# **City of Yachats**

# **Biosolids Management Plan**

July 14, 2014

Biosolids Management Plan for City of Yachats NPDES Permit No. 103001 File No. 99260 David A. Buckwald (541)547-3385

#### **INTRODUCTION**

The City of Yachats (population approximately 815 winter months 2500 peak summer months) owns and operates a municipal wastewater collection (Level II) and treatment system (Level II), and manages a biosolids management program. Originally built in 1974, under National Discharge Elimination systems (NPDES) permit number (old permit number 100812), the plant had improvements in 1992 which included a 115,000 gallon clarifier. In 2007, the City of Yachats began construction on a new Activated Sludge Sequencing Batch Reactor (SBR). The new plant was completed and began full operation on January 2009. The old donut style plant and clarifier were converted into aerobic digesters and an aerated sludge holding tank.

The City of Yachats biosolids management plan was approved by the Oregon Department of Environmental Quality (Department) on September 22, 1986. An updated biosolids management plan was submitted May 10, 2011. This revised 2014 Biosolids Management Plan is being updated at this time to address the new biosolids management process. This biosolids management plan, as required by the NPDES permit (103001), outlines the liquids and solids processes at the facility, how biosolids are managed to meet federal and state requirements, and how the biosolids land application program is operated.

Wastewater processed by the treatment works is primarily of domestic origin, and no formal pretreatment program is required to be implemented under the NPDES permit. The City of Yachats plans to begin receiving septage from residential holding tanks as well as biosolids from Angell Job Corps Wastewater Treatment Plant.

# WASTEWATER TREATMENT FACILITY

#### **Liquids Processing**

City of Yachats operates an Activated Sludge Sequence Batch Reactor located at 500 W. 7<sup>th</sup>, Yachats in Lincoln County, Oregon. Treated effluent is discharged year-round to the Pacific Ocean (R.M. 9999). The designed average dry weather flow is 0.170-0.174 million gallons per day (MGD). Actual monthly flows during the 2013 (May-October) dry season averaged 0.141 MGD and during the wet season 2013-2014 (November-April) averaged 0.171 MGD. The peak flow design capacity is 1.96 MGD. The origin of the wastewater processed is 93 percent domestic and 3 percent commercial.

# Current Liquids processing components,

#### Headworks

- One fine mesh cylindrical auger screen, capable of removing matter larger than a ¼" diameter. It has a capacity of 2.6 MGD.
- > One hand raked bar screen with a bar spacing of  $\frac{3}{4}$ " and a flow capacity of 3.0 MGD.
- > One aerated grit basin with a detention time of 6.07 minutes at a peak flow of 2.6 MGD

Biosolids Management Plan for the City of Yachats 07/14/2014 Page 2 of 23

- > One grit classifier capable of removing up to 1100 lbs. per hour.
- Three Parshall flumes with a throat width of 9". Flow range is 0.059 to 5.73 MGD. Each Parshall flume has an ultrasonic level sensor.

#### **Sequencing Batch Reactor**

- Two continuous feed tanks with treatment capacity of 0.98 MGD each. Both have a working volume of 0.32 MG each.
- Two 40 horsepower rotary positive displacement, variable speed blowers (one per basin) one redundant. Fine bubble diffusers are used for aeration which is controlled by one DO probe in each tank.
- Each basin has a variable level decanter. Normal decant rate is 2,038 gallons per minute. Peak decant rate is 3,037 gallons per minute.
- Each basin has a 2.4 horsepower WAS pump capable of pumping 74 gallons per minute. A 2" magnetic flow meter with a capacity of 0-200 gallons per minute is just downstream of the WAS pump.

# **Equalization Basin**

- The SBR decants the effluent off the basin into the equalization basin. It has a volume of 117,810 gallons at a maximum water depth of 8.4 ft.
- Secondary effluent is discharged from the equalization basin through a 12" PVC pipe to the Ultraviolet disinfection station. Effluent passes through a 12" magnetic flow meter with a flow range of 0-3000 gallons per minute prior to disinfection.

# **Ultraviolet Disinfection**

- The Ultraviolet disinfection station consists of a 12" wide channel 54" deep. The depth of flow is 24.7".
- The horizontal lamps are 64" long. There are two banks consisting of three modules. Each module having six low pressure-high output lamps, totaling 36 lamps.
- Current flow capacity is 1.96 MGD.

# **Aerobic Digestion**

- The digester contains four cells. The volume of each digester is #1- 45,807 gal., #2- 40,497 gal., #3- 40,497 gal., #4- 37,400 gal. Total digester volume is approximately 164,201 gallons.
- Each digester has a 4"PVC decanting arm to remove supernatant to the Sludge Storage Tank or the Drain pump station, whichever the operator chooses.
- Three 20 horsepower rotary positive displacement, variable speed blowers are available for use. One or two blowers for general air requirement, the third blower is redundant. Fine bubble diffusers are used for aeration which is controlled by SCADA.
- An 8,400 gallon sludge transfer tank is part of the digester tank system. Sludge or supernatant decanted off the digesters is conveyed through an 8" transfer pipe that connects digesters #3, 2, and the sludge transfer tank. An 8" pipe connects Digester #1 and #4 to the sludge transfer tank. This pipe is located on the floor of the digesters.
- A 111,500 gallon aerated Sludge Storage tank is available to use if needed for a combined volume of 275,700 gallons digester space.

# **FKC Screw Press**

Biosolids Management Plan for the City of Yachats 07/14/2014 Page 3 of 23

- The Yachats Wastewater Treatment Plant has a FKC Screw Press for a digested sludge dewatering system.
- > The 7.5 horsepower screw press has a digested sludge capacity of 0.45 dry tons per 24hr day.
- A polymer is used to condition the digested sludge. Filtrate from the process is gravity fed to the drain pump station where it is pumped to the headworks.
- > Dewatered solids are conveyed to a garbage dumpster and sent to a local landfill.
- The FKC Screw Press has the ability to be fitted for steam use to achieve Class A biosolids in the future.

### **Solids Processing**

The City of Yachats has four aerobic digesters with a total volume of 164,200 gallons and an aerated sludge storage tank with a volume of 111,500 gallons. 275,700 gallons combined if needed.

The digester cells are set to operate sequentially, but can be operated in parallel. Waste sludge from the SBR is deposited in the center digester cell No. 1 during the wasting cycle of the SBR process. Under normal operations the basins will be aerated. When the cell is full, part of the mixed sludge will overflow through stop gates set into the top of the basins wall into Cell No. 2. This process continues with the overflow of sludge continuing sequentially to Cell No. 3 and then Cell No. 4. Periodically the operator turns off the air to a cell and allows it to settle. After the solids have settled, the decanting arm in the cell is manually lowered to allow the liquid supernatant to drain to the Sludge Transfer Station where it can then be pumped to the Drain Pump Station then pumped to the headworks. The air is turned off. The sludge is then gravity fed to the Sludge Transfer station and pumped to the sludge storage tank, the dewatering press, or the tanker loading station.

The average daily waste rate in 2013 was 4,129 gallons per day with an average concentration of 4,200 mg/L to 7,800 mg/L. The average 2013 total monthly decant volume was between 77 % to 189% of the total monthly waste to the digesters, concentrating the biosolids to 0.53 to 1.15% total solids. The number of days of digestion range from 66 days during the summer to 131 days during the winter. This meets the Federal Pathogen requirements for CFR 40 503.32(b) (3) PSRP (1). During cold weather months, biosolids are held to a longer detention time. Once the detention time required has been met, any lab tests such as (pH, SOUR, Temperature correction, TS and VS) are performed to assure that CFR 40 503.33 (b)(1) or CFR 40 503.33 (b)(6)for the Federal Vector Attraction requirements have been met.

The FKC Screw Press is the primary system used to process biosolids to be hauled.

During operation, biosolids are pumped to the screw press from the Sludge Transfer Station where it is dosed with an emulsified polymer. The solids are then gravity fed into the screw press, dewatered, then dropped into a screw conveyor. Filtrate is piped to the Drain Pump Station and sent back to the headworks. Dewatered solids are conveyed out of the Sludge Handling building to an impounded area.

Beginning in 2014, depending on weather conditions, dewatered solids will be loaded into a 5 or 10 yard dump truck or into dumpsters. In dry weather conditions the solids are sent to Heard Farms Inc. in Roseburg Oregon. In wet weather conditions the solids are put into dumpsters to be sent to the land fill by the local refuse hauler.

In 2013, the inlet consistency averaged 0.88 - 1.2 % total solids with an outlet consistency of 10.0 - 17.3 % total solids. Total Solids testing on inlet and outlet consistency as well as gallons ran are recorded.

#### **Pretreatment Program**

The City of Yachats is not required at this time to implement an industrial wastewater pretreatment program as there are no industries in the city of Yachats. Pollutant monitoring requirements as stated in the permit will ensure land application of biosolids occurs within federal and state limitations.

#### **BIOSOLIDS TREATMENT PROCESSES**

Under 40 CFR Part 503 and Oregon Administrative Rules Chapter 340, Division 50, pathogen reduction and vector attraction reduction for biosolids must be met prior to land application. To meet regulatory requirements, pathogen reduction must be met before or at the same time that vector attraction reduction is achieved. City of Yachats biosolids are categorized as Class B because of the method(s) used to determine pathogen reduction.

The City of Yachats will certify in writing that Class B pathogen requirements and vector attraction reduction requirements are met. The City of Yachats will also notify the Department in writing and obtain written approval prior to any process change that would use a pathogen reduction or vector attraction reduction method other than what is specified in this biosolids management plan.

#### **Pathogen Reduction**

At the City of Yachats WWTP, pathogen reduction requirements of 40 CFR Part 503 and OAR 340-050 are met by using either one of the two alternatives listed. The two primary alternatives used are; Alt. 1) Monitor

Biosolids Management Plan for the City of Yachats 07/14/2014 Page 5 of 23 sewage sludge for fecal coliform 503.32(b)(2), and Alt. 2) Use Process to Significantly Reduce Pathogen (PSRP) 503.32(b)(3).

#### Class B Pathogen Requirements

- Alternative 1: The geometric mean of the density of fecal coliform of seven representative samples shall be less than either 2 million Most Probable Number (MPN) or 2 million Colony Forming Units (CFU) per gram of total solids (dry weight basis). See **attachments A(a) and A(b)** for independent lab results for 2013-2014.
- Alternative 2: Biosolids shall be treated in one of the Processes to Significantly Reduce Pathogens (PSRP) described in the table below. See **attachment B** for calculation.
- Alternative 3: Biosolids shall be treated in a process that is equivalent to a PSRP, as determined by the permitting authority.

#### Processes to Significantly Reduce Pathogens (PSRP) Listed in Appendix B of 40 CFR Part 503

$\boxtimes$	Aerobic Digestion	Sewage sludge is agitated with air or oxygen to maintain aerobic conditions for a specific mean cell residence time (i.e., solids retention time) at a specific temperature. Values for the mean cell residence time and temperature shall be between 40 days at 20°C (68°F) and 60 days at 15°C (59°F).
	Air Drying	Sewage sludge is dried on sand beds or on paved or unpaved basins. The sewage sludge dries for a minimum of 3 months. During 2 of the 3 months, the ambient average daily temperature is above 0°C (23°F).
	Anaerobic Digestion	Sewage sludge is treated in the absence of air for a specific mean cell residence time (i.e., solids retention time) at a specific temperature. Values for the mean cell residence time and temperature shall be between 15 days at 35°C to 55°C (131°F) and 60 days at 20°C (68°F).
	Composting	Using either the within-vessel, static aerated pile, or windrow composting methods, the temperature of the sewage sludge is raised to 40°C (104°F) or higher and remains at 40°C (104°F) or higher for 5 days. For 4 hours during the 5-day period, the temperature in the compost pile exceeds 55°C (131°).
$\boxtimes$	Lime Stabilization	Sufficient lime is added to the sewage sludge to raise the pH of the sewage sludge to 12 for $\geq 2$ hours of contact.

#### Vector Attraction Reduction

To show sludge stability the City of Yachats WWTP may use any one of the three following vector attraction reduction options:

Biosolids Management Plan for the City of Yachats 07/14/2014 Page 6 of 23

40 CFR Part 503 Requirement	What is Required?	Most Appropriate For:
Option 1 503.33(b)(1)	At least 38% reduction in volatile solids during sewage sludge treatment	Sewage sludge processed by: Anaerobic biological treatment Aerobic biological treatment
Option 2 503.33(b)(2)	Less than 17% additional volatile solids loss during bench- scale anaerobic batch digestion of the sewage sludge for 40 additional days at 30°C to 37°C (86°F to 99°F)	Only for anaerobically digested sewage sludge that cannot meet the requirements of Option 1
Option 3 503.33(b)(3)	Less than 15% additional volatile solids reduction during bench-scale aerobic batch digestion for 30 additional days at 20°C (68°F)	Only for aerobically digested liquid sewage sludge with 2% or less solids that cannot meet the requirements of Option 1 – e.g., sewage sludges treated in extended aeration plants. Sludges with 2% or greater solids must be diluted
Option 4 503.33(b)(4)	SOUR at 20°C (68°F) is $\leq$ 1.5 mg oxygen/hr/g total sewage sludge solids	Liquid sewage sludges (2% or less solids) from aerobic processes run at temperatures between 10 to 30°C (should not be used for composted sewage sludges)
Option 5 503.33(b)(5)	Aerobic treatment of the sewage sludge for at least 14 days at over 40°C (104°F) with an average temperature of over 45°C (113°F)	Composted sewage sludge (For sewage sludges from other aerobic processes, it will likely be easier to meet option 3 or 4)
Option 6 503.33(b)(6)	Addition of sufficient alkali to raise the pH to at least 12 at 25°C (77°F) and maintain a pH $\ge$ 12 for 2 hours and a pH $\ge$ 11.5 for 22 more hours	Alkali-treated sewage sludge (alkaline materials include lime, fly ash, kiln dust, and wood ash)
Option 7 503.33(b)(7)	Percent solids $\geq$ 75% prior to mixing with other materials	Sewage sludges treated by an aerobic or anaerobic process (i.e., sewage sludges that do not contain unstabilized solids generated in primary wastewater treatment)
Option 8 503.33(b)(8)	Percent solids $\ge 90\%$ prior to mixing with other materials	Sewage sludges that contain unstabilized solids generated in primary wastewater treatment (e.g., heat-dried sewage sludges)
Option 9 503.33(b)(9)	Sewage sludge is injected into soil so that no significant amount of sewage sludge is present on the land surface 1 hour after injection, except Class A sewage sludge which must be injected within 8 hours after the pathogen reduction process	Sewage sludge applied to the land or placed on a surface disposal site. Domestic septage applied to agricultural land, a forest, or a reclamation site, or placed on a surface disposal site
Option 10 503.33(b)(10)	Sewage sludge is incorporated into the soil within 6 hours after application to land or placement on a surface disposal site, except Class A sewage sludge which must be applied to or placed on the land surface within 8 hours after the pathogen reduction process	Sewage sludge applied to the land or placed on a surface disposal site. Domestic septage applied to agricultural land, forest, or a reclamation site, or placed on a surface disposal site

#### **Vector Attraction Reduction Options**

Opt. 1) The % volatile solid reduction calculation to use for aerobic digester that is decanted and that does not have appreciable grit accumulation would be the Van Kleeck or Approximate Mass balance (AMB) equation depending upon the percent solids in the decant. See **attachment B**.

# **Digester Batch Alkaline (Lime) Stabilization**

Lime Stabilization takes place when an Aerobic Digester has not met the requirements for Alternative 1 pathogen reduction or the requirements for Alternative 2 (PSRP (1) Aerobic Digestion). The biosolids will also be Lime Stabilized when the requirements for VAR option 1 and option 2 cannot be met.

Once it is determined that the digester is to be lime stabilized, the slide gates to the digester are closed. An aerated 55-gal barrel is placed at the digester, and then filled approximately half full. Then the operator, wearing proper personal protection equipment, begins to add 2-3 bags of hydrated lime into the aerated barrel. This will create a well mixed lime slurry. A 2" PVC pipe with a gate valve located at the bottom allows the operator to release the lime slurry into the aerating digester. The amount of lime added will depend on the volume and the total solids content of the biosolids in the digester. During the addition of the lime, pH will be checked to assure that a pH of at least 12.0 is reached. The pH will be checked 2 hours later to assure that it is still12.0 or higher and then 22 hours later making sure it is at least 11.5. This is done without the addition of any more lime.

# TRANSPORTATION

The City of Yachats owns a 5 and 10 yard dump truck transport biosolids from the wastewater treatment facility to other treatment facilities or authorized land application sites. The dump trucks are operated by City of Yachats's employees.

Biosolids are loaded into the dump truck with a Kubota tractor or a John Deere backhoe. When the truck is full, it is covered with a tarp and tied with rope.

Biosolids processed through the FKC Screw press during wet weather are conveyed out of the sludge processing building to a round dumpster. When the dumpster is full it is pushed to the road where it is picked up and dumped by a garbage truck. It is then transported to their landfill site.

The City of Yachats is able to handle the volume of biosolids produced through these transportation practices.

# **REMEDIAL PROCEDURES**

All spills into waters of the state or spills on the ground surface that are likely to enter waters of the state will be reported immediately to Oregon Emergency Response System (OERS) at 1-800-452-0311 and the Department's regional biosolids specialist at 1-800-349-7677. All spills of 25 gallons or more on the ground surface will be reported to the Department's regional biosolids specialist 1-800-349-7677.

# **Spill During Transportation of Biosolids**

The City of Yachats is responsible for cleanup of any biosolids spills that occur while transporting to land application sites. If a spill occurs during the transport of biosolids between the wastewater treatment facility and the land application site, the City of Yachats will:

- Contain the spill.
- Post the area and set up temporary fencing if there is a potential for public exposure.
- Remove spilled biosolids with a front end loader or shovel.
- Cover the area with dry lime if needed. Spillages which cannot be completely cleaned up require the application of 30 lbs. hydrated lime / 1000 gallons material spilled (unless sludge has previously been properly lime stabilized).
- Apply sand if needed.

• Transport spilled product to a Department authorized biosolids land application site or dispose of material in an approved manner such as landfill.

# MONITORING AND REPORTING

#### Monitoring and Sampling Program

The City of Yachats has developed and implements a biosolids monitoring and sampling plan. Samples collected and analyzed will be representative of the biosolids to be land applied. Quality control measures and procedures will be implemented for microbiological tests to verify precision and accuracy. Sampling location(s) stated will demonstrate how Alternative 1 Pathogen Reduction Requirements 503.32(b)(2) and vector attraction reduction option (s) option 1; 503.33(b)(1), option 4; 503.33(b)(4) and option 6; 503.33(b)(6) are met.

Samples for Alternative 1 Pathogen Reduction Requirements 503.32(b)(2), are taken at seven discrete areas across a highly mixed digester. They are placed in an ice cooler and transported to an outside laboratory.

Vector attraction reduction option samples are taken from the digester discharge line. They are a composite of discrete samples collected throughout the sampling period.

Sample storage and transport: Samples are stored at 4 degrees C in a refrigerator. Samples are transported in an ice cooler to maintain temperature during delivery to laboratory. Pathogen samples are delivered to lab within 6 hours of sample collection.

Sample analysis method: Standard Methods 18<sup>th</sup> edition; 2540 G, 2710 B, 9221 E. EPA 7060A, EPA 7131A, EPA 7191, EPA 7210, EPA 7421, EPA 7470A, EPA 7481, EPA 7521, EPA 7740, EPA 7950, EPA 351.3, EPA 353.3, EPA 350.2, EPA 365.3, EPA 7610, EPA 9040C, EPA 160.3 and EPA 160.4

All monitoring and reporting will be conducted in accordance with the City of Yachats NPDES permit. The monitoring frequency is based on the amount of biosolids generated that is land applied. Based on 40 CFR §503.16, Table 1 and the amount of biosolids generated and used during 2010, the City of Yachats is required to sample biosolids annually.

#### **Recordkeeping and Reporting Procedures**

The City of Yachats as the preparer and land applier of biosolids is required to maintain records to demonstrate that federal and state biosolids requirements are met. Records will be kept on file by the City of Yachats, and will be available upon request by the Department. Monitoring and sampling records will be retained for a period no less than 5 years, unless otherwise required by the NPDES permit or a site authorization letter. The minimum required records include the following information:

- Pollutant concentrations of each parameter stated in the permit,
- Pathogen requirements as stated in the permit for Class B.
- Description of how one of the vector attraction reduction requirements in 40 CFR §503.33(b)(1) or 503.33(b)(1) or 503.33(b)(6) are met,
- Certification that the information submitted is accurate to determine compliance with pathogen and vector attraction reduction requirements, and site restriction/management requirements.

#### **Annual Reporting**

A biosolids annual report is required to be submitted to the Department each year by February 19<sup>th</sup> or as required by the permit if bulk biosolids have been land applied, or biosolids derived products were sold or given away the previous year. The report will include information on biosolids handling activities and data (i.e., monitoring results, nutrient loading rates) from the previous calendar year. Some of the information required with the annual report includes:

- Daily site logs or records, including date, time, and quantity (gallon, pounds) of nitrogen/acre land applied.
- Map, including scale, showing the site and the land application location that coincides with the daily site application method (e.g., truck spreader bar, irrigation cannon).
- Signed copy of the certification statement (see next section on Certification Statement).

#### **Certification Statement**

The City of Yachats is capable of meeting Class B pathogen reduction and vector attraction reduction requirements. As required under 40 CFR §503.17, the City of Yachats must retain a certification statement indicating whether compliance with pathogen reduction, vector attraction reduction, and certain site restrictions have been met. The certification statement must be retained for a period of five years, and must be submitted with the annual report that is due February 19<sup>th</sup> or as required by the permit. The City of Yachats will retain the following certification statement and it will be signed by a principal executive officer or ranking elected official or their duly authorized representative. See **attachment C**.

The City of Yachats is also required as the land applier to certify that the management practices in 40 CFR §503.14 are being met. This certification includes that biosolids are being land applied at approved agronomic loading rates as specified in department issued site authorization letters. See **attachment C**.

#### **BIOSOLIDS CHARACTERISTICS**

Biosolids Management Plan for the City of Yachats 07/14/2014 Page 10 of 23

#### **Pollutant Characteristics**

The following table is a representative biosolids analysis for pollutant characteristics. This data and all previous data indicate that pollutant concentrations for all regulated pollutants have been met.

Parameter	Biosolids Analytical Result (mg/kg)	Sample Date	40 CFR §503.13(b)(3) Pollutant Concentration Limits (mg/kg)
Arsenic (As)	5.2	12/18/2013	41
Cadmium (Cd)	1.5	12/18/2013	39
Chromium (Cr)	11.4	12/18/2013	1200
Copper (Cu)	264	12/18/2013	1500
Lead (Pb)	13.1	12/18/2013	300
Mercury (Hg)	0.6	12/18/2013	17
Molybdenum (Mo)	7.1	12/18/2013	75
Nickel (Ni)	17.0	12/18/2013	420
Selenium (Se)	ND @ 5.0	12/18/2013	100
Zinc (Zn)	720	12/18/2013	2800

#### **Nutrient Characteristics and Other Parameters**

The following table is a representative biosolids analysis for nutrient characteristics and other parameters.

Parameter/measurement unit	Biosolids Analytical Result	Sample Date
Total solids, percent	1.12	12/18/2013
Volatile solids, percent	80.4	12/18/2013
TKN, percent	5.34	12/18/2013
NO <sub>3</sub> -N, percent	1.12	12/18/2013
NH <sub>4</sub> -N, percent	0.16	12/18/2013
Phosphorus (P), percent	1.60	12/18/2013
Potassium (K), percent	0.40	12/18/2013
pH, standard unit	3.6	12/18/2013

#### **BIOSOLIDS UTILIZATION PROGRAM**

Based on 2013 biosolids production, 0 percent of biosolids generated by City of Yachats was beneficially used through land application. 100 percent of the biosolids generated by City of Yachats were sent to the landfill. The following biosolids land application plan outlines agronomic application rate and site crops, where biosolids are land applied, site selection criteria for a new site, and site and crop management practices.

#### **BIOSOLIDS LAND APPLICATION PLAN**

Biosolids Management Plan for the City of Yachats 07/14/2014 Page 11 of 23

#### **Agronomic Application Rate and Site Crops**

Class B biosolids are required to be land applied to a site at a rate that is equal to or less than the agronomic rate for the site. An agronomic rate is the whole biosolids application rate (dry weight basis) designed to provide the annual total amount of nitrogen needed by a crop and to minimize the amount of nitrogen passing below the root zone of the crop or vegetation to groundwater.

Biosolids application rates for the City of Yachats sites were developed based on the Oregon State University (OSU) Extension Service Fertilizer Guide: Pastures, Western Oregon and Western Washington (FG-63). The annual application rate for pastures is 100 pounds available nitrogen (N) per acre, unless the application site demonstrates additional nitrogen is required to match crop uptake rates. The land application sites authorized for use can assimilate the total plant available nitrogen the biosolids provide on an annual basis. Specific site agronomic loading rates are stated in the Department issued site authorization letters.

#### Site Inventory of Existing and Potential Sites

The City of Yachats currently has one Department authorized 16 acre site listed in the table below. Surface application of dewatered biosolids would be performed using a manure spreader. The City does not currently land apply on this site. This would be an adequate land base for current and future operations, based on current biosolids generation rates. **See Attachment D** 

Site Name/Identifier	Type of Crop/Acreage	lb. N/acre	lb. N/site	Time of year applied (month)	Harvest Cycle	Department Authorized?
Hall/ T14,R11,Sec.34,	Pasture-Hay / 16	100	1600	May-October		Yes
TL 1200						

#### **Biosolids Land Application Site Inventory**

#### Site Selection Criteria for a New Site

The City of Yachats is currently and will continue to locate additional sites for land applying biosolids. Prior to using any site for land application, the City of Yachats is required to receive a written site authorization letter from the Department. The following site conditions will be considered when determining the suitability of a site for land application:

- All sites will be located on agricultural/forest/reclamation land in Lincoln County.
- A site should be on a stable geologic formation not subject to flooding or excessive run-off from adjacent land.
- Minimum depth to permanent groundwater should be four feet and the minimum depth to temporary groundwater should be one foot at the time when application of dewatered biosolids occurs.
- Dewatered or dried biosolids may be land applied on well vegetated slopes up to 30 percent.
- Soil should have a minimum rooting depth of 24 inches.

Biosolids Management Plan for the City of Yachats 07/14/2014 Page 12 of 23

#### **Public Notification**

The City of Yachats is required to notify the public of the proposed land application activity. Each year prior to land application of biosolids, the City of Yachats should verify for those sites to be used for the year that the property owners who received prior notification have not changed. If a property owner has changed, notification of the land application activity should be made to the new property owner and documented.

#### **Site Management Practices**

Site access restrictions and setbacks will be followed as outlined in the Department's site authorization letters. The City of Yachats will ensure that access is restricted by appropriate means as necessary, such as fencing or posting of signs at the land application site. Biosolids land application will not occur in those areas designated as buffer strips and will be achieved through accurate measurement and flagging of the buffer area prior to commencing land application.

#### **Crop Management Practices**

As listed in the Biosolids Land Application Site Inventory table on page 12, biosolids are applied to pasture and occasional hay fields. Timing of application and the harvest cycle of the crop are also listed. Soil conditions must be favorable for application such that runoff, leaching, or soil compaction does not occur. The timing of land application will take into consideration tilling and irrigation practices that may occur on an authorized site.

The overall management of nutrients at the land application sites takes into account the amount of biosolids land applied, the amount of commercial fertilizers used and the amount of residual nutrients in the soil. When additional sources of nitrogen (e.g., commercial fertilizer) are applied to a site, then the application of biosolids should be reduced to compensate for the additional nitrogen loading.

Prior to the initiation of biosolids application to a site, a representative soil sample is collected across the entire site, and analyzed by an independent commercial laboratory. Existing nitrogen levels in the soil profile are subtracted from the OSU Extension Service recommended nitrogen application rates for the crop and the biosolids application rate is adjusted. Soil testing is conducted at the approved land application site(s) on an annual basis. In the event of annual biosolids application to the same field for 3 consecutive years, annual sampling and testing of application site soils for nitrate and ammonia nitrogen will be conducted prior to biosolids application. Application rates must be adjusted to account for available nitrogen carried over from previous applications. If crop removal of nitrogen exceeds the calculated agronomic rate, additional nitrogen may be required to sustain crop production.

Attachment AG)

Analytical Laboratory & Consultants, Inc. 361 West Fifth Avenue • Eugene, OR 97401 541-485-8404 • 1-800-262-5973 Fax: 541-484-5995

Oregon ORELAP Accredited Laboratory ID# OR100012 Accredited in accordance with NELAC Accredited analytes marked "¥"

#### **ANALYSIS REPORT**

Attention	David Buckwald	Lab Report No.	1407053-01-07	
Client	City of Yachats	Date Received	7/2/14 1500	
	PO Box 345	Collection Date	See Below	
	Yachats, OR 97498	Collected by	David A. Buckwald	
		Client ID	See Below	P THE ACCORDING 1
Project ID	Yachats WWTP	Sample Matrix	Biosolids	

Analyte	Analyte Method		Units	Analysis Date/Analyst
Lab Report No. 1407053-01	Client ID: Digester #1	Collect	tion Date: 7/2/14 1015	
Coliform, Fecal (MTF-MPN)	SM 9221 E	158,000	MPN / gram dry wt	7/2/14 1545 JD
Total Solids	SM 2540 G	0.57	% total solids	7/2/14 JD
Lab Report No. 1407053-02	Client ID: Digester #2	Collect	tion Date: 7/2/14 1015	
Coliform, Fecal (MTF-MPN)	SM 9221 E	4,390	MPN / gram dry wt	7/2/14 1552 JD
Total Solids	SM 2540 G	1.14	% total solids	7/2/14 JD
Lab Report No. 1407053-03	Client ID: Digester #3 Site 1	Collect	ion Date: 7/2/14 1015	
Coliform, Fecal (MTF-MPN)	SM 9221 E	2,030	MPN / gram dry wt	7/2/14 1558 JD
Total Solids	SM 2540 G	1.18	% total solids	7/2/14 JD
Lab Report No. 1407053-04	Client ID: Digester #3 Site 2	Collect	ion Date: 7/2/14 1015	
Coliform, Fecal (MTF-MPN)	SM 9221 E	1,450	MPN / gram dry wt	7/2/14 1603 JD
Total Solids	SM 2540 G	1.17	% total solids	7/2/14 JD
Lab Report No. 1407053-05	Client ID: Digester #4 Site 1	Collect	ion Date: 7/2/14 1015	
Coliform, Fecal (MTF-MPN)	SM 9221 E	278	MPN / gram dry wt	7/2/14 1615 JD
Total Solids	SM 2540 G	1.08	% total solids	7/2/14 JD
Lab Report No. 1407053-06	Client ID: Digester #4 Site 2	Collect	ion Date: 7/2/14 1015	
Coliform, Fecal (MTF-MPN)	SM 9221 E	273	MPN / gram dry wt	7/2/14 1615 JD
Total Solids	SM 2540 G	1.10	% total solids	7/2/14 JD
Lab Report No. 1407053-07	Client ID: Digester #5	Collect	ion Date: 7/2/14 1015	
Coliform, Fecal (MTF-MPN)	SM 9221 E	15,300	MPN / gram dry wt	7/2/14 1621 JD
Total Solids	SM 2540 G	0.85	% total solids	7/2/14 JD

ND means Not Detected at the listed Reporting Limit.

7/8/2014

1407053

Page \_\_\_\_\_ of \_\_\_\_\_

Biosolids Management Plan for the City of Yachats 07/14/2014 Page 14 of 23

#### Attachment A(b)

#### Analytical Laboratory & Consultants, Inc. 361 West Fifth Avenue • Eugene, OR 97401 541-485-8404 • 1-800-262-5973 Fax: 541-484-5995

Oregon ORELAP Accredited Laboratory ID# OR100012 Accredited in accordance with NELAC Accredited analytes marked "¥"

#### **ANALYSIS REPORT**

	D. U.D. I		And the second		
Attention David Buckwald		ld	Lab Report No.	1312442-01-07	
Client	City of Yachat	S	Date Received	12/18/13 1600	
	PO Box 345		Collection Date	See Below	
	Yachats, OR	97498	Collected by	David A.Buckwald	
			Client ID	See Below	al resolution of the source of
Project ID	Yachats WWT	P	Sample Matrix	Biosolids	
		BIOSOLIDS	FECAL COLIFORM		
Ar	nalyte	Method	Results	Units	Analysis Date/Analyst
Lab Report	No. 1312442-01	Client ID: 1 Digester #1	Collectio	n Date: 12/18/13 1010	
Coliform, Feca	I (MTF-MPN)	SM 9221 E	77,700	MPN / gram dry wt	12/18/13 1620 JD
Total Solids		SM 2540 G	1.03	% total solids	12/18/13 JD
Lab Report	No. 1312442-02	Client ID: 2 Digester #2	Collectio	n Date: 12/18/13 1010	
Coliform, Fecal	I (MTF-MPN)	SM 9221 E	13,800	MPN / gram dry wt	12/18/13 1627 JD
Total Solids		SM 2540 G	0.94	% total solids	12/18/13 JD
Lab Report I	No. 1312442-03	Client ID: 3 Digester #3 Sit	te 1 Collectio	n Date: 12/18/13 1010	
Coliform, Fecal	(MTF-MPN)	SM 9221 E	ND @ 2	MPN / gram dry wt	12/18/13 1630 JD
Total Solids		SM 2540 G	1.11	% total solids	12/18/13 JD
Lab Report I	No. 1312442-04	Client ID: 4 Digester #3 Sit	e 2 Collection	n Date: 12/18/13 1010	an a
Coliform, Fecal	(MTF-MPN)	SM 9221 E	18	MPN / gram dry wt	12/18/13 1632 JD
Total Solids		SM 2540 G	1.10	% total solids	12/18/13 JD
Lab Report M	No. 1312442-05	Client ID: 5 Digester #4 Sit	e 1 Collection	n Date: 12/18/13 1010	
Coliform, Fecal	(MTF-MPN)	SM 9221 E	98	MPN / gram dry wt	12/18/13 1642 JD
Total Solids	1. 19 19 19 19 19 19 19 19 19 19 19 19 19	SM 2540 G	1.12	% total solids	12/18/13 JD
Lab Report N	No. 1312442-06	Client ID: 6 Digester #4 Sit	e 2 Collection	Date: 12/18/13 1010	
Coliform, Fecal	(MTF-MPN)	SM 9221 E	116	MPN / gram dry wt	12/18/13 1648 JD
Total Solids		SM 2540 G	1.12	% total solids	12/18/13 JD
Lab Report N	lo. 1312442-07	Client ID: 7 Digester #5	Collection	Date: 12/18/13 1010	
Coliform, Fecal	(MTF-MPN)	SM 9221 E	980,000	MPN / gram dry wt	12/18/13 1652 JD
Total Solids		SM 2540 G	0.51	% total solids	12/18/13 JD

1/9/2014

1312442

Page 2 of 3

Biosolids Management Plan for the City of Yachats 07/14/2014 Page 15 of 23

#### Attachment B:

Calculation of the % volatile solids reduction is to be based on comparison of a representative grab sample of total and volatile solids entering each digester and a representative composite sample of the solids existing each digester withdrawal line. Composite samples of the influent shall consist of at least four samples; each collected at approximately even intervals over an eight- (8) hour period.

Typically in the past we've used the Van Kleeck equation for digesters. The assumption, there is no grit accumulation in the digester. This volatile solids equation assumes the fixed solids input equals the fixed solids output. The Van Kleeck equation is appropriate if the digester decatante is low in total solids. The Van Kleeck equation can be used to calculate the volatile solids reduction for a digester that decants provided VSb equal VSd

FVSR: Fractional Volatile Solids Reduction

FVSR = 1 - VSb \* (1-VSf) / VSf (1-VSb)

- VSf Feed Sludge Fractional Volatile Solid, (kg/kg)
- VSb Digested Sludge (digester bottom) Fractional Volatile Solids, (kg/kg)
- VSd Decantate Fractional Volatile Solids

For this equation to be valid VSb must equal VSd.

For digesters with decant withdrawal (decant high in solids) and no grit accumulation, where the volatile and fixed concentrations are known for all streams as well as the volumetric flow rates for the decant and digester sludge then the Approximate Mass Balance equation should be used.

FVSR: Fractional Volatile Solids Reduction

FVSR=Fyb-Byd-Dyd / Fyb

Fyb	(F) (yb)	Feed Sludge Volumetric Flow Rate (m3/d) Feed Sludge Volatile Solids Concentration (kg/m3)
Byb	(B) (Bb)	Digester Sludge (bottom) Volumetric Flow Rate (m3/d) Digester Sludge (bottom) Volatile Solids Concentration (kg/m3)
Dyd	(D) (yd)	Decantate volumetric Flow Rate (m3/d) Decante Volumetric Solids Concentration (kg/m3)

Because the Aerobic digesters will be cleaned every other year, the assumption is there is no grit accumulation in the digestive process.

#### Attachment C

#### **Certification Statement**

"I certify, under penalty of law, that the information that will be used to determine compliance with the Class B pathogen requirements in 40 CFR §503.32(b)(2) or503.32(b)(3) PSRP #1 Aerobic Digestion or PSRP # 5 Lime stabilization, the vector attraction reduction requirement in 40 CFR §503.33(b (1),(4) or (6), and the site restrictions in 40 CFR §503.32(b)(5) for each site on which Class B sewage sludge was applied, was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification, including the possibility of fine and imprisonment."

	_
Signature	Date

"I certify, under penalty of law that the management practices in 40 CFR §503.14 have been met for each site on which bulk biosolids is applied. This determination has been made under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate the information used to determine that the management practices have been met. I am aware that there are significant penalties for false certification, including the possibility of fine and imprisonment."

Signature\_\_\_\_

Date

# **Attachment D**

Biosolids Management Plan for the City of Yachats 07/14/2014 Page 18 of 23



Biosolids Mana 07/14/2014 Page 19 of 23

# Lincoln County Area, Oregon (OR638)

Map Unit Symbol	Map Unit Name	Acres in AOI Pe	ercent of AOI
15B	Eilertsen silt loam, 0 to 5 percent slopes	0.0	0.0%
30A	Kirkendall silt loam, 0 to 3 percent slopes	9.7	92.4%
54A	Siletz silt loam, 0 to 3 percent slopes	0.0	0.0%
57A	Treharne silt loam, 0 to 3 percent slopes	0.8	7.6%
Totals for Area of Interest		10.5	100.0%





Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
15B	Eilertsen silt loam, 0 to 5 percent slopes	Not limited	Eilertsen (85%) Fluvaquents (2%)		0.0	) 0.0%
30A	Kirkendall silt loam, 0 to 3 percent slopes	Not limited	Kirkendall (85%) Fluvaquents (5%)		9.7	92.4%
54A	Siletz silt loam, 0 to 3 percent slopes	Not limited	Siletz (85%)		0.0	0.0%
57A	Treharne silt loam, 0 to 3 percent slopes	Not limited	Treharne (85%) Fluvaquents (3%)		0.8	3 7.6%
Totals for	Area of Interest				10.5	5 100.0%

# Summary by Map Unit — Lincoln County Area, Oregon (OR638)

Municipal biosolids are one class of organic byproduct that can successfully be recycled via land application. Biosolids are the nutrient-rich organic byproduct obtained from municipal wastewater treatment. Biosolids can be solid, liquid, or semisolid. Animal manures, food processing byproducts, and other organic materials are not considered biosolids, and are not addressed here.

To be called biosolids, raw solids must be processed to meet U.S Environmental Protection Agency (EPA) standards. Raw solids are processed by digestion, composting, or other technologies at the wastewater treatment facility. Trace element concentrations in biosolids must be lower than EPA standards for arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc. Biosolids must also meet EPA standards for human pathogen reduction and organic matter stabilization.

This interpretation evaluates each soils limitations as a location for land application of such biosolids. The soil properties used for evaluating the soil in spring months are as follows. The interpretation evaluates flooding, ponding and depth to saturated zone data for the months of June through September.

From map unit data (no seasonal adjustment) the following properties are considered: - Cobble content

Biosolids Management Plan for the City of Yachats 07/14/2014 Page 22 of 23

- Salinity
- Depth to bedrock
- Depth to cemented pan
- Shallow to densic materials
- Slope
- Sodium content
- Large stones on surface
- Depth to Permafrost
- Shallow to contrasting materials (discontinuity)
- Poor filtering capacity (coarse materials)
- Slow percolation/permeability

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.