

AGENDA

INFORMATIONAL WORKSHOP FOR THE BOARD OF DIRECTORS

CAPITAL IMPROVEMENT PROGRAM VALIDATION STUDY AND FULL SECONDARY TREATMENT IMPLEMENTATION PLAN

ORANGE COUNTY SANITATION DISTRICT

WEDNESDAY, APRIL 16, 2003 – 6:00 P.M. TO 8:00 P.M

ADMINISTRATIVE OFFICE
10844 Ellis Avenue
Fountain Valley, California
www.ocsd.com

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1. ROLL CALL

2. APPOINTMENT OF CHAIR PRO TEM, IF NECESSARY

3. WORKSHOP PRESENTATION

| | |
|-----------------------|--|
| 6:00 p.m. – 6:10 p.m. | Welcome |
| 6:10 p.m. – 6:30 p.m. | CIP Overview |
| 6:30 p.m. – 7:00 p.m. | CIP Validation Outcome and Recommendations |
| 7:00 p.m. – 7:30 p.m. | Full Secondary Treatment Implementation Schedule |
| 7:30 p.m. – 7:45 p.m. | Peer Review of Full Secondary Schedule |
| 7:45 p.m. – 8:00 p.m. | Wrap-Up & Discussion |

4. ADJOURNMENT



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ATTACHMENT 1 – CIP VALIDATION STUDY EXECUTIVE SUMMARY
APRIL 16, 2003
SPECIAL BOARD WORKSHOP

IPMC

The Orange County Sanitation District’s (District) Capital Improvement Program (CIP) consists of several hundred projects and equipment installations undertaken by the Engineering, Operations and Maintenance (O&M), and Information Technology (IT) Departments. The Engineering Department projects are generally referred to as the “large capital projects.” Projects undertaken by the O&M and IT departments are called “Special Projects.”

The District’s Capital Improvement Program (CIP) consists of projects identified in the 1999 Strategic Plan, 2002 Interim Strategic Plan Update, and projects that were added during the annual CIP budget process and include:

- Major rehabilitation of the existing headworks, primary treatment, secondary treatment, outfall pumping, and solids handling facilities at both treatment plants.
- Replacement and rehabilitation of 17 of the District’s outlying pumping stations and 44 projects to rehabilitate the trunk sewers.
- Funding for cooperative projects to help Cities upgrade their sewer systems.
- Disinfection of the District’s ocean discharge to reduce bacteria levels below State bathing standards.
- Reclamation of 70 million gallon per day (mgd) of the District’s effluent, or nearly one third of the total daily flow (Groundwater Replenishment System).
- Implementation of full secondary treatment standards.

Prioritizing Projects Based on Need

Over the last six months the District’s staff and consultants conducted a process to validate this CIP. This process involved a review of the need for each CIP project, and the associated, scope, budget, and schedule. The first step in this process was to develop the “Prioritization Principles” to ensure that the projects are needed to serve the community and maintain a safe working environment. These principles included:

• **Protect Health and Safety**

Assure that the health and safety of customers and the workers are protected.

• **Provide most appropriate investment for rate payers**

Assure that the investment of rate payers’ funds is appropriate by providing projects with schedules that truly match the projects needed, and repairing and replacing assets in a manner that enhances the asset life.

• **Protect and enhance livability and the environment**

Assure that the project focuses are on sustainability, meeting customer needs, and

community expectations to be stewards of the environment.

- **Utilize most appropriate practices**

Assure that the investment in capital includes technology that demonstrates both best practices and reliability.

- **Expedite full secondary treatment projects**

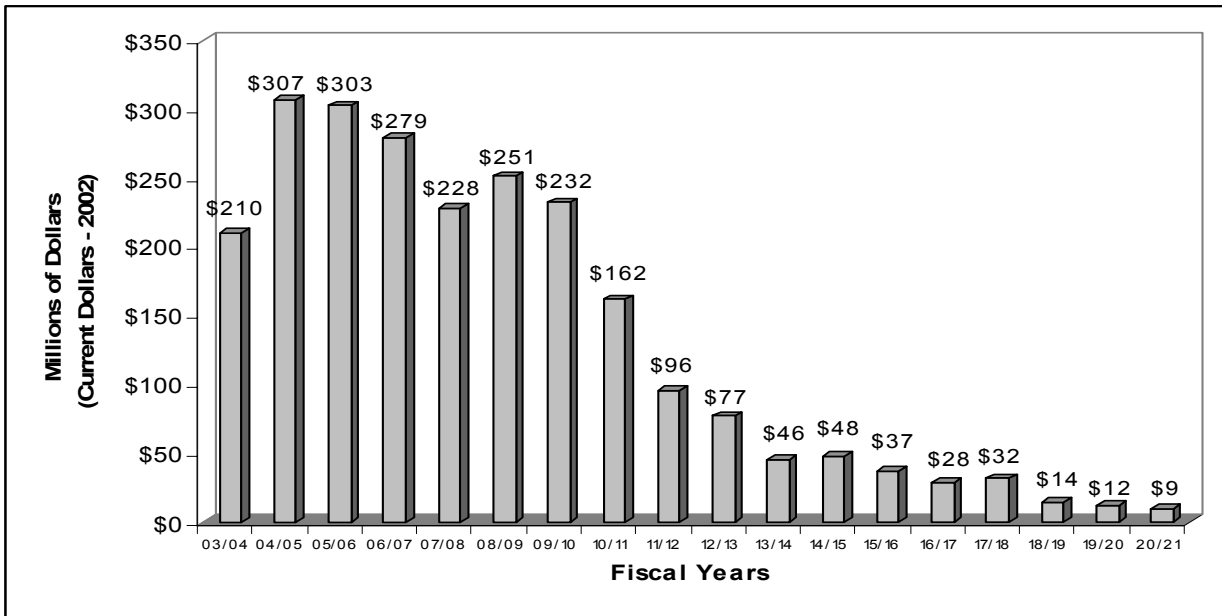
Assure that projects are consolidated and allow for the maximum number of full secondary projects to occur as quickly and safely as possible.

Validating Project Scopes, Budgets, and Schedules

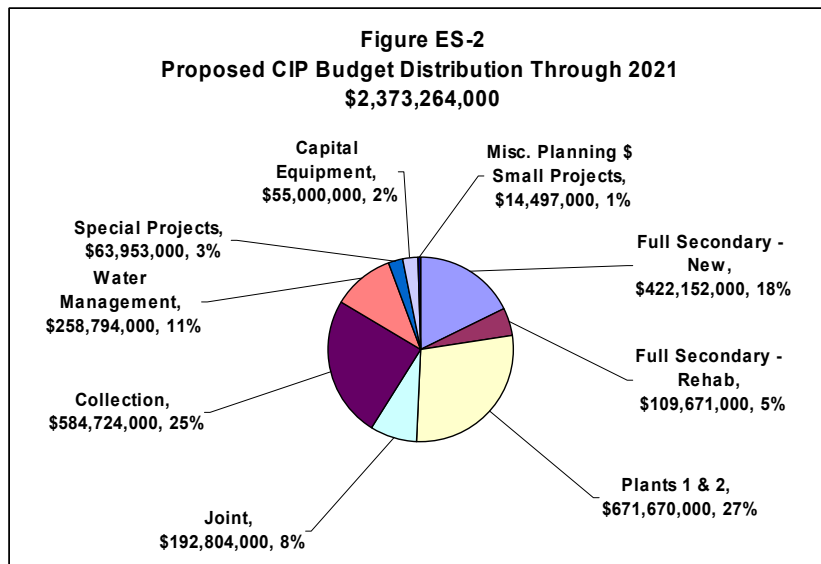
Following this prioritization process, the each project scope, budget, and schedule was reviewed to ensure that it is properly funded to complete those necessary tasks in a timely manner. This included the review of the several hundred projects currently in the CIP. The following are significant outcomes of this effort and will become the basis for the proposed FY 2003-2004 CIP.

1. There will be 136 large capital projects, 43 Special Projects, and various Capital Equipment expenditures in the proposed FY 2003-2004 CIP. The large capital projects were the focus of the detailed validation effort, but the Special Projects and Capital Equipment expenditures were revised based on their current status. The resulting projected expenditures for the proposed CIP for July 2003 through June 2021 is \$2,373,264,000. All costs are current (2003) dollars.
2. The estimated projected cash flow for the proposed CIP is shown in Figure ES-1. During the first five years of the program, the annual cash flow expenditures range between \$210 million and \$307 million. The average annual expenditure over those 5 years is approximately \$265 million, with the peak occurring in 2 successive years, FY 2004-2005 and FY 2005-2006. This chart does not include future undefined rehabilitation projects after the year 2010; however, an estimate of these future project expenses will be generated for projecting of future District fees and rates.

FIGURE ES-1
District Capital Improvement Program
Program Cash Flow
 FY 2003-2004 to 2020-2021



- The budget distribution for the proposed CIP in Figure ES-2 shows that the largest expenditures will be at Plant Nos. 1 and 2, followed closely by collections and full secondary treatment. Water Management Projects consist of the Groundwater Replenishment System (GWRS), water conservation, long-term monitoring, and the co-operative projects.



- The estimated CIP expenditure (from July 2002 through June 2021) in the 2002 Interim Strategic Plan Update (ISPU) was \$1,907,674,000. The ISPU estimate is about \$565,590,000

less than the current projected cash flow of \$2,373,264,000 (July 2003 through June 2021). The increase from the ISPU estimate is described in the Table ES-1.

**TABLE ES-1
ISPU Budget versus Proposed Validated CIP Budget**

| | |
|--|------------------------|
| Interim Strategic Plan Update Estimated CIP(*) | \$1,907,674,000 |
| Estimated Expenditures thru July 2003 | (\$100,000,000) |
| Estimated Costs from July 2003 forward | \$1,807,674,000 |
| Budget Deviations from July 2002: | |
| New Projects | \$22,833,000 |
| Approved Budget Increases during FY02/03(**) | \$33,461,000 |
| Escalation to 2003 Dollars | \$34,000,000 |
| Toxicity Control Project Increases | \$164,312,000 |
| New technologies Odor Control and Centrifuges | \$244,859,000 |
| Asset Management Program | \$35,000,000 |
| New Land Purchases for Pumping Stations | \$7,800,000 |
| Large Capital Projects - Better definition of projects | \$229,765,000 |
| Large Capital Projects - Deletions and Reductions | (\$206,440,000) |
| Deviation Subtotal | \$565,590,000 |
| | |
| IPMC CIP Validation Estimate | \$2,373,264,000 |
| | |
| Secondary Program Budget | |
| Expansion | \$422,152,000 |
| Rehabilitation | \$109,671,000 |
| Secondary Program Subtotal | \$531,823,000 |

(*) The ISPU "Total Estimated Project Budgets" is total project costs from July 2002 forward. The IPMC Validated Estimate is from July 2003 forward.

(**) \$28.7M attributed to the Groundwater Replenishment System (GWRS) project.

Expediting Full Secondary Treatment Projects

During this CIP validation process there was a separate effort to expedite full secondary treatment projects. This effort involved three parallel efforts including project consolidation workshops, a separate validation tasks just for the full secondary treatment projects, and program revisions based on the inputs from an independent peer review panel.

1. The consolidation workshops focused on reducing the total number of projects to be done by the District and reduce the time necessary to complete the full secondary treatment program. A number of projects were combined or eliminated as part of this effort.
2. The separate validation of the full secondary program focused on defining administrative and construction constraints and potential future issues. This involved estimating potential construction conflicts, outlining potential opportunities to expedite project schedules, and the assessment of known potential project risks. These ideas and issues were captured in the consultant detailed program evaluation report and will implemented with each project as they development, when possible.
3. The final process was a review of the full secondary treatment program by an independent panel of experts lead by Gerard Thibeault the Executive Officer of the

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California Regional Water Quality Control Board, Santa Ana Region. The panel commented that OCSD's 10-year implementation plan is realistic, reasonable, and achievable even compared to the 13 years and 11 years it took City of Los Angeles and Los Angeles County Sanitation Districts, respectively. The Review Panel provided valuable suggestions and comments that were incorporated in the final implementation plan. It was also noted that the District should continue to look for opportunities to be more efficient and creative to complete full secondary as early as possible.

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ATTACHMENT 2 –
SECONDARY TREATMENT PROJECT AND SCHEDULE ANALYSIS

APRIL 16, 2003
SPECIAL BOARD WORKSHOP

The following are brief descriptions of the projects that are required for the Orange County Sanitation District (District) to move to full secondary treatment.

Secondary Treatment Projects Summary

Rehabilitation Projects

1.) Activated Sludge Plant Rehabilitation at Plant No. 1, Job No. P1-82

This project includes the rehabilitation of the existing secondary facilities at Plant No. 2. This project will restore the design capacity of the treatment system to 80 mgd. This project is estimated to be operational by June 2007 at an estimated cost of \$23,870,000.

2.) Secondary Plant Rehabilitation at Plant 2, Job No. P2-74

This project replaces major piping systems at the Plant No.2 secondary facilities that have begun to fail or are at the end of their useful life. This project will restore the design capacity of the treatment system to 90 million gallon per day (mgd). This project is estimated to be operational by May 2008 at an estimated cost of \$20,475,000

3.) Trickling Filter Rehabilitation and New Clarifiers at Plant 1, Job No. P1-76

This project removes the four existing trickling filters at Plant No. 1 and replaces them with two new trickling filters and clarifiers. The new trickling filter facility will be located in the same footprint as the existing trickling filters and have the same capacity of 30 mgd at an estimated cost of \$44,693,000.

4.) Secondary Treatment Monitoring & Control System Upgrade at Plant 2, Job No. P2-47-3

This project adds hardware and software to upgrade the existing oxygen activated sludge process instrumentation and control system to current District Standards. The upgrades replace antiquated equipment with current technology and will provide improved access to process information for Operations staff. The estimated cost of the project is \$8,703,000.

5.) Ammonia Side Stream Treatment at Plant Nos. 1 & 2, Job No. P1-80/FP2-07

This project will install treatment technologies to reduce effluent ammonia attributed to the sludge treatment and dewatering processes. This project is estimated to be operational by June

2007 at an estimated cost of \$18,600,000.

Originally this project was established to remove Total Suspended Solids (TSS) and some ammonia as part of the long term implementation of the 1999 Strategic Plan. A recent increase in effluent toxicity attributed to increased ammonia concentrations has expanded this project's scope to include addressing the current and projected increases in effluent ammonia toxicity.

Expansion Projects

1.) New Secondary Treatment System at Plant No. 1, Job No. FP1-X

This project will expand Plant No. 1 to full secondary treatment capacity. This includes the construction of 90 mgd of secondary treatment process capacity. This project is estimated to be operational by December 2012 at an estimated cost of \$251,100,000.

2.) New Secondary Treatment System at Plant No. 2, Job No. FP2-X

This project will expand Plant No. 2 to full secondary treatment capacity assuming the use of trickling filter technology. This includes the construction of 60 mgd of secondary treatment process capacity. This project is estimated to be operational by December 2011 at an estimated cost of \$128,727,000.

3.) Digesters and Sludge Cake Hoppers at Plant 2, Job No. FP2-02/04/05

This project is to expand the solids handling capabilities of Plant No.2 for the full secondary treatment program. The project will also rehabilitate existing sludge support facilities that are failing or are the end of their useful life. This project is estimated to be operational by December 2010 at an estimated cost of \$42,325,000.

Secondary Treatment Program Schedule and Analysis

A detailed evaluation of the project scheduling effort is contained in Exhibit 1 – "Technical Memorandum 3 Analysis of Full Secondary Projects" from the March 28, 2003 Engineering CIP Validation Study prepared by Integrated Program Management Consultants (IPMC). Exhibit 1 also contains a detailed description of the project constraints and limitations to implementing full secondary treatment at the District.

Secondary Treatment Schedule

The schedules for each project described above that are considered part of the full secondary treatment program are also contained in Exhibit 2. Exhibit 2 is a visual illustration of the project schedules, but it includes some detailed information about the each project's schedule. This type of chart is generally used by project managers to track project schedules and costs.

Shown in the Exhibit are the District's engineering policies and procedures that break each project into 6 phases. The phases contain major project efforts like project development, design and construction. The other phases shown include commissioning (starting up of the build facilities) and close-out (warranty period). Also, within the various phases there are special studies when necessary and administrative procedures like selecting and hiring consultants and contractors. The Exhibit 2 contains tabulated information such as start and finish dates, duration of each effort, and the estimated costs for additional reference. Finally, the diamonds

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on the schedules indicate when that particular project becomes fully operational.

As shown in Exhibit 2, the District will achieve full secondary treatment in December 2012 when the Plant No.1 secondary expansion is completed, as indicated by the diamond operational milestone indicator.

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Analysis of Full Secondary Projects

TO: File

PREPARED BY: Dave MacDonald, P.E.

DATE: March 17, 2003

Full Secondary Treatment Program

OCSD has made the commitment to upgrade the treatment level to full secondary standards as expeditiously as possible. The main impact of this decision is the requirement to reduce levels of biochemical oxygen demand (BOD) and total suspended solids (TSS) from the effluent discharge to the ocean and comply with the secondary treatment standards of the Clean Water Act. The primary concerns with toxicity are the levels of ammonia and trace toxic organics in the effluent and the ability to pass the proposed effluent toxicity tests required in the National Pollutant Discharge Elimination System (NPDES) Permit. OCSD is currently conducting laboratory tests to determine the acceptable levels of ammonia and related contaminants to comply with the effluent toxicity requirements. An effluent ammonia concentration of 22 milligrams per liter (mg/L) has been established as a treatment goal until the testing program is completed. This goal will be achieved by partial nitrification of the wastewater. Plant No. 1 will provide nitrification in the activated sludge systems. Plant No. 2 will not provide a nitrified effluent.

The Ground Water Replenishment System (GWRS) is a joint effort of the Orange County Water District and OCSD to provide reclaimed water for replenishment of the local groundwater and to augment the existing seawater barrier. The system is currently being designed and is scheduled for operation by mid-2007. OCSD has made a commitment to provide 104 million gallons per day (mgd) of secondary effluent to GWRS in 2007. When GWRS is operating, OCSD is also obligated to accept return flow and maintain NPDES compliance. Initially, the return flow will be 11 mgd of microfiltration (MF) reject and 12 mgd of reverse osmosis (RO) reject.

The design flows for each plant are based on the Interim Strategic Plan Update with a planning horizon of 2020. For Plant No. 1, the estimated flow in 2020 is 177 mgd plus 20 mgd (ultimate) of MF recycle from GWRS, Phase III. A side stream treatment system may also be located at Plant No. 1. This system will treat 2 mgd of belt press recycle and 23 mgd (ultimate) of RO recycle from GWRS. An option is being evaluated to discharge the RO recycle directly to the OCSD's ocean outfall without treatment. The secondary treatment capacity at Plant No. 1 will include (1) the existing activated sludge system, upgraded for nitrification at 80 mgd; (2) a new 30-mgd trickling filter system; and (3) a proposed 90-mgd, nitrifying, activated sludge system. Plant No. 1 will produce 170 mgd of nitrified effluent by 2012. Plant No. 1 must have the capacity to produce 104 mgd of secondary effluent for GWRS by mid-2007. The secondary treatment capacity at Plant No. 2 in the year 2020 will be 144 mgd. This capacity consists of an existing pure oxygen plant with a capacity of 90 mgd and a proposed trickling filter plant with a capacity of 60 mgd. Plant No. 2 is also the location for a 2-mgd side stream treatment system for the reduction of ammonia from the sludge dewatering process recycle. OCSD will be initiating a study to determine the efficacy of various secondary

treatment processes to reduce effluent toxicity. Plant No. 2 will produce a non-nitrified effluent. OCSD is currently involved in research that can contribute to greater process efficiencies and cost savings. Research with centrifuge sludge dewatering and anoxic gas flotation (AGF) of digester sludge (SP-90) could improve future sludge treatment systems. This research will be completed in 2003 for timely input to the future sludge treatment expansion projects. OCSD also is conducting research on the use of organism selector zones in the activated sludge systems. In addition, OCSD is studying microfiltration as a potential method of suspended solids removal. This research will be completed in 2003 for input into future activated sludge designs.

Three secondary treatment projects are proposed at Plant No. 1. P1-82 is the rehabilitation of the existing activated sludge system. These improvements include replacement of flow control gates, improved return sludge hydraulics, sludge collector replacement, selector zone modifications, and two new clarifiers. This work should be completed by mid-2007, to provide 80 mgd of secondary effluent for GWRS. FP1-X is a new 90-mgd activated sludge system at Plant No. 1 that, when completed in 2012, will provide full secondary treatment for Plant No. 1.

This system will have a similar design to the existing activated sludge system with the ability to nitrify. The system will be designed for nitrification using criteria established through OCSD research and operating experience. Engineering of the project will begin in mid-2003 and the system is scheduled to be operational in 8 years. P1-76 is a project that will produce secondary effluent, using the trickling filter treatment process. Construction of this project will begin in mid-2003 and is scheduled for completion in early 2006 and will add 30 mgd of secondary treatment capacity. This project is required to meet secondary commitments to GWRS in mid-2007. A related project for Plant No. 1 is the Ellis Pump Station (I-10). Flow in the Santa Ana River Interceptor (SARI) is currently treated at Plant No. 2. The flows in the SARI include wastewater from industrial sources that are not suitable for reclamation by GWRS and, therefore, cannot be treated at Plant No. 1. The Ellis Pump Station will provide replacement flow from other service areas of treatment at Plant No. 1 and GWRS. The Ellis Pump Station is currently in design and must be constructed and operating by mid-2007.

Several projects are proposed to provide upgraded and expanded secondary treatment capacity at Plant No. 2. Three projects are proposed to improve the performance of the pure oxygen system. Project SP-72 will upgrade the oxygen generation system to reliably produce 70 tons/day of oxygen. This production rate will support a 90-mgd pure oxygen, activated sludge system. A project (P2-47-3) to upgrade the oxygen metering and control system is currently in design. These improvements are scheduled to be completed by mid-2004. This project will increase the secondary treatment capacity at Plant No. 2 to 90 mgd. Other improvements (P2-74) to the pure oxygen, activated sludge system are scheduled for implementation between mid-2003 and mid-2007.

Two new projects are proposed at Plant No. 2 to increase the secondary treatment capacity. FP2-X will add 60 mgd for trickling filter capacity. This project will begin design in early 2004 and is scheduled to be operational in 8 years and, when on line in 2011, will provide full secondary treatment at Plant No. 2. FP2-02/04/05 is a project that will add sludge treatment facilities to support the new secondary treatment systems. This project will provide additional digesters and sludge storage facilities to handle the additional sludge generated by the new secondary treatment systems.

Priority was given to full secondary projects during scheduling. Using standard time frames for design and construction, a full secondary schedule was developed that shows full secondary

can be accomplished by 2012. There are many risks in delivering projects. Some of the major common and project-specific risks were identified, and estimated delays were noted. If the risks cannot be mitigated fully, the full secondary schedule could slip by up to 2 years making the late finish 2014. The common risks and mitigation strategies are noted elsewhere in this appendix.

An outside independent peer review panel was retained to review the full secondary implementation plan and provide feedback. The panel members included:

1. Tim Haug, City of Los Angeles, Bureau of Sanitation
2. Joe Mundine, City of Los Angeles, Bureau of Sanitation
3. Tom Riegelhuth, Margate Construction
4. Gerry Thibeault, RWQCB, Executive Office
5. Garry Brown, Executive Director, Orange County Coast Keepers
6. Doug Drury, IEUA, Operations Manager

The Peer Review Panel met on January 26, 2003, in a 1/2-day workshop. The second workshop was held on February 26, 2003, to receive the panel's recommendation and comments regarding the full secondary implementation plan. A third workshop was held on March 24, 2003. Comments, observations, and recommendations have been documented in separate notes.

Technical Memorandum No. 3 is a compilation of various meeting minutes and discussions that document the need and approach to full secondary. The following items are attachments to Technical Memorandum No. 3 and can be found in the project records.

1. Full Secondary Alternatives Review Workshop dated November 20, 2002
2. Treatment Projects Consolidation Workshop No. 1 on December 5, 2002
3. Treatment Projects Consolidation Workshop No. 2 on January 8, 2003
4. Table 1- Common Schedule Risks, Mitigation Strategies, and Schedule Impacts
5. Proposed Full Secondary Schedule

SUMMARY REPORT OF PEER REVIEW PANEL

EVALUATION OF ORANGE COUNTY SANITATION DISTRICT PLAN
AND SCHEDULE FOR IMPLEMENTATION OF SECONDARY TREATMENT

April 9, 2003

Gerard J. Thibeault, Executive Officer
California Regional Water Quality Control Board, Santa Ana Region

INTRODUCTION

The Orange County Sanitation District (District or OCSD) currently discharges a blend of primary-treated and secondary-treated wastewater to the Pacific Ocean under a National Pollutant Discharge Elimination System (NPDES) permit, jointly issued by the United States Environmental Protection Agency (EPA) and the California Regional Water Quality Control Board, Santa Ana Region (Regional Board). That NPDES permit includes a waiver of full secondary treatment, under the provisions of Section 301(h) of the Clean Water Act. The permit will expire on June 8, 2003.

Under the implementing regulations of the NPDES program, the District was required to submit an application for renewal of its NPDES permit no later than 180 days before the expiration date of the permit. On July 17, 2002, the Board of Directors of OCSD voted to submit to EPA and the Regional Board an application for renewal that did not include a request for continuation of the 301(h) waiver of full secondary treatment; that is, the District voted to apply for a permit that would require full secondary treatment.

It was very clear that the District's decision to proceed to full secondary treatment was not the end of the matter. There appeared to be significant issues related to how long it would take the District to move from the policy of providing approximately fifty percent secondary treatment under the 301(h) waiver to one hundred percent secondary. It is important that a clear understanding of the time necessary to move to full secondary be developed, since this information will be integral to the development of the revised NPDES permit for OCSD, and because of the time schedules for compliance that are expected to be included therein.

PEER REVIEW PANEL

Subsequent to the vote by the OCSD Board to proceed to full secondary, Blake Anderson, General Manager of the District, agreed that a group of wastewater treatment and construction experts, along with an active observer from the interested environmental community, should be brought together to review and evaluate the District's plans for implementation of the secondary treatment project. He volunteered that the District would provide the necessary support for this effort.

Discussions then ensued concerning individuals who would be requested to participate on this peer review panel. It was agreed that engineering and construction experts, experienced in both wastewater treatment unit process and large-scale construction, would be best qualified to provide the input necessary to critically evaluate the District's plans. It was also clear that it would be beneficial to have a panel member from an interested environmental group participate in the effort to act as a public representative evaluating the effort. We were very fortunate that the following panel members agreed to assist in the peer review effort: Dr. Roger T. Haug, Deputy City Engineer for the City of Los Angeles; Joe Mundine, Assistant Director, Bureau of Sanitation and Plant Manager for the City of Los Angeles Hyperion Wastewater Treatment

Plant; Dr. Douglas Drury, Executive Manager-Operations for the Inland Empire Utilities Agency; Thomas Riegelhuth, owner and general contractor with Margate Construction Company; and Garry Brown, Executive Director of the Orange County CoastKeeper, representing environmental interests and the general public.

PROCESS

A description of the activities of the Panel is included in the attached "Secondary Treatment Implementation Peer Review Panel Process Overview". For the purposes of this report, suffice it to say that the Panel engaged in an open and spirited review and critique of the District's plans and schedule for the implementation of full secondary treatment. The Panel found that District staff was receptive to all suggestions, and all comments that might be considered critical of the District's outputs to that time. District staff responded to all of the Panel input in a professional and helpful manner. Suggestions and criticisms were discussed with an open and non-defensive attitude. Requests by Panel members for additional information, changes in working materials, or reviews of treatment process decisions were always accommodated in a positive manner.

It was clear that the expertise of the Panel members resulted in input to the District concerning matters that, in some cases, had not been considered by District staff. That was not a surprise, given the experience and expertise of the panel. Dr. Haug and Mr. Mundine recently completed work on the secondary treatment upgrade for the City of Los Angeles Hyperion Wastewater Treatment Plant, a project very similar to the District's proposed project. Their experiences with the Hyperion project provided input to the District from individuals who had just lived through problems and scheduling difficulties that were specifically and directly relevant to what is being contemplated by OCSD. Their input to the process was invaluable. Dr. Drury provided very valuable input to the process from the perspective of an individual who has enormous experience and expertise in both wastewater treatment plant operations, and very importantly, the science underlying those operations. (Dr. Drury is also an adjunct professor, teaching biological unit processes, at the University of California, Riverside.) Mr. Riegelhuth provided another level of "ground truthing" from the perspective of an individual with great experience in heavy construction. It was all well and good to get suggestions, but Mr. Riegelhuth provided the perspective on whether those suggestions could actually be implemented within the constraints of time and space available for this work. Mr. Brown provided review of the process from the perspective of an interested individual with a "bias" towards wanting to see the secondary treatment process completed absolutely as quickly as reasonable and feasible. When Mr. Brown was asked to participate on the Panel, this "bias" was both expected and encouraged. Mr. Brown's intelligent and sincere questions and comments provided important perspective and led to significant changes to process output documents that will assist the public in understanding the basis and justification of the schedule proposed by the District.

DISCUSSION

As a result of considerable Panel input between January 24th and March 24th, as well as an enormous amount of work by District staff, both to prepare the original process descriptions and schedule, and to respond to questions and suggestions of the Panel, the District proposed a schedule that would lead to implementation of full secondary treatment by the end of 2012. This means that, in slightly more than 9 ½ years, the District will attempt to implement projects to bring its treatment level up to full secondary, as well as implement other vital infrastructure projects, with expenditures totaling an estimated \$2.06 billion over that same period. This undertaking will result in project expenditures for the next nine years at a rate of \$100 million to \$150 million per year more than the City of Los Angeles spent in their year of highest project expenditure (Tim Haug).

The OCSD projected schedule leading to full implementation of secondary treatment by the end of 2012 incorporates the recommendations of the Panel. We believe that this schedule is both ambitious and very aggressive. We also believe that the District will have to manage this project with exceptional discipline and dedication, in order to meet the projected full secondary implementation date.

The incorporation of the District's proposed schedule into a compliance schedule in the District's NPDES permit, expected to be revised and re-issued during 2003, and/or into a consent decree with EPA, will provide an enforceable boundary to this process.

ADDITIONAL COMMENTS BY PEER REVIEW PANEL MEMBERS

Individual peer review panel members requested that certain clarifying statements be included with this summary.

1. Dr. Doug Drury: Dr. Drury believes that the best way to address toxicity concerns is to build a conservative nitrifying activated sludge plant, using an anoxic zone for a selector as a means to control filaments. He suggests that some activated sludge be constructed at both Plants 1 and 2.
2. Garry Brown: Garry Brown indicated support for the schedule proposed by OCSD, but requested that the following concepts be included in this summary to document his concerns and recommendations:
 - a. The reject brines from GWRS must be treated to secondary levels.
 - b. Milestones should be developed for both TSS and BOD, and the District should adhere to them.
 - c. All effluent should receive secondary biological treatment, as per the suggestion of Dr. Haug.
 - d. SARI effluent should be separated so that maximum reclamation of non-SARI flows can be achieved.
 - e. OCSD should be willing to invite and evaluate innovation opportunities during the next two years of the design process.

Mr. Brown has indicated that, with the inclusion of the five comments (a. through e.), he supports the proposed schedule. The comments by Dr. Drury and Mr. Brown were discussed during the Panel meetings, and these are issues that District staff agreed to evaluate and consider.

CONCLUSION

The panel recommends that the Board of the OCSD, the EPA and the Regional Board incorporate and enforce, as appropriate, a strategy by OCSD that leads to the implementation of full secondary treatment by December 31, 2012. This recommendation has been endorsed by all members of the Panel.

Gerard J. Thibeault
Executive Officer, California Regional Water
Quality Control Board, Santa Ana Region

SECONDARY TREATMENT IMPLEMENTATION PEER REVIEW PANEL PROCESS OVERVIEW

PURPOSE

A Peer Review Panel (Panel) was assembled to review and comment on the Orange County Sanitation District's (District) efforts to plan, schedule and implement full secondary treatment of the District's wastewater. The make-up of the panel was developed by Mr. Gerard Thibeault, Executive Officer of the Santa Ana Regional Water Quality Control Board, State of California. The term "full secondary treatment" refers to a level of treatment which produces biochemical oxygen demand (BOD) and total suspended solids (TSS) concentrations of less than 30 milligrams per liter (mg/l). The District is currently discharging a blend of approximately 68% secondary treated effluent and 32% primary treated effluent with 58 mg/l of BOD and 37 mg/l of TSS.

The primary purpose of the Panel was to provide an independent assessment of the proposed schedule necessary to implement full secondary treatment. Issues addressed by the Panel included:

- 1) What facilities are required to achieve full secondary treatment?
- 2) What are the major constraints to implementing the full secondary treatment program?
- 3) Is the schedule aggressive, reasonable, and achievable?

PANEL MEMBERS

The Panel was made up of experts from the fields of engineering, construction and environmental regulation, as well as a member of the general public. The Panel was chaired by Mr. Gerard Thibeault, Executive Officer, Santa Ana Regional Water Quality Control Board, State of California. The other Panel members consisted of Tim Haug, Assistant City Engineer (Sanitation), City of Los Angeles; Joseph Mundine, Plant Manager, City of Los Angeles Hyperion Treatment Plant; Dr. Douglas Drury, Executive Manager- Operations, Inland Empire Utilities Agency; Thomas Riegelhuth, President, Margate Construction Company; and Garry Brown, Executive Director, Orange County Coast Keeper, representing the interested public.

WORKSHOPS

Three workshops were held with the Peer Review Panel. The first workshop was held on January 24, 2003. The purpose of this workshop was to provide an introduction for the Panel to the District's full secondary program. The presentations at the workshop included background on the District's overall Capital Improvement Program (CIP) an overview of the CIP Validation Process and a discussion of decisions which lead to the full secondary treatment program. There was also a detailed presentation on the projects which are necessary to develop achieve full secondary treatment. The presentation included individual project descriptions, schedules, and a discussion of the program constraints, assumptions and risks. The Panel was given a notebook containing all the presentation materials. The workshop was followed by a tour of both treatment plants.

A second workshop was held on February 26, 2003. After reviewing the information provided at the first workshop, the Panel engaged in a detailed discussion of proposed projects and the program schedule. The discussion included (1) the benefits of the trickling filter and the activated sludge processes and their ability to control effluent toxicity, (2) the construction coordination needs with other District projects, (3) procedures for engineering consultant

selection and contractor bidding, (4) District staffing requirements for implementing the program, and (5) procedures to insure quality control and a successful program. The Minutes of the second workshop are included in Attachment No. 1.

A third workshop was held to follow-up on the discussions of the second workshop. A revised full secondary treatment implementation schedule, which reflected input from the second workshop and further refinement by the District's Capital Improvement Program validation team, was presented and reviewed. This schedule is included in Attachment No. 3. The Panel discussed the cash flow requirements of the Program, and the ability to maintain plant operations during construction. The Minutes of the third workshop is included in Attachment No. 2.

The results of these workshops can be summarized as follows:

1. There is a concern regarding the selection of trickling filters for secondary treatment at Plant No. 2. Activated sludge may be more effective at removing trace toxic organic compounds and should be considered for implementation at Plant No. 2 to address potential future treatment requirements. The District is currently conducting bioassay tests to determine the potential toxicity of the effluent. The process selection at Plant No.2 should consider trickling filters, activated sludge and the modification of the High Purity Oxygen (HPO) plant to provide nitrification. As a result of this comment, the District is conducting a process selection study prior to the design of the Plant No. 2 secondary treatment facilities.
2. It is the District's intention to operate all process units at their maximum sustainable capacity to achieve the lowest values of BOD and TSS during the construction period leading to full secondary treatment. The District is preparing a chart showing projected changes in effluent quality over time during the implementation of full secondary treatment.
3. The schedule for Plant No. 2 secondary treatment expansion (Job No. FP2-X) should be accelerated. The Plant No. 2 Headworks project should not delay secondary treatment expansion at Plant No. 2. The District will conduct a joint project study to evaluate the feasibility of expediting Job No. FP2-X.
4. There was a question posed to the District's Engineering team: Can the proposed time required for implementing full secondary treatment be reduced by 20%? Based on information known today, the proposed schedule has been developed to be reasonable and achievable. The District intends to work for early completions, when possible as information on individual projects is known.
5. The District needs to present an understandable schedule to the public. The schedule should reflect indicators of the progress, such as BOD, TSS and the percent of flow receiving secondary treatment, achieved during the implementation period.
6. The District should consider requiring Process and Instrumentation Drawings and equipment submittals at the 25% design stage and invest significant review effort at that time, in order to speed up the overall design and construction process.
7. The District should consider the following: (1) Establish a dedicated Technical Review Group to review all designs for maintainability, (2) Consider using 3-dimensional illustrations for project reviews, and (3) Establish a dedicated O&M Team for tie-ins, shutdowns, startups and commissioning

8. The District should consider contracting with a single contractor to perform final automated process control programming.
9. The District should consider instituting a program of contracting for indefinite delivery, indefinite quantity (IDIQ) type services for post construction activities, similar to the City of Los Angeles' program.
10. The District should consider contractor partnering on the large projects. Partnering is designed to create common goals and form binding relationships that work toward those goals. Partnering should encourage the contractor to contact the owner's staff directly so situations can be quickly resolved, to the satisfaction and best interests of all involved.
11. The District has developed a reasonable and achievable schedule to provide secondary treatment of the full influent flow by the year 2012.

SCHEDULES

The Panel reviewed schedules for the 8 individual projects and provided comments to the District's Engineering team.

At Plant No.1, the rehabilitation of the existing activated sludge system (P1-82, 80mgd) will be completed by mid -2007. The construction of new trickling filters (P1-76, 30mgd) will be on line by 2006. Both of these projects are needed to produce secondary effluent in 2007 for the Ground Water Replenishment System (GWRS). Job No. P1-80 is also scheduled for completion by mid -2007 in order to provide side stream treatment to the belt press recycle, and possibly the return flows from the GWRS, to meet effluent toxicity limits. The project scope for Job No. P1-80 is currently being studied. Preliminary engineering work on the new activated sludge system (Job No. FP1-X, 90 mgd) at Plant No.1 will begin in July 2003, leading to the design starting in April 2003. Due to the size and complexity of this project, it will not be operational until 2012.

There are several secondary treatment projects at Plant No.2. Job No. P2-47-3 is presently in design and will upgrade the gas flow metering and controls for the High Purity Oxygen (HPO) system. Job No. P2-74 is in the development phase and will provide mechanical and piping upgrades to the HPO activated sludge plant. The HPO plant should be fully rehabilitated to provide 90 mgd of secondary treatment by 2008. Preliminary engineering for new secondary treatment processes at Plant No. 2 will begin in July 2003. The preliminary engineering study will include a process selection study to evaluate the trickling filter and activated sludge technologies. The study will also consider the modification of the HPO plant to provide nitrification. The District's toxicity studies must also be completed in order to make a process selection. The schedule provides for full secondary treatment at Plant No. 2 by 2011. Copies of the schedules are included in Attachment No. 3.

ATTACHMENTS

1. Minutes of Peer Review Workshop No. 1 February 26, 2003
2. Minutes of Peer Review Workshop No. 2 March 24, 2003
3. Secondary Treatment Implementation Schedules
4. Secondary Treatment Project Descriptions
5. Peer Review Panel Bios
6. Projected Operational Flows and Effluent Quality during Secondary Treatment Implementation

**MEETING MINUTES
FULL SECONDARY TREATMENT PROGRAM
PEER REVIEW PANEL MEETING
FEBRUARY 26, 2003**

| | |
|-------------------|---|
| ATTENDEES: | <p>PANEL: Garry Brown, Tim Haug, Joe Mundine, Tom Riegelhuth, Gerry Thibeault, Doug Drury (absent)</p> <p>DISTRICT: Blake Anderson, David Ludwin, Robert Ooten, Bob Ghirelli, Jim Herberg, Matt Smith, John Linder, Jim Burror, Jess Yoder, Jag Salgaonkar, David MacDonald, David May, <i>Several Members of the General Public as observers</i></p> |
|-------------------|---|

A meeting was held on February 26, 2003 to discuss comments from the Peer Review Panel (PRP) on the District's Full Secondary Treatment Program (Program). The PRP had previously met on January 24, 2003 to get introduced to the Program and the planning to execute it. At that meeting information was presented for the PRC to review. Those review comments were the topic of this meeting.

The meeting was held in District Board Room from 8:00 a.m. to 1:30 p.m. The attendees are indicated above for reference. Dr. Drury could not attend. Gerry Thibeault arrived at 10:30 AM. Revised schedules and cash flow handouts were presented as additional information in this meeting and are attached.

The table below is a summary of the discussion. Each item is recorded as a recommendation, observation or an action item.

| <u>ITEM NO.</u> | <u>DESCRIPTION</u> | <u>TYPE</u> | <u>Follow up Action, if any</u> |
|-----------------|--|-------------|---|
| 1 | David Ludwin: David welcomed anyone to the meeting. He mentioned that Dr. Drury could not attend and Gerry Thibeault would be late. | | |
| 2 | Doug Drury: David Ludwin conveyed to the group Dr. Drury's concern regarding the selection of trickling filters for secondary treatment at plant no.2. Activated sludge is known to be more effective at removing trace toxic organic compounds and should be considered where toxicity is a concern. The District is currently conducting bioassay tests on marine species to determine the potential toxicity The test results will be used in the process selection study planned for FP2-X (Trickling Filters at Plant 2). The study will decide if we need to go AS or TF. We have allowed for time to do this study in the revised schedule handed out today. | Action | Jim Herberg and Jag Salgaonkar Track the completion of bioassay tests and start the process selection study immediately |
| 3 | Blake Anderson: It is the District's intention to operate all process units at their maximum sustainable capacity to achieve the lowest | Observation | None |

| ITEM NO. | DESCRIPTION | TYPE | Follow up Action, if any |
|-----------------|--|-----------------------|---|
| | <p>values of BOD and TSS.</p> <p>David Ludwin : The staging and sequencing of construction will impact the District' ability to maintain maximum efficiency</p> | | |
| <p>4</p> | <p>Tim Haug: The schedule for Plant No.2 Trickling filters can be accelerated. P2-66 Headwork's should not delay secondary treatment at Plant No.2. Can the TF units be built ahead of the Headwork's?</p> <p>Jag Salgaonkar: The two projects are in close proximity and are scheduled such that FP1-X begins excavation after P2-66 is out of the ground. On site storage of dirt is an issue.</p> <p>Tim Haug: At Hyperion we stored everything off site. It will cost more money but if you want to expedite work it can be done.</p> <p>Tom Riegelhuth: It will cost approximately \$12 to \$15 per CY for off site storage</p> <p>David Ludwin: David described the project components and explained the complexity of the project. A study is needed to coordinate the two projects and establish an approach for parallel construction.</p> | <p>Action</p> | <p>Assign FP1-X team. The P2-66 and FP1-X teams will jointly conduct a study to evaluate the feasibility of expediting FP1-X.</p> |
| <p>5</p> | <p>Tim Haug: TF's used in Bakersfield are subject to high BOD test results in warm weather months. This is believed to be due to increased nitrification and sample timing. The District is proposing to construct TF at P2 to reach full secondary. The BOD limit in the permit may not be attainable if the RWQCB does not recognize the affects of nitrification.</p> <p>Blake Anderson: Increased nitrification will be an issue whether or not the District decides to pursue TF, AS, or any other biological treatment.</p> | <p>Observation</p> | |
| <p>6</p> | <p>Tim Haug: The District should try to pursue a CBOD limit rather than a TBOD limit for future Waste Discharge Permits. CBOD testing is thought to be a more accurate test of discharge quality and more closely meets the intent of the Clean Water Act. In addition, CBOD testing would not be skewed by temporary high nitrification as TBOD testing is.</p> | <p>Recommendation</p> | |
| <p>7</p> | <p>Blake Anderson: The District must consider energy use and solids waste handling and disposal when considering the best alternatives for full secondary treatment processes and facilities. These items are significant cost items and must be considered in the planning. The</p> | <p>Observation</p> | |

| <u>ITEM NO.</u> | <u>DESCRIPTION</u> | <u>TYPE</u> | <u>Follow up Action, if any</u> |
|-----------------|---|-------------|---------------------------------|
| | District must balance meeting regulatory goals with the fiduciary responsibility of minimizing costs to the rate payers. | | |
| 8 | <p>Garry Brown: The draft schedule shows completion of all facilities in approximately 2012. Could the District examine the schedule for potential reduction of time by 20%? At what increased risk/cost will it be achieved by? Why does TF construction at P2 start in 2007 – can this be accelerated?</p> <p>David Ludwin: First, This schedule is a work in progress and subject to further refinement. The District wants to present an achievable and reasonable schedule not a schedule that is convenient for the District. The District does not want to present a schedule that can not be met, which would subject it to criticism later for not meeting the schedule. Rather, a schedule that is reasonable and achievable will be presented. The District will work to beat this schedule if possible as project knowledge grows and opportunities present themselves.</p> <p>Tom Riegelhuth: The schedule presented to date may be aggressive as it is likely that the District, because of the size of their projects, will be working with some new contractors not used to doing business with the District. This is very likely to lead to more claims than the District has historically seen, as well as schedule delays. There may not be room to reduce the schedule any more and, realistically, additional time may be required.</p> | Observation | |
| 9 | <p>Jag Salgaonkar: Full secondary program is only one component of the CIP. There are over \$ 1 Billion worth of other projects to be built at the same time. Not all District resources can be dedicated full time to full secondary program. Secondly, this CIP represents a two to three fold increase in the amount of capital expenditure over the next 7 years when compared to historical expenditures. Even the most efficient private organizations will have trouble assimilating such high growth rates. Finally, the engineering department has reorganized into the PMO and engineering and construction divisions in order to be more efficient. But, this will take some time. These factors have to be considered before we finalize the schedule</p> <p>Tim Haug. I completely agree. It is important to maintain staff morale during the hectic phase. That is where the work gets done and you can</p> | Observation | |

| ITEM NO. | DESCRIPTION | TYPE | Follow up Action, if any |
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| | push only so much through any organization. | | |
| 10 | Tim Haug: The District needs to present an understandable schedule to the public. This could be done by “overlaying” indicators of progress, such as BOD, SS, and percentage of full secondary treatment on the schedule. Showing projects and indicators on the same time lines will allow the public to see the incremental progress the District is achieving. | Recommendation | Develop performance indicators and graphic to show progress on construction schedule |
| 11 | <p>Tim Haug: The City of L.A. delivered their full secondary program in 13 years under court order. The current draft schedule shows the District delivering in 9 years. The City’s program was for average flows of 350 mgd versus 240 mgd for the District. The District draft schedule seems close, maybe optimistic.</p> <p>Tim Haug: The City of L.A. has never been able to conduct more than \$250 million in expenditures in any one fiscal year. Public agencies seem to have a bureaucratic “cap” on the amount of work they can produce each year. The District should assess its ability and staffing to complete the work. It will take the District tremendous effort to meet the presented cash flow in critical years (in excess of \$300 million).</p> | Observation | |
| 12 | Joe Mundine: The District may be able to accelerate the P2 full secondary projects so that P2 can come up to full secondary treatment sooner. This would allow the District to show significant incremental improvement to the public. | Observation | |
| 13 | Jim Burror: It took L.A. County 11 years to implement their full secondary program. The District draft schedule of 9 years for this program is in line with or even optimistic given the actual experience of other Southern California agencies. | Observation | |
| 14 | <p>Tim Haug: How is the District financing the overall CIP and the full secondary work?</p> <p>Blake Anderson: The District finances the CIP using approximately 50% Certificates of Participation (COP) and approximately 50% “pay as you go.” COP’s are equivalent to bonds. This equates to approximately \$100 per household in fees and property taxes currently. When full secondary treatment comes on line this will equate to approximately \$200 per household. At \$200 per household, the District will still be in the lowest quartile of costs for sanitation districts statewide. The District is exploring how best to propose increased rates. In addition the 1989 District Master Plan accounted for the space and</p> | Observation | |

| ITEM NO. | DESCRIPTION | TYPE | Follow up Action, if any |
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| | financing that would be needed to move to full secondary treatment so the District is well positioned in those regards. | | |
| 15 | Tim Haug: The District has wisely scheduled process research (FP1-X process selection between AS and TF) to be completed before hiring a design consultant. Determining which process to use is a major step before proceeding with the program. The District should not have the design consultant select or evaluate the process. | Observation | |
| 16 | <p>Tim Haug: The District should require PID's and proposed equipment at the 25-30% design stage and invest significant review time here. This will help the remaining design proceed more efficiently with fewer changes.</p> <p>David Ludwin / Rob Thompson: The current District standards are extensive and to require PID submittal at the 30% design stage (DS1).</p> <p>Joe Mundine: One of the measures of success of the District's full secondary program will be the cost of the program. One way to keep costs minimized is to have a significant review early in the design phase. This will lead to a better design and contract documents and minimization of change orders during construction.</p> <p>Tim Haug / David Ludwin: The City of L.A. average change orders is approximately 4% now. The District goal is to keep change orders below 5% average over the entire CIP.</p> | Observation | |
| 17 | Tim Haug: The City of L.A. has instituted a program of contracting IDIQ type services for post construction of their facilities. A single contractor is awarded the contract on a yearly basis. The City issues task orders to the contractor when needed, which greatly cuts down the time to get the work performed. It also removes the cost of procuring over and over for these services during the year. This contract is used to address minor construction after commissioning of a facility. The contractor works with O&M to address any "fine-tuning" or "customization" required for the constructed facility. Any major fine tuning is taken care of by the facility contractor. The District should consider using such a contract if the contract type issues are acceptable to the District's Board. | Recommendation | Investigate if District can do the same |
| 18 | Joe Mundine: The District might consider the following successful approaches the City | Recommendation | Investigate if District can do the same |

| <u>ITEM NO.</u> | <u>DESCRIPTION</u> | <u>TYPE</u> | <u>Follow up Action, if any</u> |
|-----------------|--|----------------|---------------------------------|
| | <p>undertook:</p> <ol style="list-style-type: none"> 1. Establish a <u>100% dedicated</u> Technical Review Group. This group would be solely dedicated to reviewing all designs for maintainability. 3D CAD designs / renderings greatly help this effort. The team should consist of all major disciplines/trades so each aspect of the design can be reviewed adequately. 2. Establish a <u>100% dedicated</u> commissioning / start up team 6-8 months before commissioning starts. The team would use the 6 months to get up to speed with design and construction of the facility so that commissioning could proceed more efficiently. 3. Establish an O&M tie-in / shutdown team. This team would work to detail out every tie-in/shutdown required for every project. This team was identified as critical to helping the City meet their full program schedule. <p>All of these teams should be budgeted in to the project programs. The cost of these teams will more than pay for themselves in efficiency and schedule savings.</p> | | |
| 19 | <p>Tom Riegelhuth: The full secondary program represents a significant volume of work, and the likelihood of working with contractors new to the District. The District has a rigorous programming requirement that is different from most wastewater agencies, which contractors are not normally familiar with. This has and could result in schedule delays and/ or change orders or frustration for the contractor. To prevent / alleviate these results the District should consider contracting with a programming contractor who would perform all facility programming. This would give consistent results from a software contractor rather than a construction contractor whose business is based on mechanical systems. Remove this portion of the work from the contracts for the process facilities.</p> <p>Joe Mundine: The District could also consider increasing O&M staff to perform programming to get a consistency of product and results desired.</p> <p>Dave Ludwin: We have talked about the various possibilities of doing this differently. Hiring staff by OCSD or having our program managers do some</p> | Recommendation | Address I&C design issue |

| ITEM NO. | DESCRIPTION | TYPE | Follow up Action, if any |
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| | <p>of the work is a possibility</p> <p>Rob Thompson: The PCI Division is considering how to proceed in this regard. There are advantages and disadvantages to the District in how to procure programming. The comments today are understood. A decision will need to be made by the District.</p> | | |
| 20 | <p>Jag Salgaonkar: A revised schedule (revised from the January 24, 2003 handout to the Panel) was distributed as well as a cash flow graph for the District's overall CIP. It was explained that this was still a work in progress and the distributed materials represented progress to date. The main difference in the schedules is that the full secondary program is now shown extending a year longer than was previously shown in the January 24, 2003 version.</p> <p>David Ludwin: The District is looking for ways to shorten the procurement cycles. Now, these cycles are approximately 85 days for consultants and 115 days for contractors. Some ideas are raising the GM or Engineering Director discretionary procurement limits. Now, the GM has approval for \$100k or 5% of the contract amount, whichever is less. The Board PDC committee has authority up to \$200k or 10% of the contract amount, whichever is less. Anything beyond these limits goes to the Board for ratification (change orders) or approval.</p> | Observation | |
| 21 | <p>Garry Brown: It would be helpful to have a graph of how the permit limit levels are being achieved throughout the duration of the full secondary program. The District should present graphic information that indicates as new facilities come on line their individual effect on permit limits. The graphic could also show the cumulative effect of all new full secondary facilities that are on line at any one time.</p> | Recommendation | Investigate how to depict this information |
| 22 | <p>Bob Ooten: The review panel should not forget that what is shown on the schedules does not reflect all District work. In addition to the CIP there are numerous small projects (approximately 50) and maintenance going on that requires District resources and time.</p> | Observation | |
| 23 | <p>Gerry Thibeault: On the schedules the Closeout Phase is shown as included in the total project time. When does beneficial occupancy occur?</p> <p>Jag Salgaonkar: Definitions of the Commissioning Phase and the Closeout Phase were presented. At the end of commissioning,</p> | Observation | |

| <u>ITEM NO.</u> | <u>DESCRIPTION</u> | <u>TYPE</u> | <u>Follow up Action, if any</u> |
|-----------------|---|-------------|---------------------------------|
| | <p>beneficial occupancy of the facilities occurs. Therefore, when reading the schedules, beneficial occupancy, at the end of commissioning, would represent when the facilities are effectively on line.</p> <p>David Ludwin: Beneficial occupancy of all planned facilities is shown as occurring in early 2012 by the draft schedule. This is 9 years from today. Again, the schedule is a work in progress. It will be updated as the planning is refined, including comments at today's meeting.</p> <p>Jag Salgaonkar: Please note that 2012 is shown on the schedule as an early finish date. This is the date if all goes well on the project and we have properly captured all risks. The schedule also shows a late finish date should some new risks arise, or those identified cannot be mitigated.</p> <p>Gerry Thibeault: The District needs to do some more planning on the schedule.</p> <p>Joe Mundine: There may be opportunity to consolidate projects further to reduce space and contractor conflicts (not enough workspace) issues.</p> <p>David Ludwin: The projects have already been consolidated. There are several large projects already. There would be tremendous bonding requirements for contractors if the large projects were to be combined into even larger projects.</p> | | |
| 24 | <p>Garry Brown: What is the highest dollar amount of expenditures the District has executed in the recent past? If City of L.A. had trouble executing \$250 million then can the District do more? How can permit requirements be met on the schedule shown?</p> <p>Jim Herberg / Matt Smith: Typically the District executes approximately 85% of what they budget each year. Prior to this year \$113 million executed was the highest, and this year it appears that it will be approximately \$140 million. Resources to execute more than this will be a big issue.</p> <p>Gerry Thibeault: Waste Discharge Permits are issued every 5 years. The District is applying for a permit now (2003 permit). When the District applies for their 2008 permit legitimate issues relating to schedule can be considered and the 2008 permit conditions can be altered from the 2003 version to account for these legitimate issues.</p> | Observation | |

| ITEM NO. | DESCRIPTION | TYPE | Follow up Action, if any |
|-----------------|--|----------------|---------------------------------|
| 25 | <p>Tim Haug: Please explain the District's Bid & Award Phases?</p> <p>David Ludwin: In the District's project delivery process Bid & Award for construction contracts occurs as part of the Design Phase. There is no separate phase for Bid & Award. Previous schedules provided for the Panel's review show Bid & Award as a separate phase. This depiction was only for the convenience of review of the panel. In general, Bid & Award is one of the last activities in the Design phase and extends all the way to the NTP for construction.</p> | Observation | |
| 26 | <p>Tim Haug: Partnering during construction is recommended. With large projects, it would seem that a partnering relationship is desirable to an adversarial relationship with contractors. Partnering establishes a mood of achievement, which may improve quality and reduce change orders. The District could consider formal partnering on the larger contracts (~\$100M or greater).</p> <p>Tom Riegelhuth: This is a good idea. With the amount of work in the full secondary program and the short schedule the District will have more claims than they have historically had. Many new contractors will be used as the contractors the District has historically used will not be able to bond and bid on such large projects. Partnering may be one way to mitigate the volume and dollar amount of claims.</p> <p>Tim Haug: The District needs to settle claims as fast as possible and not let them linger, or the schedule will suffer. For example, the City had a \$170 million digester project that this happened on. It delayed progress on the program and legal claims are still being settled 5 years after the program has finished.</p> <p>David Ludwin: The District has a history of and tries to be proactive with partnering. The District usually partners in an informal way, and employs claims adjusters during larger projects on a routine basis.</p> | Recommendation | |
| 27 | <p>Garry Brown: When will the micro filtration research be completed? How does it impact TF at P2?</p> <p>Jim Herberg: The research will be completed as shown on the schedule. Meaningful data should be available approximately June 2003. Should micro filtration be adopted, the District is thinking of a 15-20 mgd module, and is not considering</p> | Observation | |

| ITEM NO. | DESCRIPTION | TYPE | Follow up Action, if any |
|-----------------|--|----------------|---------------------------------|
| | <p>replacing all planned TF's with micro filtration.</p> <p>Bob Ooten: The District is studying micro filtration and MBR (Membrane Bio Reactor) technology.</p> | | |
| 28 | <p>Tim Haug: The City of L.A. makes the explicit distinction of stating that they have full biological treatment, rather than claiming full secondary treatment. This is meant to clarify that they can treat biodegradable substances, but does not include non-biodegradable substances.</p> | Recommendation | |
| 29 | <p>Garry Brown: When will a decision be made on how the RO reject (GWRS) be treated.</p> <p>Jag Salgaonkar: September, 2003.</p> <p>Jim Herberg: In addition toxicity species testing, currently underway, will wrap up in 3-4 weeks. The results of this testing will help to determine the proper technology to use.</p> <p>Tim Haug: Where does the toxicity, or notion of increasing toxicity come from?</p> <p>Jim Herberg: The RO reject water will come back to the District from the OCWD GWRS filtration process. OCWD will filter secondary treated water and send the reject back to the District. The reject contains a higher concentration of ammonia than was sent to OCWD. This condition will exist until 2012 when the District's AS plant expansion comes on line and flow sent to GWRS will contain much lower ammonia concentrations.</p> <p>Gerry Thibeault: The issue is the concentration of the filtrate in the discharge from the District to the ocean. Because 100 mgd of the average daily flow is sent to GWRS the remaining 140 mgd plus 10 mgd RO reject flow is discharged to the ocean, but at a higher ammonia concentration.</p> <p>Joe Mundine: The City of L.A. has a performance goal and is has no stated effluent limit for ammonia.</p> <p>Gerry Thibeault: The District is different because of the concentration of ammonia in the discharge. The City of L.A. does not have this situation.</p> | Observation | |
| 30 | <p>Garry Brown / Tim Haug: The indicators of progress need to be simple for the public to easily comprehend and they must show progress related to time and added facilities. This will make the program length easier to understand, and will let the public know how much it costs to make these</p> | Action | Develop indicators and graphic |

| ITEM NO. | DESCRIPTION | TYPE | Follow up Action, if any |
|-----------------|---|-------------|----------------------------------|
| | incremental changes (i.e. how much it costs to go from 40/40 to 35/35, etc.). It will demonstrate that the cost expended is not linear with the benefit realized. | | |
| 31 | Tim Haug: The District seems to be on the right track with their planning effort. The District seems to have touched all the key points of consideration for planning the Program. Comparing to LA's 13 years, the schedule is more aggressive. However, incremental progress can be shown using the performance indicators discussed earlier. | Observation | |
| 32 | <p>Garry Brown: One more meeting should be held. Due to the changing schedule and planning assumptions the review panel should have one more opportunity to review and discuss a finalized version. In addition, any finalized information should be made available to the panel prior to the meeting so it can be reviewed and discussed intelligently in the meeting.</p> <p>David Ludwin: The District will convene another meeting. I will contact each of the PRP members after this meeting to set the next and final meeting date.</p> | Action | Schedule the next meeting-Ludwin |

**MEETING MINUTES
FULL SECONDARY TREATMENT PROGRAM
PEER REVIEW PANEL MEETING
MARCH 24, 2003**

ATTENDEESS: PANEL: Garry Brown, Tim Haug, Joe Mundine, Tom Riegelhuth, Gerry Thibeault, Doug Drury

DISTRICT: David Ludwin, Robert Ooten, Bob Ghirelli, Jim Herberg, Matt Smith, John Linder, Jim Burror, Mark Esquer, Rob Thompson, Jess Yoder, Jag Salgaonkar, Bob Campbell and David MacDonald

A meeting was held on March 24, 2003 to receive the final comments from the Peer Review Panel (PRP) on the District's Full Secondary Treatment Program. The PRP had previously met on January 24, 2003 for introduction to the Program and again on February 26, 2003 for a discussion of the project issues. Minutes of that meeting are available.

The meeting was held in the District Board Room from 11:00am to 1:30pm. The attendees are indicated above for reference. The following is a summary of the discussion.

| Item No. | DESCRIPTION | TYPE | Follow up Action, if any |
|----------|--|-------------------------------------|--------------------------------|
| 1 | David Ludwin: David welcomed anyone to the meeting. He stated that the purpose of the meeting was to receive the final comments from the Panel. He mentioned that the agenda of the meeting included 1) comments on the Minutes of the last meeting, 2) review of the revised schedule 3) presentation on an effluent quality analysis for the next 10 years 4) discussion of the outline for the Panel Report and 5) schedule for submittal of the Panel Report to the Board | | none |
| 2 | Doug Drury: Dr. Drury stated that he had several question on minutes of the last meeting. He did not understand the comment in item No. 13 regarding secondary treatment at IEUA. The situation at IEUA does not apply to the District. The remark will be stricken Dr. Drury asked what was meant by Partnering in item 26. David Ludwin explained that it was a formal process to foster cooperation between the general contractor, subcontractors and the Owner. It involves chartering the team with common goals of cooperation and sharing in cost savings. | Comments on Minutes of last meeting | Corrections to be made by IPMC |

| | | | |
|-----------------|--|--------------------|-------------|
| | <p>Dr. Drury also asked what the significance was of biological treatment verse secondary treatment in item No.28</p> <p>Tim Haug stated that the City of L.A. makes a distinction between biological treatment and secondary treatment because a physical/chemical could meet a secondary standard of 30/30 but would not provide as complete a treatment as a biological system.</p> <p>Dr. Drury agreed that a biological system such as an activated system with a high SRT could provide a superior performance</p> <p>Tim Haug pointed out that in item 26, the City's digester project cost was \$170 m. In item No.29, Dr. Drury asked what was meant by "excess" toxicity. Tim Haug stated that a better term would be "increasing" toxicity. The Minutes will be revised.</p> | | |
| <p>3</p> | <p>David Ludwin presented the revised project schedule. Time has been added to the schedule to conduct a study of activated sludge verse trickling filters at Plant No.2. Parallel schedules have been developed for both AS and TF processes at Plant No.2. Project P1-80, treating BFR and RO recycle, will be operating by June 2007. Dr. Drury mentioned that he has experience with BFP treatment and would be available to review the current engineering studies which are being conducted. David Ludwin continued his review of the schedule and mentioned that P1-82 would provide a fully functioning, 80mgd, nitrifying AS system by June 2007. Replacement of the existing trickling filters at Plant No.1 will begin this summer.</p> <p>At Plant No. 2, P2-47-3 will update the oxygen feed and distribution system by mid 2004 and Project P2-74 will rehabilitate various components of the HPO system at Plant No.2 by mid 2008. Project FP2-02/04/05 will provide additional digester capacity in time to support additional secondary treatment at Plant No.2.</p> | <p>Informaion</p> | <p>none</p> |
| <p>4</p> | <p>David Ludwin presented the program cash flow projections. The project requires high annual expenditures of more than \$200M for the next eight years and appears to taper off in 2010. The projection is for the current CIP and does not reflect unidentified future projects. The true future expenditures may not taper off.</p> <p>Tom Riegelhuth Questioned the availability of local engineering resources to meet the District's aggressive schedule.</p> | <p>Information</p> | <p>None</p> |

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|----------|--|--------------------|---|
| | <p>Tim Haug What are the Plant 1&2 projects identified as a cost line item? There are other required projects that do not contribute directly to producing secondary effluent. There are more 30 projects which may cost more than the secondary treatment projects. Bob Ghirelli asked if there were any projects outside of secondary treatment projects that have a high priority. Jag Salgaonkar mentioned that a priority evaluation identified several high priority projects which are not full secondary projects.</p> | | |
| <p>5</p> | <p>Jim Herberg presented a graph on projected effluent quality during the construction period. The graph illustrates the available secondary treatment capacity as various projects are brought on line. The graph should indicate the milestones for Plant No.1 TF process being off line in 2003, GWRS coming on line in 2007, Plant No.2 TF process start up in 2011 and a new AS process start up at PlantNo.1 in 2012. Tim Haug stated that, if the design capacity is not available during construction, the graph should illustrate the operating capacity. The graph shows a higher % secondary with a lower % of secondary effluent going to the ocean. This condition is due to GWRS diversions in 2007. Tim Haug suggested that the graph should have a line which shows full secondary treatment of the influent. The District needs to show that it is producing more secondary effluent. The graph shows CBOD levels. Bob Ooten stated that the District needs to clarify that the permit level is based on CBOD and not TBOD. Garry Brown suggested that the graphic illustration should reflect the public's desire to produce secondary effluent</p> | <p>Action</p> | <p>District will update graph on projected effluent quality</p> |
| <p>6</p> | <p>David Ludwin asked if there were any more comments on the schedule. Tim Haug stated that the Headworks project at Plant No2 should not delay the secondary treatment projects. He suggested that the investigate ways to accelerated the secondary treatment project. Jag Salgaonkar mentioned that the District is evaluating methods to allow both projects to proceed with out delays. David Ludwin stated that the District wishes to establish a reasonable and achievable schedule and improvements will be made along the way as the projects develop. Tom Riegelhuth asked what methods are being used to monitor the schedule and the progress. David Ludwin said that the District</p> | <p>Information</p> | <p>None</p> |

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|---|---|--------|--|
| | is developing a controls system for monitoring the entire program | | |
| 7 | <p>Dr. Drury expressed concern over future effluent toxicity. He asked if the HPO system at Plant No.2 can be operated to nitrify. At the present time the HPO plant can not nitrify and there are no plans to make modification for nitrification. The future study of secondary treatment at Plant No. 2 should include a nitrification study at the HPO plant as well as AS verse TF processes for FP2-X.</p> <p>Dr. Drury is concerned that increased dry weather run off and domestic pesticides may cause effluent toxicity. Jim Herberg mentioned that the County is evaluating alternatives for treating dry weather flows.</p> <p>Bob Ghirelli stated that the District is conducting additional toxicity studies to assist the policy decision regarding effluent toxicity.</p> <p>Dr. Drury feels that the District will need activated sludge systems with high SRT, high mlvss (nitrification) to control effluent toxicity.</p> <p>Tim Haug stated that the key to Plant No.2 schedule is process selection. He asked if the District has all the studies in place to support the decision.</p> | Action | District will initiate a study of secondary treatment options at Plant No.2. The options will include trickling filters, activated sludge and the conversion of the HPO to nitrification |
| 8 | <p>David Ludwin asked Gerry Thibeault to outline the process for preparing the Panel's report to the Board. Gerry Thibeault explained that he envisioned a summary document with a cover memo from the Panel. If the District could provide the summary documentation, he could write the cover letter and distribute it to the Panel for comment. The summary attachment should include project descriptions, schedules, cash flow requirements, Panel comments, and projected effluent quality for the next ten years. Jag Salgaonkar suggested that biographical data on the Panel members should be included in the attachments. David Ludwin said the District will provide the summary attachments by 3/31 and he would like the Panel's report by 4/9. The PDC meets on 4/16 and the Board presentation will be 4/22.</p> | Action | The District will assemble the summary attachment documents |
| | | | |

ATTACHMENT NO. 4

March 28, 2003

**ORANGE COUNTY SANITATION DISTRICT
Full Secondary Treatment Projects**

**Project Name : New secondary treatment system at Plant No. 1, Job No. FP1-X
Current Phase : Project Development**

Project Description

Expand Plant No. 1 to full secondary treatment capacity. This includes the construction of 74 mgd of secondary treatment process capacity. The following major elements are included in the project:

- 1) Influent Pump station - 3 pumps
- 2) Aeration Basins - 10 basins
- 3) Secondary Clarifiers - 26 basins
- 4) RAS - 4 pumps
- 5) WAS - 3 pumps
- 6) Blower building - 3 blowers
- 7) Power building = 3 diesel generators. Electrical connections to existing PEPS and blowers and new PEPS and blowers
- 8) Digesters and boiler heat exchange equipment and pumps for mixing

**Project Name : New Secondary Treatment System at Plant No. 2, Job No. FP2-X
Current Phase : Project Development**

Project Description

Expand Plant No. 2 to full secondary treatment capacity. This includes the construction of 60 mgd of secondary treatment process capacity. The following major elements are included in the project:

- 1) Determine the process to be designed and constructed (Trickling Filters or Activated Sludge) with a capacity of 60 mgd.
- 2) Primary Effluent Pumping Station (PEPS)
- 3) Recycle pumping station

Project Name : Ammonia Side Stream Treatment at Plant Nos. 1 & 2, Job No. P1-80/FP2-07

Current Phase : Project Development

Project Description

Originally this project was established to remove TSS and some ammonia as part of the long term implementation of the 1999 Strategic Plan. A recent increase in effluent toxicity attributed to ammonia has expanded this project's scope to include addressing the current and projected increases in effluent ammonia toxicity. The future project FP2-07 has been accelerated and combined with P1-80 to allow a system wide solution to the ammonia issue.

The following major elements are included in the project:

Plant No. 1 – Approximately 2 mgd nitrifying activated sludge treatment system for removal of BOD, TSS and ammonia from dewatering filtrate and the GWRs Phase I RO reject flow streams impacts will be evaluated.

- 1) Determine the process to be designed and constructed (Activated Sludge or Membrane Solids/Liquid Separation Facilities) with a capacity of 2 mgd.
- 2) Return sludge pumping facilities
- 3) Site work including yard piping, electrical service, automated control systems and odor control system
- 4) Pumping system to convey waste sludge to Plant No. 2 via the existing Interplant Pipeline.
- 5) An evaluation of potential GWRS Reverse Osmosis reject stream options

Plant No. 2 – Approximately 2 mgd treatment system for removal of ammonia from the dewatering filtrate system.

- 1) Determine the process to be designed and constructed (Activated Sludge or Enclosed Ammonia Stripping) with a capacity of 2 mgd.
- 2) Site work including yard piping, electrical service, automated control systems and odor control system
- 3) Pumping systems to collect and distribute wastestreams.

Project Name : Activated Sludge Plant Rehabilitation at Plant No. 1, Job No. P1-82
Current Phase : Project Development

Project Description

This project includes the rehabilitation of the existing secondary facilities at Plant No.2. This project will restore the design capacity of the treatment system to 80 mgd. The following major elements are included in the project:

- 1) Rehabilitate aeration basin influent splitter box and step flow feed gates.
- 2) Replace aeration piping and diffusers within the feed channels
- 3) Replace RAS piping and improve RAS distribution.
- 4) Rehabilitate mixed liquor channel aeration piping and valves.
- 5) Replace major pieces of mechanical equipment that are failing or are past their useful life
- 6) Provide Standby power, increase power reliability and to upgrade electrical systems to meet new codes and standards.
- 7) Incorporate reinvention and automation ideas as applicable.

Project Name : Secondary Plant Rehabilitation at Plant 2, Job No. P2-74
Current Phase : Project Development

Project Description

This project replaces major piping systems at the Plant No.2 secondary facilities that have begun to fail or are at the end of their useful life. This project will restore the design capacity of the treatment system to 90 mgd. The following major elements are included in the project:

- 1) Condition assessment of the secondary facilities process equipment.
- 2) Replacement of equipment that is failing or is at the end of its useful life.

Project Name : Sec. Treat. Monitoring & Control System Upgrade at Plant 2,
Job No. P2-47-3
Current Phase : Construction

Project Description

This project adds hardware and software to upgrade the existing oxygen activated sludge process instrumentation and control system to current District Standards. The upgrades replace antiquated equipment with current technology and will provide improved access to process

information for Operations staff.

Project Name : Trickling Filter Rehabilitation and New Clarifiers at Plant 1, Job No. P1-76
Current Phase : Construction

Project Description

This project removes the four existing trickling filters at Plant No. 1 and replaces them with two new trickling filters and clarifiers. The new trickling filter facility will be located in the same footprint as the existing trickling filters. The following major elements are included in the project:

- 1) Demolition of the existing trickling filters and clarifier
- 2) Two new trickling filters and two new clarifiers
- 3) A new power building to support the increased electrical demand
- 4) Two new effluent pipelines including one to the GWR System inlet structure and one to the existing interplant line
- 5) Several junction structures to allow operational flexibility of treatment system.

Project Name : Digesters and Sludge Cake Hoppers at Plant 2, Job No. FP2-02/04/05
Current Phase : Project Development

Project Description

This project is to expand the solids handling capabilities of Plant No.2 for the full secondary treatment program. The project will also rehabilitate existing sludge support facilities that are failing or are the end of their useful life. The following major elements are included in the project:

- 1) Construct two new digesters
- 2) Rehabilitate two existing sludge cake storage hoppers
- 3) Construct two new sludge cake storage hoppers including a truck loading station, conveyors, transfer equipment and building.

**ATTACHMENT NO. 5
SECONDARY TREATMENT IMPLEMENTATION PEER REVIEW PANEL**

Garry Brown

Garry Brown is the founder and Director of Orange County CoastKeeper, a non-profit organization dedicated to improving the quality of local coastal resources. Garry earned a B.A. degree from the University of Redlands, where he then completed graduate courses in Public Administration.

Garry served as an Assistant City Manager for five years, and eight years as a legislative advocate for the real estate and building industries. From this experience, he has gained an extensive understanding of both state and local government political systems. Garry presently serves on nine Boards of Directors for community and environmental organizations.

Douglas D. Drury, Ph.D.

Dr. Douglas Drury is the Executive Manager of Operations for the Inland Empire Utilities District, and is an instructor at the University of California, Riverside. Dr. Drury earned his Ph.D. in Environmental Engineering from Utah State University, and has over 30 years of experience in research, operations, and engineering of wastewater treatment systems.

During his career, Dr. Drury has received awards from State and international organizations such as the Water Environment Federation for his contributions to the fields of wastewater research and operations. Dr. Drury has also been selected to serve on several state and national task forces on water quality issues, and is the author/co-author of a numerous published papers.

Dr. R. Tim Haug

Dr. R. Tim Haug is Deputy City Engineer and Wastewater Program Manager for the Bureau of Engineering, City of Los Angeles.

Joseph Mundine

Joseph Mundine has been employed by the City of Los Angeles for 26 years. He started his career with the City as an operator at the Hyperion Treatment Plant. He has promoted through the ranks holding several positions in both operations and maintenance and in February of 1999 he promoted to the position of Hyperion Plant Manager.

C. Thomas Riegelhuth

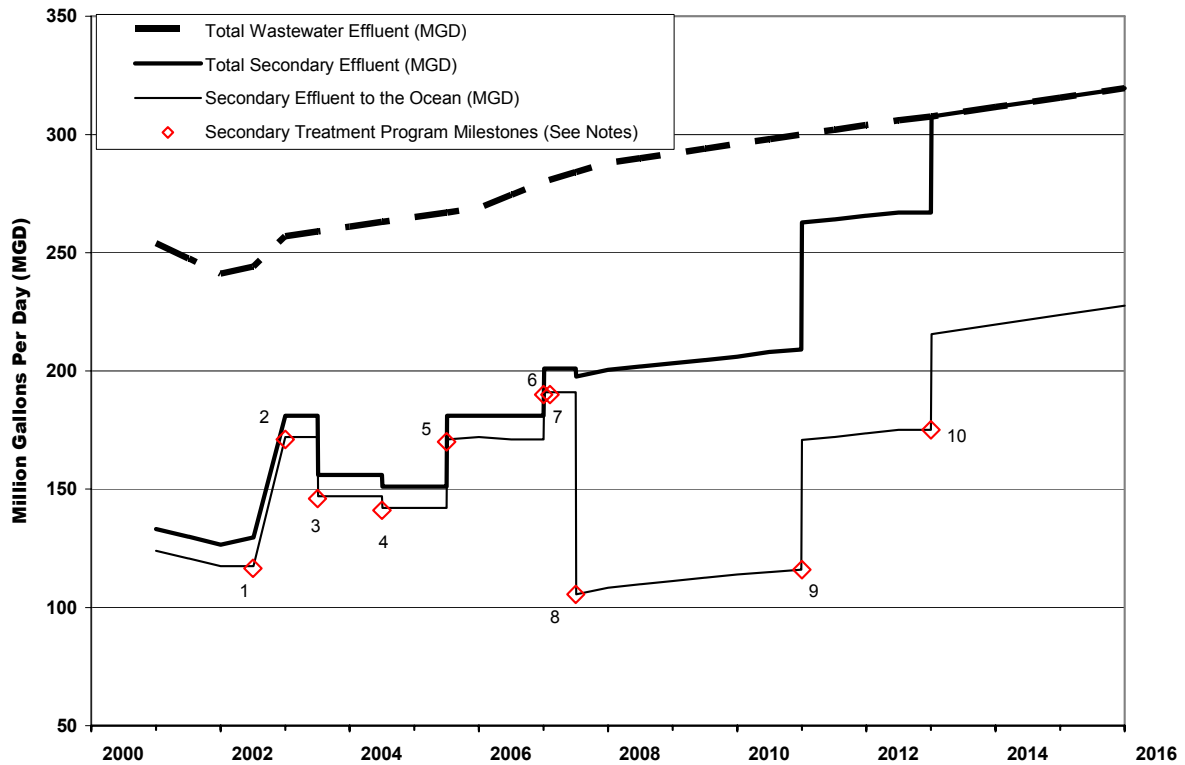
C. Thomas Riegelhuth is President of Margate Construction, Inc., which has been in business since 1965. Margate Construction, Inc. is a General Engineering Contractor specializing in the construction of Wastewater Treatment Facilities in Southern California. Margate Construction, Inc. has extensive experience constructing large facilities at the Orange County Sanitation District's treatment plants, with past and current projects ranging from \$9 million to over \$70 million.

Gerard J. Thibeault

Gerard Thibeault is the Executive Officer of the California Regional Water Quality Control Board, Santa Ana Region. Gerard graduated from Cal Poly, Pomona, in 1974 with a B.S. degree in Civil Engineering, and he received an M.S. degree in Civil Engineering from Stanford University in 1975. He worked for the Lahontan Regional Board between 1975 and 1986, when he transferred to the Santa Ana Regional Board. He was appointed as Executive Officer of the Santa Ana Regional Board in 1988 and has held that position since that time.

ATTACHMENT 6 – PROJECTED OPERATIONAL FLOWS AND EFFLUENT QUALITY DURING SECONDARY TREATMENT IMPLEMENTATION

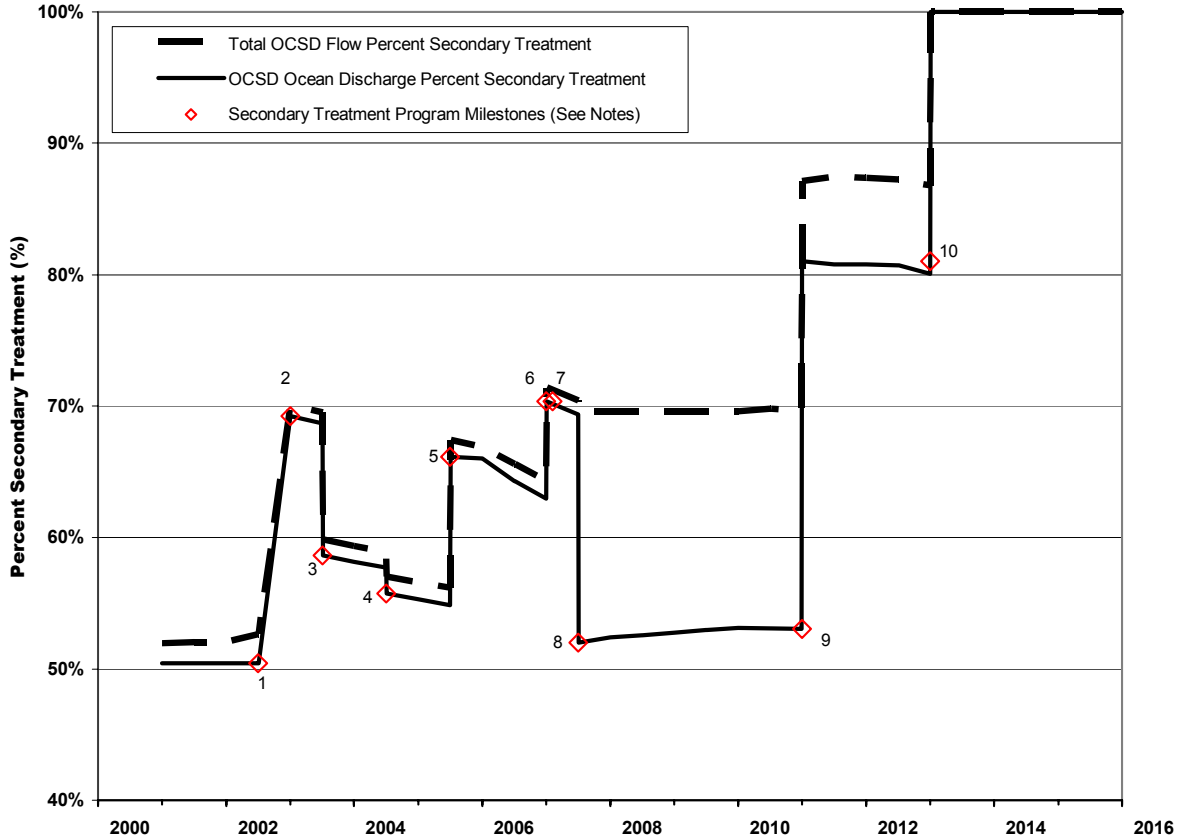
CHART 1 - PROJECTED WASTEWATER FLOW ANALYSIS
 ORANGE COUNTY SANITATION DISTRICT
 PROJECTED SECONDARY TREATMENT PROGRAM FLOW ANALYSIS



Program Milestones Dates:

| Note # | Date | Description |
|--------|---------------|---|
| 1 | July 2002 | July 17, 2002 decision to move to the 30/30 standard (full secondary treatment). |
| 2 | December 2002 | Existing secondary treatment facilities operating. (Started ramp-up in July 2002.) |
| 3 | June 2003 | Trickling filters at Plant No.1 removed from service for replacement. |
| 4 | June 2004 | Plant No.1 secondary treatment rehabilitation construction started. |
| 5 | June 2005 | Plant No.2 secondary treatment rehabilitation and trickling filter replacement construction complete. |
| 6 | January 2007 | Ammonia/Toxicity reduction facilities complete. |
| 7 | January 2007 | Plant No.1 secondary treatment rehabilitation project complete. |
| 8 | July 2007 | GWRS start-up using 104 MGD of secondary effluent from Plant No.1. |
| 9 | February 2011 | Plant No.2 secondary treatment expansion complete. |
| 10 | December 2012 | Plant No.1 secondary treatment expansion complete. |

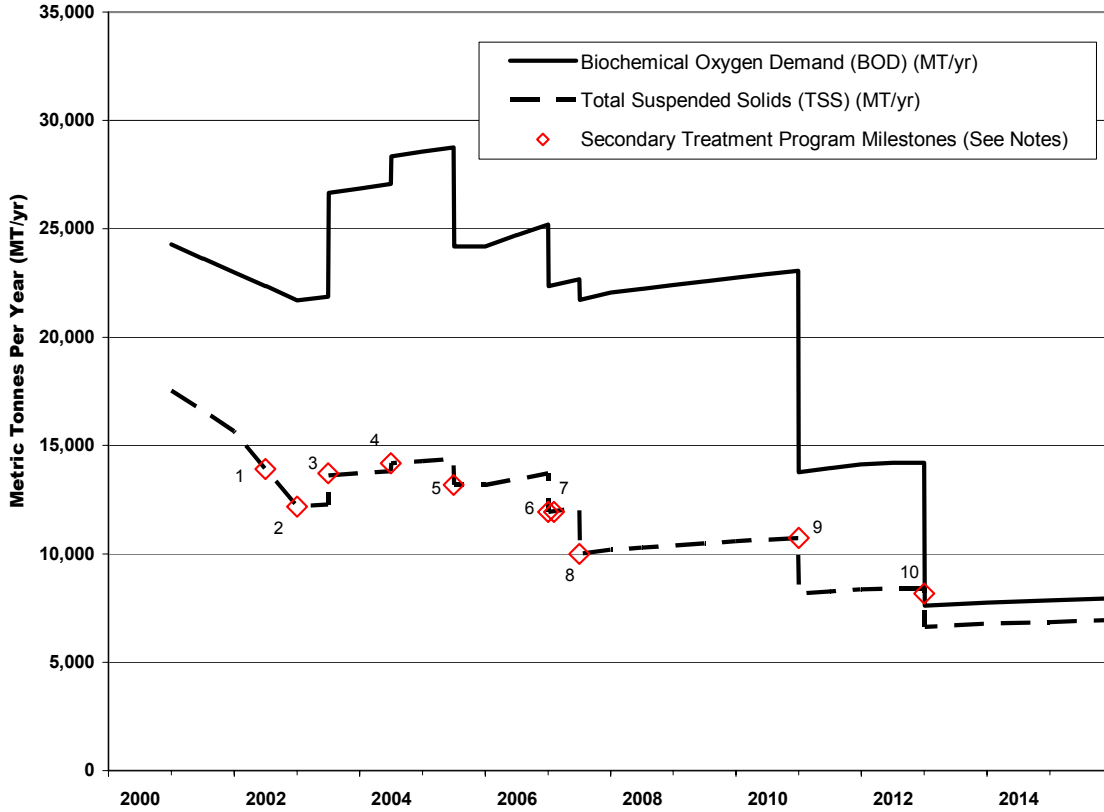
CHART 2 - PROJECTED PERCENT SECONDARY TREATMENT ANALYSIS
 ORANGE COUNTY SANITATION DISTRICT
 PROJECTED SECONDARY TREATMENT PROGRAM FLOW ANALYSIS



Program Milestones Dates:

| Note # | Date | Description |
|--------|---------------|---|
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| 7 | January 2007 | Plant No.1 secondary treatment rehabilitation project complete. |
| 8 | July 2007 | GWRs start-up using 104 MGD of secondary effluent from Plant No.1. |
| 9 | February 2011 | Plant No.2 secondary treatment expansion complete. |
| 10 | December 2012 | Plant No.1 secondary treatment expansion complete. |

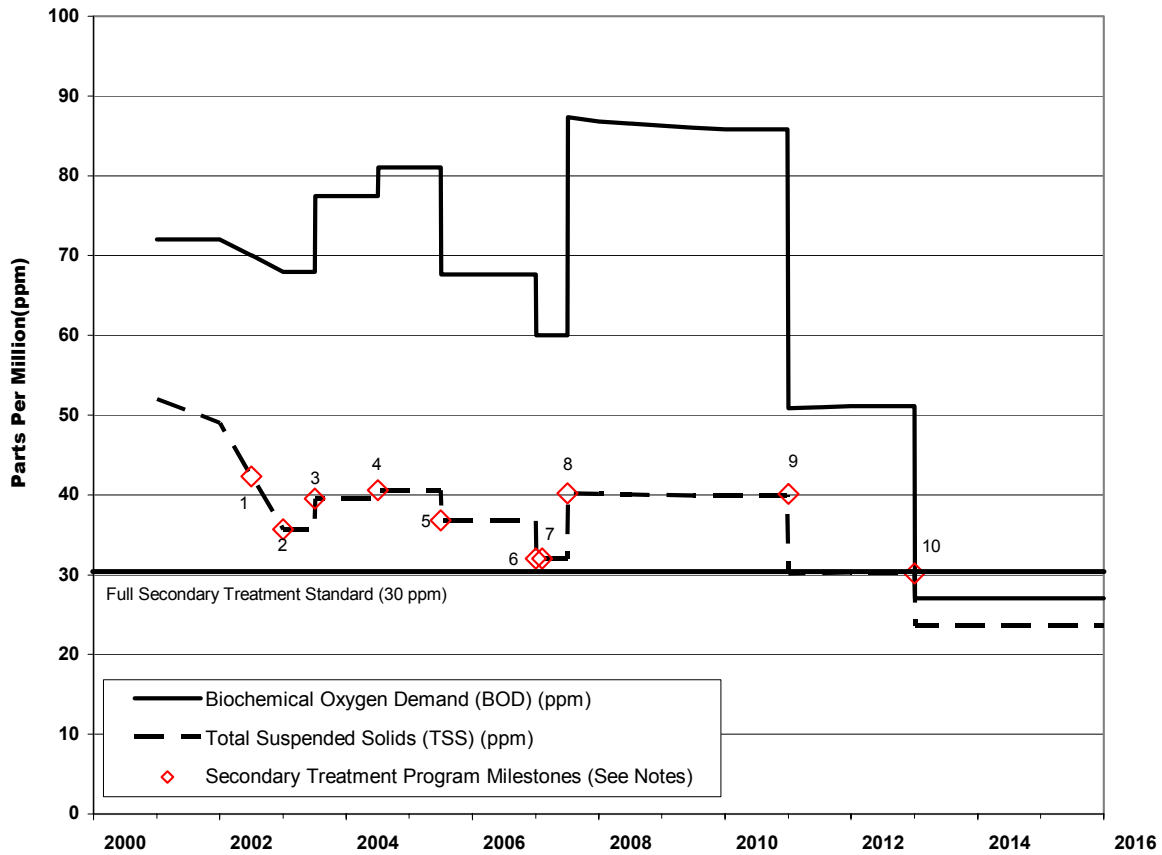
CHART 3 - EFFLUENT MASS EMISSION RATES
 ORANGE COUNTY SANITATION DISTRICT
 PROJECTED SECONDARY TREATMENT PROGRAM FLOW ANALYSIS



Program Milestones Dates:

| Note # | Date | Description |
|--------|---------------|---|
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| 3 | June 2003 | Trickling filters at Plant No.1 removed from service for replacement. |
| 4 | June 2004 | Plant No.1 secondary treatment rehabilitation construction started. |
| 5 | June 2005 | Plant No.2 secondary treatment rehabilitation and trickling filter replacement construction complete. |
| 6 | January 2007 | Ammonia/Toxicity reduction facilities complete. |
| 7 | January 2007 | Plant No.1 secondary treatment rehabilitation project complete. |
| 8 | July 2007 | GWRS start-up using 104 MGD of secondary effluent from Plant No.1. |
| 9 | February 2011 | Plant No.2 secondary treatment expansion complete. |
| 10 | December 2012 | Plant No.1 secondary treatment expansion complete. |

CHART 4 - PROJECTED EFFLUENT BOD AND TSS CONCENTRATIONS
 ORANGE COUNTY SANITATION DISTRICT
 PROJECTED SECONDARY TREATMENT PROGRAM FLOW ANALYSIS



Program Milestones Dates:

| Note # | Date | Description |
|--------|---------------|---|
| 1 | July 2002 | July 17,2002 decision to move to the 30/30 standard (full secondary treatment). |
| 2 | December 2002 | Existing secondary treatment facilities operating. (Started ramp-up in July 2002.) |
| 3 | June 2003 | Trickling filters at Plant No.1 removed from service for replacement. |
| 4 | June 2004 | Plant No.1 secondary treatment rehabilitation construction started. |
| 5 | June 2005 | Plant No.2 secondary treatment rehabilitation and trickling filter replacement construction complete. |
| 6 | January 2007 | Ammonia/Toxicity reduction facilities complete. |
| 7 | January 2007 | Plant No.1 secondary treatment rehabilitation project complete. |
| 8 | July 2007 | GWRS start-up using 104 MGD of secondary effluent from Plant No.1. |
| 9 | February 2011 | Plant No.2 secondary treatment expansion complete. |
| 10 | December 2012 | Plant No.1 secondary treatment expansion complete. |



April 8, 2003

ATTACHMENT 4 – PROJECTED OPERATIONAL FLOWS AND EFFLUENT QUALITY
DURING SECONDARY TREATMENT IMPLEMENTATION
APRIL 16, 2003
SPECIAL BOARD WORKSHOP

The District's Ocean Discharge Permit application submitted in December 2002 contained a draft Operations Plan for effluent water quality. Based on the revised full secondary treatment program schedule, the Operations Plan needs to be updated and resubmitted. The four attached charts are meant to replace the materials submitted in the 2002 Ocean Discharge Permit application.

The four charts illustrate the key criteria for monitoring the District's ocean discharge: (1) wastewater effluent flow (in million gallon per day); (2) percent secondary treatment; (3) concentrations of biochemical oxygen demand (BOD) and total suspended solids (TSS) (in parts per million); and (4) mass emissions (in metric tonnes per year).

In general, the charts show that the District's effluent concentrations of BOD and TSS will fluctuate until 2007 as secondary treatment capacity is taken out of service for planned repairs. In 2007, the secondary treatment facility repairs will be complete and the Groundwater Replenishment System (GWRS) will be started. Once GWRS is operational, the District's effluent concentrations of BOD and TSS will increase. However, the total mass, or metric tonnes, discharged to the ocean will be reduced to current levels. In 2011 and 2012, the concentrations and mass emissions of both BOD and TSS will decrease with the completion of the Plant No.2 and Plant No.1 secondary treatment plant expansions, respectively. The District's concentrations of both BOD and TSS drop below 30 parts per million, the goal of the program in December 2012.

Chart Descriptions

Chart 1 illustrates the projected wastewater flow to be treated by the District and the amount of secondary effluent discharged to the ocean. Chart 1 contains the following information in million gallons per day (mgd):

- 1.) Projected wastewater to be treated at the District – “Total Wastewater Effluent (mgd).”
- 2.) Estimated quantity of secondary treatment to be provided by the District – “Total Secondary Effluent (mgd).”
- 3.) Estimated quantity of secondary effluent to be discharged to the ocean – “Secondary Effluent to the Ocean (mgd).”

Chart 1 illustrates that wastewater flows to the District will increase over the next 20 years due to population growth in the service area. Chart 1 also shows that the District will continue to provide secondary effluent for water reclamation which accounts for the difference between “Total Secondary Effluent” and “Secondary Effluent to the Ocean.” The District's secondary treatment will fluctuate until 2007 as secondary treatment capacity is taken out of service for planned repairs. This is indicated on the charts by milestones dates 1 through 7. In 2007, the

secondary treatment facility repairs will be complete and the Groundwater Replenishment System (GWRS) will be started. This is indicated on the chart by milestone 8. Once GWRS is operational, 104 mgd of secondary effluent will be diverted from the ocean for reclamation. In 2011 and 2012, the amount of secondary treatment will increase with the completion of the Plant No.2 and Plant No.1 secondary treatment plant expansions, respectively. This is shown by milestones 9 and 10.

Chart 2 is similar to Chart 1 except it illustrates projected secondary treatment to be provided by the District during the implementation of the secondary treatment program as a percentage. Chart 2 contains the following information:

- 1.) Estimated percent secondary treatment provided by the District – “Total OCSD Flow Percent Secondary Treatment.”
- 2.) Estimated percentage of the total ocean discharge receiving secondary treatment discharged to the Ocean – “OCSD Ocean Discharge Percent Secondary Treatment.”

This type of chart has been traditionally used by the District to track the percentage our ocean discharge receiving secondary treatment. Prior to the Board’s decision in July 2002, the operational strategy was to maintain a blend of 50% advanced primary treatment to 50% secondary treatment for ocean discharge. This chart also shows the District will continue to provide secondary effluent for water reclamation. This accounts for the difference between “Total OCSD Flow Percent Secondary Treatment” and “OCSD Ocean Discharge Percent Secondary Treatment” for 2000 through 2012.

Chart 2 also illustrates that the District’s percent secondary treatment will fluctuate until 2007 as secondary treatment capacity is taken out of service for planned repairs. This is indicated on the charts by milestones 1 through 7. In 2007, the secondary treatment facility repairs will be complete and the GWRS will be started. This is indicated on the chart by milestone 8. Once GWRS is operational, and the total volume of wastewater discharged to the ocean will be reduced by 104 mgd and the District’s percent secondary effluent to the ocean will be reduced to approximately 55%. In 2011 and 2012, the percentage of secondary treatment provided will increase with the completion of the Plant No.2 and Plant No.1 secondary treatment plant expansions, respectively. This is shown by milestones 9 and 10.

Chart 3 depicts the effluent mass emissions, in metric tones per year, of the key wastewater effluent components BOD and TSS discharged to the ocean. Chart 2 contains the following information:

- 1.) Projected effluent BOD – “Biochemical Oxygen Demand (BOD)(MT/yr).”
- 2.) Projected effluent TSS – “Total Suspended Solids (TSS) (MT/yr).”

Chart 3 shows the District’s effluent mass emissions of BOD and TSS will fluctuate until 2007 as secondary treatment capacity is taken out of service for planned repairs. This is indicated on the charts by milestones 1 through 7. In 2007, the secondary treatment facility repairs will be complete and the GWRS will be started. This is indicated on the chart by milestone 8. Once GWRS is operational, the District’s effluent mass emissions of BOD and TSS will be less than current discharge levels. In 2011 and 2012, the mass emissions of both BOD and TSS will decrease with the completion of the Plant No.2 and Plant No.1 secondary treatment plant expansions, respectively. This is shown by milestones 9 and 10.

Chart 4 depicts the projected effluent BOD and TSS concentrations of the wastewater effluent discharged to ocean. Chart 2 contains the following information:

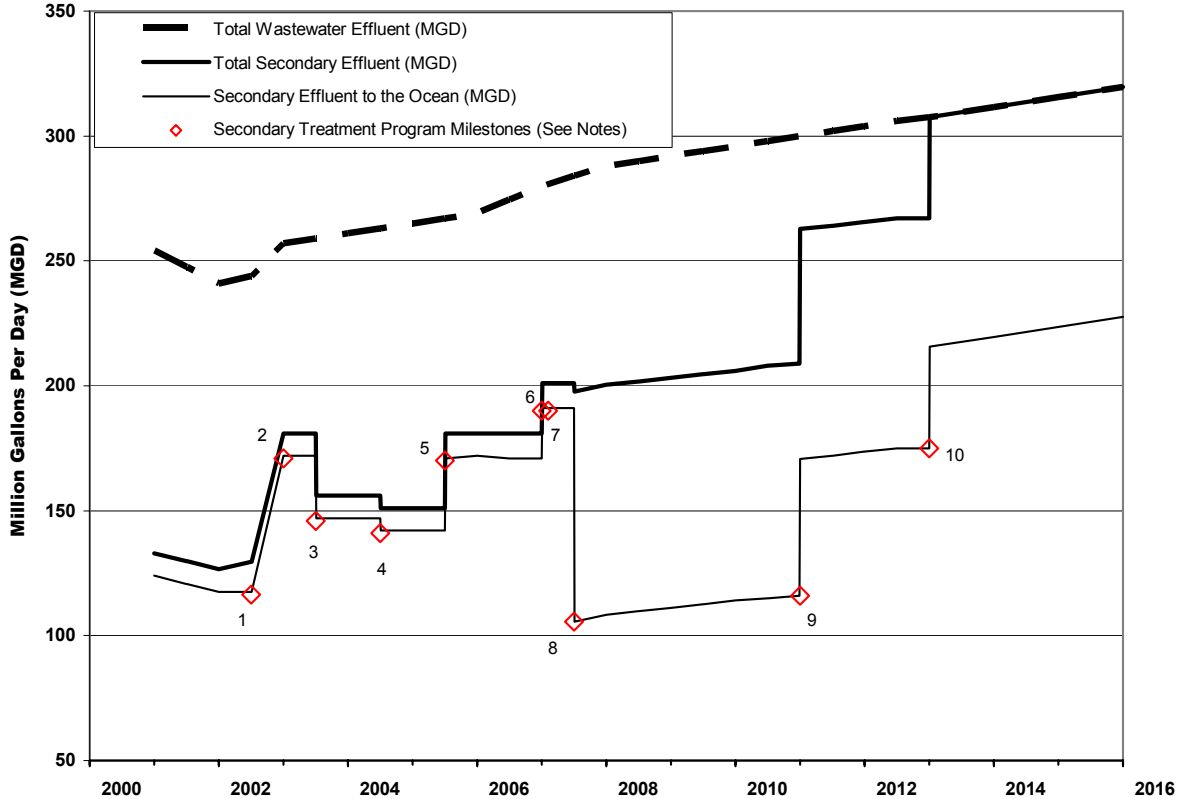
- 1.) Projected effluent BOD at the District – “Biochemical Oxygen Demand (BOD) (ppm).”

2.) Projected effluent TSS at the District – “Total Suspended Solids (TSS) (ppm).”

Chart 4 also shows the District’s effluent concentrations of BOD and TSS will fluctuate until 2007 as secondary treatment capacity is taken out of service for planned repairs. This is indicated on the charts by milestones 1 through 7. In 2007, the secondary treatment facility repairs will be complete and the GWRS will be started. This is indicated on the chart by milestone 8. Once GWRS is operational, the District’s effluent concentrations of BOD and TSS will increase until the full secondary treatment facilities can be constructed. BOD is expected to increase to about 87 parts per million (ppm), which is below the 1999 Ocean Discharge Permit limit of 109 ppm. TSS is also expected to increase slightly but will remain near current discharge levels. However, as shown in Chart 3 the total mass, or tonnes, discharged to the ocean, for both BOD and TSS, will be reduced to less than 2003 levels. In 2011 and 2012, the concentrations of both BOD and TSS will decrease with the completion of the Plant No.2 and Plant No.1 secondary treatment plant expansions, respectively. This is shown by milestones 9 and 10.

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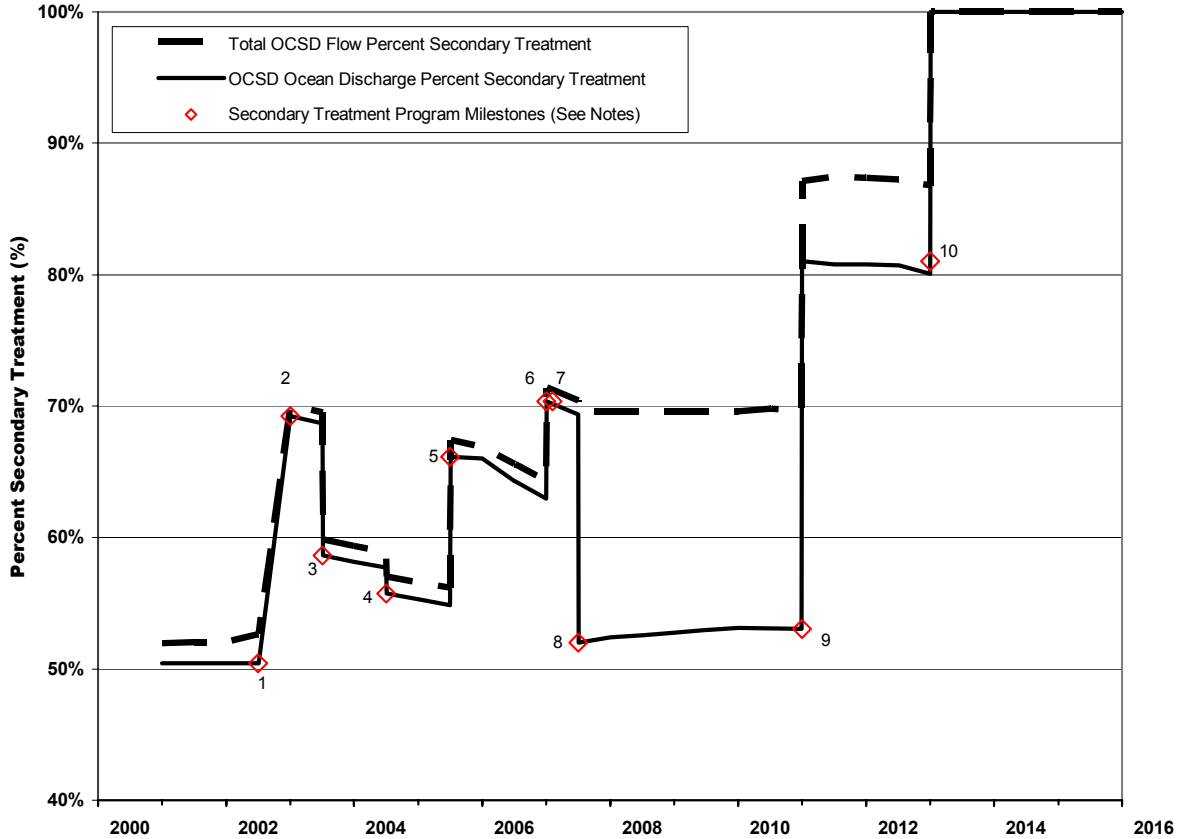
CHART 1 - PROJECTED WASTEWATER FLOW ANALYSIS
 ORANGE COUNTY SANITATION DISTRICT
 PROJECTED SECONDARY TREATMENT PROGRAM FLOW ANALYSIS



Program Milestones Dates:

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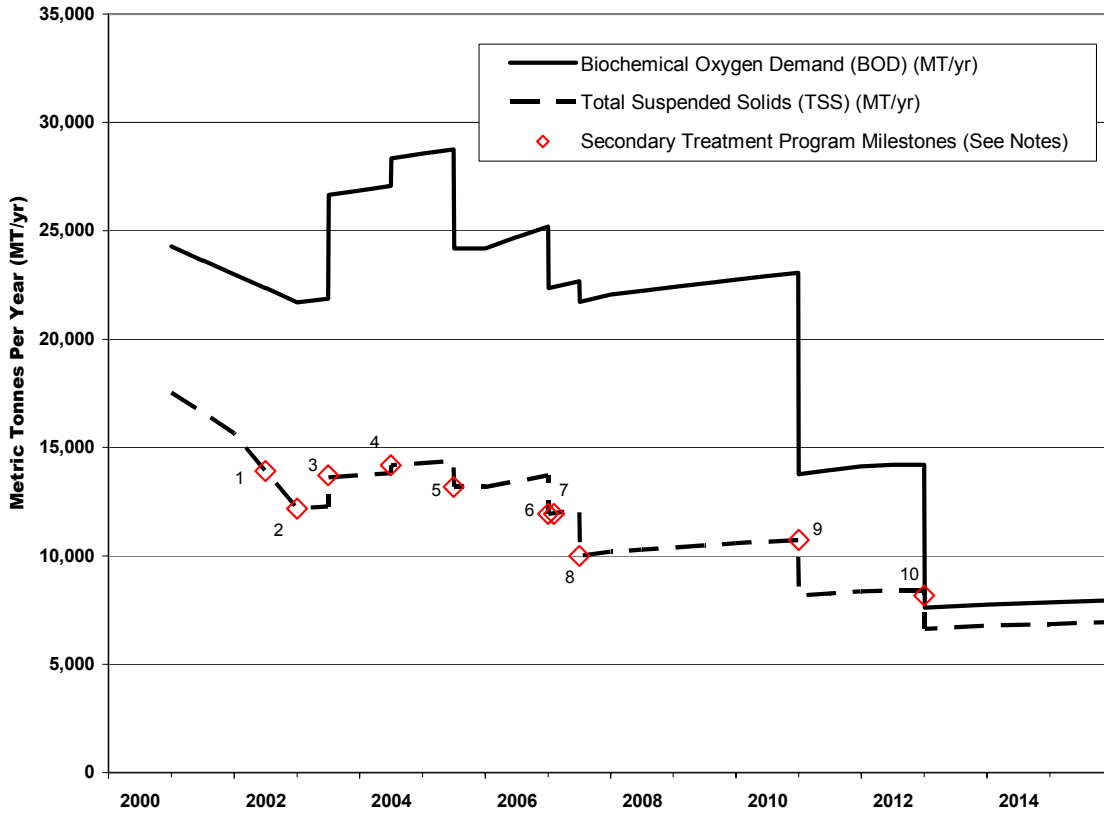
CHART 2 - PROJECTED PERCENT SECONDARY TREATMENT ANALYSIS
 ORANGE COUNTY SANITATION DISTRICT
 PROJECTED SECONDARY TREATMENT PROGRAM FLOW ANALYSIS



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| 9 | February 2011 | Plant No.2 secondary treatment expansion complete. |
| 10 | December 2012 | Plant No.1 secondary treatment expansion complete. |

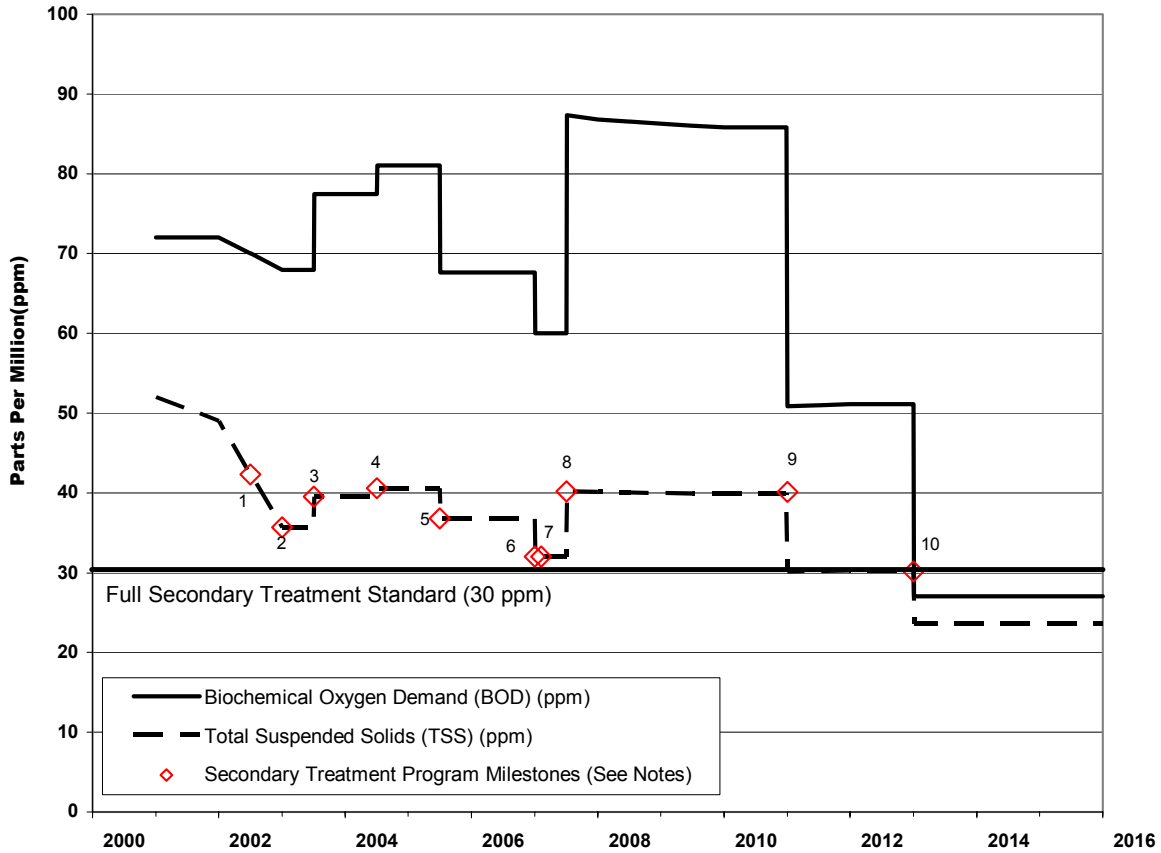
CHART 3 - EFFLUENT MASS EMISSION RATES
 ORANGE COUNTY SANITATION DISTRICT
 PROJECTED SECONDARY TREATMENT PROGRAM FLOW ANALYSIS



Program Milestones Dates:

| Note # | Date | Description |
|--------|---------------|---|
| 1 | July 2002 | July 17,2002 decision to move to the 30/30 standard (full secondary treatment). |
| 2 | December 2002 | Existing secondary treatment facilities operating. (Started ramp-up in July 2002.) |
| 3 | June 2003 | Trickling filters at Plant No.1 removed from service for replacement. |
| 4 | June 2004 | Plant No.1 secondary treatment rehabilitation construction started. |
| 5 | June 2005 | Plant No.2 secondary treatment rehabilitation and trickling filter replacement construction complete. |
| 6 | January 2007 | Ammonia/Toxicity reduction facilities complete. |
| 7 | January 2007 | Plant No.1 secondary treatment rehabilitation project complete. |
| 8 | July 2007 | GWRS start-up using 104 MGD of secondary effluent from Plant No.1. |
| 9 | February 2011 | Plant No.2 secondary treatment expansion complete. |
| 10 | December 2012 | Plant No.1 secondary treatment expansion complete. |

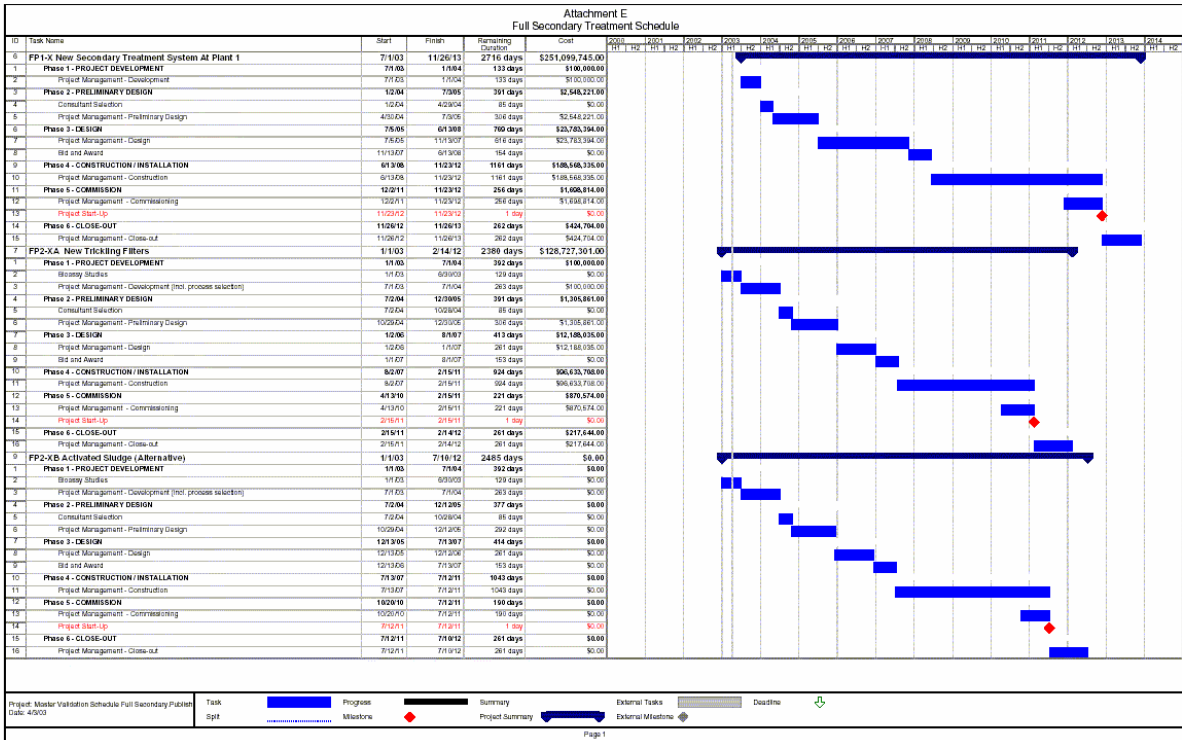
CHART 4 - PROJECTED EFFLUENT BOD AND TSS CONCENTRATIONS
 ORANGE COUNTY SANITATION DISTRICT
 PROJECTED SECONDARY TREATMENT PROGRAM FLOW ANALYSIS

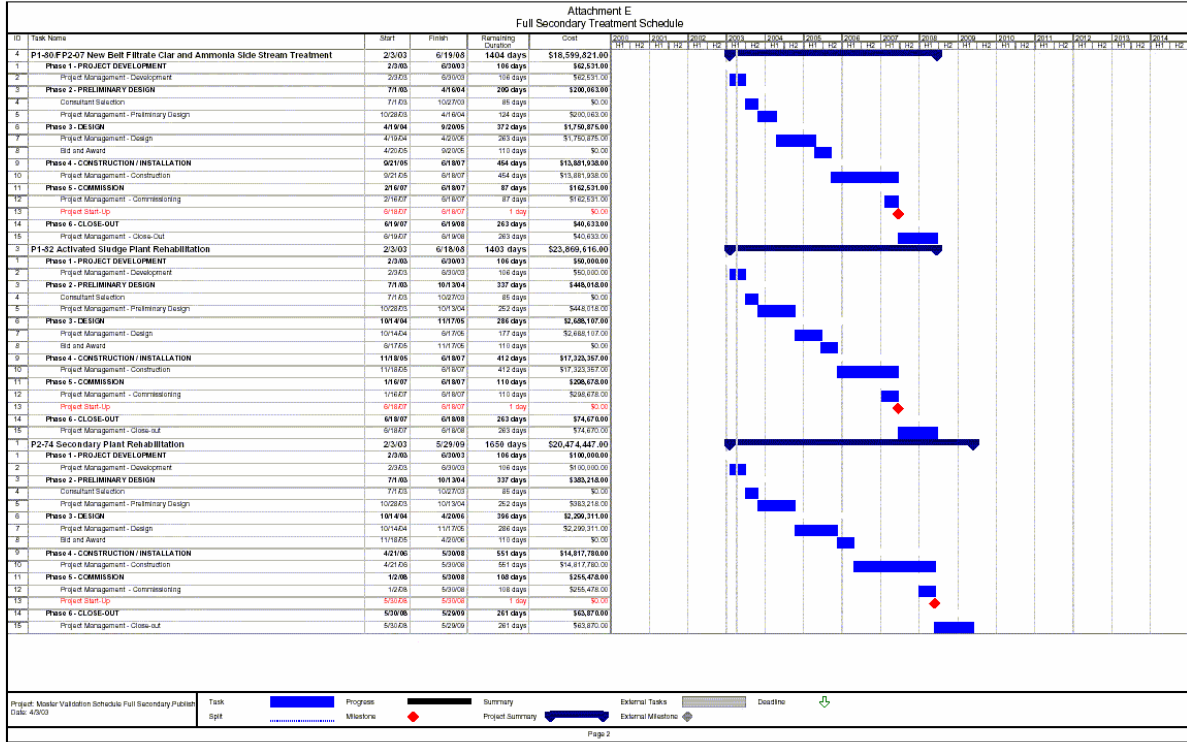


Program Milestones Dates:

| Note # | Date | Description |
|--------|---------------|---|
| 1 | July 2002 | July 17,2002 decision to move to the 30/30 standard (full secondary treatment). |
| 2 | December 2002 | Existing secondary treatment facilities operating. (Started ramp-up in July 2002.) |
| 3 | June 2003 | Trickling filters at Plant No.1 removed from service for replacement. |
| 4 | June 2004 | Plant No.1 secondary treatment rehabilitation construction started. |
| 5 | June 2005 | Plant No.2 secondary treatment rehabilitation and trickling filter replacement construction complete. |
| 6 | January 2007 | Ammonia/Toxicity reduction facilities complete. |
| 7 | January 2007 | Plant No.1 secondary treatment rehabilitation project complete. |
| 8 | July 2007 | GWRS start-up using 104 MGD of secondary effluent from Plant No.1. |
| 9 | February 2011 | Plant No.2 secondary treatment expansion complete. |
| 10 | December 2012 | Plant No.1 secondary treatment expansion complete. |

ATTACHMENT 3 - SECONDARY TREATMENT IMPLEMENTATION SCHEDULE





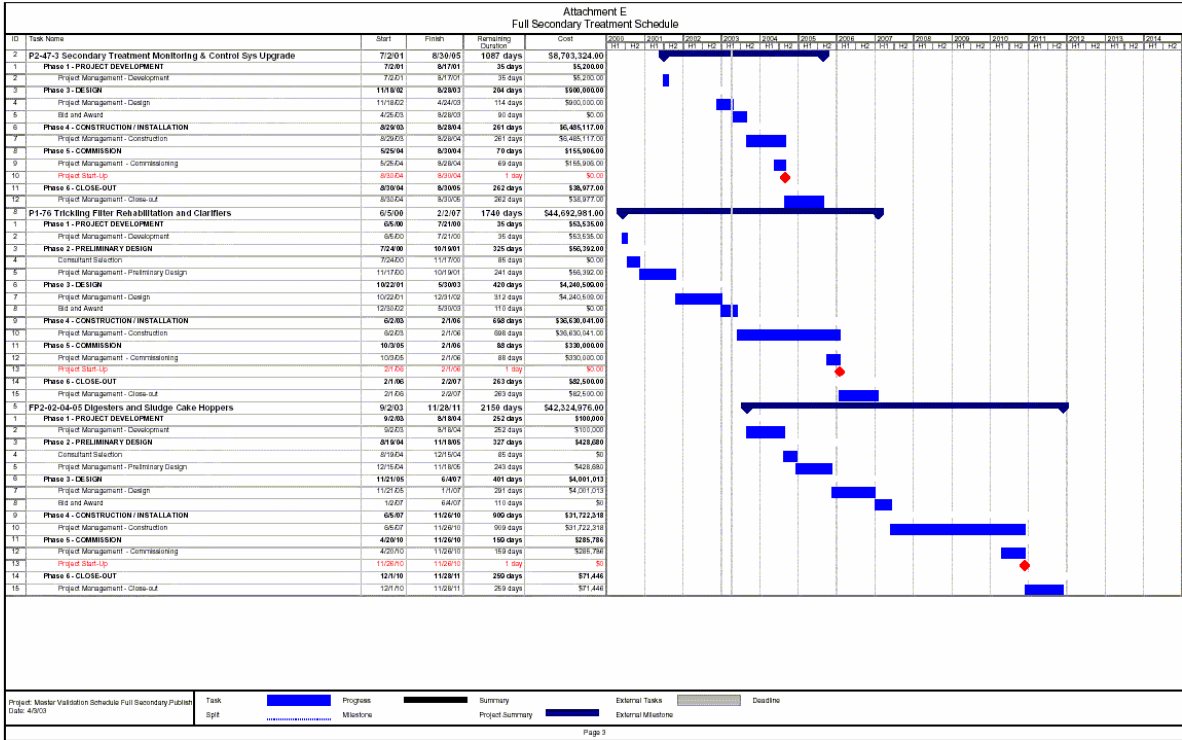


EXHIBIT 2 - FULL SECONDARY TREATMENT SCHEDULE

