

4.13

SITE SPECIFIC LAND APPLICATION PLAN FOR NEWAUKUM HILL 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 (Primary Access):	985 Highway 603 Chehalis, WA 98532
GPS Coordinates of Site Entrance:	Lat 46° 36' 33.82" N, Long 122° 57' 16.71" W
Sec, Twp, Rge:	Sec 17, Twp 13N, Rge 02W, WM
Water Resource Inventory Area:	23
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 located in an area that has seen considerable residential development on surrounding land. For the last three years it has been planted to grain (oats and barley) and it will be planted to Timothy hay this year. The farm has two timber lots, one recently logged and the other waiting for timber prices to go up. Fields range from flat to steep.

Leaseholder Arrangements: Currently fields are leased by Robert Thode.

General Site Description: The site consists of rolling hills with some flat areas. 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 and spread on the site. When biosolids arrive at the site they are placed onto the biosolids staging area that is identified on the site map found in Appendix 2.D. The staged biosolids remain in the designated area until applied to the land.

1.0 Ownership, Management, and Landowner Agreements

Owners are as listed below.

Owner	Parcel(s)	Zoning
Thode Family LP	017961011002	RRC-R1 – Rural Residential Centers
c/o Lester & Verna	017961011003	RRC-R1 – Rural Residential Centers
Thode	017961011004	RRC-R1 – Rural Residential Centers
PO Box 796	017961004001	RDD-5 – Rural Development District
Napavine, WA 98565	017961004002	RDD-5 – Rural Development District

This site is owned by Thode Family LP. Site management is performed by Robert Thode.

This site is zoned as listed in the above table and agriculture is an allowable use in this zone. There are no plans to develop this property.

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.

2.0 Past Biosolids Use

Only Class A biosolids have been applied to this site. This is a new site for Class B biosolids. No biosolids have been applied to this site that did not meet WAC 173-308-160 (3) (Table 3) for pollutants.

3.0 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.

3.1 General Location Map

Appendix 2.A – Vicinity Map

Appendix 2.B – General Location & Haul Route Maps

3.2 Site Map or Field Map

Appendix 2.C – Aerial Overview of Site

Appendix 2.D – Residences, Wells, Roads, Rail Line, Access, Staging, Signage

Appendix 2.E – Field Identification Map

Appendix 2.F – Surface Water, Wells (see Appendix 4 for Well Logs)

Appendix 2.G – Zoning Map

Appendix 2.H – Topographic Map

3.3 Soils Map

Appendix 3 – Soils Report (includes site soils map)

4.0 Seasonal and Daily Timing of Biosolids Applications

Applications at this site are limited yearly from March 1st until soil becomes saturated and based on soil conditions. Fire Mountain Farms may request an extension from Ecology to continue land application activity. An extension may be granted by Ecology for continued application at no greater than one week intervals. Continued application to the site will be at the discretion of Ecology personnel. It is proposed that there be no limitations on daily timing of applications or restrictions for holidays. 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. Once a hay crop is established, application would occur after first cutting.

Fire Mountain Farms will consider requests from neighbors if biosolids application procedures pose a likelihood of conflicting with planned activities. There are no known special events in this area that biosolids activities would likely impact.

Conflicts with recreational uses on adjacent land could occur due to odor. Class A biosolids (lime treated) have been applied to this site which has generated odor complaints. The intent for permitting this site for Class B biosolids is to allow use of material with little or no odor. Examples of low odor material would be biosolids from lagoons, drying beds or dried pellets that did not meet the 90% dry specification.

5.0 Biosolids Staging and Storage

The staging area for biosolids is a 9-foot deep concrete pit where trucks unload. This pit holds up to 200 cubic yards of biosolids. Any rainfall that may occur during operations stays in the pit and is mixed with the biosolids prior to land application. At no time will any precipitation that comes in contact with staged biosolids be allowed to runoff from the pit.

Liquid biosolids will be applied as delivered or stored in frac tanks.

Access to the site will be restricted by the informational signs shown in Appendix 5 of this plan. We have not had any issues with unauthorized access on this site, if that becomes a problem we will install gates. 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 storage unit. Most often biosolids are applied from single sources however sometimes may be incorporated if from: de-watered blended sources. 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. Nitrogen content will be tested for blended biosolids before incorporation.

Agronomic rates for an application site shall be calculated and approved prior to storing biosolids onsite unless Ecology has specifically granted storage approval in advance of an approved agronomic rate.

6.0 Cropping Practices and Livestock Management

Acres and Number of Fields:

Field No.	Acres	Crop/Use	Alternative Crops
Upper Timber-NH-4	1.99	Timber	Grain, Xmas trees
NH-1	4.79	Timothy Hay	Grain, Xmas trees
NH-2	4.47	Timothy Hay	Grain, Xmas trees
NH-3	13.51	Timothy Hay	Grain, Xmas trees
NH-6 West Timber	9.14	Douglas Fir	Cleared for hay
NH-5 East Timber	10.02	Douglas Fir	Other timber
Total	43.92		

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

Total Acreage:

Parcel Number	Acreage
017961011002	1.44
017961011003	1.38
017961011004	1.10
017961004001	36.63
017961004002	5.83
Total	46.38

Crops planned for the site are timber and hay. Grain has been planted in the past and fields are now planted in Timothy hay for the upcoming growing season; it may return to grain or other crops in the future.

7.0 Other Nutrient Sources and Soil Amendments

Other nutrient sources may be applied to this site as needed to supplement biosolids application or when biosolids is not available. Lime may be applied to this site if needed.

8.0 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 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.
- Liquid tank spreaders
- Other equipment as approved by Ecology.

Buffer widths are shown on attached maps. Specific buffers may be larger if deemed necessary and are shown on attached map. These buffers 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
- AgChem 4000-gallon pressure/vac
- Nuhn 5000-gallon pressure/vac
- 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 normal conditions, the preferred method of land application is the use of a drag-hose with airway aerator for liquid when we have large volume and the Knight or Meyer spreaders for de-watered material. This site will be more suitable to small volume source and tank spreaders. The method of application will be matched with the type of biosolids being delivered, 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 (40%+).

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

9.0 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 biosolids rule requirements and the goals and objectives of this plan are met.

9.1 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 with appropriate 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. Biosolids application rates will be calculated using Washington State Department of Ecology's Best Management Guidelines (#93-80, Revised July 2000). The Fire Mountain Farms Application Report (see Appendix 6.A of this plan) will be used to record and document application rates.

9.2 Calculating the Application Rate

Application rates are calculated using Worksheet for Calculation Biosolids Application Rates in Agriculture (PNW051 1e), Excel spreadsheet based off of PNW051 1e (aka Cogger/Sullivan Worksheet). See Appendix 7.A for 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.

9.3 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 this is recorded on the "Liquid Application Report" located in Appendix 6.B of this plan.

10.0 Sampling Plan

Sections below detail soil sampling and biosolids sampling procedures.

10.1 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.

10.2 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.

10.3 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 the 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.

10.4 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 173-308-170 (1). It is a policy of Fire Mountain Farms to only accept biosolids that meet the Pollutant Concentration Limit found in Table 3 of WAC 173-308-170 (3).

10.5 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.

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.

11.0 Groundwater Protection Plan

Groundwater depth does not come within three feet of the surface at this site in any of the fields that Fire Mountain Farms plans to apply biosolids. Some of the timbered area may have ground water that may come closer to surface, but no application will occur in the timbered areas unless groundwater is lower than three feet. Any application site that has groundwater within three feet of the surface during any part of the year shall have a 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).

Determination of depth to groundwater will be performed if there is a possibility that the groundwater has not yet fallen to a minimum of three feet-bgs prior to a planned application. Semi-permanent monitoring tubes shall be installed at the request of DOE to aid in determining groundwater depths. Some fields can be checked for groundwater depth by the observation of deep ditches that border them. Monitoring tube installation may not be required when such adjacent ditches are dry, indicating that groundwater is below the bottom of the ditch. NRCS soil guidance and past site management experience will be used to identify fields that may have seasonally high ground water.

12.0 Erosion Control Plan

NRCS has not classed this land as "highly erodible". There are permanently vegetated strips next to streams and ditches. The agricultural activities do not deem it necessary for an erosion control plan.

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.

13.0 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, Scotch broom 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, Primarily the State of Washington, to control noxious weeds on land which is adjacent to fields we farm.

14.0 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 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 is going one step beyond to insure the public is aware the land is not open for public access. The posting of signs noting the site is restricted adds an additional measure for public protection and also signals that the land is not open for public access.

15.0 Recordkeeping

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.

16.0 Additional Information

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

Appendices

1. Land Owners Agreement
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
 - E. Field Identification Map
 - F. Surface Water, Wells
 - 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

