

4.19

SITE SPECIFIC LAND APPLICATION PLAN FOR HOMESTEAD UNIT

This Plan is a component of Fire Mountain Farms, Inc. Application for Coverage Under the General Permit for Biosolids Management Permit No. BT9902

Location:

Site Address (General Location):	1027 Burnt Ridge Road Onalaska, WA 98570
GPS Coordinates of Site Entrances:	Lat 46° 35' 23.54" N, Long 122° 35' 00.83" W
Sec, Twp, Rge:	Sec 20 & 29, Twp 13N, Rge 2E, WM
Water Resource Inventory Area:	26
County:	Lewis

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Introduction

This introduction is intended to give the reviewer a quick and general overview of this site and related items. Many elements of this introduction are more completely addressed later in this Site Specific Land Application Plan.

The goals of this plan include the following:

- Establish procedures to best manage biosolids storage and land application on the site.
- Ensure that consistent and uniform land application practices are performed and observed.
- Provide improved site soil characteristics through sound agronomic management.
- Establish procedures to meet the beneficial use of biosolids as defined in WAC 173-308.

This farm is currently used for beef cattle (cow calf operation), forage production (hay, silage, pasture) and timber production. The site consists of rolling hills dominated by a productive silt loam soil. The site has 1 residences located on it, owned by Robert and Martha Thode. Structures on site include barns / Biosolids storage structures Overall productivity of site is high for forage production

Leaseholder Arrangements: Facilities used by Fire Mountain Farms, Inc. are part of an overall lease agreement between Fire Mountain Farms, Inc. and property owners.

General Site Description: The site consists of rolling hills formed from glacial action during the last ice age. Sensitive areas include wetland areas and riparian areas. Cattle pastures have been fenced to exclude livestock from surface water. None of these properties lie in either the 100 or 500-year flood zone, thus no flood zone map has been included. There have been no observations of threatened or endangered species on the site. The site is in current agricultural production. It is not expected that the application of biosolids will impact threatened or endangered species or critical habitat for such species. A list of threatened, endangered and species of concern as listed by the Department of Fish and Wildlife for Lewis County may be found in Appendix 7.D of this plan.

General Biosolids Handling: Biosolids are delivered to the site during the application window. When biosolids arrive at the site, they are placed into the onsite staging area. The biosolids staging areas are identified in Appendix 2.D of this document. The staged biosolids remain in the designated area(s) until applied to the land.

Ownership, Management, and Landowner Agreements

Owners are as listed below.

Owner	Parcel(s)	Zoning
Thode, Robert J. 856 Burnt Ridge Road Onalaska, WA 98570	033264001000 033407000000	ARL – Agricultural Resource Lands ARL – Agricultural Resource Lands

The parcels on this site are owned as listed in the above table. Farming operations on this site are managed by Robert and Martha Thode.

This site is zoned as listed in the above table and conversion to other land uses is not allowed. There is no known conversion being planned.

See Appendix 1 for signed agreements from landowners (as distinguished from a lessee, farmer, or others entitled to use the land) that acknowledge the applicability and requirements of Chapter 173-308 WAC when their property is used for biosolids land application or storage.

1.0 Past Biosolids Use

Class B biosolids that have been previously applied to this site have meet pollutant concentration limits as listed in table 3 of WAC 173-308-160. The amount of biosolids applied to this site in the past may be found in the previous year's Biosolids Annual Reports for Fire Mountain Farms, Inc.

2.0 Maps

Mapping units will designate Fire Mountain Farm's area of biosolids land application. These maps denote both site and setback boundaries (road and property line) as well as anomalies (e.g. swales, slopes >25%, physical barriers, etc.). Fire Mountain Farms site application maps will show staging/stockpiling locations, site acreage, site name, common name for site, and other identifying characteristics for each site. Maps are located in Appendix 2 of this plan. There is no flood zone map included as the site does not lie in either the 100 or 500-year flood zone.

2.1 General Location Map

Appendix 2.A – Vicinity Map

Appendix 2.B – General Location & Haul Route Maps

2.2 Site Map or Field Map

Appendix 2.C – Aerial Overview of Site

Appendix 2.D – Residences, Wells, Roads, Rail Line, Accesses, Staging, Signage, Field Identification, Surface Water

Appendix 2.E – Not Used

Appendix 2.F – Not Used

Appendix 2.G – Zoning Map

Appendix 2.H – Topographic Map

2.3 Soils Map

Appendix 3 – Soils Report (includes site soils map)

3.0 Seasonal and Daily Timing of Biosolids Applications

Biosolids applications at this site are limited yearly from March 1st until based on soil and crop conditions are unfavorable. Biosolids will not be applied if the soil is saturated, frozen, covered with snow, or when the potential for off-site movement of biosolids exists, unless otherwise approved by Ecology. Applications will be limited or cease completely when field conditions exist that could result in soil damage, or cause soil percolation or incorporation of biosolids and water to become significantly limited. A streams cross on site and 1 wildlife ponds have been built by land owners. Ten meters vegetated buffers (~33 feet) on all sides of surface waters are in place as shown on the site surface water map in Appendix 2.F. From a practical standpoint, applications will normally occur during daylight hours and operations usually do not occur on weekends or holidays. There may be occasions where deviation from the normal schedule will be required, such as the need to apply biosolids so that a subsequent crop may be planted in a timely manner prior to the rainy season.

There is also a motorcycle MX park to the west of the site. Other recreational uses on this site are hunting, (deer, elk, geese and ducks), fishing and swimming in private ponds. Fire Mountain Farms has and will continue to work with these uses to minimize impacts and will consider requests from neighbors if biosolids application procedures pose a likelihood of conflicting with planned activities.

4.0 Biosolids Staging and Storage

The current Ecology-approved staging area will hold 500 cubic yards we are currently managing the site for cattle production. In the future this site could be converted to primarily crop production

Access points at the site all have lockable gates. Access to this site will also be restricted by informational signs that are shown in Appendix 5 of this plan. To insure that drivers, follow procedures, Fire Mountain Farms has printed instruction sheets describing biosolids offloading procedures. These instruction sheets are sent to all biosolids suppliers. New drivers to the site are walked through these procedures. A triple check system is in place to assure all loads are accounted for: First, all loads are to be scheduled with the Operations Office prior to delivery. Second, all sources have been supplied numbered Delivery Tickets (these are numbered sequentially and if a number is missing, Fire Mountain Farms investigates what happened to it). See Appendix 6.C of this plan for an example. Third, all deliveries are recorded on “Delivery Record Sheet” at sites. See Appendix 6.D for an example.

Biosolids are applied as they are delivered to this site or will be placed in staging until field can be covered quickly

5.0 Cropping Practices and Livestock Management

Acreage and Number of Fields:

Field Acreage:

Field Name/No.	Acreage	Crop/Use	Alternative Crops
HS-5	6.43	Pasture	Small grains, timber
HS-4	6.81	Pasture/Hay	Small grains, timber
HS-6	5.86	Pasture	Small grains, timber
HS-3	6.07	Pasture	Small grains, timber
HS-1	5.85	Pasture/Hay	Small grains, timber
HS-2	6.12	Pasture/Hay	Small grains, timber
HS-7	6.48	Pasture	Small grains, timber
HS-8	8.45	Pasture	Small grains, timber
HS-9	4.97	Pasture	Small grains, timber
HS-10	1.54	Pasture	Small grains, timber
Total			

Crops may change to any food, feed, fiber or fuel crop as markets and other factors change.

Total Acreage:

Parcel Number	Acreage
033264001000	39.40
033407000000	28.58
Total	67.98

Livestock are managed on this site in an intensive pasture management system with most cattle being removed during wet winter months. This system requires many small fields with water available and frequent movement of cattle to new pasture. Application of biosolids is done when cattle are moved off of a field and not put back on that field for at least 30 days at minimum from last date of application. When grass is growing fast, there are still, 45 days between the times when cattle are moved off of a field until the crop is ready to pasture again. This results in 15 days to apply to the field.

Some fields will be cut for hay. The goal is to pasture off field at least once prior to letting it grow for hay. Ideal application would occur after the field was pastured the first time. If not, then it will be spread after the first cutting of hay or silage. In order for Fire Mountain Farms to better time application to crop needs and

weather, it may require the construction of additional short term, (up to two months) and long term, (up to twelve months), storage facilities.

6.0 Other Nutrient Sources and Soil Amendments

Pasturing cattle does return some nutrients to the soil. This addition of nutrients is taken into account when determining biosolids application rates. Whatever the source all nutrient sources will be taken into account when determining application rates. Currently, lime is being applied to this site as a soil amendment. This addition of lime acts to bring the soil-pH into a range that supports optimal plant growth. Other products may be applied as needed to supplement biosolids application.

7.0 Methods of Application

Fire Mountain Farms has a wide variety of application equipment and methods for field applying biosolids. Some of the equipment is very specialized (such as the timber liquid application setup) and others are more common in typical agricultural production. Land application of biosolids will be conducted with equipment that is suitable for the site and also for the material being land applied. Land application methods will provide for an even and consistent distribution in accordance with the calculated application rate (see Subsection 9.2). Quality management of biosolids requires the flexibility to adjust to various site conditions.

Equipment that may be used includes:

- Rear- and side-discharge manure spreaders for dewatered biosolids.
- Spray irrigation equipment for liquid biosolids.
- Drag hose systems for liquid biosolids.
- Other equipment as approved by Ecology.

Buffer widths have been noted on attached maps and will not generally change with application method. However, from a practical standpoint, some methods of application will require increased setbacks to insure biosolids do not enter the buffer area. For example, using a “big gun” (a sprinkler-type system designed to apply liquid materials) could require the setback of an additional distance if wind is determined to be an operational concern. Compliance may also be met on a calm day by stationing a crew member in the field to closely monitor the operations and maintenance of setbacks. Along with buffers comprised of an approved setback distance, vegetated buffers may also be used to protect sensitive areas from biosolids. Fire Mountain Farms considers the method of application to be less of a factor in the setting of buffers than other aspects such as field slope, type of vegetation, permeability of soil and sensitivity of buffered areas.

Currently Fire Mountain Farms has the following equipment:

For de-watered biosolids:

- Knight side slingers (5)
- Meyers rear discharge
- Big A with FarmCo box
- John Deere hydro push

For liquid applications:

- Truck spread with splash plates
- Houle 7300-gallon tank spreader
- Nuhn 5000-gallon tank spreader
- Terigater 4000 gallon spreader
- Hard hose reel (2)
 - With big gun
 - With 120ft spray bar
- Drag hose system
 - With airway aerator
 - With sod injector
 - With 7-shank injector
 - With splash plate

Under most conditions, the preferred method of land application is the use of a drag-hose with airway aerator for liquid and the Knight or Meyer spreaders for de-watered material. The method of application will be matched with the type of biosolids being delivered, the crop and soil conditions. For example, the 7-shank injector is only usable with liquid biosolids being applied to annual crops, whereas the Meyer works best for very dry biosolids (total solids content of 40% or greater). There may be occasions such as soil condition, crops being grown, new seeding, equipment availability, characteristics of the biosolids being delivered or other factors that may require use of different application equipment.

When biosolids must be incorporated to meet the vector attraction reduction (VAR) standard for Class B biosolids, one of the following methods will be used:

- Injection with drag-hose system
- Incorporation with tillage tool such as a disk harrow

8.0 Determining and Validating Application Rates

The subsections below detail the process to set desired nitrogen levels for a given crop, determine how much nitrogen is available in biosolids being applied, and how to calculate volume of biosolids to apply to a given field.

Ecology reserves the right to exercise professional judgment when evaluating proposed application rates and the site suitability so as to ensure the biosolids rule requirements and the goals and objectives of this plan are met.

When biosolids are applied as they are delivered to this site application rate will be calculated based on analytical provide by the facility. Most often biosolids are applied from multiple sources and application rates are calculated based on the highest nitrogen material. Application rates will be recalculated when biosolids are of a liquid consistency or when they contain significantly lower nitrogen concentration levels than what is normally delivered.

8.1 Determining the Plant Available Nitrogen Requirement

Agronomic rates for biosolids application will be determined using one or a combination of the following methods:

- Recommendation of professional agronomist or forester.
- As prescribed in farm plans on file Lewis County Conservation Districts.
- As recommended by Washington State University (WSU) Cooperative Extension guidance.
- Production estimate based on potential of soil as determined by NRCS Soils Surveys, WSU or other Cooperative Extension guidance.
- As determined by actual production data using WSU rates per production unit or the following formula. Calculation of nitrogen requirement for crop production such as hay or pasture will be as follows:

$$\text{Dry matter yield (DmY)} \times (\%N) = \text{N-uptake}$$
$$(\%N) = \text{Crude Protein}/6.25$$

Example:

$$\text{DmY}=4500 \text{ lb, Crude Protein}=18.75\%, \%N=18.75/6.25=3\%$$
$$\text{N-uptake}= 4500 \times .03 = 135 \text{ lb nitrogen utilization}$$

- Rates will be adjusted as indicated by biosolids nutrient data, soil sampling and post-harvest soil nitrate testing. Record of past production is the preferred method, but when that is not available (i.e., new site or new crop), Fire Mountain Farms will base application rate on the best available recommendation. Fire Mountain Farms, Inc. will use the Department of Ecology document, Biosolids Management Guidelines for Washington State, to assist with the calculations of appropriate. The Fire Mountain Farms Application Report (see Appendix 6.A of this plan) will be used to record and document application rates.

8.2 Calculating the Application Rate

Application rates are calculated using Worksheet for Calculation Biosolids Application Rates in Agriculture (PNW0511e), Excel spreadsheet based off of PNW0511e (aka Cogger/Sullivan Worksheet). See Appendix 7.A of this plan for an example. This spreadsheet allows input values for previous applications of biosolids, ammonium retention, and mineralization rate.

Ecology shall have 14 calendar days for review of information regarding agronomic rate recommendations. The 14-day review period shall begin after all necessary information to calculate the recommendation is received in writing by the designated Ecology staff member. If Ecology does not respond within 14 days of receiving all necessary information upon which a recommendation is based, it shall be considered approved.

8.3 Verifying the Application Rate

When applying biosolids, application rates are calculated in gallons per acre for both dewatered and liquid applications. For dewatered biosolids, each application unit is assigned a volume, and the number of loads per field is determined. For less experienced operators, the square feet of area to be covered will be determined. Depending on which applicator is being used, the correct area will be covered by varying speed and width of spread. More experienced operators will check the maximum number of loads per field and set travel area and width so as to come out at that number or less. The typical application rate procedure works like this: the supervisor determines rate and maximum number of loads for a field. This is entered on the "Application Report" and the report is given to the operator with a conservative factor built in (typically 1 to 3 loads less than specification). For liquid applications, a determination of the number of dry tons required is calculated. Then, using the percent total solids of the biosolids, the gallons per acre can be determined. The percent total solids will be checked periodically and an adjustment to the agronomic rate will be made if needed. When using the drag-hose system, a flow meter is mounted in the tractor and a read out is displayed in acres per hour. For example, if an application rate requires 30,000 gallons per acre and a flow rate of 1000 gpm (gallons per minute), the tractor speed is set to two acres per hour. All of this information is recorded on the "Liquid Application Report" located as Appendix 6.B of this plan.

9.0 Sampling Plan

Sections below detail soil sampling and biosolids sampling procedures.

9.1 Soil Sampling

The collection of soil samples and observation of crop response will assist with the determination of correct biosolids application rates. The fall post-harvest soil nitrate test helps to gauge the effectiveness of the biosolids application rates by measuring the concentration of Nitrate-N remaining in the top one foot of soil at the end of the growing season and before soils become saturated. We will follow Oregon State University/ Washington State University guidance #EM 8832-E "Post-harvest Soil Nitrate Testing, for Manured Cropping Systems west of the Cascades" by D.M. Sullivan & C.G. Cogger for sampling Protocol and analyzing sampling results.

Post-harvest soil nitrate testing is performed by collecting soil cores at multiple locations throughout the field, and combining the cores together to form a composite sample. The depth of each core will be labeled. These samples will be dried or refrigerated to stop biological activity that could change results before shipping to laboratory for analysis.

The method for determining biosolids application rates for the coming year will follow the Post-Harvest Nitrate-Nitrogen Soil Testing protocol described on pages 9-12 through 9-16 of the Biosolids Management Guidelines for Washington State (Ecology, 2000), with one exception. That method specifies that soil test Nitrate-N for each foot of soil is multiplied by a conversion factor dependent on the soil bulk density in order to produce a pound per acre amount for each depth range. However, instead of using bulk density conversion factors for determining soil nitrate N in pounds per acre, a factor of 3X will be assumed.

Post-harvest, *report-card*, trends will be compared to threshold goals to determine biosolids application rates for the following year. Additional biosolids land application will be determined by considering the following: the trend nitrate testing, previous agronomic rate of N applied, weather conditions for the growing season, other farming practice that could upset current trend point. As indicated in Table 9.6 in the biosolids management guidelines, 60 pounds per acre of Nitrate-N within the top foot is a typical midpoint residual goal.

Due to the complicated nature of soil nitrogen processes, an alternate method of determining biosolids land application rates may be used. That method would include conducting spring pre-application sampling for soil Nitrate-N and Ammonium-N prior to biosolids application, with those results subsequently used to determine appropriate application rates using the PNW0511e spreadsheet or similar. Once those calculations are complete and the results submitted, Ecology will consider allowing land application rates on a field by field basis. See the Sampling and Analysis Plan for more detailed soil collection and testing information. A sampling and analysis plan detailing the procedures for the collection of soil samples may be found in Appendix 8 of this plan.

9.2 Biosolids Sampling and Analysis

Documenting that biosolids meet the standards for land application in WAC 173-308 is performed by either the biosolids generator (e.g. wastewater treatment plant) or by Fire Mountain Farms, Inc. If biosolids quality is changed by Fire Mountain Farms after receipt through the process of blending multiple biosolids sources, Fire Mountain Farms will follow Ecology's *Policy on Mixing Different Non-Exceptional Quality Biosolids-2008*. A sampling and analysis plan detailing the procedures for the collection of biosolids samples may be found in Appendix 8 of this plan.

9.3 Pathogen Reduction

Pathogens are organisms, such as certain types of bacteria that have the potential to cause disease in humans. Biosolids must be processed to meet certain pathogen reduction standards. The pathogen reduction requirement for biosolids received at this site shall be met by one of the alternatives listed in WAC 173-308-170 (5) through (7). When biosolids from multiple sources are mixed on-site, documentation of pathogen reduction will be provided through the collection of seven samples that are representative of the blended biosolids and analyzed for fecal coliform. These samples will be delivered to a State of Washington accredited laboratory following a chain-of-custody protocol. Pathogen reduction shall be considered to have been accomplished if the geometric mean of the seven fecal coliform samples is less than 2,000,000 MPN/g-total solids (dry weight basis).

For a detailed description of pathogen reduction sampling procedures, please see the Sampling and Analysis Plan located in Appendix 8 of this plan.

9.4 Trace Elements

At a minimum, biosolids land applied at the site, must meet the Ceiling Concentration Limits for pollutants found in Table 1 of WAC 173-308-160 (1). It is a policy of Fire Mountain Farms to only accept biosolids that meet the more restrictive Pollutant Concentration Limit found in Table 3 of WAC 173-308-160 (3).

9.5 Vector Attraction Reduction Standard

Vector attraction is the characteristic of biosolids that may attract insects and animals (vectors) capable of transmitting disease. In general, biosolids meeting vector attraction prior to arriving at the site will have gone through a process to reduce volatile solids or has physical properties such as high pH that reduces vector attraction. To meet vector attraction reduction (VAR) after biosolids arrive at the site, a physical process such as injection or incorporation of the biosolids will be performed as part of the application procedure.

Most all biosolids, prior to being received at the site, shall meet one of the vector attraction reduction (VAR) requirements in WAC 173-308-180 (1) through (6). If the VAR requirement has not been met prior to the biosolids arriving at the site, one of the VAR requirements in WAC 173-308-210 (4) (a) or (4) (b) shall be met at the time of biosolids application.

10.0 Groundwater Protection Plan

Fire Mountain Farms will not apply biosolids to any area where the ground water is not lower than three feet below ground surface (bgs).

11.0 Erosion Control Plan

NRCS has not classed this land as "highly erodible". There are permanently vegetated strips next to streams and ditches. The current agricultural activities do

not deem it necessary for an erosion control plan. Some steep areas could create an erosion problem if tilled and not planted.

Biosolids will be applied at agronomic rates and managed consistent with established farming practices. Typical farming practices designed to reduce erosion potential will be in place.

12.0 Noxious Weed Plan

Sites are managed for specific crops with standard farming practices in place to control noxious weeds. The Noxious weeds of concern on this site are Tansy Ragwort and Canadian Thistle. Both have difficulty competing with desirable vegetation when adequate fertility is maintained in the soil. Our primary concern with noxious weeds is getting other property owners, including the State of Washington, to control noxious weeds on land which is adjacent to fields we farm.

13.0 Restricting Site Access

A copy of Fire Mountain Farms' informational sign can be found in Appendix 5 of this plan. Signs will be placed as noted on the map listed as Appendix 2.D.

Signs will be placed at all normal points of access and at least every quarter mile along roadways that border application areas. Signs will also be placed at other points along the boundary where it is deemed appropriate by Fire Mountain Farms or as requested by DOE. Entering improved property without permission of land owner or person who has right of possession (lease holder) is a violation of state law. The posting of signs noting the site is restricted adds an additional measure for public protection and also signals to all that the land is not open for public access.

14.0 Recordkeeping

Fire Mountain Farms shall keep specific records of land application activities. These records shall be available for inspection by Ecology upon request. As a minimum, the following information shall be included in the land application site records:

Fire Mountain Farms will maintain the following information as required. Forms for maintaining this information are located in Appendices 6 and 7 of this plan.

- Sampling and analysis data obtained or used to make decisions on land application.
- The source of biosolids delivered.
- The amount of biosolids delivered.
- The amount of biosolids applied.
- The number of acres on which biosolids were applied.
- The rate of application.

- The date biosolids were applied.
- The targeted vegetation and its nitrogen requirement.
- Information on how site management and access restrictions were met, including for livestock.
- Information on how vector attraction reduction requirements were met if biosolids were required to be tilled or injected.
- The amount in storage.

15.0 Additional Information

See the following appendices of this Site Specific Land Application Plan for more information.

Appendices

1. Land Owners Agreements
2. Site Maps
 - A. Vicinity Map
 - B. General Location and Haul Route
 - C. Aerial Overview of Site
 - D. Residences, Wells, Roads, Rail Line, Access, Staging, Signage Field Identification Map Surface Water, Wells
 - E. Not Used
 - F. Not used
 - G. Zoning Map
 - H. Topographic Map
3. Soils Report (includes site soils map)
4. Well Logs
5. Informational Sign
6. Forms
 - A. Land Application Report
 - B. Liquid Application Report
 - C. Haul Delivery Ticket
 - D. Delivery Record Sheet
7. Spreadsheets/Charts
 - A. Agronomic Rate Spreadsheet Example
 - B. Trace Elements Spreadsheet
 - C. Grazing Plan and Control Chart Example
 - D. Priority Habitat and Species List
8. Sampling and Analysis Plan
9. Post-Harvest Soil Nitrate Testing
10. Spill Plan Example
11. Supporting Documents