ORDINANCE NO. 591

AN ORDINANCE AMENDING CITY OF WILSONVILLE WASTEWATER FACILITY PLAN.

WHEREAS, the City currently has a Wastewater Facility Plan that was adopted by Ordinance No. 571 on August 30, 2004; and

WHEREAS, ORS 197.175 requires cities to prepare, adopt, and implement Comprehensive Plans consistent with statewide planning goals adopted by the Land Conservation and Development Commission; and

WHEREAS, ORS 197.712 (2)e requires cities to develop and adopt a public facilities plan for areas within an Urban Growth Boundary containing a population greater than 2,500 persons and shall include rough cost estimates for projects needed to provide sewer, water, and transportation uses contemplated in the Comprehensive Plan and Land Use Regulations; and

WHEREAS, the Wastewater Facility Plan is a support document to the City's Comprehensive Plan; and

WHEREAS, HDR Engineering, Inc. prepared a Wastewater Facility Plan Update and presented said Plan to the Planning Commission on November 12, 2003; and

WHEREAS, in developing the new Wastewater Facility Plan, the City has sought to carry out federal, state, and regional mandates, provide for alternative improvement solutions to minimize expense, avoid the creation of public nuisances, and maintain the public's health, safety, welfare, and interests; and

WHEREAS, the Wilsonville Planning Commission adopted Resolution No. 02PC05 and recommended that the City Council adopt the Wastewater Facility Plan Update; and

WHEREAS, after providing due notice as required by City Code and State Law, a public hearing was held before the City Council on August 16, 2004 and, at which time the Council considered the recommendation of the Planning Commission and City staff, gathered additional evidence and afforded all interested parties an opportunity to present oral and written testimony concerning the Plan to the City Council; and

WHEREAS, the City Council adopted the Wastewater Facility plan on August 30, 2004 except for a table illustrating the phasing of project improvements; and

WHEREAS, the City Council asked the Planning Commission to consider a revised phasing plan; and

WHEREAS, the Planning Commission conducted a public hearing on July 13, 2005; and

WHEREAS, the Council has carefully considered the public record, including all recommendations, testimony and the approved Planning Commission Resolution No. LP 2005-05-00008 that recommends the revised phasing schedule to the Mayor and City Council.

NOW THEREFORE, THE CITY OF WILSONVILLE ORDAINS AS FOLLOWS:

1. Findings. The foregoing recitations, those findings and conclusions in the above named Planning Commission Resolution No. 02PC05, and the staff report in this matter dated July 7, 2005 filed in the record of this matter, are hereby adopted as findings of fact and conclusions of law.
2. Order. Based upon such findings, the City Council hereby adopts the revised phasing plan, marked 'Exhibit A' attached hereto and incorporated by reference as if fully set forth herein, to amend the 2004 Wastewater Facility Plan, hereby changing the phasing of capital improvements to the facility; and adopts the memorandum dated October 11, 2005 from Mike Greene, Veolia Water North America Project Manager to Jeff Bauman, Public Works Director, marked 'Exhibit B' attached hereto and incorporated by reference as if fully set forth herein; and adopts as 'Exhibit C' the revised memorandum prepared by Eldon Johansen, Interim Community Development Director, dated November 1, 2005, attached hereto and incorporated by reference as if fully set forth herein.

SUBMITTED to the Wilsonville City Council and read for the first time at a regular meeting thereof on September 19, 2005 and scheduled for a second reading at a regular meeting of the City Council on November 7th, 2005, commencing at the hour of 7 p.m. at the Wilsonville Community Center.

Sandra C. King

Sandra C. King, MMC, City Recorder

ENACTED by the City Council on the 7th day of November, 2005 by the following votes:

YES: -4- NO: -0-

Sandra C. King, MMC, City Recorder

DATED and signed by the Mayor this 10th day of November, 2005.

CHARLOTTE LEHAN, MAYOR

SUMMARY OF VOTES:

Mayor Charlotte Lehan	Yes
Council President Kirk	Yes
Councilor Holt	Yes
Councilor Knapp	Yes

Ordinance No. 591
Exhibit A

Wastewater Facility Plan Update
Capital Improvement Plan
November 7, 2005

Estimated present worth costs for plant expansions (Costs in $1,000's)

Project Element	Phase 1	Phase 2	Phase 3	Total
Headworks	$1,680	$0	$795	$2,475
Primary Treatment	$125	$3,275	$2,575	$5,975
Secondary Treatment	$425	$9,669	$20,757	$30,851
Filtration	$2,690	$0	$1,415	$4,105
Disinfection	$0	$1,431	$0	$1,431
Solids Stabilization*	$2,500	$2,312	$1,806	$6,618
Biosolids Dewatering	$3,840	$0	$1,099	$4,939
Liquid & Cake Storage	$150	$4,038	$2,878	$7,066
Sludge haul/Spread Equipment	$180	$0	$0	$180
Relocate Maintenance Shop	$0	$550	$0	$550
Site Management	$446	$1,189	$1,566	$3,201
Landscaping & Mitigation	$446	$1,189	$1,566	$3,201
Total	**$12,482**	**$23,653**	**$34,457**	**$70,592**
ENR-CCI Index 3581; markups of 30% for contingency, 8% for mobilization and bonds, 15% for construction contractor overhead and profit, 20% for site work, and 25% for engineering, legal and administrative were used. A 5% site management cost was applied to account for the difficulty in managing excavation, equipment storage, and general construction coordination on a small site				

Table 7-2 of the Wastewater Facility Plan Update is amended by accelerating a portion of Solids Stabilization project from Phase 2 to Phase 1.

Ordinance No. 591
Exhibit A

Wastewater Facility Plan Update
Capital Improvement Plan
November 7, 2005

Estimated present worth costs for plant expansions (Costs in $1,000's)

Project Element	Phase 1	Phase 2	Phase 3	Total
Headworks	$1,680	$0	$795	$2,475
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ENR-CCI Index 3581; markups of 30% for contingency, 8% for mobilization and bonds, 15% for construction contractor overhead and profit, 20% for site work, and 25% for engineering, legal and administrative were used. A 5% site management cost was applied to account for the difficulty in managing excavation, equipment storage, and general construction coordination on a small site				

Table 7-2 of the Wastewater Facility Plan Update is amended by accelerating a portion of Solids Stabilization project from Phase 2 to Phase 1.

Exhibit B
Ordinance No. 591

VEOLIA Water

VEOLIA WATER NORTH AMERICA
10350 SW Arrowhead Creek Lane
Wilsonville, OR 97070
michael.s.greene@veoliawaterna.com
www.veoliawaterna.com

Tel. : 503/582-9655
Fax : 503/582-9050

Memo

TO: Jeff Bauman, City of Wilsonville Public Works Director

FROM: Mike Greene, VWNA Project Manager

CC: Owen Boe, VWNA Area Manager

DATE: 10/11/05

SUBJECT: WASTEWATER FACILITY IMPROVEMENTS

Veolia Water North America is making the following comments and recommendations regarding facility planning and development at the City of Wilsonville's Wastewater Treatment Plant.

There is a concern that improvements to the wastewater system, specifically those at the wastewater treatment plant, are not keeping pace with the accelerated residential and commercial development in Wilsonville. The most urgent process deficiencies identified in the facilities plan included the headworks, sludge dewatering, effluent filtration and other areas. Those deficiencies were scheduled in Phase 1 of a facility plan implementation schedule that was to commence in 2004.

1. Veolia strongly recommends the City move forward with planned improvements identified in the Facility plan, including upgrades and changes to the biosolids management program. Biosolids processing and program changes as well as other facility improvements are necessary at this time.
   - There is increasing competition for biosolids application sites in the Portland metro area;
   - As application sites are used more and more for development and other non-agricultural uses, there is less land available within a reasonable distance of the wastewater plant that can be used as application sites;
   - Biosolids programs, such as Wilsonville's, that depend on applying Class B biosolids to land (as a soil amendment) are subject to increasing scrutiny and negative public perception that can impact the program with little or no notice;
   - Other areas at the wastewater plant included in the Phase I schedule (Facility Plan, Nov 2002), and considered to be problematic and capacity limiting factors, are the headworks and the effluent sand filters.
2. Veolia agrees with City staff and supports their decision in changing the biosolids program from producing a Class B material, used as a soil amendment on local agricultural fields, to a Class A product. The following are factors in supporting that program change:
   - Class A material receives a higher level of treatment resulting in greater reductions of organic matter and pathogenic organisms;

- If the Class A material is dewatered and dried to over 90% solids concentration it will require much less storage area than a thickened product (2.5 % solids) or a dewatered product;
- Production of the Class A material would result in fewer odor complaints at the WWTP and agricultural application sites;
- Class A would require less dependence on land availability than Class B.
- A Class A dried product is marketable and can be sold to nurseries and other operations that cannot accept Class B material;
- Discussions and visits to other facilities producing Class A dried product indicate very favorable results.

2. Facility plans typically describe needed improvements in general terms based on many factors, such as condition, capacity, and service levels of existing infrastructure and community growth dynamics. And although facility plans are not meant to provide completed design or finalized design concepts it is generally understood that recommended improvements and schedules for completion will be adjusted and refined depending on circumstances, such as accelerated growth and/or impending failures and inadequacies of existing facilities.

Exhibit C
Ordinance No. 591

Revised 11/1/05

Date: August 22, 2005

To: Mike Stone, City Engineer

From: Eldon Johansen, Special Projects Manager

Subject: Living Machine

You asked me to review the Wastewater Treatment Plant Facilities Plan to determine if the time is right to consider the living machine concept.

In looking at the living machine concept I have reviewed several documents that are listed on Google to get a better background on the overall concept. One description as included in the Buckminster Fuller Institute website on "Living Machine® Systems" is as follows:

"Living Machine® Systems are 'whole systems' approaches to treating wastewater. They are solar-powered, accelerated versions of the water treatment facilities found in mature natural systems. Incorporating helpful microbes, plants, snails and fish into diverse, self-organizing and responsive communities, Living Machine® Systems are site-specific, biological solutions that re-route waste streams into resources."

At the forefront of the living machine concept are John Todd and Nancy Jack Todd. A description of their organization and goal as included in an article by Mary Guterson in "Designing a Sustainable Future (IC#35), Spring 1993" as included in the context institute's Quarterly of Humane Sustainable Culture is as follows:

"Fortunately, several visionaries are setting their sights on answering that question. At the forefront are John Todd and Nancy Jack Todd, husband and wife, and founders in 1981 of the Center for the Restoration of Waters at Ocean Arks International (OAI), a not-for-profit global center for water awareness and action (see IC #25 p. 42).

***The Living Machine** – OAI's goal is to introduce sustainable alternatives to conventional waste disposal, fuel production, heating and cooling, air purification, and food production. The key to accomplishing these tasks is through ecological engineering. By combining living organisms – chosen specifically to perform certain functions – in contained environments, OAI has created what John calls Living Machines.*

A Living Machine's size, shape, and casing vary according to function. Typically, it involves a series of distinct ecologies each contained within a cylinder. The cylinders communicate through water flowing within connector tubes. Wastes generated by the inhabitants of one cylinder flow through the tubes and become food for the inhabitants of another. In this manner, using sunlight as the primary source of energy, compounds are broken down."

Dharma Living Systems, Incorporated works extensively on living systems. I have reviewed their project list to determine the present use of the Living Systems concept and they have listed approximately 30 different projects that treat from 2,500 gallons per day up to 220,000 gallons per day. Most of the processes are designed to reduce water consumption by reusing a substantial part of the water for irrigation and water to flush toilets. They also have some projects that treat the sludge onsite with reed ponds.

The improvements for Phase 1 at the plant includes modification of the head works, modifications of the piping at the primary clarifiers, modification of the secondary treatment system to include step feed, improvement of the filtration system prior to treatment with ozone and discharge into the river and modification of the bio-solids handling to dewater and possibly increase the sludge product from Class B to Class A. None of these projects other than continued operation of the bio-filters for odor control lend themselves to the current concepts as included in the living machine data.

Phase 2 and potentially Phase 3 involve substantial expansion of the primary clarifiers, the secondary treatment process and the solids handling process. There would, at least, theoretically be the possibility of using the living machines concept. My initial concerns are with the overall financial viability of using the living machines concept at the wastewater treatment plant and the lack of space to integrate Living Machines into the design.

My initial reaction is that if we are going to encourage the use of the Living Machine we should do it upstream in the wastewater collection system so that the treated water from the Living Machine® Systems can be used for irrigation and for the toilet flushing systems if somebody wants to go that far in reducing water consumption. This would require a change to our overall approach to wastewater treatment where we now treat it at the wastewater treatment plant. It would also require a close check of the state DEQ requirements for use of gray water to ensure that the Living Machine® Systems will meet the right standard. My primary concern with that is the required treatment to use treated water for irrigation on parks and other public areas. Earlier reviews had indicated that the water had to be treated almost at domestic water standards prior to use on the areas where there is public contact. Nevertheless, if we are interested in the Living Machine Concept this would be the place to do it particularly considering developments on the edge of the current city wastewater collection system.

Conclusion: The living machine concept is not a viable alternative to the planned improvements included in the Wastewater Treatment Plant Facilities Plan.

ERJ:bgs

cc: Subject File
IOC-CD File

Wilsonville Community Development

- interoffice memo -

Date: July 7, 2005

To: Debra Iguchi, Planning Commission Chair

From: Dave Waffle, Community Development Director

RE: Staff Report – Wastewater Treatment Plant Facility Plan

At last month's Planning Commission meeting the staff reviewed an item from the approved wastewater treatment plant facility plan related to a change in the timing of expenditures for the drying and dewatering of sludge. As a result of the work session the staff has prepared a resolution to approve a table that illustrates the recommendation to move more quickly on sludge dewatering and drying than was originally contemplated. The table is exhibit A to the resolution.

The net affect of the change on the total capital expenditures proposed for the wastewater treatment plant (WWTP) is nil. In summary form the spending by phase is as follows:

	Phase 1	Phase 2	Phase 3	Total
Current Facility Plan	$9,982,000	$26,153,000	$34,457,000	$70,592,000
Amended Phasing Plan	**$12,482,000**	**$23,653,000**	$34,457,000	$70,592,000

No further action on the facility plan will be necessary if this resolution is adopted by the Planning Commission. The next steps are for the staff to move into the design phase for projects in phase one and to implement an increase in the sewer service rates. At the same time the Community Development staff will prepare recommendations to increase the Sewer System Development Charges (SDC's) to fund a large portion of the capital improvements that are necessary for a growing community with larger wastewater demands.

Enc.

Cc: Mike Stone, City Engineer
Jeff Bauman, Public Works Director
Mike Greene, Environmental Services Mgr.

drw/wwtp 062705

Draft – for 7/13/05 Planning Comm. mtg.

PLANNING COMMISSION
RESOLUTION NO. LP-2005-05-00008

A WILSONVILLE PLANNING COMMISSION RESOLUTION RECOMMENDING THAT THE CITY COUNCIL ADOPT AMENDMENTS TO THE WASTEWATER FACILITY PLAN RELATED TO THE HANDLING OF BIO-SOLIDS AND PREFERRED ALTERNATIVES TO PRODUCING CLASS "B" SLUDGE.

WHEREAS; the City of Wilsonville operates a wastewater treatment facility under permits from the Oregon Department of Environmental Quality (DEQ); and

WHEREAS; the City is required to undergo a thorough analysis of current and projected operating conditions as part of a facilities plan; and

WHEREAS; the wastewater facility plan is an element of the Comprehensive Plan and is required to be in compliance with City Goal 3.1 and Statewide Planning Goal 11 Public Utilities and Services; and

WHEREAS; the Wilsonville Planning Commission initially held public hearings and considered the proposed wastewater facility plan in October and November 2003 before recommending the plan to the Mayor and City Council (Resolution No. 02PC05); and

WHEREAS; the Mayor and City Council held a public hearing on August 16, 2004 and approved the plan on August 30, 2004 (Ordinance No. 571); and

WHEREAS; the Mayor and City Council asked that the Planning Commission consider a change in the phasing of capital improvements at the wastewater treatment plant related to the dewatering and drying of sludge to produce a Class A sludge under the rules of the DEQ; and

WHEREAS; such a change has a minimal net increase in the overall capital investment requirements for the plant to serve a design population of 25,000 people with a 4 million gallons a day plant by 2020;

NOW THEREFORE BE IT RESOLVED that the City of Wilsonville Planning Commission does hereby concur in the Wastewater Facility Plan with the changes in phases one and two to allow immediate investment in the necessary equipment to create a Class A wastewater sludge; and

BE IT FURTHER RESOLVED that the table attached to this Resolution as Exhibit A is hereby approved as if enclosed herein.

BE IT RESOLVED that this Resolution shall be effective upon adoption.

ADOPTED by the Planning Commission of the City of Wilsonville at a regular meeting thereof this 13th day of July, 2005, and filed with the Planning Administrative Assistant on July 14, 2005.

____

Wilsonville Planning Commission

Draft – for 7/13/05 Planning Comm. mtg.

Attest:

____

Linda Straessle, Administrative Assistant I

SUMMARY of Votes:

Chair Iguchi: ______

Commissioner Goddard: ______

Commissioner Faiman: ______

Commissioner Guyton: ______

Commissioner Hinds ______

Commissioner Juza: ______

Commissioner Maybee: ______

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
(503) 682-1011
(503) 682-1015 Fax
(503) 682-0843 TDD

CITY OF WILSONVILLE
NOTICE OF CITY COUNCIL DECISION
WILSONVILLE WASTEWATER FACILITY PLAN

Ordinance No. 591
Planning File No. SP-2005-05-00008

After conducting a public hearing on November 7, 2005 the City Council adopted **Ordinance No. 591, An Ordinance Amending City of Wilsonville Wastewater Facility Plan.**

FILE NO: Ordinance No. 591, Planning File No. SP-2005-05-00008

APPLICANT: City of Wilsonville

REQUEST: Amend the Wilsonville Wastewater Facilities Plan.

CONTACT: Eldon Johansen, Interim Community Development Director
(503) 682-4960.

This decision has been finalized in written form as **Ordinance No. 591, An Ordinance Amending City of Wilsonville Wastewater Facility Plan** and placed on file in the city records at the Wilsonville City Hall this 9th day of November, 2005, and is available for public inspection. The date of filing is the date of decision. Any appeal(s) must be filed with the Land Use Board of Appeals (LUBA) in accordance with ORS Chapter 197, within twenty-one days from the date of decision. Copies of Ordinance No. 591 may be obtained from the City Recorder, 30000 SW Town Center Loop East, Wilsonville, OR 97070, (503) 570-1506.

For Further information, please contact the Wilsonville Community Development Department, Community Development Annex, 8445, SW Elligsen Road, or telephone (503) 682-4960.

LP-2005-05-00008
Wastewater Facility Plan Amendment
Planning Commission Record Index

Planning Commission Actions at their July 13, 2005 Public Hearing:

- Notice of Decision
- Resolution No. LP-2005-05-00008
- Motion
- Draft Minutes

Entered into the record at the July 13, 2005 Planning Commission Public Hearing:

Exhibit C: Page 7-14 of the October 2004 *Wilsonville Wastewater Facility Plan*, "Project Phasing."

Exhibit B: A memo dated June 2, 2005, from Dave Waffle, regarding Bio-Solids Element – Wastewater Treatment Plan Facility Plan with the following attachments:

- Attachment A: August 16, 2004 and August 30, 2004 City Council public hearing minutes.
- Attachment B: Ordinance No. 571 with Table 7-1 "Wilsonville WWTP Facilities Plan Implementation Phasing" table
- Attachment C: November 12, 2003 Planning Commission public hearing minutes.
- Attachment D: Email dated November 12, 2003 from Commissioner Mary Hinds, regarding the incineration option.
- Attachment E: Excerpts from the October 2004 *Wilsonville Wastewater Facility Plan.*
- Attachment F: DEQ Incinerator Rule Summary
- Attachment G: Andritiz Proposal – Belt Drying system for Sludge.

Staff Report dated July 7, 2005 from Dave Waffle for the July 13, 2005 Planning Commission Meeting including:

Draft Resolution No. LP-2005-05-00008 with attached:

Exhibit A: Wastewater Facility Plan Update Capital Improvement Plan table dated August 9, 2004.

Located in Project File:

DLCD Notice of Proposed Amendment with attached:

- Executive Summary of October 2004 *Wilsonville Wastewater Facility Plan*
- Pages 5-51 through 5-90 of Chapter 5 Alternative Analysis of the October 2004 *Wilsonville Wastewater Facility Plan.*
- Ordinance No. 571
- Affected State or Federal Agencies, Local Governments or Special Districts List.

LP-2005-05-00008
Wastewater Facility Plan Amendment
Planning Commission Record Index

Planning Commission Actions at their July 13, 2005 Public Hearing:

- Notice of Decision
- Resolution No. LP-2005-05-00008
- Motion
- Draft Minutes

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
(503) 682-1011
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(503) 682-0843 TDD

NOTICE OF DECISION

PLANNING COMMISSION

RECOMMENDATION TO CITY COUNCIL

FILE NO.: **LP-2005-05-00008**

APPLICANT: **City of Wilsonville**

REQUEST: **Adoption of amendments to the Wastewater Facility Plan related to the handling of bio-solids and preferred alternatives to producing Class "B" Sludge**

After conducting a public hearing on August 15, 2005, the Planning Commission voted to recommend this action to the City Council by passing Resolution No. LP-2005-05-00008.

The City Council is scheduled to conduct a Public Hearing on this matter on August 15, 2005, at 7:00 p.m., at the Wilsonville Community Center, 7965 SW Wilsonville Road.

For further information, please contact the Wilsonville Planning Division, Community Development Annex, 8445 S.W. Elligsen Road, or telephone (503) 682-4960.

PLANNING COMMISSION
JULY 13, 2005
MOTIONS

APPLICATION NO. LP-2005-05-00008

Applicant: City of Wilsonville

Request: Wastewater Facility Plan Amendment related to the handling of bio-solids and preferred alternatives to producing Class "B" sludge. (Remand from City Council)

Commissioner Faiman moved to adopt Resolution No. LP-2005-05-00008 recommending that the City Council adopt amendments to the Wastewater Facility Plan related to the handling of bio-solids and preferred alternatives to producing Class "B" Sludge, as presented to the Planning Commission and including the June 8, 2005 Planning Commission Work Session record. Commissioner Maybee seconded the motion, which carried 3 to 2 with Chair Iguchi and Commissioner Hinds opposing.

PLANNING COMMISSION
RESOLUTION NO. LP-2005-05-00008

A WILSONVILLE PLANNING COMMISSION RESOLUTION RECOMMENDING THAT THE CITY COUNCIL ADOPT AMENDMENTS TO THE WASTEWATER FACILITY PLAN RELATED TO THE HANDLING OF BIO-SOLIDS AND PREFERRED ALTERNATIVES TO PRODUCING CLASS "B" SLUDGE.

WHEREAS; the City of Wilsonville operates a wastewater treatment facility under permits from the Oregon Department of Environmental Quality (DEQ); and

WHEREAS; the City is required to undergo a thorough analysis of current and projected operating conditions as part of a facilities plan; and

WHEREAS; the wastewater facility plan is an element of the Comprehensive Plan and is required to be in compliance with City Goal 3.1 and Statewide Planning Goal 11 Public Utilities and Services; and

WHEREAS; the Wilsonville Planning Commission initially held public hearings and considered the proposed wastewater facility plan in October and November 2003 before recommending the plan to the Mayor and City Council (Resolution No. 02PC05); and

WHEREAS; the Mayor and City Council held a public hearing on August 16, 2004 and approved the plan on August 30, 2004 (Ordinance No. 571); and

WHEREAS; the Mayor and City Council asked that the Planning Commission consider a change in the phasing of capital improvements at the wastewater treatment plant related to the dewatering and drying of sludge to produce a Class A sludge under the rules of the DEQ; and

WHEREAS; such a change has a minimal net increase in the overall capital investment requirements for the plant to serve a design population of 25,000 people with a 4 million gallons a day plant by 2020;

NOW THEREFORE BE IT RESOLVED that the City of Wilsonville Planning Commission does hereby concur in the Wastewater Facility Plan with the changes in phases one and two to allow immediate investment in the necessary equipment to create a Class A wastewater sludge; and

BE IT FURTHER RESOLVED that the table attached to this Resolution as Exhibit A is hereby approved as if enclosed herein.

BE IT RESOLVED that this Resolution shall be effective upon adoption.

ADOPTED by the Planning Commission of the City of Wilsonville at a regular meeting thereof this 13th day of July, 2005, and filed with the Planning Administrative Assistant on July 14, 2005.

Wilsonville Planning Commission

Attest:

Linda Straessle, Administrative Assistant I

SUMMARY of Votes:

Chair Iguchi:	Nay
Commissioner Goddard:	Absent
Commissioner Faiman:	Aye
Commissioner Guyton:	Absent
Commissioner Hinds	Nay
Commissioner Juza:	Aye
Commissioner Maybee:	Aye

PLANNING COMMISSION
WEDNESDAY, JULY 13, 2005
6:30 P.M.

Wilsonville Community Development Annex
8445 SW Elligsen Road
Wilsonville, Oregon

Meeting Minutes

I. CALL TO ORDER - ROLL CALL

Chair Iguchi called the meeting to order at 6:35 p.m. Those present:

Planning Commission: Debra Iguchi, Mary Hinds, Craig Faiman, Richard Goddard, Heidi Juza and Joe Maybee. Sue Guyton and City Council Liaison Sandra Scott-Tabb were absent.

City Staff: Chris Neamtzu, Sandi Young, Paul Lee, Mike Stone and Linda Straessle.

IV. CONTINUED PUBLIC HEARINGS

C. APPLICATION NO. LP-2005-05-00008

APPLICANT: City of Wilsonville
REQUEST: Wastewater Facility Plan Amendment related to the handling of bio-solids and preferred alternatives to producing Class "B" sludge. (Remand from City Council)

Chair Iguchi read Legislative Hearing Procedures for the record and opened the public hearing for LP-2005-05-00008 at 10:17 p.m.

Staff Report:

Sandi Young, Planning Director presented the Staff Report on behalf of Dave Waffle who was out of town.

- Mr. Waffle had included a one-page summary in the packet of the change that had been made in the phasing of the improvements and the reflected budget.
- City Council referred this item to the Commission for a recommendation.
- Jeff Bauman, Public Works Director, Mike Greene, Manager of the Wastewater Treatment Plant, and others were available for questions.

Jeff Bauman, Public Works Director commented that the issue was a requested change in the sequencing or phasing of projects that had already been approved by the Planning Commission and the City Council.

- Incineration was a topic of discussion at the Planning Commission work session for this matter last month.

- He offered to review the reasons why incineration was not an issue under consideration, if so desired.
  - Chair Iguchi and Commissioner Hinds believed these issues were adequately addressed at the work session.

Chair Iguchi:
- At the June 8, 2005 work session, she had inquired about how close the actual numbers compared to the projections. Numbers were projected to 2005 in the original Wastewater Facility Plan and now it was 2005. Had City staff researched those actual numbers and compared them to those projected?
  - Mike Stone, City Engineer responded that HDR had been retained to review the original projections prepared by CH2M with the new projections. He expected the answer in a couple weeks and he offered to provide the data to the Planning Commission as an informational item prior to City Council.
  - City Council would see those numbers as part of the City staff recommendations because the entire rate structure in the SDC analysis depended upon them.
- City Staff was attempting to obtain the engineers' numbers to show how they determined where the plant was in its ability to treat wastewater. She asked if the differences between the two engineering firms had been resolved yet.
  - Mr. Stone replied that the information was a part of the analysis.

Ms. Young suggested that the Commission enter the work session record into record of the public hearing since it had been referred to several times during this Public Hearing.

Commissioner Faiman moved to adopt Resolution No. LP-2005-05-00008 recommending that the City Council adopt amendments to the Wastewater Facility Plan related to the handling of bio-solids and preferred alternatives to producing Class "B" Sludge, as presented to the Planning Commission and including the June 8, 2005 Planning Commission Work Session record. Commissioner Maybee seconded the motion.

Commissioner Hinds:
- Objected to the adoption of the Resolution not necessarily because of the incineration, but because its an extremely expensive plan of $70 million for the City.
  - Once approved, there would be no turning back. For that kind of money, she believed that more research could have been done.
- She did not like voting for things that needed to be penciled out later by City staff.
- The belt dryer centrifuge was never resolved and phases were being planned for items that were uncertain.

Motion carried 3 to 2 with Chair Iguchi and Commissioner Hinds opposing.

Chair Iguchi closed the public hearing for LP-2005-05-00008 at 10:26 p.m.

LP-2005-05-00008
Wastewater Facility Plan Amendment
Planning Commission Record Index

Entered into the record at the July 13, 2005 Planning Commission Public Hearing:

Exhibit C: Page 7-14 of the October 2004 *Wilsonville Wastewater Facility Plan*, "Project Phasing."

Exhibit B: A memo dated June 2, 2005, from Dave Waffle, regarding Bio-Solids Element – Wastewater Treatment Plan Facility Plan with the following attachments:

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- Attachment E: Excerpts from the October 2004 *Wilsonville Wastewater Facility Plan.*
- Attachment F: DEQ Incinerator Rule Summary
- Attachment G: Andritiz Proposal – Belt Drying system for Sludge.

Exhibit C

Project Phasing

Several options for construction phasing were considered. The ultimate goal in project phasing was to address critical needs at the plant while minimizing the initial capital expenditure. Based on this approach, the following phases were identified. Influent flow, BOD, and TSS loadings will trigger actual implementation of the Phase 2 and Phase 3 expansions. However, for purposes of project planning, the first two phases assume flow and loadings will develop according to the low flow projection. The timing of the third expansion will depend on how flows and loads actually increase, but is likely to be 20-30 years in the future.

- **Phase 1 – Immediate Needs.** These improvements address the most urgent process deficiencies and should be operational by Winter 2004 in order to address process deficiencies at the plant. These critical needs include:

  - Increasing the headworks capacity and enclosing the headworks
  - Modifying primary sludge piping
  - Adding a lime silo and step feed enhancements for secondary treatment
  - Adding dewatering, and providing improved effluent filtration to ensure adequate solids removal in the dewatering centrate

  The primary clarifier, digester, and sludge storage improvements were initially identified as immediate needs, however due to the substantial capital investment required for these expansions, the City chose to delay these expansions. The digester expansion is driven by the need to rebuild the existing primary clarifiers. This will require operating the clarifiers at overflow rates slightly higher than design values; based on current experience, this will not significantly decrease their performance. Modifying primary sludge piping to allow use of both clarifiers and delaying the clarifier expansion until 2010 will result in a peak overflow rate of 3,000 gpd/sf.

  A small dewatered sludge storage area will be added in the sludge drying beds. However, provisions must be made for offsite disposal of dewatered biosolids until a larger storage facility can be constructed or biosolids drying is implemented.

- **Phase 2 – Near-Term Needs.** Near-term needs include improvements that address additional process deficiencies to reach an average dry weather capacity of 4 mgd influent flow, 8,700 lb/day influent BOD, and 8,600 lb/day influent TSS. These improvements are needed by 2010, and include improvements to all plant processes that were not addressed in Phase 1.

- **Phase 2 – Long-term Needs.** Long-term needs are improvements required to meet an average dry weather capacity of 7 mgd influent flow and 14,900 lb/day influent BOD and TSS. Depending on whether ultimate flow and loading is closer to the high or low projection, this phase of expansion should be operational by 2020 – 2030.

The recommended schedule for the first two phases of improvements is shown in Figure 7-10. The implementation schedule in the Draft Facility Plan was originally produced based on approval of the Facility Plan in late 2002. Activities shown in purple illustrate the revised schedule for initial activities based on actual Facility Plan approval in 2004. The following lists the specific elements included in each of the three construction phases.

Wilsonville Community Development

- interoffice memo -

Date: **June 2, 2005**

To: **Debra Iguchi, Planning Commission Chair**

From: **Dave Waffle, Community Development Director**

RE: **Bio-Solids Element – Wastewater Treatment Plant Facility Plan**

The Mayor and City Council are requesting that the Planning Commission review a limited element of the Wastewater Treatment Plant Facility Plan. The Commission last saw this item in November 2003 and it finally was approved by the City Council in August 2004. At that time the city staff requested a change in the phases of the project regarding the implementation of recommendations for the dewatering and drying of bio-solids a.k.a. sewage sludge.

The specific change requested by the staff is to move up the installation of a drying system for sludge from phase three to phase one. In this fashion the dewatering project in phase one would be combined with a belt drying system to produce a Class A sludge. As the Planning Commission had previously asked to be consulted about the direction of the facility plan before implementation of subsequent phases, the city council deemed it important to now seek their review.

The Planning Commission meeting on June 8th is scheduled as a work session only. A public hearing on the bio-solids element of the facility plan is advertised for July 13th. We wish to reacquaint Planning Commission members with the facility plan, discuss the very narrow matter that has been remanded to the Planning Commission and see how the commission would like to proceed. We intend to only have staff available at the work session. If desired, we can bring in our consultants or perhaps DEQ representatives at the hearing.

Among the staff members present at the work session will be Public Works Director Jeff Bauman, City Engineer Mike Stone and Environmental Services Manager Mike Greene. Greene is contract employee working for Veolia Water Services who manages the Wilsonville water treatment plant and the wastewater plant also. Veolia is the firm managing the Vancouver Washington wastewater plant where an incinerator is used to dispose of dewatered sludge. Greene will speak to the issues of operating such a facility in Wilsonville.

The change in the facility plan can be clearly seen in Exhibit ES-8. The cells circled in the exhibit would be moved to phase three from phase one. If approved by the City Council this would allow the staff to move ahead with the creation of Class A bio-solids. In doing so the staff believes that it will much easier to recycle this product back into the area's soils adding nutrients to fields, grasslands and gardens. As part of phase one, the cost of this equipment will also be included in the next revision to the Sewer System Development Charges and operating rate increase. These increases should have occurred in 2004 but were delayed due to the press of other business.

The city council minutes refer to a $2.5 million dollar option. That figure does not appear in any of the tables used for exhibit, but is the estimated cost of the sludge belt drying system.

The preferred method of dewatering sludge is described on page 5-69 of the facility plan entitled Alternative A-2 Centrifuge Dewatering. The preferred method of sludge drying is enclosed as a proposal from Andritz-Ruthner Inc. The combination of dewatering sludge and then drying it prior to land-spreading it is the subject of the alternative recommended by Planning Commissioner Mary Hinds for incineration. The technical memorandum on incineration discusses the feasibility of that technology but is not a complete study.

To help the Planning Commission understand the background on these issues a number of documents are enclosed:

a. Minutes of the City Council from 8/16 and 8/30/2004 – public hearing and discussion of the facility plan, including the remand back to the Planning Commission
b. Ordinance No. 571 approving the facility plan except for the table called Exhibit ES-8 that describes the estimated present worth of the various recommended plant improvements
c. Minutes of the Planning Commission from 11/12/2003 which is the public hearing on the facility plan
d. Email from Comm. Mary Hinds about her concerns regarding the incineration option – 11/12/2003
e. Excerpts from the wastewater facility plan including the executive summary, bio-solids regulations and requirements (p. 4-13 to 4-19), solids stabilization alternatives (p. 5-52 to 5-64), dewatering and dewatered bio-solids storage alternatives (p. 5-65 to 5-78) and technical memorandum – incineration.
f. DEQ Incinerator Rule summary
g. Andritz proposal – Belt Drying System for Sludge

Enc.
Cc: Mike Stone, Jeff Bauman, Mike Greene

drw/wwtp 0601005

Project Costs

The projected project costs for the Phase 1, 2, and 3 expansions are presented in Table ES-8. Biosolids dewatering costs are based on installation of belt filter presses; actual costs will depend on the type of technology selected. The costs include contingency for miscellaneous costs not itemized, mobilization and bonds, contractor overhead and profit, and engineering, legal, and administrative costs. Costs are presented in 2002 dollars and reflect costs as if all facilities were built today. Actual bonding needs will require consideration of inflation impacts and financing costs.

Table ES-8. Estimated present worth costs for plant expansions (Costs in $1,000s).

Project Element	Phase 1	Phase 2	Phase 3
Headworks	$1,680	$0	$795
Primary Treatment	$125	$3,275	$2,575
Secondary Treatment	$425	$9,669	$20,757
Filtration	$2,690	$0	$1,415
Disinfection	$0	$1,431	$0
Solids Stabilization	$0	$4,812	$1,806
Biosolids Dewatering	$3,840		$1,099
Liquid and Cake Storage	$150	$4,038	$2,878
Sludge Haul/Spread Equip.	$180		
Relocate Maintenance Shop	$0	$550	$0
Site Management	$446	$1,189	$1,566
Landscaping and Mitigation	$446	$1,189	$1,566
Total	**$9,981**	**$26,153**	**$34,458**

ENR-CCI index 3581; markups of 30% for contingency, 8% for mobilization and bonds, 15% for construction contractor overhead and profit, 20% for sitework, and 25% for engineering, legal, and administrative were used. A 5% site management cost was applied to account for the difficulty in managing excavation, equipment storage, and general construction coordination on a small site.

Subject of remand

Sludge drying equipment

The total capital cost of the BDS and associated facilities evaluated after completion of the Draft Facility Plan is approximately $10.1 million. However, construction of these facilities eliminates the need for the dewatered cake storage recommended in Table ES-8 (approximately $7.1 million). Therefore, the incremental cost of the BDS is $3.1 million. This investment provides the following benefits to the City:

- Reduced footprint (5,000 sf total for new building and storage, compared with 10,000 sf for dewatered cake storage)
- Class A biosolids product, which reduces the risk associated with the biosolids management program.

The development agreements with Costa Pacific and Matrix also include master planning fees. These fees are to be collected for each single and multi family unit at the time of application for a building permit. The fees for the former Dammasch State Hospital properties only included that part of the total fee, which would be paid to the City for the City expenses in preparing, reviewing or approving the changes to the Comp Plan, the Comp Plan map, the City Code and the zoning map. The fees for Matrix also include collection of the fees for the planning work that was accomplished by Costa Pacific in accomplishing the master planning for the Urban Village. Also included are increased fees for property that is outside the Dammasch Hospital area and the property that had been acquired by Matrix but still in the Urban Village. This property did not have any cost participation in the master planning and will have increased master planning fees above the fee for Costa Pacific or for Matrix.

Costa Pacific has requested the option of paying any additional costs to expedite plans review and engineering plan checks and approval. This option has been included in the fees.

In addition no fees are changed for repeated Engineering Department plan review. Significant plan changes result in much more staff time to review the changes. Generally, the Engineering Department makes a thorough initial review of the plans and the designer incorporates the revisions. The plans are reviewed a second time to ensure that corrections have been completed. At that time the plans are either approved or returned to the developer for minor corrections; the corrections are then approved. If the project is changed or if corrections are not completed by the second review, the Engineering Department will not have received enough funds to cover its costs. Charging additional fees for every other review will recoup these costs and provide an incentive to the developer to provide current and updated plans for review.

The Mayor opened the public hearing at 8:22 p.m., hearing nothing she closed the public hearing at 8:22 p.m.

Motion: Councilor Holt moved to approve Resolution No. 1896. Councilor Kirk seconded the motion.

Vote: Motion carried 5-0.

***B. **Ordinance No. 571 – First reading**
An Ordinance Adopting An Updated And Amended City Of Wilsonville Wastewater Facility Plan And Repealing Ordinance 447.

Mr. Kohlhoff read Ordinance No. 571 by title only on first reading. He indicated Ordinance No. 571 adopted the updated Wastewater Plan. Staff is recommending the solids stabilization project be implemented in phase one rather than phase two. This moves $2.5 million into phase one, but does not change the overall cost. The city's engineer believes this will meet the anticipated new limits on sludge disposal (Class A treatment) and reduce over time the difficulty and cost in finding and using land for Class B treatment.

Laurel Byer, **Assistant City Engineer,** provided the following staff report for the City Council packet.

The City of Wilsonville Planning Commission held a duly advertised public hearing on November 12, 2003 and adopted Resolution No. 02PC05 which recommends that the City Council adopt the Wastewater Facility Plan Update. At the public hearing, the Planning Commission moved to "Include in the Wastewater Facility Plan Update a trigger for review of the Plan prior to Phase 2 of development and to look at alternatives at appropriate times in the development." This motion stemmed from the Planning Commission's desire to have staff investigate other modes of biosolids handling, including incineration, as well as other less traditional treatment processes. Additional analysis information was included in the staff reports for the Planning Commission public hearing. The original staff report dated October 8, 2003 and addendum, dated November 5, 2003 are attached to this staff report and are contained in the Wastewater Facilities Plan Planning Commission Record for case file 02PC05. The minutes from the November 12, 2003 Planning Commission Public Hearing are included in that record.

Attached to Ordinance No. 571 is a Capital Improvements Projects List that spans three phases. The third phase was included to account for the long-term needs of the facility and determine if the existing site would be able to accommodate the City's needs past 2020. Since these costs are beyond our immediate and short-term needs, they will not be included in the Sanitary Sewer System Development Charge calculations.

The first priority project that staff is currently working on is improving biosolids handling at the plant. The existing sludge storage tanks have a limited capacity, so in order to allow for more storage, the digested biosolids must be dewatered. To date, Staff has pilot tested two options for dewatering, including a belt filter press and a centrifuge. While one of these products may allow for more on-site storage, it will not address the issue of dwindling land application sites for our current Class 'B' program. Therefore, staff is very interested in pursuing the option of treating and dewatering the sludge to the point that produces a Class 'A' biosolid. As stated in the Wastewater Facility Plan Update, Class 'A' biosolids do not have the same strict regulations that a Class 'B' product does and can be applied in more locations. It was also indicated in the report, that more than likely, the City may be required to produce Class 'A' biosolids on a regular basis in the near future. Staff believes that it would be most economical to address the Class 'B' restrictions at this time, since we are currently planning a dewatering facility for the site. Approaching the project in this manner will require that the Capital Improvement Plan, as outlined in the Wastewater Facility Plan Update, be modified slightly. An updated Table 7-2, which shows the acceleration of a portion of the Solids Stabilization projects from Phase 2 to Phase 1, is included as Exhibit "B" to the Ordinance.

Based on the Findings of Fact and information included in the Staff Report dated August 9, 2004; and based on information received from a duly advertised public hearing, Staff recommends the City Council approve the first reading of Ordinance No. 571 which adopts the Wastewater Facility Plan Update and set the date for the second reading of Ordinance No. 571 for August 30, 2004.

Mike Stone, City Engineer, introduced Heather Stevens, of HDR, the project manager. The Wastewater Facility Plan was last approved by the City Council in 1995. The proposed plan would develop, implement and finance the next series of upgrades at the Wastewater Facility. The process actually began in May of 2001; however because of urgent city work the plan was put on hold. The Planning Commission conducted their hearing in November 2003 and forwarded their recommendation to Council for approval.

Heather Stevens, HDR Project Manager, used a power point presentation for her report to show the highlights of the Wastewater Facilities Plan.

The last improvements made to the Wastewater Facility were done in the late 1990 and included an upgraded headworks, new aeration basin and clarifier, new ultraviolet disinfection system and new operations building. No improvements were made to the handling of biosolids with the acknowledgement that solids handling improvements would be required in the future. The objective of the current facility plan was to update the flow and loading projections from the 1995 plan to address current and future regulations and to evaluate all of the treatment processes, but specifically biosolids treatment and management. Long-term site planning was done to confirm the long-term suitability of the wastewater treatment plant site to hold all of the processes and equipment required and to evaluate effluent reuse. And to conduct additional biosolids evaluation based on changes in landowners accepting biosolids from the City of Wilsonville's program.

Ms. Stevens discussed the background information developed to support the plan and the recommendations. Flow and loading projections serve two purposes, one to define the needs of the facility and the other to allow scheduling of near-term improvements. Low flow projections were based on current water consumption and current wastewater generation; and High flow projections represent ultimate build out site planning if the level of growth and development continued in the City; would there be enough room at the current WWTP site to build everything required.

The existing capacity of all of the treatment processes were evaluated and show the most significant deficiency was in biosolids storage. There were some near-term limitations in liquid treatment. Reviews of the regulatory requirements show the City's NPDES permit currently has mass limits for discharge of CBOD and total suspended solids (TSS). These limits would remain in place in the future.

In biosolids management there are limits on land application of the Class B biosolids produced at the WWTP, particularly in the winter. The DEQ will require six months of on-site storage of biosolids generated at the WWTP due to the impacts of winter application of the Class B biosolids, and the lack of sites available for land application. HDR also looked at the temperature impacts on the Willamette River as required by the City's permit. The study showed the discharge had no temperature impact on the Willamette River under the regulations in place at the time.

Alternatives analysis focused on providing for ultimate build out at the current site; minimizing impacts to the community; providing flexibility for meeting future permit requirements and doing this at the most reasonable cost.

Ms. Stevens spoke about the current treatment process used at the WWTP, from the time the wastewater reaches the plant to the time it is applied to local farmland. The consultant discussed the recommended plan and components of each phase, which has three phases of improvements, those that are immediate needs, near term needs (required in 2010-2015), and long-term expansion required for ultimate build out. Ms. Stevens described the type of modifications for each of the three phases.

Ms. Stevens indicated the costs for the improvements are $10 million for the immediate needs; $26 million for the near-term needs; and the potential for an additional $35 million (depending on the whether the low flow projections or high flow projections come to reality over time).

In response to a decrease in the availability of properties for winter application of the biosolids four alternatives were reviewed, including third party hauling and land application; having the city acquire property that could be farmed and used for biosolids reuse and storage; providing onsite biosolids drying and storage, which significantly reduces the volume of biosolids that has to be stored onsite; and finally, obtaining emergency assistance from other utilities.

The recommendation from this analysis is for the city to move forward with a Class A treatment that included a belt drying system, resulting in a significant reduction of volume. Class A biosolids can be used without restriction and applied to public property and sold as a consumer product. The Class A biosolids also eliminates the need for locating agricultural land application sites. If this plan were adopted, the temporary and permanent cake storage would be replaced with a building housing the belt dryer and dried biosolids storage. Should the City go forward with the drying system, pilot testing of the proposed technology was recommended. The City has already completed pilot testing on the dewatering equipment. The next step would be pre-design of Phase 1 and construction of the improvements.

Councilor Kirk asked for how the Class A biosolids were used by the public. Ms. Stephens explained the Class A biosolids can be used as a soil amendment for gardens, and has an unrestricted use.

The Councilor wanted the combustion process explained and whether the belt dryer was being used in other communities. Ms. Stevens stated it was similar to an incineration process, which produces ash; the entire biological product is removed in this process. The process created an exhaust stream regulated through an air quality permit issued by DEQ. The belt dryer was not initially investigated because they are just now becoming available in a size that is affordable by communities the size of Wilsonville; a similar technology was being used outside of Seattle.

Mr. Stone added countries in Europe used the belt drying technology and nurseries there used the by product as a soil amendment. Mr. Stone saw first hand this technology being used in a plant in Switzerland where the belt dryer was completely enclosed and produced no odor; however, for added insurance Wilsonville will be installing an air scrubber to remove any odors.

Councilor Scott-Tabb asked what the difference was between the incinerator process and the belt dryer.

Mr. Stone explained the belt dryer was an oven with a conveyor belt that produced Class A biosolids. The biosolids travel through the oven on the conveyor belt and are heated driving off the moisture and killing any pathogens leaving an inert material. An incinerator takes the materials after they have been through the centrifuge and would burn the material leaving ash. Staff was proposing using a centrifuge, not a belt dryer.

Councilor Knapp stated there was no discussion about the use of a centrifuge in the materials given to Council and it sounded like staff was proposing something different than what was in the report.

Mr. Stone said during the 3-4 years it took to complete the analysis, technology improved and equipment sized appropriately for the City became available; the dollars in the program are for a specific treatment process. If a new technology becomes available Staff would like to be able to use that new technology subject to budget limitations. The centrifuge pilot test results show the process will produce Class A biosolids.

Councilor Knapp asked how the phasing of the new technology would occur and whether any of the phasing steps had been completed.

Mr. Stone said the city has pilot tested the centrifuge and the belt dryer. He referred to page ES-20; Table ES-8 showing the project divided into three phases. Phase 1 would be the first part of the work completed. In addition, $2.5 million would be added to Solids Stabilization for the belt dryer, making the total for Phase 1 $12.482 million. The addition of the belt dryer would take care of the biosolids disposal and eliminate the need to find locations to apply the Class B sludge materials.

Councilor Knapp recalled the Planning Commission asked Staff to return to them before they got into Phase 2 improvements, and review whether the fast changing technologies had developed to the point where other alternatives were better, and more cost effective. The Councilor was concerned that moving the solid stabilization piece from Phase 2 to Phase 1 would be circumventing the Planning Commission's review.

Mr. Stone intended to go to the Planning Commission and outline staff's change to the Phasing Plan.

Mayor Lehan opened the public hearing on Ordinance No. 571 at 9 p.m.

Mary Hinds, 11299 SW Chantilly, Wilsonville, a member of the Planning Commission, confirmed the Planning Commission amended the Master Plan to say, "include in the Waste Water Facility Plan update a trigger for review of the Plan prior to Phase 2 of development, and look for alternatives at appropriate times in the development."

Based on personal research, Ms. Hinds believed the Technical Memorandum the Commission used to base their decision upon contained misleading information. The Commission did not recommend incineration because of the costs to operate and maintain the plant, the permitting of the plant, and negative public perception. Ms. Hinds was also concerned about the expense of permitting and testing either Class A or Class B sludge.

Ms. Hinds disputes the labor, fuel and water costs provided by HDR for comparisons between the alternatives, and feels that the costs for incineration would be lower. She wanted to understand why the consultant recommended using treated water when free untreated water can be used directly from the river. Ms. Hinds discussed the benefits of the incineration plant located in Vancouver, WA and her findings there. The Commissioner spoke about the "Living Machines" that can become viable tourist attractions and offset the expense of construction.

Councilor Knapp asked what Ms. Hinds would like the Council to do with the proposal. Ms. Hinds felt not enough research was done on alternative plans, and the Planning Commission did not have enough information to make a decision; the accounting for the incineration alternative should be more closely looked at; and new technology reviewed. She thought the Planning Commission was voting on a belt dryer for sludge, which was not mentioned during the staff report.

Mr. Stone indicated he had spoken with the operators of the Vancouver plant. He learned the incinerator was constructed with the original plant, so Vancouver has not had to address the impacts of a new incinerator on the air shed. The existing WWTP is at a very low elevation and Mr. Stone was concerned an incinerator at that location could be a problem.

He noted the Oregon Department of Environmental Quality issued the permits for incinerators and staff of the Oregon DEQ has been reserved about the possibility of the City securing such a permit. Currently there are no incinerators processing wastewater in the State of Oregon at this time, which alerts Mr. Stone to the fact that other jurisdictions do not want to fight that battle.

Ms. Stevens added the analysis for the operation and maintenance schedule assumed the plant would be operated with current staffing schedules, which may not be the most cost effective manner to operate an incinerator process. A change in staffing would impact all of the processes at the wastewater treatment plant.

Mr. Johansen, Community Development Director, addressed the cost issue comments made that an incinerator would save building of Phase 3. The Phase 3 costs will be because the City grew from producing 4 mgd today to 7 mgd.

Mr. Johansen thought it was legitimate to ask Staff to compare the belt dryer with the incinerator and he did not have any problem going back to the Planning Commission. He pointed out incinerators were too large for the City to use resulting in paying a lot of capital costs for something used only 12-14 hours per week. He was concerned with making the adjustments to the Sewer System Development Charges and for new development to ferry their fair share of the costs.

Mr. Johansen asked for a chance to bring the figures back to Council on the second reading of the Ordinance to allow HDR time to put the figures together as well as to respond to the questions Council had.

Mayor Lehan understood it was important to move forward to have a base line to use to establish SDCs.

Mayor Lehan closed the public hearing at 9:30 p.m.

Motion: Council President Kirk moved, based upon the Planning Commission's recommendation and the commitment, to approve Ordinance No. 571 to implement Phase 1 as listed on page ES-20 and to go back to the Planning Commission with additional information and recommendations and requests from them to forward the City Council. Councilor Knapp seconded the motion.

Mr. Kohlhoff noted the Ordinance contained an Exhibit B, which actually amends this table by bringing in the $2.5 million. He understood the motion to be that Council would be adopting Exhibit A, but not Exhibit B.

Council President Kirk said that was correct, they would be replacing it with the table on page ES-20.

Mr. Kohlhoff clarified that before moving the $2.5 million into Phase 1, which would be taken back to the Planning Commission for review.

Council President Kirk also wanted to know what other cities were using this new belt dryer technology, the new size and the efficiencies, as well as the pros and cons of the belt dryer.

Councilor Knapp asked for clarification whether the proposed belt dryer was sized adequately as discussed on pages 10-11 on the October 1, 2003 HDR memo. Was the recommendation from HDR to purchase of one unit, or two?

Vote: Motion carried 5-0.

Ordinance No. 571 will be read a second time at the special August 30, 2004 Council meeting.

CITY MANAGER'S BUSINESS

Each year the City's Urban Renewal Agency is required to publish an annual statement about the uses and the effects of tax increment financing in the City's urban renewal area. In addition to basic financial data published in the newspaper as required by statute, the City prepares a separate report to supply the user with additional

Randy Sebastian, Renaissance Homes, 1672 Willamette Falls Drive, West Linn. Mr. Sebastian the developer for the project stated there was enough room for a tot lot play structure in the area of the pool house.

Councilor Holt rejoined the Council at 8:45 p.m.

Mayor Lehan invited the public to speak. The property owners (listed below) all spoke in favor of the project and of the positive experiences they had working with Mr. Sebastian.

- Marie McNeany, 28595 SW Canyon Creek Road
- Jerry and Joann Downs, 28205 SW Canyon Creek Road
- Merrill and Heidi Swickard, 28705 SW Canyon Creek Road
- Larry D. and Delanie Huckley, 28375 SW Canyon Creek Road
- Dorothy Bernard, 28475 SW Canyon Creek Road
- Charles and Pat Knorr, 28275 SW Canyon Creek Road
- James Boster, 28175 SW Canyon Creek Road

Mr. Kohlhoff suggested, if the applicant had no objection, under 4a to Ordinance No. 570 adding the following, "The applicant shall provide documentation of providing an access to Tax Lot 2500 across Tract D." The applicant indicated they had no difficulty with the additional language.

Mayor Lehan closed the public hearing at 9 p.m.

Motion: Councilor Knapp moved to adopt Ordinance No. 570 on first reading with the modification read by Mr. Kohlhoff regarding access to the lot as specified. Councilor Scott-Tabb seconded the motion.

Councilor Holt abstained from voting since he did not hear the applicant's presentation.

Vote: Motion carried 3-0-1

The Ordinance is scheduled for second reading on September 20, 2004.

Mayor called a recess at 9:10 p.m. and reconvened the meting at 9:20 p.m.

CONTINUING BUSINESS

***A. Ordinance No. 571 – Second Reading
An Ordinance Adopting an Updated and Amended City of Wilsonville Wastewater Facility Plan and Repealing Ordinance 447.

Mr. Kohlhoff read the Ordinance on second reading by title only.

Motion: Councilor Holt moved to adopt Ordinance No. 571 on second reading. Councilor Knapp seconded the motion.

Vote: Motion carried 4-0

Mayor Lehan	Yes
Councilor Holt	Yes
Councilor Scott-Tabb	Yes
Councilor Knapp	Yes

CITY MANAGER'S BUSINESS

Mr. Donaldson reported Ms. Loble was recovering well.

LEGAL BUSINESS

There was no report.

ADJOURN

Motion: Councilor Scott Tabb moved to adjourn the meeting, seconded by Councilor Holt.

Vote: Motion carried 4-0.

Mayor Lehan adjourned the City Council meeting at 9:25 p.m.

Respectfully submitted,

____
Sandra C. King, CMC, City Recorder

ATTEST:

____
CHARLOTTE LEHAN, MAYOR

Attachment B

ORDINANCE NO. 571

AN ORDINANCE ADOPTING AN UPDATED AND AMENDED CITY OF WILSONVILLE WASTEWATER FACILITY PLAN AND REPEALING ORDINANCE 447.

WHEREAS, the City currently has a Wastewater Facility Plan that was adopted by Ordinance 447 on August 7, 1995; and

WHEREAS, ORS 197.175 requires cities to prepare, adopt, and implement Comprehensive Plans consistent with statewide planning goals adopted by the Land Conservation and Development Commission; and

WHEREAS, ORS 197.712 (2)e requires cities to develop and adopt a public facilities plan for areas within an Urban Growth Boundary containing a population greater than 2,500 persons and shall include rough cost estimates for projects needed to provide sewer, water, and transportation uses contemplated in the Comprehensive Plan and Land Use Regulations; and

WHEREAS, the Wastewater Facility Plan is a support document to the City's Comprehensive Plan; and

WHEREAS, HDR Engineering, Inc. has prepared a Wastewater Facility Plan Update (attached as Exhibit A) and presented said Plan to the Planning Commission on November 12, 2003; and

WHEREAS, in developing the new Wastewater Facility Plan, the City has sought to carry out federal, state, and regional mandates, provide for alternative improvement solutions to minimize expense, avoid the creation of public nuisances, and maintain the public's health, safety, welfare, and interests; and

WHEREAS, the Wilsonville Planning Commission adopted Resolution No. 02PC05 and recommends that the City Council adopt the Wastewater Facility Plan Update; and

WHEREAS, after providing due notice as required by City Code and State Law, a public hearing was held before the City Council on August 16, 2004, at which time the Council considered the recommendation of the Planning Commission and City staff, gathered additional evidence and afforded all interested parties an opportunity to present oral and written testimony concerning the Plan to the City Council; and

WHEREAS, the Council has carefully considered the public record, including all recommendations and testimony, and being fully advised,

NOW THEREFORE, THE CITY OF WILSONVILLE ORDAINS AS FOLLOWS:

1. Findings. The foregoing recitations, those findings and conclusions in the above named Planning Commission Resolution No. 02PC05, and the staff report in this matter dated August 9, 2004, filed in the record of this matter, are hereby adopted as findings of fact and conclusions of law, save and except the recommendation in the Staff report to substitute the table in a proposed Exhibit B for Table 7-2 in the Wastewater Facility Plan Update is not adopted at this time.
2. Order. Based upon such findings, the City Council hereby adopts the Wastewater Facility Plan Update, Exhibit A, to replace the present Wastewater Facility Plan adopted by Ordinance 447.
3. Repeal. The City Council hereby repeals Ordinance 447.

SUBMITTED to the Wilsonville City Council and read for the first time at a regular meeting thereof on August 16, 2004 and scheduled for a second reading at a special meeting of the City Council on August 30, 2004, commencing at the hour of 7 p.m. at the Wilsonville Community Center.

____

Sandra C. King, CMC, City Recorder

ENACTED by the City Council on the 30th day of August, 2004 by the following votes:

YES: 4 NO: 0

____

Sandra C. King, CMC, City Recorder

DATED and signed by the Mayor this _____ day of August 2004.

____

CHARLOTTE LEHAN, MAYOR

SUMMARY OF VOTES:

Mayor Charlotte Lehan	Yes
Council President Kirk	Excused
Councilor Holt	Yes
Councilor Scott-Tabb	Yes
Councilor Knapp	Yes

Table 7-1. Wilsonville WWTP Facilities Plan Implementation Phasing

	Phase 1	Phase 2	Phase 3
Studies/ Predesign	1. Solids dewatering pilot study 2. Membrane bioreactor (MBR) pilot study 3. Effluent filtration (Fuzzy Filter®) pilot study 4. Willamette River TMDL evaluation 5. Odor analysis (optional) 6. Biosolids Management Plan 7. Phase 1 predesign, including: • Hydraulic analysis • Geotechnical analysis for dewatering and excavation sheeting/shoring	1. Phase 2 predesign	1. Phase 3 predesign
Engineering/ Capital Projects	Design and construction of: 1. Lime feed and storage system 2. Step feed modifications to the secondary treatment activated sludge system 3. Primary sludge piping modifications 4. Dewatering facility 5. Temporary dewatered cake storage 6. Expanded/enclosed headworks 7. New effluent filtration	Design and construction of: 1. Primary clarifier modifications, demolition of aerobic digesters 2. Aeration basin 3. Secondary clarifier 4. Modifications to existing UV channel and new UV channel 5. Anaerobic digesters and a control building 6. Liquid biosolids storage tank 7. Permanent dewatered cake storage and odor control OR Belt Drying System	Design and construction of: 1. Headworks expansion 2. New primary clarifier 3. Conversion of two aeration basins to MBRs 4. New Fuzzy Filters® 5. New anaerobic digester 6. New dewatering unit 7. Cake storage OR Belt Drying System expansion

Attachment C

PLANNING COMMISSION

Wednesday
November 12, 2003
7:00 P.M.

Wilsonville Community Development Annex
8445 SW Elligsen Road
Wilsonville, Oregon

Minutes

I. CALL TO ORDER - ROLL CALL

Chair Iguchi called the meeting to order at 7:00 p.m. Those present:

Planning Commission: Debra Iguchi, Craig Faiman, Susan Guyton, Joe Maybee, and Mark Pruitt were present. Randy Wortman arrived shortly after the Consideration of the Minutes. Mary Hinds was absent.

City Staff: Paul Lee, Eldon Johansen, Mike Stone, Chris Neamtzu and Linda Straessle.

V. CONTINUED PUBLIC HEARING

Application No. 02PC05
Request: Adoption of a Wastewater Facility Plan Update ←
Location: Citywide
Applicant: City of Wilsonville

The following was distributed at the beginning of the Meeting:
Exhibit 9: An email dated November 10, 2003, from Commissioner Hinds.

Chair Iguchi read the Legislative Hearing Procedure for the record. She opened the Public Hearing for 02PC05 at 7:05 p.m. and called for the Staff Report.

City Engineer Mike Stone noted that Planning Commission had opened and continued this Public Hearing at the October 8, 2003 meeting. He listed the exhibits to the Staff Report in the meeting packet. He explained that City staff recommendation regarding 02PC05 is for approval of the Wastewater Facility Plan Update with the addition of Exhibit 4: "Technical Memorandum on Additional Biosolids Treatment Alternative – Incineration." He introduced consultants from HDR Engineering, Inc., Heather Stephens and John Holroyd.

Ms. Stephens recapped the information provided to the Planning Commission:

- The Draft Wastewater Facility Plan Update, dated November 2002 (Plan), distributed to the Commissioners in the Fall 2002.
  - The Plan outlines recommendations for phased expansion of the Wastewater Treatment Plant that would serve the community through ultimate buildout.
  - Subsequent to buildout, the Plan addresses short-term constraints that the City is have with its biosolids management.
  - It looks at cost-effective treatments.
- Ms. Stephens gave a brief overview of the exhibits that HDR Engineering provided for the Staff Reports in the Planning Commission October 8, 2003 and November 12, 2003 meeting packets:
  - Exhibit 3: Additional Biosolids Treatment Alternatives Technical Memorandum, HDR Engineering, Inc., October 2003.
  - Exhibit 5: Additional Biosolids Treatment Alternatives - Incineration Technical Memorandum, HDR Engineering, Inc., November 2003.
  - Ms. Stephens stated when comparing the recommendations in the first memorandum (Exhibit 3) for the alternative drying system with the incineration alternative as described in the second memorandum (Exhibit 5), the two technologies achieve many the same objectives.
    - They both result in significant decrease in the volume of sludge that is produced at the treatment plants, which is a primary objective due to the fact that the product might have to be stored up to six months of the year at the facility.
    - The operational costs of the dryer are significantly lower than incinerators. The dryer produces a product with a higher level of treatment, which addresses some of the public health concerns that have been raised by the Commission. It is a beneficial reuse product that is accepted and desired by numerous farmers around Wilsonville.

Ms. Stephens explained:

- The first improvement recommended by HDR Engineering is to add a dewatering system, a mechanical separation step that will reduce the volume of sludge. She distributed a flow chart showing the different steps of the Wastewater Facility's Current Operation, Drying Alternative and Incineration Alternative (Exhibit 10).
  - There are several different treatment options, and dewatering is an integral in any of the biosolids treatment processes.
  - Dewatering allows continued land use application with more certainty of being able to find sites that can be approved for winter land application.
  - Dewatering is a critical step prior to either drying or incineration.
  - It is recommended that the City move forward with the Dewatering step as soon as possible, and to have it online before Winter 2004.

PUBLIC TESTIMONY

Tim Knapp, 11615 SW Jamaica, Wilsonville. Mr. Knapp explained that he owns a commercial/light industrial property development project in Old Town. His concerns include:

- There have been issues related to odor emissions from the wastewater treatment plant in the Old Town area during the 17 years that he has been in Wilsonville.
  - City staff has been saying over the years that they were working to eliminate the odor.
  - He has concerns about the performance of the current wastewater plant and whether it will continue to perform adequately through the City's growth. He referred to the Villebois development in terms of how much it would impact the Wastewater Treatment Plant.
  - While he admits that the odor problem in Old Town is not as frequent nor as intensive as it once was, but it has not gone away either.
  - The odor problem can severely inhabit his ability to get tenants for his buildings.

- He does not think that citizens, the development community, and commercial centers should be subjected to this type of problem.
- He has seen articles about the handling of biosolids applications but does not know very much about it. He hopes that the Planning Commission has enough information to make a decision regarding the Plan.

The Commissioners questioned Mr. Knapp regarding his testimony:
- Commissioner Wortman asked Mr. Knapp how often odor problems occurred in Old Town.
  - Mr. Knapp answered that this question is difficult to answer with any accuracy, but he thought about once a month and varies by the season of the year. He has noticed an odor problem on occasion at 1:00 a.m. He questioned why there would be a problem at this time of night.
- Commissioner Wortman asked Mr. Knapp if he complains to the City when there is an odor problem.
  - Mr. Knapp responded that in years past, he has called several times a year about the problem, but has not called the City in recent months.
  - He does not have the City's 24-hour telephone number to report those occasions when the odor is noticeable at 1:00 a.m.
- Chair Iguchi asked Mr. Knapp if incineration of the waste would be an issue to him.
  - Mr. Knapp questioned what the potential for airborne particulates composition and volume would be with the incineration process.
  - He would like to compare the experiences of other jurisdictions that use incineration and the measured effects they have experienced with incineration.
  - He is open to the possible that incineration might be a viable method of dealing with waste.
  - He suggested that the land use application of biosolids is going to become more difficult due to citizen concern about the dangers and issues of this practice.

Chair Iguchi closed the Public Testimony for 02PC05.

Chair Iguchi noted the email from Commissioner Hinds (Exhibit 9) that was distributed at the beginning meeting. Commissioner Guyton read the email into the record at Commissioner Hinds's request.

The Commissioners discussed their concerns regarding the Plan:
Commissioner Guyton:
- Agreed with many of Commissioner Hinds's comments in the email.
  - She is concerned that the Plan offers only a short-term "fix" and will not solve long-term problems.
  - Suggested that other solutions should be looked at and that incineration might be one of the other solutions.
    - It has been suggested that incineration is not the thing to do now, but it is still an option.
    - Incineration could be a long-term solution.
- Suggested that federal and state agencies could change the regulations because they are subject to the public sway.

Commissioner Faiman:
- Stated that Mr. Knapp had summarized his concerns.
- There is not enough information to make a decision.
  - The studies he would like to see have not been done yet.
  - There are questions regarding the political acceptability of the current program of using waste solids for fertilizer.
  - Because there are so many unknowns, his decision would be to go with the lowest cost alternative for now and review the subject at a future time once more information is available.

- The City should not spend a lot of money on options where there is no strong evidence that it is the correct direction to go.

Commissioner Maybee:

- Agreed with the preceding comments.
  - This is a complex subject and he does not think that it is going to lend itself to an easy solution.
  - Commissioner Guyton, Commissioner Hinds and Commissioner Faiman have pointed out that there are numerous viewpoints on this subject.
  - Looking at the incremental cost of going with the simplest solution to alternative solutions, it might be in the City's best interests to find out what the baseline cost might be and what the incremental costs might should the City decide in the future to go to an alternative option.

Commissioner Pruitt:

- Asked that the difference between a Class A and a Class B land applications be explained.
  - Ms. Stephens responded that the federal regulations for biosolids treatment recognize two different levels of treatment.
    - Class A sludge is the highest level of treatment to further reduce pathogens. Its land application is universal for soil augmentation. It can be applied in significantly more local areas than Class B sludge can.
    - Class B sludge is what the City currently produces. It has not undergone as sophisticated treatment for pathogen reduction as Class A sludge, therefore, the use is protected by putting limits on the land application.
  - Commissioner Pruitt asked if the pathogen level could be quantified for easier understanding.
    - Mr. Holroyd explained that he is the chief engineer at the Portland office of HDR Engineering. He stated that a criterion is for counts per dry gram of material which can be difficult to track. Regulators address the Class A and Class B distinctions by defining the acceptable level of treatment; what treatment might give a typical acceptable kill of pathogens.
    - Mr. Holroyd explained that regulation is based on both a sampling of the biosolids and on ensuring that the treatment process meets a standard.
- Commissioner Pruitt asked if there are fewer heavy metals in Class A sludge than in Class B sludge.
  - Ms. Stephens answered that Class A treatment processes are aimed at pathogen reduction and not at metals removal. The heavy metals level in Class A sludge is similar the level found in Class B sludge.
- Commissioner Pruitt asked Ms. Stephens and Mr. Holroyd to explain HDR Engineering's experience with wastewater treatment plants and their design.
  - Ms. Stephens explained that Class B land applications are the most prevalent current biosolids program that most wastewater facilities have.
    - In planning for the future, it is common to look at Class A treatments given public concerns and the uncertainty of regulation in terms of where the legislation will go in the future.
    - Many facilities are moving toward Class A treatments. The majority of the facilities that HDR Engineering look at use some sort of beneficial use as opposed to an alternative such as incineration. There are some uses for the ash resulting from incineration. Land application of sludge for soil amendment is considered to be a beneficial use from a regulatory viewpoint
  - Mr. Holroyd explained that HDR Engineering is one of the top five wastewater design firms in the country.
    - The Portland office is engaged with twenty-plus treatment plant expansions and design projects at any given time.
    - He listed wastewater treatment plants that HDR Engineering has worked on in the Portland area and in Seattle.
    - Ms. Stephens explained that HDR Engineering primarily designs wastewater treatment plants, but also have operation services and have treatment plant operators on staff. HDR puts

operational recommendations into facility plans. They also have incinerator operators on staff so HDR Engineering does have experience with incineration plant operation.

* Ms. Stephens stated that HDR Engineering has been in business since 1923.
* Mr. Holroyd explained that the Portland office employs about 55 people in the region and over 300 people in four or five offices.
* Mr. Holroyd stated that HDR Engineering is considered to be experts in the wastewater treatment field.

- Commissioner Pruitt asked that the costs of drying versus burning be qualified.
  * Ms. Stephens explained that in terms of capital costs, the drying option is about $10 million, whereas the incineration cost is about $14 million.
  * The major difference between drying and incineration costs is the operating cost. Incineration operation costs five times more than drying operating costs.
    – The drying operation cost is just under $100,000 a year versus $500,000 for the incineration costs.
    – Costs are based on the current staffing level at the Wastewater Treatment Plant. Staffing costs for a 24-hour operation are three to four times higher than for plants that operate with a single shift, as Wilsonville's Wastewater Treatment Plant currently does. It may not be necessary to go to a 24-hour shift full time with the incineration process, but there are labor costs with a partial 24-hour operation.
    – Wilsonville's dry product doesn't need to be sent to Eastern Oregon because the limitations on Class A land application have been removed.
    – Mr. Holroyd reported that Class A sludge is in demand for land application and is sometimes bagged and sold as fertilizer.
    – The City of McMinnville has a Class A treatment operation and makes compost which is sold without difficulty.
  * Mr. Stone noted that technical memorandum prepared by HDR Engineering dated November 3, 2003 (Exhibit 5 in the meeting packet) included information about the costs.
  * It was noted that the biosolids dewatering process would be required in both the drying and incineration process.
- Commissioner Pruitt noted Ms. Stephens comments that dewaterization is done in both the drying and incineration processes, and referred to Commissioner Hinds's statement in her email that the sludge has no odor after dewaterization, and asked if this were true.
  * Mr. Holroyd responded that his understanding of Commissioner Hinds's email was that there is no odor after incineration.
  * Mr. Holroyd confirmed that dewaterization would be done before land applications for Class A, Class B, incineration, and drying systems products: the water has to be removed before the product can be shipped or combusted.
- Commissioner Pruitt asked if Commissioner Hinds was correct that the Phase 3 expansion of the Wastewater Treatment Plant would not be needed with the incineration alternative: would these two options have different long-term bearing on the expansion that would be needed for the Wastewater Treatment Plant?
  * Ms. Stephens answered that the initial capital investment would be made for both methods which would last for the life of the facility.
    – Phase 3's total cost was $30 to $35 million, which included a lot of liquid processing improvements as well. These would still be needed regardless of the biosolids treatment option.

Commissioner Guyton:

- Noted that the small site for the Wastewater Treatment Plant and asked what would happen when there is no more room for expansion.

- Mr. Stone explained that HDR Engineering was told to do an analysis and make recommendations based on the current Wastewater Treatment Plan site, which is not going to get bigger than it currently is.
  - Costs will be 20% to 30% higher in construction costs because of the site's size limitation.
  - A portion of the current site belongs to ODOT.
- Mr. Johansen stated that there are three phases for the Wastewater Treatment Plant expansion.
  - The first two phases will take the capacity of the Plant to 4 million gallons per day (mgd). Currently the Plant runs a little more that 2 mgd. If Wilsonville's current rate of generating sewage for each area continues the way it is now, it will generate 4 mgd through Phase 2.
  - Phase 3 would bring the capacity of the Plant up to 7 mgd on this site. He estimated that Wilsonville would produce 4 to 7 mgd of sewage at full buildout even if additional areas are brought into the City or areas redevelop and produce more sewage than they currently do. There is enough space at the current site to handle this amount, but it will be crowded.
  - The City needs to negotiate with ODOT for acquisition of that portion of land adjacent to the current site, as this would allow expansion away from the neighbors of the site.

- Mr. Johansen referred to page 7-19 of the Wastewater Facility Plan Update, Table 7-2 "Estimated project costs for plant expansion (Costs in $1,000s)" and noted that there are three phases.
  - Phase 1 includes the biosolids dewatering that would be needed no matter what method is used for processing the wastes.
  - The City will go back and readdress how the solids should be handled the next time there is an update on the Plan.
    - There will be one, possibly two, more updates of the Plan before the incineration or low temperature belt drying methods would be built.
    - There is enough space on the current site for the inclusion of either the drying or incineration methods.
    - The main concern at this time is to get the initial improvements approved and make sure that the initial improvements are compatible with whatever is built in the future. He is not locked into one method.
- Mr. Johansen explained that the City only produces about half the volume of sewage that is needed to make the incineration method effective because it takes as much manpower to run a very small operation as it does a much larger operation. It would be extremely expensive to operate an incineration.
  - He suggested that with technology changes smaller incineration systems might come down in size and become more efficient. It may make more sense to wait until it is time to build the system before locking in a particular method due to possible technology changes.
- Mr. Holroyd noted that a couple of the major wastewater utilities in this area have decommissioned their incinerators recently, including plants in Clackamas and Durham, because of the high level of maintenance.

Commissioner Maybee:

- Asked if there were any correlation between odor emission and work shifts; are there more nighttime odors from plants that are under single-shift operations? Is there some reservoir approach to holding waste that comes in at night, or is the entire plant automated?
  - Ms. Stephens explained that most of the Wastewater Treatment Plant is automated so that the processes run 24 hours a day. Intermittent odors tend to be during the day. She could not think of anything that would be happening that would be causing odors at night.
- Asked how pathogens from solid waste from a Class A process measured against ambient pathogens in the environment. How quickly does this drop off?
  - Mr. Holroyd stated that most of the focus is on fecal bacteria. The wastewater business is trying primarily to reduce the organic content and reduce the harmful, or pathogenic, microbial

community. The microbes that are in the soil are much less likely to cause health problems as raw or partially treated wastewater or sewage sludge might.

Commissioner Wortman:

- Referred to page 8 of 20 of the Staff Report, Table 1. "Estimate of Probable Capital and Operating Costs for Solids Incineration", and suggested that Table 1 only addresses two of the three phases referred to earlier by Mr. Johansen. He noted that there are no capital costs associated with the Phase 2 expansion.
  - Ms. Stephens stated that Table 1 is more equivalent to Phase 2 and Phase 3 of the expansion. The Phase I improvements in the Plan address existing capacity deficiencies. Phase 2 is the first major capacity increase at the plant.
  - Commissioner Wortman suggested that the million gallons per day figures do not line up with the 7 mgd that Mr. Johansen was speaking about earlier.
    - Ms. Stephens stated that the Plan looks at the low projections and high projections and the numbers in Table 1 are based on the low projections.
    - Ms. Stephens using a enlarged copy of a page from the PowerPoint presentation shown to the Planning Commission in January 2003 (paper copies of which were provided in Exhibit 4 in the October 8, 2003 Staff Report), showing a graph "Flow and Loading Projections," explained that the high projections were looked at primarily from a site planning point of view to make sure that City growth at full buildout can be accommodated at the current plant site.
    - The difference in the numbers noted by Commissioner Wortman is because HDR Engineering believes that growth might be closer to the low projection.
  - Commissioner Wortman asked if the actual buildout capacity comes in at the high flow projections, would there be additional capacity expense to Table 1?
    - Ms. Stephens stated that there would be; another $14 million expansion would be needed.
  - Commissioner Wortman asked that the reasons for the difference between the "Initial Expansion" Total Operation and Maintenance Costs and costs for the "Ultimate Expansion" be explained.
    - Ms. Stephens explained that it would be due to the additional operating time because the equipment will be running longer as the loading of the Plant increases.
- Commissioner Wortman asked which phase of waste treatment produces the ongoing odor problems.
  - Ms. Stephens stated that HDR Engineering has identified the major odor sources. She listed those sources.
    - She noted that the recent odor control project addressed and treated one of the major sources. Mr. Stone explained that the project is to be done mid-2005
    - Phase I improvements in the Plan addresses the other major source of odors.
  - Commissioner Wortman asked if HDR Engineering is the current advisor on operations and problems.
    - Ms. Stephens answered that it has been since 2001.
  - Commissioner Wortman discussed problems in the past that were created by Coca-Cola operations and asked if Coca-Cola continues to be a significant source of the odor problems.
    - Mr. Johansen responded that they are becoming less of a factor as the City grows and there are other sources of sewage. The wastewater treatment system the City used 10 to 14 years ago did not respond well to increases in strength; the current system responds very well to changes in strength during the day.
  - Mr. Johansen suggested that a source of the intermittent odor is when the sludge storage covers are cleaned, there are odors for about an hour.
  - Mr. Stone explained that there could be a substantial impact to the odor problems during the day because of the winds that blow during the day. Winds tend to calm down during the night so the odors tend not to be blown away by the wind.
  - Mr. Stone and Mr. Holroyd explained the sources of the odors.

* Commissioner Guyton stated that as a resident of Old Town she seldom notices the odors but that might be because she is far enough north of the Wastewater Treatment Plant that it is not noticeable. She suggested that the odors are worse during specific times of the year, although the odors are better now than they were several years ago.

Chair Iguchi:

- Chair Iguchi referred to previous testimony that the odor occurs during the dewatering process and asked if the odor congregates in the water.
  - Ms. Stephens explained that the odor is associated with the solids processing steps. She explained this process in further detail. The dewatering process does have some odors associated with it and HGR Engineering is recommending that that this process be enclosed in a building.
  - Mr. Stone explained that every improvement that has been done to the Wastewater Treatment Plant has helped with the odor problems. He listed the various projects. He stated that he believes that eventually the odor problem will be eliminated.
- Asked if the higher construction costs due to the constrained site of the Wastewater Treatment Plant had been compared to what it would cost to acquire additional land somewhere else, aside from the physical structure.
  * Mr. Johansen stated that when he had worked for another jurisdiction he had to find an alternate site for the wastewater treatment plant and the experience was not good. He has not done a comparison of costs between building onsite, and locating to another site.
    - Operation costs would be too high if there are two smaller sites as there would be basically the same operation at both sites. He estimated that the capital costs for building onsite or at another site would be similar, but the operation costs would be exorbitant.
  * Ms. Stephens suggested that there would be significant additional capital costs due to pumping and piping that would offset any construction savings from building on another site.
  * Commissioner Wortman asked if another site could be located outside the City limits. The answer was inaudible.
- Chair Iguchi expressed concern that the Plan is a short-range way of handling a problem that is ongoing; the City is going to continue to grow and produce more waste.
  * It bothers her that Wilsonville's waste will be trucked out of Wilsonville.
    - Wilsonville needs to find a constructive way of taking care of its own wastes right here. This Plan does not address this in any way.
- Chair Iguchi expressed concern that HDR Engineering was not charged with looking at other technologies that are available.
  * She is concerned that the City is going to be putting in infrastructure that is going to take additional waste from the northern part of the City, the Villebois area and Coffee Lake, and will be piping that waste all the way to the Willamette River when Mr. Johansen just said that capital costs in acquiring additional land could be similar. She suggested that the cost would not be so high for locating another site when compared to the expense of the piping. She suggested that this has not been looked at and has not been addressed in the Plan. She would prefer it if the Plan looked at alternatives more closely since obviously they have not been researched at this point.
    - The idea that incinerators could go down into a reasonable cost within a short period of time is of concern to her because this has not been addressed in this Plan.
    - It looks like we are just going to continue to build as much as can be built on the current site and continue to treat it in a relatively similar way to what we have.
    - The drying belt system is going to be brought in to improve the quality of the sludge but there is nothing in the Plan about looking at other alternatives that might arise or that are already in existence that could be viable and might serve Wilsonville's needs now and into the future.
  * For this reason, she is not willing to recommend the adoption of the proposed Wastewater Facility Plan as it is now.

Commissioner Pruitt

- Asked the range of time that the Plan covers.
  - Ms. Stephens responded that the Plan looks at the ultimate buildout of the current urban growth area and urban planning areas, making sure that the short-term improvements don't preclude something that would be a logical long-term alternative, recognizing that technology continues to advance and that the City will revisit the Plan.
    - More focus was put onto the short-term alternatives because this where there is the most certainty. Additional capital improvements identified some pilot studies and other investigations, which the City can continue to do in the short-term in order to help refine the decisions that need to be made 10 to 15 year down the road.
  - Chair Iguchi suggested that if the City is building infrastructure to go down to the existing site for the short-term and all the capital expenses for putting in all the additional enclosures and other improvements, then there is a lot of money sunk into this short-term Plan; how likely is it that other less expensive alternatives will be looked at in the future.
  - Commissioner Pruitt asked that what the planning horizon of the Plan was and if the improvements in the Plan for the short-term would be usable for the long-term upgrades, and how long would it be before any additional upgrades would need to be made beyond this Plan?
    - Ms. Stephens explained that the planning horizon of the Plan is 2035.
    - The Plan could be used in the long term in terms of going back and checking where the growth is compared to what was planned. HDR Engineering tried to identify triggers that would allow the City to go back to the Plan to do the improvements in the Plan.
    - Commissioner Pruitt suggested that since the Plan has a 30-year planning horizon that it is not a short-term Plan given technology changes over the next 30 years.
    - Commissioner Wortman suggested that other than adding additional land within the City limits, this Plan covers full buildout of the City.
  - Mr. Stone explained that when a facility plan such as this Plan is put together, both the City staff and consultant make certain assumptions based on current technologies or technologies that could be utilized in a relatively short period of time.
    - The Plan was last updated in 1996. By the time that construction started in 1996 or 1997, there were two technologies that were implemented with those improvements that were relatively untried in the State of Oregon. He listed those improvements.
    - By the time that the City addresses the issues related to producing a Class A product, City staff will be coming back to the Planning Commission with a recommendation that may or may not be in conformance with what is in this Plan.
    - DEQ is very supportive of technologies that improve an existing process.
  - Mr. Holroyd stated that he takes exception to the comment that HDR Engineering is only recommending the "tried and true" old technology.
    - Membrane reactors are state-of-the-art. They are currently under construction in two places in Washington and there are no installations in Oregon.
    - The sludge drying facility that HDR Engineering is suggesting will produce a Class A sludge. This is recognized in Europe to be the most sustainable way of dealing with biosolids. To his knowledge, there is not a facility in operation in the United States that uses this process. This is not "cookbook" technology selection.
    - HDR Engineering is looking at things that are expected to prove themselves out over time and this is not standard wastewater treatment. Wilsonville's Wastewater Treatment Plant site demands some innovative thinking.
    - HDR Engineering's goal is to be able to provide the capacity within the given constraints.
    - A fairly wide array of technologies were looked at to get to the recommendations in the Plan.
  - Chair Iguchi asked if HDR Engineering had considered the Living Machine process of treating wastewater as outlined in Exhibit 7 (in the meeting packet).

- Mr. Holroyd stated that there is a response regarding the Living Machine in the meeting packet (Item 6 of Exhibit 6). He explained that he had assisted the City of Ashland in its evaluation of Living Machines, and there were concerns about when the ponds were cleaned; the flow would create problems for the wastewater treatment plant. The cost associated with this and the land area were many times higher than what they were projecting for the cost of expanding their current treatment plant.
- Mr. Holroyd explained that the Living Machine systems are using the exact same kind of biology that currently being used in Wilsonville's Water Treatment Plant. The Living Machine processes are being accelerated by adding power, heat and chemicals to make up for not having vast land areas to do the treatment.
- Chair Iguchi stated that her understanding is that the Living Machine uses a compressed land area and won't do full treatment.
- Chair Iguchi suggested that the City should be using other technologies as the City expands and that the Living Machine option would be good to include in the Plan. Mr. Holroyd stated that this could be done, but these are systems that are not forgiving for high water fluctuations and peak flow. This system is typically used for small, residential, or more contained flow conditions.

Commissioner Wortman

- Asked if building a system to convey Villebois wastewater to the current Wastewater Treatment Plant would eliminate the possiblity for doing a local treatment system in the Villebois area later.
- Mr. Holroyd stated that it is a fair assumption that this sets the course for centralized waste treatment.
  - He suggested that from an economic standpoint there are very few cases where the economy on having one treatment plant, one discharge, one operations group has not paid dividends over numerous scattered systems.
  - From a regulatory standpoint, getting multiple discharge permits in a community is unlikely.
  - Chair Iguchi suggested that once committed to a centralized treatment system it would not make any sense to include options for alternative systems in the Plan. Once the City has committed to taking all its wastes down to the Willamette River, it precludes looking at other alternatives altogether.
  - Mr. Holroyd explained that there are communities that looked for pretreatment opportunities within their system in a local area, and then send it off to a final area for treatment and disposal. This concept would not be precluded by having a centralized system.
  - Ms. Stephens explained that other alternatives could be considered when there is a need, such as an industrial need or the amount of acreage that is needed to be irrigated. HDR Engineering could not identify any need in Wilsonville that would create this alternative opportunity.
    - Mr. Holroyd explained that this would be a pretreatment or supplementary treatment as opposed to alternative systems. Typically those pretreatment applications are associated with industries of some size.
  - Mr. Johansen explained that there are two potential developments that alternative systems could be considered for, both of which are part of the industrial lands studies for lands that are outside of the planned service area.
    - Large pipe would have to be run all the way to the Wastewater Treatment Plant.
    - City staff thinks that this would be a logical area to look at the alternative systems.
    - He clarified that these lands are outside the current City limits. One is south of the Willamette River and the other is east of the City.

Chair Iguchi moved that language be included in the Wastewater Facility Plan Update to allow for triggers to review this process and also to consider alternatives at every possible opportunity in the future.

Commissioner Wortman suggested that it would be better if this motion were an amendment to a main motion.

Chair Iguchi withdrew her motion

Commissioner Pruitt moved that based on the Findings included in the Staff Report dated October 8, 2003 and the Staff Report Addendum dated November 5, 2003, on tonight's public comments, HDR testimony and answers, and the discussion of the Planning Commission, he moves that the Planning Commission adopt Resolution No. 02PC05 which recommends that the City Council adopt the Wastewater Facility Plan Update, as proposed. Commissioner Faiman seconded the motion.

Discussion:

- Commissioner Wortman suggested that HDR Engineering has done a thorough analysis and has cost-effective proposals in the Plan Update that are viable with current and foreseeable technology.

Chair Iguchi moved to amend the motion to include in the Wastewater Facility Plan Update, a triggering mechanism for reviewing the Wastewater Facility Plan periodically, and for considering technological alternative systems at every possible opportunity. Commissioner Wortman seconded the motion.

Discussion:

- Commissioner Faiman suggested Chair Iguchi language was too broad and that the "every possible opportunity" language could be a bit more modest.
  - Chair Iguchi responded that it is important for the City to take every opportunity to look at all possibilities to do something that could help in the long run. For instance, if development comes in it may be appropriate to use utilize the "Living Machine" system (as explained in Exhibit 7). She suggested "Living Machines" have been shown to be effective and have been incorporated into parklands, educational facilities, and some people drink their wastewater after it has been processed this way.
  - Commissioner Guyton suggested that a time frame could be stated for when the Wastewater Facility Plan should be reviewed.
  - Commissioner Faiman suggested that "every possible opportunity" could be construed to mean that the Plan has to be reviewed every time a new article is published about wastewater treatment.
  - Commissioner Pruitt suggested that instead of saying "every possible opportunity" state "at appropriate points in the development process" because there will be times that this issue could be looked at and times that this review could be very disruptive.
  - Mr. Johansen suggested that the Plan could undergo a full-scale review prior to Phase 2 as listed on page 7-19 of the Wastewater Facility Plan Update.
    - He explained that the consultants have reviewed Phase 1 thoroughly and have proposed state-of-the-art technology as much as the City wants to go.
  - Commissioner Wortman suggested that Chair Iguchi is suggesting additional concepts beyond a central facility when considering alternatives. Chair Iguchi agreed that this is what she is suggesting.
  - It was suggested that the amending motion is addressing two issues, one of which is that when a development comes along that presents an opportunity to review the Plan that this review be done. The industrial lands as mentioned by Mr. Johansen present such an opportunity.
  - Mr. Johansen explained that his concern is that every time an alternate site is looked at, a whole neighborhood gets upset. For example, the Villebois sewer line has to come down Evergreen Road or Barber Street, and if a plant is put in for that area it would have to be put right next to the Montebello residential area. He does not want to get a neighborhood upset about something that

Attachment D

Straessle, Linda

From: Neamtzu, Chris
Sent: Wednesday, November 12, 2003 8:38 AM
To: Straessle, Linda
Subject: FW: Wastewater Treatment Plant Facility Master Plan

02PC05
Exhibit 9

-----Original Message-----
From: Mary Hinds [mailto:mary.hinds@verizon.net]
Sent: Monday, November 10, 2003 5:05 PM
To: Sue
Cc: Chris Neamtzu
Subject: Wastewater Treatment Plant Facility Master Plan

November 10, 2003
To Wilsonville Planning Commissioners:
I regret not beeing at the Planning Commission meeting November 12.
My opinion is that there are alternatives that are cheaper and more ecologically sound than biosolid spreading, more energy saving long lasting than the current plant expansion in the master plan.

I have a few comments on the Report Addendum from HDR Engineering, Inc concerning O2PC05.
Oregon and states around the country advocate reuse of sludge through spreading on agricultural lands to capture the fertilizing and other benefits that it contains. Spreading has to be done at certain times of the year, and most cities like Portland pay to have it hauled to Eastern Oregon where there are large tracts of land that the. DEQ and EPA prefer it used on. The cost in diesel fuel to haul it, the need to store dry cakes until weather permits spreading, and the minimal testing of the product before spreading has economic and possible health effects. Politically for the agricultural stakeholders and anyone who likes to see waste reused, biosolids spreading is favorable.

On page 7 of 20 in the packet HDR asserts in the report that the permit for incineration would be "difficult to obtain, and would require an air quality model, dispersion testing and a plan for ash dispersal."

These components are also required for **any** wastewater treatment system, perhaps even expansion of one. Incinerated sludge ash disposal would amount to 90% less volume than sludge disposal, and could be disposed of potentially through local use in construction material, amendment to leaf composting or as an agricultural soil amendment.

The report says on page 7 of 20 " Depending on the level of citizen concern with incineration," the notification process "could force the city to abandon its plans for solids incineration." Vancouver Washington did not experience any negative public reaction to its plans to build an incineration plant that processes 2 tons an hour of biosolids, 24 hours/day. The fact that after dewaterization, there is NO odor associated with it as in digestion or composting could actually LESSEN public resistance.

There are some advantages to solids incineration that I want you to consider before dismissing incineration (referring to Table 2 on Page 9 of 20).
Additional benefits:
Large solids volume reduction is equal to about 10% of biosolids. This could mean no "Ultimate expansion" needed, no phase 3 of expansion. Although Incineator building costs are high, the long range costs could be reduced by the cost of phase 3 -ultimate expansion projected to be $35 million in 20-30 years.
No contracts with 3rd parties for sludge transport and spreading. If you look at the costs of these contracts, they could double when time to renew them, if there are parties still taking the product.
Potential to reuse the ash Reduce diesel used to haul sludge 200 miles to Eastern Oregon by using in concrete, composting, soil amendment.
(Reduce air pollution by hauling less product shorter distances)
Not affected by weather

Wilsonville
Wastewater Facility Plan

Executive Summary
Pages ES-1 through ES-21

Attachment E
To
June 8, 2005 Planning Commission
Work Session Staff Report
LP-2005-05-00008

Wastewater Facility Plan Amendment related to the handling of bio-solids and preferred alternatives to producing Class "B" sludge. (Remand from City Council.)

Executive Summary

Introduction

Wilsonville's wastewater treatment plant provides treatment for sanitary sewage and infiltration/inflow from connected homes, businesses, and industries in the city. The last Facility Plan for the plant was prepared in 1995, with capital improvements implemented in 1998. Since then, the City's vision of future growth has changed, as has the regulatory environment. The City has undertaken this Facility Plan to re-evaluate future flow and wasteload projections, analyze current and anticipated future regulations, evaluate the adequacy of existing plant treatment processes to meet future demands, and develop a phased capital improvement program that will allow the plant to continue to meet the City's needs through ultimate build-out.

Overview of the Recommended Plan

The recommended plan includes a combination of treatment technologies that are new to Wilsonville and expansion of existing technologies. The most notable new technologies are membrane bioreactors (MBRs) to reduce the footprint of the secondary treatment process (allowing expansion within a limited area), Fuzzy Filters for filtration of secondary effluent, anaerobic digestion for solids stabilization, and dewatering of digested solids to remove excess water. Anaerobic digestion offers savings in both capital cost and space required, and dewatering is necessary to provide adequate onsite storage of digested biosolids. Both of these processes are commonly used in wastewater treatment. MBRs and Fuzzy Filters are relatively new to the wastewater industry and should be pilot tested prior to implementation to verify operation.

To meet permit compliance and capacity requirements, a three-phased expansion program is recommended. This program allows the City to provide the necessary improvements at the plant without creating an overly complex construction management program.

- **Phase 1 – Immediate Needs.** These improvements address the most urgent process deficiencies and should be undertaken as soon as possible in order to address process deficiencies at the plant. These immediate needs include:
    - Increasing the headworks capacity and enclosing the headworks
    - Modifying primary sludge piping
    - Adding a lime silo and step feed enhancements for secondary treatment
    - Adding dewatering, and providing improved effluent filtration to ensure adequate solids removal in the dewatering centrate
- **Phase 2 – Near-Term Needs.** Near-term needs are improvements that address additional process deficiencies to reach an average dry weather capacity of 4 mgd influent flow, 8,700 lb/day influent BOD, and 8,600 lb/day influent TSS. These improvements are needed by 2010, and include improvements to all plant processes that were not addressed in Phase 1.
- **Phase 2 – Long-term Needs.** Long-term needs are improvements required to meet an average dry weather capacity of 7 mgd influent flow and 14,900 lb/day influent BOD and

TSS. Depending on whether ultimate flow and loading is closer to the high or low projection, this phase of expansion should be operational by 2020 – 2030.

- **Additional Biosolids Processing Improvements.** Due to the loss of approved sites to land apply biosolids during the winter, additional investigations were conducted after completion of the Draft Facility Plan. A technical memorandum was prepared to evaluate requirements associated with three potential changes in the City's biosolids management program: contracting biosolids hauling and land application to a private vendor, purchasing property for offsite biosolids storage and land application, and providing onsite biosolids drying using a belt dryer system (BDS) (see Appendix F). This analysis recommended that the City ultimately provide onsite drying to produce a Class A product and significantly reduce the volume of solids that must be stored during the winter. These improvements substantially increase the long-term reliability of the City's biosolids management program.

Planning Projections

Future flow and wasteload projections are a function of anticipated growth characteristics in Wilsonville's service area. These characteristics will drive future treatment plant needs.

Wastewater Flow Projections

Projecting future flows requires analysis of both the increase in baseline sanitary flow and the increase in peak flow.

Baseline Sanitary Flow

Baseline sanitary flow (average dry weather flow – ADWF) is that portion of the treatment plant influent flow produced by residential occupants, businesses, and industries in the service area. Baseline sanitary flow is a function of two factors:

- Projected residential, commercial, and industrial growth, and
- The volume of wastewater produced by various customer classes (residential, commercial, industrial, etc.)

Two sets of projections were developed to guide facility planning. High flow projections were based on the City's *2001 Comprehensive Plan*, augmented with information from the City regarding specific developments. Unit flow factors from the recent *Collection System Master Plan* were used to assess influent flows to the treatment plant. Because these estimates were developed for collection system planning, they reflect conservative assumptions. A low flow projection was also developed based on unit flow factors closer to current values.

These two sets of projections are shown in Figure ES-1. Flows are projected to increase from the current average dry weather flow of 2 mgd to between 4.4 mgd and 7 mgd at ultimate buildout in year 2035.

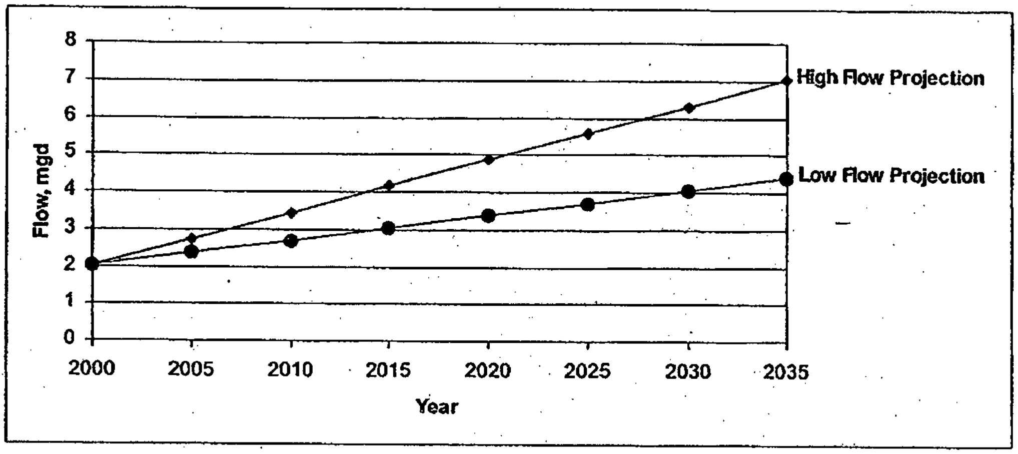


Figure ES-1. Projected Average Dry Weather Flow

Alternatives and site plans were developed based on the high projections to ensure that the plant could accommodate the infrastructure required to treat the high flows. Near-term implementation was based on the low flow projections.

Peak Flow

Many components of the wastewater treatment plant are designed to treat flows and loads greater than those seen under average dry weather conditions. Flow peaking factors (ratio of a given flow to the average dry weather flow for the corresponding year) were evaluated by examining historical data, using a statistical procedure developed by the Oregon Department of Environmental Quality (DEQ), and by examining inflow and infiltration (I/I) based on the total service area.

Future peaking factors were calculated as the average of the historical peaking factors (which were very close to the values calculated using the DEQ methodology) and the area-based peaking factors. Peaking factors and future flow projections are shown in Tables ES-1 and 2.

Table ES-1. High Flow Projections for the Wilsonville Wastewater Treatment Plant

	Peaking Factor	2000	2005	2010	2015	2020	2025	2030	2035
Dry Weather									
Average Day	1.00	2.02	2.73	3.45	4.16	4.88	5.59	6.31	7.02
Maximum Month	1.07	2.15	2.91	3.68	4.44	5.20	5.96	6.72	7.48
Maximum Week	1.13	2.29	3.09	3.90	4.71	5.52	6.33	7.14	7.94
Maximum Day	1.32	2.67	3.61	4.56	5.50	6.45	7.39	8.34	9.28
Wet Weather									
Average Day	1.20	2.42	3.27	4.13	4.98	5.84	6.69	7.55	8.40
Maximum Month	1.38	2.79	3.78	4.77	5.76	6.74	7.73	8.72	9.71
Maximum Week	1.63	3.30	4.47	5.63	6.80	7.97	9.13	10.30	11.47
Maximum Day	1.98	4.00	5.41	6.83	8.24	9.66	11.07	12.49	13.90
Peak Hour	2.95	5.96	8.07	10.17	12.28	14.39	16.49	18.60	20.71

Table ES-2. Low Flow Projections for the Wilsonville Wastewater Treatment Plant

	Peaking Factor	2000	2005	2010	2015	2020	2025	2030	2035
Dry Weather									
Average Day	1.00	2.02	2.36	2.69	3.03	3.37	3.71	4.04	4.38
Maximum Month	1.07	2.15	2.51	2.87	3.23	3.59	3.95	4.31	4.67
Maximum Week	1.13	2.29	2.67	3.04	3.43	3.81	4.20	4.57	4.96
Maximum Day	1.32	2.67	3.12	3.56	4.01	4.46	4.90	5.34	5.79
Wet Weather									
Average Day	1.20	2.42	2.82	3.22	3.63	4.03	4.44	4.83	5.24
Maximum Month	1.38	2.79	3.26	3.72	4.19	4.66	5.13	5.59	6.06
Maximum Week	1.63	3.30	3.85	4.39	4.95	5.50	6.06	6.60	7.15
Maximum Day	1.98	4.00	4.67	5.33	6.00	6.67	7.35	8.00	8.67
Peak Hour	2.95	5.96	6.96	7.94	8.94	9.94	10.94	11.92	12.92

Wasteload Projections

Future influent biochemical oxygen demand (BOD), total suspended solids (TSS), ammonia-nitrogen, and phosphorus loadings were calculated using the following average concentrations based on recent influent characteristics[1]:

- BOD: 248 mg/L
- TSS: 254 mg/L
- NH3-N: 24 mg/L
- Total P: 7.3 mg/L

Although influent concentration data for ammonia-nitrogen and total phosphorus was limited, the values recorded at Wilsonville are similar to textbook values for typical municipal wastewater. BOD and TSS concentrations closely match those used in the previous Facility Plan.

Wasteload peaking factors were evaluated using influent data from plant Daily Monitoring Reports (DMRs), and compared with peaking factors from other cities. Peaking factors based on Wilsonville's historical data are generally within the range of peaking factors experienced at other plants in the region. Therefore, peaking factors based on historical data were used for future planning.

Existing Facilities

The Wilsonville facility was constructed in the early 1970s as a Smith and Loveless package plant. The plant was upgraded through a series of expansions in the 1980s and 1990s. Today, Wilsonville's plant provides primary and secondary treatment, effluent sand filtration, ultraviolet (UV) disinfection, and aerobic digestion. Liquid biosolids are land-applied to various agricultural sites in the area for beneficial reuse. The overall performance of the treatment plant, as well as

[1] Data since 1998 was used in the Facility Plan evaluation.

the capacity and condition of key equipment and processes, was evaluated to determine the adequacy of the existing facility to meet future needs.

Capacity Evaluation

The plant currently has a capacity to treat 7,500 lb/day of influent BOD and TSS (without nitrification), with a peak stated hydraulic capacity of 8 mgd. Actual hydraulic capacity is limited to 2.8 mgd on an average basis mgd (based on primary clarifier capacity) and 4 mgd on a peak basis (based on influent screening capacity). A steady-state mass balance model was developed for major process units. Average and maximum-month flows were modeled during wet and dry seasons. Table ES-3 shows the current capacity of the major unit processes.

Table ES-3. Estimated Current process Capacity for Unit Processes, mgd

Unit Process	Design Basis	Firm Capacity	Total Capacity	Comments
Headworks	Peak Hour Flow	4 mgd	4 mgd	Based on operating experience with fine drum screen. Backup bar screen is capable of passing 8 mgd but cannot be used for normal duty service due to impacts on solids processing and disposal.
Primary Clarification[1]	Maximum Month Flow Peak Hour Flow	2.8 mgd Max Month; 6.9 mgd Peak Hour	2.8 mgd Max Month; 6.9 mgd Peak Hour	Based on conventional design criteria of 1,000 gpd/sf under maximum month conditions and 2,500 gpd/sf under peak hour conditions; firm capacity based on one clarifier in service, providing capacity for 50% of total design flow.
Activated Sludge	Maximum Week Oxygen Demand[2]	2.600 lb/day Primary Effluent BOD	5,200 lb/day Primary Effluent BOD	Based on conventional design criteria of a maximum diurnal peak oxygen uptake rate of 50 mg/L/hr; firm capacity based on one aeration basin in service.
Secondary Clarification	Total Suspended Solids Loading	96,400 lb/day TSS (equivalent to 2.2 mgd, 50% RAS, 3,500 mg/L MLSS	192,900 lb/day TSS (equivalent to 2.2 mgd, 50% RAS, 3,500 mg/L MLSS	Based on conventional design criteria of 25 lb/day/sf solids loading under maximum month conditions and 40 lb/day/sf under peak hour conditions; firm capacity based on one clarifier in service.
Filtration	Average Day Flow Peak Hour Flow	2.3 mgd Average Day 4.6 mgd Peak Hour	3.4 mgd Average Day 6.8 mgd Peak Hour	Based on conventional design criteria of 2 gpm/sf under average day conditions and 4 gpm/sf under peak hour conditions; firm capacity based on two filters in service.
UV Disinfection	Peak Hour Flow	8 mgd	8 mgd	Based on stated design criteria
Gravity Belt Thickening	Maximum Week Primary and WAS Flow	267 gpm (equivalent to 4.5 mgd MWWWF)	534 gpm (equivalent to 7.7 mgd MWWWF)	Based on stated design criteria and 40 hour/week operation; firm capacity based on one GBT in service
Aerobic Digestion	Maximum Month Solids Loading	6,500 gpd (equivalent to 1.7 mgd MMWWF)	12,900 gpd (equivalent to 3.4 mgd MMWWF)	Based on conventional design criteria of 40-day detention time at a temperature of 20°C or greater under maximum month conditions; firm capacity based on one digester in service.
Biosolids Storage	Maximum Month Digested Sludge Flow	1,400 gpd (equivalent to 0.4 mgd MMWWF)	1,700 gpd (equivalent to 0.5 mgd MMWWF)	Based on design criteria of 240 days' storage; firm capacity based on four tanks in service.

1. Total capacity based on operation of both primary clarifiers, which is currently not possible due to limitations in primary sludge piping.
2. Driven by primary effluent BOD

A spreadsheet hydraulic model was also created to develop a hydraulic profile of the plant from the raw sewage influent through the outfall. A range of flows was evaluated to determine the flow at which process control of each unit process is impaired (i.e., submerging a weir or exceeding allowable submergence on a Parshall flume), and the flow at which basins, channels, or other structures are flooded. Table ES-3 shows the influent flows at which control elements are submerged and structures are overtopped at key process locations.

It is important to understand that the "Maximum Process Flows" shown in Table ES-4 are not operating flows, but theoretical maximum flows at which point key hydraulic elements are submerged.

Table ES-4. Estimated Capacity of Hydraulic Elements, mgd

Flow Control Element/Structure	Maximum Process Flow, mgd	Maximum Overtopping Flow, mgd
Fine screen	9.4	9.4
Primary Clarifiers	16.1	17.2
Aeration Basins	17.5	18.1
Secondary Clarifiers	16.2	17.2
Sand Filters	9.9	9.9
UV Disinfection Channel	16.2	17.5

Treatment Performance

Since 1998, with the exception of one period of process upset in May and June of 1998, the plant has not violated permit limits for carbonaceous BOD (CBOD)[2] or TSS. CBOD and TSS concentrations are often in the range of 1 to 3 mg/, and are typically below 5 mg/L. Although the plant is not required to remove ammonia nitrogen (nitrify), effluent concentrations were consistently below 2 mg/L during the summer permit seasons of the years evaluated. Effluent total phosphorus is also low during the summer (under 5 mg/L).

Although the plant did not exceed the monthly median permit limit for *E.Coli* during the period examined, there have been several exceedences of the single sample permit limit of 406 CFUs per 100 mL. Plant staff feel that this is due to programming problems with the UV system and not the capacity or effectiveness of the UV system itself.

Regulatory Review

The Wilsonville facility discharges most of its effluent to the Willamette River. Some of the treated effluent is also used for nonpotable process needs onsite. Liquid biosolids are applied to local agricultural land as a soil amendment. Regulatory requirements dictating the level of treatment provided at the plant are based on current regulations and current permit requirements, as well as anticipated future requirements.

Water Quality Regulations and Requirements

The Clean Water Act and the Endangered Species Act are the key pieces of federal legislation governing the water quality requirements for effluent discharged to the Willamette River. The City's NPDES permit, issued under the Clean Water Act, currently regulates the City's effluent CBOD, TSS, *E. Coli*, pH, copper, cadmium, temperature, and chlorine residual. With the possible exception of the metals, which City is attempting to have decreased or eliminated through a separate effort, these limits are anticipated to remain in effect. For CBOD and TSS,

[2] Plant influent is monitored for BOD, however permit compliance is based on effluent concentration of CBOD, which is the carbonaceous component of BOD (excluding oxygen demand associated with oxidizing ammonia to nitrate)

which are mass-based limits, this means that effluent concentrations must decrease (and treatment performance therefore improve) as flows to the treatment plant increase.

While DEQ has not indicated that future Wilsonville permits will include an ammonia-nitrogen limit, other dischargers on the Willamette do have ammonia limits in their NPDES permits. Furthermore, changes in the characteristics of the influent sewage brought on by the change in potable water supply could impact the City's ability to nitrify during the summer, possibly leading DEQ to conclude that Wilsonville has a "reasonable potential" to exceed toxicity standards for ammonia. Therefore, future facilities should be designed to allow for nitrification, and adequate space reserved to achieve a fully nitrified effluent. There is no indication that a total nitrogen or phosphorus limit will be imposed in the future, however future improvements should not preclude implementation of denitrification and phosphorus removal.

A Mixing Zone Study conducted in conjunction with this Facility Plan shows that the City does not currently cause a measurable increase in stream temperature when the ambient temperature in the river is over 68°F. A measurable increase is predicted under conditions when the River temperature is low, however this increase should not impair the biological integrity of threatened and endangered species (steelhead and chinook salmon). A temperature total maximum daily load (TMDL) for the Middle Willamette River is currently under development which could impact Wilsonville's discharge. The alternatives analysis considers addition of an outfall diffuser to mitigate for temperature discharges from the wastewater treatment plant should this be required in the future.

Table ES-5 summarizes the anticipated effluent concentrations for the Wilsonville facility at current (2001) flow rates, and at projected 2020 and ultimate build-out flow rates under the high flow projection. If flow rates are lower than the high projection, effluent requirements will be less stringent than in Table ES-5.

Table ES-5. Projected Effluent Quality Requirements

Summer Permit Season (May 1 - October 31)									
	Year 2001			Year 2020			Ultimate Build-out		
	Monthly	Weekly	Daily	Monthly	Weekly	Daily	Monthly	Weekly	Daily
$CBOD_5$, mg/L[2]	10	15	NA	4.4	6.1	NA	3.0	4.2	NA
TSS, mg/L[2]	10	15	NA	4.4	6.1	NA	3.0	4.2	NA
Total P, mg/L	------- No Limit -------			------- No Limit -------			------- No Limit -------		
NH_3-N, mg/L	------- No Limit -------			------- No Limit -------			------- No Limit -------		
E. Coli, #/100 mL	126	NA	406	126	NA	406	126	NA	406
Chlorine Residual, mg/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dissolved Oxygen, mg/L	------- No Limit -------			------- No Limit -------			------- No Limit -------		
PH	6.0 to 9.0			6.0 to 9.0			6.0 to 9.0		
Copper, mg/L	0.013	NA	0.017	0.013	NA	0.017	0.013	NA	0.017
Cadmium, mg/L	0.00042	NA	0.00065	0.00042	NA	0.00065	0.00042	NA	0.00065
Other Requirements	85% removal of BOD_5 and TSS								
Winter Permit Season (November 1 - April 31)									
	Year 2001			Year 2020			Ultimate Build-out		
	Monthly	Weekly	Daily	Monthly	Weekly	Daily	Monthly	Weekly	Daily
$CBOD_5$, mg/L[2]	30	45	NA	10	13	NA	6.9	8.8	NA
TSS, mg/L[2]	30	45	NA	10	13	NA	6.9	8.8	NA
Total P, mg/L	------- No Limit -------			------- No Limit -------			------- No Limit -------		
NH_3-N, mg/L	------- No Limit -------			------- No Limit -------			------- No Limit -------		
E. Coli, #/100 mL	126	NA	406	126	NA	406	126	NA	406
Chlorine Residual, mg/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dissolved Oxygen, mg/L	------- No Limit -------			------- No Limit -------			------- No Limit -------		
pH	6.0 to 9.0			6.0 to 9.0			6.0 to 9.0		
Copper, mg/L	0.013	NA	0.017	0.013	NA	0.017	0.013	NA	0.017
Cadmium, mg/L	0.00042	NA	0.00065	0.00042	NA	0.00065	0.00042	NA	0.00065
Other Requirements	85% removal of BOD_5 and TSS								

Biosolids Regulations and Requirements

Biosolids treatment and reuse is governed by 40 CFR part 503, which are broad-based regulations addressing general requirements, pollutant limits, management practices, operational standards, monitoring frequency and record-keeping requirements, reporting practices, and pathogen and vector attraction requirements for treatment and disposal of all municipal wastewater sludges. The pathogen and vector attraction reduction requirements directly impact the type and quality of treatment provided at the treatment plant. Wilsonville's aerobic digesters provide adequate detention time and volatile solids destruction to produce Class B biosolids.

Class B biosolids require the City to follow site restrictions that have limited the number of land application sites available, particularly during the wet winter season. In the last few years, the number of acres permitted for biosolids application by the City has dwindled and constrained plant operations. There is some indication that DEQ may cease to approve winter application sites in the future.

EPA and DEQ recognize a higher level of treatment that further reduces pathogen content, resulting in a product called Class A biosolids. Because of the additional treatment provided, land application of Class A biosolids is not subject to the same site restrictions as Class B land application. Treatment processes such as drying, composting, lime stabilization, thermophilic aerobic digestion, and prepasteurization are recognized to produce Class A biosolids.

Reuse Regulations and Requirements

Water quality requirements for reuse are defined in the Oregon Reuse Rules. DEQ classifies reclaimed water into four categories: Level I through Level IV. Level IV treatment requirements are the most stringent, allowing reclaimed water to be used on areas open to general public contact (except during the irrigation cycle). Level IV treatment requires chemical coagulation, which is currently not provided at the plant. Offsite reuse would also require maintaining a chlorine residual, which cannot currently be provided.

Alternatives Analysis

A wide range of alternatives was considered for expanding the Wilsonville facility to meet future capacity and effluent quality requirements. Alternatives were identified and developed through a staged process that included the following steps:

- Develop evaluation criteria
- Brainstorm alternatives
- Screen alternatives
- Detailed analysis of alternatives
- Evaluation of alternatives.

Table ES-6 below shows the alternatives and features identified during two brainstorming sessions with City staff. Those alternatives that are crossed out were eliminated during the initial screening because they were not feasible or compatible with the City's long-term goals. The remaining alternatives received detailed evaluation, and were compared with each other and rated based on evaluation criteria developed jointly with the City.

Table ES-6. Wilsonville Facility Alternatives

Process Area	Alternatives	Features
Headworks	• Additional 1 mm internally-fed fine screens; no separate grit removal	• Enclose headworks • Add mechanized gates at the splitter box • Address problem with grit buildup prior to the fine screen
Primary Treatment	• Retrofit existing tanks to serve only as primary clarifiers; add new circular primary clarifiers • Maintain existing clarifiers in current configuration and add new circular primary clarifiers • Add high rate sedimentation • ~~No primary clarifiers~~	• Address piping modifications required at primary clarifier no. 2 • New clarifiers will have stainless steel mechanisms
Secondary Treatment	• Expand nitrifying activated sludge • Membrane bioreactor (MBR) • Biological aerated filter (BAF) • ~~Sequencing batch reactor (SBR)~~	• Examine step feed to increase basin capacity • Compartmentalize basins for improved redundancy • Address alkalinity drop in new drinking water source • Address problems with anoxic manhole (air entrainment, scum recycling) • Identify additional volume required for implementation of full biological nutrient removal (BNR) • Optimize selector size • Address operational issues: foam trap at entrance to basin, algae on secondary clarifiers, need for level sensors
Effluent Filtration	• Improved sand filters • ~~Fuzzy filters – reuse only~~ • Fuzzy filters – entire plant flow • Ballasted sedimentation (Actiflo®) • No filters (with MBR option)	• Investigate chemical addition requirements for reuse
Disinfection	• Medium pressure UV • Low pressure UV • Sodium hypochlorite/ bisulfite • Peracaetic acid	
Outfall	• Add second outfall • Provide detention for peak flows • Pump through existing outfall	• Add diffuser to existing outfall
Thickening	• Continue use of gravity belt thickeners	
Solids Processing	• Class B digestion and hauling to Eastern Oregon • ~~In-vessel composting~~ • ~~Lime stabilization~~ • ~~Heat treatment~~ • Pasteurization • Autothermal thermophilic aerobic digestion ~~(ATAD)~~ • Drying • ~~Class B digestion/land application on poplar plantation~~	• Need to determine when anaerobic digestion becomes more cost-effective • Need to investigate the potential markets for Class B vs. Class A biosolids • Need to add level sensors to digesters • Need to add dewatering and dewatered cake storage

Alternatives were developed for two projected flow and loading conditions: an interim expansion to provide capacity for 4 mgd ADWF (8,700 lb/day BOD and 8,600 lb/day TSS) projected to occur in approximately year 2015, and an ultimate expansion for build-out flows of 7 mgd ADWF (14,900 lb/day BOD and TSS). The ultimate build-out case provided for a long-term economic and non-economic comparison, and identified ultimate facility requirements and space needs.

Reuse Program

The City has initiated an effluent reuse program as documented in a plan submitted to DEQ in May 2000. In the Plan, the City outlined its plans to implement a two-phase reuse program to provide Level IV reuse water for irrigation of Boones Ferry Park and Memorial Park, sewer jet rodding, and storm sewer catch basin cleaning. DEQ approval of the plan was conditional based on adding chemical coagulation and maintaining a 1 mg/L chlorine residual. These conditions have not been met, and therefore the program has not been implemented.

In addition to providing a community benefit, the Facility Plan examined two other reasons that the City may choose to implement reuse:

1. Reduce hydraulic loading to the outfall during the winter peak flow season
2. Reduce contaminant loading to the river during the summer permit season

Meeting these goals requires the City to divert 3 to 5 mgd of flow, respectively, to beneficial reuse demands at ultimate build-out. This is equivalent to over 2,100 acres of turf irrigation required to divert 5 mgd of flow during the summer, or 3 mgd of industrial demand required to divert flow during the winter.

Implementing a reuse program for irrigation of limited public facilities does not impact the level of treatment required for discharge to the Willamette, and does not significantly affect the hydraulic capacity required at the plant. Because the plant does not use chlorine, complying with DEQ requirements for a Level IV reuse system requires constructing a chemical additional process solely to serve the reuse program. Therefore, the City has elected to not pursue Level IV reuse at this time.

Site Master Planning

In addition to providing adequate treatment for future needs, it is imperative that the treatment plant facilities fit on the existing plant site in a manner that optimizes plant operations and is acceptable to the surrounding community. Site layouts were evaluated based on the general site planning criteria described below:

- **Setback and Height Restrictions.** Minimum setback distances are 30 ft at the front and rear and 10 ft on the sides as measured from the property lines, with a maximum structure height of 35 ft.

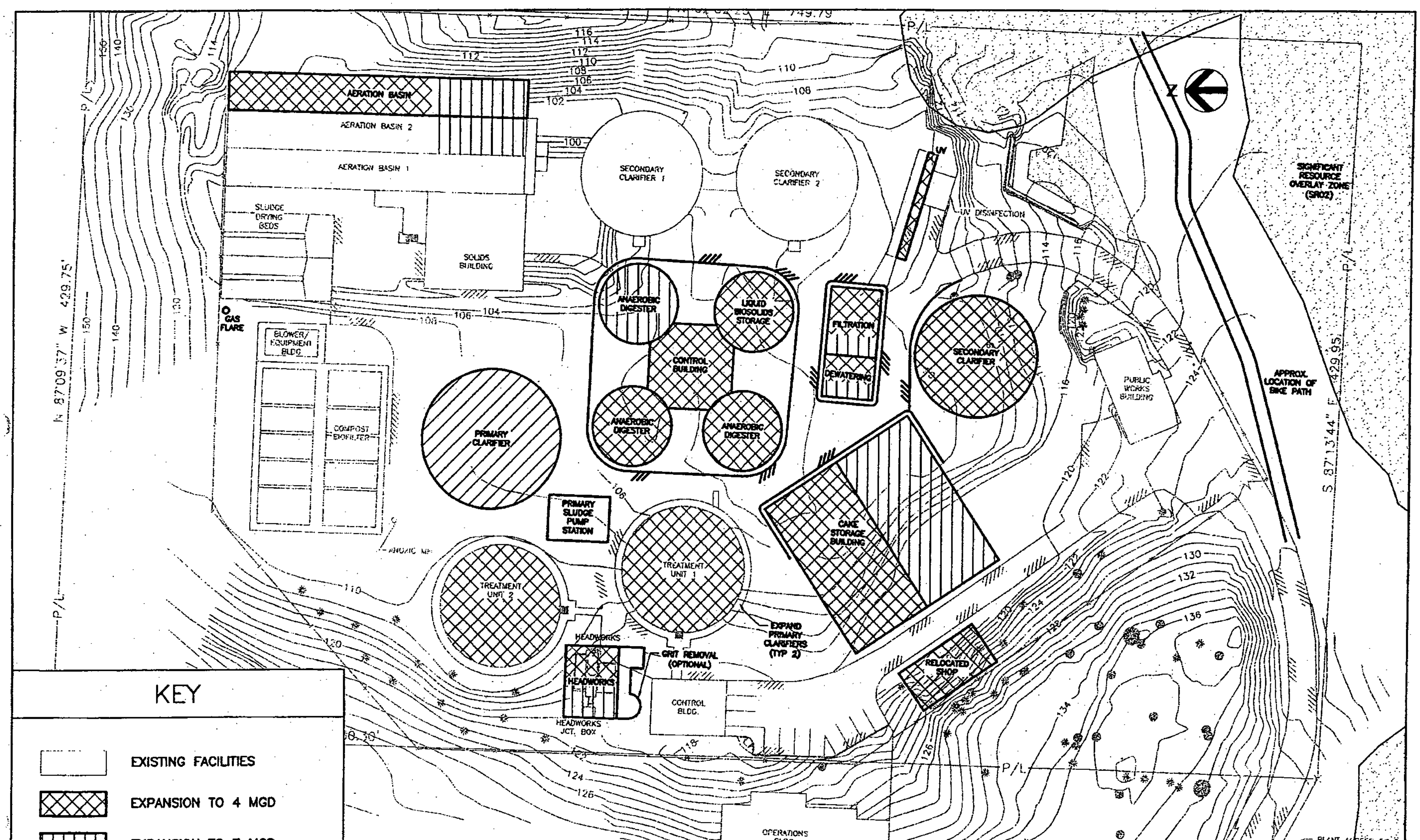
- **Significant Resource Overlay Zone and Bicycle Path.** The southwest corner of the plant includes a Significant Resource Overlay Zone (SROZ), which is a designated natural resource area. Construction in this area would be difficult to permit, and should be avoided if at all possible. There is also a relatively new bike path located on the City's property in the southwest corner of the plant.

- **Hydraulics.** Energy efficiency is a priority for the City; site plans should allow the City to continue to rely on gravity flow through the plant to the extent possible.
- **Topography.** Steep slopes exist on most of the plant's boundaries. These slopes may prohibit construction, or at a minimum make construction difficult and costly.
- **Geotechnical Issues.** Groundwater at the plant site is high, and previous construction projects have required extensive dewatering. Large boulders have also been encountered in previous excavations, and previous geotechnical investigations revealed the presence of debris such as large pieces of concrete, reinforcing steel , and other debris.
- **Proximity to Existing Structures.** Some of the proposed structures will be constructed below grade and involve a significant amount of excavation. Due to the small area available for construction, sheet piling and shoring will be required to protect existing structures. Of particular concern are dewatering and the problem of driving sheet piling in areas known to contain large boulders.
- **Aesthetics.** Portions of the treatment plant are visible to nearby residents and to traffic on nearby Interstate 5. Blending of the wastewater facilities into the surroundings will be an important consideration for future construction.
- **Potential Odor Impacts.** Solids handling and processing facilities and the headworks will have the potential to generate the most odors at the plant. These facilities will be enclosed and foul air treated, however they should also be located away from residential houses to the extent possible.
- **Lighting Impacts.** The off-site lighting impacts should be minimized.
- **Noise Impacts.** Enclosing noisy equipment in structures will minimize noise impacts.
- **Access and Operational Convenience.** Access and parking for biosolids hauling trucks, vactor trucks, chemical delivery trucks, and maintenance vehicles is crucial for plant operations. Roads and access ways with adequate turning clearance must be provided through the plant.
- **Construction Phasing/Sequencing.** Continued operation of existing treatment facilities during the construction of new facilities is required to meet the City's permit.

Based on these and other process-specific criteria described in Chapter 6, two layouts were developed showing the recommended processes from the alternatives evaluation. While both of the alternatives meet the site planning criteria, Alternative 2, shown in figure ES-2, is the preferred alternative. This alternative has more favorable hydraulics and allows easier access for biosolids hauling trucks. Construction sequencing is also slightly simplified with Alternative 2.

Recommended Plan

The Recommended Plan identifies those improvements needed immediately to meet short-term capacity and process control needs, and also provides a long-term plan for ultimate expansion of the plant. Figure ES-3 shows a simplified flow chart for the proposed liquid stream treatment, and Figure ES-4 shows a similar flow chart for solids treatment. Each of these figures is color coded to indicate when new or modified facilities must be implemented.



KEY

(blank box)	EXISTING FACILITIES
(cross-hatched box)	EXPANSION TO 4 MGD
(vertical-hatched box)	EXPANSION TO 7 MGD

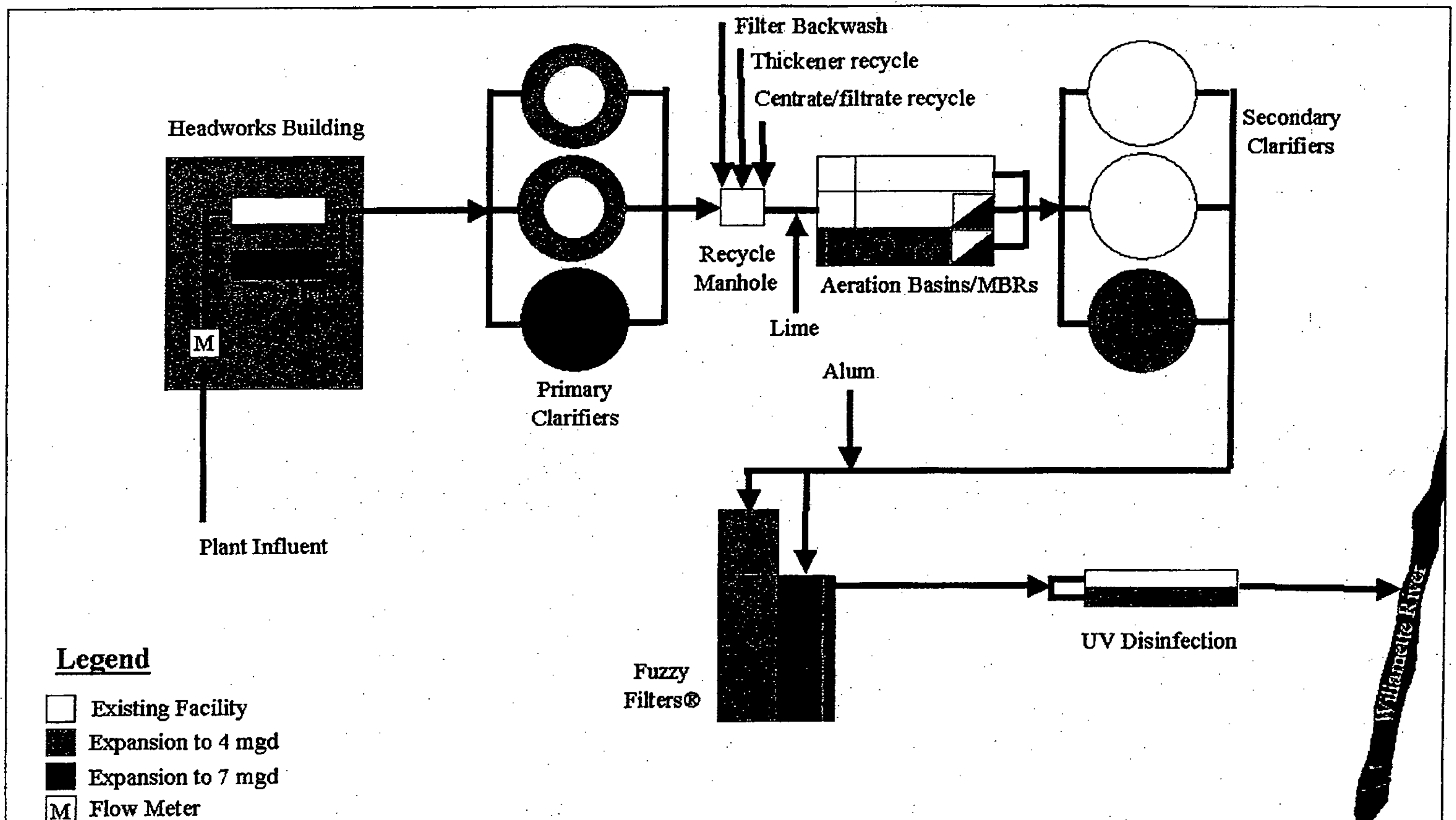
SCALE: 1"=50'

HDR Engineering, Inc.

Wastewater Facility Plan Amendment

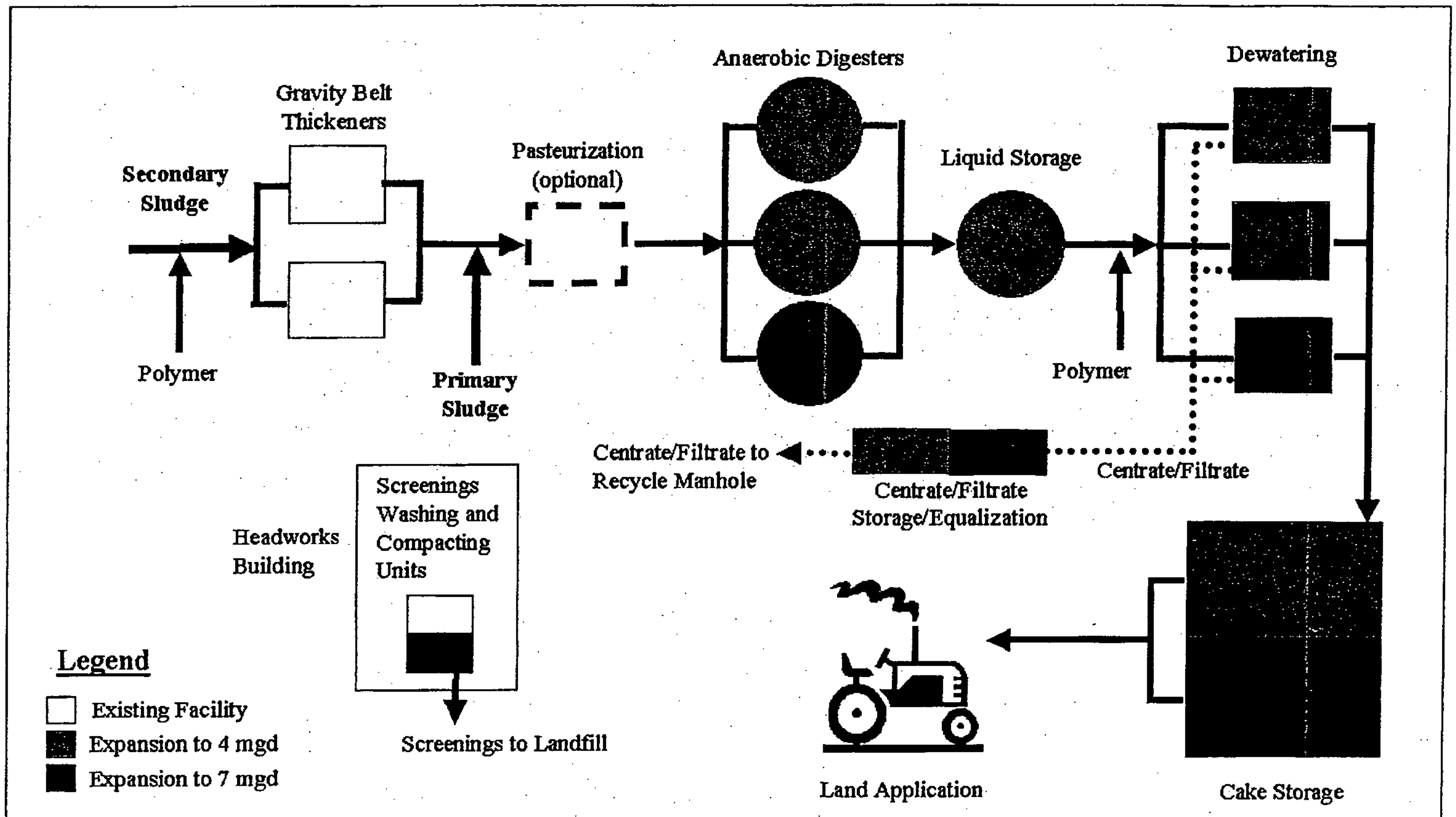
FIGURE ES-2

PROPOSED SITE PLANNING ALTERNATIVE 2



HDR | City of WILSONVILLE in OREGON | City of Wilsonville
Wastewater Treatment Facilities Plan | Liquid Treatment Schematic at Buildout

Figure ES-3



City of Wilsonville
Wastewater Treatment Facilities Plan

Solids Treatment Schematic at Buildout
Figure ES-4

The recommended plan also provides flexibility to incorporate future process changes. Space is allocated to add equipment to produce Class A biosolids, and the secondary treatment process can be operated to achieve biological phosphorus removal should these approaches prove necessary or cost-effective.

Additional Recommendations

Subsequent to completion of the Draft Facility Plan, additional analysis of biosolids management options was conducted. This evaluation was prompted by the loss of approved sites to land apply biosolids during the winter. A technical memorandum was prepared to evaluate requirements associated with three potential changes in the City's biosolids management program: contracting biosolids hauling and land application to a private vendor, purchasing property for offsite biosolids storage and land application, and providing onsite biosolids drying using a belt dryer system (BDS). This analysis recommended that the City ultimately provide onsite drying to produce a Class A product and significantly reduce the volume of solids that must be stored during the winter. These improvements substantially increase the long-term reliability of the City's biosolids management program.

Unit Process Needs

The following sections describe recommended facilities for each unit process.

Headworks

The long-term recommendation for the headworks is to provide an enclosed structure for odor control, continuing the current practice of fine screening followed by screenings washing/compaction. Initially, a new influent flow split structure will need to be constructed to direct flow to either the existing screen or a new 10 mgd rotary drum screen. A redundant screenings washing and compaction unit will also be added. Ultimately, the existing bar screen will need to be replaced with a 10 mgd rotary drum screen, giving the plant three rotary drum screens.

Primary Treatment

Additional primary clarifier capacity is a critical need at the plant due to the lack of firm primary treatment capacity. Expansion of the primary treatment facilities will consist of demolishing the existing aerobic digesters and using the structures for primary clarification only. Retrofitting the two existing structures to serve as primary clarifier only will provide adequate capacity until at least 2020. Ultimately, a third primary clarifier will be constructed for ultimate build-out.

Currently, only one primary clarifier is used due to limitations in primary sludge piping. Modifying the primary sludge piping to provide more flexibility will delay the need for retrofitting the primary clarifiers.

Secondary Treatment

Continuation of the current activated sludge technology will present challenges to site planning in the future. The recommended secondary treatment process involves converting a portion of the aeration basins to MBRs in order to minimize footprint and maintain flexibility for future implementation of denitrification or biological phosphorus removal. The initial expansion can be achieved by adding a third conventional activated sludge basin and third secondary clarifier.

Ultimately two of the activated sludge basins will be converted to MBR basins. One activated sludge basin and secondary clarifier will continue to operate in the conventional mode, and will be used to buffer peak flows to the MBR basins.

Additional short-term improvements are needed. These include:

- Addition of a lime silo and lime feed system to support complete nitrification
- Enhancements to the existing basins to provide step feed capabilities for process stability and to provide a small increase in capacity
- MBR pilot testing to confirm design parameters for modifications of the activated sludge basins

Effluent Filtration

The recommended plan includes pilot testing Fuzzy Filters to replace the existing mono-media sand effluent filters. Following pilot testing to confirm filter performance and design criteria, a new structure will be constructed to house the initial expansion of fuzzy filters as well as pumping facilities for filtration. Additional filter modules will be added to serve ultimate build-out needs. Chemical feed facilities will also be added for coagulation.

Disinfection

Medium pressure UV disinfection will continue to be used at the plant. A second UV disinfection channel will be constructed, followed by improvements to the existing channel to replace the Parshall flume with magnetic flow measurement and increase the capacity of the channel to over 10 mgd. This change allows flow to be split evenly to the two disinfection channels under all conditions, but requires the addition of flow measurement upstream of disinfection.

Effluent Discharge

The recommended plan for effluent discharge involves continued use of the existing outfall to the Willamette River. No additional outfall capacity is required initially, or through ultimate build-out if peak flows remain under 16 mgd. If additional capacity is required in the future, the City should evaluate options available to upsize the existing outfall. These options should be weighed against future regulatory and permitting issues associated with construction of a second outfall. The existing outfall could also be retrofitted with a diffuser in the future to provide additional dilution if necessary to meet water quality requirements.

Sludge Thickening

The recommended plan for sludge thickening involves continued use of the existing gravity belt thickeners for waste activated sludge (WAS) thickening and continued thickening of primary sludge in the primary clarifiers. No improvements are required through ultimate build-out.

Solids Stabilization

The recommended plan includes constructing new anaerobic digesters and associated control features for solids stabilization. Initial construction is triggered by the primary clarifier construction, and will include two anaerobic digesters, one digested sludge storage tank, and associated systems. A third anaerobic digester will be required for ultimate build-out.

Solids Dewatering and Storage

The Draft Facility Plan recommended pilot testing several different technologies for digested sludge dewatering, constructing a new dewatering facility using the optimum treatment technology, and providing a new dewatered cake storage building with loadout facilities and odor control. This storage building would be sized to provide six months of onsite storage of dewatered biosolids, and would be constructed in two phases.

The subsequent analysis included in Appendix F recommended that a minimal amount of dewatered sludge storage be constructed, and that Class A treatment technologies such as the Belt Dryer System (BDS) continue to be evaluated. While adding dewatering will significantly increase the flexibility in the City's biosolids management program, the local Class B land application program is not likely to be a long term solution for beneficial reuse of the City's biosolids. Proposed regulatory changes may significantly increase the amount of land required for Class B land application due to a shift in focus to agronomic phosphorus application rates. In the extreme, land application of Class B biosolids may be disallowed in the future. To prepare for these changes, the City should implement treatment plant improvements in a manner that facilitates moving to Class A treatment in the future. Drying systems such as the BDS can easily be added downstream of dewatering, producing a Class A product that maximizes the City's flexibility for long-term beneficial reuse.

Phasing and Implementation

To address critical capacity and performance issues while maintaining manageable construction projects, recommended improvements are divided into three implementation phases. Table ES-7 identifies the specific improvements included in each phase.

Table ES-7. Elements of Implementation Phases

Phase 1	
• Biosolids Management Plan	• Headworks Expansion
• Detailed Plant Odor Analysis	• Biosolids Dewatering
• Evaluation of Willamette River TMDL	• Filtration Expansion
• MBR Pilot Study	• Lime Feed System
• Dewatering Pilot Study	• Step Feed Improvements
• Filtration Pilot Study	• Primary Sludge Piping Improvements
• Phase 1 Predesign	• Temporary Dewatered Sludge Storage
Phase 2	
• Primary Treatment Improvements	• New Anaerobic Digestion Facilities
• Secondary Treatment Expansion	• Liquid Biosolids Storage Tank
• Disinfection Expansion	• Permanent Dewatered Sludge Storage
Phase 3	
• Headworks Expansion	• Filtration Expansion
• New Primary Clarifier	• New Anaerobic Digester
• Secondary Treatment Conversion to MBR	• Dewatering and Cake Storage Expansion

Figure ES-5 shows the schedule for implementation of improvements. This schedule is based on the low flow projections shown in Figure ES-1. The implementation schedule in the Draft Facility Plan was originally produced based on approval of the Facility Plan in late 2002. Activities shown in purple illustrate the revised schedule for initial activities based on actual Facility Plan approval in 2004.

While the Recommended Plan identified three phases of improvements, the actual timing of improvements needed in each unit process area is driven by a combination of the current unit process capacity and influent flow, BOD loading, and TSS loading. To help the City track influent wastewater characteristics and plan for required capacity expansions, a series of charts was prepared to illustrate the current and projected future capacity of each unit process following the planned incremental expansions, and compare this capacity with projected BOD, TSS, or flow based on the range of growth projections evaluated. Figure ES-5 below illustrates one such capacity chart examining digestion capacity. Based on the capacity analysis discussed in Chapter 3, digestion capacity at Wilsonville is driven by maximum month wet weather TSS loading. Therefore, the capacity chart in Figure ES-5 compares the current capacity in maximum month wet weather TSS loading with future capacity after a series of digester expansions. The City can easily track actual maximum month wet weather TSS loading and determine when to begin planning and design of the next digester expansion.

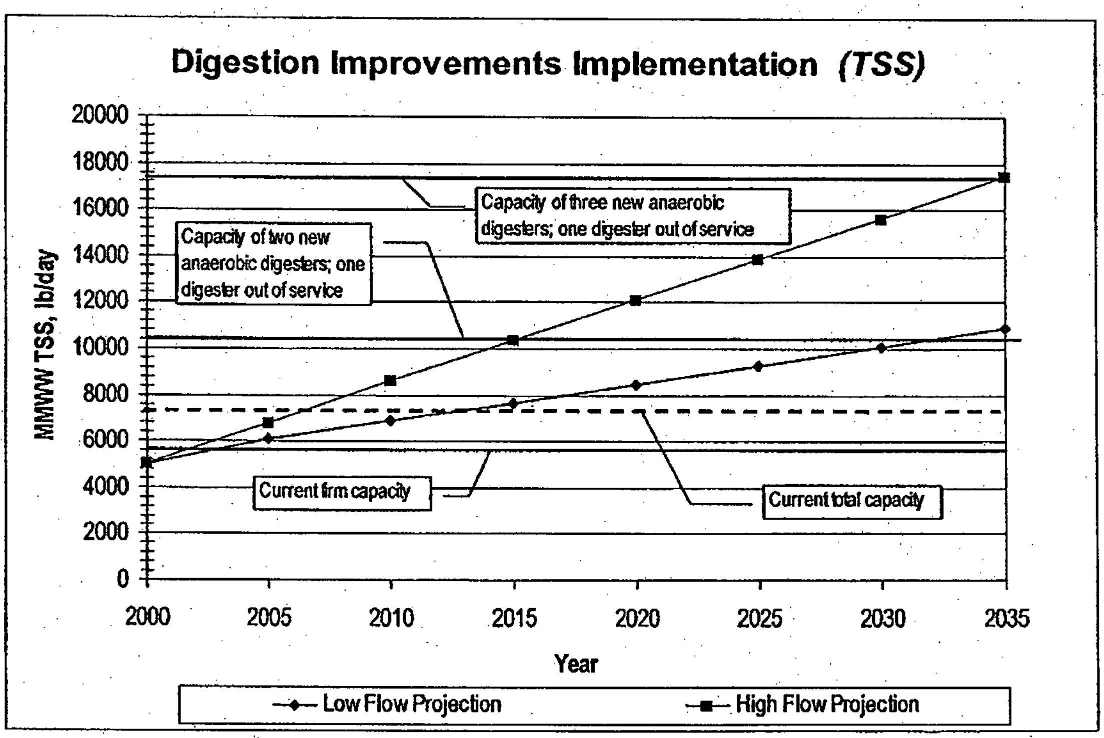
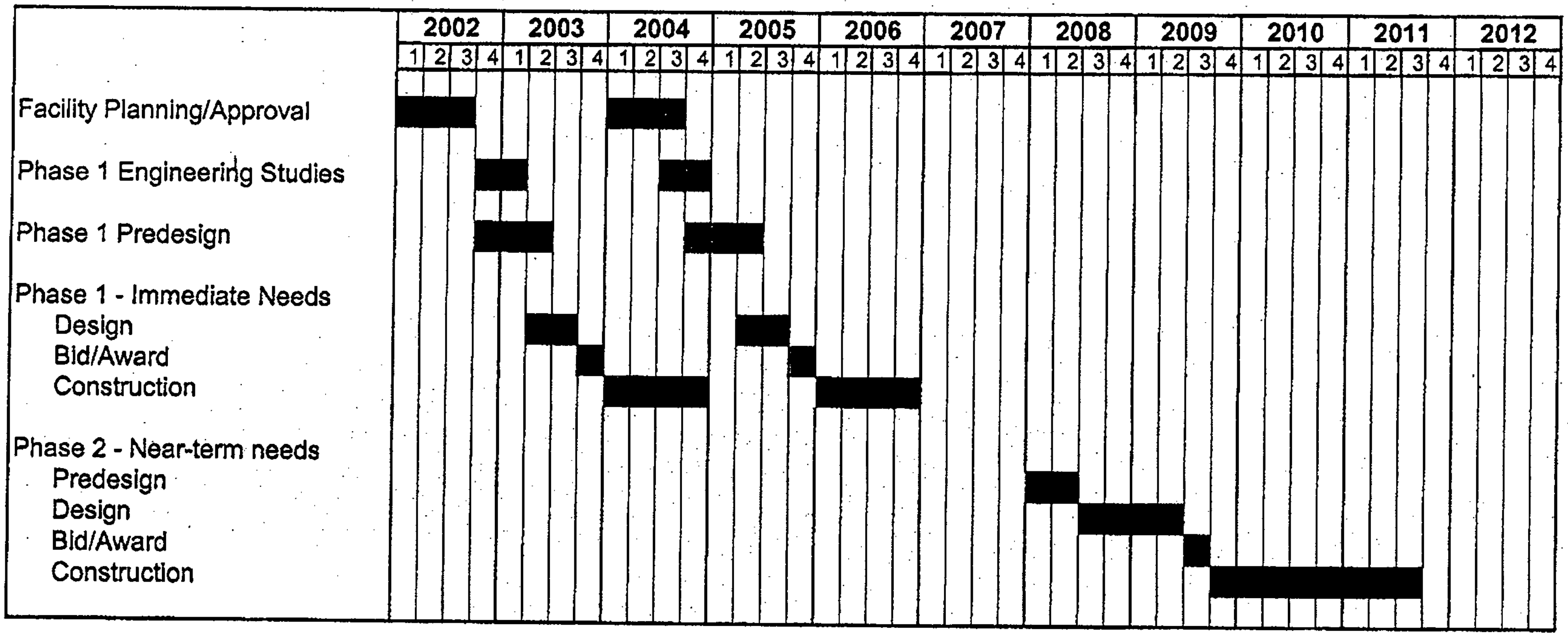


Figure ES-5. Schedule for Implementation of Phase 1 and Phase 2 Expansion



Project Costs

The projected project costs for the Phase 1, 2, and 3 expansions are presented in Table ES-8. Biosolids dewatering costs are based on installation of belt filter presses; actual costs will depend on the type of technology selected. The costs include contingency for miscellaneous costs not itemized, mobilization and bonds, contractor overhead and profit, and engineering, legal, and administrative costs. Costs are presented in 2002 dollars and reflect costs as if all facilities were built today. Actual bonding needs will require consideration of inflation impacts and financing costs.

Table ES-8. Estimated present worth costs for plant expansions (Costs in $1,000s).

Project Element	Phase 1	Phase 2	Phase 3
Headworks	$1,680	$0	$795
Primary Treatment	$125	$3,275	$2,575
Secondary Treatment	$425	$9,669	$20,757
Filtration	$2,690	$0	$1,415
Disinfection	$0	$1,431	$0
Solids Stabilization	$0	$4,812	$1,806
Biosolids Dewatering	$3,840		$1,099
Liquid and Cake Storage	$150	$4,038	$2,878
Sludge Haul/Spread Equip.	$180		
Relocate Maintenance Shop	$0	$550	$0
Site Management	$446	$1,189	$1,566
Landscaping and Mitigation	$446	$1,189	$1,566
Total	**$9,981**	**$26,153**	**$34,458**
ENR-CCI index 3581; markups of 30% for contingency, 8% for mobilization and bonds, 15% for construction contractor overhead and profit, 20% for sitework, and 25% for engineering, legal, and administrative were used. A 5% site management cost was applied to account for the difficulty in managing excavation, equipment storage, and general construction coordination on a small site.			

The total capital cost of the BDS and associated facilities evaluated after completion of the Draft Facility Plan is approximately $10.1 million. However, construction of these facilities eliminates the need for the dewatered cake storage recommended in Table ES-8 (approximately $7.1 million). Therefore, the incremental cost of the BDS is $3.1 million. This investment provides the following benefits to the City:

- Reduced footprint (5,000 sf total for new building and storage, compared with 10,000 sf for dewatered cake storage)
- Class A biosolids product, which reduces the risk associated with the biosolids management program.

Wilsonville
Wastewater Facility Plan

Chapter 4
Pages 4-13 through 4-20

Attachment E
To
June 8, 2005 Planning Commission
Work Session Staff Report
LP-2005-05-00008

Wastewater Facility Plan Amendment related to the handling of bio-solids and preferred alternatives to producing Class "B" sludge. (Remand from City Council.)

Table 4-5. Treatment and monitoring requirements for Level IV reclaimed water (from Table 1 of OAR 340 Division 55).

Category	Requirement for Level IV
Biological Treatment	Required
Disinfection	Required
Clarification	Required
Coagulation	Required
Filtration	Required
Total Coliform (organisms/100 mL)	
7-day Median	2.2
Maximum	23
Sampling Frequency	1 per day
Turbidity (NTU)	
7-day Median	2
Maximum	5
Sampling Frequency	Hourly

NA = Not applicable

Biosolids Regulations and Requirements

Currently, the City of Wilsonville produces liquid Class B biosolids. Due to problems associated with procuring and maintaining application sites, Wilsonville is interested in producing Class A biosolids. This section discusses both Class A and Class B biosolids regulations, as well as regulatory trends and monitoring requirements. Additional analysis of biosolids-related regulations was completed along with the additional biosolids analysis conducted after completion of the Draft Facility Plan. This information is included in Appendix F.

Regulations and Regulatory Trends

In February 1993, EPA issued regulations in 40 CFR part 503 which govern treatment and disposal of sludge generated by publicly owned treatment works (POTWs). These rules are entitled "Standards for the Use or Disposal of Sewage Sludge." The state of Oregon has promulgated regulations in Oregon Administrative Rules (OAR) 340-50, titled "Land Application of Domestic Wastewater Treatment Facility Biosolids, Biosolids Derived Products, and Domestic Septage," which address land application of biosolids.

Future biosolids issues include agronomic application rates, dioxins, pesticides, and toxic organic chemicals. EPA may consider requirements agronomic rates of phosphorus application in addition to existing nitrogen limits, but this is not anticipated in the near future. In December, 2001, EPA decided against regulating dioxins and dioxin-like compounds in biosolids based on analytical data from a survey suggesting low levels across the US. However, public pressure may force EPA to revisit metals, pesticides, and other toxic organic compounds in the future.

Biosolids Quality Requirements

The 503 regulations are broad-based, addressing general requirements, pollutant limits, management practices, operational standards, monitoring frequency and record-keeping requirements, reporting requirements, and pathogen and vector attraction requirements for treatment and disposal of municipal wastewater sludges. All common disposal practices, including land application, surface disposal, and incineration are covered in the regulations. From a sludge treatment perspective, major impacts of the 503 regulations include pathogen reduction requirements, vector attraction reduction (VAR), limits on metals content, and operations and performance requirements for treatment processes.

Pathogen Reduction

The 503 regulations create two categories of biosolids with respect to pathogens: Class A and Class B. Class A biosolids are an essentially pathogen-free product that can be given to the public and/or applied to lawns and home gardens. Class B biosolids are not a pathogen-free product, but can be applied to agricultural lands, forest land, or reclamation sites. Regulations require that crop harvesting, animal grazing, and public assess be restricted for specific periods of time after the application of Class B biosolids.

Treatment processes providing pathogen control in municipal sewage sludge are divided into "Processes to Significantly Reduce Pathogens" (PSRP) and "Processes to Further Reduce Pathogens" (PFRP). To meet the Class B pathogen reduction measures, sludge must be treated with a PSRP (or an equivalent process accepted by the permitting authority), or the biosolids must meet certain requirements for the density of either fecal coliform or total coliform. To produce a Class A biosolids, generators must also meet requirements regarding the density of fecal coliform and either treat sludge with a PFRP or analyze biosolids to show that specified enteric virus and helminth ova levels have been attained. PSRP and PFRP processes for Class B and Class A biosolids are summarized in Table 4-6 and Table 4-7, respectively.

Table 4-6. Processes to Significantly Reduce Pathogens (for Class B biosolids)

Process Type	Operational Requirements
Aerobic Digestion	40-day solids retention time at 68 °F, or 60 days at 59 °F
Anaerobic Digestion	15-day solids retention time at 95 to 131 °F, or 60 days at 68 °F
Composting	5 days at 104 °F and 4 hours at 131 °F
Lime Stabilization	pH > 12 for 2 hours
Air Drying	3 months total drying time and 2 months at > 32 °F

Table 4-7. Processes to Further Reduce Pathogens (for Class A biosolids)

Process Type	Operational Requirements
Composting	3 days at 131 °F for in-vessel or aerated static pile; 15 days at 131 °F for windrow, with 5 turnings
Lime Stabilization	pH > 12 for 72 hours with temperature at 126 °F for 12 hours of the high pH period; air dry to 50% solids
Heat Drying	Greater than 90% solids
Heat Treatment	30 minutes at 356 °F
Thermophilic Aerobic Digestion	10 days at 131 to 140 °F
Beta Ray Irradiation	1.0 megarad of beta ray irradiation
Gamma Ray Irradiation	gamma ray irradiation with Cobalt 60 and Cesium 137
Pasteurization	30 minutes at 158 °F

Vector Attraction Reduction

The 503 regulations also require vector attraction reduction (VAR) prior to disposal or land application. The purpose is to make the material less attractive to insects, rodents, and birds. Table 4-8 summarizes accepted vector attraction reduction methods. Only Methods 1 through 10 are applicable to the land application of bulk biosolids.

Exceptional Quality (EQ) biosolids can be produced by meeting the Class A pathogen content requirements and using Methods 1 through 8 of Table 4-8 to meet VAR requirements. Only general loading requirements must be met. If Class A biosolids are applied to agricultural land, VAR requirements can be met using Methods 9 or 10 (injection or disking) in Table 4-8. If Methods 9 or 10 are used, general requirements and management practices must be met. There are no site restrictions or additional management requirements for Class A biosolids.

Table 4-8. Vector Attraction Controls

Method	Description
1	Meet 38% reduction in volatile solids.
2	Demonstrate vector attraction reduction with additional anaerobic digestion in a bench-scale unit.
3	Demonstrate vector attraction reduction with additional aerobic digestion in a bench-scale unit.
4	Meet a specific oxygen uptake rate for aerobically digested biosolids.
5	Use aerobic processes at greater than 104 F for 14 days or longer.
6	Alkali addition under specified conditions.
7	Dry sludge with no unstabilized solids to at least 75% solids content.
8	Dry sludge with unstabilized solids to at least 90% solids content.
9	Inject sludge beneath the soil surface.
10	Incorporate sludge into the soil within 6 hours of application.
11*	Cover sludge placed on a surface disposal site with soil or other material at the end of each operating day.
12*	Alkali addition under more limited conditions than Method 6.

* Only applicable to surface disposal.

Since Class B biosolids may still contain a significant amount of pathogens, site restrictions apply to Class B biosolids, regardless of the vector control method used. These site restrictions specify the amount of time between biosolids application and harvesting of various agricultural crops, limit animal grazing on sites where Class B biosolids are applied, and identify measures to reduce public access and exposure to land application sites.

Pollutant Limits

The 503 regulations also establish pollutant limits for biosolids applied to land for beneficial reuse. The regulations distinguish between biosolids sold or given away in a bag or other container (such as compost), and bulk sewage sludge. Bulk sewage sludge applied to agricultural land, forest sites, public contact sites, or reclamation sites must comply with either a specified cumulative pollutant loading rate or a monthly average pollutant concentration. These values are shown in Table 4-9.

Biosolids sold or given away in a container must under all conditions have pollutant concentrations no higher than the ceiling concentrations stipulated in the 503 regulations. In addition, the biosolids must meet either the monthly average concentrations in Table 4-10, or the total pollutant load must be within certain annual pollutant loading rates. The ceiling concentrations and annual pollutant loading rates from the 503 regulations are shown in Table 4-10.

Table 4-9. Bulk Sewage Sludge Pollutant Limits

Pollutant	Cumulative Pollutant Loading Rate (kg/hectare)	Monthly Average Concentration (mg/kg)
Arsenic	41	41
Cadmium	39	39
Copper	1500	1500
Lead	300	300
Mercury	17	17
Nickel	420	420
Selenium	100	36
Zinc	2800	2800

Table 4-10. Bag/Container Sewage Sludge Pollutant Limits

Pollutant	Ceiling Concentration (mg/kg)	Annual Loading Rate (kg/hectare/365 day period)
Arsenic	75	2.0
Cadmium	85	1.9
Copper	4300	75
Lead	840	15
Mercury	57	0.85
Molybdenum	75	NA
Nickel	420	21
Selenium	100	5.0
Zinc	7500	140

NA = Not applicable

Restrictions on Application of Class B Biosolids

Due to the fact that Class B biosolids are not pathogen free, regulations establish specific restrictions on their application. A brief discussion of restrictions on the application of Class B biosolids is provided below.

Site Restrictions

Based on EPA regulations, Class B biosolids cannot be applied to lawns or home gardens, and sites must meet several criteria before application can begin. The state of Oregon has more stringent regulations in OAR 340-050-0070 including:

1. Normally, tillable agricultural land is suitable for the application of biosolids and domestic septage.
2. To be considered for biosolids or domestic septage land application, sites should meet all of the following conditions:
    a. Sites should be on a stable geological formation not subject to flooding or runoff from adjacent land.

b. At the time when liquid biosolids are applied, the minimum depth to permanent groundwater should be 4 feet and the minimum depth to temporary groundwater should be 1 foot.

c. Topography of the site should be suitable for normal agricultural operations. Where needed, runoff and erosion control measures should be constructed. In general, liquid biosolids should not be surface applied on bare soils where the ground slope exceeds 12 percent. Well vegetated sites with slopes up to 30 percent may be used for dewatered or dried biosolids, or for liquid biosolids application with appropriate management to prevent runoff.

d. Soil should have a minimum rooting depth of 24 inches. The underlying substratum to a depth of at least 24 inches should not be rapidly draining so that leachate will not be short circuited to groundwater.

e. Sites with saline and/or sodic soils should be avoided.

Some of Wilsonville's existing sites do not meet the requirements for minimum depth to groundwater on a year-round basis, therefore land application sites are at a premium during the wet, high-groundwater period. In the last few years, the number of acres permitted for winter biosolids application by the City has dwindled and constrained plant operations. There is some indication that DEQ may cease to approve winter application sites in the future.

State regulations also require that a buffer strip must be maintained that is large enough to "prevent nuisance odors or wind drift if needed." Buffer strips must also be provided along major highways, and strip size as determined by the Oregon DEQ field representative. Approximate buffer strip sizes for various application methods are as follows:

- Direct injection: no limit required;
- Truck spreading (liquid): 0 to 200 feet;
- Spray irrigation: 50 to 500 feet;
- Cake or dried solids: 0 to 50 feet.

Additional details regarding site restrictions for land application of biosolids are provided in OAR 340-050-0070.

Access and Use Restrictions

After application of Class B biosolids, crops harvesting, animal grazing, and public access is restricted. Following is a summary of restrictions[4]:

- Controlled access to bulk Class B domestic biosolids land application sites is required for at least ***12 months*** after surface application of solids. (Access control is assumed on rural private land.)[5]
- Food crops, feed crops, and fiber crops with edible parts that do not touch the surface of the soil, cannot be harvested until ***30 days*** after biosolids application.
- Federal and state regulations limit planting of crops for direct human consumption (fresh market fruits and vegetables) to ***14 months*** after application of Class B biosolids.

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[4] A Plain English Guide to the EPA Part 503 Biosolids Rule, USEPA, September, 1994.
[5] OAR 340-050-0065.

- Food crops with harvested parts below the soil surface for 4 months or longer prior to incorporation cannot be harvested until ***20 months*** after Class B biosolids application.
- Food crops with harvested parts below the soil surface for less than 4 months prior to incorporation cannot be harvested until ***38 months*** after Class B biosolids application.
- Turf grown on land where Class B biosolids have been applied cannot be harvested until ***1 year*** after application if the harvested turf will be placed on either land with a high potential for public exposure or a lawn (unless otherwise specified by the permitting authority).
- Animal grazing is prohibited for ***30 days*** after application of Class B biosolids.
- Access to land with a high potential for public exposure (e.g. park or ball field) is restricted for ***1 year*** after Class B biosolids application.
- Access to land with a low potential for public exposure (e.g. private farmland) is restricted for ***30 days*** after Class B biosolids application.

Agronomic Application Rates

One of the general requirements for the land application of biosolids is that application must be performed at an agronomic rate. This means that nitrogen application (dry weight basis) must not exceed that needed by a crop or vegetation. As defined in 40 CFR 503:

"Agronomic rate is the whole sludge application rate (dry weight basis) designed:

(1) To provide the amount of nitrogen needed by the food crop, feed crop, fiber crop, cover crop, or vegetation grown on land; and

(2) To minimize the amount of nitrogen in the sewage sludge that passes between the root zone of the crop or vegetation grown on the land to the groundwater.

Excess nitrogen applied to land could result in nitrate contamination of groundwater. The agronomic rate must be determined by considering total and available nitrogen in the biosolids and the expected yield of the crop or vegetation.

OAR 340-050-0065 states that the application rate "shall not exceed the agronomic rate for the particular cultivar grown," with agronomic rate defined as "a rate of biosolids or domestic septage which matches *nutrient* requirements for a specific crop on an annual basis." Nutrient requirements for particular crops can be obtained from the Oregon State University Extension Service. The Water Environment Research Foundation also provides guidance in the document *Estimating Plant-Available Nitrogen in Biosolids,* Project 97-REM-3, 2000. Rates also must be applied so that runoff, erosion, leaching, nuisance conditions, or groundwater contamination are prevented.

Some newer NPDES permits include conditions that specify that agronomic rates of phosphorus must not be exceeded. However, nitrogen is most commonly used to determine the agronomic rate for biosolids application. While Wilsonville is required by permit to monitor biosolids phosphorus concentrations, phosphorus loading rates have not been evaluated. In general, the agronomic phosphorus loading rates will place more severe restrictions on plants that employ biological phosphorus removal, whereby significant amounts of phosphorus leave the plant site as stored phosphorus in biosolids. This could be an issue for Wilsonville in the future, since the anoxic selector appears to act as an anaerobic selector, resulting in biological phosphorus removal.

Best Management Practices and General Management Requirements

Federal regulations stipulate that all biosolids (Class A or B) must not enter surface waters or wetlands without a permit under Sections 402 or 404 of the Clean Water Act (CWA). Biosolids cannot be applied to land within 50 feet of any ditch, channel, pond, or waterway, or within 200 feet of a domestic water source or well.

The Part 503 rule stipulates that biosolids cannot be applied if application is likely to impact an endangered or threatened species specified under 50 CFR 17.11 and 17.12. The regulations require that the biosolids applier certify that applicable management practices have been met, including requirements concerning endangered species.

Reporting and Recordkeeping

Table 4-11 shows the frequency of monitoring requirements for the pollutants listed in Table 4-9 and Table 4-10. Frequencies in Table 4-11 also apply to pathogen density and VAR requirements. Pathogen and VAR monitoring requirements depend on whether the biosolids are Class A or Class B, and which process is used to meet these requirements. Currently, Wilsonville produces less than 290 metric tons per year on average meaning that only once per year sampling is required. However, according to projected flows and loads discussed in Chapter 2, Wilsonville may be required to monitor once per quarter within the next ten years, depending on future biosolids production.

Table 4-11. Frequency of monitoring requirements for land application of biosolids (Table 1 of CFR 503.16).

Amount of Sewage Sludge (metric tons per 365 Day Period)	Frequency
Greater than zero but less than 290	Once per year.
Equal to or greater than 290 but less than 1,500	Once per quarter (four times per year)
Equal to or greater than 1,500 but less than 15,000	Once per 60 days (six times per year)
Equal to or greater than 5,000	Once per month (12 times per year)

The state of Oregon also requires reporting of the following parameters with the same frequency as specified in Table 4-11:

- Total Kjeldahl Nitrogen (TKN)
- Nitrate Nitrogen (NO_3-N)
- Ammonia Nitrogen (NH_3-N)
- Total Phosphorus (TP)
- Potassium (K)
- pH
- Total Solids (TS)
- Volatile Solids (VS)

Analyses must be presented on a dry weight basis for all eight parameters with the exception of pH.

Air Quality Requirements

Air pollutant emissions is regulated under the Clean Air Act (CAA), the Clean Air Act Amendments of 1990, and Oregon air contaminant discharge permit (ACDP) and Title V programs.

Air pollutants are broadly grouped as either criteria pollutants or hazardous air pollutants (HAPs). The regulated criteria pollutants or criteria pollutant precursors of concern for most facilities are particulate matter (PM), sulfur dioxide (SO_2), nitrogen oxides (NO_X), carbon monoxide (CO), and volatile organic compounds (VOCs). A VOC is defined as any carbon compound (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides, carbonates, ammonium carbonate) that creates or contributes to atmospheric photochemical reactions. A defined list of nonphotochemically reactive substances is excluded from the VOC category. Regulated HAPs are a defined list of 188 pollutants designated by EPA and adopted by DEQ.

Regulatory Trends

In Oregon, the ACDP program and the Title V permit programs govern air quality. The ACDP program has been in effect in Oregon for many years and regulates both major and minor sources of criteria pollutants. The Title V permit program was created as a result of the Clean Air Act Amendments of 1990 and regulates major sources of criteria pollutants and HAPs. The two permitting programs define major sources differently. This adds confusion to the process of determining the levels at which pollutant emissions will require a permitting action. Table 4-12 shows the significant emission rates for minor and major sources of criteria pollutants under the ACDP program. Sources with emissions below the minor source level are not generally required to have an operating permit. Table 4-13 shows the Title V major source thresholds.

Minor source permits generally require a straightforward and relatively simple permitting process in terms of addressing emissions, air pollution control equipment required, and the stringency of the permit conditions for monitoring, record-keeping, and reporting of emissions to DEQ. Major sources have more stringent monitoring and record-keeping requirements.

Table 4-12. Significant Emission Rates for Air Pollutant Sources in Oregon ACDP Program

Pollutant	Significant Emission Rate (tons/year)	
	Major Source[1]	Minor Source[2]
Particulate	25	5
Fine Particulate	15	5
Sulfur Dioxide	40	10
Nitrogen Oxides	40	10
Carbon Monoxide	100	10
Volatile Organic Compounds	40	10
Hazardous Air Pollutants	not regulated	not regulated

[1] A new source is considered a major source if emissions exceed these levels. A modification of an existing source is considered a major modification if emissions increases exceed these levels. Emissions increases are measured relative to actual emissions in 1977 or 1978 (baseline).

[2] Sources constructed after 1971 with potential emissions greater than these levels require an ACDP. The regulations are unclear as to the applicability of these thresholds to sources constructed prior to 1971, but modified during or after 1971.

Wilsonville
Wastewater Facility Plan

Chapter 5
Pages 5-51 through 5-78

Attachment E
To
June 8, 2005 Planning Commission
Work Session Staff Report
LP-2005-05-00008

Wastewater Facility Plan Amendment related to the handling of bio-solids and preferred alternatives to producing Class "B" sludge. (Remand from City Council.)

Comparison of Alternatives

Table 5-40 presents the key advantages and disadvantages of the three sludge thickening alternatives.

Table 5-40. Summary Comparison of Sludge Thickening Alternatives

Alternative	Advantages	Disadvantages
1A. GBTs – conventional secondary/MBR sludge only	• Smallest number of GBTs required	• Requires two processes to be operated for thickening (primary clarifiers and GBTs) • Covering of primary clarifiers is required to address potential odors from sludge thickening
1B. GBTs – Co-thickening of primary and secondary (conventional/MBR) sludges	• Reduces volume of solids sent to digester; less digester volume required • Primary clarifier operation can be optimized for clarification	• Requires additional equipment or extended thickening hours

The costs of the alternatives are presented in Table 5-41.

Table 5-41. Summary Cost Comparison of Thickening Alternatives (Costs in $1,000s)

	Alternative 1A – GBTs (Conventional/MBR)		Alternative 1B – GBTs (Co-thickening)	
	4.0 mgd	7.0 mgd	4.0 mgd	7.0 mgd
Total Capital Cost	$54	$0	$1,985	$0
Annual O&M Cost	$22	$45	$45	$67
Present Worth Capital Cost	$50	$0	$1,835	$0
Total Present Worth Cost	$1,724		$4,625	

Preliminary Recommendations

The alternatives do not differ significantly in terms of regulatory compliance or implementation. Both have operational drawbacks: operations will ultimately be impacted by co-thickening as the projected sludge volumes cannot be processed in the current 8-hour/day, 5-day/week shifts; separate thickening of primary sludge and WAS reduces weekly thickening time, but requires the primary clarifiers to be operated for dual purposes. Co-thickening will likely produce the most odors. However, since the thickening process is already enclosed, odors can easily be contained and treated.

Since there are no driving forces for moving to co-thickening, and since the existing GBTs need only minor improvements to process projected sludge quantities through ultimate build-out, it is recommended that primary sludge continue to be thickened in the primary clarifiers with gravity belt thickening of secondary sludge only. Figure 5-17 shows a comparison of alternatives 1A and 1C with the evaluation criteria.

Figure 5-17. Sludge Thickening Alternatives Preliminary Evaluation

Evaluation Criteria	Alt A: Secondary sludge thickening only (conventional/MBR)	Alt B: Co-thickening primary and secondary sludges	Comments
Regulatory Compliance	●	●	
Operations/ Technology	◕	◕	Co-thickening requires operation of an additional GBT.
Implementation	●	●	
Community/ Environmental	●	◕	Co-thickening requires primary sludge handling, which has the potential to produce odors.
Compatibility With Site	●	◕	Co-thickening requires a larger footprint than other options.
Cost	●	◑	
Total	●	◕	

Worse ← → Better

○ ◔ ◑ ◕ ●

Solids Stabilization Alternatives

Design Criteria

The process model was used to project design flows for solids stabilization at projected influent flows and loadings associated with ADWF flows of 4 and 7 mgd. Digester feed is assumed to consist of primary sludge at 4 percent solids and WAS at 6 percent solids. This is a conservative assumption in that it gives the City the flexibility to either co-thicken primary sludge and WAS, or operate separate thickening processes. If co-thickening were practiced, the required digester volume would be reduced.

Table 5-42. Design Flows for Solids Stabilization.

Condition	Units	Average	Max. Month	Max. Week
4.0 mgd				
Summer				
Flow	Gpd	20,800	22,256	23,504
TSS	lb/d	8,427	9,860	12,219
VSS	lb/d	6,591	7,711	9,557
Winter				
Flow	Gpd	24,960	28,912	34,112
TSS	lb/d	10,112	11,832	13,247
VSS	lb/d	7,909	9,254	10,361
7.0 mgd				
Summer				
Flow	Gpd	36,200	38,734	40,906
TSS	lb/d	14,690	17,187	21,301
VSS	lb/d	11,480	13,432	16,646
Winter				
Flow	Gpd	43,440	50,318	59,368
TSS	lb/d	17,628	20,625	23,093
VSS	lb/d	13,776	16,118	18,047

Any solids stabilization option must meet the current and future regulations set forth in 40 CFR Part 503, which are different for Class A and Class B biosolids production. Key regulatory requirements for biosolids are as follows:

- **Vector attraction reduction (VAR).** Volatile solids (VS) must be reduced by 38 percent.
- **Metals concentration limits.** Any land applied biosolids must meet concentration or application limits for eight heavy metals. This requirement must be met through source control and management practices.

The key difference between Class A and Class B biosolids requirements is pathogen reduction. Class B biosolids must meet a fecal coliform limit of 2,000,000 MPN/g TS, while Class A biosolids must have fecal coliforms less than 1,000 MPN/ g TS, or *Salmonella* sp. less than 3 MPN/ 4g TS. Certain processes have been designated by EPA as Class A and Class B, and requirements can be met through operational criteria rather than pathogen concentrations.

Redundancy criteria for digestion and solids handling processes are as follows:

- Handle wet weather maximum-month flow with largest unit out of service
- Provide full treatment to wet weather maximum-week flow with all units in service.

Alternatives Considered

In the Alternatives Kickoff Workshop held on February 13, 2002 several stabilization alternatives were suggested for evaluation. An additional meeting was held on February 27, 2002 to further screen alternatives, and the following were selected for evaluation:

- Alternative 1: Aerobic Digestion (Class B Biosolids)
- Alternative 2A: Anaerobic Digestion (Class B Biosolids)
- Alternative 2B: Anaerobic Digestion with Prepasteurization (Class A Biosolids)
- Alternative 2C: Anaerobic Digestion with Thermal Drying/Pelletizing (Class A Biosolids)

Alternative 1 – Aerobic Digestion (Class B Biosolids)

Aerobic digestion is currently practiced at the Wilsonville WWTP. The existing aerobic digesters would provide the required 40-day detention time until approximately 2015.

Table 5-43. Design criteria for aerobic digestion.

Parameter	Minimum Value
HRT – maximum month	40[1]
HRT – maximum month; one digester out of service	40[2]
Temperature	68°F

[1] Wet season loading rate
[2] Dry season loading rate

Continued use of the existing aerobic digesters precludes the use of the digester/clarifier tanks for retrofit for primary clarification use only, as described in the liquid stream discussion above. This alternative assumes that the existing digesters will remain in service, augmenting the existing capacity with new digester capacity as required in the future. Therefore, this alternative must be examined in conjunction with the primary clarifier alternatives.

This alternative also limits the City in terms of future conversion to Class A biosolids. Class A treatment of aerobic sludge often involves a high temperature process (ATAD). Operating a high temperature process in the existing basin may not be feasible, and through sharing a common wall with the primary clarifiers, this could increase the temperature of the liquid stream flow. Odors are would also be an overriding concern with an option such as ATAD.

Facilities Required/Key Design Information

Table 5-44 shows the facilities required for nominal average dry weather design flows of 4.0 and 7.0 mgd. It is assumed that the new digesters will be 55 feet square with a 35-foot sidewater depth. The square aerobic digester configuration is used to provide for compact construction.

Table 5-44. Facilities required for Alternative 1.

Item	Unit	New Facilities at 4.0 mgd ADWF	New Facilities at 7.0 mgd ADWF
Aerobic digesters	Number/dimensions	1 @ 55 ft x 55 ft x 35[1] ft	1 @ 55 ft x 55 ft x 35[1] ft
Blowers	Capacity	6,700 scfm	11,700 scfm
Sludge feed pumps	Number/gpm	2 @ 200	1 @ 200

[1] Side water depth

Alternative 2 – Anaerobic Digestion

Anaerobic digestion is the conversion of organic material to methane and carbon dioxide with no dissolved oxygen present. Anaerobic digesters are heated and mixed but not aerated. They also require covers and a gas collection and management system. Gas recovery and utilization systems provide the potential for meeting the heating requirements of the digesters and generating energy for other uses such as space heating and cogeneration of electrical power.

Digestion Phases

Several types of bacteria are involved in the anaerobic decomposition of organic material. Two distinct groups perform separate functions in an anaerobic digester:

- **Acid-forming bacteria** (also known as acidogens) convert complex organic compounds to soluble organic compounds using exocellular enzymes. Soluble compounds are then converted to volatile fatty acids (VFAs), primarily acetic and propionic acid. These organisms grow relatively quickly, requiring a solids retention time (SRT) of 0.5 to 2 days, and can grow and function under low pH (less than 4) conditions.
- **Methane-forming bacteria** (also known as methanogens) convert VFAs to methane and carbon dioxide. Methanogens are slow-growing organisms and require a SRT greater than approximately 5 days, depending on temperature. Anaerobic digesters are typically designed to provide an SRT of 15-20 days . Methanogens are very pH sensitive, and require the pH to be very close to neutral to grow and function. If the pH of the digester is reduced, failure could ensue. This condition is commonly referred to as a "sour" digester, from the odor that develops when methanogenic activity ceases.
- **Hydrogen-producing and hydrogen-consuming bacteria** also play an important role in anaerobic digesters. Hydrogen-consuming bacteria are required to keep hydrogen levels low. If hydrogen levels are too high, failure can ensue.

In conventional anaerobic digestion, these groups of bacteria function in the same digester. All of the groups of bacteria in an anaerobic digester work together to degrade sludge and form methane and carbon dioxide.

Temperature Conditions

Anaerobic digesters can be operated at a variety of temperatures, but research has shown that the process has two optimal temperature ranges: the mesophilic range at around 95°F; and the thermophilic range around 130°F. The alternatives evaluated for Wilsonville focus on mesophilic digestion. Thermophilic digesters generate significant odors and require complex operation. Thermophilic digestion is also not classified by EPA as a process to further reduce pathogens (PFRP) in 40 CFR 503, and unless operated in a batch mode, would need to be approved for Class A production based on a site-specific evaluation. Conventional anaerobic digesters could be constructed to allow future operation at high temperatures, giving the City the flexibility to convert to thermophilic operation in the future.

Gas Production and Energy Balance

Anaerobic digesters typically produce between 12 to 16 cubic feet of gas per pound of volatile solids destroyed. Gas composition depends on the nature of the feed, but is typically 60 to 70 percent methane (CH_4) and 30 to 40 percent carbon dioxide (CO_2). Trace amounts of hydrogen, hydrogen sulfide, nitrogen, and other gases are also present. The energy value of digester gas is typically between 600 to 700 BTU per cubic foot. This will provide enough energy to heat the digesters with energy to spare. A heat exchange loop including heat exchangers, boilers, ancillary piping, and space heaters would be provided to convert digester gas to heat. A small water supply connection is also required for the hot water loop. Excess gas can be combusted in waste gas burners or used to power co-generation units. However, the payback periods for co-generation at small to medium-sized plants can be relatively long, especially in the Pacific Northwest where power costs are moderate.

If anaerobic digestion is included in the recommended plan, the City should conduct a detailed energy management plan in order to fully evaluate potential onsite or nearby uses for power recovered through cogeneration, and to examine potential opportunities with local power utilities. Many utilities in the Northwest provide grant support and advantageous power purchase agreements that can make cogeneration beneficial.

Storage and equalization of digester gas is an important component of the design of an anaerobic digestion process. Gas production rates flucuate depending on feed sludge flows and characteristics. Equalization is important to prevent flucuating pressures in the headspace of digesters, and structural problems with digester covers.

Operational Issues

Anaerobic digester gas contains moisture that condenses as the gas cools. Gas collection piping should include condensate traps to prevent plugging. Materials of construction for gas collection and handling systems are particularly important due to the corrosive nature of anaerobic digester gas. Hydrogen sulfide content in anaerobic digester gas can also cause operational problems with cogeneration engines as well as contributing to air pollution. This issue should be addressed during the energy management plan and during preliminary design of the anaerobic digestion system.

Other maintenance issues associated with the heat exchangers and other ancillary equipment include scaling and plugging. High temperatures in the heat exchange loop can cause scaling in the heat exchangers and associated piping. Required cleaning frequencies range from 1 to 10 years or more, and depend on influent characteristics, digester mixing, and grit removal facilities. Rags and other large particles that are removed in liquid stream processes can plug heat exchangers. However, fine screening at Wilsonville will eliminate most of this problem. In addition, a sludge grinder just upstream of the heat exchanger will prevent most plugging problems.

Anaerobic digesters are susceptible to grit buildup over time. Grit buildup reduces the active volume of a digester and the detention time as a result. Digester cleaning equipment should be provided with new digesters, especially as Wilsonville does not have a grit removal system. However, well-mixed digesters will only need infrequent cleaning.

Chemical precipitation of phosphorus, typically in the form of struvite ($MgNH_4PO_4$), is common in anaerobic digesters and ancillary piping due to the high levels of soluble ammonium and phosphorus in anaerobic digesters. Struvite formation is especially common in plants with biological phosphorus removal, but can be minimized with proper design.

Alternative 2A – Anaerobic digestion (Class B biosolids)

Table 5-45 summarizes the design criteria for this alternative.

Table 5-45. Design criteria for anaerobic digestion.

Parameter	Minimum Value
HRT – maximum month wet weather	20
HRT – maximum week wet weather	17
HRT – maximum month dry weather; one digester out of service	15
Temperature	95°F

Based on the criteria in Table 5-45, the required number and size of anaerobic digesters at the Wilsonville WWTP for nominal design flows of 4.0 and 7.0 mgd are shown in Figure 5-18. Volumes shown assume two digesters total for a flow of 4.0 mgd, and three digesters for a flow of 7.0 mgd.

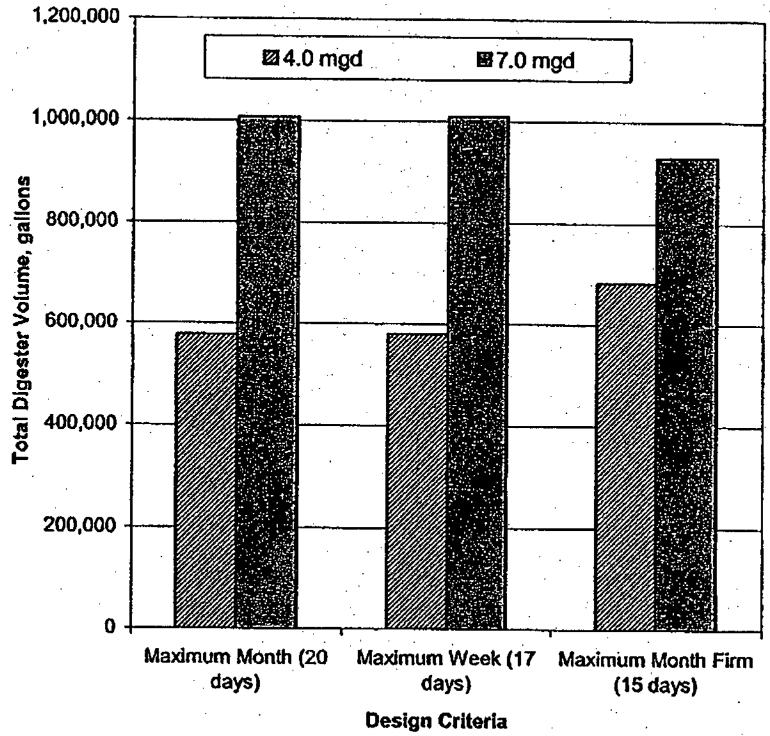

Figure 5-18. Digester Volume Requirements for Anaerobic digestion Alternatives.

Using volumes shown in Figure 5-18, two 45-foot diameter digesters with 30-foot sidewater depths, will need to be constructed before 2015, when a third identically-sized digester will need to be constructed. Table 5-46 shows an estimate of the annual energy produced by anaerobic digestion for Wilsonville based on the volatile solids destruction in the anaerobic digesters. After accounting for heat lost through the digester cover and walls, and energy used to heat the feed sludge, Table 5-46 shows that approximately 60 to 70 percent of the gas produced in the digester could be recovered for other beneficial uses.

Table 5-46. Anaerobic Digester Gas Production and Energy Value.

Volatile Solids Destruction (%)	Gas Production (cf/day)	Energy Value (MBTU/yr)	Heat Loss/Sludge Heating (MBTU/yr)	Percentage Excess
4.0 mgd				
50	50,571	11,114	4,570	59%
60	60,901	13,337	4,570	66%
70	71,051	15,560	4,570	71%
7.0 mgd				
50	88,396	19,359	7,776	60%
60	106,075	23,230	7,776	67%
70	123,754	27,102	7,776	71%

Facilities Required/Key Design Information

Table 5-47 shows the necessary anaerobic digestion facilities for nominal design flows of 4.0 and 7.0 mgd.

Table 5-47. Anaerobic Digestion Facilities Required.

Item	Unit	New Facilities at 4.0 mgd ADWF	New Facilities at 7.0 mgd ADWF
Anaerobic digesters	Number/diameter/liquid height	2 @ 45 ft dia x 30 ft high	1 @ 45 ft dia x 30 ft high
Digester mixers	Number/hp	2 @ 50	1 @ 50
Heat exchangers	Number, 1000 BTU/hr	2 @ 500	1 @ 500
Boilers	Number, 1000 BTU/hr	2 @ 550	1 @ 550
Gas storage	Volume (cf)	20,000	36,000
Sludge feed pumps	Number/gpm	2 @ 200	1 @ 200

Option 2B – Anaerobic Digestion with Prepasteurization (Class A Biosolids)

Option B is identical to Option A except it includes facilities for prepasteurization of raw sludge prior to digestion. Only pasteurization facilities will be discussed in this section; it is assumed that anaerobic digestion requirements will be similar to Option A. However, detention time requirements to meet PSRP criteria would no longer apply since Class A pathogen requirements would be met by the pasteurization system. Volatile solids reduction of 38 percent would be required, although it is likely that this could be achieved with less than a 15 day detention time at maximum month conditions. If performance testing indicated that the target volatile solids reduction could be achieved with a lower design SRT, the digester volume requirements would decrease and construction of the third digester could be delayed or possibly avoided.

Pasteurization is a process to further reduce pathogens (PFRP) described in the Part 503 regulations [503.32(a)(7)]. It is defined as maintaining the sludge temperature at or above 70°C (158°F) for at least 30 minutes. Under this alternative, the fecal coliform or *Salmonella* densities must also be less than specified levels. Batch or plug-flow processing is required by the regulations to prohibit short-circuiting of pathogens.

Typically, several small steel tanks are used to process the sludge. One vendor recommends three small tanks, each with a detention time of 1 hour. During normal operation, one tank would be filling, one reacting, and one withdrawing, creating a continuous operation out of three

Operational Issues

Since there are few pasteurization facilities in North America, information on operational issues is scarce. Pasteurization facilities require a relatively complex heat exchange loop that is typically automated. However, the effort required for maintenance of heat exchangers and heat exchange equipment is a concern with this technology.

Option C – Anaerobic Digestion with Thermal Drying/Pelletizing (Class A Biosolids)

Thermal drying of sludge/biosolids has increased in popularity due to the marketability of the final product, ease of storage, and volume reduction. Heat drying is a USEPA approved PFRP, defined in the Part 503 regulations as follows:

> "Sewage sludge is dried by direct or indirect contact with hot gases to reduce the moisture content to 10 percent or lower. Either the temperature of the sewage sludge particles exceeds 80°C (176°F) or the wet bulb temperature of the gas in contact with the sewage sludge as it leaves the dryer exceeds 80°C (176°F)."[3]

Drying methods include flash dryers, spray dryers, rotary dryers, and steam dryers. Each process can be categorized as direct or indirect drying. Direct drying involves direct contact of hot gases (or other heat transfer medium) with the wet sludge, and produces foul air emissions. Indirect drying separates the hot gases and the sludge with a solid surface, resulting in less foul air. Direct drying at the Wilsonville WWTP may require an air quality permit and would result in substantial odor production. Therefore, direct drying was not considered.

Digestion is not required prior to a drying process, but installations that operate without digestion have experienced severe maintenance issues and difficult operations. Therefore, anaerobic digestion prior to drying is assumed.

Manufacturers of indirect dryers include US Filter/Davis Products, Komline-Sanderson, Andritz, and Fenton Environmental. Systems are available to dewater and dry solids in the same unit. One such system uses a combination diaphragm plate filter press and evaporator to produce a dried solids (J-VAP, US Filter). Such systems have higher energy costs than systems with separate dewatering and drying processes. Thermal drying systems are typically sized by equipment vendors, and equipment is procured as a package.

Important design considerations include:

- Energy source – Most indirect dryers are capable of operating on anaerobic digester gas. However, the quantity of methane produced during digestion will not be sufficient to both heat the digester and power a thermal dryer. Also, the equalization volume required to store digester gas and allow for 40 hour a week operation of the dryer would not be feasible. Natural gas will be required to supplement digester gas.
- Multiple pass system vs. single pass system – Multi-pass dryers require additional equipment and have higher operating costs than single-pass units. Single-pass units, however, cannot produce a high-quality, uniformly graded dried biosolids pellet. Due to the high cost of producing a dried biosolids acceptable for a fertilizer broker or bagging operation (e.g.

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[3] US EPA. 1999. Environmental Regulations and Technology: Control of Pathogens and Vector Attraction in Sewage Sludge.

multi-pass dryer), it is assumed that biosolids will be dried in a single-pass unit and will be hauled by truck and land applied.

- Operation – To simplify controls and operations, the drying process should be synchronized with the dewatering process. Dryers and their wet scrubbers/regenerative thermal oxidizers (RTO) require a significant amount of warm-up time (typically 2 hours). In general, a solids drying process will operate more efficiently if run for long periods of time. For example, it would be better to operate a drying process for 24 hours a day, 2 days a week than to operate 8 hours a day, 6 days a week.

Marketing is key to the success of a biosolids drying program. For marketing, important aspects of a dried biosolids product are as follows[4]:

- Nitrogen content – should be at least 3 to 4 percent for direct application as a fertilizer. If the nitrogen content is lower, is can still be used as a constituent of blended fertilizer.
- Moisture content – must be 10 percent or less to meet EPA criteria for PFRP. Should be less than 5 percent to eliminate combustion potential during storage.
- Durability – dried particles must be durable enough to withstand breakage during storage and transport.
- Dustless product – dried biosolids must be dust free to eliminate problems in storage and handling.
- Ability to dissolve in soil – dried biosolids must dissolve in soil over time to release nutrients into solution for plant uptake.
- Odor free – to prevent odors at the plant and the final disposal site, the final product must be as odor-free as possible.
- Free of extraneous material – dried biosolids should be free of plastics, rags, and other extraneous materials.

Implementation of a thermal drying process would require a significant initial capital expenditures. An aggressive marketing effort would also be required prior to implementation due to the fundamental change in product from the current liquid biosolids product.

There are very few installations of thermal drying systems in the Pacific Northwest. The market for dried biosolids in the Northwest is not clear, and needs to be researched during preliminary design if thermal drying is chosen as the preferred alternative. However, one manufacturer guarantees that they will accept the dried product produced by their equipment at no cost to the utility, so disposal of the end product will not require the use of a fertilizer broker.

Additional Facilities Required/Key Design Information

Table 5-49 shows the facilities required to implement this alternative for nominal design flows of 4.0 and 7.0 mgd. Equipment shown in the table are based on the Andritz DDS-10 dryer system. Other drying systems may require different equipment of a different size. Due to the size of commercially available drying systems, it is assumed that a drying process will be adequately sized for build-out flows. A redundant dryer should be provided to maintain operation during maintenance shutdowns. Alternatively, only one solids dryer would be needed if Wilsonville chose to provide adequate dewatered cake storage to continue dewatering operations during dryer shutdowns.

[4] WEF Manual of Practice No. 8. 1998. Design of Municipal Wastewater Treatment Plants, 4th ed., vol. III.

Table 5-49. Facilities Required for Thermal Drying.

Item	Unit	New Facilities at 4.0 mgd ADWF	New Facilities at 7.0 mgd ADWF
Solids Dryer	Number @ (ton/day)	2 @ 7	—
Feed hopper	Number	1	—
Wet scrubber (RTO)	Number	1	—
Condenser	Number	1	—

Operational Issues

King County, Washington, operated a drying facility during the 1990s but abandoned the facility due to an explosion caused by dust. However, more recent installations throughout the US have been successful. Common operational issues include equipment breakdowns and dust production.

Comparison of Alternatives

Table 5-50 summarizes the key advantages and disadvantages of the solids stabilization alternatives.

Table 5-50. Comparison of advantages and disadvantages of solids stabilization alternatives

Alternative	Advantages	Disadvantages
1. Aerobic digestion (Class B biosolids)	• Least amount of capital expenditures • Small footprint required with compact square construction	• Increased energy use for aerobic solids stabilization • Produces the highest volume of digested sludge • Potentially higher operations cost due to long distance hauling • Increased management, permitting, and tracking required for Class B biosolids • Site restrictions for land application • Difficult to meet VAR requirements • Foaming problems typically more severe than anaerobic digestion
2A. Anaerobic digestion (Class B biosolids)	• Lowest present worth cost • Greater VSS destruction than aerobic digestion • Easier to meet VAR requirements than aerobic digestion • Less energy use and lower operating costs due to gas recovery	• Potentially higher operations cost due to long distance hauling • Potential new odor source at the plant site • Increased management, permitting, and tracking required for Class B biosolids • Site restrictions for land application

Table 5-50. Comparison of advantages and disadvantages of solids stabilization alternatives (continued)

Alternative	Advantages	Disadvantages
2B. Anaerobic digestion with prepasteurization (Class A biosolids)	• Fewer restrictions on final end uses of Class A biosolids, which may facilitate management of the final biosolids product • Smaller footprint than Alt 2C. • No additional odors – completely enclosed process • No restrictions on application	• Increased capital costs • Requires specialized heat exchangers and proprietary process equipment • Energy intensive
2C. Anaerobic digestion with thermal drying/pelletizing (Class A biosolids)	• Fewer restrictions on final end uses of Class A biosolids, which may facilitate management of the final biosolid product • Lowest truck traffic at plant site for biosolids transport • Potentially most marketable end product • Most easily stored biosolids product • Greatest volume reduction • No restrictions on application • Full utilization of digester gas	• Highest cost alternative • Very energy intensive • Lowest final sludge volume; lowest storage requirements • Foul air emissions from dryer • Potential explosion hazard due to dust

Table 5-51 summarizes the costs of the alternatives. A detailed cost analysis is included in the appendix.

Table 5-51. Summary Cost Comparison of Solids Stabilization Alternatives (Costs in $1,000s)

	Alternative 1a Aerobic Digestion using Exist. Basins		Alternative 1b – Aerobic Digestion with all New Basins		Alternative 2A – Class B Anaerobic Digestion		Alternative 2B – Anaerobic Digestion/ Prepasteurization		Alternative 2C – Anaerobic Digestion/ Drying	
	4.0 mgd	7.0 mgd	4.0 mgd	7.0 mgd	4.0 mgd	7.0 mgd	4.0 mgd	7.0 mgd	4.0 mgd	7.0 mgd
Total Capital Cost	$1,917	$1,917	$3,765	$1,917	$4,812	$1,807	$6,956	$1,807	$9,760	$1,807
Annual O&M Cost	$ 228	$ 296	$ 179	$237	$95	$ 116	$ 140	$ 166	$ 281	$ 330
Present Worth Capital Cost	$1,723	$ 1,152	$3,481	$ 1,152	$4,449	$ 1,085	$6,431	$ 1,085	$9,023	$ 1,085
Total Present Worth Cost	$16,004		$15,021		$10,789		$15,147		$25,375	

Preliminary Recommendations

Figure 5-20 shows a comparison of the alternatives with respect to the evaluation criteria. Key considerations are as follows:

- Class A alternatives (2B and 2C) offer easier regulatory compliance, but are more complicated to operate and maintain.
- Because Wilsonville's solids flows are relatively small compared to the size of drying equipment available, implementation of Alternative 2C cannot be logically phased.
- Life cycle costs for the drying and pelletizing option are almost fifty percent higher than the next most expensive alternative. Other than reducing the sludge storage volume, this option does not have significant benefits that outweigh the high cost.
- Aerobic digestion requires the largest tank volume.

Based on the analysis shown below and the considerations in Table 5-50, it is recommended that the City provide anaerobic digestion for all future flows. A location should be identified for a potential future prepateurization building if the City determines that producing Class A biosolids is a priority.

Figure 5-20. Solids Stabilization Alternatives Preliminary Evaluation

Evaluation Criteria	Alt 1: Aerobic digestion (Class B biosolids)	Alt 2A: Anaerobic digestion (Class B biosolids)	Alt 2B: Anaerobic digestion with prepasteurization	Alt 2C: Anaerobic digestion with thermal drying/pelletizing	Comments
Regulatory Compliance	◑	◕	●	●	
Operations/ Technology	●	◕	◑	◑	Class A alternatives will require more maintenance and are more difficult to operate
Implementation	●	●	●	◕	Thermal drying would require an extensive marketing effort or the use of a fertilizer broker
Community/ Environmental	◕	◑	◑	●	Alternatives 2A and 2B have the most potential to produce odors during biosolids storage at the plant.
Compatibility With Site	◔	●	◕	◑	Aerobic treatment requires large footprint.
Cost	◑	◕	◑	○	Class A alternatives are more Expensive, with thermal drying being by far the most expensive alternative.
Total	◑	◕	◑	◔	

Worse ← → Better

○ ◔ ◑ ◕ ●

Dewatering and Dewatered Biosolids Storage Alternatives

Design Criteria

Dewatering/Recycle Management Design Criteria

Dewatering facilities are typically designed based on maximum-week solids loadings. Reliability criteria established for this project stipulate that maximum-week conditions can be met with all units in service; whereas maximum-month conditions must be met with the largest unit out of service.

Daily and weekly throughput capacities depend on the number of hours that the dewatering units are operated each day or week. It is assumed that all dewatering facilities will be operated on a five day a week, eight hours a day schedule. This requires additional capacity and higher capital expenditures, but is the simplest operational strategy.

Several factors influence the performance of dewatering processes:

- Digested solids characteristics – aerobically digested solids are usually more difficult to dewater than anaerobically digested solids. Dewatering aerobically digested solids typically requires more polymer to achieve the same cake solids concentration as anaerobically digested solids. The ratio of primary to secondary sludge also influences dewatering – secondary sludge is more difficult to dewater than primary sludge.
- Temperature of solids – In general, the higher the temperature, the more effective the dewatering process. The temperatures of anaerobically digested solids are normally higher than aerobically digested solids.
- Solids retention time (SRT) – long activated sludge SRTs can be difficult to dewater.
- Feed solids concentration – dilute feed sludges will require more conditioning and result in lower cake solids concentrations than thicker feed sludges.

Since dewatering performance varies dramatically from plant to plant, pilot testing is recommended for developing accurate design criteria. However, typical performance of alternative processes can be used for evaluation.

Filtrate/centrate streams from dewatering processes typically contain very high concentrations of ammonia. Direct return of filtrate to the liquid stream treatment process can significantly impact the secondary treatment capacity for nitrification. For planning purposes, it is assumed that all dewatering options will include 8 hours of filtrate/centrate storage. This allows the centrate to be stored during the normal dewatering period and returned during the evening/night-time hours.

Biosolids Storage Design Criteria

Design criteria for liquid, dewatered cake, and dried biosolids storage facilities depend on the desired flexibility in the biosolids management program and the market for final disposal of the biosolids. The choice of solids stabilization, dewatering, and drying alternatives will dramatically affect the size and design of biosolids storage facilities. Forty hour/week dewatering operations will be assumed. For dried biosolids storage facilities, it is assumed that thermal drying will operate three days per week, eight hours per day.

DEQ indicates that a minimum of four months of storage must be provided, with six months preferred due to the lack of suitable winter storage sites. This storage can be in a combination of forms (liquid, dewatered, and dried sludge). Because of this storage requirement, continued production of liquid biosolids only was not considered. The City has examined the concept of off-site biosolids storage, and concluded that it is not feasible.

Projected flow and loadings for dewatering and dewatered sludge storage vary depending on the type of digestion selected. Table 5-52 shows digested biosolids flows and loadings based on 38 percent volatile solids (VS) destruction (aerobic digesters) and 50 percent VS destruction (anaerobic digesters).

Table 5-52. Digested Biosolids Flows and Loads.

38% VS destruction (Aerobic digestion)					50% VS destruction (Anaerobic digestion)				
		Average	Max. Month	Max. Week			Average	Max. Month	Max. Week
4.0 mgd - Dry Season					**4.0 mgd - Dry Season**				
Flow	gpm	49	52	55	Flow	gpm	49	52	55
TSS	lb/hr	1,036	1,213	1,503	TSS	lb/hr	898	1,051	1,302
TSS	%	4.2%			TSS	%	3.7%		
4.0 mgd - Wet Season					**4.0 mgd - Wet Season**				
Flow	gpm	59	68	80	Flow	gpm	59	68	80
TSS	lb/hr	1,244	1,455	1,629	TSS	lb/hr	1,078	1,261	1,412
TSS	%	4.2%			TSS	%	3.7%		
7.0 mgd - Dry Season					**7.0 mgd - Dry Season**				
Flow	gpm	86	92	97	Flow	gpm	86	92	97
TSS	lb/hr	1,807	2,115	2,621	TSS	lb/hr	1,566	1,833	2,271
TSS	%	4.2%			TSS	%	3.6%		
7.0 mgd - Wet Season					**7.0 mgd - Wet Season**				
Flow	gpm	103	119	141	Flow	gpm	103	119	141
TSS	lb/hr	2,169	2,537	2,841	TSS	lb/hr	1,880	2,199	2,462
TSS	%	4.2%			TSS	%	3.6%		

The volume of dewatered cake produced depends on the type of dewatering/drying selected. Table 5-53 shows projected maximum month flows and loadings of dewatered cake or dried biosolids.

Table 5-53. Maximum Month Wet-Weather Dewatered Cake/Dried Biosolids Flows and Loads.

Condition	Units	15% Cake	25% Cake	90% Cake
<u>4.0 mgd</u>				
Flow	Gpd	5,756	3,453	959
TSS	lb/d	7,205	7,205	7,205
<u>7.0 mgd</u>				
Flow	Gpd	10,039	6,023	1,673
TSS	lb/d	12,566	12,566	12,566

Alternatives Considered

The following alternatives were evaluated for dewatering (D) and sludge storage (S):

- Alternative D1 – Rotary press dewatering
- Alternative D2 – Centrifuge dewatering
- Alternative D3 – Belt filter press dewatering
- Alternative S1 – Keep all existing liquid biosolids storage; add cake storage

- Alternative S2 – Cake storage for ultimate needs; limited liquid biosolids storage
- Alternative S3 – Dried/palletized biosolids storage

Alternative D1 – Rotary press dewatering

The rotary press is a new technology for dewatering municipal solids, and is manufactured by Fournier (Black Lake, Quebec). The process is relatively simple. Figure 5-21 shows a multi-pass unit. Solids are fed to a rectangular channel, then rotated between two parallel revolving screens. Rotation is slow compared to a centrifuge, typically less than 3 rpm. Filtrate is squeezed out to the sides of the screen and collected. Sludge is increasingly dewatered as it travels around the circular channel.

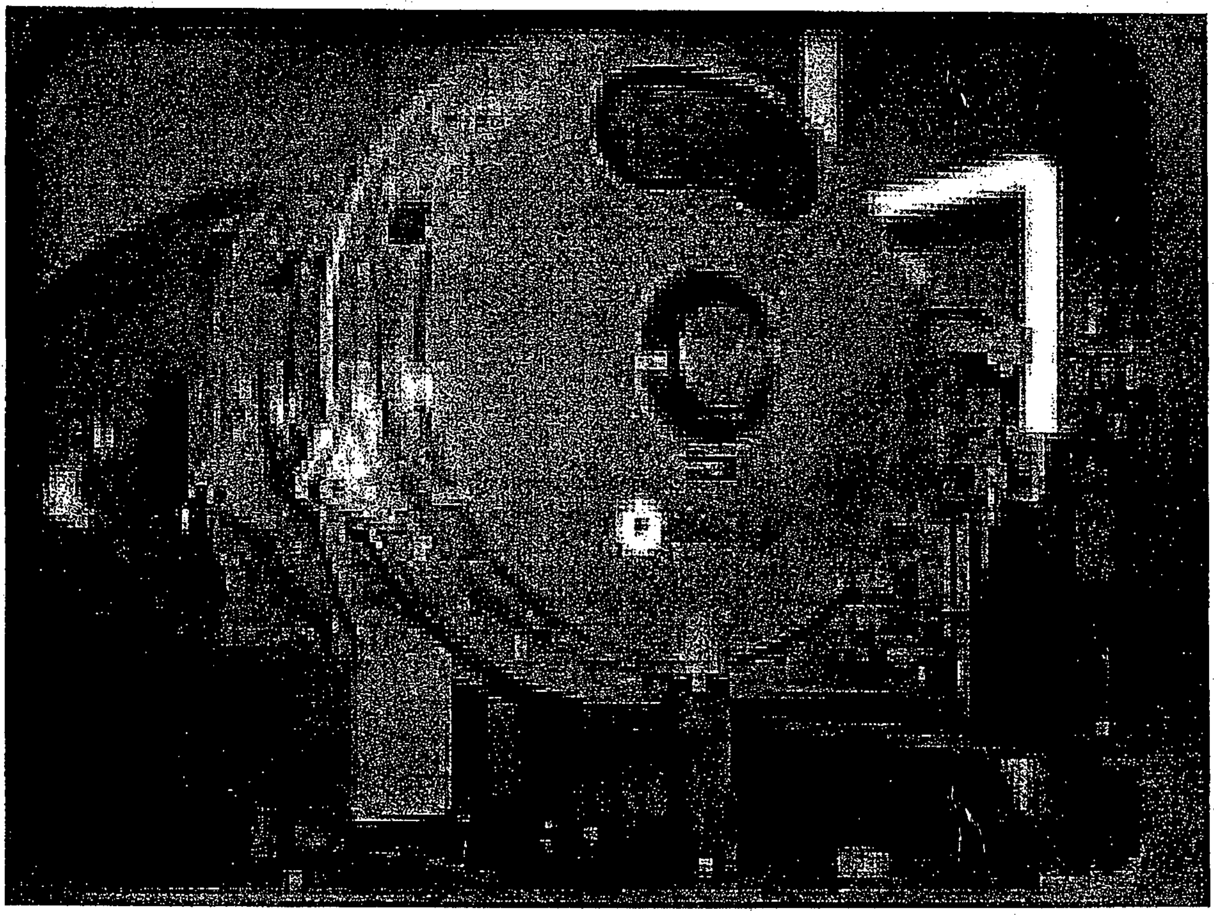

Figure 5-21. Multi-Channel Rotary Press (courtesy of Fournier Industries website).

Rotary presses provide optimal dewatering on sludges that have significant primary fractions, or significant fibrous material. In order to determine the performance on Wilsonville's sludge, the manufacturer recommends first sending sludge samples for analysis, then conducting pilot testing.

If liquid biosolids storage is available until 2015 (Storage Alternative 1), it may be possible to operate without redundant units. This would delay construction of additional rotary press units.

Facilities Required/Key Design Information

Table 5-54 presents the equipment and facilities required for a rotary press dewatering process at nominal design flows of 4.0 and 7.0 mgd. Washwater flows were assumed to be negligible since the units are only washed once a day. Also, because the rotary press is automated to adjust polymer dosage, the manufacturer claims that polymer use is less than for other comparable dewatering processes.

Table 5-54. Facilities Required for Rotary Press Dewatering.

Item	Unit	New Facilities at 4.0 mgd ADWF	New Facilities at 7.0 mgd ADWF
Rotary Presses	Number/channels	1 @ 4	1 @ 4
Filtrate Equalization Tank	Volume	23,000 gal	17,000 gal
Filtrate Pumps	Number/gpm	2 @ 15	1 @ 15
Polymer Feed System (including pumps, mixing tanks, and mixers)	Number/(lb/hr)	2 @ 10	1 @ 10

Alternative D2 – Centrifuge Dewatering

Centrifuge dewatering is the process of applying a centrifugal force to digested solids. Force is applied by rapidly spinning (1000 to 4000 rpm) digested solids, separating dewatered cake and clarified centrate, which is recycled back to the liquid treatment process. Centrate quality depends on the method of solids digestion and the solids capture rate of the dewatering process. Centrate quality can have significant impacts on liquid treatment processes. Centrifuge dewatering usually requires chemical conditioning prior to centrifugation, typically polymer and/or coagulant.

Several types of centrifuges are commercially available including disk nozzle, imperforate basket, and solid bowl. Disk nozzle and imperforate basket centrifuges are not capable is producing acceptable cake solids concentrations for digested biosolids, and are not discussed further. Manufacturers of solid bowl centrifuges include Humboldt and Sharples.

Centrifuge design is based on the solids feed rate, as rated capacity is specified by the manufacturer. Structural support is an important design issue for centrifuges as well. Due to the high rotational speed of the units, the foundation for a centrifuge should be isolated from the rest of building. Noise levels are also a concern for centrifuges, with typical levels in the range of 89 to 90 dbA at a distance of 3 feet[5]. Noise dampening is usually included with centrifuge equipment, but noise abatement should also be addressed in the building design.

Facilities Required/Key Design Information

Table 5-55 shows the facilities required for centrifuge dewatering at Wilsonville. Forty hour a week operation of dewatering equipment is assumed. For centrate equalization and pumping, the washwater flowrate was assumed to be negligible. A polymer feed rate of 20 pounds polymer per dry ton of solids at a polymer concentration of 0.1 percent by weight was assumed for the polymer feed system sizing. This is a conservative estimate of polymer dosage, and actual dosage may be less depending on the type of digestion and other factors. Centrifuges would be housed in an enclosed building with odor control.

[5] Design of Municipal Wastewater Treatment Plants, 4th ed. WEF Manual of Practice 8, 1998.

Table 5-55. Facilities Required for Centrifuge Dewatering.

Item	Unit	New Facilities at 4.0 mgd ADWF	New Facilities at 7.0 mgd ADWF
Centrifuges	Number / (lb/hr)	2 @ 1,400	1 @ 1,400
Centrate Equalization/Storage	Volume	23,000 gal	17,000 gal
Centrate Pumps	Number/gpm	2 @ 15	1 @ 15
Polymer Feed System (including pumps, mixing tanks, and mixers)	Number/gpm	2 @ 25	1 @ 25

Alternative D3 – Belt Filter Press Dewatering

Belt filter press (BFP) dewatering is performed by squeezing solids between two porous belts. Typically, solids are first allowed to drain by gravity, similar to a gravity belt thickener. The gravity zone is typically 2 to 4 m in length. Solids are then squeezed with increasing pressure between two belts passing through a series of rollers. Pressures are typically 5 to 15 psi, and can be changed by adjusting belt tension. Like the other alternatives, polymer and/or coagulant are used to condition the solids prior to dewatering.

Belts require continuous washing during normal operation, using potable or non-potable water. Washwater needs to be pressurized, and a booster pump would be required if the pressure in the plant's non-potable water loop is reduced to 60 psi in the future. A reduction in pressure is being considered as part of the 2002 Wilsonville WWTP Odor Control Improvements project. The continuous wash increases the amount of filtrate to be handled, and requires splash curbs around the unit.

BFPs are commercially available from several manufacturers, and can be purchased in belt widths from 0.5 to 3.5 meters in 0.5-meter increments. BFPs are sized by the hydraulic and/or solids loading to the unit. A maximum capacity of 50 gpm/meter was assumed.

Facilities Required/Key Design Information

Table 5-56 shows the facilities and equipment required for a BFP process at nominal design conditions of 4.0 and 7.0 mgd. Forty hour a week operation of dewatering equipment is assumed. For filtrate equalization and pumping, a washwater flowrate of 60 gpm per 1.5-meter BFP was assumed. A polymer feed rate of 20 pounds polymer per dry ton of solids at a polymer concentration of 0.1 percent by weight was assumed for the polymer feed system sizing. This is a conservative estimate of polymer dosage, and actual dosage may be less depending on the type of digestion and other factors. Belt filter presses would be housed in an enclosed building with odor control.

Table 5-56. Facilities Required for Belt Filter Press Dewatering.

Item	Unit	New Facilities at 4.0 mgd ADWF	New Facilities at 7.0 mgd ADWF
Belt Filter Presses	Number/width	1 @ 1.5 m	1 @ 1.5 m
Filtrate Equalization	Volume	42,000 gal	36,000 gal
Filtrate Pumps	Number/gpm	2 @ 50	1 @ 50
Polymer Feed System (including pumps, mixing tanks, and mixers)	Number/gpm	2 @ 25	1 @ 25

Alternative S1 – Keep All Liquid Biosolids Storage, Add Cake Storage

This alternative would give Wilsonville the flexibility to land apply dewatered cake or liquid biosolids. The most likely scenario is that liquid biosolids would be produced and applied during summer months, and dewatered cake would be produced and stored during winter months. Hauling and application of cake to an arid area (e.g. Eastern Oregon) is also possible during the winter.

Restrictions on biosolids hauling and application are as follows:

- Land application slope requirements are eased – cake can be applied to slopes up to 30 percent, while liquid biosolids can only be applied to slopes up to 12 percent.
- New hauling and spreading equipment for cake application would be required if this is not contracted out. Alternately, a contract operation could be used for this service.
- Hauling costs would be dramatically reduced if biosolids are applied at sites close to the plant, or biosolids could be hauled and applied to sites further away from the plant at a comparable cost.
- Oregon DEQ requires that cake be sampled and analyzed for pathogens before application if cake is stored for an extended period of time. Pathogen regrowth is an issue with cake storage.

Facilities Required/Key Design Information

Table 5-57 shows the equipment and facilities required for new cake storage facilities, keeping all existing liquid biosolids storage. The cake storage building would be a relatively tall building – aproximately 30 feet high – likely directly connected to or near the dewatering facilities to minimize conveyance distance. Cake solids would be conveyed to the top of the building by belts or screw conveyors and dropped into a truck loading bay. Hauling trucks would park underneath a hopper/silo, and cake would be loaded into trucks via a separate conveyor system. A screw conveyor would be located in the middle of the floor of the building. A front-end loader could be used to move cake to the middle of the bay as cake was removed. The building would be enclosed for odor control, and ventilated air would be routed to the compost biofilter. Table 5-57 assumes that dewatered cake will be produced at 25 percent solids and can be piled 20 feet high. This type of facility has been used successfully to minimize solids storage footprint at the McMinnville, OR treatment plant. Figure 5-22 shows a schematic of the conceptual storage building.

Table 5-57. Facilities Required for Cake Solids Storage, Keeping All Liquid Biosolids Storage.

Item	Unit	New Facilities at 4.0 mgd ADWF	New Facilities at 7.0 mgd ADWF
Cake Storage	Volume, cy	3,009	3,277
Cake Storage Building	Area/Depth	4,100 sf/20 ft	4,400 sf/20 ft

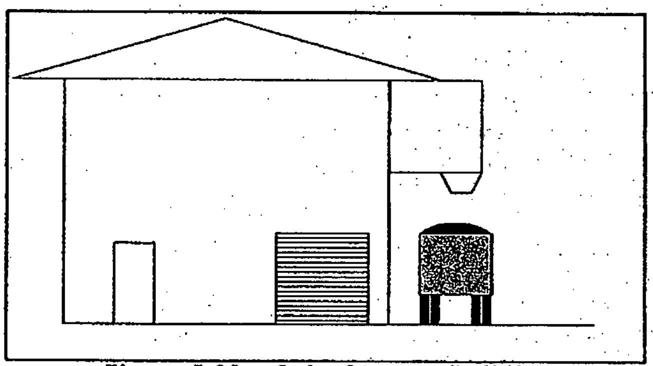

Figure 5-22 – Cake Storage Building

Alternative S2 – Phase Out Liquid Biosolids Production, Add Cake Storage

This alternative is very similar to Alternative S1 except that the existing liquid biosolids storage would be phased out over a period of several years.

Digested solids storage will still be required to provide equalization of the digester effluent with dewatering operations. A tank the same size as the anaerobic digesters should be provided at 4.0 mgd. However, the tank would have either a traveling cover or a membrane cover to accommodate gas storage and fluctuating liquid levels. At build-out, this tank will provide approximately 5 days of liquid storage during maximum week flows.

Facilities Required/Key Design Information

Table 5-58 presents the equipment and facilities required for cake storage, thereby phasing out the existing liquid biosolids storage.

Table 5-58. Facilities Required for Cake Solids Storage, Phase-Out of Liquid Biosolids Storage.

Item	Unit	New Facilities at 4.0 mgd ADWF	New Facilities at 7.0 mgd ADWF
Cake Storage	Volume	3,383 cy	3,327 cy
Cake Storage Building	Area/Depth	4,600 sf/20 ft	4,500 sf/20 ft
Liquid biosolids storage tank	Number/diameter/liquid height	1 @ 45 ft dia x 30 ft high	—

Alternative S3 – Dried Biosolids Storage

This alternative would only be appropriate in combination with thermal drying of biosolids (Solids Stabilization alternative 2C). Dried solids are typically stored in above-ground silos. Ninety days of storage volume will be assumed for the alternative. This is generally considered sufficient storage for dried biosolids.

An important design issue with dried biosolids is their potential to spontaneously combust if the moisture content is greater than 10 percent. If the moisture content cannot be kept below 10 percent, nitrogen gas can be added to the storage silo to keep it oxygen-free. However, this approach is relatively expensive. A better solution is to design the drying process to achieve 92 percent solids. The evaluation of this alternative in the solids stabilization analysis assumes that the drying process will meet this criteria, and this discussion assumes that a nitrogen supply system will not be required. Also, the discussion assumes that dried biosolids will be hauled away by truck and not bagged. A bagging operation would require a more sophisticated and expensive drying operation.

Implications on Wilsonville's biosolids application program are as follows:

- Class A biosolids – no regulations regarding site restrictions, etc.
- Some farmers are less willing to accept dried solids. However, in general, dried biosolids are more marketable than cake solids.
- Substantially smaller volume of biosolids to haul and apply

Facilities Required/Key Design Information

Required facilities for dried biosolids storage are shown in Table 5-59. Storage and conveyance equipment is often included with the thermal drying equipment under one procurement contract. Costs presented earlier for thermal drying facilities do not include storage.

Table 5-59. Facilities Required for Dried Biosolids Storage.

Item	Unit	New Facilities at 4.0 mgd ADWF	New Facilities at 7.0 mgd ADWF
Dried biosolids storage (silo/hopper)	Volume	356 cy	265 cy
Cake solids storage (hopper)	Volume	96 cy	71 cy

Comparison of Alternatives

Table 5-60 presents the major advantages and disadvantages of the three dewatering alternatives, and Table 5-61 presents a similar comparison for biosolids storage alternatives.

Table 5-60. Comparison of Advantages and Disadvantages of Solids Dewatering Alternatives.

Alternative	Advantages	Disadvantages
1. Rotary Press Dewatering	• Lowest capital expenditures • Enclosed-no additional odors • Energy efficient • Low speed rotation-less maintenance	• Few municipal installations • May not produce high solids content cake with dewatered primary/WAS • Sole source equipment
2. Centrifuge Dewatering	• Best performance (e.g. cake solids concentration) of three alternatives • Enclosed-no additional odors • Easily automated • Lower equalization volume than BFPs	• Energy Intensive • Difficult maintenance • Building requires additional structural support • Startup and shutdown can take up to an hour
3. Belt Filter Press Dewatering	• Similar operation to existing GBTs • Process can be visually inspected	• Not enclosed, odor issues • More filtrate generated, larger equalization tanks and pumps • Requires protection of belts-additional grinder, etc. • Frequent maintenance

Table 5-61. Comparison of Advantages and Disadvantages of Biosolids Storage Alternatives.

Alternative	Advantages	Disadvantages
1. Keep All Liquid Storage, Add Cake Storage	• Greatest flexibility	• Largest footprint • Most operational complexity
2. New limited liquid storage, Add Cake Storage	• Space savings over Alt 1.	• Need some liquid biosolids storage for equalization of digestion and dewatering • Most difficult product handling (all cake solids)
3. Dried Biosolids Storage	• Lowest odor potential • Smallest storage volume/footprint required • Easiest product handling	• Combustion hazard

Summaries of costs for the alternatives are shown in Table 5-62 and 5-63. Detailed cost evaluations are included in the appendix.

Table 5-62. Summary Cost Comparison of Dewatering Alternatives (Costs in $1,000s)

	Alternative 1 – Rotary Press		Alternative 2 – Centrifuge		Alternative 3 – Belt Filter Press	
	4.0 mgd	7.0 mgd	4.0 mgd	7.0 mgd	4.0 mgd	7.0 mgd
Total Capital Cost	$2,861	$1,243	$6,423	$2,014	$3,837	$1,099
Annual O&M Cost	$ 98	$ 146	$ 135	$ 191	$ 142	$ 206
Present Worth Capital Cost	$2,645	$ 747	$5,938	$1,209	$ 3,548	$ 660
Total Present Worth Cost	$9,480		$15,291		$12,898	

Table 5-63. Summary Cost Comparison of Biosolids Storage Alternatives (Costs in $1,000s)

	Alternative 1 – Existing Liquid/ New Cake		Alternative 2 – New Liquid /New Cake		Alternative 3 – Dried Biosolids Storage	
	4.0 mgd	7.0 mgd	4.0 mgd	7.0 mgd	4.0 mgd[1]	7.0 mgd[1]
Total Capital Cost	$2,479	$2,718	$4,037	$2,878	$0	$0
Annual O&M Cost	$ 5	$ 8	$ 3	$ 5	$ 3	$ 5
Present Worth Capital Cost	$2,291	$1,633	$3,733	$1,729	$ 0	$ 0
Total Present Worth Cost	$4,242		$5,649		$187	

1. Capital costs were included in solids stabilization alternative 2C.

Preliminary Recommendations

Dewatering

Figure 5-23 shows a comparison of the dewatering alternative with respect to the evaluation criteria. The rotary press is clearly advantageous from a cost standpoint. This technology is also simple to operate and maintain, and is less likely to require operator attention than a centrifuge. All of the dewatering options have relatively small footprints, and will be enclosed in a building to provide odor control.

The primary drawback with the rotary press is its lack of operational experience and the uncertainty of its performance with respect to final dewatered sludge quality. Because the dewatered sludge solids concentration critically impacts the volume of sludge storage required, it is essential that performance standards be established before a final dewatering process is selected. Samples should be provided to Fourier Industries as soon as possible for analysis, followed by pilot testing. Once performance on Wilsonville's sludge has been established, the impacts on dewatered sludge storage volume requirements can be assessed to determine whether this is a reasonable technology to use. If performance is not satisfactory, gravity belt thickeners should be installed.

Figure 5-23. Sludge Dewatering Alternatives Preliminary Evaluation

Evaluation Criteria	Alt 1: Rotary press dewatering	Alt 2: Centrifuge dewatering	Alt 3: Belt filter press dewatering	Comments
Regulatory Compliance	●	●	●	
Operations/ Technology	◔	◑	◕	Rotary press is new technology; operational characteristics unproven
Implementation	●	●	●	
Community/ Environmental	●	●	◑	Belt filter presses produce odors.
Compatibility With Site	●	●	◑	
Cost	●	◕	◑	
Total	●	●	◑	

Worse ←→ Better

○ ◔ ◑ ◕ ●

Sludge Storage

Figure 5-24 shows a comparison of sludge storage options with respect to the evaluation criteria. Dewatered solids should be stored in a new dewatered sludge storage building, phasing out the liquid sludge storage tanks in favor of a digested sludge storage tank to be located with at a new digester complex. When viewed independently from biosolids processing, dried biosolids storage appears to be the most attractive option. However, it is unlikely that this technology will be implemented for biosolids stabilization.

Figure 5-24. Sludge Storage Alternatives Preliminary Evaluation

Evaluation Criteria	Alt 1: Add cake storage, keep all liquid storage	Alt 2: Add cake storage, limited new liquid storage	Alt 3: Dried biosolids storage	Comments
Regulatory Compliance	●	●	●	
Operations/ Technology	◕	◕	●	Alternatives including both liquid and cake storage will be slightly more complicated to operate
Implementation	●	●	●	
Community/ Environmental	◑	◕	●	Higher storage volumes could result in higher volumes of truck traffic
Compatibility With Site	◔	◑	●	
Cost	◕	◕	●	
Total	◑	◕	●	

Worse ← → Better

○ ◔ ◑ ◕ ●

Biosolids Management Program

The City currently has a Class B biosolids land application program whereby aerobically digested liquid biosolids are applied to local agricultural property in the vicinity of the city. Table 5-64 summarizes the current sludge quality, based on the City's recent Biosolids Annual Reports.

Table 5-64. Biosolids Quality for 1999-2001

	1999	2000	2001	Average
Total Kjeldahl Nitrogen (% dry weight)	0.81	2.67	2.54	2.01
Nitrate (% dry weight)	0.00	0.10	0.02	0.04
Ammonia (% dry weight)	0.70	1.26	1.13	1.03
Phosphorus (% dry weight)	0.79	1.35	1.77	1.30
Potassium (% dry weight)	0.32	0.61	0.83	0.59

Land Requirements for Biosolids Application

As mentioned in Chapter 4, one of the primary requirements for the land application of biosolids is that application must be performed at an agronomic rate. This means that nitrogen application (by dry weight) must not exceed that needed by a crop or vegetation. Based on the City's recent annual biosoilds reports, nitrogen loadings to the existing sites average approximately 75 lb N/acre. This is consistent with the planning value of 80 lb N/acre used in the 1995 Facility Plan. Assuming that crops grown on future land application sites will have similar agronomic nitrogen loading rates to those on the existing sites, a planning value of 80 lb N/acres can be used to estimate future land requirements. With average nitrogen content of 2% on a dry weight basis (Table 5-64), approximately 515 acres will be required for biosolids disposal associated with an influent ADWF of 4 mgd, and 900 acres for disposal of biosolids associated with an influent ADWF of 7 mgd.

Considerations for Future Biosolids Management Program

As the City has experienced recently, identifying landowners willing to accept biosolids can be challenging. Identifying sites that are adequate for year-round biosolids land application is even more challenging. Very recently, DEQ has indicated that it may cease to approve winter land application of Wilsonville's biosolids, which would have serious implications for the City's biosolids management program.

In order to provide a secure biosolids reuse program for the future and to continue to comply with DEQ requirements, the City should complete a thorough Biosolids Management Plan in which ultimate processing needs at the treatment plant are matched to the City's goals for ultimate reuse of the final biosolids. A number of considerations associated with various processing options are outlined in Table 5-65.

Table 5-65. Considerations of Biosolids Processing Options

Biosolids End-Product	Beneficial Reuse Considerations
Class B Liquid Biosolids	• Most stringent requirements with respect to acceptable land application sites (i.e., slopes). • Highest volume of sludge to haul to land application sites.
Class B Dewatered Biosolids	• Most stringent requirements with respect to acceptable land application sites. • Lowers volume of sludge to haul, possibly facilitating application on sites farther from the treatment plant. • Provides a product that may be more marketable to large commercial land application programs (i.e., eastern Oregon)
Class A Dewatered Biosolids	• Least stringent requirements with respect to acceptable land application sites. • Final product resembles Class B sludge; marketing effort may be required to identify, educate, and entice landowners.
Class A Dried Biosolids	• Least stringent requirements with respect to acceptable land application sites. • May be the most marketable product, however detailed market analysis would be required prior to implementing sludge drying.

In addition, the City could consider new arrangements to allocate the risk associated with biosolids reuse between the City and other parties. These options include:

- Disposal of biosolids on agricultural land owned by 3rd party (current practice)
- Disposal of dewatered biosolids at a landfill
- Disposal on City-owned land that is leased to farmers
- Disposal of dewatered biosolids through contractual arrangement at large-scale land application site(s)
- Disposal through contractual arrangement with retailer or 3rd party vendor

Reuse Program

The City has initiated an effluent reuse program as documented in a plan submitted to Oregon DEQ in May 2000. In the Plan, the City outlines its plans to implement a two-phase reuse program consisting of:

- Phase I: Providing Class IV reuse water for sewer jet rodding, storm sewer catch basin cleaning, and landscaping at Boones Ferry Park.
- Phase II: Providing Class IV reuse water for irrigation at Wilsonville Memorial Park.

The City received conditional approval for this plan, provided that the following conditions are met:

- Provide chemical coagulation
- Maintain a chlorine residual of 1.0 mg/L

Because these conditions cannot be met with the current treatment process, the reuse program has not been implemented.

Wilsonville
Wastewater Facility Plan

Technical Memorandum
Additional Biosolids Treatment Alternative
Pages 1 through 7

Attachment E
To
June 8, 2005 Planning Commission
Work Session Staff Report
LP-2005-05-00008

Wastewater Facility Plan Amendment related to the handling of bio-solids and preferred alternatives to producing Class "B" sludge. (Remand from City Council.)

Technical Memorandum
Additional Biosolids Treatment Alternative - Incineration

Summary

The City of Wilsonville currently land applies aerobically digested (Class B) liquid biosolids on local farms through a year-round land application program. Through the ongoing efforts of Environmental Services staff, the City has developed strong agricultural partners that beneficially use biosolids for soil augmentation during the summer months. However, due to severe regulatory cutbacks on winter land application sites and changes in ownership or management of several key reuse properties, the City has struggled over the past years with winter biosolids management. The assumptions used in the Draft Facility Plan regarding biosolids management led to the recommendation of installing dewatering and enclosed storage to provide six months of onsite storage at the facility. The capital improvements associated with this recommendation proved difficult to finance, leading the City to request new options that were not considered or were considered but eliminated in the initial Facility Plan development. This memorandum provides a preliminary overview of an additional treatment/disposal option previously not evaluated in detail – incineration of all solids generated at the treatment plant.

It is recommended that the City continue its Class B land application program in partnership with local landowners in the short term, and implement improvements to bring greater flexibility to the program in terms of acceptable reuse or disposal options. The City should also continue to investigate Class A treatment technologies such as solids drying, and implement solids treatment improvements in a way that facilitate moving toward producing Class A biosolids in the future. Incineration of solids is considered a less viable alternative for the City due to permitting, operating and maintenance requirements, and public acceptance issues.

Introduction

Incineration has been used to manage solids at municipal wastewater treatment facilities in the US since 1936. The main advantage of incineration over other solids management options is the large volume reduction. The key issues for the design and operation of a solids incinerator are permitting and regulatory considerations related to incinerator emissions, public acceptance, equipment and energy requirements, and ash management. Each of these issues is discussed in the following sections.

Essentially, there are two incineration technologies available that have been successfully applied in the US: multiple hearth furnaces, and fluidized bed incinerators. Due to the fact that fluidized bed incinerators are considered to be more capable of meeting stringent air quality requirements than multiple hearth furnaces, and their ability to more easily be shut down and restarted, and that the two technologies have comparable costs, this analysis will focus solely on fluidized bed incinerators.

A typical process schematic of a fluidized bed incinerator is shown in Figure 1. Typically, fluidized bed incinerators operate at temperatures of approximately 1400 to 1500°F, resulting in near complete combustion of nearly everything except the inert material in wastewater solids. The fluidized bed incinerator furnace is vertically-oriented, and units are commercially available with diameters ranging from 9 to 34 feet in diameter. A bed of sand and the influent solids feed at the bottom of the unit is "fluidized" by blowing air at a pressure of 3 to 5 psig through a refractory (e.g. temperature resistant material) grate or set of diffusers. Oxygen for near complete oxidation of combustible material is required, and typically, air quantities in excess of the requirements are maintained to minimize supplemental fuel requirements and ensure that air quality requirements can be met.

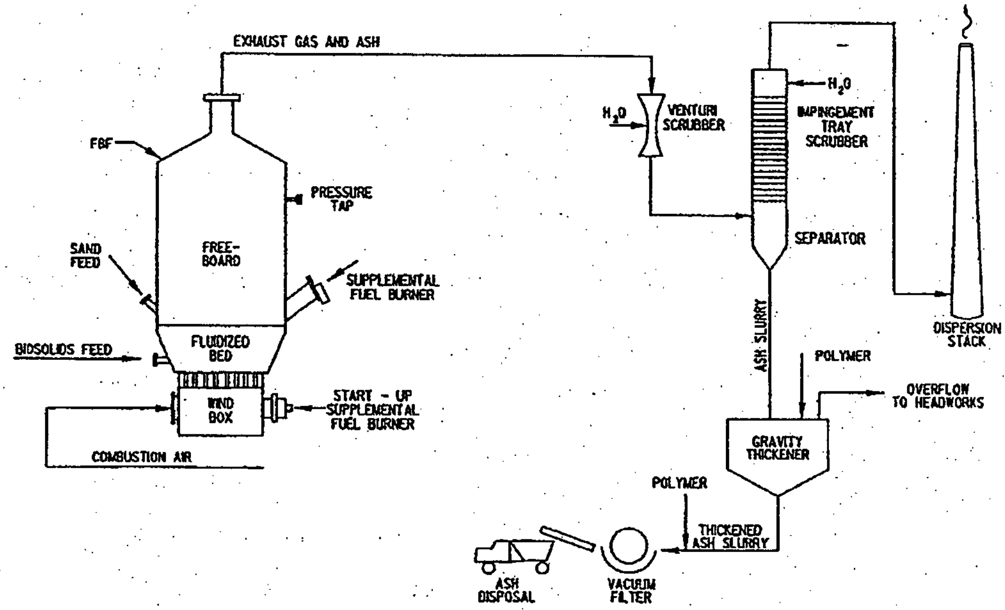

Figure 1. Typical fluidized bed incinerator schematic (from NBP, 2000).

Operations and maintenance costs can be significant for fluidized bed incineration systems. Unless the solids concentration is in excess of approximately 28 percent, the incineration process requires supplemental fuel. Natural gas or No. 2 fuel oil is most commonly used. A small amount of sand from the bed of the unit also escapes with the gas and must be periodically replaced. Waste heat recovery can be performed in several ways, but most typically, combustion air is heated with furnace exhaust prior to entering the fluid bed furnace. Other forms of heat recovery include injecting exhaust gas directly into the furnace, and using bed coils around the furnace.

The exhaust gas and ash exits through the top of the furnace and is treated further to remove the ash and particulates and for emissions control. The characteristics of the ash depend on the exhaust gas processing, but may require concentration in either a gravity thickener or other thickening process. The following sections describe emissions control and ash management in more detail.

Wilsonville could operate an incineration system with a one shift per day, five day per week operating staff. The high temperatures involved in the incineration process combined with the nature of wastewater solids would likely result in operations and maintenance issues that may require more staff at the Wilsonville WWTP to manage the incineration process than would a Class B land application program using anaerobic digestion and cake storage.

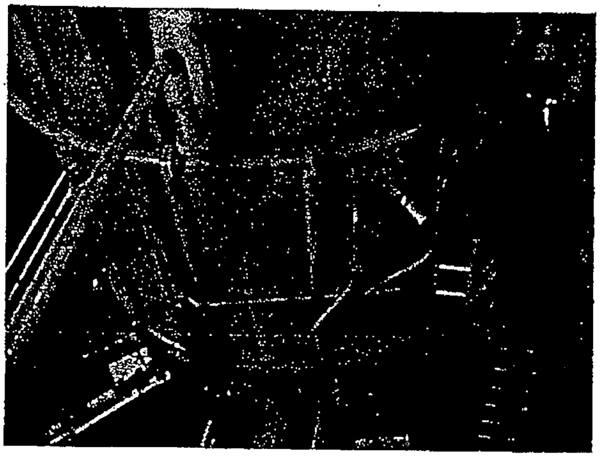

Figure 2. Fluidized bed furnace at Edmonds WWTP (courtesy of City of Edmonds, Washington).

Experience of Other Pacific Northwest Utilities

Several Pacific Northwest utilities currently use incineration to manage municipal wastewater solids. Washington utilities currently using incineration include Lynnwood, Anacortes, Edmonds, Marysville, Bellingham, and Vancouver. However, there are no municipal solids incinerators operating in the state of Oregon. Clean Water Services, the municipal wastewater utility for Washingon County, Oregon, previously incinerated solids but moved to a Class B biosolids land application program due to operational and other problems. Oregon law has promoted land application of biosolids since approximately 1990 (see later discussion under Current Regulatory Considerations). While Washington law currently indicates a similar preference, most of the facilities listed above were constructed prior to the 1990s, and some (such as Lynnwood and Edmonds) have been in operation since the late 1960s. Some have other constraints that favor incineration – the Edmonds facility, for example, is located in downtown Edmonds where minimizing truck traffic to and from the facility is a primary concern.

Incinerator Emissions

When properly designed and operated, municipal biosolids incinerators can completely combust the solids to produce emissions of carbon dioxide, water, and sulfur dioxide (National Biosolids Partnership, 2000). However, incomplete combustion of biosolids can produce hydrocarbons, volatile organic compounds (VOCs), and carbon monoxide, all of which can significantly degrade air quality. Particulates, some heavy metals, nitrous oxides, and sulfur oxides are also a concern in incinerator emissions.

Due to the vaporization of some heavy metals at the high temperatures of the incineration process, environmental release of heavy metals into the air is a significant concern. Metals expected to at least partially vaporize during incineration include cadmium, lead, mercury, and zinc (National Biosolids Partnership, 2000). Modern pollution control equipment can capture most of these metals, but mercury presents a challenge when vaporized.

Any solids incineration system must be designed with a significant amount of air pollution control equipment. Obtaining air quality permits is typically the most challenging part of implementing solids incineration. This issue is discussed further in the section titled Current Regulatory Considerations.

Ash Management

Incineration of wastewater solids reduces the volume to approximately 20 to 40 percent of the dry weight of the raw solids (National Biosolids Partnership, 2000). In fluidized bed incineration systems, most of the ash in carried out of the top of the furnace to be processed by the air pollution control equipment. Scrubbers remove the particulates using a water spray, then the particulate/water slurry is processed in a separator.

Ash can be beneficially reused, as it typically contains relatively high concentrations of phosphorus and potassium. Beneficial uses include agricultural fertilizer, and structural additive for building materials. There is no risk of pathogens in the ash, as they cannot survive the high temperature incineration process. For landfilling, ash required further concentration in a gravity thickener and potentially a dewatering device. Ash needs concentration to pass the Paint Filter Test, which is required for disposal in a landfill.

Current Regulatory Considerations

The Draft Facility Plan outlined current and potential future biosolids regulations and requirements, but did not consider the air quality regulations that would apply to a solids incinerator. The following sections presents a review of pertinent federal and state regulations.

Federal Requirements

40 CFR Part 503 Rule regulates emissions from municipal solids incinerators for total hydrocarbons (THC), carbon monoxide, and the following heavy metals:

- Arsenic
- Beryllium
- Cadmium
- Chromium
- Lead
- Mercury
- Nickel

The Rule uses different approaches for different heavy metals:

- "Risk-specific concentrations" (e.g. limiting the concentration in the feed solids) are used for arsenic, cadmium, chromium and nickel,
- The National Ambient Air Quality Standard (NAAQS) is used to regulate lead,
- A technology-based operational standard is used for total hydrocarbons, and
- The National Emissions Standards for Hazardous Air Pollutants (NESHAPS) are used for beryllium and mercury.

40 CFR Parts 50, 51, and 52 establish national ambient air quality standards. This regulation forms the basis of the Part 503 regulations for arsenic, cadmium, chromium, nickel, and lead. 40 CFR Part 61 is titled the National Emissions Standards for Hazardous Air Pollutants (NESHAPS), and Subpart E lists the requirements for beryllium and mercury emissions from municipal solids incinerators, which are 10 grams and 3,200 grams emitted in a 24-hour period, respectively. For all heavy metals, the Part 503 Rule regulates the feed solids concentration.

State Requirements

Wilsonville would need to obtain an Oregon Air Contaminant Discharge Permit (ACDP) prior to constructing an incinerator, as the City does not currently have one. A "Standard" version of the

ACDP would be required due to the potential to discharge hazardous pollutants, and the permit application fee is $10,000, not including the annual fee of $6,400. This permit would require a significant amount of effort to obtain, and would require an air quality model, dispersion testing, and a plan for ash disposal.

There are public notice requirements in the ACDP process that would alert plant neighbors to the fact that the City plans in construct and operate an incinerator at the plant. According to the Oregon Department of Environmental Quality (DEQ), current public perception of any type of incineration facility is very negative (Broad, 2003). Depending on the level of citizen concern with incineration, this process could force the City to abandon plans for solids incineration.

DEQ also indicates that mercury emissions are of particular to citizens and leaders across the state (Broad, 2003). DEQ would scrutinize any permit application or plan to emit mercury (such as a municipal solids incinerator), and may not permit such a facility. Additional investigation, potentially including pilot testing, would be required to determine whether or not incineration is a viable alternative from a regulatory perspective.

Finally, the Oregon Administrative Rules promote the land application of treated biosolids over other forms of disposal due to the agricultural value of the material. OAR 340-50-006 states that "The Environmental Quality Commission (EQC) encourages the land application of treated domestic wastewater biosolids, biosolids derived products, and domestic septage which are managed in a manner which protects the public health and maintains or improves environmental quality. These beneficial recyclable materials improve soil tilth, fertility, and stability and their use enhances the growth of agricultural, silvicultural, and horticultural crops." DEQ confirmed verbally that both DEQ and EPA would prefer land application of treated biosolids over incineration due to the beneficial reuse value of the biosolids product (Henderson, 2003).

Analysis of Alternative

The following sections describe the conceptual design of a solids incineration process at the Wilsonville WWTP.

Design Criteria

Digestion would not be necessary and is not desirable in combination with an on-site incineration process due to the following:

- Digestion results in a reduction in fuel value of the solids.
- Raw solids have enhanced dewatering characteristics compared to digested solids.
- There is a cost savings associated with eliminating the digestion process.

Therefore, the raw solids flows and loads would be applicable for design of an incineration process. According to the Draft Facility Plan, the annual average raw solids load at the initial expansion point would be approximately 9,000 lb/d, and the raw solids load at the ultimate expansion point would be approximately 15,500 lb/d.

Since the plant is not staffed 24 hours per day, seven days per week, the incineration process will need to be sized to process the solids during normal working hours to avoid increased staffing. Operation of storage/thickening and dewatering on a five day per week, eight hours per day schedule is assumed. This would allow thickening and dewatering operations to coincide with incineration without the need for additional solids storage.

Incineration Costs

Table 1 presents the estimated costs for an incineration system at Wilsonville, given the design criteria discussed in the previous section. Capital costs assume that an incineration facility capable of handling ultimate solids flows and loads would be constructed in the initial expansion. Therefore, no capital expenditures would be necessary for the ultimate expansion, as shown in Table 1. The table shows that incineration is cost intensive, both in capital and O&M costs.

Table 1. Estimate of Probable Capital and Operating Costs for Solids Incineration.

Capital Costs	Initial Expansion (3.4 mgd ADWF)	Ultimate Expansion (4.4 mgd ADWF)
Fluidized Bed Furnace	$ 1,200,000	$ -
Sludge Storage/Blend Tank	$ 250,000	$ -
Sludge Feed Pump (Piston)	$ 150,000	$ -
Fluidizing Blower	$ 350,000	$ -
Heat exchanger	$ 250,000	$ -
Fuel Storage and Feed System	$ 100,000	$ -
Air Pollution Control Equipment	$ 750,000	$ -
Ash Thickening and Dewatering	$ 500,000	$ -
Ancillary Equipment	$ 250,000	$ -
Building	$ 900,000	$ -
Misc. Utilities	$ 25,000	$ -
Electrical and Controls @ 20%	$ 1,417,500	$ -
Sitework @ 15%	$ 945,000	$ -
Subtotal A	**$ 7,087,500**	**$ -**
Misc. Costs Not Itemized (30% of A)	$ 2,126,250	$ -
Subtotal B	**$ 9,213,750**	**$ -**
Mobilization and Bonds (8% of B)	$ 737,100	$ -
Contractor Overhead and Profit (15% of B)	$ 1,382,063	$ -
Subtotal C	**$ 11,332,913**	**$ -**
Engineering, Legal, Admin. (25% of C)	$ 2,833,228	$ -
Total Capital Costs	**$ 14,166,141**	**$ -**
Annual Operations and Maintenance Costs		
Labor	$ 108,000	$ 126,000
Electricity	$ 70,000	$ 70,000
Fuel	$ 146,000	$ 244,000
Water	$ 82,500	$ 138,000
Spare Parts and Misc. Materials	$ 20,000	$ 20,000
Disposal (Landfill)	$ 45,000	$ 75,000
Annual permit fee	$ 6,400	$ 6,400
Total Operations and Maintenance Cost	**$ 471,500**	**$ 673,000**

Annual labor costs for the incineration options equate to approximately 1.7 full time equivalent (FTE) employees associated with the incineration process. These costs are associated with startup and shutdown during each shift, management of the ash product, and maintenance resulting from high wear and tear due to the frequent heating and cooling cycles. These annual O&M costs are approximately 50% higher than the most expensive alternative examined in the Facility Plan.

Advantages and Disadvantages of Solids Incineration

Table 2 lists the advantages and disadvantages of incineration versus a land application program for biosolids management. The disadvantages of incineration appear to outweigh the advantages, mainly due to permitting, public acceptance, and operations and maintenance costs.

Table 2. Advantages and Disadvantages of Incineration.

Advantages	Disadvantages
Large solids volume reduction	Potential emission of hazardous air pollutants
Minimal truck traffic in and out of treatment facility	Difficult and expensive permitting process
Enhanced solids dewatering	Negative political and public perception
Space savings at plant	Energy intensive
	Maintenance intensive
	Destruction of valuable organic fertilizer; loss of economic benefits to local agricultural community

Recommendations

While incineration is potentially a viable option for solids management at Wilsonville, it is not the preferred option due to stringent and potentially unattainable permitting requirements, high operations and maintenance costs, and the potential negative perception of neighbors in the immediate vicinity of the treatment plant. Incineration does remove pathogens beyond levels achieved in a Class B system, and significantly reduces the volume of solids leaving the plant site. However, these benefits can also be achieved through a Class A treatment process, which allows continued use of the treated biosolids for land application as is preferred by EPA and DEQ at a lower cost than incineration. Therefore, incineration is not recommended for further consideration.

References

Broad, J. (2003), Oregon Department of Environment Quality, personal communication.

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USEPA (1979), Process Design Manual: Sludge Treatment and Disposal.

USEPA (1994), A Plain English Guide to the Part 503 Biosolids Rule.

Water Environment Federation (1994), Beneficial Use Programs for Biosolids Management.

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Oregon DEQ

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- Notices
- Permits & Licensing
- Vehicle Inspection

Home > Programs > Air Quality > Permits/Licensing > Incinerator Rules

Attachment F

Incinerator Rule

Stricter air quality requirements developed by the Department of Environmental Quality (DEQ) for solid and infectious waste incinerators in Oregon went into effect March 13, 1995. Companies that have not already complied with these rules were required to shut down their incinerators by March 13, 1995. Comparable rules for crematory incinerators have been effect since March 13, 1993.

The rules were specifically developed to respond to growing concern over possible health risks associated with emissions from the burning of chlorinated plastics, found predominantly in solid and medical waste which is classified as infectious waste. The rules apply to all sizes of solid and infectious waste incineration facilities operating in the state.

There are no infectious waste incinerators currently operating in Oregon. Approximately 50 Oregon hospitals had infectious waste incinerators and closed them down after the rules were adopted by the Environmental Quality Commission (EQC) March 2, 1990. Oregon's infectious waste is currently transported to be sterilized at various treatment facilities in Washington and Oregon. The municipal waste incinerator in Brooks, which also incinerates some infectious waste, is subject to the new rules.

The rules were developed to implement a law passed by the 1989 Oregon Legislature that requires pathological waste (which includes biopsy materials and all human tissue) be incinerated instead of being disposed of at a landfill.

DEQ's rules set emission standards that significantly reduce emissions of fine particulate matter, acid gases, and toxic air pollutants. The rules also require high-efficiency pollution control equipment and continuous air quality monitoring equipment for specified pollutants.

All existing crematory incinerators were given three years to upgrade their facilities to meet the new requirements. All existing solid and infectious waste incinerators were given five years to upgrade their facilities to meet the new requirements. Since March 1990, all permit applications for new incinerators have been required to meet these standards.

In January 1995, the Environmental Protection Agency issued proposed regulation that would further reduce air pollution from medical waste incinerators.

Last updated: 8/27/2001 jsf

Andritz Proposal
Reference DS-605
Belt Drying System (BDS) for Sludge

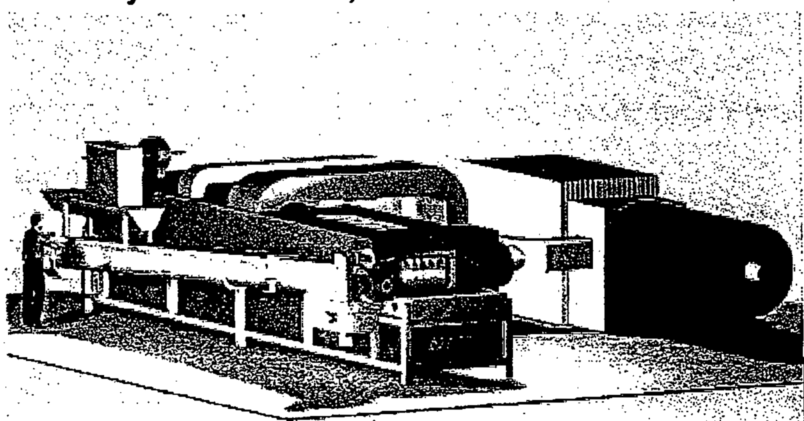
Compiled for:

City of Wilsonville
8445 SW Elligsen Rood
30000 SW Town Center Loop E
Wilsonville, OR 97070
Tel: (503) 682-4960
Email: stone@ci.wilsonville.or.us
Contact: Mr. Michael Stone P.E.

Attachment G

Project:

City of Wilsonville, OR



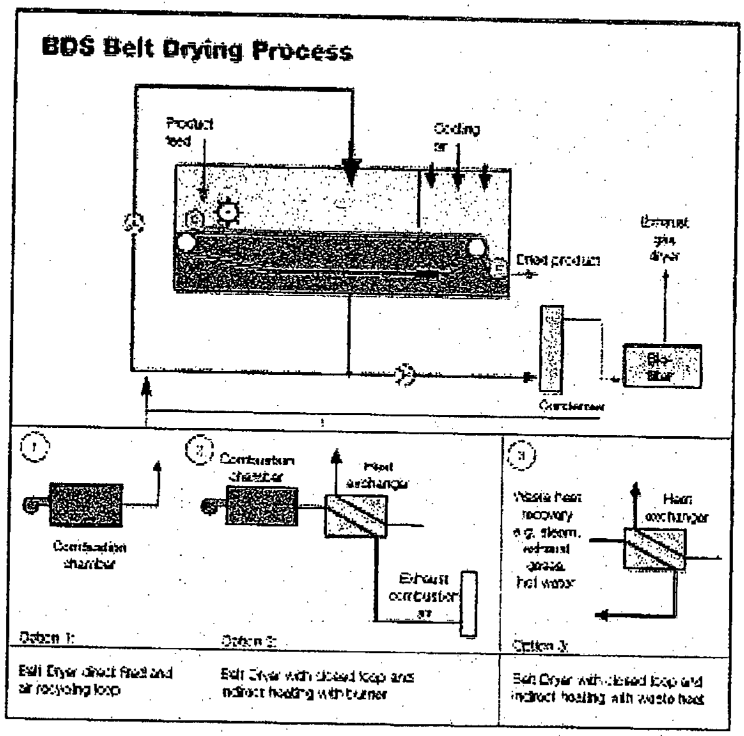
Provided By:

Andritz-Ruthner, Inc.
1010 Commercial Blvd. So.
Arlington, TX 76001
Contacts: *Mr. Bob Hill -Regional Manager, Dryer Systems*
Tel: *(817) 419-1790*
Fax: *(817) 419-1990*
Email: *bobhill@andritz-arl.com*

April, 13th 2004

5.0 PROCESS DESCRIPTION (BDS-05 DIRECT HEATING)

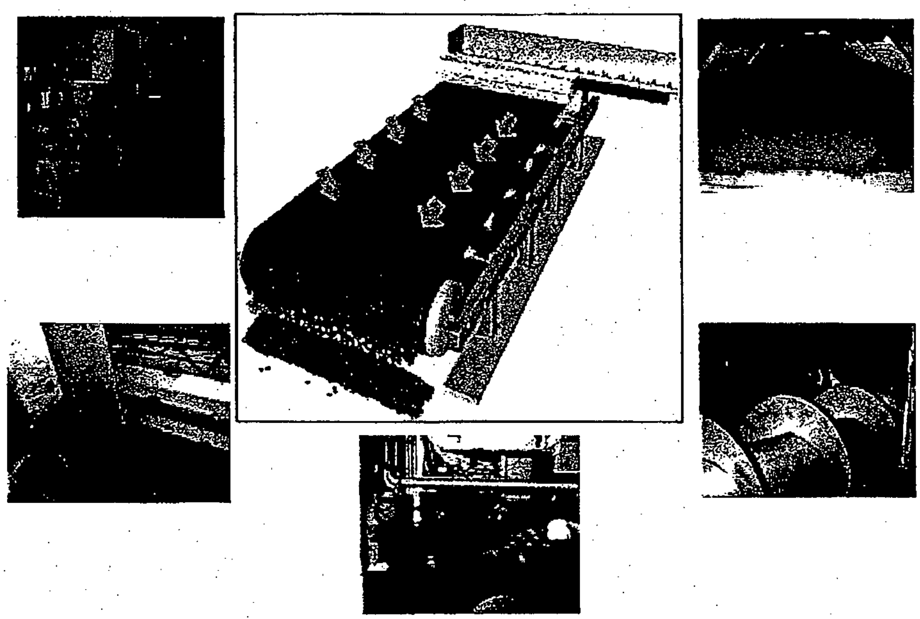
Product path description



The sludge cake is stored in a tank and fed continuously with speed-controlled dosing screws to a feeding and mixing screw. Part of the previously dried product is also fed onto the feeding and mixing screw and mixed with the wet product. This screw conveys the product to the distribution screw, which feeds and doses the product evenly onto the dryer belt. This screw and a distribution coil, which is adjustable in height, assure that the layer is homogenous across the width of the belt, at an adjustable height of approx. 4 – 20 cm. As it passes through the dryer, product is warmed with hot air and dried. After the drying zone, the product is cooled in the downstream cooling zone. At the end of the belt, the dried product is discharged with a screw and either discharged from the system or backmixed.

Drying air

The drying air is heated in the gas steam furnace to the feed temperature, 120 – 150°C, for products like sewage sludge, saw dust, etc., before entering the belt dryer. The air flows through the material to be dried and absprbs the moisture from the product. With a view to achieving the best possible thermal efficiency, the dryer runs at a high circulating air rate, that is to say that a large part of the drying air returns to the gas steam and is re-circulated to the dryer. Part of the circulating air is extracted by the exhaust air fan continuously and fed to the saturator/washer. Exhaust air from the saturator is then treated in the biofilter or another device (RTO, chemical washer), if necessary, to remove odour.



On account of the arrangement of the fans after the drying, all dryer components are under a slight vacuum, hence no dust or odor emissions can be emitted to the environment.

The slight vacuum of 10-20 mm WC above the belt is ensured with the help of appropriate controls.

Heat generation / exhaust air

The drying heat is generated with saturated steam at a pressure of 5 bars abs. and a temperature of 152°C. After the heat exchanger, the condensate temperature is 150°C, and is discharged to the customer-supplied network. The drying air leaves the heat exchanger at a temperature of 120-150°C.

Control and Automation

The plant is controlled and monitored via PLC. An operator interface is provided via a flat screen monitor (Touch Screen). Commands are entered by touching the appropriate functions on the screen or using the mouse.

Starting and stopping of the plant is near-automatic, with pre-programmed sequences such as "Quick Start" and "Quick Stop" sequences in addition to the normal starting and stopping modes. The quick mode is used to start and stop the system within a very short time, i.e. approx. 5 and 15 min respectively.

During operation, the PLC controls controls and monitors the relevant data. The system is equipped with 4 cameras and a display showing the sludge mixture, feed section and sludge in the course of the drying process. Apart from patrolling the system from time to time, operator presence is not required. The system can run in automatic (hands-off mode) during the night. Unmanned operation should be monitored by continuous measuring of the dry substance in the final product (optional equipment). In the event of a failure of the feed system or changes in the sludge characteristics, respectively dewatering outside the permissible range, the control would switch of the system automatically and safely.

In addition to customary controlling and monitoring functions, the display also shows operating curves, error messages, regulator setting and limit values (current or from archives) and a print-out can be made of all this data. Data can also be transmitted to a central system via an interface or modem to an external user.

Safety Engineering

Plant safety is highly prioritised. It must be borne in mind that the drying principle selected and the temperature profile give high plant safety, because there are no critical temperatures or dust concentrations. Nevertheless, we have equipped the plant with the following additional safety devices.

The high degree of automation and continuous monitoring of all safety-relevant parameters ensures that the system is automatically cut out in case of an operator error or if limit values are exceeded. The plant features continuous measuring of CO and dust concentration in the drying air; if the limits are exceeded, the system is shut off automatically and the water-sprinkler in the product and exhaust air section of the dryer is released.

Maintenance

The integrated belt cleaning system should be activated once per month to clean the dryer belt with water at high pressure.

Apart from normal servicing work like greasing and oil changing at the mechanical elements, no other regular maintenance work is required.

LP-2005-05-00008
Wastewater Facility Plan Amendment
Planning Commission Record Index

Staff Report dated July 7, 2005 from Dave Waffle for the July 13, 2005 Planning Commission Meeting including:

Draft Resolution No. LP-2005-05-00008 with attached:

Exhibit A: Wastewater Facility Plan Update Capital Improvement Plan table dated August 9, 2004.

Wilsonville Community Development

- interoffice memo -

Date: **July 7, 2005**

To: **Debra Iguchi, Planning Commission Chair**

From: **Dave Waffle, Community Development Director**

RE: **Staff Report – Wastewater Treatment Plant Facility Plan**

At last month's Planning Commission meeting the staff reviewed an item from the approved wastewater treatment plant facility plan related to a change in the timing of expenditures for the drying and dewatering of sludge. As a result of the work session the staff has prepared a resolution to approve a table that illustrates the recommendation to move more quickly on sludge dewatering and drying than was originally contemplated. The table is exhibit A to the resolution.

The net affect of the change on the total capital expenditures proposed for the wastewater treatment plant (WWTP) is nil. In summary form the spending by phase is as follows:

	Phase 1	Phase 2	Phase 3	Total
Current Facility Plan	$9,982,000	$26,153,000	$34,457,000	$70,592,000
Amended Phasing Plan	**$12,482,000**	**$23,653,000**	$34,457,000	$70,592,000

No further action on the facility plan will be necessary if this resolution is adopted by the Planning Commission. The next steps are for the staff to move into the design phase for projects in phase one and to implement an increase in the sewer service rates. At the same time the Community Development staff will prepare recommendations to increase the Sewer System Development Charges (SDC's) to fund a large portion of the capital improvements that are necessary for a growing community with larger wastewater demands.

Enc.

Cc: Mike Stone, City Engineer
Jeff Bauman, Public Works Director
Mike Greene, Environmental Services Mgr.

drw/wwtp 062705

Draft – for 7/13/05 Planning Comm. mtg.

PLANNING COMMISSION
RESOLUTION NO. LP-2005-05-00008

A WILSONVILLE PLANNING COMMISSION RESOLUTION RECOMMENDING THAT THE CITY COUNCIL ADOPT AMENDMENTS TO THE WASTEWATER FACILITY PLAN RELATED TO THE HANDLING OF BIO-SOLIDS AND PREFERRED ALTERNATIVES TO PRODUCING CLASS "B" SLUDGE.

WHEREAS; the City of Wilsonville operates a wastewater treatment facility under permits from the Oregon Department of Environmental Quality (DEQ); and

WHEREAS; the City is required to undergo a thorough analysis of current and projected operating conditions as part of a facilities plan; and

WHEREAS; the wastewater facility plan is an element of the Comprehensive Plan and is required to be in compliance with City Goal 3.1 and Statewide Planning Goal 11 Public Utilities and Services; and

WHEREAS; the Wilsonville Planning Commission initially held public hearings and considered the proposed wastewater facility plan in October and November 2003 before recommending the plan to the Mayor and City Council (Resolution No. 02PC05); and

WHEREAS; the Mayor and City Council held a public hearing on August 16, 2004 and approved the plan on August 30, 2004 (Ordinance No. 571); and

WHEREAS; the Mayor and City Council asked that the Planning Commission consider a change in the phasing of capital improvements at the wastewater treatment plant related to the dewatering and drying of sludge to produce a Class A sludge under the rules of the DEQ; and

WHEREAS; such a change has a minimal net increase in the overall capital investment requirements for the plant to serve a design population of 25,000 people with a 4 million gallons a day plant by 2020;

NOW THEREFORE BE IT RESOLVED that the City of Wilsonville Planning Commission does hereby concur in the Wastewater Facility Plan with the changes in phases one and two to allow immediate investment in the necessary equipment to create a Class A wastewater sludge; and

BE IT FURTHER RESOLVED that the table attached to this Resolution as Exhibit A is hereby approved as if enclosed herein.

BE IT RESOLVED that this Resolution shall be effective upon adoption.

ADOPTED by the Planning Commission of the City of Wilsonville at a regular meeting thereof this 13th day of July, 2005, and filed with the Planning Administrative Assistant on July 14, 2005.

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Wilsonville Planning Commission

Draft – for 7/13/05 Planning Comm. mtg.

Attest:

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Linda Straessle, Administrative Assistant I

SUMMARY of Votes:

Chair Iguchi:	_______
Commissioner Goddard:	_______
Commissioner Faiman:	_______
Commissioner Guyton:	_______
Commissioner Hinds	_______
Commissioner Juza:	_______
Commissioner Maybee:	_______

Exhibit "A"

Wastewater Facility Plan Update
Capital Improvement Plan
August 9, 2004

Estimated present worth costs for plant expansions (Costs in $1,000's)

Project Element	Phase 1	Phase 2	Phase 3
Headworks	$1,680	$0	$795
Primary Treatment	$125	$3,275	$2,575
Secondary Treatment	$425	$9,669	$20,757
Filtration	$2,690	$0	$1,415
Disinfections	$0	$1,431	$0
Solids Stabilization	$2,500	$2,312	$1,806
Biosolids Dewatering	$3,840	$0	$1,099
Liquid and Cake Storage	$150	$4,038	$2,878
Sludge Haul/Spread Equip.	$180	$0	$0
Relocate Maintenance Shop	$0	$550	$0
Site Management	$446	$1,189	$1,566
Landscaping and Mitigation	$446	$1,189	$1,566
Total	**$12,482**	**$23,653**	**$34,457**

ENR-CCI Index 3581; markups of 30% for contingency, 8% for mobilization and bonds, 15% for construction contractor overhead and profit, 20% for sitework, and 25% for engineering, legal and administrative were used. A 5% site management cost was applied to account for the difficulty in managing excavation, equipment storage, and general construction coordination on a smaller site.

*Table 7-2 of the Wastewater Facility Plan Update is amended by accelerating a portion of Solids Stabilization project from Phase 2 to Phase 1.

batch reactors. The heat exchange loop for pasteurization is relatively complex: sludge-to-sludge heat exchangers are used to transfer heat from pasteurized sludge to the feed, then the feed sludge is heated to 70°C by passing through a hot water loop (maintained by another set of heat exchangers). As such, significant heat exchanger capacity, pumps, piping, valving, and other equipment are typically required. Pasteurization facilities are typically housed in a small building, and sited near digestion facilities.

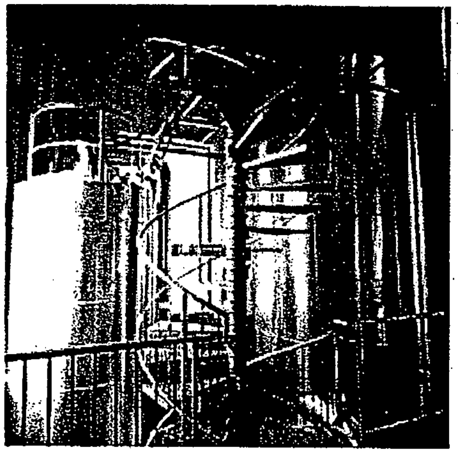

Figure 5-19 AutoTherm™ pasteurization vessels (courtesy of Chicago Bridge & Iron website).

Additional Facilities Required/Key Design Information

Table 5-48 shows the required size of pasteurization tanks for nominal design flows of 4.0 and 7.0 mgd. Typically, a system with the capacity to treat build-out flows would be implemented in one phase as it is more cost-effective. Even with one stage of expansion, the size of the prepasteurization tanks is relatively small. Additional costs for elements such as the structure, piping, etc. would be incurred with the first expansion, so the incremental savings associated with reducing the tank size and phasing tank installation is small.

Additional equipment is required for a pasteurization system. Pasteurization tanks would need to be exhausted and foul air treated due to gas production by fermentative bacteria. A cooling system would also need to be provided for the building due to the high temperatures of the process. A benefit to such a system is that heat exchange requirements for the digesters would be much less with a pasteurization system, as the pasteurization process would bring the sludge temperature to 95°F.

Table 5-48. Facilities Required for Pasteurization.

Item	Unit	New Facilities at 4.0 mgd ADWF	New Facilities at 7.0 mgd ADWF
Pasteurization building	Dimensions	40 ft x 40 ft	—
Pasteurization vessels	Number/volume	3 @ 6,300 gal	—
Mixers	Number/hp	3 @ 10 hp	—
Heat exchangers	Number	2	—
Sludge grinder	Number/hp	1 @ 5	—
Pumps	Number/gpm	3 @ 100 (sludge)	—