0	0	0	0	0	0	0
Commercial P2O5 method	None applied	None applied	None applied	None applied	None applied	None applied	None applied	None applied
Commercial P2O5 timing	None applied	None applied	None applied	None applied	None applied	None applied	None applied	None applied
Organic P2O5 rate (lbs/ac)	47	31	31	31	31	31	31	0
Organic P2O5 method	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	None applied
Organic P2O5 timing	All months possible	All months possible	All months possible	All months possible	All months possible	All months possible	All months possible	None applied
SCORE	20.2	11.9	19.9	21.9	16.9	19.4	14.4	0.0
P RUNOFF RISK RATING	Medium	Low	Medium	Medium	Medium	Medium	Medium	Low

COMMENTS

SOIL AND RISK ASSESSMENT

Oregon Phosphorus Index Risk Interpretation

P Index rating	Interpretation	Recommended Nutrient Limitation
West PI Score<13 East 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
West PI Score 13-25 East 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
West PI Score >25-50 East 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
West PI Score >50 East 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

SOIL AND RISK ASSESSMENT

REFERENCES

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Silage Corn, Western Oregon, EM 8978-E, June 2009
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Soil Test Interpretation Guide, OSU EC 1478, August 1999
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Feed Management

Feed Management, A tool for balancing nutrients on dairies and other livestock operations, EM 8913-E, July 2006
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Manure Application Setback Features/Distances

CAFO General Permit #1
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Manure Nutrient Availability

Waste Utilization Jobsheet 633 OR-JS, Oregon USDA-NRCS, May 2003
http://efotg.sc.egov.usda.gov/references/public/OR/633js042707.pdf

REFERENCES

Phosphorus Assessment

Agronomy Technical Note No. 26: The Phosphorus Index, Oregon NRCS, June 2008
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Agricultural Phosphorus Management Using the Oregon/Washington Phosphorus Indexes
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Practice Standards

Oregon NRCS Nutrient Management Standard (590), May 2008
http://efotg.nrcs.usda.gov/references/public/OR/590std.doc

Record Keeping

Online Decision making And Record Keeping, October 2015
http://www.odark.org

Oregon ODA CAFO Recordkeeping Calendar, January 2015
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Water Quality/Quantity

Oregon NRCS Water Quality Technical Note No. 1: Water Quality Indicator Tools, October 2000,
ftp://ftp-fc.sc.egov.usda.gov/OR/Technical_Notes/Water%20Quality/WaterQual01.pdf

Software

Revised Universal Soil Loss Equation, RUSLE2 version 1.26.6.4, October 2006
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REFERENCES

ORAWM WORKBOOK

OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM)

Version 5.2

8/24/2016

CLIENT: Fir Ridge- Cloverdale Farm

ASSISTED BY: Bruce D. Wilson, H&R Engineering LLC

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= 70 — Nutrient Production (lbs./day/1000 lb. Animal Unit) N	P	K	Nutrient Production (lbs./day) N	P	K	Manure CF/D/AU	Annual Days Confined	Days Grazed	Days Off Farm
MILKER (Holstein)	260	1,300	338.0	0.70	0.12	0.32	236.60	40.63	108.77	1.70	215	150	0
MILKER (Jersey)	120	900	108.0	0.85	0.14	0.49	91.91	15.48	52.59	1.95	215	150	0
MILKER (DRY)	70	1,100	77.0	0.30	0.04	0.10	23.10	3.23	7.70	0.92	151	214	0
HEIFERS (12-24 Months)	40	970	38.8	0.27	0.05	0.12	10.32	1.77	4.66	0.90	0	184	181
CALVES (1-12 Months)	5	200	1.0	0.42	0.05	0.11	0.42	0.05	0.11	1.34	365	0	0
Totals/Averages-	495	894	562.8	0.64	0.11	0.31	362.3	61.2	173.8	1.6			

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 (Holstein)	70%	0%	0%	0%	0%	0%	70%	70%	70%	70%	70%	70%	
	260	260	260	260	260	260	260	260	260	260	260	260	1,656
MILKER (Jersey)	70%	0%	0%	0%	0%	0%	70%	70%	70%	70%	70%	70%	
	120	120	120	120	120	120	120	120	120	120	120	120	529
MILKER (DRY)	100%	0%	0%	0%	0%	0%	100%	100%	100%	100%	100%	100%	
	70	70	70	70	70	70	70	70	70	70	70	70	539
HEIFERS (12-24 Months)	100%	0%	0%	0%	0%	0%	0%	100%	100%	100%	100%	100%	
	40	0	0	0	0	0	0	40	40	40	40	40	233
CALVES (1-12 Months)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	5	5	5	5	5	5	5	5	5	5	5	5	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>>>	428	0	0	0	0	0	389	428	428	428	428	428	2,957
Total AUM's>>>>>>>>>>	-428	0	0	0	0	0	-389	-428	-428	-428	-428	-428	-2,957

REFERENCES

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ANIMAL WASTE MANAGEMENT SYSTEM INVENTORY

WEATHER STATION TILLAMOOK 1 W

Month	Precipitation	Evaporation	Paved	Unpaved
	25Yr-24Hr	6.00	Lot Runoff Factors as a Percent of Monthly Precipitation	
	RCN=	95.00		
	Average Monthly Inches			
October	7.16	1.42	50%	20%
November	13.71	0.75	60%	25%
December	13.94	0.60	60%	25%
January	13.09	0.48	60%	25%
February	10.79	0.78	50%	25%
March	9.90	1.26	45%	15%
April	6.81	1.90	40%	15%
May	4.84	3.22	40%	10%
June	3.41	3.40	35%	10%
July	1.64	3.91	30%	0%
August	1.42	3.52	40%	10%
September	3.68	2.54	45%	15%
Annual	90.39	23.78		

AREAS CONTRIBUTING RUNOFF TO LIQUID STORAGE FACILITY

Description of Runoff Area	Area in SF
Paved Lot Area >> Is paved lot scraped daily? (Y/N) NO	4,792
Unpaved Lot Area >>	0
Roof Area >>>	0
Surface Area of Silage Storage Facility>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>> Does Silage Seepage Drain to Storage Facility? (Y/N) YES	12,200
Total Runoff Area Contributing to Liquid Storage Facility>>>>>>>>>>>>>>>>	16,992

WATER USE THAT ENTERS LIQUID STORAGE FACILITY

Type of Water Use	Number of Animals	Number of Washes per Day	Gallons of Water Used per Wash-Day	Total Water Use per Day, Gallons	Total Water Use per Day, Cubic Feet
Animal Washwater	380	2	0.25	190	25.4
Equipment Wash		2	350.00	700	93.6
Flushwater		0	0.00	0	0.0
Miscellaneous		2	25.00	50	6.7
Total>>>				940	125.7

CROP DATA

Field Number	Acres	Crop	Percent Dry Matter (DM)	Yield Units	Target Yield	Nutrients Removed in Pounds per Acre: Nitrogen N	Phosphorous P_2O_5	Potassium K_2O
1-17	211.6	Grass Hay/Pasture	100%	Ton	6.00	348	110	289
18-23	152.7	Grass Hay/Pasture	100%	Ton	6.00	348	110	289
Off Farm								
Total Acres-	364.3							

REFERENCES

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8/24/2016

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ASSISTED BY: **Bruce D. Wilson, H&R Engineering LLC**

ANIMAL WASTE MANAGEMENT SYSTEM INVENTORY

BEDDING VOLUME

Type of Animal	Type of Bedding Facility	Bedding Material	Unit Weight Lbs/CF	Amount Needed Lbs/Day/AU	Volume CF/Day/AU	Total Volume CF/Day	Total Weight Lbs/Day
MILKER (Holstein)	Free Stall	Wood Shavings/Manure	9.00	3.10	0.34	116	1,048
MILKER (Jersey)	Free Stall	Wood Shavings/Manure	9.00	3.10	0.34	37	335
MILKER (DRY)	Loose Housing	Wood Shavings/Manure	9.00	3.10	0.34	27	239
HEIFERS (12-24 Months)	Loose Housing	Wood Shavings/Manure	9.00	3.10	0.34	13	120
CALVES (1-12 Months)	Confined	Wood Shavings/Manure	9.00	3.10	0.34	0	3

SOLIDS SEPARATION FACTOR

Type of Animal	Type of Separator	% Solids Separated	Volume of Solids Separated CF/Day	Volume of Solids in Liquids CF/Day	Volume of Manure in Liquids CF/Day	Volume of Manure in Solids CF/Day	Accumulated Sludge in Storage CF/Day	Density of Separated Solids Lbs/CF	Weight of Separated Solids Lbs/Day
MILKER (Holstein)	Press Type (Screw or Roller)	40%	277	415	346	230	199	36	9,970
MILKER (Jersey)	Press Type (Screw or Roller)	40%	99	148	126	84	112	36	3,563
MILKER (DRY)	Dry Scrape System	100%	97	0	0	71	0	36	3,505
HEIFERS (12-24 Months)	Dry Scrape System	100%	48	0	0	35	0	36	1,738
CALVES (1-12 Months)	Dry Scrape System	100%	2	0	0	1	0	36	61
Totals>>			523	564	472	422	311		18,837

REFERENCES

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8/24/2016

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ASSISTED BY: **Bruce D. Wilson, H&R Engineering LLC**

ANIMAL WASTE MANAGEMENT SYSTEM PRODUCTION

MONTHLY VOLUMES

	Runoff in Cubic Feet														
	Roof Area	Paved Slab Area	Unpaved Lot Area	Silage Pit Surface	Facility	Manure		Bedding		Solids Separated		Solids in Liquids		Total	
Month	Square Feet	Square Feet	Square Feet	Area, SF	Water Use	Solids	Liquids							Solids	Total Liquids
	0	4,792	0	12,200	Cubic Feet	Cubic Feet	Cubic Feet	Cubic Feet	Pounds	Cubic Feet	Pounds	Cubic Feet	Pounds	Cubic Feet	Cubic Feet
October	0	1,430	0	2,298	3,896	934	6,419	1,439	12,954	3,548	127,740	5,244	188,791	3,548	12,868
November	0	3,285	0	4,286	3,770	3,250	22,501	5,415	48,732	14,249	512,972	16,917	609,002	14,249	28,257
December	0	3,340	0	4,385	3,896	3,358	23,251	5,595	50,356	14,724	530,071	17,481	629,302	14,724	29,102
January	0	3,136	0	4,169	3,896	3,358	23,251	5,595	50,356	14,724	530,071	17,481	629,302	14,724	28,682
February	0	2,154	0	3,503	3,519	3,033	21,001	5,054	45,483	13,299	478,774	15,789	568,402	13,299	24,965
March	0	1,779	0	2,352	3,896	3,358	23,251	5,595	50,356	14,724	530,071	17,481	629,302	14,724	25,507
April	0	1,088	0	1,840	3,770	904	6,212	1,393	12,536	3,434	123,620	5,075	182,701	3,434	11,773
May	0	773	0	492	3,896	934	6,419	1,439	12,954	3,548	127,740	5,244	188,791	3,548	10,405
June	0	477	0	347	3,770	904	6,212	1,393	12,536	3,434	123,620	5,075	182,701	3,434	9,668
July	0	196	0	0	3,896	934	6,419	1,439	12,954	3,548	127,740	5,244	188,791	3,548	9,336
August	0	227	0	144	3,896	934	6,419	1,439	12,954	3,548	127,740	5,244	188,791	3,548	9,511
September	0	661	0	1,362	3,770	904	6,212	1,393	12,536	3,434	123,620	5,075	182,701	3,434	10,869
Annual	**0**	**18,546**	**0**	**25,178**	**45,869**	**22,809**	**157,567**	**37,190**	**334,711**	**96,216**	**3,463,777**	**121,349**	**4,368,574**	**96,216**	**210,943**
Annual Gallons	**0**	**138,727**	**0**	**188,332**	**343,100**	**170,608**	**1,178,598**	**278,182**		**719,696**		**907,693**		**719,696**	**1,577,852**

DAILY NUTRIENT PRODUCTION

	Pounds/Day of Nutrients from **LIQUIDS**			Pounds/Day of Nutrients from **SOLIDS**			Pounds/Day of Nutrients from **GRAZING**			Grazing Manure	Confined Manure
Type of Animal	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	Gallons/Yr	Cubic Feet/Yr
MILKER (Holstein)	291.30	101.43	175.14	52.03	17.64	22.30	236.60	93.08	131.07	645,357	123,945
MILKER (Jersey)	113.16	38.64	84.67	20.21	6.72	10.78	91.91	35.46	63.37	235,579	45,244
MILKER (DRY)	0.00	0.00	0.00	12.70	3.51	3.95	23.10	7.41	9.28	113,395	10,697
HEIFERS (12-24 Months)	0.00	0.00	0.00	5.67	1.92	2.39	10.32	4.04	5.61	48,061	0
CALVES (1-12 Months)	0.00	0.00	0.00	0.23	0.06	0.06	0.00	0.00	0.00	0	489
	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-	**1,042,391**	**180,375**

REFERENCES

OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM)

Version 5.2

8/24/2016

CLIENT: **Fir Ridge- Cloverdale Farm**
ASSISTED BY: **Bruce D. Wilson, H&R Engineering LLC**

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_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
October	3,761	1,303	2,416	679	228	309	8,165	3,144	4,681	12,605	4,675	7,406
November	12,134	4,202	7,794	2,555	838	1,113	0	0	0	14,689	5,040	8,907
December	12,538	4,342	8,054	2,641	866	1,150	0	0	0	15,179	5,208	9,204
January	12,538	4,342	8,054	2,641	866	1,150	0	0	0	15,179	5,208	9,204
February	11,325	3,922	7,275	2,385	782	1,038	0	0	0	13,710	4,704	8,313
March	12,538	4,342	8,054	2,641	866	1,150	0	0	0	15,179	5,208	9,204
April	3,640	1,261	2,338	657	221	299	7,592	2,921	4,361	11,889	4,403	6,999
May	3,761	1,303	2,416	679	228	309	8,165	3,144	4,681	12,605	4,675	7,406
June	3,640	1,261	2,338	657	221	299	7,901	3,043	4,530	12,199	4,524	7,167
July	3,761	1,303	2,416	679	228	309	8,165	3,144	4,681	12,605	4,675	7,406
August	3,761	1,303	2,416	679	228	309	8,165	3,144	4,681	12,605	4,675	7,406
September	3,640	1,261	2,338	657	221	299	7,901	3,043	4,530	12,199	4,524	7,167
Annual	**87,040**	**30,144**	**55,911**	**17,550**	**5,792**	**7,736**	**56,053**	**21,584**	**32,144**	**160,643**	**57,520**	**95,791**

MONTHLY IMPORTS INTO STORAGE FACILITIES

Month	Liquids		Solids	
	Cubic Feet	Gallons	Cubic Feet	Tons
October	**0**	0	**0**	0
November	**0**	0	**0**	0
December	**0**	0	**0**	0
January	**0**	0	**0**	0
February	**0**	0	**0**	0
March	**0**	0	**0**	0
April	**0**	0	**0**	0
May	**0**	0	**0**	0
June	**0**	0	**0**	0
July	**0**	0	**0**	0
August	**0**	0	**0**	0
September	**0**	0	**0**	0
Totals-	**0**	**0**	**0**	**0**

REFERENCES

OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM)

Version 5.2

8/24/2016

CLIENT: **Fir Ridge- Cloverdale Farm**
ASSISTED BY: **Bruce D. Wilson, H&R Engineering LLC**

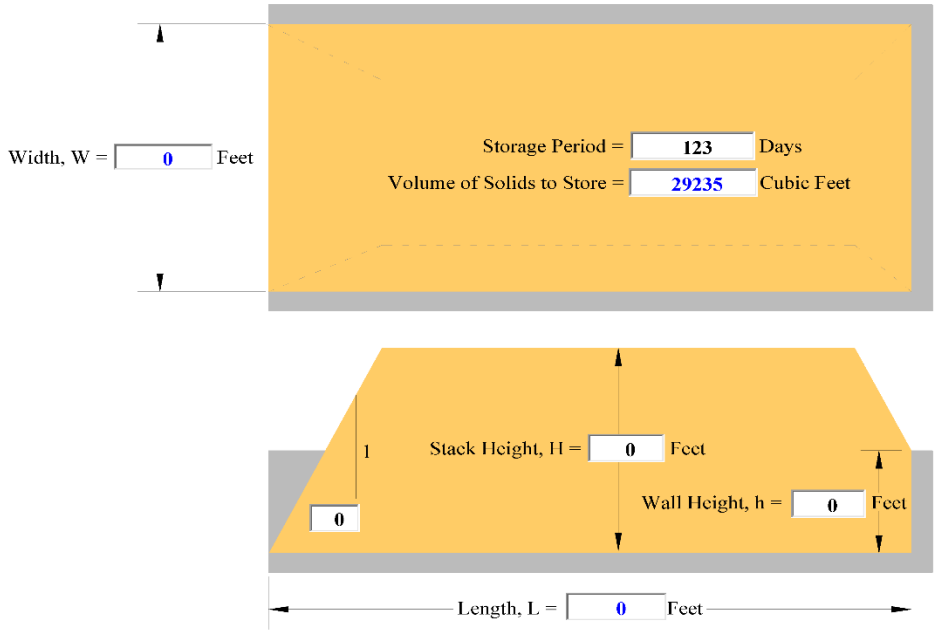
ANIMAL WASTE MANAGEMENT SYSTEM STORAGE

SOLIDS STACKING FACILITY

Solids Storage Facility Parameters	Value
Storage Period, Days=	123
Stacking Width, W in Feet=	0
Stacking Height, H in Feet=	0.00
Wall Height, h in Feet=	0.00
Stack Side Slope (X:1)=	0.00
Existing Storage, Cubic Feet=	30,000
Surface Area of Existing Storage, SF=	0
25 Year-24 Hour Storm Runoff, CF=	0
Volume Needed, Cubic Feet=	29,235
Design Volume, Cubic Feet=	0
Is Facility Covered?	NO
Volume Reduction Factor=	0.50

VOLUME OF MONTHLY SOLIDS STACKED IN FACILITY

Month	Number of Days	Manure CF	Bedding CF	Solids to Store CF	Solids to Store Tons	Normal Runoff CF
October	31	2,966	582	1,774	64	0
November	30	11,600	2,649	7,125	256	0
December	31	11,986	2,738	7,362	265	0
January	31	11,986	2,738	7,362	265	0
February	28	10,826	2,473	6,650	239	0
March	31	11,986	2,738	7,362	265	0
April	30	2,871	563	1,717	62	0
May	31	2,966	582	1,774	64	0
June	30	2,871	563	1,717	62	0
July	31	2,966	582	1,774	64	0
August	31	2,966	582	1,774	64	0
September	30	2,871	563	1,717	62	0
Annual	365	78,862	17,354	48,108	1,732	0



REFERENCES

OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM)

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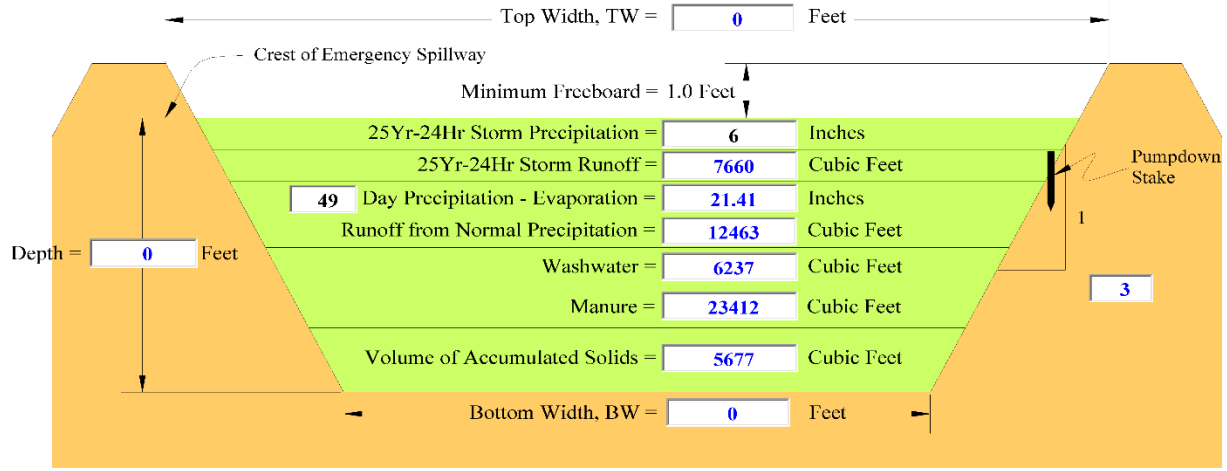
8/24/2016

CLIENT: **Fir Ridge- Cloverdale Farm**
ASSISTED BY: **Bruce D. Wilson, H&R Engineering LLC**

ANIMAL WASTE MANAGEMENT SYSTEM STORAGE

WASTEWATER STORAGE POND — **MONTHLY INFLOWS INTO WASTEWATER STORAGE POND**

Pond Parameters	Value	Month	Number of Days	Rain-Evap on Pond CF	Rain-Evap on Existing Storage, CF	Normal Runoff CF	Washwater CF	Solids CF	Imported Liquids CF	Waste to Store CF	Waste to Store Gallons
Storage Period, Days=	49	October	31	0	11,568	3,728	3,896	5,244	0	24,436	182,795
Side Slope (X:1)=	3.00	November	30	0	26,120	7,571	3,770	16,917	0	54,377	406,770
Bottom Width, BW, Feet=	0	December	31	0	26,886	7,725	3,896	17,481	0	55,987	418,814
Bottom Length, BL, Feet=	0	January	31	0	25,414	7,306	3,896	17,481	0	54,096	404,669
Accumulated Solids Duration, Years=	0	February	28	0	20,174	5,657	3,519	15,789	0	45,139	337,662
Existing Storage, Acre Feet=	2.68	March	31	0	17,413	4,131	3,896	17,481	0	42,921	321,068
Surface Area of Existing Storage, SF=	24,185	April	30	0	9,896	2,927	3,770	5,075	0	21,668	162,090
Minimum Soil Liner Depth, Feet=	1.00	May	31	0	3,265	1,265	3,896	5,244	0	13,670	102,259
25 Year-24 Hour Storm Runoff, CF=	7,660	June	30	0	20	823	3,770	5,075	0	9,689	72,475
Top Width, TW, Feet=	0	July	31	0	-4,575	196	3,896	5,244	0	4,761	35,618
Top Length, TL, Feet=	0	August	31	0	-4,232	371	3,896	5,244	0	5,279	39,488
Volume Needed, Acre Feet=	2.65	September	30	0	2,298	2,024	3,770	5,075	0	13,166	98,491
Design Volume, Acre Feet=	0.00	Annual	365	0	134,247	43,725	45,869	121,349	0	345,190	2,582,198



REFERENCES

OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM)
Version 5.2

8/24/2016

CLIENT: **Fir Ridge- Cloverdale Farm**
ASSISTED BY: **Bruce D. Wilson, H&R Engineering LLC**

ANIMAL WASTE MANAGEMENT SYSTEM UTILIZATION

NUTRIENTS AVAILABLE AFTER STORAGE

Nutrient Source	Type of Operation / Type of Storage Facility	Pounds of Nutrients Available			Percent Nutrients Retained After Storage			Pounds of Nutrients Retained After Storage		
	Dairy	N	P2O5	K2O	N	P2O5	K2O	N	P2O5	K2O
Liquids	Storage Pond Manure Analysis	87,040	30,144	55,911	**65%**	**95%**	**95%**	56,576	28,637	53,116
Solids	Solids Storage Manure Analysis	17,550	5,792	7,736	**75%**	**90%**	**90%**	13,162	5,213	6,962
Grazing	NONE	56,053	21,584	32,144	**100%**	**100%**	**100%**	56,053	21,584	32,144

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	P2O5	K2O	N	P2O5	K2O	N	P2O5	K2O
Liquids	Sprinkling	56,576	28,637	53,116	**75%**	**100%**	**100%**	42,432	28,637	53,116
Solids	Broadcast (Incorporated 7 or more days after application)	13,162	5,213	6,962	**70%**	**100%**	**100%**	9,214	5,213	6,962
Grazing	Grazing	56,053	21,584	32,144	**85%**	**100%**	**100%**	47,645	21,584	32,144

NUTRIENTS AVAILABLE AFTER DENITRIFICATION

Nutrient Source	Location / Soil Drainage Class	Pounds of Nutrients Available			Percent Nutrients Retained After Denitrification			Pounds of Nutrients Retained After Denitrification		
	Coast	N	P2O5	K2O	N	P2O5	K2O	N	P2O5	K2O
Liquids	Somewhat Poorly Drained	42,432	28,637	53,116	**80%**	**100%**	**100%**	33,946	28,637	53,116
Solids	Somewhat Poorly Drained	9,214	5,213	6,962	**80%**	**100%**	**100%**	7,371	5,213	6,962
Grazing	Somewhat Poorly Drained	47,645	21,584	32,144	**80%**	**100%**	**100%**	38,116	21,584	32,144
							TOTAL-	***79,432***	***55,434***	***92,222***

REFERENCES

OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM)
Version 5.2

8/24/2016

CLIENT: **Fir Ridge- Cloverdale Farm**
ASSISTED BY: **Bruce D. Wilson, H&R Engineering LLC**

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
1-17	211.6	Grass Hay/Pasture	**48%**	16,294	47	**17%**	1,253	4	**81%**	30,874	89
18-23	152.7	Grass Hay/Pasture	**32%**	10,863	31	**11%**	811	2	**19%**	7,242	21
Off Farm			**20%**	11,315		**72%**	9,477		**0%**	0	
TOTALS-	**364.3**		**100%**	**38,472**	**78**	**100%**	**11,541**	**6**	**100%**	**38,116**	**110**

NUTRIENT BALANCE BASED ON AVAILABLE ACRES

Field Number	Acres	Crop	NUTRIENTS APPLIED			- NUTRIENTS REMOVED			= NUTRIENT BALANCE		
			Nitrogen, N Lbs/Acre	Phosphorous, P_2O_5 Lbs/Acre	Potassium, K_2O Lbs/Acre	Nitrogen, N Lbs/Acre	Phosphorous, P_2O_5 Lbs/Acre	Potassium, K_2O Lbs/Acre	Nitrogen, N Lbs/Acre	Phosphorous, P_2O_5 Lbs/Acre	Potassium, K_2O Lbs/Acre
1-17	211.6	Grass Hay/Pasture	229	152	249	348	110	289	-119	42	-40
18-23	152.7	Grass Hay/Pasture	124	91	156	348	110	289	-224	-19	-133
Off Farm											

REFERENCES

REFERENCES

OREGON DEPARTMENT OF AGRICULTURE
MODIFICATION OF ANIMAL NUMBERS
National Pollutant Discharge Elimination System
(NPDES PERMIT)

Statutory Authority
Oregon Revised Statutes (ORS) 468B.050 When permit required
ORS 468B.210 Maximum numbers of animals based on ability to contain, treat, hold and dispose of wastes as necessary to comply with all conditions of the permit.

A. General Information **Master Address #AG-P0155720CAFG EPA#ORG010510**

Name or Business Name – Fir Ridge- Cloverdale Farm

Facility Location Address – 37400 Hwy 101 S

City – Cloverdale, OR **Zip Code - 97112** **County - Tillamook**

B. Livestock Type: Circle the item that best represents your operation.

1. Beef Feedlot (Fattening) 2. Beef Cattle (Cow/calf) 3. Hogs 4. Sheep and Goats
5. Dairy Farm, Heifer Replacement Farm 6. Poultry/Broiler 7. Poultry/Eggs
7. Mink/Rabbits 8. Horses and Other Equine 9. Other_____

C. Current Permitted Animal Numbers: In the space below please describe your number of animals by herd composition or class.
Fir Ridge- Cloverdale Farm is a Medium Concentrated CAFO currently permitted for 450 Milking and Dry Cows.

D. Current Permitted CAFO Designation: Circle one. See reverse side for table.

Large Concentrated Medium Concentrated Medium Confined Small Confined Small Concentrated

E. Proposed change in permitted animal numbers: In the space below please describe your proposed animal numbers by herd composition or class.
Fir Ridge- Cloverdale Farm is requesting to be permitted for 495 dairy animals- 450 Milking and Dry Cows and 45 Heifers and Calves.

F. New CAFO Designation based on increase / decrease in animal numbers. Circle one. See reverse side for table.

Large Concentrated Medium Concentrated Medium Confined Small Confined Small Concentrated

G. Certification:
I understand that an approved animal waste management plan is required prior to permit increase. I agree to prepare and implement an animal waste management plan in accordance with the requirements and timelines specified in the permit.

_____	_____	Scott Ruby
Signature (operator or owner)	Date	Print Name
_____	_____	_____
Signature (operator or owner)	Date	Print Name

REFERENCES

Definition of Legally Authorized Representative:
See 40 CFR 122.22 for more detail. Please also provide the information requested in brackets *[ ]*

- **Corporation** — President, secretary, treasurer, vice-president, or any person who performs principal business functions; or a manager of one or more facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million that is authorized in accordance to corporate procedure to sign such documents
- **Partnership** — General partner *[list of general partners, their addresses, and telephone numbers]*
- **Sole Proprietorship** — Owner(s) *[each owner must sign the application]*
- **City, County, State, Federal, or other Public Facility** — Principal executive officer or ranking elected official
- **Limited Liability Company** — Member *[articles of organization]*
- **Trusts** — Acting trustee *[list of trustees, their addresses, and telephone numbers]*

SEND THIS FORM TO:

Oregon Department of Agriculture
Natural Resources Division
635 Capitol Street NE
Salem, Oregon 97301-2532

ANIMAL MODIFICATION REQUEST INSTRUCTIONS

A. GENERAL INFORMATION:

1. Enter the legal name.
2. Enter the common name of the facility or operation, if different than the legal name.
3. Enter the facility's physical address (physical location), including city, state, zip code and telephone number.

B. CIRCLE THE APPROPRIATE LIVESTOCK TYPE OF YOUR OPERATION.

C. Self-explanatory
D. Self-explanatory
E. Describe your proposed animal increase by herd composition or class
F. Self-explanatory
G. Signature

CAFO Designation by Size Threshold (used for items D and F)

	Confined		**Concentrated**		
	Confines more than one animal for more than 4 months on prepared surface		Stabled or confined and fed or maintained for total of 45 days or more in any 12-month period Crops, vegetation, forage growth, or post-harvest residues not sustained in normal growing season in lot or facility		
	Small Confined Waste water control facility or disposal system for wet wastes	***Medium Confined*** Waste water control facility or disposal system for wet *or* dry wastes	***Small Concentrated*** Significant contributor of pollutants to waters of the U.S. Designated by director [40CFR §122.23(b)(9)]	***Medium Concentrated*** Discharging pollutants to waters of the U.S. [40 CFR §122.23(b)(6)]	***Large Concentrated*** [40 CFR §122.23(b)(4)]
Animal sector	**Small Confined**	**Medium Confined**	**Small Concentrated**	**Medium Concentrated**	**Large Concentrated**
Mature dairy cows[1]	<200	200-699	<200	200-699	≥700
Veal calves	<300	300-999	<300	300-999	≥1,000
Cattle[2]	<300	300-999	<300	300-999	≥1,000
Swine> 55 lbs	<750	750-2,499	<750	750-2,499	≥2,500
Swine < 55 lbs	<3,000	3,000-9,999	<3,000	3,000-9,999	≥10,000
Horses	<150	150-499	<150	150-499	≥500
Sheep or lambs	<3,000	3,000-9,999	<3,000	3,000-9,999	≥10,000
Turkeys	<16,500	16,500-54,999	<16,500	16,500-54,999	≥55,000
Chickens, including laying hens or broilers w/wet waste system manure handling system)	<9,000	9,000-29,999	<9,000	9,000-29,999	≥30,000
Laying hens w/dry waste system	NA	25,000-81,999	<25,000	25,000-81,999	≥82,000
Broiler chickens w/dry waste system	NA	37,500-124,999	<37,500	37,500-124,999	≥125,000
Ducks w/other than wet waste system	<10,000	10,000-29,999	<10,000	10,000-29,999	≥30,000
Ducks w/wet waste system	<1,500	1,500-4,999	<1,500	1,500-4,999	≥5,000
Other animal type	As determined by ODA.[3]		Designated by director.	NA	NA

1 Whether milked or dry.
2 Other than mature dairy cows or veal calves; cattle includes but is not limited to heifers, steers, bulls and cow/calf pairs.
3 To determine the number of animals that require permit coverage, ODA will compare the operation to the most similar animal type in the table.

CAFO NPDES General Permit #01-2016
Issuance Date: March 31, 2016
Effective Date: April 20, 2016
Expiration Date: February 28, 2021

OREGON CONFINED ANIMAL FEEDING OPERATION NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM GENERAL PERMIT NUMBER 01-2016

Oregon Department of Agriculture

State of Oregon
Department of Agriculture
Confined Animal Feeding Operation Program
and
Department of Environmental Quality
Water Quality Division

DEQ
State of Oregon Department of Environmental Quality

In compliance with the provisions of Oregon Revised Statutes (ORS) Chapter 468B,
Oregon Administrative Rules (OAR) Chapter 340, Divisions 40, 45 and 51 and Chapter 603, Division 74,
the Federal Water Pollution Control Act as amended (The Clean Water Act),
Title 33 United States Code, Section 1251 et seq., and
the National Pollutant Discharge Elimination System (NPDES) program.

Until this permit expires or is modified or revoked, permit registrants who have properly obtained coverage under this permit are authorized to discharge to waters of the state in accordance with the special and general conditions that follow.

Ray Jaindl, Director
Natural Resources and Pesticides
Oregon Department of Agriculture

Lydia Emer
Operations Division Administrator
Oregon Department of Environmental Quality

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APR 04 2016

NATURAL RESOURCES

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SPECIAL CONDITIONS

DEFINITIONS

1. "25-year, 24-hour rainfall event" means an event with a probable recurrence interval of once in twenty-five years as defined by the National Weather Service in Technical Paper Number 40, "Rainfall Frequency Atlas of the United States," May 1961, or equivalent regional or state rainfall probability information developed from this source.
2. "40 CFR" means Title 40 of the Code of Federal Regulations (2014).
3. "Agency" means Oregon Department of Environmental Quality or Oregon Department of Agriculture.
4. "Agricultural stormwater" is defined at 40 CFR § 122.23(e).
5. "Animal waste management plan" or "AWMP" or "waste management plan" means a written document containing the minimum elements necessary to manage manure, litter, and process wastewater from operations covered by this permit in accordance with the terms and conditions of this permit.
6. "Agronomic application rate" means the rate or amount of nutrients applied to the soil for utilization by growing or planned crops such that the crops remove the same or greater amount of nutrients provided by the agronomic application.
7. "Bedding" means any absorbent material that is used to provide animal cleanliness and comfort in a confinement system. Bedding materials include but are not limited to: straw; sawdust; wood shavings; grass seed cleanings; recycled, composted, or dried manure solids; and recycled paper products. Bedding that comes into contact with animals, manure, litter, or process wastewater is determined to be manure, litter, or process wastewater for purposes of this permit.
8. "Confined animal feeding operation" or "CAFO" as defined in OAR 603-074-0010(3) and OAR 340-051-0010(2) means:
   (a) The concentrated confined feeding or holding of animals or poultry, including but not limited to horse, cattle, sheep, or swine feeding areas, dairy confinement areas, slaughterhouse or shipping terminal holding pens, poultry and egg production facilities and fur farms:
      (i) In buildings or in pens or lots where the surface has been prepared with concrete, rock or fibrous material to support animals in wet weather; or
      (ii) That have wastewater treatment works; or
      (iii) That discharge any wastes into waters of the state; or
   (b) An animal feeding operation that is subject to regulation as a concentrated animal feeding operation pursuant to 40 CFR § 122.23.
9. "Director" means the director of the State of Oregon Department of Environmental Quality or director of the State of Oregon Department of Agriculture or their authorized designee(s).
10. "Discharge" when used without qualification means the "discharge of a pollutant." "Discharge of a pollutant" is defined at 40 CFR § 122.2.
11. "Dry waste" means any solid manure, litter, bedding, or waste feed that cannot be transferred or applied with a pump or pipe system. Precipitation that comes into contact with dry waste does not change dry waste into wet waste. Dry waste may contain urine, manure, leachate or incidental process wastewater that has been absorbed into the feces, and used bedding materials in amounts that allow the waste to retain the dry characteristic so that the material cannot be transferred or applied with a pump or through a pipe.
12. "Dry waste treatment works" means any plant or other works used for the purpose of treating, stabilizing or holding wastes as a dry, solid substance. Dry waste treatment works for purposes of this permit do not utilize pumps or pipes to transfer or apply dry waste and typically do not need any added water or liquid to transfer or apply dry waste. Dry waste treatment works include but are not limited to manure piles and covered dry manure stack storage facilities.
13. "Dry-weather discharge" means a discharge of manure, litter or process wastewater from a land application area that is not defined as Agricultural Stormwater (40 CFR 122.23(e)) and where the land application of manure, litter, or process wastewater has not met all the site-specific nutrient management practices contained in the department-approved Animal Waste Management Plan and specified in 40 CFR 122.42(e)(1)(vi)-(xi). Dry weather discharges include but are not limited to: discharges through tile drains, discharges combined with irrigation water, infiltration of nutrients below the crop root zone, discharges due to failure of manure application or irrigation equipment.
14. "Frozen soil" means soil that has a soil temperature of 32° F (or 0° C) or less in any three (3) continuous inches of the top 12 inches of soil.

15. "Groundwater" means water in a saturated zone or stratum beneath the surface of land or below a surface water body.
16. "Manure" means solids or liquids excreted from an animal or other material (for example, bedding, compost, litter, feed waste, silage leachate, raw materials such as feed or silage) that comes into contact with solid or liquid excreted from an animal .
17. "OAR" means Oregon Administrative Rule.
18. "ORS" means Oregon Revised Statute.
19. "Overflow" means the discharge of manure or process wastewater resulting from the filling of wastewater or manure storage structures beyond the point at which no more manure, process wastewater, or stormwater can be contained by the structure.
20. "Person" is defined at 40 CFR § 122.2.
21. "Point source" is defined at 40 CFR § 122.2.
22. "Pollutant" is defined at 40 CFR § 122.2.
23. "Pollution" or "water pollution" is defined at ORS 468B.005(5).
24. "Process wastewater" or "process wastes" means water directly or indirectly used in the operation of the CAFO for any or all of the following: spillage or overflow from animal or poultry watering systems; washing, cleaning or flushing pens, barns, manure pits, or other CAFO facilities; direct contact swimming, washing, or spray cooling of animals; or dust control. Process wastewater or process wastes also includes any water that comes into contact with any raw materials, products, or byproducts including manure, litter, feed, milk, eggs, or bedding. OAR 340-051-0010(5) and OAR 603-074-0010(17)
25. "Production area" means that part of a CAFO that includes the animal confinement area, the manure storage area, the raw materials storage area, and the waste containment areas. The animal confinement area includes but is not limited to open lots, housed lots, feedlots, confinement houses, stall barns, free stall barns, milkrooms, milking centers, cowyards, barnyards, medication pens, walkers, animal walkways, and stables. The manure storage area includes but is not limited to lagoons, runoff ponds, storage sheds, stockpiles, under house or pit storages, liquid impoundments, static piles, and composting piles. The raw materials storage area includes but is not limited to feed silos, silage bunkers, and bedding materials. The waste containment areas include but are not limited to settling basins, and areas within berms and diversions that separate uncontaminated stormwater. Also included in the definition of production area is any egg washing or egg processing facility, and any area used in the storage, handling, treatment, or disposal of animal mortalities. OAR 340-051-0010(6) and OAR 603-074-0010(18)
26. Quantitation Limits (QLs) – The QL is the minimum level, concentration or quantity of a target analyte that can be reported with a specified degree of confidence. It is the lowest level at which the entire analytical system gives a recognizable signal and acceptable calibration for the analyte. It is normally equivalent to the concentration of the lowest calibration standard adjusted for sample weights, volumes, preparation and cleanup procedures employed. The QL as reported by a laboratory is also sometimes referred to as the Method Reporting Limit (MRL) or Limit of Quantitation (LOQ).
27. "Saturated soil" means soil with all available pore space filled that has reached its maximum retentive capacity as defined in "Qualitative Description of Soil Wetness" (Brady, N. and Weil, R., p. 201, 2007).
28. "Setback" as defined at 40 CFR §412.4(b)(1) means a specified distance from surface water or potential conduits to surface water where manure, litter, and process wastewater may not be land applied. Examples of conduits to surface water include but are not limited to: Open tile line intake structures, sinkholes, and agricultural well heads.
29. "Treatment works" means any plant or other works used for the purpose of treating, stabilizing or holding wastes. ORS 468B.005(8)

30. "Vegetative buffer" as defined at 40 CFR §412.4(b)(2) means a narrow, permanent strip of dense perennial vegetation established parallel to the contours of and perpendicular to the dominant slope of the field for the purposes of slowing water runoff, enhancing water infiltration, and minimizing the risk of any potential nutrients or pollutants from leaving the field and reaching surface water.

31. "Waste storage facilities" means the physical system used for the isolation and retention of process wastes on the confined animal feeding operation until their ultimate utilization.

32. "Wastes" is defined at ORS 468B.005(9).

33. "Water" or "waters of the state" is defined at ORS 468B.005(10).

34. "Waters of the U.S." is defined at 40 CFR § 122.2.

35. "Wet waste" means any liquid manure, contaminated stormwater, process wastewater, liquid feed waste and silage or manure leachate. Wet waste may include solid material particles that are suspended or dissolved in the liquid.

36. "Wet waste treatment works" means any plant or other works used for the purpose of treating, stabilizing or holding wet wastes. .Wet waste treatment works for purposes of this permit include, but are not limited to: tanks or lagoons to store wet waste; pumps, pipes, curbs, gutters, and collection sumps to direct, collect, transfer, or apply wet wastes; and any system that separates dry waste from wet waste.

S1. PERMIT COVERAGE

S1.A. When is a permit required and which CAFOs are covered by this permit?

1. Any person who owns or operates a confined animal feeding operation (CAFO) that discharges to surface water of the state is required to obtain NPDES permit coverage. NPDES General Permit #01 provides coverage for the types of CAFOs listed in Table 1 below that discharge to surface water of the state. This includes concentrated animal feeding operations defined at 40 CFR § 122.23 that discharge to waters of the U.S.

2. Any person not wishing to be covered by this permit may apply for an NPDES individual permit in accordance with OAR 340-045-0030. In addition, the director may require coverage under an NPDES individual permit pursuant to the provisions in OAR 340-045-0033 and OAR 603-074-0012.

S1.B. Can I elect coverage under this permit even if my CAFO does not discharge to surface water?
Any person who owns or operates a CAFO that does not discharge to surface water of the state may voluntarily elect to be covered under this permit. Any person making such an election is subject to all applicable requirements of this permit.

Table 1: Classification of CAFOs that require coverage by NPDES General Permit #01

Type of CAFO discharging to surface water of the state	Small	Medium	Large
mature dairy cows[1]	<200	200-699	≥700
veal calves	<300	300-999	≥1,000
cattle[2]	<300	300-999	≥1,000
swine ≥ 55 lbs	<750	750-2,499	≥2,500
swine < 55 lbs	<3,000	3,000-9,999	≥10,000
horses	<150	150-499	≥500
sheep or lambs	<3,000	3,000-9,999	≥10,000
turkeys	<16,500	16,500-54,999	≥55,000
chickens, including laying hens or broilers w/wet waste system	<9,000	9,000-29,999	≥30,000
laying hens w/dry waste system	<25,000	25,000-81,999	≥82,000
broiler chickens w/dry waste system	<37,500	37,500-124,999	≥125,000
ducks w/other than wet waste system	<10,000	10,000-29,999	≥30,000
ducks w/wet waste system	<1,500	1,500-4,999	≥5,000
other animal type[3]	Designated by director.	Designated by director.	Designated by director.

[1] Whether milked or dry.
[2] Other than mature dairy cows or veal calves; cattle includes but is not limited to heifers, steers, bulls and cow/calf pairs.
[3] To determine the number of animals that require permit coverage, ODA will compare the operation to the most similar animal type in the table.

S1.C. How do I apply for permit coverage?

1. New Application
   To obtain permit coverage for the first time, a person must submit to ODA an ODA *Application to Register* (*ATR*), Land Use Compatibility Statement (LUCS), Animal Waste Management Plan (AWMP), and application fee. The application, LUCS, AWMP, and fee must be submitted to ODA at least 180 days prior to the time permit coverage is needed or as specified by ODA in writing. For information on AWMP requirements, see S3, p. 13.

2. Renewal of Permit Coverage
   To renew permit coverage, the permit registrant must submit an ODA renewal application at least 180 days before the expiration date of this permit or as specified by ODA in the renewal notice but no later than the expiration date of this permit. Applicants must certify on their renewal application whether an AWMP is new, updated or current and on file. New and updated animal waste management plans must be submitted with the application.

3. Notification of Permit Coverage
   ODA will review the application and notify the applicant in writing when permit coverage is approved or denied. Permit coverage does not begin until written notice is issued by ODA to the applicant. Written notification will include a *Notice of Registration* that will include the following information:
   (a) The owner and operator's legal name;
   (b) Facility name and location;
   (c) Contact information, including mailing address and telephone number;
   (d) Effective date of permit coverage;
   (e) Maximum number of animals allowed at the facility; and
   (f) Regulatory status of the operation. ODA will use the following classifications for regulatory status:
      (i) *Large concentrated animal feeding operation* as defined in 40 CFR § 122.23(b)(4);
      (ii) *Medium concentrated animal feeding operation* as defined in 40 CFR § 122.23(b)(6);
      (iii) *Small concentrated animal feeding operation* as defined in 40 CFR § 122.23(b)(9) and designated by the director pursuant to OAR 603-074-0012;
      (iv) *Elective large, medium, or small CAFO* sized according to Table 1, p. 6.

S1.D. How do I transfer permit coverage to a new owner or operator?

The permit registrant must complete an ODA transfer form and submit it to ODA for approval at least 30 days before transfer of the CAFO is scheduled to occur or as specified by ODA. The form must be signed by the previous owner or operator as well as the new owner or operator. ODA will respond to the request for transfer by conducting a site inspection and a review of the permit file. ODA will notify the permit registrant and transferee in writing of transfer of coverage under this permit or deny the request with an explanation of why the request was denied.

S1.E. What activities are covered by this permit?

1. This permit covers the discharge of pollutants resulting from processes, wastes, and operations that are properly identified by the registrant through its AWMP approved by ODA.

2. This permit does not cover disposal of human wastes or treatment works that mix human and animal wastes. Any person owning or operating such a system must apply to DEQ for coverage under an individual or general permit issued pursuant to ORS 468B.050. This general permit may be used in addition to an individual or general permit issued by DEQ pursuant to ORS 468B.050 that covers some other type of wastewater at this same facility, for example, septic system wastewater.

3. Pursuant to 40 CFR § 122.23(e), precipitation-related discharges that qualify as agricultural stormwater discharges from land application areas are not subject to NPDES permit requirements. For discharges from the land application area to meet the definition of agricultural stormwater, manure and wastewater must be applied in accordance with site specific practices listed in the ODA-approved AWMP that ensure appropriate agricultural utilization of nutrients.

S1.F. How do I cancel permit coverage?

1. ODA will cancel coverage under this permit upon issuance of an appropriate individual permit by ODA and DEQ or coverage under WPCF General Permit #01 is granted by ODA.

2. Any permit registrant may request in writing to ODA that coverage under this permit be cancelled if any one of the following applies:
   (a) Conditions or standards have changed so that the CAFO no longer qualifies for or is required to have coverage under this permit.
   (b) The permit registrant no longer has animals on site and all waste storage and control facilities have been cleaned and re-purposed or decommissioned in accordance with the following requirements:
      (i) Cleaning/Re-purposing Requirements
         (1) All liquid and solid manure, litter and process wastewater must be removed from the structure(s) and either land applied according to the ODA-approved AWMP or exported according to S2.K, p. 12.
         (2) All liquid storage facilities that could fill with rain water must be flushed with clean water, the flush water land applied or exported according to S2.K, p. 12 and the remaining liquid in the structure tested to confirm the *E. coli* level is at or below the water quality standard of 406 Colony Forming Units/100ml of sample.
         (3) All liquid transfer systems are cleaned and modified so that they are not a conduit for any pollutant to enter surface water or groundwater.
      (ii) Decommissioning Requirements
         (1) All liquid and solid manure, litter and process wastewater must be removed from the structure(s) and either land applied according to the approved AWMP or exported according to S2.K, p. 12.
         (2) If the structure has a synthetic liner, the liner must be removed and disposed or recycled in a lawful manner.
         (3) After completion of [(ii)(*1*)] above, any earthen structure must be filled with soil and returned to the grade matching the surrounding area. All soil fill and remaining exposed soil must be seeded to site-appropriate grass or ground cover to prevent erosion.

3. The permit registrant must also certify that it will not commence operation of a regulated CAFO at the same location until the appropriate NPDES or WPCF permit coverage has been obtained.

4. ODA will respond to the request for cancellation by conducting a site inspection and a review of the permit file. ODA will notify the permit registrant in writing of termination of coverage under this permit or deny the request with an explanation of why the request was denied.

S1.G. Will my information be kept confidential?

Information, including the name and address of an NPDES permit applicant or permit registrant, NPDES permit applications (for example, ODA *ATRs*) and their attachments (for example, AWMPs), NPDES permits, and NPDES permit discharge data cannot be kept confidential pursuant to 40 CFR § 122.7(b) and (c), ORS 468.095(1), and ORS 192.410 to 192.505. The applicant or permittee may request that director classify other records as confidential upon a proper showing that the record is a trade secret pursuant to ORS 468.095(2).

S1.H. What are the public notice and participation requirements of this permit?

1. Prior to approving new permit coverage, renewing permit coverage, or approving proposed substantial changes to an AWMP, ODA will provide public notice and participation as detailed in Table 2, p. 9.

2. ODA may batch multiple notices as regionally appropriate.

3. Application and permit documents (for example, Application to Register, renewal application, AWMP, Land Use Compatibility Statement) will be available for public review at ODA headquarters and appropriate field offices. If available, electronic copies of documents will be provided upon request.

4. ODA will schedule public hearings if written requests for public hearing are received during the comment period from at least 10 persons or from an organization or organizations representing at least ten persons. If a hearing is scheduled, ODA will provide at least 30 days notice before the hearing is held. The public comment period will remain open for additional comments for at least seven (7) days after the public hearing.

S1.I. **Table 2: NPDES Public Notice Requirements**

	New Application	Renewal Application	AWMP Changes
Permit Action	(a) Receipt of ODA *ATR* (*Application to Register*) for existing operation not currently under an NPDES permit or new proposed operation	(b) Receipt of renewal application	(c) Receipt of proposed substantial change to CAFO's AWMP (See S3.D, p. 14)
Public Participation Process	(i) Public notice of a comment period of at least 35 days provided as follows: • Published in regional newspaper; • Posted on ODA and DEQ websites; and • Emailed to interested persons list maintained by ODA. (ii) Opportunity for public hearing. See S1.H.4. (iii) A written response to relevant comments will be developed by ODA and made available to interested persons.	(i) Public notice of a comment period of at least 35 days provided as follows: • Posted on ODA and DEQ websites; and • Emailed to interested persons list maintained by ODA. (ii) Opportunity for public hearing. See S1.H.4. (iii) A written response to relevant comments will be developed by ODA and made available to interested persons.	(i) Public notice of a comment period of at least 35 days provided as follows: • Posted on ODA and DEQ websites; and • Emailed to interested persons list maintained by ODA. (ii) Opportunity for public hearing. See S1.H.4. (iii) A written response to relevant comments will be developed by ODA and made available to interested persons.
Contents of Public Notice	• Name of operation • Name of operator or owner if different than operator, mailing address, and telephone number • Physical address of operation • Type of operation • Number of animals proposed • Land Use Compatibility Statement (LUCS) • Summary of AWMP	• Name of operation • City, county, and zip code • Permit registration number • Type of operation	• Name of operation • City, county, and zip code • Permit registration number • Type of operation • Overview of proposed substantial change

S2. DISCHARGE LIMITATIONS AND OPERATING REQUIREMENTS

S2.A. Prohibitions and Discharge Limitations

1. The permit registrant must not discharge manure, litter, or process wastewater to surface water and groundwater of the state except as allowed in S2.B and S2.C and provided these surface water discharges do not exceed the following effluent limits.
   (a) *E. coli* must not exeed zero organisms/100 mL or quantitation limit of 2 Colony Forming Units/100 mL or 0.0 most probable number/100 mL;
   (b) Nitrate plus Nitrite Nitrogen (NO_3+$N0_2$) must not exceed zero mg/L or quantitation limit of 0.1 mg/L;
   (c) Total Phosphorus (P) must not exceed zero mg/L or quantitation limit of 0.1 mg/L.

   Types of discharge that are prohibited include but are not limited to: contaminated runoff from confinement or waste accumulation areas; overflow or discharges from waste storage facilities; discharges due to improper land application activities from seepage below the root zone, surface drainages or field tile outlets; dry-weather discharges, discharges due to equipment failure; leakage or seepage from facilities in the production area in excess of approved designs; and discharges to underground injection control (UIC) systems.

2. Compliance with the effluent limits above must be determined by laboratory test results of a representative grab sample of the discharge taken at the time of occurrence. If a grab sample is not taken, then the permit registrant is in violation of the effluent limits.

S2.B. Production Area Limitations

1. For all CAFOs (except swine, poultry, and veal *large* CAFOs, the construction of which commenced after April 14, 2003):
   The permit registrant must not discharge manure, litter, or process wastewater to surface water of the state from the production area, except when:
   (a) Rainfall events cause an overflow of waste management and storage facilities designed, constructed, operated, and maintained to contain all manure, litter, and process wastewater, including the runoff and direct precipitation, from a 25-year, 24-hour rainfall event; and
   (b) The production area is operated in accordance with the applicable inspection, maintenance, recordkeeping, and reporting requirements of this permit.

2. For swine, poultry, and veal *large* CAFOs the construction of which commenced after April 14, 2003:
   The permit registrant must not discharge manure, litter, or process wastewater from the production area to surface water of the state.

3. The permit registrant must properly land apply manure, litter, and wastewater from the production area in a manner consistent with S2.C. All other authorized discharges from the production area must be managed to minimize impacts on surface water and groundwater of the state and meet the effluent limits in S2.A above.

4. The permit registrant must not exceed the seepage design rates approved by ODA for waste storage or animal confinement facilities in the production area and seepage to groundwater from these facilities must not violate state groundwater quality protection standards.

5. ODA will inform a permit registrant if any additional limits or controls are necessary to be consistent with the wasteload allocations in an EPA-approved or issued Total Maximum Daily Load for NPDES permit coverage or if coverage to an individual NPDES is necessary.

S2.C. Land Application Limitations

1. To prevent discharges to waters of the state, the permit registrant must apply manure, litter, or process wastewater to land application areas at agronomic rates in accordance with the permit registrant's ODA-approved AWMP. Land application areas include land under the control of the permit registrant, to which manure, litter, or process wastewater from the production area is or may be applied.

2. The permit registrant's discharges to groundwater due to seepage below the root zone of the crop or by other means must not violate state groundwater quality protection standards.

3. The permit registrant is allowed to apply manure, litter, or process wastewater to frozen soil provided:
   (a) The AWMP addresses such applications [see S3.C.2(k), p. 14];
   (b) The application does not result in a discharge to surface water or groundwater, except as allowed in S2.B and S2.C; and
   (c) Land applications do not cause or contribute to a violation of state water quality standards.

4. The permit registrant must not apply manure, litter, or process wastewater to saturated soils immediately before or during rainfall events that are expected to result in surface runoff. If the permit registrant makes such an application because it is a desired alternative to allowing waste storage or treatment works to overflow (for example, land application to saturated soils to pond wastewater onsite provides for greater protection of surface water than a direct overflow of a waste storage tank to surface water), the application will be considered a violation of this permit.

5. ODA will inform a permit registrant if any additional limits or controls are necessary to be consistent with the wasteload allocations in an EPA-approved or issued Total Maximum Daily Load for NPDES permit coverage or if coverage to an individual NPDES is necessary.

S2.D. Direct Access by Animals to Surface Water of the State in the Production Area Prohibited

The permit registrant must prevent direct animal contact with surface water of the state in the production area of its CAFO. Direct animal contact means any situation where animals in the production area have free access and are allowed to loiter or drop waste in surface water. Direct contact with surface water of the state by animals on pasture or rangeland is not, by itself, a violation of this permit.

S2.E. Waste Storage Facilities

1. The permit registrant must provide adequate storage capacity for solid and liquid wastes at all times so that land application occurs only during periods when soil and weather conditions allow for agronomic application and are in compliance with the Land Application Limitations in S2.C, p. 10 of this permit.

2. The permit registrant must site, design, construct, operate, and maintain all waste storage facilities to contain all manure, litter, process wastewater, and stormwater runoff and direct precipitation from a 25-year, 24-hour rainfall event for the storage period established in the ODA-approved AWMP. New and modified construction of waste facilities must be approved in advance and prior to construction by ODA in conformance with ORS 468B.055 and OARs 340-051 and 603-074.

3. Permit registrants with a *large* CAFO must also have depth markers in all surface liquid impoundments (for example, lagoons, ponds, tanks) designed to clearly indicate the:
   (a) Maximum design volume,
   (b) Minimum capacity necessary to contain the 25-year, 24-hour rainfall event, including additional freeboard requirements, and
   (c) Depth of manure and process wastewater.

S2.F. Prevention of System Overloading

1. The permit registrant may not increase the number of animals over 10% or 25 animals, whichever is greater, of the maximum number assigned by ODA in the *Notice of Registration and General Permit Summary* until an updated plan is approved in writing by ODA (see S3.B AWMP Submittal, p. 13, and S3.D Requirements for AWMP Updates and Changes, p. 14).

2. The permit registrant must ensure that animal numbers do not exceed the capacity of the waste storage facilities described in the ODA-approved AWMP.

S2.G. Handling of Animal Mortalities

The permit registrant must not dispose of animal mortalities in liquid manure or treatment works. Animal mortality composting is allowed and must be described in the Animal Waste Management Plan. The permit registrant must handle animal mortalities in such a way as to prevent discharge of pollutants to waters of the state (surface water and groundwater).

S2.H. Proper Operation and Maintenance

The permit registrant must at all times properly operate and maintain all facilities and systems used for process wastewater collection, storage and utilization, and correct any deficiencies found as soon as possible.

S2.I. Maintaining Compliance if System Fails

The permit registrant must control all applications and discharges upon reduction, loss, or failure of the waste storage or utilization facilities until the facilities are restored or an alternative method of storage or utilization is provided. This requirement also applies when the primary source of power is reduced, lost, or fails.

S2.J. Setback Requirement

The permit registrant must develop and maintain setbacks or vegetated buffers when manure, litter, or process wastewater application occur adjacent to any surface water, open tile intake structures, sinkholes, well heads, or other conduits to surface water or groundwater. The permit registrant must also include descriptions of setbacks, vegetated buffers, and/or equivalent measures in its AWMP. Compliant setbacks, vegetated buffers, or equivalent measures include the following:

1. 100 ft. setbacks (non-vegetated, non-managed buffers).
2. 35 ft. vegetated, managed buffers.
3. If approved by ODA, variable-width, seasonal setbacks determined by the type of manure, litter or process wastewater and application method used.
4. If approved by ODA, a demonstration that a setback or vegetated buffer is not necessary or may be reduced in size because implementation of alternative conservation practices or field-specific conditions will provide equivalent or better environmental protection than [1., 2. and 3.] above.

S2.K. Manure, Litter, or Process Wastewater Transfers

1. The permit registrant retains responsibility of the manure, litter, or process wastewater until the transfer or export is completed with the required documentation.

2. The permit registrant must maintain manure, litter, or process wastewater transfer or export records as required by S4.C.2(d), p. 19.

3. Prior to transferring manure, litter, or process wastewater to other persons, the permit registrant with a *large* CAFO must provide the recipient of manure, litter, or process wastewater with a manure nutrient analysis conducted within the previous 12 months.

S2.L. Proper Disposal of Other Wastes

The permit registrant must dispose of any chemicals or other wastes in accordance with applicable state regulation. The permit registrant must manage chemicals and wastes to prevent their disposal in any manure, litter, process wastewater, or stormwater storage or treatment system unless specifically designed to treat these wastes and the wastes and treatment systems are identified in the AWMP. The permit registrant must not dispose of chemicals or other wastes to any system used for the control of uncontaminated stormwater.

S3. ANIMAL WASTE MANAGEMENT PLAN

S3.A. Animal Waste Management Plan (AWMP) Implementation and Compliance

1. Upon registration to this permit, the permit registrant must implement its current ODA-approved AWMP developed for its CAFO.

2. The permit registrant's ODA-approved AWMP is incorporated into this permit by reference. The permit registrant must comply with all terms and conditions of its ODA-approved AWMP. Failure to comply with the ODA-approved AWMP constitutes a violation of the terms and conditions of this permit.

S3.B. AWMP Submittal and Public Notice

1. The applicant applying for permit coverage for the first time must submit its AWMP with the ATR to ODA for review and approval according to the schedule provided in S1.C, p. 7.

2. The existing permit registrant with coverage under NPDES General Permit #01 or another permit may submit its AWMP previously approved by ODA with the *Application to Register or Renewal Application* for review and approval according to the requirements in S1.C, p.7

3. AWMPs are subject to public notice requirements detailed in S1.H, p. 8.

S3.C. AWMP Elements

1. The permit registrant must ensure that its AWMP is adequate for the proposed or existing population of animals, reflective of the proposed or existing facility operation, and prepared in accordance with the terms and conditions of this permit, OAR 340-051, and OAR 603-074.

2. The AWMP must to the extent applicable include the following:
   (a) Procedures to ensure collection, handling, and storage of contaminated stormwater runoff from the production area, manure, litter, and process wastewater in compliance with the requirements of S2. Discharge Limitation and Operating Requirements. Calculations used to determine that storage capacity exists must be provided, including a demonstration that facilities are at least designed and constructed to contain all manure, litter, process wastewater, and stormwater runoff and direct precipitation from a 25-year, 24-hour rainfall event.
   (b) Procedures to ensure proper operation and maintenance of the storage facilities.
   (c) Procedures for proper management of animal mortalities. The procedures must ensure that animal mortalities are disposed of legally and are not disposed of in any storage or treatment system that is not specifically designed to treat animal mortalities.
   (d) Procedures to ensure that clean water is diverted, as appropriate, from the production area.
   (e) Procedures to prevent direct contact of confined animals with surface water.
   (f) Identification of appropriate site-specific conservation practices to be implemented, including buffers, setback areas, or equivalent practices, to control runoff of pollutants to surface water and groundwater.
   (g) Protocols to land apply manure, litter, or process wastewater in accordance with site-specific nutrient management practices that ensure: 1) appropriate agricultural utilization of the nutrients in the manure, litter, or process wastewater, and 2) application of nutrient at rates not to exceed the maximum agronomic application rate included in the ODA-approved AWMP. The protocols must include the following:
      (i) The NRCS Phosphorous Index, USDA/NRCS Oregon Agronomy Technical Note #26, revised October 2008 or equivalent calculation must be completed for all fields or management units that receive manure, litter or process wastewater to determine if nitrogen or phosphorous is the most limiting nutrient. The maximum nutrient application rate must be calculated for the most limiting nutrient and must account for all other nitrogen and phosphorus sources.
      (ii) Expected crop yields.
      (iii) Calculations showing the total nitrogen and phosphorus to be applied annually to each field from manure, litter, process wastewater, and other sources.
      (iv) Annual manure application rates and an explanation of the basis for determining these rates. For *large* CAFOs, these rates must be based on actual test data. For other operations, data or "book values" from established reference sources (for example, Oregon Animal Waste Management program) may be used instead of actual testing.
      (v) Method(s) used to apply manure, litter, or process wastewater

(vi) Timing of manure, litter, and process wastewater applications.

(h) For all operations, protocols for soil testing. For *large* CAFOs, protocols for testing of manure, litter, and process wastewater. For other operations that are not required to test manure, litter, or process wastewater, test protocols are not required but the references that are used to characterize manure, litter, or process wastewater must be included.

(i) If applicable, an Agricultural Compost Management Plan must be included as required by OAR 340-096 for composting activities.

(j) If applicable, a Solid Waste Conversion Technology Plan must be included as required by OAR 340-096.

(k) Frozen soil application procedures if applications of manure, litter, or process wastewater will be made to frozen soil. At a minimum, the following must be included:
   (i) Description of the potential receiving field(s), estimates of waste amounts and types, and estimated timing of applications.
   (ii) Aerial photo(s) identifying all areas and surface water bodies within 1,000 ft. of the boundaries of the receiving field(s).
   (iii) Soil map(s) identifying soil types for receiving field(s).
   (iv) Topographic map(s) for receiving field(s).
   (v) Description of the structural practices in place to ensure that no discharges to surface water occur during application and after the soil thaws.
   (vi) Description of the method used to determine when soil is frozen and management practices to be followed when planning an application and during and after an application to frozen soil.
   (vii) Description of monitoring and reporting requirements to ensure that the permit registrant is in compliance with frozen soil application procedures.
   (viii) Procedures for transfer or export of manure, litter, or process wastewater.
   (ix) Identification of specific records that will be maintained to document the implementation and management of the minimum elements described above.

S3.D. Requirements for AWMP Updates and Changes

(See Table 3, p.16, for an overview of the following requirements.)

1. Requirements for *small or medium* CAFOs electing permit coverage (see Table 3, p. 16, for an overview)

   (a) *Substantial changes.* The permit registrant must submit any proposal to make substantial changes to its AWMP to ODA for approval at least 45 days in advance of implementation of the proposed changes. ODA will public notice the proposal as described in S1.H, p. 8. ODA will notify the permit registrant of its final decision concerning the proposed changes after the public notice period ends. The permit registrant must not implement a proposed change until ODA has approved it. The following types of changes to an AWMP are considered substantial:
      (i) A change in the type of manure system including but not limited to switching from a dry to a liquid manure system, switching from a liquid to a dry manure system, or changing the manure system to accommodate an animal species or type of operation not included in the scope of the current AWMP.
      (ii) An increase in maximum allowed animal numbers such that the operation becomes defined as a *large* CAFO.

   (b) *Non-substantial changes.* Public notice of non-substantial changes (described below) to an AWMP is not required; however, the permit registrant must submit its proposal to make such a change to ODA for approval at least 45 days in advance of implementation of the proposed change unless a different timeframe is allowed by ODA. ODA will notify the permit registrant of its final decision concerning the proposed change after reviewing the proposal. The permit registrant must not implement a proposed change until ODA has approved it. The following changes to an AWMP are considered non-substantial provided they do not result in a substantial modification listed in paragraph (a) above:
      (i) An increase in animal numbers greater than 10% of the registrant's maximum allowed animal numbers provided the increase does not change the operation into a *large* CAFO.
      (ii) When facility expansions, production increases, or process modifications will result in new or increased generation of waste, litter, or process wastewater beyond the scope of the current AWMP.

2. Requirements for all other CAFOs (see Table 3, p. 16, for an overview)
   (a) *Substantial changes.* The permit registrant must submit any proposal to make substantial changes to its AWMP to ODA for approval at least 60 days in advance of the proposed changes. ODA will provide public notice on the proposal as described in S1.H, p. 8. ODA will notify the permit registrant of its final decision concerning the proposed changes after the public notice period ends. The permit registrant must not implement a proposed change until ODA has approved it. The following types of changes to an AWMP are considered substantial:
      (i) Addition of new land application areas not previously included in the AWMP, unless the land application area is covered by an existing AWMP that has already been incorporated into an existing NPDES permit and the application of manure, litter, or process wastewater on the newly added land application area is in accordance with that existing NPDES permit.
      (ii) Any changes to the field-specific maximum annual rates for land application.
      (iii) Any changes to the maximum amounts of nitrogen and phosphorus derived from all sources for each crop.
      (iv) Addition of any crop or other uses not included in the AWMP and corresponding field-specific rates of application.
      (v) A change in the type of manure system including but not limited to switching from a dry to a liquid manure system, switching from a liquid to a dry manure system, or changing the manure system to accommodate an animal species or type of operation not included in the scope of the current AWMP.
      (vi) Any changes that are likely to increase the risk of pollutant transport to surface water or groundwater.

   (b) *Non-substantial changes.* The permit registrant must submit any proposal to make non-substantial changes to its AWMP to ODA for approval at least 60 days in advance of the proposed changes unless a different timeframe is allowed by ODA. A proposal for a non-substantial change is not subject to public notice. ODA will notify the permit registrant of its final decision concerning the proposed changes after reviewing the proposal. The permit registrant must not implement a proposed change until ODA has approved it. The following types of changes to an AWMP are considered non-substantial provided they do not result in a substantial modification listed in paragraph (a) above:
      (i) An increase in animal numbers greater than 10% of the registrant's maximum allowed animal numbers.
      (ii) When facility expansions, production increases, or process modifications will result in new or increased generation of waste, litter, or process wastewater beyond the scope of the current AWMP.

Table 3: Overview of Requirements for Proposed Changes to AWMPs

	Small or Medium CAFO Electing Coverage		All Other CAFOs	
	Substantial Change	***Non-Substantial Change***	***Substantial Change***	***Non-Substantial Change***
Description of proposed change	1. A change in the type of manure system including but not limited to switching from a dry to a liquid manure system, switching from a liquid to a dry manure system, or changing the manure system to accommodate an animal species or type of operation not included in the scope of the current AWMP. 2. An increase in maximum allowed animal numbers such that the operation becomes defined as a large CAFO.	The following are considered non-substantial provided they do not result in a substantial change: 1. An increase in animal numbers greater than 10% of the registrant's maximum allowed animal numbers. 2. When facility expansions, production increases, or process modifications will result in new or increased generation of waste, litter, or process wastewater beyond the scope of the current AWMP.	1. Addition of new land application areas not previously included in the AWMP, unless the land application area is covered by an existing AWMP that has already been incorporated into an existing NPDES permit and the application of manure, litter, or process wastewater on the newly added land application area is in accordance with that existing NPDES permit. 2. Any changes to the field-specific maximum annual rates for land application. 3. Any changes to the maximum amounts of nitrogen and phosphorus derived from all sources for each crop. 4. Addition of any crop or other uses not included in the AWMP and corresponding field-specific rates of application. 5. A change in the type of manure system including but not limited to switching from a dry to a liquid manure system, switching from a liquid to a dry manure system, or changing the manure system to accommodate an animal species or type of operation not included in the scope of the current AWMP. 6. Any changes that are likely to increase the risk of nitrogen and phosphorus transport to surface water or groundwater.	The following are considered non-substantial provided they do not result in a substantial change: 1. An increase in animal numbers greater than 10% of the registrant's maximum allowed animal numbers. 2. When facility expansions, production increases, or process modifications will result in new or increased generation of waste, litter, or process wastewater beyond the scope of the current AWMP.
Timeline to submit proposal to ODA	Submit at least 45 days in advance of proposed change(s).	Submit at least 45 days in advance of proposed change(s) unless a different timeframe allowed by ODA.	Submit at least 60 days in advance of proposed change(s).	Submit at least 60 days in advance of proposed change(s) unless a different timeframe is allowed by ODA.
Public notice process	ODA will public notice as described in S1.H, p. 8.	Not required.	ODA will public notice as described in S1.H, p. 8.	Not required.
ODA approval	ODA will notify the permit registrant of its final decision concerning the proposed change(s) after the public notice period ends.	ODA will notify the permit registrant of its final decision concerning the proposed change(s) after reviewing the proposal.	ODA will notify the permit registrant of its final decision concerning the proposed change(s) after the public notice period ends.	ODA will notify the permit registrant of its final decision concerning the proposed change(s) after reviewing the proposal.

S4. MONITORING, INSPECTION, RECORDKEEPING, AND REPORTING REQUIREMENTS

S4.A. Monitoring Requirements

1. Prohibited Discharges

If a prohibited discharge to surface water or groundwater that is not allowed by S2.B or S2.C, p. 10 occurs, the permit registrant must record the following information and notify ODA within 24 hours (see S4.D, p. 19 for written reporting requirements):

(a) A description and cause of the discharge;
(b) The period of discharge including exact date(s), time(s), and duration of discharge;
(c) An estimate of discharge volume;
(d) Name or location of receiving water;
(e) If a grab sample was taken of the discharge;
(f) Corrective steps taken, if appropriate, to reduce, eliminate, or prevent reoccurrence of the discharge;
(g) For any unauthorized discharge that may have come in contact with a drinking water intake, confirmation that Oregon Emergency Response System (OERS) was notified.

2. Soil, Manure, Litter, and Process Wastewater Monitoring for *Large* CAFOs

The permit registrant with a *large* CAFO must conduct the following sampling and analysis:

Sample Type	Analytical Parameter	Minimum Frequency	Sample Method
• Liquid manure • Process wastewater (if handled separately from liquid manure) • Solid manure	Total nitrogen Total phosphorus	Annually	Sample according to guidance contained in PNW 0533 and PNW 505.
Exported manure, litter, and process wastewater	Total nitrogen Total phosphorus	Annually	Sample according to guidance contained in PNW 0533 and PNW 505.
Soil from land application area(s)	Total nitrogen Total phosphorus Nitrate-nitrogen	Annually on a minimum of 20% of the fields or management units that receive manure, litter or process wastewater applications each year. All fields or management units must be sampled at least once every 5 years.	Sample according to guidance contained in PNW 570-E, EM 8832-E for post-harvest nitrate-nitrogen
Grab sample of effluent discharge from production or land application area	*E. coli*, Nitrate plus Nitrite Nitrogen (NO_3+$N0_2$), Total Phosphorus (P)	Upon occurrence see S2.A.2, p.10.	Grab sample analyzed using test methods in 40 CFR Part 136

3. Soil, Manure, Litter, and Process Wastewater Monitoring for all Other Operations

The permit registrant must conduct the following sampling and analysis:

Sample Type	Analytical Parameter	Minimum Frequency	Sample Method
Soil from land application area(s)	Total nitrogen Total phosphorus	Once every 5 years from all fields or management units where manure, litter, or	Sample according to guidance contained in PNW 570-E, EM

		process wastewater is applied.	8832-E.
Grab sample of effluent discharge from production or land application area	*E. coli*, Nitrate plus Nitrite Nitrogen (NO_3+NO_2), Total Phosphorus (P)	Upon occurance see S2.A.2, p.10.	Grab Sample analyzed using test methods in 40 CFR Part 136

S4.B. Inspection Requirements

1. The permit registrant must conduct the following inspections:

Item	Large CAFO	All Other Operations
(a) Stormwater diversion devices, runoff diversion structures, animal waste storage structures, and devices channeling contaminated stormwater to wastewater and manure storage and containment structures	Weekly and record results	At least once every six months
(b) Water lines, including drinking water or cooling water lines	Daily and record results	At least once every six months
(c) Equipment used for land application of manure, litter, or process wastewater	Daily when equipment is in use and record results	At least once every six months when equipment is in use
(d) Liquid impoundments for manure and process wastewater	Weekly and record depth of manure and process wastewater according to depth marker required by S2.E.3, p. 11	At least once every six months

2. The permit registrant must correct any deficiencies found as a result of these inspections as soon as possible. The permit registrant with a *large* CAFO must record any actions taken to correct these deficiencies and, if deficiencies are not corrected within 30 days, provide an explanation of the factors preventing immediate correction.

S4.C. Recordkeeping and Availability Requirements

1. The permit registrant must maintain all information required by this permit at the facility for at least five (5) years and make this information available to ODA upon request.

2. Upon obtaining permit coverage, the permit registrant must record the following information:

Item or Parameter	Large CAFO	All Other Operations
(a) Date, amount, and nutrient loading of manure, litter, or process wastewater applied to each field.	Required	Required
(b) Weather conditions at the time of application and 24 hours before and after application.	Required	Not required
(c) Total amount of nitrogen and phosphorus actually applied annually to each field, including documentation of calculations of the total amount applied.	Required	Required

Item or Parameter	Large CAFO	All Other Operations
(d) Total amount of manure or wastewater transferred or exported to other persons.	Required. Also include: (i) Date and amount of each transfer or export (ii) Name and address of each recipient (iii) Copy of the manure nutrient analysis conducted provided to the recipient (See S2.K.3, p. 12)	Required
(e) Description of actions taken to correct deficiencies discovered during inspections.	Required (See S4.B.2, p. 18)	Not required

S4.D. Reporting Requirements

1. Reporting to ODA and Oregon Emergency Response System (OERS)
   (a) If a discharge to surface water or groundwater occurs that is not allowed by S2.B and S2.C, p. 10, the permit registrant must notify ODA within 24 hours of the discharge. The permit registrant must submit a written report within five (5) days to ODA. The information to be submitted is listed in the monitoring requirements (See S4.A, p. 17) of this permit.
   (b) The permit registrant must notify ODA within 24 hours of becoming aware of any significant physical failure at any time of treatment works required under this permit.
   (c) The permit registrant must notify ODA within 24 hours of any permit noncompliance that may endanger health or the environment as described in G13.6, p. 23.
   (d) In addition to complying with [1.(c)] above, the permit registrant must notify Oregon Emergency Response System (OERS) of any unauthorized discharge that may come in contact with a surface water or groundwater drinking water system intake within 24 hours. Notification must be made by calling OERS at 1-800-452-0311

2. Reporting of Monitoring Results of a prohibited effluent discharge
   (a) The permit registrant must submit monitoring information for an effluent grab sample no later than one month from the date the sample was taken unless a different schedule is established by an administrative order as described in S4.E, p. 20.
   (b) Reporting of monitoring information must include:
      (i) The date, exact place, and time of sampling or measurements;
      (ii) The individual(s) who performed the sampling or measurements;
      (iii) The date(s) analyses were performed;
      (iv) The individual(s) who performed the analyses;
      (v) The analytical techniques or methods used; and
      (vi) The results of such analyses that includes the sample result and quantitation limit of the analysis.

3. Annual Report
   (a) The permit registrant must submit an annual report to ODA by March 15 of each year. The annual report must include the following for the previous calendar year :
      (i) Maximum number and type of animals approved by ODA in the permittee's *Notice of Registration*, whether in open confinement or housed under roof (for example, beef cattle, broilers, layers, swine weighing 55 pounds or more, swine weighing less than 55 pounds, mature dairy cows, dairy heifers, veal calves, sheep and lambs, horses, ducks, turkeys, other).
      (ii) Actual number of animals by type averaged over the year.
      (iii) Estimated amount of total manure, bedding, litter, process wastewater, and other material that comes in contact with manure generated (tons, gallons, cubic feet, or cubic yards).
      (iv) Estimated amount of total manure, bedding, litter, process wastewater, and other material that comes in contact with manure transferred to other persons by the permittee (tons, gallons, cubic feet, or cubic yards).
      (v) Estimated amount of manure, bedding, litter, process wastewater, and other material that comes in contact with manure applied to land by the permittee (tons, gallons, cubic feet, or cubic yards).
      (vi) Total number of acres for land application covered by the AWMP developed in accordance with

the terms of this permit.

(vii) Total number of acres under control of the permittee that were used for land application of manure, litter, and process wastewater in the previous 12 months.

(viii) Summary of all manure, litter, and process wastewater discharges from the production area that have occurred, including date, time and approximate volume.

(ix) A statement indicating whether the AWMP was developed or approved by a certified waste management planner.

(x) Any Concentrated Animal Feeding Operation that discharges to surface waters must also report the following items (xi) through (xvi). (40 CFR 122.42(e)(4)(viii)

(xi) Actual crop(s) planted and actual yield(s) for each field.

(xii) Actual nitrogen and phosphorus content of the manure, litter, and process wastewater.

(xiii) Data used and results of calculations based on protocol in the ODA-approved AWMP.

(xiv) Amount of manure, litter, and process wastewater applied to each field during the previous 12 months.

(xv) Results of soil testing for nitrogen and phosphorus if testing was performed.

(xvi) Amount of any supplemental fertilizer applied.

(b) The annual report must be signed and certified by the permittee or permittee's authorized representative with the following statement: "I certify, under penalty of law, that this document and all attachments were prepared under my direct supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations."

S4.E. Additional Monitoring

1. ODA may establish specific monitoring requirements in addition to those contained in this permit by administrative order. An administrative order is an agency action expressed in writing directed to a named person or named persons (ORS 183.310).

2. If a permittee experiences two or more discharges within a 24-month period that are not associated with a 25-year, 24-hour or greater rainfall event, ODA may require surface water and/or groundwater quality monitoring or transfer the permittee to an individual permit. Monitoring for the following parameters may be required: bacteria, total suspended solids, total kjeldahl nitrogen, biochemical oxygen demand, and other nutrient indicators. If ODA waives the additional monitoring requirements because such monitoring would be impracticable or not likely to produce useful information, ODA will set out the basis for the decision in writing and make the decision available to interested persons.

GENERAL CONDITIONS

The general conditions in this schedule apply only to the extent they do not conflict with the requirements contained in special conditions S1 through S4. If the permit requirements in special conditions S1 through S4 conflict with these general conditions, the permit requirements in special conditions S1 through S4 will control.

G1. Compliance with other laws and statutes
Nothing in the permit will be construed as excusing the permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G2. Duty to comply [40 CFR § 122.41(a)]
The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

1. The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.
2. The Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $25,000 per day for each violation. The Clean Water Act provides that any person who *negligently* violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who *knowingly* violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.
3. Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.

G3. Duty to reapply [40 CFR § 122.41(b)]
If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit.

G4. Need to halt or reduce activity not a defense [40 CFR § 122.41(c)]
It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

G5. Duty to mitigate [40 CFR § 122.41(d)]
The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

G6. Proper operation and maintenance [40 CFR § 122.41(e)]
The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

G7. Permit actions
1. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition. [40 CFR § 122.41(f)]
2. After notice, registration under this permit may be modified or revoked as it applies to any person for cause as follows:
   (a) Violation of any terms or conditions of the permit,
   (b) Failure of the permittee to disclose fully all relevant facts, or misrepresentations of any relevant facts by the permittee during the permit issuance process and during the life of the permit;
   (c) Failure to pay permit fees required by Oregon Administrative Rule when due;
   (d) Information indicating that the permitted operation poses a threat to human health or welfare;
   (e) A change in ownership or control of the operation, or
   (f) Other causes listed in 40 CFR § 122.62 and 122.63.
3. Modification or revocation of coverage under this permit as it applies to any person may be initiated by ODA.
4. Issuance of coverage under an individual permit may be initiated by ODA in accordance with S1.A.2.

G8. Property rights [40 CFR § 122.41(g)]
This permit does not convey any property rights of any sort, or any exclusive privilege.

G9. Duty to provide information [40 CFR § 122.41(h)]
The permittee shall furnish to the director, within a reasonable time, any information which the director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the director, upon request, copies of records required to be kept by this permit.

G10. Inspection and entry [40 CFR § 122.41(i)]
The permittee shall allow the director or an agency authorized representative (including an authorized contractor acting as a representative of the Administrator), upon presentation of credentials and other documents as may be required by law, to:
1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
4. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act or state law, any substances or parameters at any location.

G11. Monitoring and records [40 CFR § 122.41(j)]
1. Samples and measurements taken for the purpose of monitoring must be representative of the monitored activity.
2. Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which must be retained for a period of at least five years (or longer as required by 40 CFR Part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a

period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the director at any time.

3. Records of monitoring information must include:
   (a) The date, exact place, and time of sampling or measurements;
   (b) The individual(s) who performed the sampling or measurements;
   (c) The date(s) analyses were performed;
   (d) The individual(s) who performed the analyses;
   (e) The analytical techniques or methods used; and
   (f) The results of such analyses.
4. Monitoring must be conducted according to test procedures approved under 40 CFR Part 136 unless another method is required under 40 CFR subchapters N or O.
5. The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

G12. Signatory requirement [40 CFR § 122.21(k)]

1. All applications, reports, or information submitted to the director shall be signed and certified. (See § 122.22)
2. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

G13. Additional reporting requirements [40 CFR § 122.41(l)]

1. *Planned changes.* The permittee shall give notice to the director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:
   (a) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in § 122.29(b); or
   (b) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under § 122.42(a)(1).
   (c) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan;
2. *Anticipated noncompliance.* The permittee shall give advance notice to the director of any planned changes in the permitted facility or activity that may result in noncompliance with permit requirements.
3. *Transfers.* This permit is not transferable to any person except after notice to the director. The director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Clean Water Act. (See § 122.61; in some cases, modification or revocation and reissuance is mandatory.)
4. *Monitoring reports.* Monitoring results must be reported at the intervals specified elsewhere in this permit.
   (a) Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the director for reporting results of monitoring of sludge use or disposal practices.
   (b) If the permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136, or another method required for an industry-specific waste stream under 40 CFR subchapters N or O, the results of such monitoring must be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the director.
   (c) Calculations for all limitations that require averaging of measurements must utilize an arithmetic mean unless otherwise specified by the director in the permit.
5. *Compliance schedules.* Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date.
6. *Twenty-four hour reporting.*
   (a) The permittee shall report any noncompliance that may endanger health or the environment. Any information must be provided orally within 24 hours from the time the permittee becomes aware of the

circumstances. A written submission must also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission must contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

(b) The following must be included as information that must be reported within 24 hours under this paragraph.
   (i) Any unanticipated bypass that exceeds any effluent limitation in the permit. (See § 122.41(g) or G14, p. 24.)
   (ii) Any upset which exceeds any effluent limitation in the permit. (See § 122.41(n) or G15, p. 24.)
   (iii) Violation of a maximum daily discharge limitation for any of the pollutants listed by the director in the permit to be reported within 24 hours. (See § 122.44(g).)

(c) The director may waive the written report on a case-by-case basis for reports under G13.6(b) of this section if the oral report has been received within 24 hours.

7. *Other noncompliance.* The permittee shall report all instances of noncompliance not reported under G13.4, 5, and 6 of this section, at the time monitoring reports are submitted. The reports must contain the information listed in G13.6 of this section.
8. *Other information.* Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the director, it shall promptly submit such facts or information.

G14. Bypass [40 CFR § 122.41(m)]

1. *Definitions.*
   (a) *Bypass* means the intentional diversion of waste streams from any portion of a treatment facility.
   (b) *Severe property damage* means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
2. *Bypass not exceeding limitations.* The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of G14.3 and 4 of this section.
3. *Notice*
   (a) *Anticipated bypass.* If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.
   (b) *Unanticipated bypass.* The permittee shall submit notice of an unanticipated bypass as required in G13.6 of this section (24-hour notice).
4. *Prohibition of bypass.*
   (a) Bypass is prohibited, and the director may take enforcement action against a permittee for bypass, unless:
      (i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
      (ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
      (iii) The permittee submitted notices as required under G14.3 of this section.
   (b) The director may approve an anticipated bypass, after considering its adverse effects, if the director determines that it will meet the three conditions listed above in G14.4(a) of this section.

G15. Upset [40 CFR § 122.41(n)]

1. *Definition. Upset* means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
2. *Effect of an upset.* An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of G15.3 of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

3. *Conditions necessary for a demonstration of upset.* A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
   (a) An upset occurred and that the permittee can identify the cause(s) of the upset;
   (b) The permitted facility was at the time being properly operated; and
   (c) The permittee submitted notice of the upset as required in G13.6(b)(ii) of this section (24 hour notice).
   (d) The permittee complied with any remedial measures required under G5 of this section.
4. *Burden of proof.* In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.