



South Bayside System Authority

Providing wastewater services to residents and businesses in Redwood City, San Carlos, Belmont, and West Bay Sanitary District

SBSA BULLETIN

Fall 2011

SBSA Commission

Jeff Ira Chair
Redwood City Council Member
Ronald W. Shepherd Vice Chair
West Bay Sanitary District Member
Robert Grassilli Secretary
San Carlos Council Member
Warren Lieberman
Belmont Council Member
Board Member

SBSA Offices

1400 Radio Road
Redwood City, CA 94065
Phone: 650-591-7121
Fax: 650-591-7122
E-mail: dchild@sbsa.org

SBSA Staff

Daniel T. Child
Manager
Kenneth Kaufman
Technical Services Manager
Linda Bruemmer
Support Services Manager
Andrew Baker
Operations & Maintenance Manager
Teresa Herrera
Engineering Manager
Donna Allen
Environmental Health & Safety
Manager

Manager's Corner

By Daniel Child, SBSA Manager

Why Our Conveyance System Master Plan is Important for Our Customers



The SBSA conveyance system is a dynamic and complex system, pumping 24-hours a day, seven days a week, with flows ranging from low flow periods of five million gallons a day (MGD) in dry weather conditions, up to high wet weather flows of 71 MGD.

The SBSA conveyance system currently includes four pump stations, one for each of the four member agencies, a wet weather booster station located near the San Carlos Airport, a lift station located at the wastewater treatment plant, and a nine-mile long reinforced concrete force main with approximately 4,000 single "O"-ring bell and spigot joints. The pump stations are in varying states of condition, ranging from very poor to poor. In most instances, equipment is at the end of its useful life and the condition has degraded to the extent that the systems are not reliable. The 40-year old force main's condition is poor, due to joint leaks caused by moving bay mud soil conditions and occasional re-leakage of past repairs. Additionally, the frequency of leaks has increased significantly over the past three years.

These challenging operating characteristics, coupled with the need to reliably meet regulatory requirements, necessitated close study and careful analysis to ensure that the new facilities will take SBSA at least to the design horizon of estimated demands required for the year 2030.

To help SBSA efficiently undertake necessary improvements, the Commission authorized the firm of Winzler and Kelly to prepare a Conveyance System Master Plan (CSMP), which was presented and accepted by the Commission in August. With this acceptance, individual projects or groups of projects will be initiated and proceed through the design, environmental review, permitting, and construction steps. These will occur over the next seven years.

The CSMP identifies 11 projects necessary to provide SBSA a reliable conveyance system:

- Menlo Park Pump Station Rehabilitation
- Redwood City Pump Station Replacement (next to the current location)
- San Carlos Pump Station Replacement (next to the current location)

**SBSA Team Competes in
'Operations Challenge' --
Page 6**

**ENGINEERING FOR THE 48-INCH FORCE
MAIN RELIABILITY PROJECT IS UNDERWAY**

- Belmont Pump Station Replacement (in a new location)
- Force Main Alignment Study (except for the current 48-inch project)
- 33-inch Force Main (segment 1) Rehabilitation
- 48-inch Force Main (segment 2) Replacement (project currently underway)
- 54-inch Force Main (segment 3/5) Replacement
- 24-inch Force Main (segment 4) Replacement
- Flow Equalization Facility (FEF) Rehabilitation for Peak Wet Weather Flows
- New Plant Headworks for screenings and grit removal

The Master Plan recommends that the San Carlos Booster Station, which is currently used to boost the wet weather flows from the West Bay Sanitary District and the City of Redwood City be eliminated. While the Master Plan recommends decommissioning the Influent Lift Station at the plant, SBSA staff will continue to evaluate the potential long term value and feasibility of keeping the system operational.

The original SBSA CIP in 2008 identified 11 projects with an estimated cost of \$200 million. The original estimate did not include a rag and grit removal headworks system to be located at the plant. In order to protect the downstream equipment in the plant, a headworks facility has since been included in the 2011 CIP Update. The final Conveyance System Master Plan places the estimated total project cost, including all engineering, project management, environmental review, regulatory permitting and easement acquisitions at just over \$225 million.

Schedule and Sequence of Work

- Work on the 48-inch Force Main Reliability Improvement Project will continue and projects identified for the remainder of the conveyance system are sequenced to proceed as follows:
- 2011/12 – Complete programming of work and force main alignment study.
- 2012 – Preliminary Design starts for all the pump stations, segment 3/5 of the force main and the Flow Equalization Facility.
- 2013 – Final design starts for the Redwood City, San Carlos and Belmont pump stations, segment 3/5 of the force main and the Flow Equalization Facility. The preliminary design of the headworks project starts.
- 2014 – Final design starts for Menlo Park pump station and segment 1 and segment 4 of the force main projects. Construction is completed for the Redwood City, San Carlos and Belmont pump stations and the 48 inch [segment 2 of the force main].
- 2015 – Final Design of the headworks starts. Construction is completed for the Flow Equalization Facility.
- 2016 – Construction is completed for the Menlo Park pump station
- 2017 – Construction is completed for force main segments 1, 4, 3/5 and the headworks project.

At the same August meeting in which the Master Plan was accepted, the Commission retained David J. Powers and Associates to perform environmental review and permitting services for the 48-inch Force Main Reliability Improvement Project.

As noted above, engineering for the 48-inch Force Main Reliability Improvement Project is currently underway. SBSA decided to move forward on this particular project because of the instability of the pipeline and the resulting risk this section of the force main places on SBSA. Another reason was to coordinate the replacement of the portion of the project that runs under Bair Island with agencies performing restoration there. It was, therefore, put into design approximately one year ago to facilitate its completion. While all of the conveyance system projects will be extremely sensitive and complex from environmental review and permitting standpoints, the 48-inch section is probably the most complex.

The 48-inch Force Main Reliability Improvement Project is located within the cities of San Carlos and Redwood City. The new force main will operate like the existing force main, i.e., it will convey sewage from the Menlo Park Pump Station and the Redwood City Pump Station to the San Carlos Pump Station as part of the overall sewage conveyance system which runs from Menlo Park to the SBSA treatment plant in Redwood

Shores.

Engineers are finalizing an alignment plan for the 48-inch section and we will be providing significant information publicly in the near future.

Steps Underway to Provide Information for Rehabilitation of Fixed Film Reactors

An engineering firm has been authorized to perform services that will provide essential information required to determine appropriate repair and rehabilitation for SBSA's Fixed Film Reactors (FFR), which is part of the secondary biological treatment system.

There are four FFRs, each of which is comprised of a steel superstructure frame, lined with corrugated fiberglass siding within which are stacked blocks of plastic media. Directly downstream of the FFRs is the activated sludge biological process (aeration system). The FFR CIP budget was developed to rehabilitate the superstructure, the media, and the distribution systems of all four FFRs. The plastic media, corrugated siding and other components of this process are deteriorating and have far exceeded their life expectancy.

The firm of CDM was authorized by the SBSA Commission to perform engineering design, bid and construction period services, and structural inspection related to the demolition of FFR No. 4. Previously, CDM was retained to evaluate the secondary process and prepare a preliminary design for the FFR rehabilitation. The FFR "Basis of Design Report" has been underway for several months and was finalized in August. The next step would typically be the final design of the FFR rehabilitation followed by construction.

But the report has uncovered some unanswered questions. Much like the recent work on digester 3, CDM was unable to evaluate the condition of the existing superstructure that is hidden from view because it is inside the active process and covered with the fiberglass siding. This prevents a full assessment of the existing structural condition and limits the ability to determine appropriate repair and rehabilitation. Exposing the entire superstructure requires removal of the interior contents (distributor arm, media, siding, and waste material). This work would normally be done as part of the construction effort by the contractor, after the bid documents were completed and the contractor was on-site doing the demolition work.

Last year, FFR Number 4 had a major mechanical failure and it was determined not to repair it at the time as the CIP replacement project was being designed. Since FFR No. 4 is currently out of service, SBSA has the opportunity to investigate the internal condition of one of the four units and determine what is believed to be a "typical" condition of the structures.

This will allow engineers to have the outstanding issues identified and designs resolved prior to bidding and awarding the contract to rehabilitate the FFRs. By issuing a separate contract for demolition work on FFR No. 4 prior to the larger rehabilitation project, SBSA can explore the conditions of the hidden superstructure. With the contents of FFR No. 4 removed, CDM can conduct a physical inspection of the superstructure and resolve the unanswered questions. It is assumed that the results of the inspection will be representative of the other three FFRs.

Another significant unknown is how difficult it will be to remove the nearly 85,000 cubic feet of plastic media in each FFR as the current condition of the media can only be speculated. The ease of disposal of the media is also open to conjecture. The knowledge gained from the demolition of FFR No. 4 can be incorporated into the construction documents for the other FFRs. Reducing uncertainty in the construction documents can result in better bids and fewer change orders.

Once the contents of FFR No. 4 have been removed, the demolition contractor would provide access for CDM to complete visual inspection and ultrasonic testing to determine the structural upgrade required during the final construction project. The field information will be used to judge the extent of repairs and prepare construction specifications for the final design.

Major Step Underway Toward SBSA's Automation Program

With SBSA's new Plant Control and Administration building under construction, the Commission has authorized initiation of work necessary to implement a major component of SBSA's Automation Program – SCADA and IMS network integration. The new combined network is called the SIMS (SCADA and IMS network).

The firm of Black & Veatch is providing engineering services related to SCADA Integration with IMS Network. SCADA (Supervisory Control and Data Acquisition) is the on-line process monitoring and control system set up to monitor the plant and pump stations 24 hours per day. The SCADA system plays an integral role in process reliability and permit compliance. Although it was part of the original plant design, several significant system upgrades were required during the 1990's and 2000's as technology advanced and the process control requirements increased.

Currently, there is a significant effort underway to fully automate the wastewater treatment plant to improve reliability, reduce labor demands and increase energy efficiency. The Automation Program includes defined projects to automate the individual processes (such as the Activated Sludge process, CIP 8017) and to integrate the SCADA system with the Information Management System (IMS). Both types of projects are necessary components to achieve the goals of the Automation Program.

For the past 10 years, the SCADA and IMS functions were purposely kept as separate systems due to the different needs and reliability standards. Since technology has evolved, SBSA staff recognized opportunities for integrating business and SCADA functions that will maximize the usefulness of both systems. Integration will enable SBSA to expand the efficiency gains started with other IMS-related projects and to better distribute SCADA information to a wider range of user groups without jeopardizing performance of either distinct function. This integration has also been identified as a required task to enable accomplishment of SBSA's Automation Program goals.

Why a 'Heat Balance Study' is Important

CDM Engineering has been authorized by the SBSA Commission to prepare a Heat Balance Study. The result of the study will be a technical document that aligns SBSA's heat sources with its demands during different operating scenarios. It will include recommendations for how to rehabilitate and optimize the hot water system.

The work also will contain a spreadsheet model for future SBSA use to predict heat demands and to use as a tool to help with decision-making in how to operate the cogeneration engines and boilers.

A valuable by-product of the anaerobic digesters is digester gas or biogas. Biogas has an energy content that allows it to be used in various ways. The biogas produced in SBSA's digesters is beneficially used in two locations at the plant; in the boilers and in the cogeneration engine. Biogas use as fuel for the boilers is to produce heat and, in the cogeneration engine, to produce electricity and heat. The hot water produced by both the boilers and the cogeneration engine is conveyed to the digesters for sludge heating as well as to the laboratory building and maintenance building for space heating.

Several CIP projects currently underway or planned will affect the heat supply or the heat demand at the plant. For example, the project to install new cogeneration engines will increase the supply of heat available, and the improvements to the digesters and the construction of the Plant Control Building will increase the heat demands.

The cogeneration project, in particular, will increase SBSA's flexibility in providing hot water to the digesters and buildings. There is a need for a tool to match the new heat sources with the new demands to assure SBSA has enough heat during different operating scenarios. Additionally, a hydraulic analysis

of the hot water loop piping is needed to assure that each location that requires hot water receives enough volume of water.

CDM is currently providing planning services for the cogeneration engine replacement project. This project is the main driver for the need for a heat balance study since the availability of heat will expand greatly with the engines. Additionally, it is timely to analyze heat balance needs because the Plant Control Building and Digester #3 rehabilitation work are near completion.

SBSA staff has worked with CDM to develop a scope of work to perform a heat balance study given the current and planned new facilities. CDM will perform a detailed analysis of SBSA's hot water system, including the supply and demands, the pipe sizing and routing, and the sizing needs of heat exchangers.

The Significance of Replacing DMF Valve and High Pressure Air Piping

Among the significant plant function improvements required at SBSA is the replacement of DMF valve and high pressure air piping. The SBSA Commission has authorized the firm of Freyer & Laureta (F&L) to perform the necessary engineering services.

SBSA's Dual Media Filters require a number of large automated valves to operate the filtration system in standard mode, backwash mode, or pump-down mode. Many of these valves are 30 years old, past their useful life and needing to be replaced. The piping and valves in the DMF Gallery are extremely congested and are so high in the air that scaffolding is required for access. Due to the difficulty of access and need for scaffolding, the work is beyond the capability of in-house maintenance staff and the installation of the new valves will need to be performed by a contractor, with design assistance from a consulting engineer. There are 30 valves in total that need to be installed ranging in size from 18-inch to 24-inch.

Most of the new valves are pneumatically operated and receive air from the SBSA plant's high pressure air system. Two years ago, the plant air compressors were replaced because the system had high maintenance needs and the capacity was too small to meet all plant needs. At the time, it was tacit that the high-pressure air piping also needed replacing due to numerous leaks in the piping. It was intended that the pipe replacement would be done in conjunction with another suitable project. Due to the importance of the high-pressure air system to the DMF valves, these two CIP projects will be combined into a single design and construction effort.

F&L has provided design documents for the Recycled Water In-Plant Use project recently awarded for construction by the Commission. During the course of that design work, F&L became very familiar with SBSA's gallery and the highly congested condition of the pipe runs in the gallery. Because a piping corridor will need to be identified for the air piping and because of their familiarity with the gallery, F&L are well suited for this project. Staff and F&L have developed a scope of work and budget to perform design services for the DMF Valve and High Pressure Air System Replacement Project. The not-to-exceed fee for the work is \$79,500. The CIP budget for the two projects combined is \$681,000.

New CIP Project -- Primary Sludge Piping Replacement

Replacement of SBSA's primary sludge piping has been approved as the 90th of 139 projects in SBSA's 10-year Capital Improvement Program (CIP). This project replaces the primary sludge piping that has been eroded and worn through due to the abrasive nature of the solids in the wastewater. The pipe has been repaired with patches in many locations. The replacement will be done in conjunction with another ongoing project, the Bilge Pit Piping Manifold project. All work and contracts associated with these projects will be brought to the Commission for approval prior to award of work.

SBSA Team Competes in ‘Operations Challenge’ at WEFTEC

A four-member SBSA team placed 24th out of 40 in its first venture ever into the annual “Operations Challenge” sponsored by and at the Water Environment Federation’s annual Technical Exhibition and Conference (WEFTEC) in Los Angeles.

SBSA participants were **Mike Serrano** – Operations; **Jim Kemp** (team captain) and **Mickey Daly** – Maintenance; and, **Enrique Salvatierra** – Lab. **Don Cottier** served as team coach and **Norm Domingo** was an alternate who had trained with the SBSA team, which called itself “South Bayside Sewer Avengers.”

“This was our first national competition and we only had a couple of months to prepare,” Cottier said. “Some of these teams have been competing for over five years and train year round. It was a great experience.”

SBSA has in the past participated in a Santa Clara Valley Section California Water Environment Association (CWEA) team called “24 hour composites.”

At WEFTEC, wastewater collection and treatment personnel display their skills in a series of incidents, including:

- How do operators and technicians overcome flooding, a sewer collapse, process failure, and other emergencies?
- Do you ever wonder what transpires behind the scenes during the operation of a wastewater treatment facility?

Each team was sponsored by a WEF Member Association or recognized Operator Association. Winners were determined by a weighted point system for five events (collection systems, laboratory, process control, maintenance and safety), each designed to test the diverse skills required for the operation and maintenance of wastewater treatment facilities, their collection systems, and laboratories.



Front Row left to right: Enrique Salvatierra, Norman Domingo, Don Cottier

Back left to right: Mike Serrano, Jim Kemp, Mickey Daley

New Employees

- **Brian Bruemmer** – Maintenance Helper – 6/26/11
- **Susan Hiestand** – Pollution Prevention Specialist – 9/19/11
- **Jesse Long** – Utility Worker – 10/3/11
- **Kenneth Mak** – Lab Assistant – 8/15/11

You can see a nearly four minute video of SBSA's team in action at WEFTEC by using this link to youtube:
http://www.youtube.com/watch?v=P3Y34a_wFAg

Find SBSA on Facebook, Twitter, and Web

- Facebook: in search, put in South Bayside System Authority, and click “like.”
- Twitter: in search box put in SBSAnews, click, and follow us.
- Find us on the web at www.sbsa.org