Wastewater Treatment Plant Evaluation

City of Stayton
OREGON

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CHAPTER 1.0 – INTRODUCTION

1.1 HISTORY

The City of Stayton has provided wastewater treatment for the Stayton-Sublimity area since 1962. The original wastewater treatment plant (WWTP) was an oxidation ditch type plant which was upgraded in 1972 and 1975 and operated until 1996. The plant consisted of the following elements:

- Headworks (included comminutors and flow measurement)
- Oxidation ditch
- Secondary clarifiers
- Chlorine contact chamber and equalization pond
- Gravity filters
- Aerobic digester and sludge lagoons

Some of the old plant features are still in existence. Most have been abandoned except for the aerobic digester and sludge storage ponds.

Abandoned Oxidation Ditch

1.2 EXISTING FACILITIES

In the late 1980's the oxidation ditch plant became overloaded and required expansion as a result of continuing growth in the Stayton-Sublimity area. A facilities planning study was undertaken at that time to evaluate future treatment alternatives. Considering the expected tougher future effluent discharge limitations, the City elected to construct a new mechanical sequencing batch reactor (SBR) plant. Additional land was purchased expanding the plant site to the west. The first phase of construction occurred in 1996 and consisted of the following process units:

Phase I – SBR Plant Improvements (1996)

- Operations building and lab

- Headworks
  - Parshall flume flow measurement
  - Rotomat inclined screen
  - Vortex type grit separator
  - Automatic influent sampler

- Influent pump station
- Batch reactors (2)
- Blower building and SBR process support facilities
- Decant equalization basin
- UV disinfection facilities
- Reuse of the existing aerated sludge storage tank
- Belt press and lime stabilization

- Onsite paved biosolids storage basin (originally to be abandoned, but put into use because of a lack of a winter biosolids application site)

A site plan showing existing facilities and existing plant process flow schematic are included on Figures 1-1 and 1-2, respectively.

The current facilities are relatively new and the plant normally meets discharge permit requirements with a few exceptions as discussed in Chapter 3.

Existing Treatment Plant

A second phase of improvements was projected to occur approximately in the year 2006 as follows:

Phase 2 – SBR Plant Improvements (previously anticipated by 2006)

- Batch reactors (1)
- Filters (2)

1.3 PURPOSE OF STUDY

The purpose of this study is to provide an assessment of the existing SBR plant and to develop a master plan and capital improvement plan that address:

- Compliance with existing and anticipated future NPDES permit limits
- Plant process performance and potential improvements
- Condition of existing facilities and equipment
- Staffing and O & M protocol
- Process monitoring procedures
- Development of future facility needs and capital improvement plan

This evaluation of the wastewater treatment plant is being performed simultaneous with the wastewater collection system master plan which is bound in a separate document. Some of the flow data developed in the wastewater collection system master plan has been used in this study.

1.4 ABBREVIATIONS

The following abbreviations have been used in this report:

- BOD 5-day biological oxygen demand
- cfs cubic feet per second
- DEQ Oregon Department of Environmental Quality
- EPA United States Environmental Protection Agency
- FPS Facilities Planning Study
- fps feet per second
- gal gallon
- gcd or gpcd gallons per capita per day
- gpd gallons per day
- gpm gallons per minute
- Hp horsepower
- Hp-hr horsepower per hour
- I/I Infiltration and Inflow
- lbs pounds

- lbs/day pounds per day
- mg/L milligrams per liter
- MG million gallons
- MGD million gallons per day
- MLSS mixed liquor suspended solids
- ml milliliter
- NH_3N ammonia nitrogen
- O&M operation and maintenance
- SCS Soils Conservation Service
- SS or TSS total suspended solids
- TKN total kjeldahl nitrogen
- TMDL total maximum daily load
- TN total nitrogen
- TP total phosphorus
- WW wastewater
- WWTP wastewater treatment plant
- yr year

CHAPTER 2.0 – FLOW AND LOAD PROJECTIONS

2.1 GENERAL

This chapter provides an analysis of existing and future plant flow and water quality to determine load conditions (biochemical oxygen demand and suspended solids). It is necessary to look at existing influent flow and biochemical oxygen demand and suspended solids loads to provide a comparison to plant design criteria so as to determine remaining capacity available. Historical data is also useful in projecting future flow and load conditions.

2.2 EXISTING FLOW

Discharge monitoring reports were reviewed for January 2000 through December 2004 to determine flow conditions for those years. Flow data is summarized along with the original Phase I (Year 2006) plant design criteria in Table 2.1. Please note that these flows reflect the contributions of both Stayton and Sublimity.

Table 2.1
Existing and Design Conditions - Influent Flow Rates (MGD)

Flow Condition	2000	2001	2002	2003	2004	Phase I Plant Design Criteria
Annual Average Flow	1.34	1.34	1.60	1.94	1.55	1.72
Dry Weather (May – Oct)						
Average Daily Flow	1.08	1.00	1.16	1.17	1.41	1.37
Max. Month Flow	1.34	1.12	1.26	1.81	2.01	2.18
Max. Day Flow	1.57	1.29	2.12	2.50	2.72	3.10
Wet Weather (Nov - April)						
Average Daily Flow	1.89	1.37	2.18	2.75	2.26	1.96
Max. Month Flow	2.30	2.97	2.70	3.06	3.46	2.71
Max. Day Flow	2.96	3.98	4.98	5.46	5.37	3.91
Peak Flow	unknown	unknown	unknown	5.74	unknown	6.87

From the above data, it can be seen that dry weather flows are approaching the original Year 2006 Phase I plant design capacity. The wet weather flows have already exceeded the design conditions. Looking at the difference between dry and wet weather flows, it is apparent the City has a high degree of inflow and infiltration (I/I) from its sewer collection system. The plant design hydraulic profile is shown on Figure 2-1 at previously anticipated peak flow instantaneous rates of 6.87 (Phase I 2006) and 9.27 MGD (Phase II 2016). More current population and flow projections are presented in Table 2.3 which shows that a peak flow of 6.87 MGD would correspond more closely to Year 2010.

2.3 EXISTING PLANT BOD AND SS LOADS

Plant BOD and SS data from the year 2000 to 2004 Discharge Monitoring Reports were also reviewed and are summarized in Table 2.2 for Stayton and Sublimity. Year 2006 plant design criteria loading data is also shown.

Table 2.2
Existing and Design Conditions - Influent BOD/SS Loads

Load Conditions	2000	2001	2002	2003*	2004	Phase I Design Criteria
Biochemical Oxygen Demand (BOD)						
Average Annual (mg/l)	183	145	139	135	110	157
Average Annual (lbs/day)	1862	1487	1661	1781	1422	2254
Max. Month (mg/l)	248	178	198	220	161	211
Max. Month (lbs/day)	2027	1889	1978	1965	1783	4760
Suspended Solids (SS)						
Average Annual (mg/l)	131	109	109	109	102	157
Average Annual (lbs/day)	1341	1121	1330	1462	1319	2254
Max. Month (mg/l)	190	133	164	184	161	211
Max. Month (lbs/day)	1630	1601	1689	1863	1693	4760
*Population 9460						

From the above information, it can be seen that organic loading is significantly lower than the year 2006 Phase 1 plant design capacity. The mass loading is currently less than half of the Phase 1 maximum month design capacity. As a part of this study, the City also completed an

inventory of all non-residential users to better characterize the type of wastewater entering the City's conveyance and treatment systems. A summary of this survey can be found in Appendix E.

2.4 FUTURE PLANT FLOW RATES

Existing plant per capita flow rate was evaluated and determined to have a significant amount of I/I. The City is implementing a program to remove excess I/I where economically feasible. In addition, future new construction should not have the same I/I problems. Taking the above into account, flows were projected based on an approximate 3.35% geometric growth rate for the wastewater collection system and are presented in the table below. The projected flow rates reflect the combined flow of Stayton and Sublimity. For a more comprehensive discussion of flow rates, documentation can be found in the "Wastewater Collection System Master Plan."

Table 2.3
Projected Future Plant Flow Rates

Flow Condition	3.35% Growth Projection		
	Estimate 2015 Flow (MGD)	Estimate 2025 Flow (MGD)	Estimate UGB Buildout Flow (MGD)
Population	14,000	19,400	34,200
Annual Average Flow	2.8	3.9	6.9
Dry Weather (May – Oct)			
Average Daily Flow	1.9	2.7	4.9
Max. Month Flow	2.4	3.4	6.1
Max. Day Flow	3.2	4.6	8.3
Wet Weather (Nov - April)			
Average Daily Flow	3.6	5.0	8.9
Max. Month Flow	4.2	5.7	10.0
Max. Day Flow	6.7	8.4	13.3
Peak Flow	8.0	10.1	16.1

The following sections of this report are based upon the above flow rate projections.

2.5 FUTURE PLANT BOD/SS LOADS

As more I/I is removed from the system, BOD and suspended solids concentrations will increase. Plant BOD and SS loads will also increase as a direct result of increased growth. Taking the above into account and using flows projected from master planning for the wastewater collection system, future projected BOD and SS loads were estimated as shown in Table 2.4 for Stayton/Sublimity.

Table 2.4
Projected Future Plant BOD/SS Loads

Load Condition	3/35% Growth Projection		
	Estimate 2015 Loads	Estimate 2025 Loads	Estimate UGB Buildout Loads
Population	14,000	19,400	34,200
Biochemical Oxygen Demand (BOD)			
Average Annual (mg/l)	160	160	160
Average Annual (lbs/day)	3,740	5,200	9,210
Max. Month (mg/l)	210	210	210
Max. Month (lbs/day)	4,200	5,960	10,680
Suspended Solids (SS)			
Average Annual (mg/l)	140	140	140
Average Annual (lbs/day)	3,270	4,550	8,060
Max. Month (mg/l)	220	220	220
Max. Month (lbs/day)	4,400	6,240	11,190

Based on projected organic loads, the existing two SBR basins will reach average annual organic loading design BOD capacity by approximately the year 2010 and maximum month BOD capacity by the year 2018.

Based on peak design flow, the two SBR basins will reach design flow capacity by the year 2010.

CHAPTER 3.0 – NPDES PERMIT LIMITS

3.1 GENERAL

The National Pollutant Discharge Elimination System (NPDES) permit limits are important as the plant must be capable of meeting existing permit limits as well as anticipated future limits. The City's permit expired in December 2003 and the new permit was issued in June 2004. Following is a review of previous permit conditions and how new permit limits may impact future plant operation and facility improvements.

3.2 PREVIOUS PERMIT CONDITIONS

The City operated under the previous permit since startup of its SBR plant in 1996. The primary limits of the permit varied according to season as follows.

(1) May 1 – October 31:					
Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
BOD_5	10 mg/l	15 mg/l	110	160	220
TSS	10 mg/l	15 mg/l	110	160	220

(2) November 1 – April 30:					
Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
BOD_5	30 mg/l	45 mg/l	340	510	680
TSS	30 mg/l	45 mg/l	340	510	680

*Mass load limits are based on a dry weather flow of 1.35 MGD. Note that this dry weather flow was the rated design flow for the old oxidation ditch plant which was not increased when the SBR plant went online.

(3) Other Parameters (Year-Round):	
E. *coli* Bacteria	Shall not exceed 126 organisms per 100 ml monthly geometric mean. No single sample shall exceed 406 organisms per 100 ml.
pH	Shall be within the range of 6.0 – 9.0
BOD_5 and TSS Removal Efficiency	Shall not be less than 85% monthly average

The permit's dry season BOD and SS permit limits were relatively stringent. However, the City has done an exceptional job in meeting previous permit conditions over the last 4 years with only a few exceptions as follows:

- Exceedance of effluent BOD/SS limits as a result of one batch reactor being taken out of service for repairs.
- Effluent pH violations as a result of incorrect pH meter readings.
- E coli violation as a result of one batch reactor being taken out of service for repairs.
- Mass load limit violation in May 2003.

3.3 NEW PERMIT REQUIREMENTS

The State of Oregon Department of Environmental Quality (DEQ) has several areas of concern regarding future discharges to the North Santiam River and Willamette River drainage basin. These areas of concern include:

- Heat load discharge which can raise the temperature of the North Santiam River and adversely affect aquatic life.
- Potential ammonia levels discharged, which may be toxic to aquatic life.
- BOD and SS loads to the North Santiam River. DEQ currently has a policy of limiting future new discharges to the river, and limiting any future increase in mass loads from existing discharges to the river.
- Total mass daily load (TMDL) investigations by DEQ may lead to future discharge limits on metals, in particular mercury, and nutrients (nitrogen and phosphorus). Metals and nutrient limits will not impact the new permit, but could impact the City's next permit in 2009.

Considering the above, it is unlikely that limitations in future permits will be relaxed and it can be stated that a higher degree of treatment will be necessary to maintain and even improve effluent quality as future growth occurs.

DEQ has conducted an evaluation of the City of Stayton's discharge over the last few years, and how it might impact the North Santiam River with

regard to heat load, ammonia, and BOD/SS mass loads. The results indicate a potential risk to the river in those areas and are reflected in the new permit limits as indicated below:

(1) May 1 - October 31:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
$CBOD_5$	10 mg/L	15 mg/L	110	160	220
TSS	10 mg/L	15 mg/L	110	160	220

(2) November 1 - April 30:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
BOD_5	30 mg/L	45 mg/L	340	510	680
TSS	30 mg/L	45 mg/L	340	510	680

*The mass load limits are based upon average dry weather design flow of 1.35 MGD, and are uncharged from the previous permit.

(3) Other Parameters (year-round except as noted)

Parameter	Limitations
E. coli Bacteria	Shall not exceed 126 organisms per 100 mL monthly geometric mean. No single sample shall exceed 406 organisms per 100 mL.
pH	Shall be within the range of 6.0 - 9.0
$CBOD_5$ Removal Efficiency (May 1 through October 31)	Shall not be less than 85% monthly average.
BOD_5 Removal Efficiency (November 1 through April 30)	Shall not be less than 85% monthly average.
TSS Removal Efficiency	Shall not be less than 85% monthly average.
Excess Thermal Load (September 1 through June 15)	**Shall not exceed a weekly average of 30 million Kcals/day.**
Ammonia-N (May 1 through October 31)	**Shall not exceed a monthly average concentration of 12 mg/L and a daily maximum concentration of 27 mg/L.**

The complete new permit is attached in Appendix B and became effective on June 1, 2004 and expires on May 31, 2009.

3.4 NEW PERMIT IMPACTS

The above limits required by the new permit will have an impact on current operation of the plant and will eventually require facility improvements to meet some limits. These impacts are discussed below.

3.4.1 Heat Load Limit

DEQ provided an evaluation of Stayton's historical effluent temperature and flow and arrived at the conclusion that the City would exceed the heat load limit of 30.2 million kcals to the North Santiam River during the salmon rearing and migration period of September 1 through June 15. That conclusion was based on a theoretical model calculated dilution of 14:1 in the existing mixing zone. The City and DEQ question the dilution accuracy and DEQ has requested that the City conduct an evaluation to determine the actual mixing zone dilution. If the actual dilution is determined to be substantially higher DEQ will consider deletion of the heat load limit from the permit. Therefore, it is important that the City conduct the evaluation to determine actual mixing zone dilution.

Should the mixing zone dilution be inadequate, a strategy is needed for the City to insure compliance with the heat load limit. Mixing conditions are complicated by the fact that the City discharges to a sidestream branch of the North Santiam River. The river splits about one half mile upstream with the smaller amount of river flow passing over the Stayton outfall discharge.

There appear to be several strategies and alternatives for meeting the heat load limit:

1) Measure the effluent temperature at a manhole as close to the river as possible to account for some cooling of effluent that occurs downstream of the UV disinfection process.

2) Extend the outfall about 700 feet across the dividing island to the main branch of the North Santiam where dilution would be much greater (See Figure 3-1). Hydraulic analysis is needed to better define feasibility. An amended or new NPDES permit would likely be required for the new point of discharge. It may also be advantageous to discharge to both channels.

3) The US Army Corps of Engineers could be consulted about dredging of the entrance to the river branch flowing past the Stayton plant to allow greater flow diversion in that section,

thereby increasing dilution. The disadvantage is that dredging would probably need to be repeated annually to maintain the higher branch flow rate, especially since previous sandbar formation has partially closed the channel. It is highly unlikely that the USACOE would allow annual dredging of this channel.

4) The Santiam Water Control District operates a canal which discharges several hundred yards upstream of the WWTP outfall. The District has discussed increasing flows through its hydroelectric plant to the canal in the future, thus providing increased dilution water. The District is currently negotiating the flow increase under licensing renewal with the FERC. If flow increases are substantial (>250 cfs) it could improve dilution such that the City would not have potential to violate their permit.

5) There has been discussion of the City purchasing land adjacent to the treatment plant. However, it appears Norpac controls most adjacent land which they are currently irrigating. During high effluent temperature periods, it may be possible to irrigate adjacent lands, or provide storage to hold all or part of the effluent until higher effluent temperature periods pass and then slowly return stored wastewater to the river.

6) It may be possible to create a labyrinth of underground piping and use the ground as a heat sink and reduce effluent discharge temperature. This would have to be pilot tested to determine feasibility.

7) It has been indicated that wetlands can reduce effluent temperatures as well as provide additional treatment. The City could consider this option as well.

8) Other alternatives would include trading credits such as planting trees to shade and cool the river, or purchasing credits through a trading program that cools the river. Other possibilities include buying upstream water rights to limit withdrawals so as to maintain greater river flow and dilution.

The above alternatives are discussed further in Chapter 6. Evaluation of actual existing mixing zone dilution achieved will dictate whether further measures are necessary to meet heat load limits. The mixing zone study is scheduled for completion by August 2006.

3.4.2 BOD/SS Mass Load Limits

Dry weather mass load limits of 110 lbs/day were exceeded in May 2003 and were in the 90 to 100 lbs/day range for several other months despite reasonable effluent BOD and SS concentrations in the 10 mg/L range. Well designed and operated SBR plants can achieve effluent quality less than 10 mg/l, however, that concentration is the reliable threshold which can be guaranteed to be met and satisfy permit limits. As population growth continues, effluent mass loads discharged will also increase. To meet the limit, additional treatment will be necessary. Filtration would provide the greatest immediate benefit, as approximately 80 to 90 percent reduction of BOD and suspended solids is possible in the filters, and filters would also provide an additional barrier if upset conditions occur in the batch reactors.

3.4.3 Ammonia Limit

The May 1 through October 31 ammonia limit of 12 mg/L monthly average and 27 mg/L daily maximum has been consistently met by the plant over the last several years. There has been discussion by DEQ of possibly raising the ammonia limit even higher. The plant has significant organic capacity remaining and should not have any difficulty meeting the current mandated limit over the next 5 years, particularly since it is a warm weather limit. Beyond 5 years additional basin capacity and aeration would need to be added. Nitrification and reduction of ammonia is much easier to achieve during warm weather months. The City will need to monitor plant alkalinity since ammonia removal decreases significantly below a pH of 6.5. Should influent pH drop below that level, chemical addition may be necessary to raise alkalinity and pH.

3.4.4 Future TMDL Related Limits

At this time it is difficult to know if DEQ's future total mass daily load (TMDL) studies on the Willamette Drainage Basin, including the North Santiam River, will have any impact on the City of Stayton. It is critical the City continue to monitor the river and plant effluent in accordance with permit requirements to gather sufficient data to allow DEQ to make rational decisions should future TMDL limits be proposed. The SBR process can be readily modified to remove phosphorus and nitrogen should nutrient limits be imposed; however, additional reactor tank volume may be necessary. Mercury can either be controlled at the source (dental offices, etc.), by isolating mercury laden products from discharge to the sewer, or removed at the WWTP by use of absorbents and chemical precipitation.

CHAPTER 4.0 – PROCESS EVALUATION

4.1 GENERAL

Plant process evaluation is necessary to determine the plant's present and future capability of meeting its NPDES permit requirements as well as addressing operation and maintenance issues. Recommendations can then be made for improvements to comply with permit requirements, ensure adequate capacity is available, and assist in ease of future operation and maintenance of the plant.

Facility improvement alternatives and recommendations are presented in further detail in Chapters 5 and 6.

4.2 PLANT LIQUID PROCESS UNIT EVALUATION

A plant process flow schematic is shown on Figure 1-2. An evaluation was made for capacity of each process flow unit and discussions were held with plant staff to determine process performance, facilities conditions, and any deficiencies which might exist. An evaluation for each process unit is presented in the following paragraphs.

4.2.1 Headworks

The headworks facilities are located near the plant entrance and consist of a parshall flume influent flow meter, automatic sampling equipment, manual and Rotomat fine screen (indoors), influent pump station and vortex type grit separator.

Flow measurement and automatic influent sampling take place just upstream of the screening facility. The screening facility consists of two parallel concrete channels, one channel with an inclined Rotomat screen, and the other with a backup manually cleaned bar screen. The Rotomat screen has a nominal capacity of 5 MGD but will handle 6.8 MGD per the manufacturer. It operates automatically based on either upstream channel depth or by timer. The collected screenings are washed of fecal and organic materials by spray system, compressed to remove excess water, and discharged to an adjacent dumpster.

Influent Screen and Grit Washer

The influent pump station consists of a below grade 30 foot diameter by 18 foot deep concrete wetwell with four submersible pumps, two pumps each with a capacity of 1390 gpm and two pumps each with a capacity of 3680 gpm. With one of the larger pumps out of service, the total capacity is 9.3 MGD, which is capable of meeting the original plant year 2016 design flow. One additional pump will be required to meet the year 2025 peak flow rate of 10.1 MGD. The pumps automatically cycle on and off based on wetwell level.

Influent Pump Station

The influent pump station discharges to an elevated vortex type grit basin with a peak flow capacity of 9.3MGD. At the projected year 2025 peak flow rate of 10.1 MGD there may be some minor carryover of grit; however addition of more capacity is not warranted until the year 2025. Settled grit is removed by recessed impeller grit pump to a cyclone separator and grit washer and classifier. Clean grit is then discharged to a dumpster.

The headworks facilities generally operate with few problems. Concerns or deficiencies noted include the following:

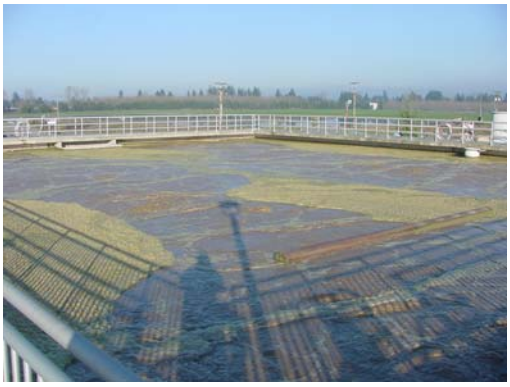
- The Rotomat inclined screen has ¼ inch openings which allow some smaller plastics and material to get through. According to plant staff the screen is also difficult to maintain and repair.

- At times, excessive amounts of grease in the influent stream is reported by plant staff. Excessive grease can clog pipelines and cause operating problems with plant equipment.

- Original influent pump level floats would hang up and come off. An electronic level sensing device is currently used to monitor level; however, a backup level sensing system is needed in event of failure to prevent pump station overflow conditions.

4.2.2 Batch Reactors

The plant has two 1.3 MG concrete batch reactors each with jet aeration headers (2), floating decanters (2), scum skimmers, and reactor mixing pumps. Two positive displacement blowers provide air for process needs, and a field programmable process control panel with PLC provides sequencing and control of process functions. The PLC operating process parameters can be adjusted by a computer located in the operations building.



Batch Reactor

Each reactor typically goes through a staggered 6 hour batching process except when high peak flows occur when the cycle time is reduced to 4 hours. Typical plant process sequencing is as follows:

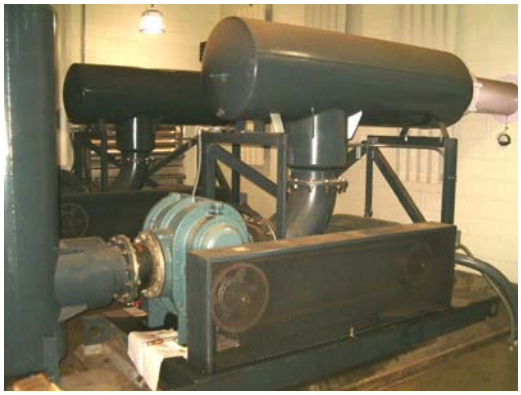
- Anoxic fill (80 minutes)

- Mixed fill (60 minutes)

- Aerated mixed fill (40 minutes)
- Aerated react (15 minutes)
- Settle (130 minutes)
- Decant (20 minutes)
- Sludge waste (3 minutes)
- Idle (12 minutes)

Solids are typically wasted at a rate as needed to maintain a desired mixed liquor suspended solids (MLSS) concentration and solids residence time in the basins. The plant has been operated over a MLSS range of 2000-3000 mg/l for the past few years in an attempt to increase sludge age and minimize solids production downstream since onsite solids storage is limited. Water depth in the reactors varies from 16 to 22 feet based on influent flow rate.

The SBR process is supported by two 200 Hp positive displacement blowers each with a capacity of 3400 scfm. Dissolved oxygen (DO) sensors in each basin are used to control and maintain a DO concentration of 2-3 mg/l during the aerated react phase. Blowers are constant speed and are turned on and off during the aerated mixed fill and aerated react phases to provide the required DO concentration.



Process Blowers

Plant design solids residence time (SRT) is not shown on the plant design criteria drawings; however, the plant appears to be designed for a calculated Phase I minimum solids residence time of 12.5 days based on a MLSS concentration of 2,500 mg/l and sludge mass loading data shown on the plant solids balance diagram in

the WWTP plans. The calculated current maximum month SRT is approximately 24 days. Therefore, the reactors have considerable additional organic capacity available.

It should be noted that current wet weather average, peak month, and peak day hydraulic loading rates exceed previously established Phase I Year 2006 design criteria. Peak day flows result in decreased detention time, which reduce aeration, settling, and decant cycle times. This can have a negative impact on treatment. Fortunately, these peak events normally occur during wet weather months when effluent BOD/SS limits are less stringent.

Should permit violations occur, 1) peak flows will need to be reduced through a program of collection system I/I reduction, 2) flow equalization will need to be added, 3) increased reactor capacity will need to be added, or 4) filters added.

There are some issues with the batch reactors that make operation and maintenance more difficult and less efficient than it could be.

- It is difficult to take one of the reactors out of service as that transfers all load to a single reactor which, in most instances, results in overload. That was the case in July 2002 which resulted in exceedence and violation of permit requirements. It would be advantageous to add a third basin which would assist in meeting wet weather peak flows and allow one basin to be taken offline when maintenance and repairs are needed. An equalization basin could be added to reduce peak flows, however, would not provide treatment capability.

- The SBR process is highly automated with programmable logic controller (PLC), automatic operated valves, and individual pumping systems. The process is extremely difficult to operate manually. Loss of any of the above components usually results in single basin operation, overload, and effluent violation. It would be desirable to have a spare pneumatic valve actuator of each size, a spare pump of each size, and spare PLC with important cards. This would provide redundancy, and minimize single basin operation situations.

- The high capacity mixing pumps (11,000 gpm) are also used for sludge wasting by extreme throttling to lower flow rate. There are several disadvantages to wasting in that manner, including excessive backpressure on the mixing pumps leading to seal failures, very high sludge draw-off rates for

brief periods (1-3 minutes) which can result in “coning” (drawing in excessive water with sludge), and poor regulation of sludge flow. Instead it is recommended that separate sludge wasting pumps with variable frequency drives be installed to allow separate sludge withdrawal at lower and adjustable flow rate (200-500 gpm for 10-30 minutes).

- One mixing pump recently has suffered impeller damage with erosion and holes reducing flow by half. It appears severe cavitation or other problem has occurred. Pumping conditions should be reviewed to determine if head and flow conditions are abnormal.

Reactor Mixing Pump

- Recent cold weather in the low 20° F range resulted in plant overflow due to water freezing inside outdoor exposed pneumatic air piping controlling the SBR valves. A sequencing batch reactor plant may experience dormant periods in pipelines up to 6 hours, which also allows adequate time to freeze conveyance pipelines and valves. Although freezing conditions are rare, they can occur and preventative measures are needed to protect exposed valves and pipelines from freezing.

Outdoor Process Piping

- Excessive foaming which is difficult to remove has occurred in the reactor basin. This can be a symptom of filamentous organisms, in particular Nocardia, which can lead to foaming and poor settling sludge. The mixed liquor has been checked by microscope for filamentous organisms and found to be present.

- Backflushing of the jet aeration system is difficult as it requires manual operation of up to four valves with up to 300 turns to open each valve. The process is time consuming, and therefore is not performed as frequently as desired.

4.2.3 Equalization Basin

The 215,000 gallon concrete equalization (EQ) basin provides storage for the SBR short duration high decant flow rates (16.2 MGD = 11,200 gpm). That allows a lower flow rate (6.9 MGD = 4,760 gpm) to be pumped to the UV disinfection process. The basin has adequate capacity; however, there are several issues with the basin that require resolution as follows:

- The bottom of the basin accumulates settled solids since the floor is relatively flat. This requires periodic maintenance to remove the solids between decant cycles.

- The basin walls accumulate algae which can slough off and impact UV disinfection performance.

- Access to the basin for cleaning is poor.

Equalization Basin

4.2.4 UV Disinfection System

The existing UV disinfection system consists of two parallel channels each with two horizontal banks of low pressure, low intensity lamps (288 total). The system is manufactured by Trojan Technologies (Model UV3000), and is designed for a peak flow of 6.87 MGD. The existing system lacks redundancy (separate third channel and lamp banks); however, redundancy is not essential since loss of several lamps involves a relatively simple replacement resulting in minimal downtime. The system normally meets E *coli* NPDES permit limits except in cases of abnormally high suspended solids conveyed from the batch reactors and EQ basin as a result of poor settling, biological process overload/upset, excessive high flow rates, or algae sloughing and cleaning of the EQ basin. The effluent channel level control gate controls the high water level over the lamps and is not designed to be water tight, and can lose water and expose the top lamps between discharge cycles. The lamps also must be manually cleaned once a month which is time consuming.

UV Disinfection Process

Current plant peak flow rate is 6. 5 MGD, so expansion of the system will be necessary in the next 5 years, based on projected future flow rates (or perhaps longer if I/I is reduced). When expansion is required, consideration should be given to upgrading to the new low pressure high intensity disinfection systems currently on the market. These latest technology lamps have several advantages including:

- Significantly fewer lamps required to treat the same flow rate.

- High intensity lamps are able to penetrate flow with higher suspended solids and thus achieve pathogen inactivation even during poor upstream process performance.

- The lamps are now made with self-cleaning systems which eliminate the necessity of manually cleaning as currently practiced.

- Replacement can be phased in as each new bank will provide improved inactivation of pathogens.

4.3 PLANT SOLIDS HANDLING PROCESS EVALUATION

Solids wasted from the batch reactors are pumped to a concrete solids storage tank (aerated and mixed) with a volume of 225,000 gallons, or to a sludge storage pond with an additional volume of 180,000 gallons. Every day, sludge is pumped by a transfer pump at a rate of approximately 100 gpm through a sludge grinder, dosed with a polymer, and dewatered by a 1.7 meter belt filter press. Sludge cake from the press is then lime stabilized to Class B standards, and is land applied offsite in dry weather periods. When land application is not possible during wet weather months due to wet field conditions, the sludge cake is stored onsite.

Existing and estimated future sludge production quantities are shown on Table 4-1 below.

Table 4.1
Estimated Sludge Production - (tons/day)

Description	2005	2015	2025	Buildout
Average month with lime	0.80	1.10	1.50	2.60
Average month without lime	0.60	0.80	1.10	1.95
Maximum month with lime	1.20	1.60	2.20	3.90
Maximum month without lime	0.90	1.20	1.70	2.90

An evaluation of solids processing units is discussed in the following paragraphs.

4.3.1 Liquid Solids Storage

The reactor mixing pumps are used to pump waste solids from the batch reactors at approximately 0.4 to 1.0% total solids content to

the aerated storage tank or sludge storage pond. Current peak month pumping results in an average of approximately 40,000 gpd solids wasted. The storage tank volume is 225,000 gallons. As noted, the plant has an additional liquid solids storage pond with a capacity of 180,000 gallons if needed. Therefore, the plant has a current peak month holding capacity of 10 days. Year 2025 (population 19,400) sludge would be 80,000 gpd and holding capacity of 5 days. Additional liquid sludge storage should be provided for a minimum duration of two weeks should downstream dewatering equipment require repair.

The existing aerated storage tank typically holds very thin solids with no means of decanting excess water. It is recommended the aerated sludge storage tank be equipped with a decanting mechanism so as to allow thicker solids on the order of 3-4% to be pumped to the belt press and/or separate thickener facilities be provided to accomplish the same result. This would significantly increase belt press production capability and provide a dryer sludge cake on the order of 20-25% from the belt press.

Aerated Sludge Storage Tank

Liquid Sludge Storage Pond

4.3.2 Sewer Cleaning Disposal Area

The plant operates a small sand filter containment area for separation of deleterious materials discharged by the City sewer cleaning truck. Material is discharged to the sand surface and a standpipe well used to remove filtered water. The sand area is cleaned by hand. The water is currently removed manually by installation of a temporary pump and hose discharge to the plant drain system. The water removal process should be automated to simplify operation, and a manual screen added to collect and remove larger debris.

4.3.3 Dewatering Facilities

Sludge is dewatered from 0.4 to 1% to approximately 15 to 20% solids by belt filter press. Prior to dewatering the Waste Activated Sludge (WAS) is conditioned with a liquid polymer and pumped by a variable speed progressive cavity pump or constant speed centrifugal pump to the press. The standby centrifugal pump is quite old (1962), lacks adequate capacity, and should be replaced. Dewatered filtrate is drained and conveyed back to the influent pump station. Solids capture typically exceeds 90%. The belt press performance is within the range typically obtained by other plants.

Belt Filter Press

The belt press has a specified dewatering capacity of 130 gallons per minute, however only operates at approximately 100 – 110 gpm due to transfer pumping equipment limitations. The current average month daily sludge flow is approximately 40,000 gpd and can be dewatered in approximately 6 hours. Therefore, sludge dewatering currently requires approximately 40 hours per week. Dewatering operation is currently excessive and will become worse as future sludge production increases. Solids thickening needs to be provided to feed a sludge concentration of 3-4% to the belt filter

press. This will significantly reduce BFP run time from 40 hours to 8 hours per week and also meet future dewatering needs. Adequate dewatering capacity appears to exist for current sludge production, but will be inadequate for future production without some changes as discussed in Chapter 6.

The primary shortcomings of the dewatering system are transfer pumping capacity limitations and that the plant has only one belt press. If the press were to go down and require repairs over an extended period, there would be no way to dewater the sludge. In that case, liquid sludge would need to be stored (2 week future capacity) onsite until the press was repaired.

4.3.4 Lime Stabilization System

The plant achieves a Class B solids per EPA 503 regulations for land disposal by lime stabilization. Lime is stored in a 1255 cubic foot silo with bin activator (the silo provides 3-4 weeks storage at current maximum feed rates). Lime is fed by volumetric feeder to a screw conveyor that has a capacity of 10 lbs/minute. The lime feed system is automatically controlled. Lime is uniformly fed by screw feeder and mixed with dewatered sludge cake at the belt press conveyor. The lime treated sludge is discharged to a covered concrete containment stabilization area just outside the building for the required Class B stabilization period. Sufficient lime is added to achieve a pH over 12 for a minimum of 2 hours and a pH of at least 11.5 over an additional 22 hour period. The lime stabilization system is adequately sized and achieves the desired Class B stabilization requirements. As with the belt press, only single components of the system are available and if repairs are needed, the system could be down for an extended period.

Lime Storage Silo

The lime stabilized sludge in the biosolids stabilization area was observed during a site visit draining to adjacent grounds from the containment area. A more reliable means of total containment is needed.

Biosolids Stabilization Area

4.3.5 Onsite Biosolids Storage

Upon achieving sludge stabilization, the biosolids are loaded and conveyed by truck to a land application site. In wet weather conditions biosolids are stored in an asphalt lined sump (with drain) south of the dewatering building and stabilization area. Filtrate from the drain is returned to the influent pump station. At current sludge production levels, the sump is filled to capacity at the end of the wet weather season. To address onsite storage limitations either, 1) additional onsite lined storage must be provided, 2) storage provided at the disposal site, 3) or sludge volume reduced through additional onsite drying.

Onsite Biosolids Storage

The dewatered sludge also accumulates a great deal of water from precipitation in the wet season making it very difficult to load and haul at the start of the dry season. A permanent cover is needed to keep the sludge dry.

4.3.6 Biosolids Disposal

The City currently disposes of biosolids at a DEQ approved offsite land application site known as the Studnick site located approximately 12 miles from the plant. It consists of approximately 200 usable land application acres of grass pasture out of 580 acres total. In addition, the City is currently pursuing agreements and DEQ approval for disposal on two alternative sites, referred to as the Tracy and Lamb sites.

Test results of the City's sludge show levels of metals significantly lower than DEQ's allowable spreading requirements. Maximum land application rates are typically dictated by total nitrogen applied. The Oregon DEQ permit allows application of 100 pounds of available nitrogen per acre per year at the Studnick site. The plant currently produces an average of approximately 290 tons of biosolids per year which contains about 25-30% lime (70 tons). Therefore, approximately 220 tons of biosolids per year at a typical total nitrogen content of 3% represents 6.6 tons of nitrogen per year. That amount requires approximately 130 acres of land for spreading per year. It should be noted that total nitrogen content of the City's biosolids has ranged up to 6 – 7% TN which would require 260 acres for land spreading.

The biggest concern with the Studnick site is that no long-term agreement exists with the owner, and the City would have to look elsewhere if the owner no longer wanted the biosolids. The relatively long haul distance of 12 miles also results in increased biosolids disposal cost. The City also has a single hauling truck which makes disposal time consuming.

Other concerns include numerous state restrictions placed on land disposal of Class B biosolids and the tendency for tighter future restrictions which may ultimately require biosolids to be treated to Class A standards. Treatment to Class A standards and benefits are discussed further in Chapter 6.

4.4 MISCELLANEOUS FACILITIES

The plant is supported by a potable water/utility water system, electrical and emergency power, and general site space requirements. Following are comments regarding miscellaneous existing plant facilities and needs.

4.4.1 Plant Facility Conditions

The plant is still relatively new as it was constructed in 1996. It has been maintained very well and all structures, piping, and facilities still appear to be in good condition.

4.4.2 Utility Water System

The plant utility water system comes off the City's potable water distribution system through a backflow preventer. Potable water utilization at times has been in excess of 100 gpm which is on the high side. Holding water in the UV channel at a constant level accounts for over half of this amount. It would be worth investigating a solution to the UV channel problem and the use of plant effluent instead of potable water for plant utility water.

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4.4.3 Plant Electrical System

The plant receives utility power from PPL and is distributed from a 2000 amp 480 V switchboard in the Blower Building Electrical Room. The switchboard distributes electrical power through 8 MCC distribution panels throughout the plant. Emergency backup power is provided by a 1250 KW diesel engine generator which powers all of the key plant components as needed to meet plant discharge permit requirements until normal utility power can be restored. The electrical and emergency power systems appear adequate to meet plant needs until the year 2025.

4.4.4 Plant Facility Siting

The plant encompasses approximately 8 acres. The existing plant has adequate space for incorporating two additional SBR basins and filters. Adequate room appears to exist to meet facility needs for the next 25 years. A feature that would greatly assist in meeting plant O&M requirements would be a new maintenance building and garage as the City currently has no place to perform equipment maintenance work indoors, or provide covered storage for plant spare parts or equipment.

CHAPTER 5.0 – OPERATIONAL ANALYSIS

5.1 GENERAL

This chapter provides an evaluation of the existing WWTP in regard to staffing levels, plant operations, monitoring, and controls, O&M procedures, testing procedures, industrial pretreatment, and O & M costs.

5.2 STAFFING LEVELS

The plant is currently manned on a daily basis by a full staff from 6:00 a.m. to 4:00 p.m. Monday through Friday and 7:00 a.m. to 4:00 p.m. on weekends by a combination water/wastewater operator. The sewer utility staff includes the following:

- Wastewater collection system supervisor (Level 4)
- WWTP supervisor in training (Level 1)
- Wastewater operators (2 @ Level 3, 0.5 @ Level 2)

Therefore, the sewer department has 4 ½ people which are allocated to both the sewer collection system and the wastewater treatment plant. The plant operators also serve as lab technicians. One operator is allocated strictly to sludge hauling during the summer months. A number of tasks are contracted out as follows:

- Sewer system cleaning/TV inspection
- Mechanical maintenance
- Electrical maintenance and repairs
- Collection system repairs
- Instrumentation/controls repairs

Landscaping maintenance is performed by both the City Parks Department and plant staff when available.

5.2.1 Recommended Staffing Level

EPA publishes a manual entitled “Estimating Staffing for Municipal Wastewater Treatment Facilities” dated March 1973. Staff operation and maintenance hours can be projected based on the size of plant, type of plant, unit processes, employed, type of waste treated and adjustments for local conditions. Local adjustments are made for plant layout, climate, training, type of waste stream treated, etc. The staffing estimates are based on a survey of staffing levels for 35 small to large wastewater treatment facilities across the country.

Using the manual a staffing estimate worksheet was filled out as applicable to the City of Stayton plant. This worksheet is included in Appendix C.

Following is a summary of personnel recommended for the wastewater utility:

• Collection system and pump stations	(1.0 person)
• TV inspection and collection system cleaning (if undertaken)	(0.5 person)
• Pretreatment and GIS programs (if undertaken)	(1.0 person)
• Treatment plant per EPA guidelines	(6.5 people)
TOTAL	9.0 People

The City currently budgets 4.5 personnel to the wastewater utility. Note that the equivalent of 1.5 personnel are recommended above for new programs. Therefore, it appears the wastewater utility is currently understaffed by 3.0 people not including the new programs. That condition is reflected in the level of services either being contracted out or personnel being borrowed from other City operating groups to do wastewater related work tasks.

Of the nine total staff recommended for the wastewater utility group, the following management organization is recommended.

Wastewater Utility Group Supervisor: This person would be responsible for the entire wastewater utility group and supervise the following personnel:

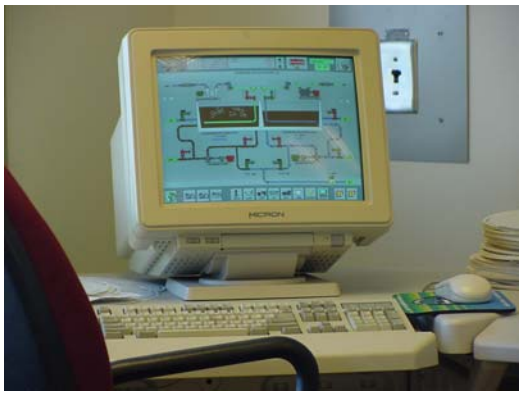
- Wastewater Treatment Plant Chief Operator would be at least a Level III operator and be responsible for efficient and effective operation of the wastewater treatment plant.
- Wastewater Collection System Supervisor would be at least a Level III operator in collection and pumping station operations and be responsible for those facilities.
- Treatment plant and collection system operations staff.

Please note that due to the small size of the current utility group, supervisory personnel could serve multi-supervisor functions and would also assume part-time operations and maintenance duties as needed.

As the system grows to twenty or more staff, fulltime supervisory personnel should be provided as discussed above.

5.3 OPERATIONS, MONITORING, AND CONTROLS

As previously indicated the sequencing batch reactor plant is highly automated due to the batching process which provides step by step treatment from “fill to idle”. The basic process is monitored and controlled by PLC’s and computer system. There is a great deal of flexibility built into the control system in that any of the discrete process timed sequences can be easily varied by computer to optimize the type of treatment desired and the effluent quality.



Computer Monitoring and Control System

Operating parameters of the plant are currently set to provide a long solids residence time and to minimize sludge production. Another control goal is to minimize effluent BOD and SS concentrations so as to remain within NPDES permit mass load limits. At times the City has experienced sludge settling problems. An extended settling period up to 2 hours has been necessary to settle solids. This problem appears to be a result of a long solids residence time and growth of filamentous organisms as verified by recent microscopic analysis.

Filamentous organisms, particularly Nocardia, in the mixed liquor, cause bulking and difficult to settle sludge.

Growth of filamentous organisms in SBR’s is not uncommon. The filamentous organisms can be temporarily eliminated by chemical treatment. Spraying of foam with chlorine solution is also necessary to temporarily eradicate the organisms. Even with chemical treatment, the organisms will usually reappear. Long-term measures to minimize growth of filamentous organisms is discussed further in chapter 6.

The City appears to be meeting anticipated future ammonia limits; however, the plant control scheme may need to be modified in the future should ammonia levels increase. A longer solids residence time and aeration period will allow nitrification and ammonia removal to occur.

US Filter/Jet Tech, the manufacturer of Stayton's system, is available to assist in troubleshooting SBR process issues and problems. Because they have a large number of these plants in operation they can be a valuable resource in solving unique operating problems. Some installations can be direct telephone connected into the computer control system and allow process evaluation. Alternatively, data can be provided to Jet Tech for analysis.

Other plant process unit monitoring and controls appear to be adequate. The City is able to remote monitor key plant alarm functions by telephone dialer which is important since the plant is unmanned overnight. The City is currently doing a comprehensive review of all plant alarms to be sure all needed alarms are in place and to insure the most important alarms are placed on the after-hours dialer.

5.4 OPERATION AND MAINTENANCE PROCEDURES

The City currently uses a manual system for scheduling and logging equipment maintenance. In addition, a significant amount of specialized electrical and mechanical maintenance is contracted out. Based on present staff levels as indicated above, general maintenance duties such as painting, cleaning, and landscaping are performed as time allows.

Currently most plant maintenance is performed as corrective maintenance, rather than preventative maintenance

Most mechanical treatment plants are converting to computerized O&M which greatly facilitates scheduling and record keeping of O&M requirements. It allows for logging of equipment information, spare parts inventory, prompting for scheduled maintenance, printout of maintenance instructions, record keeping, budgeting, summary reports, etc. There are numerous O&M software packages on the market ranging in cost from less than $1,000 to greater than $25,000 depending on amount of information and the level of detail desired. It is recommended that the City convert to computerized O&M. Keller Associates can assist the City in searching for a software package to meet its needs. Upon purchase of the O&M software, the City should set up a comprehensive maintenance management program which would incorporate all of the functions indicated above. By installation of a computer O&M system, it is anticipated more attention will be paid to a regular scheduled preventative maintenance program and less repair time will be necessary.

5.5 TESTING

The City's laboratory does all required testing for its NPDES permit except for biosolids analysis and only a few tests that require specialized needs and equipment. The level of testing performed appears adequate and acceptable. Future testing mandated by the plant's new permit will require significant additional specialized testing to be contracted out. Once or twice a year dual samples should be sent to another lab as a confirmation of the City's lab results. It is recommended that a full-time lab technician be hired to oversee all future testing needs.

5.6 INDUSTRIAL PRETREATMENT & GIS PROGRAMS

The City currently does not have an industrial pretreatment ordinance and therefore has no legal means of controlling what substances are discharged to the treatment plant. This can result in toxic chemical upsets of the biological process, process overloading, excessive grease, and other discharges detrimental to plant operation. Most municipalities have extensive industrial pretreatment ordinances in place to track and control undesirable chemicals or high strength wastes from impacting plant operations. The ordinance provides for pretreatment of industrial waste at the source and for charging commercial and industrial dischargers additional costs as required to treat their wastes. It is recommended that a comprehensive industrial pretreatment ordinance be written and adopted by the City. It is recommended that a pretreatment person be hired to organize and track the above activities. This would be approximately a ½ to 2/3 time effort with remaining time assisting in plant or sewer system operation and maintenance.

The City is also in the process of implementing a GIS utility tracking system for all City utilities. The GIS system will greatly assist the City in documenting the location, condition, inventory, etc. of existing facilities and in planning for system expansions. A full-time person would be required with about 1/3 of that person's time allocated to wastewater GIS work.

Considering the above, the equivalent of one additional staff will be required by the wastewater utility for industrial pretreatment and GIS work.

5.7 OPERATION AND MAINTENANCE COSTS

The year 2004 sewer O & M budget, not including capital improvements, or bonded indebtedness is $719,000. This includes O & M for both the treatment plant and collection system.

An article on the internet by EPA summarizes O & M costs for sequencing batch reactor plants according to maximum month design flow. Based on Stayton's Phase I plant maximum month design flow of 2.5 MGD the EPA cost curve shows an estimated annual O & M budget of $1,150,000. Stayton's budget of $719,000 is about 65% of the EPA recommended average.

The above data is bound in Appendix D. Recent work by Keller Associates for the City of Blackfoot, Idaho (approximate population of 10,000 people similar to Stayton) showed an annual sewer department budget (not including bonded indebtedness or capital improvements) of approximately $1,300,000 for treatment plant and collection system O & M.

Based on the above it can be stated that the City of Stayton's operation of its sewer collection system and wastewater treatment plant is very efficiently run and is budgeted considerably under similar sized communities.

CHAPTER 6.0 – RECOMMENDED IMPROVEMENTS

6.1 GENERAL

Chapters 2 through 5 presented an assessment of the existing plant with regard to its capability to meet new permit conditions as well as continued City growth. Those chapters also discussed areas where operating facilities could be more efficient and could be improved to assist in ease of operation and maintenance of the plant. Recommended improvements and their costs will be discussed in further detail in this section

6.2 NPDES PERMIT AND I/I RELATED IMPROVEMENTS

Improvements will be needed to meet new NPDES permit conditions as well as high inflow and infiltration flows. Related improvements are discussed below.

6.2.1 Filtration

The City's previous and new permit conditions allow a monthly dry weather CBOD and SS mass discharge load of 110 lbs/day. It should be noted that in May 2003, the dry weather monthly mass load limit for BOD of 110 lbs/day was exceeded. In addition, several dry weather months have resulted in mass load discharges in the 90 and 100 lbs/day range. This upward trend indicates additional treatment will be required to decrease effluent CBOD and SS mass loads.

The most likely alternative to significantly reduce mass load discharged is to provide filtration prior to UV disinfection. Filters would also provide a measure of protection in the event of plant upsets or solids washout due to high peak flows. Several alternative filtration processes should be evaluated including various media bed type filters and membrane disk filters. Of these, mechanical membrane disk type filtration appears to be the most promising based on performance and cost. Reduction of 80 to 90% of suspended solids and BOD is possible. It is recommended that two filters be constructed to meet the projected year 2025 peak flow rate of 10.1 MGD. Estimated total project cost for 2 filters at 5.05 MGD each is $1,000,000. These filters could be phased with one constructed now and a second as needed in the future.

6.2.2 Outfall Improvements

Depending on the results of the City's mixing zone dilution analysis, improvements may also be necessary to either 1) reduce effluent

discharge heat load during the September 15 to June 1 period; 2) cease discharge to the river during excessive temperature periods; or 3) obtain greater effluent dilution by dredging and expanding flow to the existing channel, or extending the outfall to the main branch of the river to obtain greater dilution. Regardless of dilution findings, it appears likely heat load will be a future issue as plant flows increase as a result of growth.

The most practical alternatives to mitigate heat load limits during the critical months of September and possibly October are as follows:

- Outfall Extension: One alternative would be extension of the outfall into the main branch of the Santiam River to achieve greater dilution. Estimated total project cost for this alternative is $500,000.

- Potential Upstream Flow Increase: A canal operated by the Santiam Water Control District discharges several hundred yards upstream of the WWTP outfall. The District is currently negotiating with the Federal Energy Regulatory Commission (FERC) to substantially increase flow through its hydroelectric facility which discharges to the canal and could potentially add up to 250 cfs or more in that branch of the river during the critical months of September and October. The City should track the outcome of these proceedings and determine viability of increased dilution upon completion of negotiations.

- Land Application: It is estimated that approximately 300 acres would be currently required to irrigate for September and October when effluent temperatures may cause violations. Norpac appears to control all of the available land adjacent to the WWTP, which they are using for irrigation of their own effluent. It is unlikely a deal with Norpac could be negotiated and the City would need to purchase or lease lands at a site remote from the plant. Estimated costs for land purchase alone, is approximately $2,100,000, plus additional costs for conveyance and application facilities.

- Wetlands Cooling: It has been reported by others that constructed wetlands can provide effluent cooling benefit as well as provide additional treatment. A wetlands could be constructed south of the existing plant on approximately 7 acres of City owned land. The effluent would likely need to be collected and chlorinated/dechlorinated prior to discharge

to the river. Average wetlands construction costs are approximately $50,000 per acre for surface flow wetlands. Distribution, collection, and chlorination/dechlorination costs would be approximately $200,000. Including engineering and contingency, the total project cost is estimated at approximately $750,000.

- Credit Trading: This alternative would consist of planting I trees along upstream riparian zones to cool the river by shading equivalent to the amount~ wastewater effluent heat added. This has been done by at least one industry on the Willamette drainage already. Other credit trading would consist of water rights purchase upstream to maintain a higher 7Q10 river flow. A significant amount of investigation would be required to establish credit trading as a viable alternative for Stayton.

For the purpose of this report and budgeting, the outfall extension alternative would appear to be the most feasible at this time. However, the above alternatives are all conceptual in nature and warrant further evaluation prior to commitment to a course of action.

Existing Outfall Location

6.2.3 Reactor Expansion

Inflow and infiltration flows and increased flow from growth impact SBR hydraulic cycle times. Decreased cycle times, particularly in the settle and decant phases during high I/I flows can increase effluent suspended solids and BOD concentrations. That has occurred in the recent past when sustained peak flows have resulted in washout of suspended solids from the reactors. To resolve this problem, either I/I must be reduced in the collection system to Phase I design flow rate conditions (See Chapter 2) or

additional reactor basin capacity provided. I/I reduction is discussed in the collection system evaluation and basin capacity increase under the batch reactor recommendations below. Filtration, as previously recommended above, will also help alleviate high suspended solids loads, however, would result in increased backwashing during those events.

6.3 HEADWORKS IMPROVEMENTS

The existing headworks appear to function relatively well and few improvements appear to be needed. The plant occasionally has some problems with grease. A hot water spray wash system could be implemented. A portable hot water pressure washer would cost approximately $7,500, however, this alternative would be labor intensive. Rather than provide grease removal facilities at the plant, that problem is normally better handled at the source(s) through the City's sewer use ordinance. The ordinance should require all major grease producers such as auto repair shops, restaurants, and other food establishments to install grease traps or grease interceptors and provide routine cleaning. Consumer education and random periodic verification by staff may be necessary to ensure compliance and reduce grease problems at the plant. Correcting the grease problem at the service also provides the added benefit of reducing buildup in sewer collection pipelines. Nationwide, grease blockings are responsible for close to one half of all Sanitary Sewer Overflows (SSO's), although grease blockings have not been a major source of SSO's for Stayton to this point.

6.3.1 Screening Improvements

The influent Rotomat screen is operating at recent peak flow rates up to 6.5 MGD. The screen has a peak flow capacity of 6.8 MGD (per Lakeside, the manufacturer). The screen has 1/4-inch openings which allow some smaller material to get through. Lakeside was contacted about retrofitting the screen with 1/8-inch opening mesh. The manufacturer indicated the existing type screen mesh size could only be decreased to 3/16", which would lower the screen capacity to 6.2 MGD.

The City has two alternatives. The existing screen could be retrofitted with a 3/16" mesh which would cost approximately $40,000. However, the capacity would be reduced to 6.2 MGD which is less than current peak plant flows. It would not be worth the cost to retrofit the screen, since it will require replacement within five years to meet higher flows anyway. Instead, it is recommended that the screen be replaced in the next 5 years (or sooner if desired to provide better screening) with a 11 MGD 1/8-

inch fine screen that will remove smaller material and meet peak flow conditions for at least a 20-year period. It is recommended that the existing manually cleaned bar screen be left in place as a backup. The larger 11 MGD capacity screen may require channel modifications and is estimated to cost approximately $270,000 total project cost.

6.3.2 Influent Pump Station Improvements

A third 3680 gpm pump should be added about the year 2020 to bring total pumping capacity to 12.7 MGD with a small and large pump on standby. Estimated project cost for the pump and rail facilities would be $30,000.

Addition of a backup influent pump level control by a top mounted electronic sensing device or pressure transducer would provide pump control redundancy and prevent overflow conditions. A backup liquid level sensing system is estimated at $10,000 total project cost.

6.4 SEQUENCING BATCH REACTOR IMPROVEMENTS

Issues and problems with the existing SBR units and support equipment were discussed in Section 4 and 5. A description of recommended process improvements and costs are discussed below:

6.4.1 Additional SBR Basin Capacity

Basin capacity should be expanded for several reasons. First, it will allow basin maintenance to occur without violating permit conditions. Second, it will provide increased hydraulic capacity to better handle peak flows. Third, it would provide additional operational flexibility. Only a single basin expansion is needed to handle flows and loading to the year 2025. Auxiliary equipment such as piping, valves, pumping equipment, etc. must also be expanded. Following are estimated costs for a single basin expansion:

SBR Expansion Estimated Costs		
Description	Construction Cost	Total Project Cost
Sitework	$60,000	$78,000
Piping/Valves	600,000	780,000
Concrete Basin	800,000	1,040,000
Decanters / Scum Skimmer	100,000	130,000
Blower / Piping	125,000	163,000
Pump Equipment	100,000	130,000
Electrical / Control	150,000	195,000
Miscellaneous	100,000	130,000
TOTAL	**$2,035,000**	**$2,645,000**

A second batch reactor will be required in 2025.

6.4.2 Reactor Batch Fill Tank Addition

As previously discussed, many SBR plants have a chronic tendency to repeatedly generate filamentous organisms. This has been confirmed by microscopic evaluation of the City's plant biomass. These organisms significantly impact sludge settling and, thus, effluent quality. It also limits operational flexibility since the settling phase takes up to 2 hours or 33% of the treatment cycle versus 20-30 minutes for a normal well settling sludge.

One way to permanently alleviate this problem is to create an anaerobic environment prior to the fill–mix phase in which the filamentous organisms do not grow. Experience has shown that a complete anaerobic environment cannot be obtained in the reactor itself. A batch fill tank is needed in the process train prior to the batch reactors. The anaerobic batch–fill tank typically is sized about 1/4 of the reactor tank size to limit filamentous growth. Experience at other plants has shown the batch fill tank to significantly reduce filamentous organisms and improve solids settling. Additional piping, pumping, mixing, and process sequencing changes are also needed to incorporate the batch–fill tank. Total project cost of a batch fill tank and appurtenances is estimated at $850,000.

6.4.3 Waste Sludge Pump Additions

Addition of separate waste sludge pumps will allow more efficient operation of the SBR mixing pumps and will provide better control of sludge withdrawal from the SBRs. Some modifications of piping will be necessary to convey sludge to the new pumps and sludge discharge line. Reprogramming will also be needed to eliminate throttling of the mixing pump and coordinate sequencing of WAS pump operation. Estimated project cost for addition of waste sludge pumps for the existing two reactors is $110,000.

6.4.4 Spare SBR / Process Equipment

The SBR process is a complex highly automated system that is very difficult to run in a manual mode. If one of the automated components breaks down, single basin operation would be required until a repair could be made.

It is recommended that all key pumps, automated valves, and PLC's/software cards susceptible to malfunction be provided with spare equipment to allow easy replacement in event of outage. The following spare equipment should be provided:

- Mixing pump
- Waste sludge pump (to be provided above)
- 24-inch spare for the mixing pump discharge valve, SBR inlet valve, decant valve
- 14-inch air inlet valve
- Spare software cards and PLC for the SBR operating system

A spare valve for the 18-inch WAS line may or may not be needed depending on how the new waste sludge piping is configured. The estimated project cost for the above spare equipment is approximately $65,000.

6.4.5 Freeze Protection

The exterior SBR valves and pipelines exposed to the weather should be protected against freezing. This could be done by constructing a heated shelter over the area, or providing heat tracing and insulation for exposed valves and piping. The insulation

system is typically covered with an aluminum jacket for protection. The latter method would be much less expensive with an estimated project cost of approximately $40,000 for applicable exposed piping to / from both basins.

6.4.6 Aeration System Backflush Valving

As previously indicated backflushing of the aeration system is a manual process not very easily accomplished. It should be done weekly to ensure jet aeration nozzles are clean and oxygen transfer efficiency maintained. The simplest and least cost alternative would be to provide a portable hydraulic or pneumatic valve operator at a cost of approximately $7,000. To automate the backflush process would require several valves for each reactor to be equipped with pneumatic operators and control system. It is estimated automation of the aeration backflush system would be approximately $75,000 total project cost utilizing the existing valves. Considering US Filter Jet Tech recommends weekly backflushing, it is recommended an automated system be provided.

6.5 EQUALIZATION BASIN IMPROVEMENTS

There are several O & M issues associated with the EQ basin as follows;

- It cannot be taken out of service for cleaning for more than a 2-hour period as the basin is always needed.
- Algae tend to accumulate on the walls and floor slab. The floor has very little slope and solids tend to accumulate.
- There is no easy way to clean the basin as all intermediate pumps route flow to the UV disinfection system, then to river discharge.
- Cleaning of the basin is difficult and can be hazardous due to the lack of permanent access to the basin.

The EQ basin has a capacity of 215,000 gallons. At current maximum day flow rate that allows a decant period of approximately one hour which is adequate. Based on future flow rates, it appears a second EQ basin will be required when peak flow rates reach 6.9 MGD or approximately year 2010. Also, another intermediate pump will be required when maximum day flows reach 6.9 MGD.

Algae accumulation could be mitigated by covering the basin which would deny light as needed for algae growth. Or a very smooth wall lining, such

as epoxy or polyurethane could be applied to minimize algae adherence and assist in ease of cleaning.

Basin cleaning could be improved by steepening the floor slope, and lining the basin, as well as providing a separate pump or valving an existing pump to convey flow to the digester via the WAS line, instead of to the UV disinfection system.

Access for cleaning could be improved by adding a stairwell, platform, catwalk, and ladder with cage on the west wall.

The above recommended improvements estimated project costs are as follows:

- Either 1) install a cover over the existing and new EQ basins - $150,000, or 2) line existing EQ basin tank – Cost would range from $26,000 to $60,000 depending on coating type and thickness, durability, and longevity desired. Lining the basin is recommended.

- Install a 4th intermediate pump and piping - $60,000

- Steepen basin bottom slope to 2%, add pump to existing sump or valving to use an existing pump, and pipe to WAS line - $65,000

- Construct access improvements including stairwell platform, catwalk and ladder with cage - $75,000

- Construct a 215,000 gallon second EQ basin including pumps and piping - $650,000

The above in-basin improvements must be made between decant periods, preferably during low flow dry weather conditions, or a temporary bypass system provided while improvements are made.

6.6 UV DISINFECTION SYSTEM IMPROVEMENTS

Although the existing UV system is functional and normally meets E coli permit limits, it could be improved. As discussed previously, newer technology is currently available that provides better performance and is self cleaning. The new low pressure high intensity system uses less than ½ the lamps so flow capacity could be easily expanded using the existing UV basin channels. The estimated cost for an 10.2 MGD high intensity automatically cleaned system to meet year 2025 requirements is approximately $600,000 total project cost. This improvement is solely at the discretion of the City as the most pressing current issue is the time

required to manually clean the lamps. It could be phased in if desired by the City.

It is also noted that the UV structure is uncovered, which makes maintenance during the winter months difficult and hazardous. It would greatly help to cover and enclose the structure to allow for better wet weather O & M conditions. A covered metal structure is estimated to cost approximately $100,000 total project cost.

The level in the channel could be automatically maintained during periods of no discharge by adding a small tank and recycle pump at a cost of approximately $25,000.

6.7 SOLIDS HANDLING FACILITY RECOMMENDATIONS

Solids handling facilities currently create the greatest level of concern for plant staff, particularly in the area of dewatered sludge storage and disposal. Following is a discussion of solids handling facility recommendations:

6.7.1 Liquid Sludge Storage

Liquid sludge storage is needed for sludge wasted from the SBRs to provide holding capacity prior to dewatering. The City has a 225,000 gallon sludge storage tank and 180,000 gallon sludge storage pond onsite. The old oxidation ditch is also available for storage with an estimated capacity in excess of 500,000 gallons. Thus, total liquid sludge storage is approximately 1,000,000 gallons, which is 25 days current capacity, or 13 days Year 2025 (population 19,400) capacity. Should the lime stabilization or dewatering equipment fail, adequate capacity appears to be available to allow repairs and put equipment back online.

It is recommended that the oxidation ditch be cleaned and provided with piping and pump to easily fill and draw off sludge should it ever be necessary. Aerators should also be provided to minimize odors. Estimated total project cost is $250,000.

It is recommended that the old low capacity standby liquid sludge pump be replaced with a 130 gpm progressive cavity pump. Estimated total project cost for pump, piping, and valves is approximately $50,000.

In the short-term, it is recommended that decanting facilities including supernatant discharge and piping be provided for the aerated storage tank to allow thicker solids to be pumped to the belt

press. This will assist in increased belt press production and dryer cake from the press. The estimated project costs for decant facilities is $100,000.

In the long-term, it is recommended to provide a thickener to reduce 2025 sludge volume of 80,000 gpd at .5% solids to 13,300 gpd at 3.0% solids. With a thickener, the aerated sludge storage tank alone would have a storage capacity of 18 days at 2025 sludge production levels, which would be adequate. It would also substantially decrease belt press operating time. A gravity belt thickener with polymer feed equipment, piping, housing, and pump equipment would have an estimated total project cost of $830,000.

It is recommended that the City install both decanting facilities and the gravity belt thickener for redundancy. This will substantially decrease belt filter press run time. These improvements will also assist in providing increased liquid storage capacity since the aerated storage tank will hold much thicker solids.

6.7.2 Dewatering and Lime Stabilization Facilities

The belt filter press should be adequate to meet year 2025 needs providing the following is implemented:

- Make repairs as needed to bring capacity up to 130 gpm, the specified rated capacity.
- Install liquid sludge thickening facilities as indicated above, which should allow the dry weight of feed sludge to the belt press from the digester to be increased by a factor of 6.

Due to the expense involved and liquid sludge storage available to allow time for repairs of this equipment, duplication of dewatering and lime stabilization facilities for redundancy is not recommended. However, it is recommended that spare parts be provided for those elements that may be susceptible to breakdown, such as spare drives, bearings, belt press belt, conveyor drive and belt, etc. such that they can be quickly replaced if needed. It is recommended that approximately $65,000 be set aside to purchase the components most susceptible to outage.

Should the belt press be inoperable for an extended period of time (>21 days) it may be necessary to contact a dewatering equipment supplier and temporarily lease trailer mounted dewatering equipment until repairs can be made.

It is also recommended that the existing sludge containment area, where the sludge conveyer discharges, be modified to allow complete containment without leakage. This could be done by extending the drain trench across the opening with a grating and providing a removable stop log wall in front of the drain trench. These improvements are estimated to cost $8,000 total project cost.

6.7.3 Dewatered Sludge Onsite Storage Alternatives

Biosolids disposal impacts onsite storage in that adequate onsite storage is needed during periods when biosolids cannot be land applied. Biosolids disposal can be very difficult for the City at times for a variety of reasons, particularly during the winter months:

- Crop uptake of biosolids nutrients (nitrogen and phosphorus) in the winter months slows considerably and DEQ is hesitant to permit winter application sites.

- Fields become wet during the rainy season and farmers do not want biosolids spreading vehicles leaving ruts and damaging fields.

- Application is susceptible to farming schedules in that biosolids spreading cannot occur during planting or harvesting or other periods at the farmers discretion.

- Should farmers graze their fields, animals are not allowed to graze on fields during and up to 30 days after biosolids application per DEQ regulations.

- It is very difficult to obtain a long-term agreement with a farmer to guarantee a place for continued sludge disposal. Without an agreement the farmer can refuse biosolids at any time leaving the City in a bind.

- Application regulations are becoming increasingly difficult to adhere to as there are numerous restrictions which must be met.

As a result of the above, the City must either find a reliable winter land application site or store biosolids onsite for long periods when biosolids land application is not possible.

Existing onsite dewatered sludge storage is barely adequate to meet existing sludge production during wet weather months. The

storage area is uncovered and susceptible to precipitation that reintroduces water that was previously removed by the belt press.

Either the sludge volume must be reduced (as discussed further below under sludge disposal), or more onsite or offsite sludge storage needs to be provided. It is recommended that stored dewatered sludge be provided with a permanent cover to prevent accumulation of water and facilitate sludge handling and disposal.

The existing effluent pond immediately east of the dewatering building could be converted to onsite storage. It is almost twice the size of the existing sludge storage area. Note that additional onsite sludge storage will not be needed if a reliable winter disposal site can be found or the sludge drying alternative as discussed in the next section is selected. Following are estimated costs for onsite storage improvements:

- Cover existing sludge storage pond with a permanent cover. A permanent structure with adequate access and ventilation is estimated at a total project cost of $250,000.

- Prepare (pave) existing effluent pond for additional sludge storage and cover the pond with 140' x 160' steel framed cover. A Brown Bear should also be provided to assist in turning over the sludge and drying. Estimated project cost for these improvements is $1,025,000.

6.7.4 Sludge Disposal Recommendations

Average sludge production quantities projected for Year 2025 are estimated at 1.1 dry tons per day (not including lime). Assuming the City's sludge continues to contain low levels of heavy metals, and land application is governed by total nitrogen (TN) at 3% of total sludge quantity and at an application rate of 100 lbs/acre per year, approximately 240 acres of land application area will be needed (not counting buffers, etc).

There are a number of disposal alternatives to consider including continued disposal of lime stabilized Class B biosolids, or enhanced treatment and disposal of Class A biosolids. These alternatives are discussed further below.

<u>Class B Biosolids Disposal:</u> This method is currently being practiced with disposal at the Studnick site. Additional sites (Lamb and Tracy) are currently being pursued as temporary alternative application sites particularly during the winter. DEQ is willing to

permit winter disposal on these temporary sites for two years until the City arrives at a permanent disposal solution. Disadvantages of the present Class B disposal method include the lack of sufficient improved onsite biosolids storage facilities, the current relatively long haul distance, and the lack of a long term disposal agreement should the landowner no longer want the biosolids. The landowner also controls when the biosolids may be applied.

A second Class B solids winter reuse alternative would be similar to the method reported to be used by the City of Salem and several other western Oregon communities. They contract for hauling biosolids to eastern Oregon during the winter where year-round application is possible and permitted.

Another alternative would be for the City to purchase their own land for continued land application of Class B biosolids so as to have better control of the disposal site. Two hundred and seventy acres allowing for buffer area at an estimated cost of $4,000 per acre would result in a land purchase cost of $1,080,000. Additional covered onsite storage facilities would still be needed.

Class A Biosolids Disposal: The City has expressed a desire to provide a higher degree of biosolids treatment meeting EPA 503 Class A standards, instead of Class B treatment as presently practiced.

That desire is motivated by more restrictive EPA/Oregon DEQ land application standards for Class B sludge and less restrictive and more readily available application sites for Class A biosolids (including nurseries, golf courses, landscaped public rights-of-way, home gardens, and more readily available agricultural sites).

Following are EPA accepted Class A treatment technologies:

- Composting (in vessel, static aerated pile, or windrow)
- Lime stabilization (in vessel under tightly controlled conditions)
- Pasteurization (in vessel heat treatment to 70 degrees C > than 30 minutes)
- Thermophilic aerobic digestion (heat to 55 degrees C > 10 days)
- Anaerobic digestion processes

- TPAD (temperature phased digestion)
- Thermophilic digestion
- Acid phased digestion
- Three phased digestion (acid, thermo, meso)

- Beta and gamma ray radiation

- Heat drying (heat to 80 degrees C > 3 hours)

Of the above Class A processes, composting, lime stabilization and heat drying are the three Class A processes that appear most suited to meet the City's needs.

- Composting is a relatively simple process and can be either in-vessel, aerated static pile, or windrow composting. Windrow and aerated static pile composting involve minimal capital cost; however, extensive land and labor is required as multiple piles are needed which must be mixed every few days. In addition, variations in weather, mixing, and inadequate monitoring can lead to inconsistencies in meeting Class A criteria for the windrow and aerated static pile process. In-vessel composting is the composting process most likely to consistently produce Class A biosolids since the process is performed under more tightly controlled conditions than the other composting methods.

- Lime stabilization to meet Class A requirements is also performed in-vessel to allow tighter control of mixing and heating conditions. Also, the City has lime feed facilities already onsite.

- Heat drying offers the benefit of volume reduction which would alleviate onsite storage conditions and reduce biosolids hauling costs.

Estimated annual costs for the above six Class A and Class B processes are presented in Table 6.1.

Table 6.1
Sludge Treatment and Disposal Alternative Costs

Alternative Biosolids Disposal Cost Comparison	Existing Disposal Class B	Land Purchase Class B	E. Oregon Hauling Class B	In Vessel Compost Class A	In Vessel Lime Stab. Class A	Heat Drying Class A
CAPITAL COSTS (includes 30% for engineering and contingency)						
Land	$0	$1,.080,000	$35,000 Leased	$0	$0	$0
Equipment (installed)	0	0	0	850,000	900,000	1,520,000
Housing	0	0	0	120,000	150,000	450,000
Onsite Covered Sludge Storage	1,200,000	1,200,000	250,000	1,200,000	1,200,000	65,000*
Sludge Load/Dry Equip.	75,000	75,000	0	150,000	75,000	0
Sub-Total	$1,275,000	$2,355,000	$285,000	$2,320,000	$2,325,000	$2,035,000
Annual Capital Cost*	$94,400	$174,000	$21,100	$171,700	$172,600	$150,600
*4%, 20 years						
OPERATING COST						
Materials - Lime	$40,000	$40,000	$40,000	$0	$33,000	$0
Materials - Amendment	0	0	0	15,000	0	0
Power / Heat	3,000	3,000	0	10,000	15,000	50,000
Labor	25,000	25,000	25,000	65,000	65,000	65,000
Sludge Hauling	36,000	18,000	75,000	0	0	0
Sub-Total	$104,000	$86,000	$140,000	$90,000	$113,000	$115,000
Total Annual Cost	$198,400	$260,000	$161,100	$261,700	$285,000	$265,600
Cost/Dry Ton Biosolids	$500	$650	$400	$650	$710	$660

* Fill in existing sludge storage basin if heat drying used

The City could continue with Class B biosolids reuse at lowest cost, by transporting biosolids to eastern Oregon region in the winter similar to the City of Salem, and summer spreading similar to current practices. This method would require long-term agreements with landowners and still be susceptible to restrictive spreading schedules plus DEQ regulation constraints for reuse of Class B solids.

Of the Class A processes, heat drying appears to provide the greatest benefits for the following reasons:

- Disposal of Class A biosolids should be much easier. The final product will be an excellent dry pathogen free soil amendment with a nutrient value such that it should be in demand by the public. It may be possible to sell the final product, however, would require extensive marketing. Experience with smaller plants has shown that marketing costs usually offset any sales benefit. Even those plants that are able to sell biosolids only realize a gain in the range of $10 - $60 per dry ton.

- Heat drying is the only process that provides significant volume reduction (on the order of 4 to 5 times less sludge volume) as total solids after drying are in the 90% range. Volume reduction means the City will not have to provide increased covered sludge storage capacity onsite. That is a significant benefit to the City.

- Hauling and application tasks are reduced by a factor of 4 to 5 as a result of reduced volume to be hauled. It is anticipated that demand will be such that the public may pick up the product and haul it themselves.

- The process is not as structurally intensive as most of the other Class A processes are and will occupy less area onsite. The entire process comes skid mounted.

- Odors are better controlled as the sludge is contained and off gases can be scrubbed.

The primary disadvantage of heat drying is the need for fuel for the drying process which would be susceptible to energy cost increases. However, the advantages are considered to far outweigh the one disadvantage.

A manufacturer's quote for 3.6 dry ton per day heat drying process equipment operating for 30% of the time at 1.1 dry tons per day (year 2025 average rate) is approximately $750,000. An additional $300,000 should be allowed for installation, sitework, piping, and electrical requirements. It is recommended the sludge drying equipment be housed. Housing consisting of an approximate 120' x 60' metal building would be at an estimated cost of $350,000. Ventilation and odor scrubbing would cost approximately $100,000 and abandoning the existing biosolids storage basin would be

$65,000. Therefore, the entire housed installation is estimated at $1,565,000 construction cost and $2,035,000 total project cost.

Being a relatively new process, it is strongly recommended that the City visit at least two operating biosolids heat drying installations and discuss equipment performance with operating staff and establish a comfort level with this type of process prior to making a final commitment to the heat drying process.

Should the heat drying process be installed, the City could terminate the current lime stabilization process, saving on operation and maintenance expenses. Additional onsite sludge storage volume would also not be needed.

On a short-term basis, it is recommended the City explore winter land application as practiced by the City of Salem and summer spreading as currently practiced. In the long-term, it is recommended the City consider Class A biosolids reuse and implement the heat drying process.

It is also recommended the City purchase 80 acres near the WWTP to serve a dual purpose as follows:

- It would provide a reliable backup means of disposal of biosolids for the winter months should the Class A biosolids not be picked up at the plant and avoid dependence on others during the winter period.

- It would provide a backup area for partial land application of effluent during September and October to mitigate effluent temperature issues.

The total cost of 80 acres is estimated at $560,000 based on recent appraisals.

6.8 MBR ALTERNATIVE TO SBR EXPANSION

The existing plant will require significant upgrade in the next twenty years to meet growth and stricter NPDES permit requirements. The major facilities needed, will include two additional SBR reactors, two filters, batch fill tank, and an EQ basin.

Instead of expanding the existing SBR process it may be worth considering addition of a parallel membrane bioreactor process. This process is increasingly being employed by many municipalities across the U.S. as it provides the highest quality effluent of current biological

wastewater treatment plants. Benefits of the membrane bioreactor process include reduced space required, it is not susceptible to bulking (poor settling) sludge since solids separation is by filtration not settling, lower sludge production, decreased disinfection dose, and simplicity of operation.

A 2 MGD (maximum month flow) membrane bioreactor addition which would meet the City's needs for the next twenty years is estimated at a total project cost of $5,900,000. In comparison, the cost of two additional SBR reactor trains, one filter (the existing plant would still require one filter at peak flow capacity of 7.5 MDG, and another EQ basin would be approximately $ 6,690,000.

There are advantages and disadvantages to adding the MBR process as follows:

- Disadvantages

  - It would require operating essentially two different types of processes simultaneously, in addition, the SBR process would be batch flow, and the MBR process would be continuous flow.

  - The expansion would require a significant capital expenditure in the next five years.

  - The membrane filter cassettes must be replaced approximately every 10 years at a cost of approximately $675,000. Filter longevity should increase and replacement costs decrease in the future as more competition enters the market and improved lower cost membranes surface.

- Advantages

  - The MBR process provides the highest level of treatment in the wastewater industry to date with effluent BOD/SS usually less than 2 mg/l. This would allow expansion to 6.6 MGD max month flow (buildout conditions) without violating mass load limits.

  - Due to high MLSS and long sludge age characteristic of the MBR process solids production is decreased.

  - The process takes up minimal room. The complete 2 MGD expansion would be contained inside a basin 90 feet by 65 feet versus two 100 foot square SBR reactors.

- Once the initial MBR expansion is made, it may be possible to use existing SBR tankage for further expansions thus decreasing future expansion cost.

- The MBR process is capable of nutrient removal (phosphorus and nitrogen) should that be added to the City's future permit.

- The MBR process is easy to operate and permit violations are rare since the filter membrane serves as a safeguard against plant upsets or operator errors.

A cost comparison of the two alternatives is shown in Table 6.2 and Table 6.3:

Table 6.2
MBR/SBR vs SBR Capital Cost Comparison

Item	MBR/SBR	SBR Only
Filter(s)	$750,000(1)	$1,000,000(2)
Batch Fill Basin	850,000	850,000
Batch Reactors(2)	0	5,290,000
Two MGD MBR Expansion	5,900,000	---
EQ Basin	0	650,000
UV System	500,000	600,000
TOTAL	**$8,000,000**	**$8,390,000**

Table 6.3
MBR/SBR vs SBR Annual O & M Costs

Item	MBR/SBR	SBR Only
Labor Cost	$450,000	$390,000
Power Cost	130,000	160,000
Chemical Cost (Filter Cleaning)	10,000	0
Repair Cost	50,000	50,000
Equipment Replacement	120,000	132,000
Membrane Replacement	88,000	----
Solids Disposal	180,000	240,000
Annual O & M Cost	1,028,000	972,000
Annualized Capital Cost	640,000	671,000
TOTAL ANNUAL COST	**$1,668,000**	**$1,643,000**

Based on the above two tables, the two alternatives are approximately the same cost. However, as the City approaches buildout conditions, the MBR alternative would be lower cost by approximately $1.5 million since existing SBR process tankage could be retrofitted with membrane filters.

The decision can be delayed until the next SBR reactor is needed in 2010. At that time membrane cost could decrease even further. History has shown that effluent limits continue to become more restrictive and the MBR process is currently the best available technology for providing a high quality effluent. Keller Associates recommendation would be to make the transition to the MBR process prior to the addition of a 3rd SBR basin, or approximately year 2010.

6.9 MISCELLANEOUS PLANT IMPROVEMENTS

In addition to all of the process related improvements discussed above there are some additional improvements which would assist in improving plant operation and maintenance as follows:

6.9.1 Plant Utility Water System

In evaluating plant water uses it was determined that the treatment plant is the City's second largest water user with an average of approximately 110,000 gallons per day of potable water used for plant functions such as belt press and influent screen spray wash systems, foam spray, general washdown, landscaping, etc. Approximately 40-50% of that amount is used for keeping the UV channel full. Many plants use disinfected plant effluent for many plant water uses. Discussion with Oregon DEQ staff indicate UV disinfected water (without chlorination) can be used for plant utility water purpose including landscape irrigation. Therefore, significant potable water savings are possible. A recycle system for the UV channel would significantly reduce potable water use, however, the lamps could warm the water which would be detrimental to the effluent temperature limit. A separate onsite well or Ranney collector could also serve as a source of plant utility water. An approximate cost for a utility water system would be in the range of $75,000 – 100,000.

6.9.2 Sewer Debris Disposal Area

The City currently disposes of debris cleaned from sewers at the plant site to a sand filter. The process could be enhanced by addition of a larger wetwell and an automated pump which would pump filtered water directly to the headworks and a manual bar screen to remove larger debris. The project cost for this addition is estimated at $30,000.

6.9.3 Maintenance Management Program

As indicated in Chapter 5, a comprehensive maintenance management program should be set up to maximize preventative maintenance and minimize corrective maintenance. This will require purchase of computerized software and organization of the program to allow the plant to operate more efficiently with less repairs and equipment downtime. Purchase of the O&M software and incorporation of the maintenance management program is estimated at $200,000.

6.9.4 Aerated Sludge Storage Tank Rehab

This tank was part of the original plant and has been in use for over 40 years. It is reported by staff that the interior concrete shows evidence of corrosion and should be replaced or rehabilitated. This would require sand blasting the interior surface, spot repair of significant damaged areas and resealing of the entire interior surface with a polyurethane sealing system. Estimated total project costs would be approximately $100,000.

6.9.4 Maintenance and Storage Building

The existing plant has no place for weather protected storage of spare equipment and supplies, vehicles, or for doing any mechanical repairs, etc. A maintenance building would greatly assist in providing for the above functions and improving plant O&M. It is anticipated that four (4) bays (one side open) for vehicles and an enclosed maintenance shop and separate equipment/materials storage area would require approximately 3,750 square feet with 14-foot wall height. Estimated project cost including a paved drive would be approximately $350,000. It may be possible to reduce this cost by common wall construction with the heat drying equipment building.

6.9.5 Plant Buffer Space

The existing plant is currently surrounded by agricultural land. In the future, it is likely that development will occur closer to the plant with resulting complaints regarding esthetics, noise, and odors. For this reason it is recommended that land be purchased around the plant to maintain buffer space between the plant and future development. The buffer distance is very subjective, however, the WEF Manual of Practice for Design of Municipal Wastewater Treatment Plants recommends a distance of 150 to 250 feet between the plant and residential growth. At a distance of 250 feet

approximately 20 acres would need to be purchased at a cost estimated at $200,000. In addition to the buffer space, it is recommended the City provide for industrial zoning for at least an additional 750 feet beyond the buffer space.

6.10 RECOMMENDATION SUMMARY

A summary of recommended improvements, their cost, and priority is shown on Table 6.4 below. Improvements indicated as 1 are immediate needs with 1A as highest need and 1B as lower priority depending on available funds. A site layout is provided on Figure 6-1 showing anticipated locations of new facilities requiring significant land use.

Table 6.4
City of Stayton WWTP Improvements
Opinion of Most Probable Cost

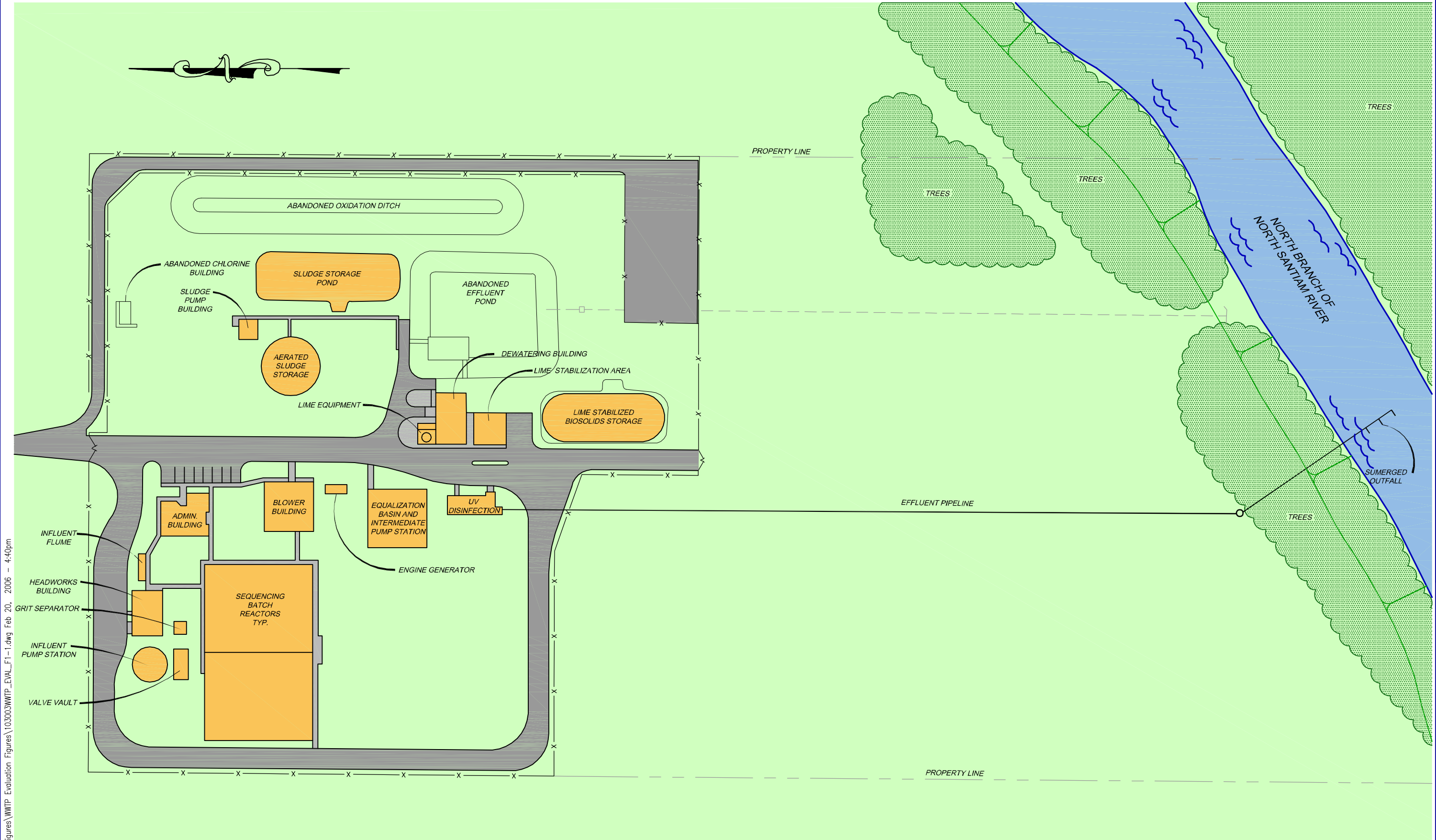
Priority	Improvements Description	Capacity or Permit Related Need	Needed to improve Plant Operations & Reliability	Estimated Total Project Cost (2005)	Estimated Population/Year (Marion County)
Headworks:					
2	Provide a new 1/8" fine screen at 11MGD	✓		$270,000	11,900 / 2010
1B	Backup pump station level controls		✓	10,000	Present
3	Influent pump addition	✓		30,000	2020
Batch Reactors:					
1B	Batch Fill Basin		✓	$850,000	Present
1B	Heat trace / insulate exterior piping / valves		✓	40,000	Present
1B	Waste sludge pumping separation		✓	110,000	Present
1B	Spare process equipment / valves		✓	65,000	Present
1B	Automate backflush system		✓	75,000	Present
EQ Basin:					
2	Line interior of EQ basin		✓	$60,000	Present
1B	Basin drain improvements		✓	65,000	Present
2	Add Intermediate pump and piping	✓		60,000	11,900 / 2010
1B	Access improvements		✓	75,000	Present
UV Disinfection System:					
2	Cover existing structure		✓	$100,000	Not Time Dependant (Taking Bids)
	Convert and expand existing UV system to high intensity system @ 10.2 MGD capacity				
1A	Phase 1 (3.4 MGD)	✓		200,000	Present
2	Phase 2 (3.4 MGD)	✓		200,000	2010
3	Phase 3 (3.4 MGD)	✓		200,000	2015
2	Channel level control system		✓	0	Completed

Solids Handling Facilities:					
1B	Clean and convert oxidation ditch to aerated sludge storage		✓	$250,000	Present
1B	Replace liquid sludge transfer pump		✓	50,000	Present
1B	Provide spare parts for stabilization / dewatering equipment		✓	65,000	Present
1A	Improve existing sludge containment		✓	0	Completed
1B	Provide aerated sludge tank decanting facilities.		✓	100,000	Present
1B	Sludge Thickener Facilities		✓	830,000	Present
3	Provide Class A sludge heat drying system (housed)	Future DEQ Requirement?	✓	2,035,000	2015
2	Purchase 80 acre biosolids application site near plant		✓	560,000	2010 or as Available
1A	Provide improved permanent cover for solids storage		✓	250,000	Present
1B	Rehab aerated storage tank		✓	100,000	Present
Miscellaneous Improvements:					
1A	Provide filter to lower effluent BOD/SS mass loads	✓		$750,000	Present
1B	Plant utility water system		✓	100,000	Not Time Dependant
1B	Maintenance and storage building		✓	350,000	Not Time Dependant
1B**	Extend river outfall	✓		500,000	By 12-31-08
2	Buffer around WWTP	✓		200,000	Present
2	2 MGD Parallel MBR Plant		✓	5,900,000	2010
1B	Sewer debris cleaning area upgrade		✓	30,000	Present
1B	Maintenance management program		✓	200,000	Present
Total Cost By Priority:					
1A				$1,300,000	Present
1B				3,765,000	See Above
2				7,350,000	See Above
3				2,265,000	See Above
	Total Improvements Cost			$14,680,000	

1A = Needed Immediately 1B = Recommended Immediately, but can be delayed 2-5 Years depending on availability of funds
2 = Medium Priority 3 = Low Priority

**Assumes existing mixing zone dilution is inadequate to meet NPDES permit heat load limits.

Appendix A Figures



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KELLER ASSOCIATES

CITY OF STAYTON

Wastewater Treatment Evaluation

Site Plan

FIGURE 1-1

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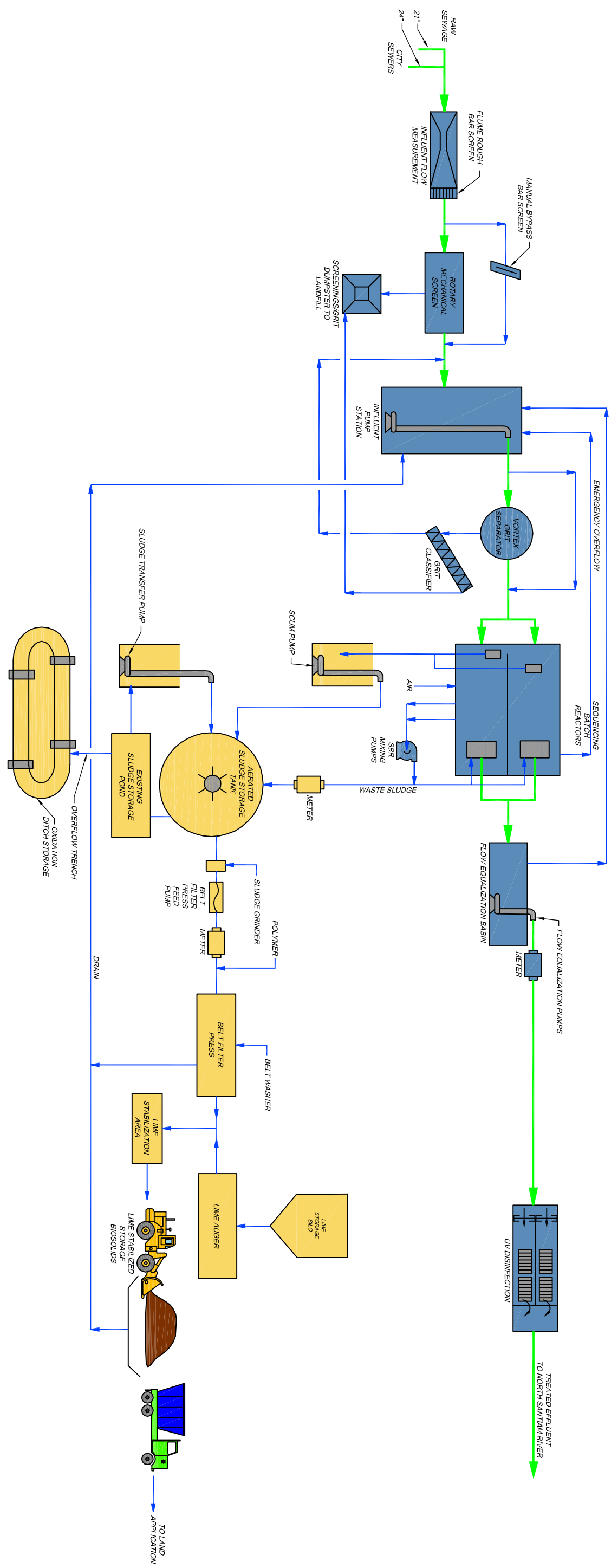

FIGURE 1-2

Schematic Flow Diagram

Wastewater Treatment
Evaluation

KELLER ASSOCIATES

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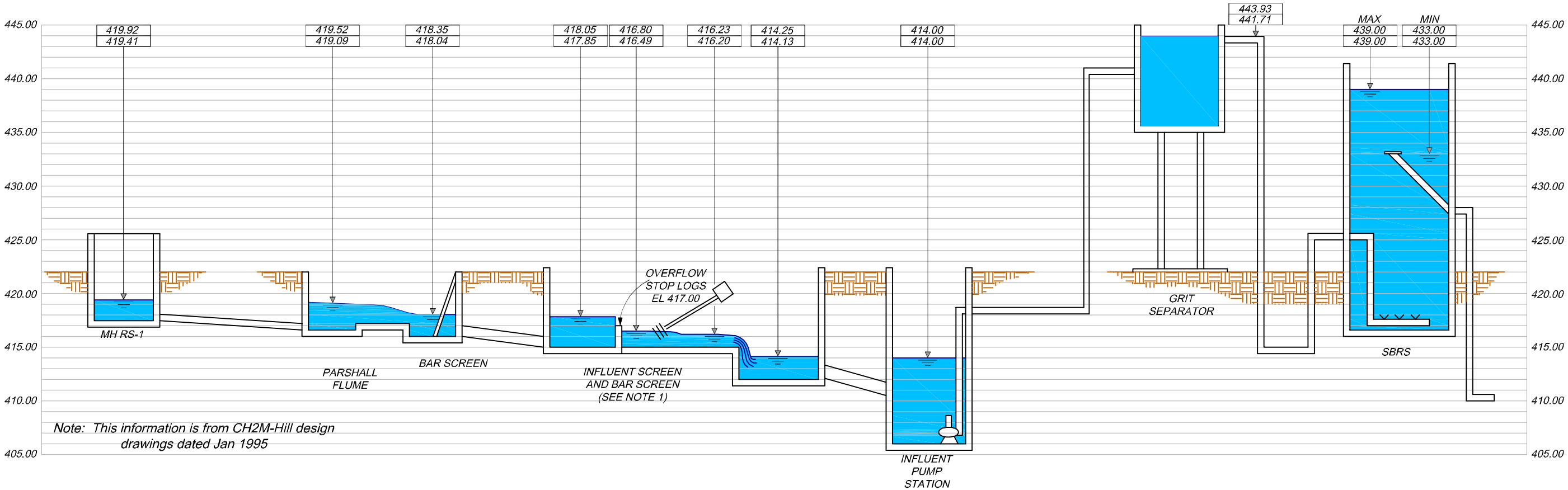

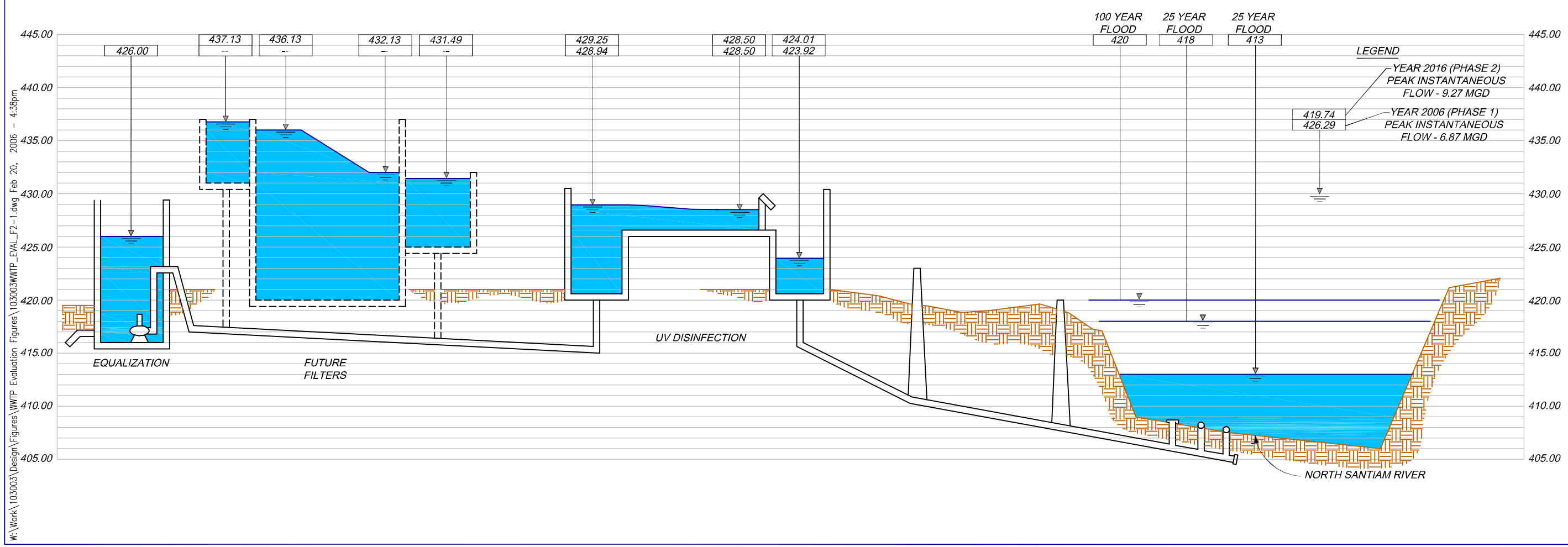

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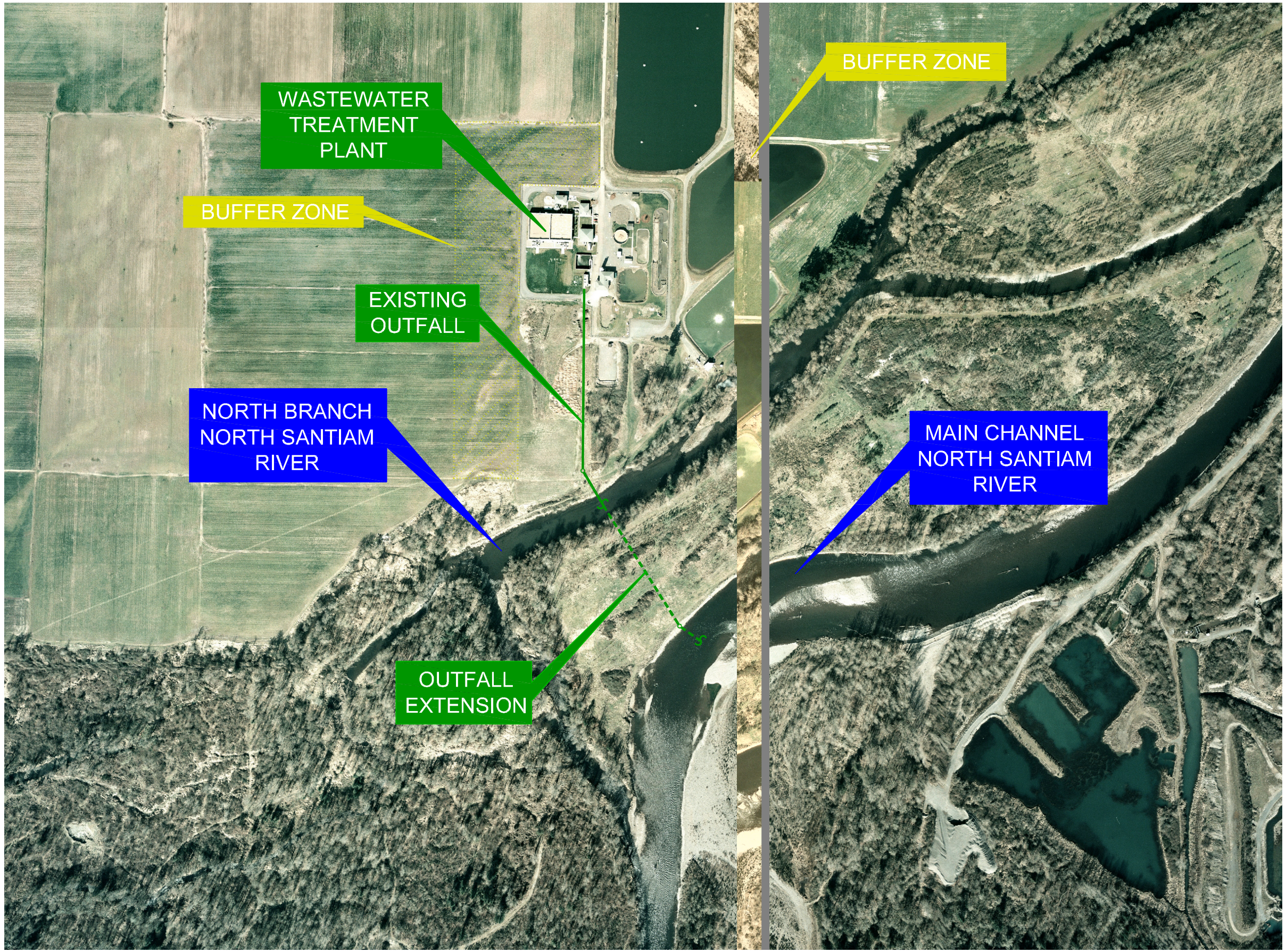
KELLER ASSOCIATES

CITY OF STAYTON

Wastewater Treatment Evaluation

Plant Hydraulic Profile

FIGURE 2-1



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KELLER ASSOCIATES

Wastewater Treatment Evaluation

Proposed Outfall Extension

FIGURE 3-1

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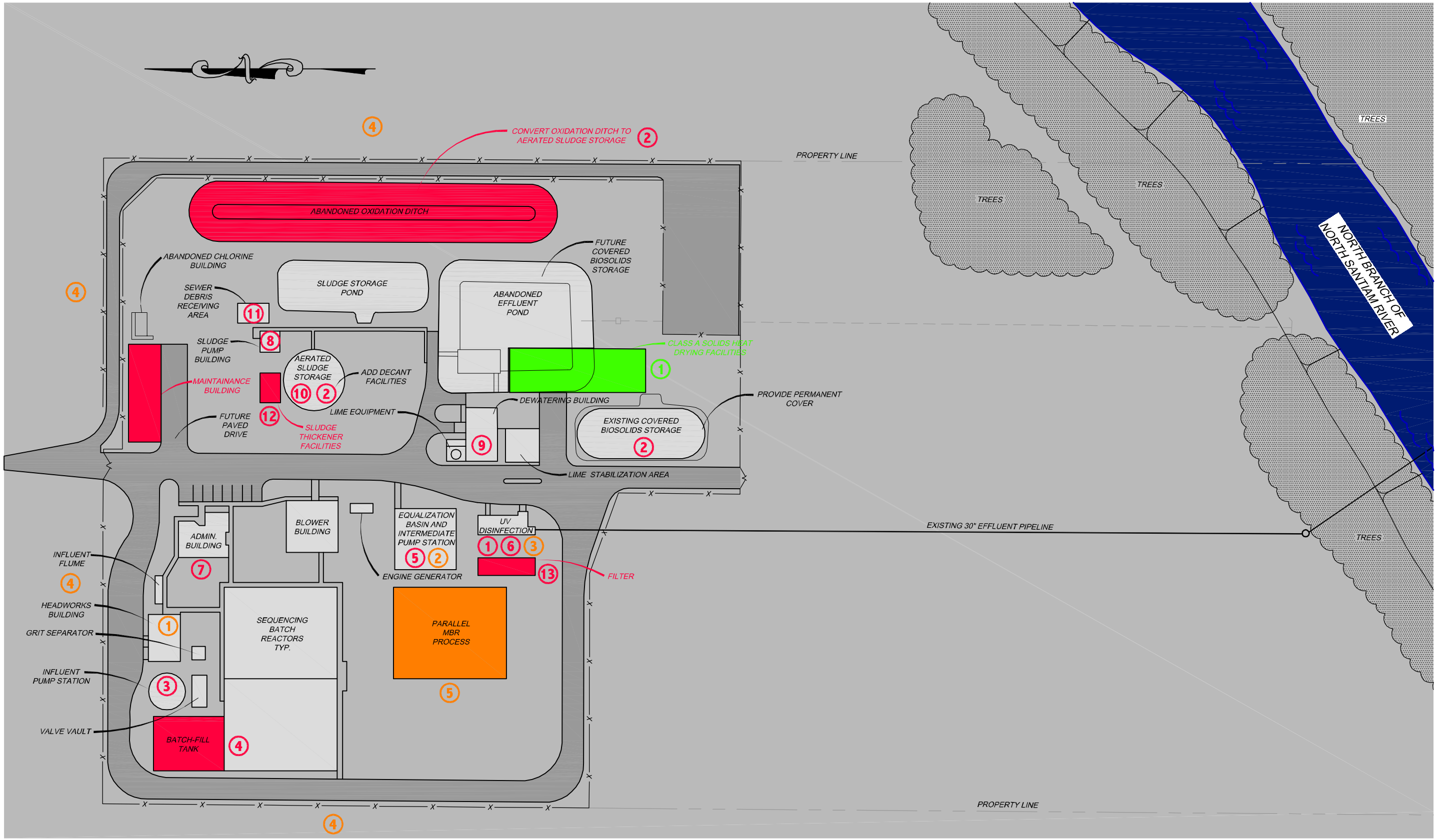

PRIORITY 1 IMPROVEMENTS (2005-2009)

1. UV Upgrade
2. Solids Handling Upgrades
3. Pump Station-Backup Level Controls
4. Batch Fill Tank Addition
5. EQ Basin Improvements
6. Plant Utility Water System
7. Maintenance Management Program
8. Replace Liquid Sludge Transfer Pump
9. Spare Parts For Stabilization/Dewatering System
10. Rehab Aerated Storage Tank
11. Sewer Debris Receiving Area Upgrade
12. Sludge Thickener Facilities
13. Filter Addition

PRIORITY 2 IMPROVEMENTS (2010-2014)

1. New Headworks Screen
2. EQ Basin Upgrade
3. Cover UV Sructure & UV Expansion
4. Purchase Land Disposal Site & Buffer Around Plant
5. MBR Process Addition

PRIORITY 3 IMPROVEMENTS (2015+)

1. Add Class A Heat Drying

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KELLER ASSOCIATES

Wastewater Treatment Evaluation

Wastewater Treatment Master Plan

FIGURE 6-1

Appendix B NPDES Permit

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

Department of Environmental Quality
Western Region – Salem Office
750 Front Street NE, Suite 120, Salem, OR 97301-1039
Telephone: (503) 378-8240

COPY

Issued pursuant to ORS 468B.050 and The Federal Clean Water Act

ISSUED TO:

City of Stayton
362 N. Third Avenue
Stayton, OR 97383

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Treated Wastewater	001	R.M. 14.9

FACILITY TYPE AND LOCATION:

Activated Sludge - Sequencing Batch Reactor
Stayton STP
950 Jetters Way
Stayton
Treatment System Class: Level III
Collection System Class: Level III

RECEIVING STREAM INFORMATION:

Basin: Willamette
Sub-Basin: North Santiam
Receiving Stream: North Santiam River
LLID: 1230064446868 - 14.9 - D
County: Marion

EPA REFERENCE NO: OR002042-7

Issued in response to Application No. 984903 received December 31, 2002. This permit is issued based on the land use findings in the permit record.

Mark E Hamlin
for Michael H. Kortenhof, Western Region Water Quality Manager

June 25, 2004
Date

PERMITTED ACTIVITIES

Until this permit expires or is modified or revoked, the permittee is authorized to construct, install, modify, or operate a wastewater collection, treatment, control and disposal system and discharge to public waters adequately treated wastewaters only from the authorized discharge point or points established in Schedule A and only in conformance with all the requirements, limitations, and conditions set forth in the attached schedules as follows:

Page
Schedule A - Waste Discharge Limitations not to be Exceeded 2
Schedule B - Minimum Monitoring and Reporting Requirements 4
Schedule C - Compliance Conditions and Schedules 8
Schedule D - Special Conditions 9
Schedule F - General Conditions 12

Unless specifically authorized by this permit, by another NPDES or WPCF permit, or by Oregon Administrative Rule, any other direct or indirect discharge to waters of the state is prohibited, including discharge to an underground injection control system.

SCHEDULE A

1. Waste Discharge Limitations not to be exceeded after permit issuance.

a. Treated Effluent Outfall 001

(1) May 1 - October 31:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
$CBOD_5$	10 mg/L	15 mg/L	110	160	220
TSS	10 mg/L	15 mg/L	110	160	220

(2) November 1 - April 30:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
BOD_5	30 mg/L	45 mg/L	340	510	680
TSS	30 mg/L	45 mg/L	340	510	680

* The average dry weather design flow to the facility is 1.90 MGD. The mass load limits are based upon average dry weather design flow of the previous treatment facility (1.35 MGD).

(3) Other Parameters (year-round except as noted)

Parameter	Limitations
E. coli Bacteria	Shall not exceed 126 organisms per 100 mL monthly geometric mean. No single sample shall exceed 406 organisms per 100 mL. (See Note 1)
pH	Shall be within the range of 6.0 - 9.0
$CBOD_5$ Removal Efficiency (May 1 through October 31)	Shall not be less than 85% monthly average.
BOD_5 Removal Efficiency (November 1 through April 30)	Shall not be less than 85% monthly average.
TSS Removal Efficiency	Shall not be less than 85% monthly average.
Excess Thermal Load (September 1 through June 15)	Shall not exceed a weekly average of 30 million Kcals/day (see Notes 2 and 3)
Ammonia-N (May 1 through October 31)	Shall not exceed a monthly average concentration of 12 mg/L and a daily maximum concentration of 27 mg/L (see notes 2 and 4)

(4) Except as provided for in OAR 340-045-0080, no wastes shall be discharged and no activities shall be conducted which violate Water Quality Standards as adopted in OAR 340-041-0445 except in the following defined mixing zone:

The allowable mixing zone is that portion of the North Santiam River contained within a band extending out sixty-six (66) feet from the north bank of the river and extending from a point ten (10) feet upstream of the outfall to a point two hundred (200) feet downstream from the outfall. The Zone of Immediate Dilution (ZID) shall be defined as that portion of the allowable mixing zone that is within twenty (20) feet of the point of discharge (see Note 5).

(5) Raw sewage discharges are prohibited to waters of the State from November 1 through May 21, except during a storm event greater than the one-in-five-year, 24-hour duration storm, and

from May 22 through October 31, except during a storm event greater than the one-in-ten-year, 24-hour duration storm.

If an overflow occurs between May 22 and June 1, and if the permittee demonstrates to the Department's satisfaction that no increase in risk to beneficial uses occurred because of the overflow, no violation shall be triggered if the storm associated with the overflow was greater than the one-in-five-year, 24-hour duration storm.

(6) Chlorine and chlorine compounds shall not be used as a disinfecting agent of the treated effluent and no chlorine residual shall be allowed in the discharged effluent due to chlorine used for maintenance purposes.

(7) Septage shall not be accepted at this facility for treatment or processing.

b. No activities shall be conducted that could cause an adverse impact on existing or potential beneficial uses of groundwater. All wastewater and process related residuals shall be managed and disposed in a manner that will prevent a violation of the Groundwater Quality Protection Rules (OAR 340-040).

NOTES:

1. If a single sample exceeds 406 organisms per 100 mL, then re-samples may be taken during the next five consecutive discharge intervals beginning no more than 34 hours after the original sample was taken. If the log mean of the five re-samples is less than or equal to 126 organisms per 100 mL, a violation shall not be triggered.

2. The Excess Thermal Load limit and ammonia limits were based on the average dry weather design flow, an estimated dilution in the mixing zone and the temperature and ammonia criterion, respectively. Both limits are considered interim. The permittee may request that this permit be re-opened, and the limits modified or eliminated upon completion of the mixing zone dilution study required by Schedule C, Condition 3.

3. The Excess Thermal Load limit may be adjusted if the Permittee chooses riparian improvements as a portion of their thermal reduction program. The Excess Thermal Load limit shall become effective upon completion of the improvements required by Schedule C, Condition 4. If the Total Maximum Daily Load (TMDL) for temperature for this sub-basin assigns a Waste Load Allocation (WLA) to this source, this permit may be re-opened to establish new thermal load limits and/or new temperature conditions or requirements.

4. The ammonia limits were calculated using the EPA Gold Book Criteria and are considered interim limits. DEQ is in the process of adopting the EPA 1999 ammonia criteria. Upon approval of the new standard by the EPA, the following limits will automatically be applied to the discharge without a permit modification:

Parameter	Limitations
Ammonia-N	Shall not exceed a monthly average concentration of 23 mg/L and a daily maximum concentration of 51 mg/L

5. The current discharge is into the smaller of two river channels. Depending upon the results of the mixing zone study, the discharge may be moved to the other channel or the discharge may be split between the channels. The permit may be reopened and the mixing zone definition revised depending upon the results of the mixing zone dilution study.

SCHEDULE B

1. **Minimum Monitoring and Reporting Requirements** (unless otherwise approved in writing by the Department).

The permittee shall monitor the parameters as specified below at the locations indicated. The laboratory used by the permittee to analyze samples shall have a quality assurance/quality control (QA/QC) program to verify the accuracy of sample analysis. If QA/QC requirements are not met for any analysis, the results shall be included in the report, but not used in calculations required by this permit. When possible, the permittee shall re-sample in a timely manner for parameters failing the QA/QC requirements, analyze the samples, and report the results.

a. Influent

The facility influent grab samples and measurements and composite samples are taken on the inlet side of the Parshall flume. The composite sampler is located next to the Parshall flume.

Item or Parameter	Minimum Frequency	Type of Sample
Total Flow (MGD)	Daily	Measurement
Flow Meter Calibration	Semi-Annual	Verification
$CBOD_5$ (May 1 to October 31)	2/Week	24-hour Composite
BOD_5 (November 1 to April 30)	2/Week	24-hour Composite
TSS	2/Week	24-hour Composite
pH	3/Week	Grab

b. Treated Effluent Outfall 001

The facility effluent grab samples for bacteria and pH and all toxic samples are taken from the discharge end of the UV channels. Composite samples are taken from the stilling well just prior to the UV channels. The composite sampler is located in the UV building. Temperature monitoring is conducted within the last manhole in the effluent transmission line to the river.

Item or Parameter	Minimum Frequency	Type of Sample
Total Flow (MGD)	Daily	Measurement
Flow Meter Calibration	Semi-Annual	Verification
$CBOD_5$ (May 1 to October 31)	2/Week	24-hour Composite
Ammonia-N (May 1 to October 31)	2/Week	24-hour Composite
BOD_5 (November 1 to April 30)	2/Week	24-hour Composite
TSS	2/Week	24-hour Composite
pH	3/Week	Grab
E. coli	2/Week	Grab (See Note 1)
UV Radiation Intensity	Daily	Reading (See Note 2)
Pounds Discharged ($CBOD_5$ or BOD_5 and TSS	2/Week	Calculation
Average Percent Removed ($CBOD_5$ or BOD_5 and TSS)	Monthly	Calculation
Temperature:		
Effluent Temperature, Daily Max	Daily	Continuous (see Note 3)
Effluent Temperature, Average of Daily Maximums(September 1 through June 15)	Weekly	Calculation
Excess Thermal Load(September 1 through June 15)	Weekly	Calculation (See Note 4)
Nutrients: (see Note 5)		
TKN, NO_2+NO_3-N, Total Phosphorus	1/Week (May-Oct)	24-hour Composite

b. Treated Effluent Outfall 001 (continued)

Item or Parameter	Minimum Frequency	Type of Sample
Toxics:		
Metals (Ag, Cd, Cu, Hg, Pb, Zn) measured as total is mg/L (See Note 6)	Semi-annually (see Note 6)	24-hour daily composite
Priority Pollutants (see Note 7)	(see Note 7)	24-hour daily composite
Whole Effluent Toxicity	Annually (see Note 8)	Acute & chronic

c. Biosolids Management

Item or Parameter	Minimum Frequency	Type of Sample
Sludge analysis including: Total Solids (% dry wt.) Volatile solids (% dry wt.) Biosolids nitrogen for: NH_3-N; NO_3-N; & TKN (% dry wt.) Phosphorus (% dry wt.) Potassium (% dry wt.) pH (standard units) Sludge metals content for: As, Cd, Cu, Hg, Mo, Ni, Pb, Se & Zn, measured as total in mg/kg	Annually	Composite sample to be representative of the product to be land applied from the Dewatered biosolids (See Note 9)
Record of locations where biosolids are applied on each DEQ approved site. (Site location maps to be maintained at treatment facility for review upon request by DEQ)	Each Occurrence	Date, volume & locations where sludges were applied recorded on site location map.
Quantity and type of alkaline product used to stabilize biosolids (when required to meet federal pathogen and vector attraction reduction requirements in 40 CFR 503.32(b)(3) and 40 CFR 503.33(b)(6))	Each occurrence	Measurement
Initial time when solids that received alkaline agent ascended to pH >= 12	Each batch	Date, time, and actual pH measurement (corrected to standard at 25°C)
2 hours after initial alkaline addition and sustained at pH >= 12	Each batch	Date, time, and actual pH measurement (corrected to standard at 25°C)
24 hours after initial alkaline addition and pH >= 11.5 was sustained	Each batch	Date, time, and actual pH measurement (corrected to standard at 25°C)

d. North Santiam River

Item or Parameter	Minimum Frequency	Type of Sample
Metals (Ag, Cd, Cu, Hg, Pb, Zn) measured as total is mg/L (See Note 6)	Semi-annually (see Note 6)	Grab

2. **Reporting Procedures**

a. Monitoring results shall be reported on approved forms. The reporting period is the calendar month. Reports must be submitted to the Department's Western Region - Salem office by the 15th day of the following month.

b. State monitoring reports shall identify the name, certificate classification and grade level of each principal operator designated by the permittee as responsible for supervising the wastewater collection and treatment systems during the reporting period. Monitoring reports shall also identify each system classification as found on page one of this permit.

c. Monitoring reports shall also include a record of the quantity and method of use of all sludge removed from the treatment facility and a record of all applicable equipment breakdowns and bypassing.

3. **Report Submittals**

a. The permittee shall have in place a program to identify and reduce inflow and infiltration into the sewage collection system. An annual report shall be submitted to the Department by September 1 each year which details sewer collection maintenance activities that reduce inflow and infiltration. The report shall state those activities that have been done in the previous year and those activities planned for the following year.

b. For any year in which biosolids are land applied, a report shall be submitted to the Department by February 19 of the following year that describes solids handling activities for the previous year and includes, but is not limited to, the required information outlined in OAR 340-050-0035(6)(a)-(e). The report shall include a summary of waste sludge disposed of in landfills.

NOTES:

1. *E. coli* monitoring must be conducted according to any of the following test procedures as specified in **Standard Methods for the Examination of Water and Wastewater, 19th Edition**, or according to any test procedure that has been authorized and approved in writing by the Director or an authorized representative:

Method	Reference	Page	Method Number
mTEC agar, MF	Standard Methods, 18th Edition	9-29	9213 D
NA-MUG, MF	Standard Methods, 19th Edition	9-63	9222 G
Chromogenic Substrate, MPN	Standard Methods, 19th Edition	9-65	9223 B
Colilert QT	Idexx Laboratories, Inc.		

2. The intensity of UV radiation passing through the water column will affect the systems ability to kill organisms. To track the reduction in intensity, the UV disinfection system must include a UV intensity meter with a sensor located in the water column at a specified distance from the UV bulbs. This meter will measure the intensity of UV radiation in mWatts-seconds/cm2. The daily UV radiation intensity shall be determined by reading the meter each day. If more than one meter is used, the daily recording will be an average of all meter readings each day.

3. Due to the intermittent nature of the discharge, effluent temperature monitoring is required only when discharging. If temperature data must also be collected during periods of non-discharge (based on equipment installation), efforts should be made to distinguish between discharging and non-discharging periods. All continuous temperature monitors are to be checked visually monthly to insure that the devices are still in place and submerged. All continuous temperature monitors must be audited quarterly and checked monthly, following procedures described in DEQ Procedural Guidance for Water Temperature Monitoring. The

Department acknowledges that uninterrupted data collection is not guaranteed due to vandalism, theft, damage or disturbance. In the event of equipment failure or loss, the permittee shall notify the Department and deploy new equipment to minimize interruption of data collection.

4. Calculated as follows:
(Weekly average of daily maximum effluent temperatures in °C - applicable stream temperature standard, 13°C) X (Weekly average of daily flow in MGD) X 3.785 = Excess Thermal Load, in Million Kcals/day.

5. Starting in 2006, the permittee shall monitor nutrients at the specified frequency and season for two years. After two years, nutrient monitoring of the effluent for cadmium, copper, lead, mercury and silver may be eliminated unless otherwise notified in writing by the Department.

6. During the first two years after permit issuance, special monitoring for cadmium, copper, lead, mercury, silver and zinc shall be conducted on the effluent and receiving stream. TSS and hardness shall be monitored simultaneously. The special monitoring for cadmium, copper, lead, silver and zinc shall be conducted using a "clean" sampling method, an "ultra-clean" sampling method, EPA method 1669 or any other test method approved by the Department. The special monitoring for mercury shall be conducted in accordance with EPA Method 1631. After the first two years, special monitoring of the receiving stream for cadmium, copper, lead, mercury and silver may be eliminated. After the first two years, special monitoring of the effluent for cadmium, copper, lead, mercury and silver may be eliminated unless otherwise notified in writing by the Department. For all tests, the method detection limit shall be reported along with the sample result.

7. The permittee shall perform all testing required in Part D of EPA Form 2A. The testing includes all metals (total recoverable), cyanide, phenols, hardness and the 85 pollutants included under volatile organic, acid extractable and base-neutral compounds. Three scans are required during the 4 ½ years after permit issuance. Two of the three scans must be performed no fewer than 4 months and no more than 8 months apart. The effluent samples shall be 24-hour daily composites, except where sampling volatile compounds. In this case, six (6) discrete samples (not less than 100 mL) collected over the operating day are acceptable. The permittee shall take special precautions in compositing the individual grab samples for the volatile organics to insure sample integrity (i.e. no exposure to the outside air). Alternately, the discrete samples collected for volatiles may be analyzed separately and averaged.

8. Beginning no later than calendar year 2005, the permittee shall conduct Whole Effluent Toxicity testing for a period of four (4) years in accordance with the frequency specified above. If the Whole Effluent Toxicity tests show that the effluent samples are not toxic at the dilutions determined to occur at the Zone of Immediate Dilution and the Mixing Zone, no further Whole Effluent Toxicity testing will be required during this permit cycle. Note that four Whole Effluent Toxicity test results will be required along with the next NPDES permit renewal application.

9. Composite samples from the Dewatered biosolids shall be taken from reference areas in the Dewatered biosolids pursuant to Test Methods for Evaluating Solid Waste, Volume 2; Field Manual, Physical/Chemical Methods, November 1986, Third Edition, Chapter 9.

Inorganic pollutant monitoring must be conducted according to Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Second Edition (1982) with Updates I and II and third Edition (1986) with Revision I.

SCHEDULE C

Compliance Schedules and Conditions

1. By September 22, 2004, the permittee shall submit to the Department a report which either identifies known sewage overflow locations and a plan for estimating the frequency, duration and quantity of sewage overflowing, or confirms that there are no overflow points. The report shall also provide a schedule to eliminate the overflow(s), if any.

2. Industrial Waste Survey/Pretreatment Program

   a. As soon as practicable, but by no later than six (6) months from permit issuance date, the permittee shall submit to the Department an industrial waste survey as described in 40 CFR 403.8(f)(2)(i-iii) suitable to make a determination as to the need for development of a pretreatment program.

   b. Should the Department determine that a pretreatment program is required, the permit shall be reopened and modified in accordance with 40 CFR 403.8(e) to incorporate a compliance schedule to require development of a pretreatment program. The compliance schedule requiring program development shall be developed in accordance with the provisions of 40 CFR 403.12(k), and shall not exceed twelve (12) months.

3. By no later than December 31, 2004, the permittee shall submit to the Department for approval a plan and schedule for conducting a mixing zone dilution study. The study should be conducted through a dye study or other Department approved method and should include a characterization of the zone of immediate dilution and the mixing zone boundary. Within one year of Department approval of the plan, permittee shall submit a completed mixing zone study to the Department. If the dilution achieved is significantly different than the computer model prediction, the permittee may request a permit modification to adjust the Excess Thermal Load limit and/or the ammonia limit, as appropriate.

4. If the mixing zone dilution study continues to indicate the permittee has a reasonable potential to violate the temperature standard, the permittee shall complete the following schedule:

   a. By no later than December 31, 2006, the permittee shall submit to the Department an evaluation of alternatives for corrective action that will result in compliance with the Excess Thermal Load limit.

   b. By no later than December 31, 2007, the permittee shall submit to the Department for approval final engineering plans and specifications for the corrective actions necessary to comply with the Excess Thermal Load limit.

   c. By no later than December 31, 2008, the permittee shall complete construction of all necessary improvements and comply with the Excess Thermal Load limit.

5. The permittee is expected to meet the compliance dates which have been established in this schedule. Either prior to or no later than 14 days following any lapsed compliance date, the permittee shall submit to the Department a notice of compliance or noncompliance with the established schedule. The Director may revise a schedule of compliance if he/she determines good and valid cause resulting from events over which the permittee has little or no control.

SCHEDULE D

Special Conditions

1. All biosolids shall be managed in accordance with the current, DEQ approved biosolids management plan, and the site authorization letters issued by the DEQ. Any changes in solids management activities that significantly differ from operations specified under the approved plan require the prior written approval of the DEQ.

   All new biosolids application sites shall meet the site selection criteria set forth in OAR 340-050-0070 and must be located within Marion and Linn Counties. All currently approved sites are located in Marion and Linn Counties. No new public notice is required for the continued use of these currently approved sites. Property owners adjacent to any newly approved application sites shall be notified, in writing or by any method approved by DEQ, of the proposed activity prior to the start of application. For proposed new application sites that are deemed by the DEQ to be sensitive with respect to residential housing, runoff potential or threat to groundwater, an opportunity for public comment shall be provided in accordance with OAR 340-050-0030.

   The facility is allowed to dispose of sludge of in a Department approved landfill as a solid waste (either in a landfill cell or is used as interim cover). Disposal must be in accordance with OAR Chapter 340, Division 93. Proper waste monitoring would be prescribed by the landfill in accordance with that rule. Monitoring of such sludge as biosolids is not required under this permit.

2. This permit may be modified to incorporate any applicable standard for biosolids use or disposal promulgated under section 405(d) of the Clean Water Act, if the standard for biosolids use or disposal is more stringent than any requirements for biosolids use or disposal in the permit, or controls a pollutant or practice not limited in this permit.

3. **Whole Effluent Toxicity Testing**

   a. The permittee shall conduct whole effluent toxicity tests as specified in Schedule B of this permit.

   b. Whole Effluent Toxicity (WET) tests may be dual end-point tests, only for the fish tests, in which both acute and chronic end-points can be determined from the results of a single chronic test (the acute end-point shall be based upon a 48-hour time period).

   c. Acute Toxicity Testing - Organisms and Protocols

      (1) The permittee shall conduct 48-hour static renewal tests with the *Ceriodaphnia dubia* (water flea) and the *Pimephales promelas* (fathead minnow).

      (2) The presence of acute toxicity will be determined as specified in **Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms**, Fourth Edition, EPA/600/4-90/027F, August 1993.

      (3) An acute WET test shall be considered to show toxicity if there is a statistically significant difference in survival between the control and 100 percent effluent, unless the permit specifically provides for a Zone of Immediate Dilution (ZID) for toxicity. If the permit specifies such a ZID, acute toxicity shall be indicated when a statistically significant difference in survival occurs at dilutions greater than that which is found to occur at the edge of the ZID.

d. Chronic Toxicity Testing - Organisms and Protocols

(1) The permittee shall conduct tests with: *Ceriodaphnia dubia* (water flea) for reproduction and survival test endpoint, *Pimephales promelas* (fathead minnow) for growth and survival test endpoint, and *Raphidocelis subcapitata* (green alga formerly known as *Selanastrum capricornutum*) for growth test endpoint.

(2) The presence of chronic toxicity shall be estimated as specified in **Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms**, Third Edition, EPA/600/4-91/002, July 1994.

(3) A chronic WET test shall be considered to show toxicity if a statistically significant difference in survival, growth, or reproduction occurs at dilutions greater than that which is known to occur at the edge of the mixing zone. If there is no dilution data for the edge of the mixing zone, any chronic WET test that shows a statistically significant effect in 100 percent effluent as compared to the control shall be considered to show toxicity.

e. Quality Assurance

(1) Quality assurance criteria, statistical analyses and data reporting for the WET tests shall be in accordance with the EPA documents stated in this condition and the Department's **Whole Effluent Toxicity Testing Guidance Document**, January 1993.

f. Evaluation of Causes and Exceedances

(1) If toxicity is shown, as defined in sections c.(3) or d.(3) of this permit condition, another toxicity test using the same species and Department approved methodology shall be conducted within two weeks, unless otherwise approved by the Department. If the second test also indicates toxicity, the permittee shall follow the procedure described in section f.(2) of this permit condition.

(2) If two consecutive WET test results indicate acute and/or chronic toxicity, as defined in sections c.(3) or d.(3) of this permit condition, the permittee shall evaluate the source of the toxicity and submit a plan and time schedule for demonstrating compliance with water quality standards. Upon approval by the Department, the permittee shall implement the plan until compliance has been achieved. Evaluations shall be completed and plans submitted to the Department within 6 months unless otherwise approved in writing by the Department.

g. Reporting

(1) Along with the test results, the permittee shall include: 1. the dates of sample collection and initiation of each toxicity test; 2. the type of production; and 3. the flow rate at the time of sample collection. Effluent at the time of sampling for WET testing should include samples of required parameters stated under Schedule B, condition 1. of this permit.

(2) The permittee shall make available to the Department, on request, the written standard operating procedures they, or the laboratory performing the WET tests, are using for all toxicity tests required by the Department.

h. Reopener

(1) If WET testing indicates acute and/or chronic toxicity, the Department may reopen and modify this permit to include new limitations and/or conditions as determined by the

Department to be appropriate, and in accordance with procedures outlined in Oregon Administrative Rules, Chapter 340, Division 45.

4. The permittee shall comply with Oregon Administrative Rules (OAR), Chapter 340, Division 49, "Regulations Pertaining To Certification of Wastewater System Operator Personnel" and accordingly:

   a. The permittee shall have its wastewater system supervised by one or more operators who are certified in a classification and grade level (equal to or greater) that corresponds with the classification (collection and/or treatment) of the system to be supervised as specified on page one of this permit.

Note: **A "supervisor" is defined as the person exercising authority for establishing and executing the specific practice and procedures of operating the system in accordance with the policies of the permittee and requirements of the waste discharge permit. "Supervise" means responsible for the technical operation of a system, which may affect its performance or the quality of the effluent produced. Supervisors are not required to be on-site at all times.**

   b. The permittee's wastewater system may not be without supervision (as required by Special Condition 4.a. above) for more than thirty (30) days. During this period, and at any time that the supervisor is not available to respond on-site (i.e. vacation, sick leave or off-call), the permittee must make available another person who is certified at no less than one grade lower then the system classification.

   c. If the wastewater system has more than one daily shift, the permittee shall have the shift supervisor, if any, certified at no less than one grade lower than the system classification.

   d. The permittee is responsible for ensuring the wastewater system has a properly certified supervisor available at all times to respond on-site at the request of the permittee and to any other operator.

   e. The permittee shall notify the Department of Environmental Quality in writing within thirty (30) days of replacement or redesignation of certified operators responsible for supervising wastewater system operation. The notice shall be filed with the Water Quality Division, Operator Certification Program, 811 SW 6th Ave, Portland, OR 97204. This requirement is in addition to the reporting requirements contained under Schedule B of this permit.

   f. Upon written request, the Department may grant the permittee reasonable time, not to exceed 120 days, to obtain the services of a qualified person to supervise the wastewater system. The written request must include justification for the time needed, a schedule for recruiting and hiring, the date the system supervisor availability ceased and the name of the alternate system supervisor(s) as required by 4.b. above.

5. The permittee shall notify the DEQ Western Region - Salem Office (phone: (503) 378-8240) in accordance with the response times noted in the General Conditions of this permit, of any malfunction so that corrective action can be coordinated between the permittee and the Department.

6. The permittee shall not be required to perform a hydrogeologic characterization or groundwater monitoring during the term of this permit provided:

   a. The facilities are operated in accordance with the permit conditions, and;

   b. There are no adverse groundwater quality impacts (complaints or other indirect evidence) resulting from the facility's operation.

   If warranted, at permit renewal the Department may evaluate the need for a full assessment of the facilities impact on groundwater quality.

NPDES GENERAL CONDITIONS
(SCHEDULE F)

SECTION A. STANDARD CONDITIONS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of Oregon Revised Statutes (ORS) 468B.025 and is grounds for enforcement action; for permit termination, suspension, or modification; or for denial of a permit renewal application.

2. Penalties for Water Pollution and Permit Condition Violations

Oregon Law (ORS 468.140) allows the Director to impose civil penalties up to $10,000 per day for violation of a term, condition, or requirement of a permit.

In addition, a person who unlawfully pollutes water as specified in ORS 468.943 or ORS 468.946 is subject to criminal prosecution.

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment. In addition, upon request of the Department, the permittee shall correct any adverse impact on the environment or human health resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

4. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and have the permit renewed. The application shall be submitted at least 180 days before the expiration date of this permit.

The Director may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date.

5. Permit Actions

This permit may be modified, suspended, revoked and reissued, or terminated for cause including, but not limited to, the following:

a. Violation of any term, condition, or requirement of this permit, a rule, or a statute;

b. Obtaining this permit by misrepresentation or failure to disclose fully all material facts; or

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

The filing of a request by the permittee for a permit modification or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

6. Toxic Pollutants

The permittee shall comply with any applicable effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

7. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege.

8. Permit References

Except for effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants and standards for sewage sludge use or disposal established under Section 405(d) of the Clean Water Act, all rules and statutes referred to in this permit are those in effect on the date this permit is issued.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls, and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

2. Duty to Halt or Reduce Activity

For industrial or commercial facilities, upon reduction, loss, or failure of the treatment facility, the permittee shall, to the extent necessary to maintain compliance with its permit, control production or all discharges or both until the facility is restored or an alternative method of treatment is provided. This requirement applies, for example, when the primary source of power of the treatment facility fails or is reduced or lost. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

3. Bypass of Treatment Facilities

a. Definitions

(1) "Bypass" means intentional diversion of waste streams from any portion of the treatment facility. The term "bypass" does not include nonuse of singular or multiple units or processes of a treatment works when the nonuse is insignificant to the quality and/or quantity of the effluent produced by the treatment works. The term "bypass" does not apply if the diversion does not cause effluent limitations to be exceeded, provided the diversion is to allow essential maintenance to assure efficient operation.

(2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities or treatment processes which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Prohibition of bypass.

(1) Bypass is prohibited unless:

(a) Bypass was necessary to prevent loss of life, personal injury, or severe property damage;

(b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and

(c) The permittee submitted notices and requests as required under General Condition B.3.c.

(2) The Director may approve an anticipated bypass, after considering its adverse effects and any alternatives to bypassing, when the Director determines that it will meet the three conditions listed above in General Condition B.3.b.(1).

c. Notice and request for bypass.

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior written notice, if possible at least ten days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in General Condition D.5.

4. Upset

a. Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operation error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of General Condition B.4.c are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the causes(s) of the upset;

(2) The permitted facility was at the time being properly operated;

(3) The permittee submitted notice of the upset as required in General Condition D.5, hereof (24-hour notice); and

(4) The permittee complied with any remedial measures required under General Condition A.3 hereof.

d. Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

5. Treatment of Single Operational Event

For purposes of this permit, A Single Operational Event which leads to simultaneous violations of more than one pollutant parameter shall be treated as a single violation. A single operational event is an exceptional incident which causes simultaneous, unintentional, unknowing (not the result of a knowing act or omission), temporary noncompliance with more than one Clean Water Act effluent discharge pollutant parameter. A single operational event does not include Clean Water Act violations involving discharge without a NPDES permit or noncompliance to the extent caused by improperly designed or inadequate treatment facilities. Each day of a single operational event is a violation.

6. Overflows from Wastewater Conveyance Systems and Associated Pump Stations

a. Definitions

(1) "Overflow" means the diversion and discharge of waste streams from any portion of the wastewater conveyance system including pump stations, through a designed overflow device or structure, other than discharges to the wastewater treatment facility.

(2) "Severe property damage" means substantial physical damage to property, damage to the conveyance system or pump station which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of an overflow.

(3) "Uncontrolled overflow" means the diversion of waste streams other than through a designed overflow device or structure, for example to overflowing manholes or overflowing into residences, commercial establishments, or industries that may be connected to a conveyance system.

b. Prohibition of overflows. Overflows are prohibited unless:

(1) Overflows were unavoidable to prevent an uncontrolled overflow, loss of life, personal injury, or severe property damage;

(2) There were no feasible alternatives to the overflows, such as the use of auxiliary pumping or conveyance systems, or maximization of conveyance system storage; and

(3) The overflows are the result of an upset as defined in General Condition B.4. and meeting all requirements of this condition.

c. Uncontrolled overflows are prohibited where wastewater is likely to escape or be carried into the waters of the State by any means.

d. Reporting required. Unless otherwise specified in writing by the Department, all overflows and uncontrolled overflows must be reported orally to the Department within 24 hours from the time the permittee becomes aware of the overflow. Reporting procedures are described in more detail in General Condition D.5.

7. Public Notification of Effluent Violation or Overflow

If effluent limitations specified in this permit are exceeded or an overflow occurs, upon request by the Department, the permittee shall take such steps as are necessary to alert the public about the extent and nature of the discharge. Such steps may include, but are not limited to, posting of the river at access points and other places, news releases, and paid announcements on radio and television.

8. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in such a manner as to prevent any pollutant from such materials from entering public waters, causing nuisance conditions, or creating a public health hazard.

SECTION C. MONITORING AND RECORDS

1. Representative Sampling

Sampling and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and shall be taken, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Director.

2. Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to insure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than ± 10 percent from true discharge rates throughout the range of expected discharge volumes.

3. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

4. Penalties of Tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two years, or by both. If a conviction of a person is for a violation committed after a first conviction of such person, punishment is a fine not more than $20,000 per day of violation, or by imprisonment of not more than four years or both.

5. Reporting of Monitoring Results

Monitoring results shall be summarized each month on a Discharge Monitoring Report form approved by the Department. The reports shall be submitted monthly and are to be mailed, delivered or otherwise transmitted by the 15th day of the following month unless specifically approved otherwise in Schedule B of this permit.

6. Additional Monitoring by the Permittee

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Discharge Monitoring Report. Such increased frequency shall also be indicated. For a pollutant parameter that may be sampled more than once per day (e.g., Total Chlorine Residual), only the average daily value shall be recorded unless otherwise specified in this permit.

7. Averaging of Measurements

Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean, except for bacteria which shall be averaged as specified in this permit.

8. Retention of Records

Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records of all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

9. Records Contents

Records of monitoring information shall include:

a. The date, exact place, time and methods of sampling or measurements;

b. The individual(s) who performed the sampling or measurements;

c. The date(s) analyses were performed;

d. The individual(s) who performed the analyses;

e. The analytical techniques or methods used; and

f. The results of such analyses.

10. Inspection and Entry

The permittee shall allow the Director, or an authorized representative upon the presentation of credentials to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit, and

d. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by state law, any substances or parameters at any location.

SECTION D. REPORTING REQUIREMENTS

1. Planned Changes

The permittee shall comply with Oregon Administrative Rules (OAR) 340, Division 52, "Review of Plans and Specifications". Except where exempted under OAR 340-52, no construction, installation, or modification involving disposal systems, treatment works, sewerage systems, or common sewers shall be commenced until the plans and specifications are submitted to and approved by the Department. The permittee shall give notice to the Department as soon as possible of any planned physical alternations or additions to the permitted facility.

2. Anticipated Noncompliance

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity that may result in noncompliance with permit requirements.

3. Transfers

This permit may be transferred to a new permittee provided the transferee acquires a property interest in the permitted activity and agrees in writing to fully comply with all the terms and conditions of the permit and the rules of the Commission. No permit shall be transferred to a third party without prior written approval from the Director. The permittee shall notify the Department when a transfer of property interest takes place.

4. Compliance Schedule

Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date. Any reports of noncompliance shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirements.

5. Twenty-Four Hour Reporting

The permittee shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally (by telephone) within 24 hours, unless otherwise specified in this permit, from the time the permittee becomes aware of the circumstances. During normal business hours, the Department's Regional office shall be called. Outside of normal business hours, the Department shall be contacted at 1-800-452-0311 (Oregon Emergency Response System).

A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. If the permittee is establishing an affirmative defense of upset or bypass to any offense under ORS 468.922 to 468.946, and in which case if the original reporting notice was oral, delivered written notice must be made to the Department or other agency with regulatory jurisdiction within 4 (four) calendar days. The written submission shall contain:

a. A description of the noncompliance and its cause;

b. The period of noncompliance, including exact dates and times;

c. The estimated time noncompliance is expected to continue if it has not been corrected;

d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and

e. Public notification steps taken, pursuant to General Condition B.7.

The following shall be included as information that must be reported within 24 hours under this paragraph:

a. Any unanticipated bypass which exceeds any effluent limitation in this permit.

b. Any upset which exceeds any effluent limitation in this permit.

c. Violation of maximum daily discharge limitation for any of the pollutants listed by the Director in this permit.

The Department may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

6. Other Noncompliance

The permittee shall report all instances of noncompliance not reported under General Condition D.4 or D.5, at the time monitoring reports are submitted. The reports shall contain:

a. A description of the noncompliance and its cause;

b. The period of noncompliance, including exact dates and times;

c. The estimated time noncompliance is expected to continue if it has not been corrected; and

d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

7. Duty to Provide Information

The permittee shall furnish to the Department, within a reasonable time, any information that the Department may request to determine compliance with this permit. The permittee shall also furnish to the Department, upon request, copies of records required to be kept by this permit.

Other Information: When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or any report to the Department, it shall promptly submit such facts or information.

8. Signatory Requirements

All applications, reports or information submitted to the Department shall be signed and certified in accordance with 40 CFR 122.22.

9. Falsification of Information

A person who supplies the Department with false information, or omits material or required information, as specified in ORS 468.953 is subject to criminal prosecution.

10. Changes to Indirect Dischargers - **[Applicable to Publicly Owned Treatment Works (POTW) only]**

The permittee must provide adequate notice to the Department of the following:

a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of the Clean Water Act if it were directly discharging those pollutants and;

b. Any substantial change in the volume or character of pollutants being introduced into the POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

c. For the purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

11. Changes to Discharges of Toxic Pollutant - **[Applicable to existing manufacturing, commercial, mining, and silvicultural dischargers only]**

The permittee must notify the Department as soon as they know or have reason to believe of the following:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:

(1) One hundred micrograms per liter (100 μg/L);

(2) Two hundred micrograms per liter (200 μg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 μg/L) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;

(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

(4) The level established by the Department in accordance with 40 CFR 122.44(f).

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) Five hundred micrograms per liter (500 μg/L);

(2) One milligram per liter (1 mg/L) for antimony;

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

(4) The level established by the Department in accordance with 40 CFR 122.44(f).

SECTION E. DEFINITIONS

1. BOD means five-day biochemical oxygen demand.

2. TSS means total suspended solids.

3. mg/L means milligrams per liter.

4. kg means kilograms.

5. m^3/d means cubic meters per day.

6. MGD means million gallons per day.

7. Composite sample means a sample formed by collecting and mixing discrete samples taken periodically and based on time or flow.

8. FC means fecal coliform bacteria.

9. Technology based permit effluent limitations means technology-based treatment requirements as defined in 40 CFR 125.3, and concentration and mass load effluent limitations that are based on minimum design criteria specified in OAR 340-41.

10. CBOD means five day carbonaceous biochemical oxygen demand.

11. Grab sample means an individual discrete sample collected over a period of time not to exceed 15 minutes.

12. Quarter means January through March, April through June, July through September, or October through December.

13. Month means calendar month.

14. Week means a calendar week of Sunday through Saturday.

15. Total residual chlorine means combined chlorine forms plus free residual chlorine.

16. The term "bacteria" includes but is not limited to fecal coliform bacteria, total coliform bacteria, and E. coli bacteria.

17. POTW means a publicly owned treatment works.

Appendix C

Plant Staffing Level Estimate

ENVIRONMENTAL PROTECTION AGENCY

STAFFING ESTIMATE WORKSHEET

By: Dennis Suihkonen

Date: 6/8/2004

Plant: City of Stayton

Location: Stayton, Oregon

Type: Sequencing Batch Reactor

Design Flow 1.9 MGD Ave Dry Weather

I. Adjustment For Local Conditions (see TALC)

Local Condition	Adjustment						
	Comment	Operation	Maintenance	Supervisory	Clerical	Laboratory	Cleaning, Painting Yard work
Plant layout	Average						
Unit Processes	Standard/Diff.	5%					
Level of Treatment	Secondary						
Type of Removal Requirement	Percentage						
Industrial Wastes	Minimal						
Productivity	Good						
Climate	Wet Winters		10%				
Training	All certified						
Auto. Monitoring	Good						
Auto. Sampling	Some						
Off-Plant Laboratory	Lab at Plant						
Off-Plant Maintenance	Pump Stas.		15%				
Age of Equipment	Well cared for						
Storm, Infiltration	High	10%					
Present Flow	Near Design						
TOTAL		0.15	0.25	0	0	0	0

ENVIRONMENTAL PROTECTION AGENCY
STAFFING ESTIMATE WORKSHEET

II. Annual Manhours

Unit Process	Annual Hours					
	Operation	Maintenance	Supervisory	Clerical	Laboratory	Cleaning, Painting Yardwork
Collection System	1000	500	150			
Raw Sewage Pump Sta.	100	200	50			
Screening	210	50	100			
Grit Removal	210	50	50			
Influent Pump Sta.	100	200	50			
SBR	900	700	200			
SBR Support Facilities	330	220	100			
UV Disinfection	110	190	100			
Aerobic Digestion	200	100	50			
Belt Press Dewatering	500	250	100			
Lime Stabilization	250	125	50			
Sludge Trucking	500	100	50			
Laboratory			50		2000	
Total	4410	2685	1100	0	2000	800
Adjustment (From I)	1.15	1.25	1.00		1	1.00
TOTAL	5070	3360	1100		2000	800

STAFFING ESTIMATE WORKSHEET

III. Staffing Suggestion

	Total Hours Per Year	Number of Staff**
Operations	5070	2.9
Maintenance	3360	1.9
Supervisory	1100	0.6
Clerical (Public Works Staff)	0	0
Laboratory	2000	1.1
Yardwork, Cleaning, Painting	800	0.5
Weekend Staff		0.5
Total	12,330	7.5*

*Assumes 1752 Actual Working Hours Per Year Per Person

365 Work days @ 8 hours per day = 2920 hours

- 52 weekends @ 16 hours per weekend = -832 hours
- 5 weeks vacation and sick leave = -200 hours
- 12 holidays = -96 hours
- 40 hours training = -40 hours

ACTUAL WORKING HOURS = 1,752 hours

Appendix D O & M Costs

City of Stayton, Oregon
Fiscal Year 2004 - 2005 Budget

Fund 030 - Sewer Enterprise Fund

The Sewer Enterprise budget provides funding to transport and treat raw sewerage for residential, commercial, and industrial customers in Stayton and Sublimity. Sewerage is delivered to the Wastewater Treatment Plant via 32 miles of sanitary sewer collection lines. The Sewer Enterprise budget provides funding to meet annual maintenance objectives (sewer line cleaning, televising, repair, replacement, lift station maintenance, treatment plant maintenance, pump maintenance, sludge disposal, tracking and billing sewer charges, etc.). Revenues for this fund are received from Stayton sewer user fees as well as monthly flow-related fees from the City of Sublimity. Current staffing includes the Wastewater Supervisor, three Maintenance Worker positions, a fourth position shared with the Water Fund, two seasonal maintenance positions and portions of the salaries of the Receptionist/Cashier and Utility Billing Clerk.

Revenues

Account Number	Description	01 - 02 Actual	02 - 03 Actual	03 - 04 Adopted	04 - 05 Proposed	04 - 05 Approved	04 - 05 Adopted
40100	Beginning Cash	3,719,373	4,214,401	3,541,925	3,188,290	3,188,290	3,338,490
43500	Earned Interest	104,863	74,763	45,945	40,400	40,400	40,400
43899	Miscellaneous Grant	0	0	0	60,000	60,000	60,000
44100	Sublimity Contract	173,706	178,057	182,000	110,970	150,000	150,000
44200	Customer Receipts	1,386,221	1,370,030	1,347,455	1,374,480	1,374,480	1,374,480
45230	Developer Reimbursements	0	6,991	4,980	2,710	2,710	2,710
48200	Transfer From SDC	22,946	26,116	0	1,200,000	1,200,000	1,200,000
49500	Miscellaneous	2,985	6,224	5,760	1,795	1,795	1,795
Total Revenues		**$5,410,094**	**$5,876,581**	**$5,128,065**	**$5,978,645**	**$6,017,675**	**$6,167,875**

Expenses

51140	PW Director	28,292	0	0	0	0	0
51150	PW Supervisor	14,252	0	0	0	0	0
51155	Wastewater Supervisor	0	45,708	48,810	49,945	49,945	49,945
51215	PW Secretary	6,567	0	0	0	0	0
51330	Custodian 20%	1,878	0	0	0	0	0
51390	Seasonal PT	0	0	22,385	23,400	23,400	23,400
51420	Clerk 32%	7,369	7,886	8,370	9,010	9,010	9,010
51430	Plant Operator (2.5)	130,446	87,419	128,370	131,550	131,550	131,550
51460	Engineer Technician	13,565	0	0	0	0	0
51470	Utility Clerk 50%	13,854	14,642	15,080	16,635	16,635	16,635
51710	Weekend Duty	2,600	5,100	5,760	5,760	5,760	5,760
51720	Overtime Pay	3,811	4,915	2,015	2,015	2,015	2,015
51730	Holiday Pay	100	0	505	505	505	505
51910	FICA & Medicare	16,794	12,402	17,540	18,270	18,270	18,270
51920	Workers Compensation	3,396	3,451	4,200	3,690	3,690	3,690
51930	Fringe Benefits	54,728	0	0	0	0	0
51931	Health & Dental	0	29,041	37,995	46,670	46,670	46,670
51933	Disability	0	706	1,095	955	955	955
51934	Life Insurance	0	173	260	335	335	335
51935	PACM Retirement	0	18,893	25,580	21,685	21,685	21,685
51936	Assoc. Admin. - PSNL Choice	0	221	180	110	110	110
	Personnel Services	$ 297,652	$ 230,356	$ 316,145	$ 330,535	$ 330,535	$ 330,535
52110	Office Supplies	1,147	658	2,700	2,940	2,940	2,940
52120	Billing Supplies	5,451	5,212	7,500	7,200	7,200	7,200
52140	Technician Supplies	750	0	0	0	0	0
52210	Telephone/Alarms	5,006	6,557	6,605	6,800	6,800	6,800
52420	Computer Expense	3,016	5,073	17,035	9,320	9,320	9,320
52510	Electricity	110,640	104,878	135,815	122,710	122,710	122,710
52530	Utilities/Shop Building	5,677	989	0	0	0	0
53150	Custodial Supplies	0	117	0	0	0	0
53200	Office Rent/Move In 50%	3,136	0	0	0	0	0
54110	Uniforms	1,251	1,310	3,610	3,560	3,560	3,560
54120	Memberships	0	0	850	1,500	1,500	1,500
54130	Training/Conferences	2,982	3,229	6,875	8,390	8,390	8,390
55110	Plant Operating Expense	46,659	68,399	105,365	137,370	137,370	137,370
55115	Permit - NPDES	0	9,315	0	5,650	5,650	5,650
55120	System Operating Expense	5,948	109,363	167,520	181,640	181,640	181,640
56110	Sludge Disposal	31,701	28,468	53,105	53,100	53,100	53,100

City of Stayton, Oregon
Fiscal Year 2004 - 2005 Budget

Account Number	Description	01 - 02 Actual	02 - 03 Actual	03 - 04 Adopted	04 - 05 Proposed	04 - 05 Approved	04 - 05 Adopted
58110	Gasoline & Diesel	1,684	2,073	3,685	4,860	4,860	4,860
58120	Vehicle Maintenance/Repair	2,561	5,097	5,200	7,000	7,000	7,000
62015	Webaite Maintenance	0	0	0	0	0	0
62110	Contract Custodian	2,374	0	0	0	0	0
62120	Contract Services	0	0	10,000	10,000	10,000	10,000
62120	Contract Services LBCC	7,915	12,837	10,660	10,660	10,660	10,660
62130	Contract Sewer Master Plan	0	26,116	0	0	0	0
62135	Contract Stormwater Master Plan	0	0	75,000	56,250	56,250	56,250
62150	Contract Legal	1,924	0	0	0	0	0
62170	Contract Engineer	14,130	37,187	24,400	24,440	24,440	24,440
62180	Contract I&I Evaluation	225	0	6,000	6,000	6,000	6,000
63110	Audit	4,127	3,848	4,000	5,330	5,330	5,330
63120	Insurance	34,344	40,964	44,805	54,040	54,040	54,040
	Materials and Services	$ 292,648	$ 471,687	$ 690,730	$ 718,760	$ 718,760	$ 718,760
71200	Equipment	8,068	194	104,850	0	0	26,300
74110	Plant Improvements	0	81,789	236,000	140,000	140,000	263,900
74120	System Improvements	0	27,717	0	0	0	0
74121	Shaff Rd. Line Replacement	215	0	263,250	0	0	0
74620	Wilco Road Lift Station	24,246	38	0	0	0	0
	Capital Outlay	$ 32,529	$ 109,738	$ 604,100	$ 140,000	$ 140,000	$ 290,200
81150	OEDD Principal (1994)	29,418	33,322	33,320	0	0	0
81250	OEDD Interest (1994)	45,485	41,581	41,580	0	0	0
81410	RD Bond Principal	65,581	68,617	68,800	3,344,025	3,344,025	3,344,025
81420	RD Bond Interest	312,832	309,796	309,800	136,720	136,720	136,720
	Debt Service	$ 453,316	$ 453,315	$ 453,400	$3,480,745	$3,480,745	$3,480,745
90110	Transfer To General Fund	103,550	118,500	120,870	126,370	126,370	126,370
90115	Transfer To Public Works Fund	0	91,970	111,265	124,740	124,740	124,740
90155	Trans To Vehicle Repl Fund	16,000	16,000	87,135	67,585	67,585	67,585
	Transfers	$ 119,550	$ 226,470	$ 319,270	$ 318,695	$ 318,695	$ 318,695
95110	Contingency	0	0	200,000	300,000	300,000	300,000
95140	RD Requirement	0	0	227,050	120,435	120,435	120,435
95150	OEDD Fund	0	521,832	0	0	0	0
99100	Unappropriated Fund Balance	4,214,399	3,863,183	2,317,370	569,475	608,505	608,505
	Contingency/Unappropriated	$4,214,399	$4,385,015	$2,744,420	$ 989,910	$1,028,940	$1,028,940
Total Expenses		$5,410,094	$5,876,581	$5,128,065	$5,978,645	$6,017,675	$6,167,875
Total Sewer Revenues		$5,410,094	$5,876,581	$5,128,065	$5,978,645	$6,017,675	$6,167,875
Total Sewer Expenses		$5,410,094	$5,876,581	$5,128,065	$5,978,645	$6,017,675	$6,167,875
Difference		$ -	$ -	$ -	$ -	$ -	$ -

Search: SBR O+M Costs

Operation and Maintenance Costs

The O&M costs for the SBR system include electricity, maintenance, labor, and taxes and insurance. No chemicals are utilized in the SBR system. EPA assumed the labor requirements for the SBR system to be four hours per day and based electricity costs on horsepower requirements. EPA obtained the labor and horsepower requirements from vendors. EPA estimated maintenance, taxes, and insurance using the factors detailed in Table 1-2.

Table 3-2 presents the itemized O&M cost estimates for the SBR systems. The resulting cost curve is presented as Figure 3-3. The O&M cost equation for the SBR systems is:

$$\mathbf{\ln(Y2) = 13.139 + 0.562\ln(X) + 0.020(\ln(X))^2} \qquad \textbf{(3-3)}$$

where:

X = Flow Rate (MGD) and

Y2 = O&M Cost (1989 $/YR).

Table 3-2. O&M Cost Estimates for Sequencing Batch Reactor Systems

Flow Rate (MGD)	Power	Labor	Maintenance	Taxes & Insurance	Total O&M Cost (1989 $/YR)
0.001	65	14,600	8,260	4,130	27,055
0.01	392	14,600	29,744	14,872	59,608
0.05	1,852	29,200	52,540	26,270	109,862
0.10	3,703	29,200	80,140	40,070	153,113
0.50	18,298	58,400	194,156	97,078	367,932
1.0	36,596	58,400	264,384	132,192	491,572

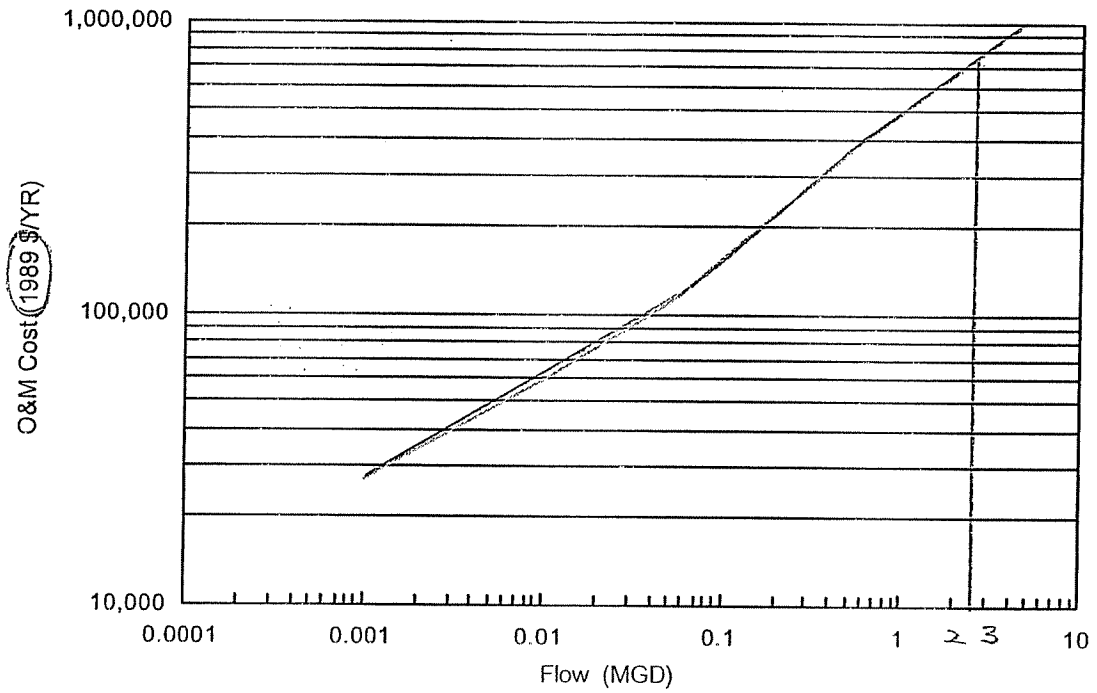

Figure 3-3. O&M Cost Curve for Sequencing Batch Reactor Systems

1989 Estimate = $750,000

Ave annual inflation for 15 years = 2.86% per US Consumer Price Index

infl factor = $(1.0286)^{15}$
= 1.53

2004 Estimate = 750,000 (1.53)
= $1,150,000

Appendix E Industrial User Summary

Stayton Wastewater Division

362 North Third Avenue, Stayton, Oregon 97383
Phone: (503) 769-3425 • Fax: (503) 769-1456

Commercial/Industrial Waste Data Disclosure Form

1. Company Name: _____
2. Division Name: _____
3. Facility Address: _____
   _____
4. Mailing Address: _____
   _____

Fold Here

5. Representative completing this form: _____
   Name: _____ Title: _____
   Telephone:(____)_____
6. Briefly describe type of business – principle
   Products/services: _____
7. Number of Employees: _____ Normal Operating Schedule: _____
   _____ hours/day _____ days/week
8. Is the building hooked to sewer system? ☐ Yes or ☐ No If not will it be? ☐ Yes or ☐ No
9. Do you or will you use fats, oils or greases in your business? ☐ Yes or ☐ No
   Grease trap present? ☐ Yes or ☐ No Frequency of cleaning oil/grease trap? _____
   If not will one be installed? ☐ Yes or ☐ No If yes, when? _____
10. Do you or will you use chemicals in your business: ☐ Yes or ☐ No
11. Are there or will there be floor drains present at your facility? ☐ Yes or ☐ No
12. Do you or will you discharge wastewater (other than domestic water from bathrooms, toilets, etc.) to the sewer system? ☐ Yes or ☐ No
13. Do you have an accidental spill prevention plan for your business?
    ☐ Yes or ☐ No

Fold Here

14. Does your business use film developing equipment? Yes or No If so, do you recover the silver? ☐ Yes or ☐ No

"I certify under penalty of law, that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated this information submitted. Based on my inquiry of the person(s) who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including possibility of fine and imprisonment of knowing violations."

_____

Name of Signing Official (Print or type) Title

_____

Signature Date

Stayton Wastewater System

Commercial/Industrial Wastewater Discharge Survey

Company Name	NAICS No.	Products Services	No. of Employees	Hours a Day	Days a Week	Sewer System	Fats, Oils, Greases	Grease Trap Present	Cleaning Frequency	Chemicals	Floor Drains	Non Domestic Wastewater	Spill Prevention Plan	Film
AFR Properties, LLC		Mini Storage Warehouse Space	0			Yes	No	No	n/a	No	No	No	No	No
Americmax B.P.	331315	Light Gage Sheet Metal	24	8	5	Yes	No	No	n/a	Yes	No	No	Yes	No
Antiques & Uglies		Used Furniture/Collectibles	0	5	6	Yes	No	No	n/a	No	No	No	No	No
Apostolic Trust Tabernacle		Church	0			Yes	No	No	n/a	No	No	No	No	No
Backroads Oil, Inc	811191	Automotive Oil/Lube	5	11	7	Yes	Yes	Yes	Trimonthly	No	Yes	No	Yes	No
Bind & Hat Inn		Bed/Breakfast Inn	0	n/a	n/a	Yes	No	No	n/a	No	No	No	No	No
Boldt, Carlisle & Smith, CPA's		CPA Firm	10	8	5	Yes	No	No	n/a	No	No	No	No	No
Brent Walker and Jerry Weis Partnership	524210 423990	Insurance Sales and Timber Sales Office	5	8	5	Yes	No	No	n/a	No	No	No	No	No
Calvary Lutheran Church		Church		4-9	5	Yes	No	No	n/a	No	No	Yes	No	No
Cammack-Kenesley Insurance		Insurance Agency	6	7.5	5	Yes	No	No	n/a	No	No	No	No	No
Canyon River LLC		Gas Station/C-Store	20	24	7	Yes	No	No	n/a	Yes	Yes	No	Yes	No
Carquest of Stayton	44131	Auto Parts Sales	4	10.5	6	Yes	No	No	n/a	Yes	No	No	No	No
Century 21 Select Prop	531210	Real Estate Sales/Listing	2	8	6	Yes	No	No	n/a	No	No	No	No	No
Church of Jesus Christ of LDS		Church	1	8	1	Yes	No	No	n/a	Yes	Yes	No	No	No
Dale's Auto Body, Inc.	811121	Auto Body Repair/Paint	3	11	5	Yes	No	No	n/a	Yes	No	No	Yes	No
Daren L Goin DMD P.C.	621210	General Dentistry	5	8	4	Yes	No	No	n/a	Yes	Yes	No	Yes	Yes
Dean Yeager, MD		Medical Provider	16	5-12	7	No	No	No	n/a	Yes	No	No	Yes	No
Drs. Sims, Boughn, Gooch		Medical Office	14	8	5	Yes	No		n/a	Yes	Yes	No	Yes	Yes
DSK Incorporated		Quick Service	58	19	7	Yes	Yes	Yes	30-60 days	Yes	Yes	No	Yes	No
Duncan, Tiger & Niegel, PC		Legal Services	7	8	5	Yes	No	No	n/a	No	No	No	No	No
Edward Jones & Co.		Investments	2	8	5	Yes	No	No	n/a	No	No	No	No	No
El Mariachi		Restaurant	2		7	Yes	Yes	No	n/a	Yes				No
Fender's Landing		Restaurant	20	16.5	7	Yes	Yes	Yes	Monthly	Yes	Yes	Yes	Yes	No
Feyasian		R	3	12	7	Yes	Yes	Yes	Weekly	No	Yes	No	No	No
First American Title Insurance Company of Oregon		Escrow Closing	5	8	5	Yes	No	No	n/a	No	No	No	No	No
Freres Building Supply		Retail Building Materials	9	8	6	Yes	No	No	n/a	No	No	No	No	No
H&C Properties, LLC	531120	Leases offices in building	10	8	5	Yes	No	No	n/a	No	No	No	No	No
Hair For All		Beauty Shop	0			Yes	No	No	n/a	Yes	No	Yes	No	No
II-S Mechanical Inc.		Commercial Plumbing/Heating	10	8	5	Yes	No	No	n/a	No	No	No	No	No
James L. McRehee Attorney at Law P.C.		Attorney	2	9	5	Yes	No	No	n/a	No	No	No	No	No
Jeffrey J. Gries, DMD		Dental Service	3	7.5	4	Yes	No	No	n/a	Yes	No	Yes	Yes	Yes
Jeld-Wen	326199	Vinyl Windows/Doors	200	16	5	Yes	No	No	n/a	No	No	Yes	Yes	No
John H. Gilberts MD		Health Care Services	5	8-12	7	Yes	No	No	n/a	Yes	Yes	No		No
Koenig Repair	3312	Machine Shop	2	8	5	Yes	No	No	n/a	Yes	No	No	No	No
La Esperanza Mex. Bakery		Bakery	2	12	7	Yes	No	No	n/a	No	No	No	No	No
La Esperanza Mexican Rest.		Restaurant	7	17	6	Yes	Yes	Yes	Biweekly	No	No	No	No	No
Laidlaw Transit, Inc.	4151	Transportation	20	10	5	Yes	Yes	No	n/a	Yes	No	No	Yes	No
Laser Electric Inc.		Auto Electric	2	8	5	Yes	No	No	n/a	Yes	No	Yes	Yes	No

Company Name	NAICS No.	Products Services	No. of Employees	Hours a Day	Days a Week	Sewer System	Fats, Oils, Greases	Grease Trap Present	Cleaning Frequency	Chemicals	Floor Drains	Non Domestic Wastewater	Spill Prevention Plan	Film
Layco II, LLC		Donuts/Coffee	3	8.5	6	Yes	Yes	No	n/a	No	Yes	No	No	No
Littav Harvester		Berry Harvesters (Mfg.)	25	8	5	Yes	No	No	n/a	No	No	No	Yes	No
Loosley Development Co.	44-45	Retail				Yes	Yes	Yes		No	Yes	No	No	Yes
Lulay Financial		Investments/Planning	2	9	5	Yes	No	No	n/a	No	No	No	No	No
M&M Shipping dbr Postal Connection		Shipping/Business Services	4	10	6	Yes	No	No	n/a	No	No	No	No	No
Madison & Davis Insurance Co.	524210	Insurance Agency	2	8	5	Yes	No	No	n/a	No	No	No	No	No
Marc Nelson Oil Products, Inc.		Patrolem Products And Fueling Station	2	9 24	5 7	Yes	No	No	n/a	Yes	No	No	Yes	No
McMillan Enterprises, Inc.	444130	Retail Hardware		11.5	7	Yes	No	Yes	As Needed	Yes	Yes	Yes	No	No
Mike Adams Construction Co.	236220	Contractor for Commercial and Industrial Construction	18	8	5	Yes	No	No	n/a	Yes	No	No	No	No
New Life Foursquare Church		Church	2	7	6	Yes	No	No	n/a	No	No	No	No	No
None		Building Vacant - None	0			Yes	No	No	n/a	No	No	No	No	No
Norpac Foods	311411 311421	Frozen and Canned Vegetables	≈ 825	24	7	No	No	No	n/a	Yes	Yes	No	Yes	No
North Santiam School Dist. 29J		Middle School		8	5	Yes	Yes	No	n/a	No	Yes	No	Yes	No
North Santiam School District		School/Education	300	8	5	Yes	Yes	Yes	Monthly	Yes	Yes	No	Yes	No
NW Preferred Federal Credit Union		Credit Union/ Financial Services	6	8	5	Yes	No	No	n/a	No	No	No	No	No
Oil Producers Inc.		Gas Station/C-Store	6	16	7	Yes	No	No	n/a	No	Yes	No	Yes	No
Oregon Dept. of Transportation		Vehicle Title/Registration ID's/Driver License	4	8	5	Yes	No	No	n/a	No	No	No	No	No
P.T. Northwest/Stayton Physical Therapy		Physical Therapy	4	11	5	Yes	No	No	n/a	No	Yes	No	No	No
PacificCorp		Utility-Power Training Facility	4	8	5	Yes	No	No	n/a	No	Yes	No	Yes	No
Philips Products	326199	Mfg. Windows/Doors	448	24	5	Yes	Yes	No	n/a	Yes	Yes	Yes	No	No
Poor John's Bottle Factory		Bar/Restaurant	5	17	7	Yes	Yes	No	Weekly	No	Yes	No	No	No
Porter TV & Appliance		Not Open for Operation	0			Yes	No	No	n/a	No	No	No	No	No
Quilt 'n Stitch		Fabric Sales	2	8	4	Yes	No	No	n/a	No	No	No	No	No
Ramirez Imports		Retail	0	8		Yes	No	No	n/a	No	No	No	No	No
Randy's Towing		Tow Office	3	24	7	No	No	No	n/a	No	No	No	No	No
Regis High School		High School	24	12	5	Yes	Yes	Yes	Annually	Yes	Yes	Yes	Yes	No
River Ranch Restaurants, Inc.		Fast Food	22	15	7	Yes	Yes	Yes	Quarterly	No	Yes	No	Yes	No
Robert D. Odle DMD		Dentistry	0	8	5	Yes	No	No	n/a	Yes	No	Yes	Yes	Yes
Roth Family Market		Grocery	70			Yes	Yes	Yes	Trimonthly	Yes	Yes	No	No	Yes
Rumours Restaurant & Lounge		Restaurant	12	18	7	Yes	Yes	Yes	Weekly	Yes	Yes	Yes		No
Santiam Hospital	622110	Hospital	150	24	7	Yes	Yes	Yes	Weekly	Yes	Yes	Yes	Yes	Yes
Santiam Vision Source		Optometric Services	6	8	5	Yes	No	No	n/a	No	No	No	Yes	No
Santiam Water Control District		Water Delivery	5	8	5	Yes	No	No	n/a	No	No	No	Yes	No
Smoker Craft, Inc.	336612	Manufacturing	30	8	5	No	No	No	n/a	Yes	No	No	Yes	No
Spaniol's Inc.		Plumbing Contrator	3	9	5	Yes	No	No	n/a	No	No	No	No	No
St. Mary Catholic School	611110	School	26	8.5	5	Yes	No	No	n/a	Yes	Yes	No	No	No
Stayton Animal Supply		Retail Pet Food	5	9.5	6	Yes	No	No	n/a	Yes	No	No	No	No
Stayton Bowl		Bowling Center	4	10-12	7	Yes	No	No	n/a	No	No	No	No	No

Company Name	NAICS No.	Products Services	No. of Employees	Hours a Day	Days a Week	Sewer System	Fats, Oils, Greases	Grease Trap Present	Cleaning Frequency	Chemicals	Floor Drains	Non Domestic Wastewater	Spill Prevention Plan	Film
Stayton Builders Mart	444190	Lumberyard/Building Materials Retail	8	10	6	No	No	No	n/a	No	No	No	No	No
Stayton Church of Christ		Church	7			Yes	No	No	n/a	No	No	No	No	No
Stayton Church of the Nazarene		Church	3	5	2-3	Yes	No	No	n/a	No	No	No	No	No
Stayton Cleaners		Dry Cleaning/Alterations	1	10	5	Yes	No	No	n/a	Yes	Yes	No	Yes	No
Stayton Community Action Resource		Client Services	1	8	4	Yes	No	No	n/a	No	No	No	Yes	No
Stayton Construction, Inc.	236220	General Contractor	150	8	5	Yes		Yes	Monthly	Yes	No	Yes	Yes	No
Stayton Cooperative Telephone			16	8	5	Yes	No	No	n/a	No	No	No	No	No
Stayton Cooperative Telephone Engineering/Operations	517110	Telecommunication (Wired)	10	8	5	Yes	No	No	n/a	No	No	No	No	No
Stayton Cooperative Telephone Willamette Valley Internet	517110	Telecommunication (Wired)		8	5	Yes	No	No	n/a	No	No	No	No	No
Stayton Fire District		Fire Department	6 Full-time 30 Vol.	9	5	Yes	No	No	n/a	No	Yes	No	No	No
Stayton Flowers and Gifts		Flowers	3			Yes	No	No	n/a	No	No	No	No	No
Stayton Hearing		Hearing Aid Dispenser	2	6	3	Yes	No	No	n/a	Yes	No	No		No
Stayton Mail Newspapers		Newspaper	7	8	5	Yes	No	No	n/a	Yes	No	Yes	Yes	No
Stayton Mini Storage located 1855 Pacific Court	531130	Mini Storage Warehouse	1	8	6	Yes	No	No	n/a	No	No	No	No	No
Stayton Mini Storage located 1880 Pacific Court	531130	Mini Storage Warehouse	1	8	6	Yes	No	No	n/a	No	No	No	No	No
Stayton SDA Church		Church	n/a			Yes	No	No	n/a	No	No	No	No	No
Stayton Self Defense		Martial Arts School	1	8	6	Yes	No	No	n/a	No	No	No	No	No
Stayton Sports Store		Retail Athletic Goods	4	10	6	Yes	No	No	n/a	Yes	No	No	No	No
Stayton Veterinary Hospital		Veterinary Hospital	5	9	6	Yes	No	No	n/a	Yes	No	No	Yes	Yes
Storehouse Ministries		Church	3	5	4	Yes	No	No	n/a	No	No	No	No	No
Subway		Fast Food-Sandwiches	10	16	7	Yes	No	Yes	Quarterly	No	Yes	No	No	No
The Eagles Nest		Repair/Custom Parts	1	9	7	Yes	No	No	n/a	No	No	No	No	No
The Karsten Co., Inc.	321991	Manufacturing Housing	153	8	5	Yes	No	No	n/a	Yes	Yes	No	No	No
The Lovin Oven			3	9.5	6	Yes	Yes	No	n/a	No	No	No	No	No
Upward Bound		Camp/Respite for people with disabilities	5-20	6	3-7	Yes	No	No	n/a	No	No	No	No	No
US Bank		Bank	10	9.5	5	Yes	No	No	n/a	No	Yes	No	No	No
Uvision/Willsmette Broadband	517510	CableTV Service Provider	3	8	5	Yes	No	No	n/a	No	Yes	No	Yes	No
Van Dorn Enterprises, Inc.	2500	Underground Utilities	9	10	4	Yes	No	No	n/a	No	No	No	No	No
Vital Health		Retail/Health Foods	3	8	5	Yes	No	No	n/a	No	No	No	No	No
Washington Mutual		Financial/Bank	10	9	6	Yes	No	No	n/a	No	No	No	No	No
Weddle Funeral Home		Funeral Hom	5	5-8	7	Yes	No	No	n/a	Yes	Yes	Yes	Yes	No
West Coast Bank	522110	Commercial Bank	7	9	5	Yes	No	No	n/a	No	Yes	No	Yes	No
Weyerhaeuser Company	321213	Engineered Wood Manufacturing	185	24	7	Yes	No	No	n/a	Yes	No	Yes	No	No

Company Name	NAICS No.	Products Services	No. of Employees	Hours a Day	Days a Week	Sewer System	Fats, Oils, Greases	Grease Trap Present	Cleaning Frequency	Chemicals	Floor Drains	Non Domestic Wastewater	Spill Prevention Plan	Film
Wilco	5541	Retail Fuel Station	12	17	7	No	No	No	n/a	No	No	Yes	Yes	No
Wilco		Retail Products		11	7	Yes	No	No	n/a	No	Yes	Yes	Yes	No
Wilco Farmers	SIC 5999	Crop Protection Products Nutrients, and Services	7	8	6	Yes	Yes	No	n/a	Yes	No	No	Yes	No
William George, Inc. (Stayton Liquor)		Retail	3	8	7	Yes	No	No	n/a	No	Yes	No	Yes	No
Wizbones LLC	443120	Computer Sales/Repair	0	9	5	Yes	No	Yes	Quarterly	No	No	No	No	No
Total with NAICS No.	**34**			**Total # of "Yes"**		**108**	**20**	**16**		**41**	**36**	**18**	**39**	**8**

Company Name	NAICS No.	Products Services	No. of Employees	Hours a Day	Days a Week	Sewer System	Fats, Oils, Greases	Grease Trap Present	Cleaning Frequency	Chemicals	Floor Drains	Non Domestic Wastewater	Spill Prevention Plan	Film
ITEMS ADDED 11/21/05														
Summit Clean		Cleaning/Resoration	3	8	5	Yes	No	No	Yes		No	No	Yes	No
Safeway, Inc.		Retail Grocery	82	19	7	Yes	Yes	Yes	as needed	Yes	Yes	Yes	Yes	No
Newman & Newman, Inc. - Hgaro's Pizza		Pizza Takeout & Delivery	10	11	7	Yes	Yes	Yes	-	Yes	-	No	No	No
Stayton Auto Supply			1	8	1	Yes	Yes	No		Yes	Yes	No	No	No
C&M Inc. - Curves of Stayton / Sublimity		Fitness Center	4	14	6	Yes	no	-	-	Yes	No	No	No	No
Trademark Construction, Inc.		General Contractor	15	8	5	Yes	Yes	No	n/a	Yes	No	No	No	No
WW Oil and Lube Inc.		Auto Repair Center		8.5	5	Yes	Yes	-	-	Yes	No	No	No	No
Adams Saw & Knife Inc.		Saw Sales & Repair	1	8	5.5	Yes	Yes	Yes	as needed	No	No	No	Yes	No
Stayton A&W		Restraunt	20	13	7	Yes	Yes	No	-	Yes	Yes	No	No	No
Beauty Management, Inc.		Beauty Salon	4	11	7	yes	No	No	-	Yes	No	No	No	No
Banks Lumber		Build Truss for Fleetwood I	32	8	5	Yes	No	No	-	No	Yes	No	Yes	No
Stayton Tire and Automotive LLC		Auto Tires/Light Service	1	8	6	Yes	Yes	No	-	Yes	No	No	Yes	No
Steve's Auto Repair		Auto Repair	2	8	5	Yes	Yes	Yes	6 Month	Yes	Yes	Yes	Yes	No
Star Car Wash		Car Wash	3	8	6	Yes	No	No	n/a	No	No	Yes	No	No
Stayton United Methodist Church		Protestant Church	3	4	6	Yes	No	-	-	No	Yes	No	No	No
Farmers Insurance Group		Insurance Services	2	8	5	Yes	No	-	-	No	No	No	No	No
Bi-mart Corporation		Retail Sales	55	11	7	Yes	No	No	n/a	No	Yes	No	Yes	No
Robert Armstron P.C.		Accounting - Income Taxe:	5	12	6	Yes	No	No	No	No	No	No	No	No
Our Town Monthly		Publishing Company	4	8	5	Yes	No	-	-	No	No	No	No	No
Capitol City Companies Inc.		Fuel Station / C-Store	14	24	7	Yes	No	No	No	Yes	Yes	Yes	Yes	No
Santiam Smile Design - David B. Thompson		Dental Practice	7	10	4	Yes	No	-	-	Yes	Yes	Yes	Yes	No
Stayton Fitness LLC		Gym	10	16.5	7	Yes	No	-	-	No	No	No	No	No
Holm II, Inc.		Office	6	10	5	Yes	No	-	n/a	No	-	No	Yes	No
B.C. Nelson		Dental Office	5	8	5	Yes	No	No	-	Yes	No	Yes	No	Yes
North Santium Funeral Service		Serice Industry	1	8	6	Yes	No	No	-	Yes	No	Yes	Yes	No
Prumdential Real Estate Professional		Real Estate	12	9	6	Yes	No	-	-	No	-	No	Yes	No
Mary Artz Tax and Business Services, Inc.		Taxes & Bookkeeping sen	2	8	5	Yes	No	No	No	No	No	No	No	No
Koening Trucking Inc.		Dump Truck for Hire	1	8	5	Yes	Yes	No	-	No	No	No	No	No
Family Chiropractic Clinic		Health Care - Chiropractor	1	-	-	Yes	No	No	n/a	No	No	No	No	No
Key Bank		Retail Banking	5	9	4	Yes	No	-	-	No	No	No	No	No
Mill Creek Dental, Inc.		Dental Office	4	8	4	Yes	No	No	n/a	Yes	No	Yes	Yes	Yes
Stayton Tax Service & Book Keeping Inc.		Taxes & Accounting	4	8	5	Yes	No	-	-	No	No	No	No	No
Stayton Pharmacy		Pharmacy	8	10	5	Yes	No	No	-	No	No	No	No	No
R & R Washboard		Self Service Laundry	0	14	7	Yes	No	-	-	No	No	No	Yes	No
Budget Self-Stor		Mini Storage	2	4	5	Yes	No	No	-	No	No	No	No	No
Sunshine Daycare Center LLC		Daycare Center	4	12	5	Yes	No	No	-	Yes	Yes	No	No	No
Hollister Street Auto Body / Hatch Radiator		Auto Body & Refinish and	1	8	5	Yes	Yes	-	-	Yes	Yes	-	Yes	No
Steven R Summers P.C.		Attorney's Office	3	8	5	Yes	No	No	-	No	No	No	No	No
Insomnia		Coffee	1	11	7	No	No	No	-	No	No	No	No	No
Santiam Lodge #25		Lodge	0	4	1	Yes	No	No	No	No	No	No	No	No
Ugo's Pizza Stayton / Johnson Fam. Corp.		Pizza Parlor	13	12	7	Yes	Nyes	Yes	4 Months	Yes	Yes	Yes	No	No
USPS		Delivery	14	11	6	Yes	No	No	-	No	No	No	Yes	No
Cascade Pro Auto	811111	Auto & Light Trk Repair	4	9	5	Yes	Yes	No	-	Yes	No	Yes	Yes	No
Slayden Construction / Stayton Construction		General Contractor	150	8	5	Yes	-	Yes	Monthly	Yes	No	Yes	Yes	No
I-Real Cars		Display Autos for Sale	0	0	0	No	No	-	-	No	No	No	No	No

Company Name	NAICS No.	Products Services	No. of Employees	Hours a Day	Days a Week	Sewer System	Fats, Oils, Greases	Grease Trap Present	Cleaning Frequency	Chemicals	Floor Drains	Non Domestic Wastewater	Spill Prevention Plan	Film
ITEMS ADDED 1/17/06														
Santiam Cleanery Arc		Laundramat, Dry Cleaner	5	11	7	Yes	No	No	-	?	Yes	Yes	Yes	No
Learning Tree Preschool & Daycare		Child Care Center	6	11.5	5	Yes	No	No	-	No	No	No	Yes	No
Crowson Enterprises, Inc.		Grocery Store	12	13	7	Yes	No	-	-	No	Yes	No	No	No
Stayton Printing		Printing, copy service, reta	1	9	6	Yes	No	-	-	No	No	No	Yes	No
Helena Chemical		Ag Chemical Wholesale	8	10	5	Yes	No	-	-	No	No	No	Yes	No