Attachment 3A

BIOSOLIDS MANAGEMENT PLAN
City of Newport Wastewater Treatment Plant

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File Number: 60731

INTRODUCTION

This Biosolids Management Plan is being submitted in conjunction with the new NPDES Permit Application for the Newport Wastewater Treatment Plant. The new Newport Wastewater Treatment Plant is currently in the construction phase of implementation. Upon startup the existing plant will be decommissioned and all treatment accomplished at the new plant. The permittee remains the City of Newport with a mailing address of: City Hall, 810 SW Alder Street, Newport, Oregon 97365.

Wastewater Characteristics

The treatment facility is designed to treat the following flows: Dry Weather Average = 3.5 MGD; Dry Weather Maximum Month = 4.0 MGD; Wet Weather Average = 4.35 MGD; and, Wet Weather Maximum Month = 5.0 MGD. The wastewater is essentially all domestic in origin as the largest commercial/industrial discharger in the system is the Rogue Ale Brewery which typically discharges a maximum of 10,000 gallons of pretreated wastewater per day into the city's system. All dischargers into the City's wastewater system are subject to a pretreatment ordinance, Newport Ordinance No. 714, that limits the strength and contaminants allowable in wastewater to concentrations that will not interfere with the liquids or solids treatment and disposal methods of the treatment facility. The current treatment facility does not accept septage. The new facility is provided with a septage receiving station with screening unit. The City therefore has the ability to accept septage if plant conditions warrant.

This Biosolids Management Plan summarizes information found in the NPDES permit application. More detailed information can be found in Drawings 13 through 18 of the construction documents provided in Appendix 5 to the NPDES application and in Figure 1 (a map of the land application site). The site consists of approximately 112 acres, 56 acres both north and south of Grant Creek, east of the city's airport runways. Also included is Figure 2, a map of the City's current biosolid reuse site for land application of anaerobically digested liquid biosolid produced from the existing plant. This site was approved by DEQ in December 1999 (the land north of Grant Creek shown on Figure 1).

Septage Receiving Facility

The new facility has been designed to accept septage.

Pretreatment Program

This source does not have a Department approved Pretreatment Program.

SECTION I: TREATMENT FACILITY

Description- ThermoBlender™ Lime Treatment

Whereas the new treatment facility does not have primary clarification, WAS is the main solids stream processed. The WAS pumps deliver waste activated sludge settled in the secondary clarifiers to an aerated sludge storage tank. Screened septage from the septage receiving station can also be discharged to the sludge storage tank. The sludge storage tank is a circular concrete tank covered with an aluminum dome roof. The tank is 60-feet in diameter with a 20-foot side wall height. With a 17-foot normal liquid depth, the tank holds approximately 360,000 gallons. Positive displacement blowers (to allow varying liquid levels) aerate the tank through coarse bubble diffusers to maintain aerobic conditions and active mixing. The tank is designed to hold 4 days of WAS production at design maximum month conditions at a concentration of approximately one percent. The tank is provided with decant capability to allow concentration of the waste sludge to extend its storage capabilities. Sludge from storage is typically delivered to one of two dewatering centrifuges (one for redundancy) and the dewatered sludge cake conveyed to the lime stabilization/pasteurization system. Each centrifuge has a nominal capacity of 650 dry pounds per hour and is anticipated to produce a cake with a dry solids content of 16 to 18 percent. Each centrifuge is provided with a polymer conditioning system. Lime stabilization is accomplished in an RDP "EnVessel" lime pasteurization system. This system consists of two main components: a lime and sludge mixer ("ThermoBlender") and a pasteurization vessel. The lime/sludge mixer mixes (blends) the dewatered sludge cake with dry lime in a trough with two mixing augers, and heats the mixture to 70C.The ThermoBlender discharges the heated lime/sludge mixture into the pasteurization vessel where the necessary detention time is provided again under heated conditions. The processed mixture is then discharged onto a series of conveyors and delivered either to covered storage or directly into a land application vehicle.

Newport's lime stabilization/pasteurization system is designed to produce a Class A product with regard to pathogen reduction criteria in accordance with the EPA's Part 503 regulations. The system also has the capability of being operated to produce a Class B product should the reuse method so dictate.

The ThermoBlender blends the dewatered sludge cake with a metered amount of alkaline material, high calcium quicklime, to produce an end product meeting either of the Class A or B pathogen reduction classifications, and the vector attraction reduction criteria, of the Part 503 rule. The alkaline material will raise the pH of the end product above 12.0 for 2 hours and the pH will remain above 11.5 for an additional 22 hours. The mixing of the high calcium quicklime and dewatered sewage sludge will generate heat from the chemical reaction. With the supplemental electrical heat system of the ThermoBlender, the lime/sludge mixture temperature will be raised above 70°C (158°F) during mixing in the ThermoBlender.

The ThermoBlender discharges the material to the Pasteurization Vessel, which is designed to maintain the temperature of the material for the required retention time of 30 minutes.

The ThermoBlender intimately blends the lime with the sludge to produce a homogenous end product meeting the requirements of the Part 503 rule. The ThermoBlender utilizes cut-flight-mixing augers to thoroughly mix the sludge and lime. The effectiveness of the mixing action is a function of the moisture content of the sludge cake, the percentage of the CaO in the quicklime, the speed of the ThermoBlender, the retention time of the sludge in the ThermoBlender, the feed rate of the sludge, and the lime dosage and introduction point for a given sludge capacity.

The lime stabilization/pasteurization system includes a 30-ton capacity dry lime storage silo with variable speed volumetric feeder, lime transfer screw conveyor, and lime addition screw conveyor. The lime addition screw is provided with multiple discharges to allow the lime to be introduced to the ThermoBlender at any one of four points. The mixing augers in the ThermoBlender are designed to convey the product up the center of the housing. This provides for continuous mixing of sludge and lime the entire length of the mixing chamber. The augers are variable speed and are normally set to run at the speed at which the material bed depth in the mixing chamber completely covers the conveying augers. This will allow the constant rolling of sludge over the top of the augers providing maximum mixing and maximum surface area for heat transfer from the internal heat tube assemblies.

The ThermoBlender heat system is an electric resistance type system provided with temperature sensors to properly control and protect the heat system. The ThermoBlender is provided with two internal heat tube assemblies that act as one heat zone, and three external elements that act a second heat zone. Each heat zone is provided with control thermocouples for the proper operation and several spares. The external zone has three thermocouples; only two are required for the proper operation. The internal two heat tube assemblies are wired together to act as one zone with two independent circuits. Between the two heat tube assemblies, there are six thermocouples, however, only three are required for the operation. Each heat zone uses one temperature indicating thermocouple for the operation. The indicating thermocouple is wired to the system's "heat system power control panel" to provide for temperature indication and the process/heater set point temperature. This thermocouple and the panel-mounted controller are used to control the output power to each heat zone. The other thermocouples required for the operation are wired to the heat system power panel to protect the heat system from over-temperature conditions. The operating set point of each heat zone will be affected by the sludge throughput and lime dosage. The preferred settings for the various control variables (auger speed, lime dose and application point(s), and the heater settings) will be determined during startup and adjusted during routine operation for optimum system performance.

The pasteurization vessel consists of a flat conveyor belt operating in an enclosed heated vessel. The pasteurization vessel heat system is an electric resistance type system similar to the ThermoBlender, which is powered and controlled from the same heat system power control panel. Thermocouples control the heating system to maintain a minimum sludge/lime mixture temperature of 70°C. The speed of the pasteurization vessel conveyor is set to maintain a minimum detention time of 30 minutes for the sludge/lime mixture in the vessel. Various duct connection points are provided in the system to collect odorous off gasses for treatment in a liquid scrubber.

SECTION II: SOLIDS TREATMENT

Solids Processing

The new facility is an oxidation ditch type secondary treatment plant capable of nitrification. Wastewater is conveyed to the treatment plant Headworks via a 2,900-foot forcemain from the Influent Pump Station. The Headworks consists of flow measurement, dual in-channel rotary screens with 0.25-inch openings, and accommodations for adding a future vortex-type grit removal unit. The screened influent then enters a three-channel "Orbal" type (oxidation ditch) aeration basin system with disc aerators and process flexibility to accomplish nitrification, and a degree of denitrification and biological phosphorous removal. Mixed liquor from the aeration basin is split between two circular secondary clarifiers for separation of clarified effluent from settled return and waste solids. The settled return activated sludge (RAS) is pumped back to the aeration basin and the desired amount of waste activated sludge (WAS) is pumped to an aerated sludge storage tank. The clarified effluent from the secondary clarifiers is disinfected in a chlorine contact basin with sodium hypochlorite used as the disinfectant. Disinfected effluent is piped to the City's existing ocean outfall.

SECTION III: SOLIDS STORAGE

Solids storage is provided in both the liquid and solid form. Liquid sludge storage is provided in the aerated sludge storage tank. Also, although not formally considered normal operation or design intent, the aeration basin is a large volume, long SRT type of system and can be used to a limited extent to inventory sludge by building up the mixed liquor concentration. The covered storage area in the truck loading area of the solids building also provides for Biosolids cake storage. As stated previously, the sludge storage tank has a nominal volume of 360,000 gallons, which equals 4 days of storage at design maximum month condition. This also translates to 7 days at design average and 11.5 days at initial conditions. Additionally the tank can be decanted, thus extending the amount of available liquid sludge storage prior to processing.

The cake storage area is designed to provide 30 days of storage at design conditions under a minimum stacking height of approximately 3 feet. The stacking height is controllable to some extent by adjusting the lime dose and use of temporary barriers in the building. Using a maximum practical stacking height of 6 feet would give the plant approximately 120 days of product storage at initial winter conditions. This amount of storage is considered adequate, at least initially, given: 1) the City's ownership and control over their existing land application site, 2) minimum application site interruptions due to such factors as harvesting due to the silvacultural operation, 3) the ability to use additional treatment plant site areas such as the vactor truck disposal pads for supplemental storage, and 4) given the Class A product, the City intends to investigate other reuse/marketing options for the material once a product is available.

Should it be needed, additional treatment by the addition of more lime to the product can be accomplished in conjunction with storage by on-pad mixing with a loader or other piece of City equipment.

II Solid Treatment Processes

The EPA's 40 CFR parts 503 and the DEQ's Oregon Administrative Rules (OAR) 340-50 allow permittees to use EPA approved alternatives to satisfy Class A and B biosolid pathogen or vector attraction reduction criteria. The permittee must notify the Department in writing and get approval prior to any process change that would utilize pathogen reduction or vector attraction reduction alternatives other than their primary reduction alternatives contained in this management plan. The permittee must also certify that the alternatives used are EPA approved and that sampling and monitoring conforms to the 40 CFR 503 and OAR 340-050 regulations.

Part 503 Compliance

As described in ThermoBlender Section, the lime stabilization process for Newport can achieve either the EPA 40 CFR Part 503.32 Class A or B criteria for pathogen reduction depending on the desired end use. Class A, meet Processes to Further Reduce Pathogens (PFRP) Alternative 5 Pasteurization, pathogen reduction is achieved by the time and temperature criteria of providing a minimum of 30 minutes detention time for the lime/sludge mixture at a minimum temperature of 70°C. Regardless of whether or not supplemental heat is added to meet the Class A time/temperature requirements, the sludge cake is mixed with adequate lime and blended to produce a Class B, Processes to Significantly Reduce Pathogens (PRSP) Alternative 3, lime stabilized biosolid by raising the pH of the mixture above 12.0 for two (2) hours. Vector attraction reduction criteria (Part 503.33 (b) (6)) is achieved by the lime stabilization process adding the lime necessary to raise the pH of the mixture above 12.0 for 2 hours and maintain the product pH at a level of greater than pH = 11.5 after an additional 22 hours and at the time of land application or marketing distribution (note: monitoring required).

Pathogen Reduction
To meet the 503 part regulatory requirements pathogen reduction must be met before vector attraction reduction or at the same time vector attraction reduction is achieved.

Class A Biosolid

With all Class A alternatives microbial monitoring for fecal coliforms or *Salmonella* sp. is required (see section A and B below). This management plan lists the primary alternative and options employed by the permittee to meet Class A and B biosolid criteria. Typically Class A biosolid can be met by using one of 6 EPA approved alternatives; the two primary alternatives used by this facility are Alt. 3) Monitor sewage sludge for fecal coliform or *Salmonella* sp. and densities of enteric viruses and viable helminth ova 503.32(a)(5), and Alt. 5) Use Process to Further Reduce Pathogen (PFRP) 503.32(a)(7) Pasteurization.

A) Monitoring for Fecal Coliform or *Salmonella* sp.

Monitoring for Fecal Coliform or *Salmonella* sp. is required to detect growth of bacterial pathogens. Because Class A biosolids may be used without site restrictions, all Class A material must be tested to show that the microbial requirements are met at the time when it is ready to be used or disposed. In addition to meeting process requirements, Class A biosolid must meet one of the following requirements:

- Either the density of the fecal coliforms in the sewage sludge be less than 1,000 MPN per gram total solids (dry gram weight),
- *Or* the density of *Salmonella* sp. Bacteria in the sewage be less than 3 MPN per 4 grams of total solids (dry weight basis).

Unlike Class B biosolid solid Class A requirements is not based on an average value. Sampling for Class A biosolid consists of at least 7 discrete samples taken over a 2-week period. Test results are required before Class A material can be release for use or disposal. The microbial requirement that a Class A biosolid must be meet is either:

- At the time of use or disposal, or
- At the time the biosolid are prepared for sale or given away in a bag or other container for land application, or
- At time the biosolid or material derived from the biosolid is prepared to meet the requirements in 503.10(b), 503.10 (c), 503.10 (e) or 503.10 (f).

B) Class A Pathogen Reduction Alternatives

Alt. 1) Sewage Sludge treated in process listed under 503.32(a)(3)

This requirement is use when the pathogen reduction process uses specific time-temperature to reduce pathogens. Under this alternative it is necessary to demonstrate the following:

- Either the density of the fecal coliforms in the sewage sludge be less than 1,000 MPN per gram total solids (dry gram weight), or the density of *Salmonella* sp. Bacteria in the sewage be less than 3 MPN per 4 grams of total solids (dry weight basis). At the time the sewage sludge is used, disposed, prepared for sale, or given away in bag or container for land application **or** at the time the sewage sludge or material derived from the sewage sludge is prepared to meet the requirements in 503.10(b), 503.10(c), 503.10(e), or 503.10(f)
- **And** the required time-temperature regimes are meet.

Alt. 3) Sewage Sludge treated in Other Processes 503.32(a)(5)
This requirement relies on comprehensive monitoring of bacteria, enteric viruses, and viable helminth ova to demonstrate adequate reduction of pathogens:

- Either the density of the fecal coliforms in the sewage sludge be less than 1,000 MPN per gram total solids (dry gram weight), *Or* the density of *Salmonella* sp. Bacteria in the sewage be less than 3 MPN per 4 grams of total solids (dry weight basis).
- The density of enteric viruses in the sewage sludge after pathogen treatment must be less than 1 PFU per 4 grams of total solids (dry weight basis).
- The density of viable helminth ova in the sewage sludge after pathogen treatment must be less than 1 per 4 grams of total solids (dry weight basis).

Alt. 5) Use of Processes to Further Reduce Pathogens (PFRP) 503.32(a)(7) Pasteurization,
This requirement relies the process to demonstrate adequate reduction of pathogens to meet Class A biosolid criteria:

- The temperature of the sewage sludge is maintained at 70ºC (158ºF) or higher for 30 minutes or longer, and
- Either the density of the fecal coliforms in the sewage sludge be less than 1,000 MPN per gram total solids (dry gram weight), *Or* the density of *Salmonella* sp. Bacteria in the sewage be less than 3 MPN per 4 grams of total solids (dry weight basis).

***** Alternative 5, Pasteurization, is the primary pathogen reduction alternative used by this facility to achieve a Class A biosolid.

Class B Biosolid

Class B biosolid can be met by using one of three alternatives, the two primary alternatives used by this facility are Alt. 1) Monitor sewage sludge for fecal coliform 503.32(b)(2), and Alt. 2) Use Process to Significantly Reduce Pathogen (PSRP) 503.32(b)(3).

Alt. 1) Monitor sewage sludge for fecal coliform 503.32(b)(2) requires that seven samples of treated sewage sludge (biosolid) be collected and that the geometric mean fecal coliform density of these samples be less than 2 million MPN per dry gram biosolid (dry weight basis).

Alt. 2) Use Process to Significantly Reduce Pathogen (PSRP) 503.32(b)(3) considers sludge treated in one of the PSRPs listed in appendix B of the Part 503 to meet Class B biosolid criteria for pathogen reduction.
For this facility the following PSRPs are primarily used:

- **#1** Aerobic digestion, sludge is treated with air for a specified residence time at a specified temperature. Values of the mean cell residence time and temperature shall be between 40 days at 20ºC (68ºF) and 60 days at 15ºC (59ºF).
- **#5** Alkaline Stabilization: Sufficient lime is added to the sewage sludge is raised to the pH to 12 or higher for more than 2 hours of contact.

B) Vector Attraction

This facility primarily uses the following vector attraction reduction options:

Opt. 1) The 38% volatile solid reduction calculation to use for anaerobic 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 decantante (**attachment A**).

To meet the biosolid vector attraction reduction requirements an anaerobic digester must provide a 15 day detention time at 35º C in a completely mixed high rate digester in order to achieve a volatile solids reduction of 38 % or more. There are several alternative volatile solid reduction methods that are deemed equivalent to the 38% volatile solid reduction criteria under the EPA's and the DEQ's regulations. The vector attraction options listed below are most suitable for this facility.

Opt. 6) Addition of sufficient alkali to raised to the pH to $12 or higher at 25ºC (77ºF) and maintain a pH of 12 for 2 hours and a pH $11.5 for 22 more hours of contact.

Opt. 10) Incorporation: Sewage sludge placed on a surface disposal site must be covered with soil or other material at the end of each operating day.

C) Batch Processes

Class A Biosolid

Alt. 5, PFRP, Pasteurization: biosolid batch-pile must meet Processes to Further Reduce Pathogens (PFRP) for Pasteurization the criterion is a minimum of 70ºC for more than 30 minutes.

Class B Biosolid

Alt. 3, # 5 PSRP) Process that Significantly Reduces Pathogens (PSRP) Lime Stabilization: monitor process to show batch-pile meets a pH of more than 12 for a for $2 hours of contact (active mix). Elevated pH and temperatures regimes must be met by the entire sewage sludge mass, operational protocols which include monitoring pH and temperature at various points to ensure consistent temperature and pH are appropriate.

Process Failure

The treatment plant design incorporates several levels of contingency options to deal with various potential process failure modes. First, a significant amount of liquid sludge storage is provided in the sludge storage tank to allow the inventorying of liquid sludge should there be a failure of a critical downstream piece of processing equipment. Additionally, a truck loading connection is provided at the solids building that would allow the hauling of unprocessed liquid sludge to a neighboring treatment plant, in case of extreme emergencies. Regarding process equipment, two dewatering centrifuges, with associated transfer conveyors, are provided allowing one completely redundant dewatering train. Within the lime stabilization process train, the conveyor system allows bypassing dewatered sludge cake around the ThermoBlender and pasteurization vessel to truck loading or the covered storage area. Bypassed cake could then either be lime stabilized in a temporary mixer, stabilized by the mixing of lime and cake with a loader, or trucked to another treatment plant or location for processing. Should the heating features of the ThermoBlender or pasteurization vessel be inoperative, a Class B product can still be produced by simply the blending of lime and cake in the ThermoBlender.

SECTION V: BIOSOLIDS CHARACTERISTICS

The new treatment facility is not scheduled to be online until 2002. Both the liquids and solids processes will be significantly different than those of the existing plant. Therefore a definitive presentation of biosolids characteristics can only be approximate at this time. This section, however, will present the most appropriate data and projections currently available. Solids projections for initial and design conditions for the new plant are presented in Section below. Given the projected sludge quantities, the City will be required to formally sample and report biosolids characteristics on a quarterly basis. The anticipated monitoring program for the facility's solids handling processes is discussed in the following Section.

Biosolids Quantities

As reported in the City's Annual Biosolids Reports, the existing Newport treatment plant has produced the following biosolids quantities over the past several years: 1995 = 253 dry tons, 1996 =146 dry tons, 1997 =152 dry tons, 1998 = 158 dry tons, and 1999 = 70 dry tons. These biosolids are produced through the anaerobic digestion of primary and waste biological filter sludge. The new plant will have a different treatment process and associated type and quantity of sludge. Design year and initial sludge productions for the new plant are as follows:

Unstabilized Sludge Production Estimates

Condition	Dry lbs./day	Dry tons/day	Dry tons/year
Initial Average	2600	1.3	475
Design Average	4300	2.15	785
Design Max. Month	7400	3.7	-

The significant difference in initial estimated quantities versus existing is the result of the different wastewater treatment process, digestion of sludge versus no digestion, and the fact the projections are only estimates and generally conservative. It is also anticipated that there will be a limited amount of volatile solids reduction that occurs during liquid sludge storage and aeration and the lime stabilization process itself that is not factored into the biosolids estimates. Similarly, the lime component is not included in the tonnage values indicated. It is anticipated that a lime dose in the range of 0.45 to 0.60 pounds of lime per pound of sludge solids, dry weight basis, will be used in the stabilization process. Actual solids generation will be documented during startup of the new plant and ongoing operations.

III Biosolid Characteristics

The City of Newport's treatment works utilizes an activated sludge process. The treatment facility wastes actived sludge form an oxidation ditch to the alkaline stabilization pasteurization sludge process units.

For the past five- (5) years the average volatile solids reduction criteria has been achieved by the City of Newport's wastewater treatment facility. The sludge under was held for 4 months under anaerobic digestion prior to removal and a performing a volatile solids reduction calculation.

Annually, the City of Newport has generates approximately 70 dry tons of biosolids (1999 biosolid analysis). For the year (2001) the City of Newport land applied about 70 dry tons (64 dry metric tons) of Class B biosolid to city owned property.

Monitoring

City of Newport produces less than 290 dry metric tons of biosolid each year. Currently under the 40 CFR Part 503, the City of Newport is required to take representative biosolid sample once per year for metal analysis; for pathogen and vector attraction reduction more frequent monitoring will be required due to batch process operational issues. Frequency of monitoring depends on the amount biosolid generated that is marketed to be sold or given away, land application and surface disposal. Frequency depends the amount on bulk biosolid applied to the land, or the amount of sewage sludge received by a person who prepares biosolid that is sold or given away in a bag or other container for application to the land (dry weight basis), or the amount of biosolid (excluding domestic septage) placed on a surface disposal site.

Testing and Monitoring

The volume of material applied to the application site will be monitored on the basis of truck measure and application rate based on volume/rate calibration of the outfeed device of the application vehicle. The resulting application rate to the site will be calculated accordingly. The nitrogen loading will be calculated accordingly, based on sampling of the product at the treatment plant as previously discussed. This information will be included in the plant's annual biosolids report to the DEQ.

Sampling

1) ThemoBlender

- Sample location: Conveyor belt between alkali process and pasteurization unit.
- Number and type of sample taken per day-batch-event: for vector attraction reduction pH measurements must be taken at the beginning of the batch process to show a sludge has reach a pH of 12 or higher (record start and finish times and pHs). Must meet pH of 12 or more for 2 continuos hours, and
- 5 random pH samples of the batch must be taken at equal time intervals (between the start and finish time) as the batch is treated with alkali agent.
- Sample storage and transport: Sample can be tested at the facility.
- Sample analysis method: measure pHs with pH meter that is calibrated every day before use with pH buffer 7 and 10.

2) Pasteurization unit:

- Sample location: sample temperature and start time (written records) and adjust conveyor speed to meet pasteurization criteria of minimum 30 minutes at minimum 70^oC.
- Number and type of sample taken per day-batch-event: temperature measurements must be taken at the beginning of the batch process to show a sludge has reach a temperature of 70^oC or higher (written record of start and finish time at a temp. of minimum 70^oC), and
- 5 random temperature samples of the batch must be taken at equal time intervals to show batch temperature is maintained at minimum 70^oC.
- Sample storage and transport: samples to be taken within the pasteurization unit.
- Sample analysis method: In process temperature probes (3 possible locations) need to be calibrated and serviced according to the manufacture specifications.

3) Biosolid stock pile on storage build

- Sample location: Using a randomization table, quadrant off the batch-pile of Class A biosolid and pull random samples for pathogen reduction analysis.
- Number and type of sample taken per day-batch-event: minimum of 7 discrete samples over a two week period for Class A biosolid.
- Sample storage and transport: Discrete samples need to be put on ice (4^oC) and transported to a lab for analysis immediately.
- Sample analysis method: The 503.32 pathogen reduction alternative selected by the city will determine which pathogen(s) test methods shall be employed.

Biosolid Analysis:

Biosolid Chemical Analysis:

The following table presents the chemical analyses of the City's biosolids for the past several years. Because of a different stabilization process the future biosolids will have significantly different nutrient characteristics than existing. The metals data however will be representative because the wastewater characteristics will not change. The metals data does show the 'clean' nature of the City's biosolids as indicated by their comparison to the Part 503, Table 3 "Exceptional Quality Standard" criteria.

City of Newport-Biosolids Chemical Characteristics

Constituent	Part 503, Table 3, Criteria	Year				
		1999	1998	1997	1996	1995
As, mg/kg	41	ND@5.0	ND@5.0	25.9	12.4	ND@20.0
Cd, mg/kg	39	4.0	4.9	4.2	5.8	4.65
Cr, mg/kg	-	41.0	36.2	37.3	35.4	34.7
Cu, mg/kg	1500	394	374	340	423	426
Pb, mg/kg	300	117	83.2	111	108	93.6
Hg, mg/kg	17	6.6	3.4	4.18	5.2	6.4
Mo, mg/kg	**-**	19.1	14.2	12.0	25.0	20.4
Ni, mg/kg	420	26	26.1	38.1	24.3	23.0
Se, mg/kg	100	ND@10.0	ND@10.0	ND@5.0	5.9	ND@4.0
Zn, mg/kg	2800	1030	1070	1020	1320	1220

Pounds	(#) Metal	#/yr.	#/ac/yr.	Site life
lb.	Arsenic (As)	0.7	0.013	2719
lb.	Cadmium (Cd)	0.56	0.011	3233
lb.	Chromium (Cr)	5.74	0.11	9706
lb.	Copper (Cu)	55.16	1.06	1262
lb.	Lead (PB)	16.38	0.32	850
lb.	Mercury (Hg)	0.92	0.018	854
lb.	Molybdenum (Mo)	2.67	0.051	312
lb.	Nickel (Ni)	3.64	0.07	5357
lb.	Selenium (Se)	1.4	0.027	1193
lb.	Zinc (Zn)	144.2	2.77	901

The site life would be limited to 312 years based on the Molybdenum (Mo) loading from the 1999 biosolids analysis (attachment B). The City of Newport needs approximately 45 to 50 acres of pasture/grass land to apply on to handle their annual biosolid production.

Biosolid Nutrient Analysis:

These biosolids contain about 2455 pounds (lb.) total nitrogen (N) of which about 1344 lb. are in an available form of nitrogen form (NO_3-NO_2, and NH_3). Other nutrients include 2646 lb. phosphorus (P), 434 lb., potassium (K), and has a pH of approximately 7. The city would need approximately 25 acres at 100 lb. N/acre agronomic loading to handle their 70 dry tons of Class B biosolid.

City of Newport-Biosolids Nutrient Characteristics

Constituent	Part 503, Table 3, Criteria	Year				
		1999	1998	1997	1996	1995
Total Solids,%	-	1.47	2.97	2.33	2.38	2.76
Vol. Solids, %	-	68.0	65.9	62.1	69.2	67.4
TKN, mg/kg	-	8.97	5.89	7.17	8.54	6.8
NH4-N,mg/kg	-	4.75	1.92	3.07	2.48	1.98
NO2/NO3-N	-	ND	ND	ND	ND	ND
P, %	-	1.89	1.69	1.9	2.38	1.8
K, %	-	0.31	0.17	0.22	0.25	0.24

The most significant chemical characteristic differences between the old and new plants will be the pH and nutrient content of the biosolids. Being lime stabilized, biosolids from the new plant will be at a minimum pH of 11.5 when either land-applied or marketed as a soil conditioner. Being undigested and dewatered as well as lime stabilized, the biosolids will contain essentially all organic nitrogen (TKN) and no ammonia nitrogen. Wastewater treatment plants producing similar biosolids (Stayton, Sunriver, and Black Butte) report that essentially all nitrogen is TKN and ranges between 3 and 4 percent on a dry weight basis.

SECTION VII: Biosolid Beneficial Reuse

General

Newport plans to develop a dual-faceted program that includes continued land application, and the marketing/distribution of the Class A product as a soil conditioner. The City initially will continue to apply biosolids to their existing land application site where trees are grown for harvesting. Whereas the new plant will produce a Class A product suitable for distribution, the City will also develop a distribution and marketing program targeted to landscaping, nursery, and agricultural operations that use soil amendment, fertilizer, liming agent, and similar products. For instance the City's own Parks Department is a potential user of this material thus avoiding the cost of purchasing similar products. Although it is difficult to market the product before it is produced, the City will begin the public education process during construction of the new plant by identifying and contacting potential users. As the distribution/marketing program develops, the reliance on the existing land application program will decrease.

IV Biosolid Beneficial Reuse Program

Transportation and Land Application:

As discussed previously, the City is trying to implement an off-highway haul route between the treatment plant and airport. This route would be less than one mile and allow the use of a specialized application vehicle for hauling as well as application. Regardless, based on the necessary haul and application details, the City will procure a specialized land application vehicle prior to completion of plant construction. Unlike the City's existing liquid biosolids haul and application tanker truck, the new vehicle will be designed to handle the dewatered lime-stabilized cake material and broadcast it from the application site road network the appropriate distance onto the tree farm. Biosolids storage will be accomplished at the treatment plant site as described previously and no material will be stored at the land application site. A map of the airport land application site is on file with the DEQ as part of the November 18, 1999 "Agricultural Application Site Approval Request".

Application Rates

The proposed application rate for the lime-stabilized material on the City's approved airport property land application site will be between 3.0 dry/tons per acre per 3-year period. This corresponds to between 30 pounds of available nitrogen per acre per year for a silvacultural operation. The application loading rates are based on US Forest Service nitrogen uptake rates for conifers. At these rates, approximately 52 dry tons per year can be applied on the existing 52 approved acres. If pasture grass were grown on the same acreage then the total available nitrogen loading rate would be 100 lb. N-ac. At these rates, approximately 2.6 dry tons per acre year can be applied on the existing 52 approved acres (135 dry tons total).

Site Approval

The City's application for site authorization was approved in December 1999.

Biosolids are off loaded into a city owned (gal.)-truck near the treatment plant's Biosolid treatment building. The biosolid loading area is enclosed in case of accidental spillage of biosolids during the truck loading process. During the summer months the City of Newport's biosolids are beneficially reuse on 52 acres DEQ authorized land application sites near the airport.

The biosolid land application sites are capable of assimilating about 2 times the City of Newport's 's annual total nitrogen production. The perennial agronomic biosolid land application rate for pastures and grass is 100 lb. available N per acre –yr.

Biosolids Site management Information:

Site Number	Site Use	Total Available N Loading (lb./ac/yr.)	Net acres for Biosolid Application	Available Nitrogen Site uptake
Airport Site 1	if Pasture	100-lb. N/acre	52 acres	5200 lb. N/yr.
Airport Site 1	if Conifers	30-lb. N/acre	52 acres	1560lb.N/yr

Long term biosolid application rates and site restrictions are contained in the biosolid site authorization letter. References to the OAR 34-50, The EPA 40 CFR Part 503, site setbacks, site agronomic loading rates, land application restrictions and site restrictions are also detailed out in the site authorization letter.

Distribution and Marketing

The amount of Class A product distributed to the various users will be recorded and provided in the annual report. Proper identification of the material and its chemical analysis and suggested application rates will be provided to users.

V Contingency Options

In event biosolids are spilled between the treatment facility and the land application site the City of Newport's sewage treatment works shall contain the spill, absorb (via sand) and remove spilled biosolid. Class B biosolids spilt must be removed with a front-end loader or shoves and land apply the spillage at a DEQ authorized application or disposal site. All spills into waters of the state or spills on the ground surface that are like to enter waters of the state shall be reported to immediately to Oregon Emergency Response System (OERS) at 1-800-452-0311 and your regional biosolids coordinator at (541) 440-3338. All spills of 40 gallons or more on the ground surface shall be report to the regional biosolids coordinator at (541) 440-3338.

Spill During Transport

The current haul route from the treatment facility to the land application area uses public roads, including U.S. Highway 101. The haul distance is less than a mile along Highway 101. The City has, however, identified a possible off-highway route that may be implemented in the future. The biosolids hauled will be a dewatered Class A biosolid so disinfection in case of a spill will not be a significant issue. Immediate cleanup of spilled material will be the priority and will be accomplished by a variety of methods ranging from shovel for small quantities to loader and dump truck for largest quantities. Proper notification and highway traffic safety and traffic control techniques will be utilized. At a minimum, spill notification will be to the DEQ, Oregon Emergency Response System, and Oregon Highway Division. The City will develop a Response Plan reflecting the haul route actually used when the current effort to implement the on-site haul route is concluded.

VI Reporting

Daily Reporting and Recordkeeping:

Each year prior to land application of biosolid the source operators shall check to see if contiguous property owners have changed. The operators shall keep a record of contact (date, and/or written log of phone call w/ name and number, and/or xerox of postcard w/ name and address, etc.,) with contiguous property owners, which notifies them of the biosolid land application practice. Operator shall provide this documentation in the annual biosolid report.

Annual Reporting

The Annual Biosolid Report is due February 19, of each year for the previous years land applied biosolid. Part of this report is the submittal of the daily site logs, which have the date, time, and quantity gal-lb. N/acre land applied for each day-tank-batch land applied. Site logs shall have a scaled map showing the site and the land application location that coincides with the daily site loading methods (truck spreader bar, irrigation cannon). Daily records should clearly show the location of daily biosolid loading site log.

Annual Report shall have a signed copy of the certification statements for pathogen reduction, vector attraction reduction and biosolid has been land applied at approved agronomic loading. Person signing statements should be the operator of record at the treatment plant. The operator shall shown how the vector attraction reduction was met i.e., volatile solids reduction was achieved by time and temperature, the Van Kleeck equation filled out with digester records (MCRT), bench scale test, sour test or any other EPA approved alternative method appropriated for biosolid generated at your facility. Certification of pathogen reduction is required and is satisfied by submittal of test results in the Annual Biosolid Report. All the previous year's biosolid sampling and analysis that is required by the permit shall be included in City of Newport's Annual Biosolid Report **(in each year's annual report appendix).**

Daily Recordkeeping

The ability to inventory liquid sludge in the sludge storage tank will allow the plant personnel to dewater and process biosolids through the lime stabilization/pasteurization system on an intermittent basis. It is anticipated that the processing train will operate several days during a normal workweek and will be shut down for the remainder of the week including weekends and holidays. During operational periods, solids processing will be continuously monitored by instrumentation with data archived in the process computer system. The amount of sludge dewatered and subsequently lime stabilized will be initially set by the operator, based on the flow rate to dewatering and the solids concentration in the sludge storage tank, in order to achieve a desired cake quantity delivered to lime stabilization.

Lime feed will be set by adjusting the output of the lime feeder based on historical setpoints to achieve proper stabilization. Material temperatures at various points in the lime stabilization/pasteurization system are continuously and automatically monitored and recorded via the system instrumentation to insure process performance.

Data that will be manually initiated by sampling includes: sludge concentrations to dewatering, dewatered sludge cake solids concentration, and product pH and fecal coliform. The liquid and cake solids information should be gathered at least daily with an exact frequency to be determined based on 503 criteria, process stability, and historical performance. A daily samples for pH, and temperature are required. At least 7 discrete samples per 2 week period for Class A pathogen reduction per is required. Lime stabilization/pasteurization system temperature data that will be continuously monitored via instrumentation and recorded in the plant process computer includes ThermoBlender outlet temperature, and pasteurization vessel inlet and outlet temperatures. The computer will record daily temperature values.

Monthly Reporting

The daily data and monthly fecal coliform data discussed will be summarized in a monthly DMR reporting format for submittal to the DEQ.

Annual Reporting

The City will submit an Annual Biosolids Report to the DEQ in a similar manner to what is currently done. The quarterly sampling requirements dictated by the Part 503 regulations will be included along with certification of compliance with the Part 503 regulations. The amount of biosolids applied to the City's approved land application site along with the associated site management (nutrient management) reporting requirements will be included. As discussed in the next section, the City intends to develop "distribution and marketing"(D&M) options for the Class A material. The amount of Class A product reused by the various D&M users will also be identified.

VII Certification Statement

City of Newport's facility is capable of meeting their primary alternatives for achieving Class A or B biosolid pathogen and vector attraction reduction criteria. Signed Class A and/or B biosolid and vector attraction certification statements shall accompany all biosolids that are land applied **(attachment C).** For Class A or B biosolid annual biosolid analysis must be provided upon request. Certification statements must also show conformance with nutrient and land application loading rates where applicable.

Attachment A:

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 (a weighted blend of the primary and secondary clarifier solids) 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 that 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

$$FVSR = Fyb - Byb – Dyd / Fyb$$

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

Because the Aerobic digester is cleaned every year the assumption is there is no grit accumulation in the digestive process.

Assumptions: Fixed Solids and Volatile Flows Streams.

Attachment C:

"I certify, under penalty of law, that the pathogen requirements in [insert either 503.32(a) or 503.32(b)], the management practices in 503.14 and the vector attraction reduction requirements in [insert 503.33(b)(1) through 503.33(b)(10)] have been met. 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 pathogen requirements and vector attraction reduction requirements have been met. I also certify that all biosolids were land applied at the approved agronomic loading rate noted in the respective Department site authorization letter. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."

Signature………………………………………. Date…………………….