

OPERATIONS PLAN/SITE SPECIFIC LAND APPLICATION PLAN



*Application Sites Located in
Benton, Kittitas, Klickitat, and Yakima Counties*

*Submitted as an addendum to
Natural Selection Farms' Application for Coverage
Under the General Permit for Biosolids Management*

December 2, 2015

TABLE OF CONTENTS

1.0 INTRODUCTION	3
1.1 PLAN GOALS	3
1.2 PLAN OBJECTIVES	3
2.0 DEFINITIONS	3
3.0 MAPPING REQUIREMENTS	4
3.1 MAP CONTENTS	4
4.0 SOIL	5
4.1 SOIL SAMPLING PROCEDURES	5
5.0 BUFFERS	6
6.0 APPLICATION SITE APPROVAL	7
7.0 APPLICATION RATES	7
7.1 BASIS FOR BIOSOLIDS APPLICATION RATES	7
7.2 RANGE LAND AGRONOMIC RATE CALCULATIONS	7
7.3 AGRONOMIC RATE CALCULATIONS FOR HOP YARDS	8
7.4 AGRONOMIC RATE APPROVALS	9
8.0 APPLICATION METHODS	9
8.1 CONDITIONS OF APPLICATIONS	10
8.2 INCORPORATION OF BIOSOLIDS	10
8.3 APPLCIATION OF LIQUID BIOSOLIDS	10
9.0 BIOSOLIDS STORAGE	10
10.0 LANDOWNER AGREEMENTS	11
11.0 POLLUTANT CONCENTRATIONS	11
12.0 GROUND WATER PROTECTION PLAN	11
13.0 CROPS, USE, AND PRODUCTION	11
14.0 HAUL ROUTES	11
15.0 RECORD KEEPING	11
16.0 CONDITIONAL USE PERMITS	12
17.0 SIGNS RESTRICTING SITE ACCESS	12

1.0 Introduction

Natural Selection Farms (NSF) handles Biosolids suitable for land application and has regulatory obligations under WAC 173-308, Biosolids Management. This document satisfies the requirements for a **Site Specific Land Application Plan** and sets forth the procedures for land application in partial fulfillment of those requirements. This is a "living" document and will be amended and updated as new procedures are added or existing ones are changed. The Department of Ecology has permitting and oversight authority for the implementation of this plan.

1.1 The Goals of this plan include the following:

- Establish the procedures governing a biosolids land application program for NSF sufficient to meet or exceed Beneficial Use of Biosolids as defined in WAC 173-308-080;
- Ensure consistent, uniform, and orderly land application of biosolids at agronomic rates;
- Improve soil characteristics at land application sites.

1.2 The following objectives are set forth to structure the procedures for land application in order to achieve the plan goals:

- Identify and map specific biosolids Application Sites that are scientifically defensible and have limited public controversy;
- Provide the amount of plant available nitrogen (PAN) necessary for the optimum growth of a targeted vegetation type through soil sampling and agronomic rate calculation procedures;
- Document allowable activities regarding the storage, handling, and application methods for Biosolids;
- Define biosolids practices that enhance the intended crop type while limiting noxious weeds.

2.0 Definitions

This section should contain all terms requiring a definition or explanation in order to clarify meanings and eliminate ambiguity.

Agronomic Rate: The biosolids application rate that provides the amount of nitrogen necessary for the optimum growth of targeted vegetation, and that will not result in the

violation of applicable standards or requirements for the protection of ground or surface water as established under chapter 90.48 RCW and related rules including chapters 173-200 and 173-201A WAC.

Application Sites: Those areas specifically evaluated, mapped, and approved for land application of biosolids at agronomic rates under authority of Chapter 173-308 WAC.

Biosolids: Municipal sewage sludge that is a primarily organic, semisolid product resulting from the wastewater treatment process that can be beneficially recycled and meets all applicable requirements in Chapter 173-308 WAC.

Dewatered Biosolids: Biosolids that have had water removed sufficiently to allow it to be land applied as typical biosolids cake, i.e., suitable for land application. These biosolids are typically in excess of 10% solids.

Drying Bed Biosolids: Biosolids that have air-dried in drying beds and are typically in excess of 80% solids

Liquid Biosolids: Biosolids that shall be land applied with equipment suitable for evenly land applying liquid at agronomic rates

Ecology: Washington State Department of Ecology

Permittee: Natural Selection Farms, Inc (NSF); the entity that is covered under the General Permit of Biosolids management for which this plan is written

3.0 Mapping Requirements

The land Application Sites permitted under this plan shall be discrete areas with specific, identifiable boundaries and some type of a unique name or identifier. Biosolids shall only be applied to mapped and approved Application Sites. The name and/or number of these sites shall be shown on the maps and used for referencing individual areas for agronomic rate calculations or other biosolids management requests. Note, not all past permitted areas have not been mapped to these standards, Application Site maps will be updated over time as agronomic requests are made to Ecology.

3.1 Map Contents

Geographical Information System (GIS) has been used to digitally map the extent of sites permitted for biosolids application by NSF. To develop this data base we have made every effort to use the most accurate data available to the consumer/general public. However, even in the most standard maps, an inherent degree of inaccuracy exists, and prevents our map layers from overlying each other perfectly. Due to this inaccuracy, NSF adheres to buffer distances identified in this Operations/Site Specific Land Application Plan and uses the buffers identified on the maps for reference purposes only.

The GIS database will be updated on an ongoing basis. Reasons for this include:

- Map updates from the various data sources
- Refinement of fields and buffer layers as the map quality improves
- Technology improvements
- Expansion of permitted areas

All maps include as a minimum: a title, a date, a north arrow, a legend that defines all map symbols, and a map scale. Maps shall specifically identify the Township, Range, and Section of all properties for which biosolids are to be applied.

As the maps will be stored in an electronic data base, they will be of an appropriate scale to show the detail necessary for evaluation of the proposed application areas. Data maintained in the map database includes individual Application Site boundaries, tillable acres, buffers, contour lines, perennial and intermittent streams, wetlands, all known roads, property boundaries, adjacent properties and their zoning classification, wells and well circles, NRCS Soil survey information including soil types and their descriptions, presence and extent of any threatened or endangered species or related critical habitat, and the location of any critical areas on site as required to be identified under chapter 36.70A RCW in the county's growth management plan

4.0 Soil

NRCS Soil reports are examined for each of the land application areas. Principle soils groups are available as a map layer.

4.1 Soil Sampling Procedures

Prior to determination of an application rate, composite samples shall be collected independently from the top three feet of soil. The samples shall be taken separately from each foot of soil 0-12", 12-24", and 24-36" where possible, within all Application Sites on which biosolids are to be applied. The individual samples are typically soil cores 10-12" in length, taken from the indicated depths. The individual samples should be located in an unbiased fashion and evenly distributed in order that the composite sample is *representative* of the soil across the entire Application Site. For hop yard sampling protocol, see 7.3 *Agronomic Rate Calculations for Hop Yards*.

Separate *composite* samples shall be collected for each Application Site each time an agronomic rate is calculated. These samples shall be analyzed for ammonium (NH₄) or ammonia (NH₃), nitrate (NO₃), total nitrogen (or TKN) and percent organic matter unless other analytical results are requested by Ecology.

For any site that has not previously received biosolids, concentrations of the Pollutants (WAC 173-308-160, Table 1) shall be determined for the top foot (0-12") of soil prior to any biosolids land application under this plan.

5.0 Buffers

Biosolids applied to Application Sites identified in this Operations/Site Specific Land Plan shall maintain the minimum buffer widths shown below. Buffer distances may be adjusted based on site-specific considerations or monitoring data. These buffers shall be identified on Application Site maps. Minimum buffer distances are based on the Biosolids Management Guidelines for Washington State; Publication #93-80, revised July 2000.

Domestic, Irrigation, or Sampling Well Buffers: 100'

Property Buffers (Roads, Dwellings, Fence Lines): 0-50'—Dependent upon circumstances.

Where there are no sensitive adjoining property uses buffer may be reduced to near zero. NSF standard application minimums are listed below as follows:

- Property Line: 5-50'
- Occupied Home: 100' exceptions permitted with home owner approval
- Major Arterial or highway: 25'
- Public/Minor Road: 5-50'

Federal and State rules require minimum buffers of 33 feet to all waters of the U.S. for Class B biosolids. Prior to each application, NSF determines the appropriate buffer by evaluating the site circumstances in reference to the Biosolids Management Guidelines for Washington State in the table below. Wetlands are managed as surface water.

Table 4.9, Biosolids Management Guidelines for Washington State Publication #93-80, revised July 2000.

6.0 Application Site Approval

Biosolids shall be applied only to areas identified on maps attached with, or as an addendum to this Site Specific Land Application Plan. All sites authorized for biosolids land application shall be approved by Ecology in advance of land applying biosolids. If Application Sites are to be added to the area managed under this Site Specific Land Application Plan, they must meet the requirements set forth in the NSF General Land Application Plan, and Sections 3 and 5 above before being reviewed for approval.

Ecology reserves the right to exercise professional judgment when evaluating proposed Application Site's suitability to meet rule requirements as well as the goals and objectives set forth in this plan.

7.0 Application Rates

Agronomic application rates for biosolids shall be calculated and approved by Ecology prior to biosolids land application unless Ecology agrees to other conditions on a site-specific basis. A revised agronomic rate will be calculated each time biosolids are to be land applied except as noted under section 7.2 for rangeland applications.

7.1 Basis for Biosolids Application Rates

Agronomic rates shall be separately calculated for different crop species grown on a given Application Site.

Application rates for biosolids shall be based on the following: the soil analysis, pounds per acre nitrogen uptake (if this is yield-based, data should be provided) or crop requirement, nitrogen content of the biosolids, current data on soil nitrogen status, soil type, total soil organic matter, an estimated biosolids mineralization rate, and the professional judgment of Ecology.

Cooperative Extension Services, University fertilizer guidelines, or an agronomist / soil scientist shall be the basis of recommendations for plant available nitrogen (PAN) additions. The information upon which the recommendation is based shall be provided to Ecology prior to approving a biosolids application rate.

7.2 Range Land Agronomic Rate Calculations

For biosolids applications to rangeland, vegetative production (yield, in tons per acre) will need to be estimated. The estimate of production shall be used in calculating plant uptake of nitrogen. An acceptable method for calculating annual plant uptake of nitrogen is the following:

Equation 1: $\text{Crude Protein} / 6.25 = \% \text{ N of Dry Matter}$

Equation 2: $(\% \text{ N of Dry Matter}) \times (\text{Est. Dry Matter Annual Production}) = \text{Annual } \underline{\text{Nitrogen Uptake}}$

NOTE: To utilize *Equations 1 & 2*, field sampling of vegetation from primary forage species shall be conducted. These samples shall be analyzed for crude protein in order to determine the input value for *Equation 1*. Estimates of forage species dry matter annual production shall be determined from authoritative sources such as University Extension, rangeland specialists, or other science-based data where the source information can be verified.

The application rate initially calculated for rangeland shall remain in effect until Ecology determines that a revision is necessary. Revisions may be based upon soil nitrogen testing or other factors that would indicate different rates of application are appropriate. Multiple year applications may be approved on a site-specific basis.

7.3 Agronomic Rate Calculations for Hop Yards

Information gained through the mineralization studies and the utilization of biosolids from previous years of applications and the restructuring of hop plantings has led to this method of agronomic rate calculations for biosolids applications to hop yards.

1. Pre-winter soil samples shall be taken prior to spring biosolids application when possible. This sampling will likely occur during the October through November sampling window, to determine plant available nitrogen (PAN) within the rooting zone of the hops. Hop yards that are being modified, replanted or in a condition that makes fall sampling unsuitable, will be sampled as early in the spring as weather permits. As a BUF, NSF actively solicits growers to change to an organic method of crop fertilization and soil enhancement. If we are given approval to supply biosolids to a field after the designated sampling window, it will be necessary to sample early spring to determine an accurate application rate for the fields.
2. Sampling will be conducted in the top 3 feet of soil in 1 foot increments. Samples will be taken within the hop row, not to be more than 1' to either side, ie directly on top of the hill. This data for all hop yards where biosolids are applied shall be provided to Ecology.
3. A requirement for 100 lbs N/ac residual in the top 2 feet of soil after a growing season has been identified as acceptable. Biosolids may be applied at such rates that plant available nitrogen in the year of application is 250 lbs/acre; this is to include residual soil mineral nitrogen and estimated mineralized nitrogen from biosolids.
4. For broadcast applications, the majority of the applied biosolids shall be windrowed, scraped, or otherwise moved away from the middle of the row and deposited next to the hop row for better utilization of the nitrogen by the hops. This means that the overall biosolids application rate will be reduced as it will only be covering about a 5-6 foot band near the hop row and not the entire 14 foot spacing per row. Therefore, the agronomic rate determined in #2 above, shall be multiplied by a factor of 0.75 to account for the non-farmed "middles".

5. Due to variation in biosolids mineralization, fields may receive up to an additional 100 lbs N/ac through the drip irrigation system. Leaf petiole sampling during June will regulate how much of the scheduled drip applied nitrogen is needed. Growers will follow historical petiole nitrate nitrogen values they have established for each variety, and will cease drip applied nitrogen if petiole values exceed the normal nitrate nitrogen range for a particular variety. Baby hops with a limited root system will be an exception as drip applied nitrogen may need to be continued, even with high petiole nitrate nitrogen levels. The baby hop yards shall be specifically identified to Ecology prior to biosolids land application.
6. A cover crop will be seeded in all hop yards that receive biosolids. This crop shall be mowed at least once per year during the growing season, discharging the cut material towards the hops to be later incorporated next the hop row. Alternatively, this cover crop may be cut and removed. Planting of the cover crop will be as early as possible to maximize plant growth and nitrogen removal from areas outside the reach of hop roots. Late fall and/or winter biosolids applications may result in the cover crop being spring planted. If soil samples demonstrate residual nitrate has not accumulated in the middles, this requirement may be waived.
7. Soil sampling between rows shall be conducted on all yards where biosolids will be applied. These samples shall be taken no closer than 6 feet from the row. This should provide a two foot band in the middle of rows from which to sample. These samples shall be a composite of at least 5 separate locations in each yard. One composite shall be taken at each 1 foot of soil. Soil shall be sampled to 3 feet. Sampling between the rows will be conducted upon the request of the Biosolids Coordinator at Ecology's Central Regional Office.

7.4 Agronomic Rate Approvals

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.

8.0 Application Methods

Land application of biosolids shall be conducted with equipment suitable for the purpose and the material being land applied. This means that land application methods shall produce even and consistent spread patterns in accordance with the calculated agronomic rate(s).

8.1 Conditions of Applications

Biosolids will be applied when weather and site conditions allow for proper application and management. Unless approved by Ecology, biosolids will not be applied if the soil is saturated or flooded, frozen, covered with snow, or other conditions that could result in soil damage or off-site movement of biosolids.

8.2 Incorporation of Biosolids

Biosolids that does not meet Vector Attraction Reduction (see WAC 173-308-180) shall be incorporated into the soil within 6 hours after land application. Injection of liquid biosolids meets VAR incorporation requirements. Biosolids that do not meet vector attraction reduction shall not be surface applied on established grass hay fields.

8.3 Application of Liquid Biosolids

Liquid biosolids shall be applied by equipment appropriate for even distribution of liquid material for the specific land application.

Liquid biosolids shall not be applied in such a manner that it results in runoff. This may have the practical effect of limiting application volumes on slopes, relative to volumes applied on level ground. Material shall not be applied in excess of the calculated annual agronomic rates. In addition, it shall be insured that liquid material does not migrate from the location applied. If agronomic rates allow for application volumes that result in runoff, the biosolids may have to be applied in separate applications to prevent such runoff. Multiple applications may be allowed in order to reach the agronomic rate, although time may be required for infiltration to prevent runoff or damage to soil structure from running equipment on wet soil.

9.0 Biosolids Storage

Biosolids products from different generators shall be stored separately. Where biosolids from different generators are stored at the same location, each storage pile shall be clearly marked with signs indicating the source of the biosolids. These signs need to remain legible during the entire period of storage. It's typically the case that signs weather to extent that they become unreadable. It is NSF's responsibility to maintain these signs. Ecology shall be given authority to rescind storage or application approvals if storage sites and / or signage are not properly maintained.

Prior to storing biosolids on an application site, the agronomic rates for an application site shall be calculated and approved, unless Ecology has specifically granted storage approval in advance of an approved agronomic rate.

10.0 Landowner Agreements

At the time their property is submitted for application or storage site approval, Ecology shall be provided with signed agreements that acknowledge the applicability and requirements of Chapter 173-308 WAC from landowners (as distinguished from a lessee, farmer, or others entitled to use the land).

11.0 Pollutant Concentrations

To the best of NSF's knowledge, biosolids with pollutants in excess of the values in WAC 173-308-160 Table 3 have not been applied to Application Sites covered by this plan.

12.0 Ground Water Protection Plan

If any active application site has groundwater within 3 feet of the surface during any part of the year, NSF shall have a Ground Water Protection Plan. The details of the plan shall be drawn up to meet the specific area and can include simple measures like restricting application during periods when the water table is high.

13.0 Crops, Use, and Production

All relevant crop information such as crop type, standard production information, generally intended use, distribution information, and farming practices shall be submitted with each request for an agronomic rate recommendation. A note regarding distribution and utilization: NSF, operating as a BUF, is not always privileged to know where the crop will be marketed or utilized.

14.0 Haul Routes

Biosolids delivery trucks shall follow designated haul routes as shown on the Spill Prevention and Response Plan. It's recognized that due to a variety of weather and road related conditions that routes may be subject to change. However, when road weight restrictions are in place, truck routes shall be coordinated with county departments that regulate traffic on county roads.

15.0 Record Keeping

NSF 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:

- Dates of Application for each Application Site;

- Total Wet and Dry tons applied to each Application Site;
- Names of biosolids generators and their wet and dry tons applied to each site.

16.0 Conditional Use Permits

Permittees shall acquire conditional use permits where required. Any land application conditions specified in a Conditional Use Permit (C.U.P.) shall be made an addendum to this plan.

17.0 Signs Restricting Site Access

A sign containing the following information will be posted at all access points and along common points of public contact:

BIOSOLIDS APPLICATION SITE

DATE BIOSOLIDS APPLIED:

Enter only with permission of Farm Manager

Natural Selection Farms has applied a Class B biosolids product to this site as a soil amendment. Biosolids applied to this site are primarily a stabilized organic product resulting from the treatment of municipal wastewater. The biosolids applied on this field meet all the regulatory requirements for land application prescribed in Chapter 173-308 WAC, Biosolids Management.

Contact Information for this Site:

Permittee:

Natural Selection Farms Inc.
P.O. Box 419
Sunnyside, WA 98944
(509) 837-3501

Regulatory Officials:

Department of Ecology
Peter Severtson
303 S. Mission
Wenatchee, WA 98801
(509) 665-5381

Yakima County Health District
Ted Silvestri
1210 Ahtanum Ridge Drive
Union Gap, WA 98903
Phone 509-575-4040

ACCESS IS RESTRICTED TO PERSONS INVOLVED WITH THIS PROJECT