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 2012

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Manager's Corner

By Daniel Child, SBSA Manager

Pipeline Improvement Project: How We Are Coordinating with USFWS

This column and our public outreach for the last several months have focused on the pending construction of the 48-inch Force Main Reliability Improvement Project, which is located within the cities of San Carlos and Redwood City.

When approved by the SBSA Commission in November, it is hoped that construction can begin in the second quarter of 2013. The existing 2.5 mile, 48-inch force main was constructed in 1971; its replacement with the new pipe is part of SBSA's approximately $400 million, 10-year Capital Improvement Program (CIP) to replace and upgrade aging infrastructure.

Our staff and consultants have been working diligently to coordinate our project with the U.S. Fish & Wildlife Service (USFWS). Key points:

• The USFWS owns and manages the Don Edwards San Francisco Bay National Wildlife Refuge, of which Bair Island is a part. Bair Island is a collection of three islands (Outer, Middle, and Inner) that are currently undergoing habitat restoration work in accordance with the Bair Island Restoration and Management Plan (BIRP) that was approved in 2007. (www.fws.gov/desfbay/Bair_Intro.htm)

The SBSA force main construction schedule will be closely coordinated with the ongoing restoration work at the Refuge, including the eventual opening of Inner Bair Island to public access.

• A portion of the existing SBSA 48-inch force main is already located within the existing levee on Inner Bair Island. It was installed in this location in 1969-1971. Replacement of this part of the force main was included in the BIRP, including construction of a new protective levee for the force main by the USFWS.

• Through an extensive alignment study, and close coordination

Manager's Corner

(Continued from previous page)

between SBSA and the USFWS, the construction of this new levee will be performed as part of the restoration plan work. The new levee will run the length of the entire west side of the island. The force main will then go under the drainage channel. The new force main is proposed to be included in the construction of the new levee.

• This alignment will allow the Inner Bair Island portion of the force main to be constructed as one unit, which will decrease the cost of the force main and minimize disruption and inconvenience to the use of public and private property in the vicinity of the pipeline.

• SBSA and the USFWS will enter into a Memorandum of Understanding (MOU) for the portion of the force main project that will be located on federally-owned land. The MOU will outline the roles and responsibilities of the two agencies for both construction work and long-term access and maintenance activities.

• The SBSA force main construction schedule will be closely coordinated with the ongoing restoration work at the Refuge, including the eventual opening of Inner Bair Island to public access.

• You can see a graphics for the USFW for USFWS Inner Bair Island Trail and SBSA 48-inch Force Main Phased Access Plan at our website **www.sbsa.org/48-inch-pipeline/**

Producing Biodegradable Plastics from Methane Gas

SBSA is working with a new start-up company in its efforts to produce biodegradable plastics from SBSA's methane gas.

Palo Alto-based Mango Materials has developed a process that can use methane gas from wastewater treatment plants or landfills to produce pellets of polyhydroxyalkanoate (PHA), a valuable polymer that is converted into a variety of high margin or high volume, eco-friendly plastic products.

Molly Morse

Mango Materials founder and CEO Molly Morse, who helped invent the process while earning her PhD at Stanford, explained that the closed loop process converts methane generated by SBSA's anaerobic digestion to a biopolymer (PHA) through a microbial process. In a published interview, Morse said that the PHA is "the polypropylene of bioplastics," describing it as "bacterial fat" where excess carbon is present and/or when key nutrients are limited (thus prompting the microbes to store energy). The biopolymer can be sold as pellets for production of plastic goods such as cell phones, computers, toys and food packaging and can be reprocessed to produce more biogas and continue the cycle.

SBSA Laboratory Director Bob Wandro said that SBSA is providing an 8'x10' shipping container to Mango staff for them to conduct some of their experiments and located the mobile room next to SBSA's anaerobic digester, where the methane is produced. "This gives them easy and direct access to the methane gas without having to construct a costly pipeline from the digesters to the laboratory," Wandro explained.

Mango staff initially collected gas samples in special plastic bags for experiments at their offsite laboratory. In May of 2012 they began their experiments onsite at SBSA where they are also given access to the SBSA laboratory for some of their testing.

SBSA Technical Services Manager Ken Kaufman said that for now SBSA is simply facilitating research into new uses for digester gas. "We have written several letters of recommendation for Mango Materials to help them acquire funding through grants," Kaufman said. "I expect that SBSA will receive some recognition for its assistance with this work."

Kaufman added, "If this turns into a viable process, the scaled-up reactor may use part or all of SBSA's digester gas without generating significant air emissions and produce a biodegradable feedstock for plastics manufacturing. Currently SBSA's digester gas is converted to electricity using a generator or burned in a flare. In these cases there are air emissions such as carbon dioxide, carbon

monoxide, oxides of nitrogen, etc."

Methane is a greenhouse gas that is 25 times more potent than carbon dioxide, according to Kaufman. It is also produced in landfills and often the gas is not collected and used to generate electricity the way it is in wastewater plants.

Any incentive to prevent the release of methane from landfills would be helpful; landfills are one of the potential sites for the full-scale process that Mango Materials expects to develop.

Mango Materials is only producing research quantities at this time, at a cost of about $2.75 a pound. The company is interested in partnering with biogas producers. The initial Mango research was partially funded through a National Science Foundation grant.

Mango has been chosen as a finalist for the Postcode Lottery Green Challenge Business Plan Competition 2012, which has been initiated by Nationale Postcode Loterij N.V. ("the Dutch Postcode Lottery") to encourage the development of new, innovative, creative and yet commercially viable products and/or services that contribute to an eco-friendly lifestyle.

Mango Materials is currently only producing research grade materials and hopes to have trial samples within the next year. For more information: www.mangomaterials.com and www.greenchallenge.info

Grease Receiving Station Improvements

SBSA's updated Grease Receiving Station (GRS) is a vast improvement over the previous station. One final piece of work will be to bring the station onto the Plant SCADA system; currently it is automated at a local control panel. The SCADA Plant tie-in will be done in conjunction with the Digestion System Automation project.

Key points in the $1.1 million improvements:

- Converted the existing equipment pit to a wet pit, including a concrete cover and slide gate and constructed associated new receiving area; this provides for two redundant receiving pits.
- The prior station was part of the original treatment plant construction in 1979 and was intended to handle septic waste from customers within SBSA's service area. The station was later converted to receive offsite grease deliveries and modified to inject the grease into the digesters to increase the digester gas production for energy recovery.
- Installed new chopper pumps, transfer pumps, and control system.
- Installed new odor control system, including odor collection piping.
- Installed new automated grease hauler receiving and billing station.
- Revised drainage plan at the truck parking area and traffic rated drain grates and frames.

In addition to increased gas and energy production, the Grease Receiving Station generates revenue to SBSA in the form of tipping fees

Large amounts of oil and grease in wastewater can cause sewer lines to clog, sewer lift station failures, wastewater treatment plant problems, and environmental concerns. SBSA's program attracts restaurants and other businesses to dispose of their grease at the GRS. In addition to increased gas and energy production, the station generates revenue to SBSA in the form of tipping fees.

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- **Twitter**: in search box put in SBSAnews, click, and follow us.
- Find us on the **web** at **www.sbsa.org**

Automating SBSA's Operations Update

SBSA plans to complete the SIMS network installation in November 2012 when the Plant Control/Administration Building is finished and ready to be occupied. The installation/implementation services are being divided between Black & Veatch, ExtraTeam Inc., and SBSA staff. Most of the equipment for the project will be provided by ExtraTeam, Inc.

SIMS is the acronym for the integration of SBSA's Information Management System (IMS) with SCADA (Supervisory Control and Data Acquisition). SCADA is the use of a category of software application programs, for process control and data gathering in real time from remote locations, in order to control equipment and conditions. SCADA is used in power plants as well as in oil and gas refining, telecommunications, transportation, and water and wastewater treatment.

SCADA systems include hardware and software components. The hardware gathers and feeds data into a computer that has SCADA software installed. The computer then processes this data and presents it in a timely manner. SCADA also records and logs all events into a file stored on a hard disk or sends them to a printer. SCADA warns when conditions become hazardous by sounding alarms.

ExtraTeam, Inc., a leading technology consulting firm and systems integrator based in Pleasanton, CA, is procuring equipment from several vendors and conducting equipment installation/configuration/startup. The design and implementation of the SIMS integration is a complex and highly technical project. The design has taken many months of collaboration between ExtraTeam, Black & Veatch and SBSA.

In addition to providing the equipment and supplies, ExtraTeam is providing services to install and configure the core switches, the firewall and VPN appliance, RSA security appliances, the unified computing system infrastructure and associated virtualization, network storage, network management software and as-built documentation.

The recently completed design has significantly changed from the originally envisioned layout, hardware, capabilities, and approach. This is largely due to a more holistic approach, which resulted in a design based on the convergence of the IMS and SCADA Networks as opposed to just an upgrade to the SCADA Network which included a limited tie to the IMS network.

As a result, SBSA requested that Black & Veatch re-evaluate the level of effort for programming and installation related services based upon the final design. Their services include confirmation of SIMS Network interconnection design and configuration of software and hardware, including startup and training.

The new design includes many benefits for SBSA, including:

– Remote access necessary for unmanned facility operations which will allow plant operator response, identification and in many cases correction of operational issues which may occur.

– Remote access and management of the standby power systems allowing flexibility in managing critical plant loads and even fuel use management during an extended outage.

– Remote security access improvements preventing malicious or accidental intrusion into the SBSA SCADA and IMS systems thus preventing issues ranging from loss of data to NPDES non-compliance.

– Significant and needed improvements in the SCADA operating system and data collection backups thus protecting the large investment SBSA has made and continues to make in replacement and upgraded systems.

– Provides for uninterrupted plant operation in the event of a failure of a server, switch, or other plant-wide network component. Will provide alarm notification on these types of failures to notify IT/Operations of a failure on a redundant component.

– This platform will allow a significant future reduction in required server counts and associated energy costs through server virtualization.

Capital Improvement Program Update

The SBSA Commission recently authorized staff to initiate or proceed with 21 projects in the $400 million, 10-year Capital Improvement Program (CIP). The CIP identifies 144 projects; the Commission has now authorized 122 of them. Key projects among the 21:

- Automation System Integration $1,030,805.
- Thickener Overflow Line Butterfly Valve Replacement $28,300.
- Landscape Impoundment Improvements $269,100.
- Evaluation of Plant Under-slab Piping $371,800.
- Seismic Upgrade of Digester Mix Room and Boiler Room Piping $334,500.
- Levee Repair Behind Warehouse $375,000.
- Screenings for Fixed Film Reactor Influent $858,000.
- Drying Beds Northern Expansion $1,656,000.
- Wet Side Power $1,716,000.
- Hot Water Piping Improvements - Phase I $171,600.
- 1406 Radio Road Property Improvements $1,135,000.
- Maintenance Building Roof Replacement $250,000
- SHB Demolition and Improvements - Phase II $2,153,580.

Projects are being implemented now because there is the opportunity to combine some of these projects with other, ongoing projects. By combining projects, SBSA receives the benefits of efficiency in designing and constructing similarly-focused projects or projects in the same locations as each other.

By approving initiation of these projects, the Commission is not authorizing significant expenditures; authorization for significant expenditures on any project requires separate Commission approval.

Employee Corner

New employees:

- **Matthew T. Webster**, Plant Mechanic II – instrumentation: Matthew comes to SBSA from the City of San Jose, where he worked an electrician. He previously worked in the private sector as an electrician and instrumentation and controls supervisor.
- **Daniel R. Mills**, Administrative Assistant: Daniel comes to SBSA from the real estate industry, and before that was employed with Nippon Airlines at SFO.
- **Matthias J. Nickle** and **Burnell Lawrence**, Utility Workers: Matthias and Burnell are both new to the industry; both are pursuing a career in wastewater through the Regional Occupation Programs (ROP), which offers classes in wastewater leading to an Operator-in-Training certification.
- **Stuart Zanni,** Water Quality Specialist – Industrial Waster Inspector. Stuart retired from the City of Redding in 2009 from his most recent position of Industrial Waste Analyst and is coming out of retirement to work for SBSA. Stuart has worked in the industry since 1986.
- **Ramin Harooni and Randy Hart,** PT Laboratory Assistants. Ramin was previously an EMT and Randall a graduate researcher at California State University in Fresno.

Certification:

- **James Kemp**, CWEA grade III Mechanical Technologist
- **Quinten Green**, Operator Grade III
- **Raymond Wong**, Operator Grade III
- **Francis Rooney**, CWEA Grade I Lab Analyst

Work Proceeding on Emergency Force Main Leak on SBSA Property

The SBSA Commission and staff have approved emergency steps to repair a leak from the force main located on the SBSA plant property.

On Monday July 2, 2012 SBSA staff confirmed a leak in the 60" force main on the SBSA plant property as the force main enters the influent pump station vault. This section of the force main is a 60 inch diameter, reinforced concrete pipe in 12-foot long sections. The leaking section has a significant break in the pipe as the last section of pipe enters the valve vault.

The section of pipe with the break is the first section of reinforced concrete pipe exterior to the plant and begins the bell and spigot connections to the force main. Due to the challenging bedding of the pipe, and its location in disturbed bay mud, the pipe is susceptible to movement that causes displacement of the joints and subsequent leaks from the pipe.

Due to its location in disturbed bay mud, the pipe is susceptible to movement that causes displacement of the joints and subsequent leaks from the pipe

SBSA is investigating possible corrosion causes of the current break and leak besides movement. This section of pipe is the most susceptible to damage due to movement as the influent vault end of the pipe is connected to the building and pile supported and the other end of the pipe migrates in bay mud.

The force main leak is located less than a foot from the influent vault directly at the southern exterior of the influent vault wall. This leak was discovered early and very little wastewater had come to the surface and none of the water entered waters of the state. Once a leak is discovered, the influent lift pumps at the treatment plant are started and a small vacuum is created in the force main to stop any further leaking until the repair can be made.

Over the years, SBSA has refined the leak repair process and today utilizes a mechanical restraint on the joints when a repair is made. By reinserting the "O" ring and then placing the mechanical restraint spanning both sides of the joint, the leaks have been successfully sealed and no "repeat" leaks have occurred when this technology has been used.

However, the leak at this location needs to be addressed by a different means as it is so close to the vault wall. The location of the force main in this area will cause extra work to be performed. In addition, it is required to cut and subsequently repair the pavement of the parking and roadway in the area of the leak.

All of the extra work adds to the cost of repairs in this area. SBSA has retained the services of Power Engineering as the contractor to repair force main leaks. They have significant experience with leak repair, proper shoring requirements, and experienced manpower available with short notice able to complete the work in the short time required to repair the force main.

SBSA has also retained the limited services of Freyer and Laureta to survey the extent of the pipe settlement and also Kennedy Jenks to investigate the structural concerns of the pipe break and differential settlement of the force main.

The leak was discovered early and very little wastewater had come to the surface and none of the water entered waters of the state

The estimated cost of the repairs by all firms for this leak is not known at this time but is not expected to exceed $500,000. The initial work was authorized under the emergency authority of the SBSA Manager; however, the Manager is limited to the initial $300,000 required under emergency conditions. As a result, on Sept. 13 the SBSA Commission ratified the emergency declaration and authorized all cost associated with the work.

48-Inch Force Main Improvement Contractor to Face 10% Retention of Contract Amount; Microtunneling and "Open Cut" Options Described

The 48-inch Force Main Reliability Improvement Project (described in the Manager's Corner on Page 1) will consist of two main types of installation: traditional open cut and microtunneling. Microtunneling is being used where possible, even though it is much more expensive than "open cut," because this method avoids the need to have long stretches of open trench for laying pipe. This method is typically used for crossing sensitive areas such as water features to minimize ground and surface water disturbances.

The SBSA Commission recently approved a staff recommendation to retain 10 percent of the contract amount, finding that the project fits both technical and legal definitions as "substantially complex."

Due to the special and complex nature of the work required for the 48-inch project and the associated requirements that the microtunneling contractor and open-cut shored contractor must meet to be prequalified to bid and, subsequently, to successfully complete the project, it was determined to designate it as "substantially complex."

A brief summary of each installation method is provided below:

Microtunneling

- Microtunneling construction explanation: Microtunneling is a method of underground construction that does not disturb the surface between the two points of "launching" and "receiving."
- A launching shaft is built at one end and a receiving shaft is built at the other end of each microtunneling drive. During construction, a hydraulically-driven, laser- guided drill head cuts through the earthen material at depths of 30 to 50 feet below the surface. A hydraulic jacking system pushes sections of steel pipe with the drill head mounted on the front of the pipe.
- Slurry is used to remove the soil being agitated by the drill head. The slurry is pumped back to a separation plant that removes the soil from the slurry and this soil is hauled to off-site disposal. The resulting fluid is then reused, sent back to the drill head for more soil removal. This process continues until the drill head reaches its destination at the receiving shaft. At that point a crane removes the drill head.
- After the steel pipe is installed, the large-diameter High Density Poly Ethylene (HDPE) pipe is inserted into the steel casing pipe.
- Guiding the drill head during the tunneling process involves an operator remotely guiding the drill head while in a control room located at the top of the launching shaft. After the launching and receiving shafts are built, just prior to starting the tunnel operation, the area immediately around the receiving shaft is relatively inactive until the drill head shows up for removal.
- However, the area around the launching shaft is very different. This area includes the control room, a separation plant with trucks coming and going, a crane regularly lifting steel pipe into the shaft to continue to advance the drill head, along with other construction equipment and construction trailers. The area around the launching shaft has been described as a small city because several large pieces of equipment are required to support the microtunneling process. This includes high truck traffic, an overhead crane, and slurry cleaning process plant.
- The good news is once construction is complete and the landscape is restored, because this is an underground utility, there will be no signs of prior construction.

Open Cut

- Open cut construction generally consists of the following stages:
- Install trench shoring system (if required)
- Excavate trench
- Install pipe bedding
- Fuse HDPE pipe joints (either at grade or in trench)
- Pull fused HDPE pipe into the trench
- Test newly installed pipe
- Backfill and compact
- Restore surface conditions