Workshops on Wheels Project - A New Model for Shared Learning

June 30, 2014

baywork
I. BACKGROUND

One of BAYWORK’s strategic objectives is to help water/wastewater agencies make sure that staff has the information needed to do quality work. Success in the water/wastewater industry requires more than being qualified at the time of hire. Because infrastructure, technology, equipment, regulations, and customer expectations are always changing, ongoing training is needed in order for staff to be fully prepared.

BAYWORK’s primary role in this area has been to help improve the capacity of Bay Area water/wastewater agencies to provide adequate documentation, staff development, technical training, and knowledge management systems through use of new tools, approaches, and processes. This is done through a combination of research, workshops, reports, and online functions that support collaborative learning. The BAYWORK website at www.baywork.org is used as a repository for all of this information (including PowerPoints, competed surveys, and videos), so the information can be available on a continuous basis to staff of all water and wastewater utilities.

Examples of BAYWORK activities in this area with links to the website are below:


- A workshop on Using Technology to Teach (e.g., through use of webinars, videoconferencing, and online training tools); ([http://baywork.org/wp-content/uploads/2013/01/UTT-6-EBMUD-Use-of-Webinars.pdf](http://baywork.org/wp-content/uploads/2013/01/UTT-6-EBMUD-Use-of-Webinars.pdf))

- Pilot testing of video-conferencing to provide technical training simultaneously at several different sites; ([http://baywork.org/wp-content/uploads/2013/01/UTT-8-BAYWORK-Videoconferencing-Project.pdf](http://baywork.org/wp-content/uploads/2013/01/UTT-8-BAYWORK-Videoconferencing-Project.pdf)) and,

- Creation of a Training Bulletin Board to allow agencies to post training opportunities that they are willing to share with other water/wastewater agencies. ([http://baywork.org/training-bulletin-board/](http://baywork.org/training-bulletin-board/))
During FY 2013-2014, BAYWORK signatories decided to test a new approach to technical training: Workshops on Wheels that would both convey technical information and encourage development of a learning community among Bay Area water, wastewater, and storm water professionals. The focus was on identifying, documenting, and providing on-site training on best practices and innovations in all aspects of water, wastewater, and storm water treatment.

II. WORKSHOPS ON WHEELS PROJECT

The Workshops on Wheels project consisted of the following processes:

a. Research was conducted on innovations from various agencies, using the project survey form (see Attachment A);

b. Findings (completed surveys and handouts) were included in binders provided to each Workshops on Wheels attendee;

c. Tours were conducted at multiple sites in one day, with operators, engineers, and managers presenting information on innovations (see workshop agendas, Attachments B-D);

d. Participants were invited to provide feedback on each workshop (see Attachment E);

e. Participants received contact information on speakers so that they would be able to request additional information later on topics of particular interest to the attendees;

f. Workshop materials, as well as videos from each of the workshops, were posted to the BAYWORK website at www.baywork.org, and are available on the Resources page of the website.

g. This report, containing both a summary of Lessons Learned from the Workshops on Wheels Project, and detailed information on the innovations reported by each participating agency, will also be posted to the BAYWORK website for the benefit of the water/wastewater industry at large.

Workshops on Wheels tours involved renting a tour bus (with a driver) and providing box lunches, snacks, and beverages. Between five to seven facilities were visited per workshop, with individual plant tours lasting an average of 30 minutes.
Networking was encouraged, as the intent of the project was not only to provide a one-time learning opportunity, but also to set the stage for future information-sharing. Only one bus was used per tour (with maximum seating of 56), to ensure that there was adequate space for participants at each site visited.

The three Workshops on Wheels tours held in FY 2013-2014 were attended by 138 employees from 34 Bay Area water/wastewater utilities. Seven agencies made presentations for the North Bay Workshop on Wheels, where five sites were visited. At the East Bay Workshop on Wheels, staff from eight agencies made presentations and seven sites were visited. For the South Bay Workshop on Wheels, staff from five agencies made presentations and seven sites were visited.

III. LESSONS LEARNED

1. The ability to see, hear, and touch - People like it. Not only water and wastewater treatment operators but also managers and engineers reported a benefit from in-person visits to utility locations, versus hearing about innovations in a traditional classroom or conference setting. Many said that they appreciated being able to visit multiple sites and multiple agencies in one day, something they said that they would not be able to arrange on their own. They appreciated a chance to see and hear about processes and infrastructure that they wouldn’t normally see or be aware of.

At the North Bay Workshop on Wheels tour one participant said, “By speaking with other agencies and learning what worked and what didn’t work for them, we can learn from their experiences and possibly use that information.”

During the East Bay Workshop on Wheels tour, another participant said, “I liked the concept. I’m always fascinated by different facilities and what they are doing. As technology goes, it is constantly in flux.”

2. Need to balance desire for variety with desire for more in-depth information. It is never possible to satisfy all the people all the time, and the Workshops on Wheels tours are no exception. While most appreciated seeing so many innovations in one day, a few expressed an interest in spending more time at fewer locations. As the handouts and the tour process were refined in response to attendee feed-back, the workshop binder was expanded to include contact information on all speakers who had expressed a willingness to provide more information in the future. Although the fast-paced, menu-tasting approach
“left them wanting more,” participants were encouraged to follow-up with speakers where they had an interest in continued learning.

3. **The work of the workshop planning committee is the key to success.** There were four planning meetings per workshop over two to three months to create each day’s agenda. The committee planned, in detail, stops at facilities, lunches, snacks, beverages, and breaks. The planning committee for each workshop included speakers who would be making presentations. Speakers’ involvement in planning was critical in terms of determining topics, defining the length and nature of each presentation, and planning logistics. The agenda provided to participants was supplemented by a very detailed itinerary used by planning committee members; the detailed itinerary included when participants would be arriving and getting back onto the bus at each site, taking into account both the time required to walk to the facility or the bus, and possible traffic problems. Some planning committee members participated in more than one workshop; their acquired knowledge was extremely valuable.

4. **Find a good site for lunch.** Box lunches and drinks were provided free of charge for all workshops. For the North Bay and South Bay tours lunch was at local parks, while in the East Bay, lunch was at Sunol Temple, an outdoor facility of the San Francisco Public Utilities Commission. This provided a time-out in a hectic day, and an opportunity to get to know colleagues. There had been discussion by the East Bay planning committee to have lunch on the bus during the East Bay tour, but we found we had the time to stop and get off the bus, which was appreciated by all.

**Request and learn from feed-back.** After each workshop a Lessons Learned meeting was held where planning committee members could discuss what worked and what could be improved upon for future events. Some of the planning committee members from the North Bay tour observed that at a few locations excessive noise made it difficult to hear the speakers, so we had a cordless microphone available for each speaker for the East Bay and South Bay Workshop on Wheels.

Another suggestion after the North Bay tour was to include a feed-back form in the binder for participants – something that we incorporated into the East Bay and South Bay tours (see Attachment E). The feed-back form asked participants to rate the Workshops on Wheels approach in three categories - “I liked it a lot,” “It was OK,” or “I didn’t like it,” with room to expand on their selection if they wished. For the East Bay tour, 19 said they liked it a lot, one said it was OK. Of those responding to the South Bay tour, 31 said they liked it a lot, two said it
was OK, while for both tours no one said that they did not like it. In addition, the feed-back forms had space for comments about what they liked. Comments included “good food and snacks,” “well-organized,” “a great way to see and learn how different agencies are utilizing best practices,” and “very instructional.”

East Bay and South Bay participants were also asked to let us know if the handouts in the binders and the presentations were “Very Useful,” “OK,” or “Not Useful,” as well as space for comments on how we might improve the Workshops on Wheels experience. For the East Bay tour 18 found the handouts very useful and two said they were OK, while at the South Bay tour 25 said the handouts were very useful and 6 said they were OK. For the presentations, 18 of those responding at the East Bay tour found them very useful and two found them OK. In the South Bay tour, 31 found the presentations very useful and one said they were OK. No one participating in the North Bay tour thought that the handouts or presentations were not useful, while one at the South Bay tour did not like either the handouts or presentations. Suggestions for improvements included “less PowerPoints,” “would like to see maintenance hardware for data gathering,” and “would like to see more use of innovative technology for pipeline engineering.”

We took their feedback very seriously and wherever possible, useful suggestions were incorporated into planning for the next workshop. For example, at the South Bay Workshop on Wheels we asked all participants to introduce themselves to the group at the start of the day— a recommendation from the East Bay Workshop on Wheels feedback form. Additionally, we provided coffee and healthy snacks at registration, and water and snacks during the South Bay tour— another suggestion from the previous tour.

5. **Online Registration.** Using an online registration tool (Eventbrite) helped streamline and manage enrollment.

   - We could send an email reminder message through Eventbrite to those who signed up for the tour near the event date to remind them about the upcoming event.

   - Eventbrite also allowed us to email additional information, such as a request to bring hardhats and vests for the East Bay Workshop on Wheels for a site where construction was in progress.
6. **Speakers need to be on the tour from start to finish.** With everyone’s busy schedule it can be a real challenge to take a full day away from work to attend the workshop, but it is vital for the success of the tours to have all speakers on hand for the entire day. The speaker can assist the bus driver with directions, if needed, and also instruct the driver on special parking and where to pick up the attendees after each site visit. Another invaluable benefit is that the attendees can follow up with the speakers during the course of the day with additional questions or further information on the innovation at their site.

7. **Documentation.** Each participant was given a binder that had the day’s agenda along with a project survey for each agency and handouts about the innovation, such as articles, PowerPoints, speaker contact information, and a feedback form. All the project surveys and handouts were posted to the www.baywork.org website after the event, along with a video of the day. Surveys and handouts from all the tours are attached in Appendix I.

8. **Keep finding new ways to learn from each other.** The number and type of innovations that were discovered and documented as part of the Workshops on Wheels project was both unexpected and exciting. New ways to reuse water, new ways to turn waste into energy, new approaches to water and wastewater treatment, new approaches to asset management and use of computerized information systems, and other innovations were stimulating and thought-provoking for all participants. As a result, BAYWORK’s plans for FY2014-2015 include two more Workshops on Wheels.

The Workshops on Wheels project is only one component of a larger strategy, which is to continually find new ways to support and learn from each other. None of us can be successful in the water/wastewater industry by simply continuing to do what we learned early in our careers. Changing regulations, technology, and customer expectations require continuous upgrades to our knowledge. The Workshops on Wheels project is one new way for us to collaborate in learning and keep pace with our industry’s demands.
Attachment A:
Project Survey Template
BAYWORK WORKSHOP ON WHEELS (WOW) PROJECT

Survey of Bay Area Water/Wastewater/Water Recycling Innovations

PURPOSE: Please use this survey form to:

1. provide information on an innovation your organization has implemented or is planning in the area of water/wastewater distribution, collections, treatment, or recycling,

2. let us know if you are willing to share information on your innovation through an on-site tour, a presentation to staff of another utility, or a more extended on-site visit, and

3. tell us which Bay Area water/wastewater utilities you would be interested in visiting to learn more about their innovations.

Ideas for areas in which you may have innovations to report:

I. SURVEY RESPONDENT

   Name: __________________________________________________________

   Title: __________________________________________________________

   Agency: _________________________________________________________

   Address: ________________________________________________________

   ________________________________________________________________

   Phone: _________________________________________________________

   Email address: _________________________________________________

   Number of employees: __________________________________________

   Number of Customers served: ____________________________________

FACILITY CHARACTERISTICS:
Name of treatment facility or system: _________________________________

Type of treatment facility: _________________________________

(Water Distribution, Water Treatment, Wastewater Collections, Wastewater Treatment, Recycling)

Other (please describe): _________________________________

II. INNOVATION

1. Please describe the innovation that your facility is most proud of, or that you think may interest staff of other water/wastewater utilities most. This can include an innovation that is planned but not yet been implemented.

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

2. Please select all categories which apply to this innovation:

___ Increased use of Information Technology
___ New treatment process
___ Modification of workflow processes or classifications
___ Inter-agency agreements or other administrative changes
___ New approach to documentation, technical training, staff development, or knowledge management
___ Optimization of existing resources
___ Other (please describe): __________________________________________________________

3. What factors motivated the utility to implement this change?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

4. What barriers/challenges did the utility encounter in planning and implementing the change?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

5. What benefits has the utility derived from the change?

________________________________________________________________________

________________________________________________________________________
6. How has the change affected staff competencies and training needed?

7. What lessons did you learn in the process about what worked and what didn’t?

III. INFORMATION-SHARING

1. Would you be willing to host an on-site tour (45 minutes to an hour) that would include a demonstration or discussion of your innovation?

   _____yes    _____no
If so, please provide the name and contact information of the person in your organization who would lead this tour.

________________________________________________________

________________________________________________________

2. Would someone on your staff be willing to visit another regional water/wastewater facility to provide a presentation on this innovation?

_____yes  _____no

If so, please provide the name and contact information of person who would be willing to make a presentation on this topic.

________________________________________________________

________________________________________________________

3. Would you be willing for a staff member from another water/wastewater utility to conduct a follow-up visit to your utility to learn more about your innovation?

_____yes  _____no

If so, please provide the name and contact information of the individual who should be conducted to arrange a follow-up visit.

________________________________________________________

________________________________________________________

4. Would your staff be interested in learning more about an On-Line forum to discuss water/recycling/wastewater treatment issues?

_____yes  _____no

If so, please provide the name and contact information of a person BAYWORK could contact to discuss further.

________________________________________________________
V. **INTERESTS**

1. Please identify a regional water/wastewater treatment facility within the primary service area of BAYWORK (Marin, San Francisco, San Mateo, Santa Clara, Alameda, and Contra Costa Counties) which you would like to visit in order to learn more about an innovation they have implemented.

2. Please describe the innovation.

3. Please provide contact information on a staff member at this agency:

   Name: _______________________________

   Phone Number: ______________________

   E-Mail Address: ______________________

Please return your completed survey to Kory Loucks-Powell at klouckspowell@sfwater.org and cc: Cheryl Davis at ckd@sfwater.org. If you have any questions about the survey or the Workshop on Wheels project, you can also address them to Kory Loucks-Powell and Cheryl Davis.
Attachment B:
North Bay WoW Agenda
North Bay Workshop on Wheels
November 14, 2013
8:45 am-4:00 pm

Treating Wastewater for Non-potable Reuse
Gary Wettstein
Las Gallinas Valley Sanitary District

Serving Recycled Water for Innovative Uses
Jim Kenney
Marin Municipal Water District

De-Chlorination of Effluent Using Engineered Wetland
Matt Pierce
City of Petaluma

Lunch at Miwok Park

Actiflo Process and Chlorine Dioxide
Marco Jennison
North Marin Water District

Food Waste to Energy
Chris Finton
Central Marin Sanitation Agency

Wastewater Conveyance Infrastructure Planning
Using Risk Minimization and Level of Service Criteria
Greg Norby
Ross Valley Sanitation District

BAYWORK On-Line Forum
Raj Singh
City of San Jose
Attachment C:
East Bay WoW Agenda
East Bay Workshop on Wheels
March 11, 2014
7:30 am - 4:30 pm

City of Pleasanton - Leo Lopez
Smart Use of Computerized Maintenance Management Systems: How the City of Pleasanton is Leveraging Technology to Optimize Operations and Maintenance

Zone 7 Water Agency - Bill Sadler
Salt Management with Mocho Groundwater Demineralization Plant

Dublin San Ramon Services District - Levi Fuller
Rehabilitation Efforts to Restore Sand Filter Performance

City of San Jose – Raj Singh
BAYWORK’s On-Line Forum

San Francisco Public Utilities Commission – Steve Hanes
Using SCADA Technology to Manage Complex Water Treatment Processes

LUNCH EN ROUTE

Alameda County Water District - Milan Viau
Energy Savings through Hydroelectric and Control of Ozone Disinfection Products through Upstream Chloramination

City of Hayward - Ray Busch
How the City of Hayward is using the Renewable Energy Self-Generating Bill Credit Transfer tariff (RES-BCT) to Go Green and Save Green

Oro Loma Sanitary District - Jimmy Dang
Title: Digester Facilities Upgrade Project - Use of 3D Design Tools to Improve Design Stage Review and Construction Progress Tour
Attachment D:
South Bay WoW Agenda
San José-Santa Clara Regional Wastewater Facility- Jim Ervin and Mike D’Arcy
Continuous Upgrades in Biological Nutrient Removal and Energy Savings

Silicon Valley Advanced Water Purification Center – Steve Twitchell (SCVWD) and Hugh Logan (City of San José)
Largest Northern California Facility that Treats Secondary Effluent to Potable Standards

SFPUC/Santa Clara Valley Water District Intertie – John Cook (SCVWD)
An Emergency Intertie between SFPUC & SCVWD for Water Supply Reliability

San José Water Company - Moss Operations Center – Adam Feffer, Francois Rodigari, and Curt Rayer
Achieving Phase III Completion of AWWA Partnership for Safe Water Distribution System Optimization;
Monitoring and Tracking Water Quality Complaints with GIS;
Operating a Distribution System to Optimize Cost Savings

LUNCH

West Valley Sanitation District – Kelvin Hatchett
CMMS, GIS, and Scaled Integration Technology

Rinconada Water Treatment Plant – Steve Twitchell
Water Treatment: Phasing in the New while Operating the Old

SNACK

Sunnyvale Storm Pump Station – Dan Stevenson
Storm Water Trash Capture Devices and Pumping
Attachment E:
East Bay WoW Participant Feedback Form
A. Workshop on Wheels approach:

___ I liked it a lot  ___ It was OK  ___ I didn’t like it

Please tell us what you liked about the Workshop on Wheels approach.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Please tell us what we could improve upon.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
B. Information presented:

___ Very useful       ___ OK       ___ Not useful

Please tell us what you found most useful of the information presented.

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

Please give us any additional feedback on what you liked and what we might improve upon for our next Workshop on Wheels.

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
C. **Additional comments:**

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________
Appendix I:
WoW Materials
I. Presenter: Gary Wettstein, Water Treatment Operator, Las Gallinas Valley Recycling Plant

Presenter: James Kenney, Superintendent of Water Treatment, Marin Municipal Water District

II. Treatment Plant Characteristics:

- Water treatment recycling
- 350 service connections
- Two employees, excluding supervisor and remote monitoring

III. Innovation:

A. Description

Marin County is not a very industrialized part of the state so the use of recycled water can be limited. Taking this into consideration, we have been able to expand the use for recycled water beyond that of just irrigation. Some of the other uses for our recycled water include toilet flushing in residential as well as commercial buildings, including the county jail and the new EOC building, a small commercial laundry, three car-washes, and the commercial building cooling towers.

B. Type of Innovations

- Optimization of existing resources
C. Motivation for Innovations

The major motivation for this recycling facility was to conserve potable water. Currently the Las Gallinas Recycling Plant serves Marin Municipal Water District about 600-acre feet of potable water annually.

D. Barriers/Challenges

Aside from the capital costs of the plant and the distribution system, we had the challenge of working in partnership with another utility run by an entirely different Board. Our agency was out in front of the regulatory bodies and had to petition for permission for many of our alternative uses, beyond irrigation. We also had to petition to allow our operators to work under their California Department of public Health licenses at a tertiary wastewater facility.

E. Benefits

The district saves 600-acre feet of potable water annually.

F. Effect on Staff Training

The recycling plant is a conventional tertiary treatment plant. The processes for the treatment are the same as at our drinking water facilities, but due to the size of the facility, processes more much faster. This plant requires substantial training for the operators since the equipment is not standardized to the other facilities, due to its design and size. This facility is not manned 24 hours-a-day, so the operator must be trained to forecast production requirements. This plant is a real challenge to operate and a great training-ground for new operators. With proper training, the operators will have the required competency to operate it effectively and efficiently.

The District has created a Water Treatment Operator IV position. One of the requirements of this promotional position is the proven ability and competency to operate this facility. In order to receive this promotion the operators agree to work two weeks a year at this facility to maintain their operational competency.

G. Lessons Learned

Training and having complete Standard Operating Procedures available to the operator are very important to the success of operating this facility.
IV. Information Sharing:

- Willing to host on-site tour

- Willing to visit another regional water/wastewater facility to provide presentation on innovation

- Willing for staff member from other utility to conduct a follow-up visit to learn more about innovations

- Interested in on-line forum to discuss water/recycling/wastewater treatment issues
MMWD Las Gallinas Recycling Plant and Distribution System

Baywork Workshop on Wheels Presentation
November 14, 2013
A diagram of the treatment process at the plant. Treatment includes flocculation, coagulation, filtration, high rate "DensaDeg" clarification, disinfection, corrosion control and pH control.

Legend

M Mixer
P Pump
D Scraper Drive

Treated Water Storage Tanks

Hypo
NaOH
ZOP
Modified Clearwell
To Terra Linda Tanks (PT)

Distribution Pumps

Product Water Pumps

DLENSD Effluent Storage Pond

Inlet Pump Station

Rapid Mix Tank

Solids Recirculation

"DensaDeg" High-Slurry Thickener Clarifier

To LCSVSD Sludge Ponds

Filter Backwash

Anthracite Gravity Filters

NaOH, ZOP, Hypo

Hypo, ZOP

NaOH

LAS GALLINAS RECYCLING PLANT
FLOW SCHEMATIC DIAGRAM

SAN RAFAEL
LAS GALLINAS VALLEY RECYCLING PLANT FACILITIES
Marin Municipal Water District

History

In 1912 the Marin Municipal Water District became the first municipal water district in the State of California. The district was comprised of 26 smaller private water companies that were combined to become the Marin Municipal Water District of today.

Currently MMWD provides high quality drinking water to 185,000 people in a 147-square mile service area of Central and Southern Marin County. The District manages seven reservoirs, 21,635 acres of water shed lands including a large section of Mount Tamalpais and two smaller parcels located in West Marin, two surface water treatment plants: San Geronimo 35 MGD; Bon Tempe 20 MGD, one water quality station where Sonoma County Water Agency intetie water is further treated, and one 2 MGD wastewater recycling plant in association with Las Gallinas Valley Sanitary District.

Las Gallinas Recycling Plant

Purpose:

The Las Gallinas Recycling plant was originally developed in response to the severe drought that hit Marin County in 1976. The purpose of the plant is to divert treated wastewater from Las Gallinas Valley Sanitary District and reuse this water for non-potable uses. The recycling facility would increase the amount water available to the District for potable use.

The System and the Plant

The MMWD Las Gallinas Recycling Plant and the Distribution System were originally constructed in 1979 and expanded to its current configuration in 1989.

The Plant and System include-
- 2.0 MGD Conventional Treatment Plant with DensaDeg Clarification and 8 dual media filters
- 1 MG Finished Water Clear Well. 700,000 gallons of storage and 300,000 gallon chlorine contact chamber
- 2- 500,000 gallon storage tanks
- 3 pump stations
- 25 miles of piping
- 350 service connections
- Produces an average of 530 acre feet or 172 MG annually

The Challenge

Marin County as whole is not a very industrialized portion of the Bay Area and has very little industrial, manufacturing, or agricultural uses for our recycled water within our system
footprint. While we have always had the typical golf courses, median strip irrigation, school turf and landscaping uses, the District found itself in the position of having the ability to provide a stable supply of high quality recycled water, but not enough customers to meet the current plant capacity. The District's approach to solving this issue was to have additional uses for recycled water recognized and approved by the regulatory agencies allowing the District to expand the usage within the existing distribution system.

The Innovation

The District was able to get regulatory approval for uses that had not been previously allowed in California. MMWD was able to achieve many "first in California" using this approach. Some of these include:
- First Car Wash to use Recycled Water
- First Commercial Laundry
- First Condominium Complex to be dual plumbed west of the Mississippi. (102 residential fixtures on recycled water)
- First approved cooling tower application for recycled water
- First County Jail to use recycled water for toilet flushing

Another aspect to growing the demand for our recycled water is through our water ordinances, where "All existing customers of the district and new applicants for water service whose property may be served by recycled water provided by the district shall connect their property to such recycled water service for those uses for which the use of potable domestic water would be deemed a waste or unreasonable use of water as specified in Division 7, Chapter 7, of the California Water Code and the state and local regulations promulgated pursuant thereto." This ordinance creates a way for the system expansion when commercial, governmental or multi-residential buildings are in the permitting process for remodel, new construction, or when there is a request for change in service or change in use.

What Does the Future Hold?

MMWD continues to try and expand the number of uses and our customer base for recycled water. We are currently working to infill the customers within our existing system. Two of the most recent additions are the County of Marin Emergency Operations Center which will add approximately 100 flushing fixtures and the Marin Covenant Church Youth Center which will add another 33 flushing fixtures.

MMWD continues to evaluate expansion opportunities with our current partners to bring in additional customers such as Peacock Gap Golf Course or Mt. Tamalpais Cemetery and looking towards new partnerships and the opportunities they provide to expand the use of recycled water within the county.
ZW1500 Configuration Modules

A module contains thousands of individual membrane fibers (11,520 fiber count)
The fibers are oriented vertically in a PVC housing
The fibers are fixed in a polyurethane material into plastic headers at each end

ZW1500 Configuration Modules and Rack

Modules are assembled into Racks where connections are made to common permeate, waste, air and feed headers
ZeeWeed® 1500 Operation
Running State

A positive pressure is created within the fiber lumen by the feed water pump
Water is forced through the pores in the membrane fibers and collected as permeate
Solids greater in size than the membrane pores are rejected and remain in the module housing
The permeate (treated water) runs the length of the fiber lumen and is collected in the permeate header

ZeeWeed® 1500 Operation Flows During Running State

Permeate

Membrane Fiber

Fiber Lumen

Membrane Fiber

Dead End

Rejected Solids
Periodically Flushed
GE Water & Process Technologies ZENON
Membrane Solutions

ZW1500 PFD

Z-PAK Components

Goulds Permeate, CIP and Backwash pumps
Quincy PLT Oil Lubricated Compressors

Aerzen Rotary Lobe P0, Oil Free Blowers
Bray Series 31 Butterfly Valves

Prominent Gamma L and Sigma 1,2,3 Metering Pumps
Bray Series 92/93 Pneumatic Actuators

imagination at work
I. **Presenter:** Matt Pierce, Operations Supervisor

II. **Treatment Plant Characteristics:**

- Water recycling (wastewater treatment)
- 65,000 customers served
- 15 employees

III. **Innovation:**

A. **Description**

The treatment facility utilizes polishing wetlands to de-chlorinate effluent prior to river discharge. This mode of operation has reduced chemical use and effluent chlorine residual monitoring is accomplished with two daily grabs samples rather than continuous online monitoring.

B. **Type of Innovations**

- Increased use of Information Technology
- Modification of workflow processes or classifications
- Inter-agency agreements or other administrative changes
- Optimization of existing resources

C. **Motivation for Innovation**

Reduce chemical cost, decreased dependency on chemicals, and simplified
D. Barriers/Challenges

Staff negotiated this wetlands mode of operation during the facility’s NPDES permit renewal. SCADA controls had to be modified.

E. Benefits

- Reduced sodium bisulfite usage
- Eliminated the workload associated with keeping four DeO₃ analyzers calibrated and in service
- Significantly reduced standby callouts related to river discharge

F. Effect on Staff Training

The change has had little impact on training and staff competencies

G. Lessons Learned

Optimizing and/or re-purposing existing processes can have significant operational benefits

IV. Information Sharing:

- Willing to host on-site tour
- Willing to visit another regional water/wastewater facility to provide presentation on innovation
- Interested in on-line forum to discuss water/recycling/wastewater treatment issues
Dechlorination of Effluent Using Engineered Wetlands

Ellis Creek Water Recycling Facility, City of Petaluma

- Historical Timeline
- Facility Treatment Processes / Flow Schematics
- Challenges of Wetlands
- Dechlorination Mode of Operation
- Benefits of Natural Dechlorination

HISTORICAL TIMELINE

- 1938: Original Plant Built on Hopper St.
- 1972: Oxidation Ponds Built
- Late 70's/ early 80's: Prohibition of summer discharge & start of agricultural reuse
- 2002: Ellis Creek WRF @ 50% Design
- 2004: Purchase 261 Acres for New Plant
- Oct 2005: Construction Contract Awarded
- Jan 2009: Plant Operational
Facility Treatment Process

- **Design Criteria**
  - AUVF: 8.7 mg/L, Peak Flow: 36 mgd
  - INF ROD: 275 mg/L, INF TSS: 275 mg/L
  - 10,000 lbs/day BOD loading to ponds

- **Secondary Treatment Process**
  - Activated Sludge - Siemens Orbal Process (<16 mgd)
  - Aerated Lagoons/oxidation ponds (>16 mgd)

- **Advanced Secondary Treatment Process**
  - Treatment Wetlands (30 acres)
    - Repurposed two existing storage ponds
  - Polishing Wetlands (31 acres)

- **Anaerobic Digestion of Waste Activated Sludge**

- **Tertiary Treatment**
  - Continuous Upflow Sand Filters
  - UV Disinfection
  - Users: City Parks, Golf Courses, Vineyards, Pasture Irrigation
Multi-Purpose Objectives Accomplished with Wetlands

- Algae removal
- Enhanced secondary treatment
  - metals and nutrients
- Reduced energy & chemical costs versus DAFT
- Conservation of 200 acres of wetland/upland habitat along Petaluma River
- Integration of 4 miles of recreational trails
- Recreational activities; bird watching, hiking...
- Educational opportunities including interpretive signage

Polishing Ponds / Site - Trails
BASIC COMPONENTS OF THE IAMP

- Level of Service Objectives
- Field Data – Lots of it
- Likelihood and Consequence of Failure Metrics and Scores
- Numerical Risk Model (SMARTool) for Pipelines
- Conventional Assessments for Pump Stations
- GIS to Analyze Results
- Prioritized CIP and Cash Flow

HOW THE IAMP RISK MANAGEMENT TOOL WORKS

Likelihood of Failure (from InfoNet CMMS) × Consequence of Failure (GIS Data)

- Material (Techite)
- Structural Condition
- O&M Condition
- Located in Bay Mud
- Located in Landslide Zone
- Capacity/SSOs
- Maintenance Needs

Risk Score for Every Pipe Segment

- Near Waterway
- Near School, Park
- Crosses Major Roadway
- Serves Large Area
Operation Benefits to Natural Dechlorination

- Reduced bisulfite costs (approx 75%)
- Reduced reliance on chemicals
- Reduced staff time maintaining DeOx 2000 analyzers
- Reduced call-outs & alarms for dechlorination system
- Eliminated the potential for chlorine violations
- Reduce operational stress

Summary

- Optimized existing infrastructure
- Reduced operating costs
- Improved operational reliability
- Maintained treatment performance
- Maintained recreational and educational opportunities for the public
Disinfection and Dechlorination

- CCB Mode of Operation: Use chlorine contact chamber followed by chemical dechlorination
  - Sodium bisulfite used to dechlorinate final effluent
  - Continuous monitoring of chlorine residual

- Natural De-chlorination Mode: Chlorinate between Treatment Wetlands and Polishing Wetlands followed by natural dechlorination
  - Naturally dechlorinate through Polishing Wetlands
  - Monitor chlorine residual 2x/day

- Use CCB mode and natural dechlorination mode in parallel operation
  - Sodium bisulfite used to dechlorinate
  - Continuous monitoring of chlorine residual

Natural Dechlorination

- Testing has shown no chlorine is present at the vegetative/open water interface in first series of Polishing Ponds
- Prove a 0.0 mg/L chlorine residual by dosing bisulfite, and by titrating a negative chlorine residual (bisulfite residual)
- Compliance location is E-001
- NPDES permit requires two chlorine additions per day, minimum 4 hours apart.
- Target residual 1.5 – 2.0 mg/L
- SCADA will log a “90” in the historian to indicate the BeoX 2000 analyzers are disabled in Wetlands Mode
- Flow paced dosing of sodium bisulfite residual control is not available
I. **Presenter:** Marco Jenison, Water Treatment Operator

**Respondent:** Robert Clark, Operations/Maintenance Superintendent

II. **Treatment Plant Characteristics:**

- Water
- 61,000 customers served
- 50 employees

III. **Innovation:**

A. **Description**

Chlorine dioxide delivery system modifications

B. **Type of Innovations**

- Increased use of Information Technology
- Modification of workflow processes or classifications
- New approach to documentation, technical training, staff development, or knowledge management
- Optimization of existing resources
C. Motivation for Innovation

Oxidation efficiency, chemical cost reduction, operational efficiency, safety, better control, and monitoring of process

D. Barriers/Challenges

Chemistry of oxidation chemicals and lake water relocation and storage of bulk chemicals and delivery systems control modifications; redesign of ClO₂ delivery system; reliable water pressure for generator

E. Benefits

- Improved chemical use efficiency
- Extended filter run times
- Higher organic removal
- Chemical mixing quality ClO₂
- Better control of dose

F. Effect on Staff Training

- More training on ClO₂
- Missing system
- Removal of high hazard chemical (sulfuric acid)

G. Lessons Learned

- Relocation of ClO₂ allows a better mixing control with higher quality ClO₂
- Use of Cl with ClO₂ helped reduce chlorate (DBP) limitations of ClO₂

Information Sharing:

- Willing to host on-site tour
- Willing to visit another regional water/wastewater facility to provide presentation on innovation
- Willing for a staff member from another utility to conduct a follow-up visit to learn more about innovation
- Interested in on-line forum to discuss water/recycling/wastewater treatment issues
Stafford Treatment Plant

Actifloc and Chlorine Dioxide

For over 50 years water from Stafford Lake was delivered to a conventional treatment plant for potable use in Novato. The plant had an upflow clarifier and used only chlorine as an oxidant. The clarifier design was of old technology which is still commonly used in water treatment. This old Stafford Treatment Plant saw its very last day of operation in mid-October, 2004. A totally new plant was being built on site with a newer clarification technology. The new process is called Actifloc. As a package plant it is called Actifloc. Oxidation; a step needed mainly for the removal of iron and manganese, is now accomplished with chlorine dioxide rather than with chlorine in the new plant. The new plant with the Actifloc process and chlorine dioxide was built to meet recent water quality standards which set limits on a group of compounds found in drinking water produced from contact with chlorine and naturally occurring organic molecules. These compounds, haloacetic acid and trihalomethanes are the disinfection by-products. The rule restricting these to levels of 60 parts per billion of haloacetic acid and 80 parts per billion of the trihalomethanes is called the Disinfection Byproduct Rule. Meeting the DPB rule was not possible in the old plant with its long chlorine contact time with high doses of chlorine in the old clarifier where there was a sludge blanket and high levels of organics.

**ACTIFLO**

This is a rapid settling process utilizing a special microsand for sand ballasted clarification. After coagulation the microsand is injected along with polymer. Flocculation follows quickly, creating floc particles weighted down with sand. Sand ballasted clarification happens many times faster than clarification with conventional clarifiers. Our Actifloc units do very well in handling the big changes in raw water turbidity we occasionally see after a heavy rain event on the watershed. They are easy to start up and shut down, occupy a small "footprint", meaning they take up less area than a conventional operation of the same size because of the much smaller clarifier; and if there is trouble in the process such as loss of a chemical feed or failure of a critical mixer, the problem becomes apparent much sooner in an Actifloc unit than it would in a conventional plant. Treating the water when there are high amounts of algae has been more troublesome in our experience because of the difficulty in rapid settling various phytoplankton species.

**CHLORINE DIOXIDE**

Though made from chlorine, chlorine dioxide has a different chemistry than chlorine. The product we generate on site is a green solution that will give off strong-smelling chlorine dioxide gas. It dissolves readily in water, but since it does not hydrolyze in water like chlorine does, it will not form ions such as hypochlorite or chloride, so it will readily come out of the water as a gas if agitated. It does not react with many organic compounds like chlorine does, so there is far less potential to make the disinfection by-products (DBPs). It cannot be transported; the gas is explosive. Any facility using chlorine dioxide must have a chlorine dioxide generator. The solution made by our generator has a concentration around 0.2% which is way too low to be dangerous.

Marco Jennison  
Water Treatment Operator  
415-897-4133 ext 8880  
mjennison@nmwd.com
Ross Valley Sanitation District No. 1
San Rafael, CA

I. **Presenter:** Greg Norby, General Manager

II. **Treatment Plant Characteristics:**
   - Wastewater Collections
   - 55,000 customers served
   - 38 employees

III. **Innovation:**

   A. **Description**

   Ross Valley Sanitary District has over 200 miles of gravity sewer system, 9 miles of force-mains, and 19 pump stations. Much of this infrastructure is 50 to 75 years old and is past its service life. The new National Pollution Discharge Elimination System (NPDES) and Regional Water Quality control Board (RWQCB) requirements for wastewater conveyance systems have dramatically changed the acceptable levels of performance for the system, which has also been experiencing high rates of sanitary sewer overflows, due to the degraded infrastructure condition. Traditional capital improvements plan approaches are insufficient for dealing with allocation of limited capital funding sources in the face of potentially overwhelming needs for repair, replacement, and rehabilitation. To address the basic challenge of how to systematically allocate limited funds to address the failing infrastructure, Ross Valley Sanitary District has applied a combination of risk-based methods (minimizing the likelihood and consequences of SSO events) and Level of Service objectives – what our customers and the public at large consider desirable for their wastewater service. The risk/LOS model was developed in a combined Access database and GIS platform, and was used to develop a technically rigorous, cost-effective, and consistent basis for an initial five years. $75M capital improvements plan that will address the most critical system needs. The model is also an excellent communication tool for elected officials and the general public, as it visually demonstrates the application of the underlying, relatively complex methods in a simple, visual form.
B. Type of Innovations

- Increased use of Information Technology
- Modification of workflow processes or classifications
- New approach to documentation, technical training, staff development, or knowledge management
- Optimization of existing resources

C. Motivation for Innovation

The District had accumulated, through a series of plans going back to 2006, and driven primarily by the much tighter NPDES requirements along with clear signs of increasingly critical failures of existing infrastructure, a potentially overwhelming list of projects and related costs which were not feasible under funding, project execution capacity, and public support constraints. In March 2013, the District was issued a Cease and Desist Order (CDO) from the San Francisco Bay Area RWQCB, which mandated immediate actions to begin implementing the backlog of capital projects and out in place adequate financial resources to fund the capital program. The Risk/LOS-based approach, including the modeling tools, was developed into the on-going CDO compliance requirements.

D. Barriers/Challenges

We are still working to implement the model, which requires continued condition assessment (CCTV for gravity sewers) and building up the remaining CMMS data sets. Getting engineering and Operation and Maintenance staff to embrace the Risk/LOS-based approach to capital projects and rehabilitation work is also an on-going process.

E. Benefits

The District now has a standard, repeatable, defendable process for selecting and prioritizing its capital program projects. The GIS-based tools also provide an effective means for communicating with decision-makers such as electe Board officials, and the rate-payers. As the District continues to complete its remaining condition assessment work and complete each year’s capital projects, the Risk/LOS-based tools will be iteratively applied to continually refine and update a rolling five-year capital program in a flexible and efficient manner.
F. Effect on Staff Training

The use of risk-minimizing and LOS criteria has required greater IT systems use and training, and getting staff accustomed to less “firefighting” and more increased/planned actions.

G. Lessons Learned

The process is relatively new and will be on-going for the next several years. Lessons learned include how the certain Level of Service criteria affected the model results (for example, proximity to streams, sewers in major roadways), and how differently various stakeholders (operations staff, Board members, customers) view what is important for Level of Service (e.g., cost/low rates, rapid responses to SSO’s impacts to streams from sewer spills, disruption of major traffic areas).

IV. Information Sharing:

- Willing to host on-site tour
- Willing to visit another regional water/wastewater facility to provide presentation on innovation
- Willing for a staff member from another utility to conduct a follow-up visit to learn more about innovation
- Interested in on-line forum to discuss water/recycling/wastewater treatment issues
ROSS VALLEY INFRASTRUCTURE ASSET MANAGEMENT PLAN

REDDUCING THE RISK OF OVERFLOWS THROUGH STRATEGIC ASSET MANAGEMENT

North Bay Workshop on Wheels

ABOUT ROSS VALLEY SANITARY DISTRICT

- Established in 1899
- About 13 Square Miles
- Population of ~ 55,000
- 194 miles of gravity sewers
- 8.4 miles of force mains
- 19 pump and lift stations
THE CHALLENGE

- Aging infrastructure exceeding service life.
- More stringent NPDES requirements.
- Increasing rate, severity of SSO's.
- No consistent, technically sound process for prioritizing 200 miles of sewer lines.
- CCTV assessment results = information overload.
- Price tag keeps growing, public and elected officials not supportive of "fix it all... now!" approach.
- Last rate case rejected by Board in face of public opposition.

RECENT CHANGES IN O&M ENABLED A MORE STRATEGIC APPROACH TO ASSET REPLACEMENT PLANNING

- CCTV inspection initiated in 2009 is over 50% complete
- Zone Cleaning of the entire system completed in August 2013

  IMPROVED CONFIDENCE. Field data replaced assumptions about system condition that were largely speculative

  COST EFFECTIVE SOLUTIONS. Repairs focus on bad pipes and maximize the service life of good pipes
THE DISTRICT'S IAMP LEVELS OUT REPLACEMENT NEEDS

Without strategic asset management, replacements follow the Nessie Curve. The IAMP prioritizes critical needs and defers the rest for a more consistent program.

Approximate pipeline replacement schedule based on original installation dates and 75-year service life.

RISK REDUCTION IS GAINED THROUGH A CONTINUUM OF MAINTENANCE, DOCUMENTATION, AND REPAIR

Preventive Maintenance Program
Real-time Data
CMMS*
Managed Risk
* Computerized Maintenance Management System

Repair or Replace
BASIC COMPONENTS OF THE IAMP

- Level of Service Objectives
- Field Data – Lots of it
- Likelihood and Consequence of Failure Metrics and Scores
- Numerical Risk Model (SMARTool) for Pipelines
- Conventional Assessments for Pump Stations
- GIS to Analyze Results
- Prioritized CIP and Cash Flow

HOW THE IAMP RISK MANAGEMENT TOOL WORKS

Likelihood of Failure (from InfoNet CMMS)
- Material (Techite)
- Structural Condition
- O&M Condition
- Located in Dry Mud
- Located in Landslide Zone
- Capacity/SSOs
- Maintenance Needs

Consequence of Failure (GIS Data)
- Near Waterway
- Near School, Park
- Crosses Major Roadway
- Serves Large Area

Risk Score for Every Pipe Segment
RISK TOOL SHOW THAT 10% OF THE SYSTEM'S PIPES CONTAIN THE HIGHEST RISK

Highest Risk Pipes Have PACP Str Gr5 or Teckite plus...
High Consequence
Moderate Consequence

Other Pipes Require Re-inspection and Reassessment

Many Pipes Require No Corrective Action

Inspection In Process

A COMPARISON OF SYSTEM NEEDS BEFORE AND AFTER THE RISK TOOL SHOWS THE VALUE OF THE ASSET MANAGEMENT APPROACH

Raw Scores

Risk Assessment
TOP FIVE THINGS TO TAKE AWAY FROM THIS PRESENTATION

- RSVD had the data, and now has the tools needed to implement Lifecycle Asset Management
- About ten percent of the system presents the majority of risk
- By prioritizing critical projects and deferring the rest, a high Level of Service can be achieved, with rapid early results
- Costs are controlled through a surgical approach to pipeline replacement
- The District and the Regional Board are now on the same page and ready to move forward

THANKS FROM THE ROSS VALLEY INFRASTRUCTURE ASSET MANAGEMENT PLAN TEAM

DISTRICT STAFF
GREG NORBY, INTERIM GM
RANDELL ISHII, DISTRICT ENGINEER
JOHN CLARK, CHIEF OF OPERATIONS

CONSULTANT TEAM
VIVIAN HOUSEN, V. W. HOUSEN & ASSOCIATES
BEN SHICK, SCHAAF & WHEELER
DARBY HOWARD, JDH CORROSION
Central Marin Sanitation Agency
San Rafael, CA

I. Presenter: Chris Finton, Treatment Plant Manager

II. Treatment Plant Characteristics:

- Wastewater
- 120,000 customers served
- 41 employees

III. Innovation:

A. Description

Central Marin Sanitation Agency is partnering with Marin Sanitary Service (solid waste management company) to divert food-waste from the coast landfill and feed our two anaerobic digesters this product to produce extra bio-gas.

B. Type of Innovations

- Increased use of Information Technology (data tablet operation of facility)
- Public/Private Partnership

C. Motivation for Innovation

Direct food waste from the coast landfill to produce energy, reduce greenhouse gas emissions, and extend landfill lifespan.
D. Barriers/Challenges

This is a new concept in not only Marin County, but in the country as a whole

E. Benefits

Public is supportive of the project, the additions/electricity produced from diverting foodwaste will pay for the improvements need to accomplish this work.

F. Effect on Staff Training

Effect on staff training needed new facility to operate, but staff-competencies have not changed.

G. Lessons Learned

- Relocation of CIO$_2$ allows a better mixing control with higher quality CIO$_2$
- Use of CI with CIO$_2$ helped reduce chlorate (DBP) limitations of CIO$_2$

IV. Information Sharing:

- Willing to host on-site tour
- Willing to visit another regional water/wastewater facility to provide presentation on innovation
- Willing for a staff member from another utility to conduct a follow-up visit to learn more about innovation
- Interested in on-line forum to discuss water/recycling/wastewater treatment issues
BAYWORK: Online Discussion Forum

BAYWORK Roadmap

1. Develop qualified candidates for mission-critical jobs
2. Provide staff with the information they need to do quality work
3. Modify work processes to optimize use of available staff
4. Maximize cost-effectiveness of workforce development investments through collaboration
Performance Measures

2011-2012 Initiative
Establish BAYWORK Website

2012-2013 Initiative
Create Job Posting Function, Job Training
Bulletin Board and Online Forum

The Creation of a BAYWORK Online Forum

baywork.vanillaforums.com
Forum - Functionality

- Connect with participants sharing similar interests and challenges
- Private and open discussions
- Post videos, photos and documents

Forum - Eligibility

- Staff of water/wastewater utilities - these do not need to be BAYWORK signatories or Bay Area utilities.
- Vendors and consultants not eligible
- Other stakeholders (e.g., community colleges) at the discretion of the moderator, based on the topic of the online forum
Forum – Online Support

- User Guide
- Video Tutorials
- Moderator and Administrator Support

Forum - Registration Process

- Interested parties will submit a completed application to the Moderator of their chosen Category/topic
- Applicants will be required to sign a Disclaimer/Terms of Agreement
- Moderator issues electronic invitation to Forum
First, from the Home page select the Category that you wish to engage.

CANDIDATE DEVELOPMENT/OUTREACH FOR MISSION CRITICAL JOB CATEGORIES

These include: Electrician, Electronic Maintenance Technician/Instrument Technician, Engineer, Machinist/Mechanic, Wastewater Treatment Operator, Water Distribution Operator, and Water Treatment Operator.

- Discussion among utilities regarding outreach materials and distribution channels for Mission Critical Job Categories
- Job Posting on BAYWORK website
- Discussion regarding candidate development for Mission Critical Job Categories in utilities:
  - Recruitment options and how social media can be used for this purpose
  - Internships and partnering with schools for educating high school and college students
  - Training options and needs
Please Join Us!

Moderator

Moderator contact info
City of Pleasanton
Pleasanton, California

I. **Respondent:** Leo Lopez, Assistant Utilities Superintendent

II. **Treatment Plant Characteristics:**

- Water distribution and sewer collection
- Approximately 60,000 people served
- 21 employees in the Utilities Division (Water/Sewer/Storm) with 80 total employees at the Operations Service Center (Administration, Parks, Streets, Support, and Utilities)

III. **Innovation:**

A. **Description**

The Operations Services Department has used our Computer Maintenance Management System (CMMS) for over 10 years to track and plan the time and cost of resources utilized on any given task or project.

B. **Type of Innovations**

- New approach to documentation, technical training, staff development, or knowledge management
- Optimization of existing resources

C. **Motivation for Innovations**

- Need to accurately track work and resources
- Plan preventatively as opposed to a reactionary workforce
D. Barriers/Challenges

Line staff cooperation
Time between implementation and accurate data collection

E. Benefits

Ability to demonstrate effective use of resources

F. Effect on Staff Training

Recently applied to new employee training manual
Highlighted areas where we needed to communicate
Clearer expectations for assignments

G. Lessons Learned

Processes for reviewing and collecting data is constantly evolving

IV. Information Sharing:

- Willing to host on-site tour.
- Willing to visit another regional water/wastewater facility to provide presentation on innovation.
- Willing for staff member from other utility to conduct a follow-up visit to learn more about innovations.
- Interested in on-line forum to discuss water/recycling/wastewater treatment issues.
LEVERAGING TECHNOLOGY TO OPTIMIZE OPERATIONS AND MAINTENANCE

Introduction
1. Why a Computerized Maintenance Management System?
   • Budget Planning
   • Asset Management
   • Preventative Maintenance Scheduling
2. Brief Implementation discussion

Video Presentation
1. Regulatory Compliance
   • Annual Reporting for EPA and SSMP
2. GIS Integration
   • Reporting Completed work
   • Creation of Work orders
3. Work Planning
   • Ability to project work to be completed in a Fiscal Year and track progress
4. Customer Service
   • Efficiency in creating work orders to expedite response
5. Supervisory Control and Data Acquisition (SCADA)
   • Constant monitoring of the Water and Sewer systems
   • Fully automated for remote control of pumps and valving
   • Historical data recording
6. Laboratory Input Management System (LIMS)
   • Automatic Reporting for water quality compliance

Conclusion
Q&A
<table>
<thead>
<tr>
<th>CODE</th>
<th>Activity</th>
<th>Description</th>
<th>ACCT NUMBER</th>
<th>WK REQ No.</th>
<th>Comment/ W. Req (Y/N)</th>
<th>Labor Hours</th>
<th>G.T. Hours</th>
<th>Units</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>108</td>
<td>Other Admin Time</td>
<td></td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HRS</td>
</tr>
<tr>
<td>110</td>
<td>Meetings</td>
<td></td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HRS</td>
</tr>
<tr>
<td>111</td>
<td>Training</td>
<td></td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HRS</td>
</tr>
<tr>
<td>704</td>
<td>Meter Install</td>
<td></td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Meters</td>
</tr>
<tr>
<td>705</td>
<td>AMR Tech Support</td>
<td></td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Meters</td>
</tr>
<tr>
<td>706</td>
<td>Delinquent TO</td>
<td></td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Meters</td>
</tr>
<tr>
<td>707</td>
<td>New Resident TO</td>
<td></td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Meters</td>
</tr>
<tr>
<td>729</td>
<td>Backflow Program</td>
<td></td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Devices</td>
</tr>
<tr>
<td>740</td>
<td>Meter Read Mobile</td>
<td></td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Meters</td>
</tr>
<tr>
<td>741</td>
<td>Meter Read Manual</td>
<td></td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Meters</td>
</tr>
<tr>
<td>742</td>
<td>Meter Edit Review</td>
<td></td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Meters</td>
</tr>
<tr>
<td>743</td>
<td>Meter Edit Field</td>
<td></td>
<td>530-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Meters</td>
</tr>
<tr>
<td>750</td>
<td>Account Maintenance</td>
<td></td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Accounts</td>
</tr>
<tr>
<td>751</td>
<td>Services</td>
<td></td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Locs</td>
</tr>
<tr>
<td>760</td>
<td>Accounting</td>
<td></td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Accounts</td>
</tr>
<tr>
<td>765</td>
<td>Lockbox</td>
<td></td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Accounts</td>
</tr>
<tr>
<td>770</td>
<td>Billing</td>
<td></td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Accounts</td>
</tr>
<tr>
<td>772</td>
<td>Shutoff Notices</td>
<td>10-Day 48Call 48OK Shut-off</td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Accounts</td>
</tr>
<tr>
<td>773</td>
<td>Hydrant Meters</td>
<td></td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Meters</td>
</tr>
<tr>
<td>774</td>
<td>Rebates</td>
<td>HET</td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Rebates</td>
</tr>
<tr>
<td>775</td>
<td>Licensing</td>
<td>Bike Dog</td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lios</td>
</tr>
<tr>
<td>780</td>
<td>Leak Audit SFR</td>
<td>DK Call Check</td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Accounts</td>
</tr>
<tr>
<td>781</td>
<td>Leak Audit MFR</td>
<td>DK Call Check</td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Accounts</td>
</tr>
<tr>
<td>782</td>
<td>Leak Audit COMM</td>
<td>DK Call Check</td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Accounts</td>
</tr>
<tr>
<td>783</td>
<td>Leak Audit FRR</td>
<td>DK Call Check</td>
<td>536-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Accounts</td>
</tr>
<tr>
<td>922</td>
<td>Customer Service</td>
<td></td>
<td>530-135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8 Calls</td>
</tr>
</tbody>
</table>

**Note:** (All MISCELLANEOUS activity codes must be explained below)
<table>
<thead>
<tr>
<th>CODE</th>
<th>Activity</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>108</td>
<td>Other Admin Time</td>
<td>All work associated with miscellaneous administrative tasks.</td>
<td># of HRS</td>
</tr>
<tr>
<td>110</td>
<td>Meetings</td>
<td></td>
<td># of HRS</td>
</tr>
<tr>
<td>111</td>
<td>Training</td>
<td></td>
<td># of HRS</td>
</tr>
<tr>
<td>703</td>
<td>Meter Box Repairs</td>
<td>Physical repairs of meters, meter boxes &amp; meter lids. Landscape mc's</td>
<td># of Locations</td>
</tr>
<tr>
<td>704</td>
<td>Meter Install</td>
<td>New meter install, CMO and all related processing</td>
<td># of Meters</td>
</tr>
<tr>
<td>705</td>
<td>AMR Tech Support</td>
<td>Datamatic Firefly Maintenance.</td>
<td># of Meters</td>
</tr>
<tr>
<td>706</td>
<td>Delinquent Turn-on/off</td>
<td></td>
<td># of Meters</td>
</tr>
<tr>
<td>707</td>
<td>New Resident Turn-on/off</td>
<td></td>
<td># of Meters</td>
</tr>
<tr>
<td>708</td>
<td>Customer Request Turn-on/off</td>
<td></td>
<td># of Meters</td>
</tr>
<tr>
<td>729</td>
<td>Backflow Program</td>
<td>Administration duties of the backflow program.</td>
<td># of Devices</td>
</tr>
<tr>
<td>740</td>
<td>Meter Read Mobile</td>
<td>Reading (AMR) meters while in a vehicle, import &amp; export of reads, Meter Perouting</td>
<td># of Meters</td>
</tr>
<tr>
<td>741</td>
<td>Meter Read Manual</td>
<td>Read meters on foot, import &amp; export of reads, Meter Rerouting</td>
<td># of Meters</td>
</tr>
<tr>
<td>742</td>
<td>Meter Edit Review</td>
<td>Print and review meter exceptions report; prepare for field edit; enter corrections</td>
<td># of Meters</td>
</tr>
<tr>
<td>743</td>
<td>Meter Edit Field</td>
<td>Field edit checks, verify accuracy of meter reads</td>
<td># of Meters</td>
</tr>
<tr>
<td>750</td>
<td>Account Maintenance</td>
<td>Address changes, collection, assessments, leak adjustments, NSF</td>
<td># of Accounts</td>
</tr>
<tr>
<td>751</td>
<td>Services</td>
<td>Administrative processing of scheduled field services</td>
<td># of Locations</td>
</tr>
<tr>
<td>760</td>
<td>Accounting</td>
<td>Auto pay, bankruptcy, batch processing, payment postings, deposit preparation, drawer closing, opening mail, pay mode, drop box</td>
<td># of Accounts</td>
</tr>
<tr>
<td>765</td>
<td>Lockbox</td>
<td>Time spent by us to insure that Lockbox Company can process our bill mailings.</td>
<td># of Accounts</td>
</tr>
<tr>
<td>770</td>
<td>Billing</td>
<td>Processing and/or printing of bills.</td>
<td># of Accounts</td>
</tr>
<tr>
<td>771</td>
<td>Mail</td>
<td>Stuffing envelopes, prepare notices and other documents for mailing.</td>
<td># of Accounts</td>
</tr>
<tr>
<td>772</td>
<td>Shutoff Notices</td>
<td>Processing 10 day and 48 hour shutoff notices.</td>
<td># of Accounts</td>
</tr>
<tr>
<td>773</td>
<td>Hydrant Meters</td>
<td>Anything to do with the handling of hydrant meters for rental.</td>
<td># of Meters</td>
</tr>
<tr>
<td>774</td>
<td>Rebates</td>
<td>Processing and handling of toilet and washer rebates. HET HEW</td>
<td># of Rebates</td>
</tr>
<tr>
<td>775</td>
<td>Licensing</td>
<td>Processing and handling of bicycle and dog licensing.</td>
<td># of Licenses</td>
</tr>
<tr>
<td>780</td>
<td>Leak Audit SFR</td>
<td>DK's, calls or leak checks resulting from high usage for Single Family Residential Customers</td>
<td># of Accounts</td>
</tr>
<tr>
<td>781</td>
<td>Leak Audit MFR</td>
<td>DK's, calls or leak checks resulting from high usage for Multi-Family Residential Customers</td>
<td># of Accounts</td>
</tr>
<tr>
<td>782</td>
<td>Leak Audit COMM</td>
<td>DK's, calls or leak checks resulting from high usage for Commercial Customers</td>
<td># of Accounts</td>
</tr>
<tr>
<td>783</td>
<td>Leak Audit IRR</td>
<td>DK's, calls or leak checks resulting from high usage for Irrigation Customers</td>
<td># of Accounts</td>
</tr>
<tr>
<td>922</td>
<td>Customer Service</td>
<td>All work (field or office) associated with responding to customer inquiries/complaints.</td>
<td># of Calls</td>
</tr>
</tbody>
</table>
Water Work Order

W/O # W000140174
Activity 111
W/O Type PM

Issued 03/06/14 07:39
Closed 03/06/14 07:45

Created by
Assign to 2746

Customer Information

First Name TEST
Last Name SAMPLE
Address

Phone 123-456-789-
Cell Phone 

Cross Street

Customer Notes:

wo_udf1 wo_udf2 wo_udf3 wo_udf4 wo_udf5
wo_udf6 Further Action Claim Filed County Problem Customer Problem

Task Descr/Complaint: ***TEST SAMPLE***
Action Taken: TEST SAMPLE
Supervisor Notes: TEST

<table>
<thead>
<tr>
<th>Seq.</th>
<th>Date</th>
<th>Type</th>
<th>Code/Description</th>
<th>Hours</th>
<th>Pay Type</th>
<th>Div</th>
<th>Unit</th>
<th>Activity Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>03/06/14</td>
<td>labor</td>
<td>2746 - LEONARD LOPEZ</td>
<td>0:30</td>
<td>0.00</td>
<td>026</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Labor Cost $35.43 Material Cost $0.00 Equipment Cost $0.00
Contractors Cost $0.00 Misc. Cost $0.00 Total W/O Cost $35.43

Print Name __________________________ Signature __________________________ Date __/__/____
**Water Work Order**

W/O # W000140174  
Activity 111  
W/O Type PM  

Issued 03/06/14 07:39  
Closed 03/06/14 07:45  

**Customer Information**

First Name TEST  
Last Name SAMPLE  
Address  

Phone 123-456-789-  
Cell Phone  

Cross Street  

Customer Notes:

<table>
<thead>
<tr>
<th>wo_udf1</th>
<th>wo_udf2</th>
<th>wo_udf3</th>
<th>wo_udf4</th>
<th>wo_udf5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Further Action</td>
<td>Claim Filed</td>
<td>County Problem</td>
<td>Customer Problem</td>
</tr>
</tbody>
</table>

Task Descr/Complaint: TEST SAMPLE****

Action Taken: TEST SAMPLE  
Supervisor Notes: TEST  

<table>
<thead>
<tr>
<th>Seq</th>
<th>Date</th>
<th>Type</th>
<th>Code/Description</th>
<th>Hours</th>
<th>Rate</th>
<th>Qty</th>
<th>Unit</th>
<th>Activity Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>03/06/14</td>
<td>labor</td>
<td>2746 - LEONARD LOPEZ</td>
<td>0:30</td>
<td></td>
<td>0.00</td>
<td>026</td>
<td></td>
</tr>
</tbody>
</table>

Labor Cost $35.43  
Material Cost $0.00  
Equipment Cost $0.00  
Contractors Cost $0.00  
Misc. Cost $0.00  
Total W/O Cost $35.43  

Print Name ______________________________  Signature ______________________________  Date ___/___/___
Dublin San Ramon Services District
Dublin, California

I. **Respondent:** Levi Fuller, Wastewater Treatment Plant Operations Supervisor

II. **Treatment Plant Characteristics:**

- Wastewater/water recycling
- 155,000 people served
- 112 employees

Dublin San Ramon Services District (DSRSD) provides drinking water to more than 67,000 people in Dublin since March 1961 and in the Dougherty Valley since May 2000.

DSRSD provides wastewater collection and treatment at the Regional Wastewater Treatment Facility for approximately 138,000 people in Dublin and southern San Ramon since March 1961 and in Pleasanton (by contract) since September 1965.

DSRSD has produced recycled water for landscape irrigation and construction since 1999. In 2006 DSRSD and the East Bay Municipal Utilities District (EBMUD) formed the San Ramon Valley Recycled Water Program (SRVRWP). By the end of 2012 the SRVRWP was serving customers at 334 locations. Customers include the cities of Dublin and San Ramon, Dublin Unified School District, San Ramon Valley Unified School District, Dublin Ranch Golf Club, and The Bridges Golf Club at Gale Ranch.

III. **Innovation:**

A. **Description**

1. Mixed Liquor Activation Sludge Wasting, as opposed to Return Activation Sludge Wasting.
2. Recycled water - Continuous Backwash Sand Filtration & Micro-Filtration (CBSF/MF) Ultraviolet Recycled Water Treatment Facility
3. Bay Area Chemical Consortium

B. Type of Innovations

**New treatment processes:**

- Modification--- Mixed Liquor Activated Sludge Wasting as opposed to Return Activated Sludge Wasting

**Modification of workflow processes or classifications:**

- Water/Wastewater System Operator-Combined Wastewater Collection/Water Distribution Operators classification.

**Inter-agency agreements to increase efficiency:**

- Bay Area Chemical Consortium (BACC) – Joint Chemical Bidding Consortium currently consisting of 46 water and wastewater agencies in 12 counties, and growing. Member agencies are realizing substantial cost savings by jointly bidding treatment process chemicals.

- DSRSD, Pleasanton, and Livermore - Joint Effluent Disposal Facility through the Livermore Amador Valley Water Management Agency (LAVWMA).

- Dublin San Ramon Services and East Bay Municipal Utility District Recycled Water Agency (DERWA) –Joint Recycled Water Treatment and Distribution Facilities for San Ramon Valley.

C. Motivation for Innovations

1. Need for a more stable Activated Sludge Process
2. Recycled water - Need to recycle wastewater
3. Bay Area Chemical Consortium - Desire to reduce chemical costs
4. Cross-functionality - Desire to increase efficiency by improvement of employee skills sets.
D. Barriers/Challenges

1. There were no barriers or challenges for the Activated Sludge Process.
2. Recycled water - The challenge was convincing the public of the need for the project.
3. Bay Area Chemical Consortium - The challenges were to convince other agencies that group bidding would result in cost savings for all. Working out the logistics.
4. Cross-functionality - The barrier was getting the employee bargaining union to support the cross training concept and combine what were previously two separate job classifications.

E. Benefits

1. Stabilization of the Activated Sludge process, elimination of wide swings in the wasting rate and mixed liquor solids inventory.
2. Recycled water - Efficient use of the water resource more potable water available potable only purposes
3. Bay Area Chemical Consortium - Significant reduction in chemical costs for DSRSD, as well as other participating agencies.
4. Cross-functionality - More efficient use of the staffing resources.

F. Effect on Staff Training

1. Recycled water - Need to train staff on how to operate Continuous Backwash Sand Filtration & Micro-Filtration (CBSF/MF) and UV facilities. Increase in the on-shift operational responsibilities. Increase in the Mechanical, Electrical, SCADA, and Instrumentation work responsibilities.
2. Bay Area Consortium - Insignificant training need; however, significant staff time needed for coordination and administration.
3. Cross-Functionality - Training needs for staff.

G. Lessons Learned

1. Recycled water - CBSF is not as robust at removing turbidity as pilot testing indicated. UV system presented some start up challenges.
2. Bay Area Chemical Consortium - Administrative challenges, sore bid losers challenging awards.
IV. Information Sharing:

- Willing to host on-site tour
- Willing to visit another regional water/wastewater facility to provide presentation on innovation
- Willing for a staff member from other utility to conduct a follow-up visit to your utility to learn more about your innovation
- Interested in on-line forum to discuss water/recycling/wastewater treatment issues
Refurbishing a Continuous Backwash Sand Filter

Inspection and Refurbishment of a Continuous Backwash Sand Filter

Pre-Refurbishment Testing

Filter #1 was able to meet the 2 NTU turbidity limit at a loading rate of 3.7 gpm/ft² (equal to 8 mgd with all 5 filters running)

Filter #1 was not able to meet 2 NTU at 4.2 gpm/ft² (equal to 9 mgd with all 5 filters running)

More extended filter capacity testing will be conducted following rehab of the filter. Analysis of existing media indicates that it continues to meet design specifications.
Continuous Backwash Sand Filter Refurbishment

- Evaluate Existing Sand Filter Media
- Conduct a Pre-Filter Performance Test
- Remove Existing Sand
- Inspect Filter Infrastructure
- Conduct repairs as necessary
- Replace Sand Filter Media
- Conduct Post-Filter Performance Test
I. **Respondent:** Jim Smith, Superintendent of Water Treatment

II. **Treatment Plant Characteristics:**

- Water Treatment
- 1,300,000 people served
- 1,750 employees

III. **Innovation:**

A. **Description**

East Bay Municipal Utilities District (EBMUD) installed an Aqua Metrology Systems THM-100 on-line THM in March 2013. It was installed at the Orinda WTP since this plant receives raw water from all three Mokelumne Aqueducts and the Briones Reservoir. The data from the analyzer is on-line so staff can compare how raw water changes and process changes at the plants impact THMs. The EBMUD goal is to never exceed a TTHM of 40 ppb, which is half the MCL.

B. **Type of Innovations**

New on-line water quality instrument

C. **Motivation for Innovations**

To decrease disinfection by-products

D. **Barriers/Challenges**

The ASM THM-100 is a new technology and EBMUD ran a 90-day trial with multiple split samples before it purchased the unit.
E. Benefits

EBMUD has a better understanding of how changes in source waters and process changes at the plant impact disinfection by-products.

F. Lessons Learned

With any new piece of equipment, it is helpful to run a 90-day trial before purchasing.

IV. Information Sharing:

- Willing for staff member from other utility to conduct a follow-up visit to learn more about innovations
I. **Respondent:** Bill Sadler, Water Facilities Supervisor

II. **Treatment Plant Characteristics:**

- Mocho Groundwater Demineralization Plant, Reverse Osmosis (RO)
- 200,000 people served
- 105 employees

III. **Innovation:**

A. **Description**

Salt Management with Mocho Groundwater Demineralization Plant

With the accumulation of salts in the Livermore-Amador Valley’s main groundwater basin, Zone 7 Water Agency built the Mocho Groundwater Demineralization Plant.

B. **Type of Innovation**

Optimization of existing resource

C. **Motivation for Innovation**

Accumulation of salts in the Livermore-Amador Valley’s main groundwater basin

D. **Barriers/Challenges**

Several years of planning and capital costs for the groundwater demineralization plant and built in the middle of Pleasanton at a very busy intersection.

E. **Benefits**

Softened groundwater to resolve water quality issues and make possible the future use of recycled water for irrigation.
F. **Effect on Staff Training**

The technology created challenges for agency’s 19 water treatment plant operators who had no experience with RO, or of the associated SCADA system. Extensive training by the engineering firm and vendors brought the operators up to speed. The staff is now competent operating the plant and they have annual training.

G. **Lessons Learned**

Training and having Standard Operating Procedures available to the operators was very useful and important for the successful operation of the plant.

IV. **Information Sharing:**

- Willing to host on-site tour
- Willing to visit another regional water/wastewater facility to provide presentation on innovation
- Willing for a staff member from other utility to conduct a follow-up visit to your utility to learn more about your innovation
- Interested in on-line forum to discuss water/recycling/wastewater treatment issues
The Mocho plant’s RO system operates at 80 percent efficiency, meaning that 80 percent of the 7.7 mgd raw water pumped turns into 0.6 mgd of softened potable water and 20 percent is disposed of as brine. The system’s design will allow for a future efficiency increase to 85 percent if brine quality doesn’t restrict this operating condition.

ZONE 7 PLANT REDUCES GROUNDWATER HARDNESS

The recently completed Mocho Groundwater Demineralization Plant uses reverse osmosis (RO) to help Zone 7 Water Agency (Calif.) manage its water supply while slowing down salt and mineral buildup in the Livermore-Anadore Valley Main Groundwater Basin. The Mocho plant protects the basin’s long-term use and facilitates use of recycled water for irrigation purposes, thereby enhancing the valley’s overall water-supply reliability. In addition, the plant softens some of the groundwater supplies delivered primarily to Zone 7’s western service area, including Pleasanton, Dublin, and part of San Ramon.

PROJECT SPECIFICS
Project Name: Mocho Groundwater Demineralization Plant
Designer/Contractor: Carollo Engineers/GSE Construction
Opening Date: August 2009
Water Source: Groundwater
Technology: RO is used to treat up to 7.7 mgd of groundwater pumped from a series of nearby existing wells. After salt concentrate is removed, about 6.1 mgd of treated water is available for blending with other supplies prior to delivery to water retailers. About 1.6 mgd of concentrate is discharged to San Francisco Bay.

Project Cost: Plant planning, design, and construction cost $55.6 million. It costs about $1.5 million to operate for the nine months planned each year.
Service: Water hardness is measured as calcium carbonate. In 2008, calcium carbonate in Zone 7’s surface water supplies averaged 115-120 mg/L (considered moderately hard), while the groundwater from its seven wells averaged 260-440 mg/L (considered very hard). The plant lowers about 29 percent of Zone 7’s groundwater to a hardness level of about 150 mg/L.
Staffing: Staffed two hours daily and remotely monitored and operated the rest of the time.
WORTH THEIR SALT

Extensive training on new technology spelled success for operators at a groundwater demineralization plant, while they faced challenges at three surface water plants.

A 6.1 mgd water treatment plant in Northern California that uses reverse osmosis (RO) to soften groundwater has solved water-quality issues and made possible the future use of recycled water for irrigation.

It all started when salts were accumulating in the Livermore-Amador Valley's main groundwater basin in California. Zone 7 Water Agency partnered with Carollo Engineers to design and build the Mocha Groundwater Demineralization Plant, which went online in August 2009. Located in Pleasanton, Calif., the plant provides water to 200,000 residents.
The technology created challenges for the agency's 19 operators, who had no experience with RO or the associated SCADA system. Extensive training by Carollo and the vendors brought the operators up to speed. The RO plant requires minimal attention from those who operate it and the agency's three surface water plants.

In 2012, the demineralization plant received the Membrane Plant of the Year award from the Southwest Membrane Operator Association (SWMOA), based on exemplary safety records, clean premises, minimal permit violations and public education for plants having at least 1.0 mgd of membrane-based treatment.

The RO plant has proved easy to operate, freeing operators to deal with the widely variable source water at the surface water plants.

**Salt management**

Zone 7 manages water quality for the Almaden Creek Watershed above Niles in Northern California and has primary responsibility for managing the Livermore-Amador Valley surface and groundwater resources. Historically, it has managed the major groundwater basin by maximizing surface water deliveries, recharging the basin with low-total-dissolved-solids surface water, restricting groundwater pumping, and restricting wastewater disposal in the watershed.

The agency hired Carollo Engineers in 2000 to decide how best to manage the salt accumulation in the aquifer. Tom Seacord, Carollo associate vice president, was project manager. "We looked at where the demineralization plant should be located, how the finished water was going to tie into the distribution system, and how to get rid of the brine, which is the waste stream that is produced," he says.

Besides the treatment plant, Carollo designed a 28-inch high-density polyethylene pipeline that conveys water from four wells to the Mocho plant. "We looked at the chemistry of the groundwater when designing the RO system," says Seacord. "The amount of brine produced can change based on the concentrations of salts in the groundwater.

The plant removes minerals from up to 7.7 mgd of the groundwater pumped from Zone 7 wells in northern Pleasanton. That translates into 4,000 tons of salts removed annually. The plant operates at 80 percent efficiency, turning 6.1 mgd into softened permeate. This water is blended with other groundwater and surface-water supplies before delivery to retailers in Pleasanton and the Dublin San Ramon Services District (DSRSD). The remaining 1.6 mgd of brine is pumped to San Francisco Bay via the Livermore-Amador Valley Water Management Agency (LAVWMA) export system.

**Demineralization plant**

Nineteen operators support the Mocho groundwater plant and the agency's three surface water plants. Although all are involved with remote operation of the Mocho plant, three operators are assigned hands-on
FEATHER IN THE CAP

When the Zone 7 Water Agency's Mocho Groundwater Desalination Plant won the 2012 Membrane Plant of the Year award from the Southwest Membrane Operator Association, the operators were thrilled. "It was a feather in our cap," says Rich Gould, water facility supervisor. "We put a lot of work into that plant."

An affiliate of the American Membrane Technology Association (AMTA), SWMOA is dedicated to improving the quality of water supplies through desalting, reuse and other technologies.

Says Tom Seacord, associate vice president at Carollo Engineers, who managed the Mocho plant design, "The operators do a really good job of monitoring the plant and tracking its performance. Operators are the ones giving out this award, and it is a great honor when plants receive recognition from their peers."

The Mocho plant conducts many tours, including one for the AWWA 2012 Spring Conference in Santa Clara, Calif. "Our groups are generally 10 to 40 people, and we can adjust the tour content based on attendees' technical level," says Gould.

Zone 7 publicized the Mocho plant's award in its newsletter and online publication. "I feel that the operators deserved this award," says Gould. "They are energetic, enthusiastic and true professionals. They're always there when you need them. Plus, they really embraced the reverse osmosis technology."

From left, plant operator 3 John Brie, plant operator 3 Caroline Abram, and plant manager Rich Gould, shown with the facility's reverse osmosis system (Layne Christensen).

Zone 7 Water Agency,
Mocho Groundwater Desalination Plant,
Pleasanton, Calif.

FOUNDED: August 2009
POPULATION SERVED: 200,000
SOURCE WATER: Livermore Amador Valley Main (Groundwater) Basin
TREATMENT PROCESS: Reverse osmosis
KEY CHALLENGE: Increase RO recovery to 65 percent
ANNUAL BUDGET: $1.6 million
WEBSITE: www.zone7water.com

Operators flush the wells before directing water to the plant to remove sand. After cartridge filter pretreatment (Parker Hannifin), operators add a scale inhibitor for a higher RO recovery rate. The water is then sent to the RO system (Layne Christensen), which contains 1,092 membrane elements (Hydranautics). The RO permeate is sent to the deaerator (DeLoach Industries) to remove carbon dioxide. Caustic soda is added for pH adjustment, and chloramine for disinfectant residual.

The SCADA system (system integrator Wunderlich-Malec) uses Wonderware (Invesys) software and enables the plant to be permitted as an unstaffed facility. "Unlike the membranes at our ultrafiltration plant, the RO membranes don't require backwashing," says Gould. "We chemically clean the membranes once a year."

duties: water plant operators Caroline Abram (T3 water operations license, seven years with the agency), Jeff Madden (T4 license, six years) and John Brie (T3 license, one year). All operators report to Rich Gould, water facility supervisor, who has been with the agency for 32 years and holds a T5 water operator license.
Lowering salt levels
The operators check the RO permeate conductivity from each vessel to make sure there are no issues with the membranes, such as unseated cartridge O-rings from system starts and stops. Once a week, an operator spends a few hours taking conductivity readings from each of the 156 pressure vessels.

If the permeate conductivity from one of the vessels is unusually high, operators insert a graduated tube into the problem vessel and then gradually retract the tube to sample the permeate water conductivity and determine which O-ring is unsealed.

The demineralization plant is operating as designed. Incoming groundwater hardness (as CaCO₃) averages 474 mg/L and the TDS averages 692 mg/L. By contrast, finished water averages are 204 mg/L hardness and 311 mg/L TDS. The plant reduces the salt concentration in the drinking water, resulting in less salt at the wastewater plant.

"Our SCADA system allows us to operate the plant remotely from our surface water facilities. It’s such a reliable plant, and we have redundancy on the equipment."

RICH GUILD

"Customers don’t need their water softeners anymore, so the brine resulting from water softener operation is no longer a contributing factor to wastewater salt concentrations," says Gould. "Because the groundwater has less salt in it, after treatment it may be recycled for irrigation."

Operator contributions
Operators contributed ideas during plant design. For example, Carollo held workshops to discuss the proposed chemical feed system so that operators could explain their preferences. Maintenance and safety employees also gave their input.

"They knew what types of chemical pumps they liked or didn’t like and they had preferences on which pump manufacturers to use in order to maintain consistency for their training programs and spare parts inventories," says Seacord. "They were a great client — very helpful and engaged with the design process."

Although the operators were familiar with many aspects of the design, they were not familiar with RO technology. Forty hours of classroom and hands-on training over two months brought them up to speed. "There was a learning curve, and I conducted training on the technology," says Seacord. "But the operators are smart people, and they get it. They have an ultrafiltration system at one of the surface water plants, and RO is easier to understand, since you don’t have to backwash."

Equipment vendors conducted training on how and when to perform maintenance. Carollo conducted process operation, SCADA control and chemical safety training.
DEDICATED TO DESALINATION

Tam Seacord, associate vice president with Caradco Engineers, won the American Membrane Technology Association (AMTA) 2012 Water Quality Person of the Year Award for his dedication to the water treatment industry. The award recognizes contributions to water supply improvement.

For 15 years, Seacord has worked exclusively on desalination projects, including the Mochio Groundwater Desalination Plant. A licensed professional engineer, he has worked on planning, pilot studies, and design and construction of desalination plants throughout the United States. He is on the board of the AMTA and the Northwest Membrane Operator Association and is also a member of AWWA, International Desalination Association, Southeast Desalting Association, and Southwest Membrane Operator Association.

"I have been volunteering on boards and committees for quite some time," says Seacord. "It's all voluntary, but it's a great way to give back to the industry. I enjoy the people and the work." Seacord was past chairman of the Aliso Viejo Desalination Collaborative, a non-profit group formed in 2015.

The group recognized that the information on seawater desalination and the perception about the industry was outdated, so they built a seawater desalination demonstration plant using full-scale equipment and made their data on energy use and costs available to the public," says Seacord. The Northwest Membrane Operator Association conducts workshops where vendors give operator hands-on training with the equipment.

"Traditional operator training courses and exams don't cover membrane technology," says Seacord. "There's a real need for operator-focused training in this area. It's fun to get your hands on the equipment, and I'm excited to be involved in the start-up of this organization and working with this group of membrane plant operators."

Self-running plant

"Our SCADA system allows us to operate the plant remotely from our surface water facilities," says Gould. "It's such a reliable plant, and we have redundancy on the equipment. Every few weeks, we may have to make a correction at the site."

Operators spend two hours each day at the plant during the week, and one hour a day on weekends. They run weekly tests in the plant's laboratory on raw and finished water. These tests include free and total chlorine residual, free ammonia residual, silt density index, turbidity, pH, conductivity, hardness, and alkalinity.

The agency's central laboratory at the Del Valle Water Treatment Plant conducts monthly metals and minerals analyses and checks disinfection byproduct levels quarterly. They check organics levels twice a year and check the calcium carbonate precipitation potential, which tells them how much caustic is needed to reduce the blended permeate.

The agency's maintenance department handles any preventive maintenance. "We have welders and instrument technicians who can maintain the equipment, and everything is done on a schedule," says Gould. "The plant really doesn't require much maintenance."

Surface water challenges

The agency's surface water plants — two conventional and one ultrafiltration — have a maximum daily output of 60 mgd. They are staffed around the clock by at least one operator per site. The operators welcome the variety of working at both the groundwater and surface water plants. While the groundwater plant largely operates itself, the surface water plants pose challenges that keep operators on their toes.

"The surface water plants can have sudden and dramatic raw water quality changes," says Gould. "These include changes in turbidity, diurnal changes in pH and temperature, and changes in dissolved organic carbon."
The alkalinity can range from 30 mg/L to 130 mg/L depending on source and time of year. Storm events may increase the raw water turbidity from 5 NTU to 50 NTU in less than two hours. Taste-and-odor-causing algae are a challenge, and occasional blooms of filter-clogging algae also create problems.

Operators closely monitor incoming water quality and process parameters and make adjustments when needed. "Fortunately we have quite an arsenal of tools at our disposal, and a seasoned crew who can anticipate these kinds of changes," says Gould.

"As for the operations staff, thorough training is key. We were lucky because we already had operators on board who understood all the other technologies."

RICH GOULD

The operators are highly experienced, and more than half have been with Zone 7 for longer than 10 years. Most have T4 water operator licenses or higher.

"We provide a lot of training and do what we can to see that the operators have enough contact hours for licensing," says Gould. "They take online courses in RO and other technologies and, if there is time, they attend AWWA webcasts and conferences."

There is an agency-wide safety program: "We have a stellar safety record," says Gould.

Future plans

The Metcho plant does not foresee any changes for at least 10 years. "We may need to replace the membrane elements, but none of the equipment," says Gould.

The long-term plan is to increase the operating recovery to 85 percent to reduce the brine discharge, which keeps more water within the groundwater basin. In the meantime, the goal is to continue to meet permit requirements and provide softened water to clients. Zone 7 will also strive to meet its salt removal target by exporting up to 4,000 tons of salt from the basin per year in the RO plant’s brine stream.

Gould offers advice for plants considering RO technology for groundwater treatment: "Get up-to-date information. We had never done this type of thing before, and it was worth the money to pay an experienced consultant to do the work. As for the operations staff, thorough training is key. We were lucky because we already had operators on board who understood all the other technologies. If you're starting from scratch, look for people who are experienced."

---

MORE INFO:

Carollo Engineers, Inc.
603/529-6460
www.carollo.com

Dielbach Industries Inc.
949/221-6995
www.dielbachindustries.com

Hach Company
800/227-4224
www.hach.com

Hydraulicarts
800/227-7873
www.membranes.com

Inwina Operations Management
949/727-3100
www.inwina.com

Larry Chilson Company
913/877-4600
www.larrychinson.com

Parlier Irrigation
209/644-4500
www.parlier.com

Wunderlich-Malee
952/933-3322
www.wmalee.com

---

Do not miss this year's premier groundwater exposition!

Discover new technology and equipment from hundreds of exhibitors.

Connect with thousands of your peers from around the world.

Grow your knowledge and your business with 60-plus hours of educational offerings.

Las Vegas, Nevada ~ December 4-7
www.GroundwaterExpo.com
I. **Respondent:** Ray Busch, Manager

II. **Treatment Plant Characteristics:**

- Water Treatment
- 148,800 people served
- 19 employees

III. **Innovation:**

A. **Description**

How the City of Hayward is using the Renewable Energy Self-Generating Bill Credit Transfer tariff (RES-BCT) to Go Green and Save Green

The Hayward Water Pollution Control Plant is the first city-owned facility in California to apply for the RES-BCT tariff. The Renewable Energy Self-Generating Bill Credit Transfer tariff allows for dollar-for-dollar bill credit transfer of energy exported to the grid. The Hayward Water Pollution Control Plant is projected to export 1.6 million kilo-watt hours of electricity to the grid from the one megawatt solar array and a state of the art 1.2 megawatt cogeneration facility. In essence, the Water Pollution Control Plant will make excess energy from renewable resources and apply the surplus energy to other city-owned meters at full value. This will save about $175,000 a year for the citizens of Hayward.

B. **Type of Innovations**

Modification of workflow processes or classifications
Optimization of existing resources
Commitment to going green and saving green where utilizing special funding and saving, and grant money meet renewable energy and rate-payer savings
C. Motivation for Innovations

City council objectives and grant monies

D. Barriers/Challenges

Timelines for SGIP funding

E. Benefits

Dollar-for-dollar Bill credits for energy put on the grid

IV. Information Sharing:

- Willing to host on-site tour
- Willing to visit another regional water/wastewater facility to provide presentation on innovation
- Willing for a staff member from other utility to conduct a follow-up visit to your utility to learn more about your innovation
- Interested in on-line forum to discuss water/recycling/wastewater treatment issues
Biogas Cogen Upgrade Project
and RES-BCT
(Renewable Energy Self-Generating Bill Credit Tariff) (PUC Code 2830 and Assembly Bill AB 2466)

- Existing/old cogen – two 375 kW engine generators
- New cogen – one 1130 kW engine generator with space for one future generator
- New FOG receiving station – 80 scfm of biogas
- Total biogas production including FOG – 300 scfm
- Electrical efficiency – 40%
- Heat recovered – 3 million BTU/hr
- Overall efficiency – 75%
- Financial information
  - Construction cost – $9 million
  - SGIP incentive – $2.7 million
  - FOG tipping fee – $219,000 per year
  - WPCF PG&E bill savings – $410,000 per year
  - RES-BCT tariff – $175,000 per year savings
RES-BCT

Find out what it means to the city

By Ray Busch and Don Clark, City of Hayward

The Harvard City Council continues to list green principles as top priority for the future. To keep in touch with the direction of the city, the city is to set an example of going green. The Harvard Water Pollution Control Facility is helping the city achieve this, through these practices.

1. Upgrading and implementing the WPCF cogeneration facility (segment) will be replacing the old 400 HP and 500 HP by a new facility. The new facility will be much more efficient, reducing the amount of energy required to operate the system.

2. New rules require more energy conservation. The city is also trying to encourage the use of solar power, which is an excellent way to save money and reduce our carbon footprint.

3. One Hayward Solar Farm: a new megawatt solar array with 3,500 panels is being built and operated by the city. There are plans and signing underway for the next second megawatt solar array.

4. Calpine partnership. The city has partnered with Calpine and is providing 2.5 to 5.0 MGD of secondary effluent to the Calpine/Aliso Canyon City Energy Center. The city is estimated to save $100,000 per year.

The Economic Green Sweet Spot

Beyond environmental benefits, the projects mentioned above qualify as unique funding and grant opportunities that could positively impact rate payers.

Pre-Winter Sale!

Get ready for the winter with our all stainless "B3" SS Dewatering Pump

- Portable with handle
- Weight: 172 lbs automatic float
- 1.5" outlet
- Heavy duty construction
- Stainless steel 43 gen ICC pump

Sale priced at only $249.00 WOW!

Terms and Conditions Apply. No cash value. Can not be combined with any other offer. Cannot be used in conjunction with any other offer. Offer expires 1/31/2015.

Complete Water Services

Innovative Solutions. Proven Success. Call today 800-331-9301

Value of Special Funding

<table>
<thead>
<tr>
<th>Source of Funding</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPCF PACE Grant Assistance</td>
<td>$410,000 (annual)</td>
</tr>
<tr>
<td>RES-BCT Tariff</td>
<td>Value of Bill Credit Transfer (expected energy) $175,000 (annual)</td>
</tr>
<tr>
<td>Self-Generation Incentive Program (SGIP)</td>
<td>$2,450,000 (expected 5 years)</td>
</tr>
<tr>
<td>Performance Based Incentive (PBI)</td>
<td>$1,267,000 (expected over 5 years)</td>
</tr>
<tr>
<td>FICA, OSHA, and Cal/OSHA (FOG)</td>
<td>$1,910,000 (annual)</td>
</tr>
</tbody>
</table>
Alameda County Water District
Alameda, California

I. **Respondent:** Milan Viau, Water Treatment and Distribution Supervisor

II. **Treatment Plant Characteristics:**
   - Conventional treatment with raw water ozonation
   - 100,000 people served
   - 19 employees

III. **Innovation:**

   A. **Description**
      - WTP2 users hydroelectric power generated on-site
      - WTP2 uses two bromate control strategies:
        1. pH suppression
        2. Upstream Chloramination

        Together, superior bromate reduction is achieved.

   B. **Type of Innovations**
      
      New treatment process  
      Optimization of existing resources

   C. **Motivation for Innovations**
      
      The high cost of electricity to make ozone triggered the hydroelectric power  
      Regulations trigger the bromate reduction strategies
D. Barriers/Challenges

Operator knowledge of electricity
Bearing wear-and-tear

E. Benefits

ACWD has saved a great deal of money with the hydroelectric power. Bromate control allows treatment under a variety of conditions while keeping bromates under 1 ppb.

F. Staff Training

Additional training was needed
Additional work also required to monitor the systems
It has added to the knowledge standards for the operators and technicians.

G. Lessons Learned

We did not need to install a C02 carriage water system for pH suppression; Vabor feed works just as well.
Choosing the correct type of turbine for hydroelectric generation is very important.

IV. Information Sharing:

- Willing to host on-site tour
- Willing to visit another regional water/wastewater facility to provide presentation on innovation
- Interested in on-line forum to discuss water/recycling/wastewater treatment issues
Alameda County Water District
Water Treatment Plant #2
March 11, 2014
Baywork

Power Facility:

Purpose: Control of plant flow through the use of hydroelectric power generation.

Distribution of power to the plant processes.

Control the high head of the supply water.

Reduce electrical cost to operate the ozone system and the treatment processes.

Technical: Converts 335 ft of hydraulic head to usable power.

Two 125 KW turbine generators

Four 250 KW turbine generators

One back-up 500 KW diesel generator

Bypass valve sized for full plant flow

Uninterruptable Power Supply for plant controls and computers

Design issues:

Variable flow requirements of the treatment plant

Synchronous generators versus outside excitation on induction generators.

Proper sizing of the bearings and location of the counterweight

Good air flow for cooling
Power production well within the curve

The best type of generator for the application

Service life of the generator

Cost savings:

At $0.15 per KWh, the company saves approximately:

- $1620/day at 14 MGD
- $2430/day at 21 MGD
- $2790/day at 24.5 MGD

At 21 MGD nominal water plant production, enough power is generated to operate WTP2 and 25% of MSJWTP current needs. The treatment plant becomes self-proficient at 10.5 to 14 MGD.

At 21 MGD nominal water plant flow, nearly 6 million kilowatt hours is generated per year enough power to supply 450 four person homes. If this power was generated through an oil burning generator, 9000 barrels of crude oil would need to be used.

**Bromate Control Strategies:**

**pH Suppression:**

CO2 or Sulfuric Acid

Safety

Cost
I. **Respondent:** Jason Warner, General Manager and Jimmy Dang, Associate

II. **Treatment Plant Characteristics:**

Secondary-Activated Sludge, wastewater, solid waste, and recycling

170,000 people served

43 employees

III. **Innovation:**

A. **Description**

Digester Facilities Upgrade Project – Use of 3D Design Tools to Improve Design Stage Review and Construction Progress Tour

The treatment facility produces all of its own electricity on a net annual basis. With the planned expansion of our grease receiving program, our goal is to limit purchases of natural gas to under 1,000 therms per month.

For the tour, we intend to demonstrate how we used 3D visualization to obtain improved input from our operations and maintenance personnel. Seeking and obtaining sound feedback from our operations and maintenance group helps provide the best long term project value as well as superior performance over time. Using 3D tools is now a modest cost project delivery option and represents an industry best practice.

Additionally, 3D tools allow for better coordination with existing utilities and space constraints. 3D visualization tools are a significant factor in the low value of construction change orders.
B. Type of Innovations

Increased use of technology
Modification of workflow processes or classifications
New approach to documentation, technical training, staff development, or knowledge management
Optimization of existing resources

C. Motivation for Innovations

The Oro Loma culture places a high value on Operations and Maintenance involvement at the planning, design, and implementation phases of capital project delivery. By incorporating existing 3D design tools into the project delivery process, the project manager can more accurately convey the details of a design and obtain focused feedback in time to incorporate it.

D. Barriers/Challenges

Once the reviewers and senior management observed the output, everyone was immediately sold on the approach.

E. Benefits

The construction is approximately 50 percent complete. Change orders are under 0.1 percent of the contract value.

F. Effect on Staff Training

There is a greater understanding of what the finished product will look like and be. This allows all staff to mentally prepare for the implementation phase, as well as to make better sense of the construction as it occurs.

G. Lessons Learned

Based on the modest costs of the 3D tools and benefits to date, the District will incorporate these methods on all future significant capital projects.
IV. Information Sharing:

- Willing to host on-site tour

- Willing to visit another regional water/wastewater facility to provide presentation on innovation

- Willing for a staff member from other utility to conduct a follow-up visit to your utility to learn more about your innovation

- Interested in on-line forum to discuss water/recycling/wastewater treatment issues
Digester Facilities Improvement Project – Use of 3D Modeling to Improve Design and Construction

Jimmy Dang, P.E.
March 11, 2014

Project Description

- Construction of two new concrete anaerobic digesters, including:
  - Concrete covers.
  - Mixing and heating systems.
  - Digester gas system modifications.
  - Mechanical, electrical and instrumentation modifications to the existing system.
- Construction time = 600 calendar days
- Engineer’s Construction Estimate = $10M

3D Modeling

- Two separate programs into one model
  - Structural – Autodesk Revit
    - Revit files export into AutoCAD MEP
  - Mechanical – AutoCAD MEP 3D
- No Additional Cost (Caveats)
  - Levels of detail – large diameter pipe and major structures and equipment; only major components, no electrical shown
  - Complexities
  - Existing areas vs. new areas – no 3D in existing area. Modeling existing area would be additional effort.
Interaction
- Operations and Maintenance Personnel
- May not be accustomed to reading plans
- Model and Isometric view helps portray elements of design (see examples)

Staff Feedback through Modeling
- Added tees and cleanouts for flushing in specific locations
- Valve orientations and locations were easily identified
- Set elevation of gas piping on top of digesters for ease of maintenance

Contract
- Contractor: Mountain Cascade, Inc.
- Contract Amount: $7,197,490
- Award Date: 2/19/13
- Notice to Proceed: 3/11/13
- Anticipated Completion: Nov. 2014
Project Timeline

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bid Date</td>
<td>01/29/13</td>
</tr>
<tr>
<td>Notice of Award</td>
<td>02/19/13</td>
</tr>
<tr>
<td>Notice to Proceed</td>
<td>03/11/13</td>
</tr>
<tr>
<td>Completed pile driving</td>
<td>06/15/13</td>
</tr>
<tr>
<td>Complete concrete slabs</td>
<td>07/29/13</td>
</tr>
<tr>
<td>Complete concrete</td>
<td>January 2014</td>
</tr>
<tr>
<td>Substantial Completion</td>
<td>June 2014</td>
</tr>
<tr>
<td>Startup and Final Completion</td>
<td>October 2014</td>
</tr>
</tbody>
</table>

Project Budget

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>$450,000</td>
</tr>
<tr>
<td>Construction</td>
<td>$10,000,000</td>
</tr>
<tr>
<td>5% Anticipated Change Orders</td>
<td>$500,000</td>
</tr>
<tr>
<td>Inspections</td>
<td>$150,000</td>
</tr>
<tr>
<td>Construction Support</td>
<td>$400,000</td>
</tr>
<tr>
<td>Salaries and Overhead</td>
<td>$500,000</td>
</tr>
<tr>
<td>Total</td>
<td>$12,000,000</td>
</tr>
<tr>
<td>Spent To Date</td>
<td>$4,596,937</td>
</tr>
<tr>
<td>Budget FY 2011/12</td>
<td>$12,000,000</td>
</tr>
<tr>
<td>12/13, 13/14, 14/15</td>
<td>$12,000,000</td>
</tr>
</tbody>
</table>
### Construction Progress

<table>
<thead>
<tr>
<th>Expenses</th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salaries</td>
<td>75,600</td>
</tr>
<tr>
<td>Overhead</td>
<td>90,000</td>
</tr>
<tr>
<td>Inspections</td>
<td>42,000</td>
</tr>
<tr>
<td>Construction Support</td>
<td>178,000</td>
</tr>
<tr>
<td>Construction</td>
<td>4,173,000</td>
</tr>
<tr>
<td>Change Orders</td>
<td>37,842(53%)</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>3,495</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4,599,937(58%)</td>
</tr>
<tr>
<td><strong>Budget (2012-13, 13-14)</strong></td>
<td>9,750,000</td>
</tr>
</tbody>
</table>

---

**Questions/Comments?**
I. **Respondent:** Steve Hanes, SCADA Administrator

II. **Treatment Plant Characteristics:**

Water Treatment - 160 MGD Conventional WTP  
2.1 million people served  
16 Treatment/Field Operators

III. **Innovation:**

A. **Description**

Sunol Valley Water Treatment Plant has gone through a sizable upgrade that included the installation of a treated water reservoir and a disinfection process change to chloramines.

The installation of Micro-motion Coreolis metering is now not only used to monitor the flow of the product, but is also used to monitor the density of the ammonia and adjust the pump speed to deliver the appropriate chemical composition for effective chloramine production.  
The use of this metering is used at the Sunol Treatment Plant as well as at the Chloramination Facility located downstream - Both use the same technology.

B. **Type of Innovations**

Increased use of information technology  
New treatment process
C. Motivation for Innovations

The addition of ammonia to the process was labor-intensive due to the volatility of the product that reduces its potency and effectiveness.

D. Barriers/Challenges

Problem identification and communication were the major obstacles to a solution. In-house Information System Engineering identified and implemented the solution.

E. Benefits

Less staff time is required in the analysis of stored chemicals to determine the dosage/ratio changes to maintain process chemistry.

F. Effect on Staff Training

Staff needed to be trained on the function of the new control scheme and the SCADA interface screens for initiation. Staff still requires training on the manual processes of evaluating on-site chemicals and process control, but a level of automation allows them to focus on the broader balance of the operation.

G. Lessons Learned

Operations has the pulse of where issues reside within the operating plants. Opening communications with in-house resources enhances the process without incurring large project expenditures.

IV. Information Sharing:

- Willing to host on-site tour
- Willing to visit another regional water/wastewater facility to provide presentation on innovation
- Willing for a staff member from other utility to conduct a follow-up visit to your utility to learn more about your innovation
BAYWORK

The SFPUC Welcomes You to the Sunol Valley Water Treatment Plant

This presentation was prepared by the presenter with the technical assistance of IS Senior Engineer Travis Hoff

Presenter: Steve Hanes
ITSSCADA Administrator
shanes@sfwater.org
(650) 808-3880
SVWTP Characteristics

- 160 MGD Conventional Water Treatment Plant
- 2 Local Water Sources (Calaveras and San Antonio Reservoirs)
- 1 Hetch Hetchy Source Water Can be Treated if Required
- 17 MG Treated Water Reservoir (New Addition to the Process)
- Chlorammines Effluent Disinfection Process (New Addition to the Process)
Technology and Innovation

• Water and Wastewater are Legacy Processes
• Technology needs to be Applicable to the Process
• Innovation is Applying Technology to enhance a Process
• People provide the Innovation

• Sunol WTP has been through a 3 year upgrade to increase capacity, add and enhance processes and control
**Process: Chloramination**

- **PLC – Programmable Logic Controller**
  - Monitors Field Instruments
  - Makes Calculations
  - Controls Field Equipment

- **Micromotion Meter**
  - Flow
  - Density
  - Temperature

---

**Chemical Characteristics**

**Chloramines:** (4.7 Hypo: 1 Ammonia)

- Sodium Hypochlorite:
- 12% Solution that Decays over time in Storage
- Dosing is Linear and Paced to Plant Flow
- Residual is Easily Measured For Feedback Control

- Anhydrous Ammonia (NH3)
- 19% Solution that Decays over Time in Storage
- Stratifies in Storage
- Specific Gravity is Less than Water
- Dosed Downstream of Hypo
Chemical Metering

- Sodium Hypochlorite:
- 12% Solution that Decays over time in Storage
- Dosing is Linear and Paced to Plant Flow
- Residual is Easily Measured For Feedback Control

- Anhydrous Ammonia (NH3)
- 19% Solution that Decays over Time in Storage
- Stratifies in Storage
- Specific Gravity is Less than Water
- Dosed Downstream of Hypo

Innovation

Innovation is Applying Technology to enhance a Process

- New Process:
  - Chloramines:
    - Effluent Disinfection is Only Effective if the Proper Ratio of Ammonia to Hypo is Maintained
- Challenge:
  - Maintain the Ammonia Ratio
Process: Chloramination

- PLC – Programmable Logic Controller
  - Monitors Field Instruments
  - Makes Calculations
  - Controls Field Equipment

- Micromotion Meter
  - Flow
  - Density
  - Temperature

- Plant Effluent Water Flow Rate (MGD)

Applying Technology

- Process control strategy determined
- Process variables identified
  - Chemical relationships
- Formula derived
- PLC programmed and tested
- SCADA system updated
- Operators trained

- Operations Staff is now able to set a chlorine dosage and a desired ratio to automatically feed ammonia at the proper rate.
The End

Thank you for your participation.
Most innovation takes place with the inter-communications of people, just like us, seeking answers.

Steve
South Bay Workshop on Wheels – June 4, 2014
San José-Santa Clara Regional Wastewater Facility
San José, CA

I. **Presenter:** James Ervin, Compliance Manager

**Presenter:** Mike D’Arcy, Wastewater Superintendent and Wastewater Operator

II. **Treatment Plant Characteristics:**

- Wastewater Treatment Facility
- 196 employees
- 1,400,000 customers served

III. **Innovation:**

A. **Description**

The facility converted its secondary and nitrification wastewater treatment processes to a single Biological Nutrient Removal (BNR) process in 1997. Since that time the facility has experimented with, and implemented, a number of upgrades and improvements that have further augmented wastewater treatment or reduced energy consumption. These improvements included the addition of fine-bubble diffusers, remote actuators for existing valves, valve replacements, and pulse aeration to save energy.

B. **Type of Innovations**

- New treatment process
- Optimization of existing resources
C. Motivation for Innovations

The need to reduce copper concentration in the facility’s final effluent was the original driver. Later improvements were made to increase treatment effectiveness at lower energy cost.

D. Barriers/Challenges

The cost and availability of manpower were always issues.

E. Benefits

The change resulted in a more stable treatment process, improved discharge water quality, and lower energy consumption.

F. Effect on Staff Training

Operator manuals have to be updated, otherwise there has been no change in the amount of training required.

G. Lessons Learned

Biological Nutrient Removal works better than anticipated after control issues were resolved. Fine-bubble diffusers save energy, but add moderate maintenance cost. The incorporation of fine-bubble diffusers involved experimentation with materials and physical dimensions to determine the best sizes and configurations. Pulse aeration saves energy, but the optimal trade-off of aeration versus settling can only be determined empirically.
IV. Information Sharing:

- Willing to host on-site tour

- Willing to visit another regional water/wastewater facility to provide presentation on innovation

- Willing for a staff member from other utility to conduct a follow-up visit to your utility to learn more about your innovation

- Interested in on-line forum to discuss water/recycling/wastewater treatment issues
about our plant
The San Jose/Santa Clara Water Pollution Control Plant (Plant) cleans our wastewater before it flows into the South San Francisco Bay. Wastewater is the water that goes down drains in our homes and businesses from washing dishes and clothes, showering, flushing toilets, and industrial processes.

Built in 1956, the Plant is a round-the-clock operation that cleans an average of 110 million gallons of wastewater per day, and has the capacity to clean up to 160 million gallons per day.

The Plant serves eight cities with 1.4 million residents and a business sector with more than 17,000 main sewer connections. Our Plant is the largest advanced wastewater treatment facility in the western United States.

Our wastewater undergoes a sophisticated 10-hour treatment process that simulates the way nature cleans water. The Plant removes 99 percent of the impurities before the cleaned water is discharged into the South San Francisco Bay or recycled for other uses such as irrigation, industrial processes, cooling towers, and flushing toilets. Our Plant includes an advanced (tertiary) level of treatment that is necessary to meet our region’s strict regulations for the shallow waters and sensitive ecosystem of the southern Bay.

Our Plant is located on 2,600 acres at the South Bay shoreline, covering more area than twice the size of San Francisco’s Golden Gate Park. The site includes a 175-acre wastewater processing area, a 755-acre sludge-drying area, and an 850-acre former salt production pond. The remaining acreage is open land that buffers adjacent communities from odors and hazardous operations.

how does the Plant clean our wastewater?
our environment
Recovering Renewable Resources

Clean water
Currently about 10 million gallons of the Plant’s treated water is recycled daily for landscape irrigation, industrial processes, softening agents, and flushing toilets in San José, Santa Clara, and Milpitas. Every gallon of water that is recycled conserves a gallon of precious drinking water. Recycled water costs less than drinking water, saving businesses money while protecting the environment and creating a drought-proof water supply. On average, the Plant’s recycled water system saves more than 2.2 billion gallons of water per year.

Clean biosolids
The solids removed from the wastewater treatment process are treated to produce high-quality Class A biosolids. Currently, our biosolids are used by the adjacent landfill to meet regulations for daily covering of incoming garbage. Although our biosolids are not used as fertilizer or processed as compost, they qualify for such use. The City of San José seeks out partnerships with innovative firms to convert solid waste and biosolids—such as those produced by the Plant’s treatment process—inoculated with methanotrophs, methanol, biogas, and electricity that will someday power municipal operations as well as be available to other users. The Plant is researching how to capture energy from fats, oils, grease, and other food streams.

Clean energy
The Plant uses 11 megawatts of energy each day, which is enough to power 9,000 homes per year. Roughly 90 percent of the Plant’s energy needs are met by methane gas (biogas) generated by the Plant’s digesters and purchased from the nearby landfill. Using methane gas supports the Plant’s goal of 100 percent energy self-sufficiency by 2022. Biogas is produced from treating settle wastewater solids in the digester tanks. New feedstocks, such as fats, oils, grease, and other organic wastes, along with more efficient digester technologies, can also help us achieve the goal of energy self-sufficiency.

Our history
1800 - 1940
1940 - 1950

1909: The City of San José constructs a simple sewage system that takes unflushed wastewater directly into the Bay.

1940: Indoor plumbing greatly increases Amelio’s tonnage, eliminating more wastewater.

1946: The Federal Water Pollution Control Act requires states to plan increases in wastewater treatment facilities to combat the increase in wastewater contaminating the nation’s water. It is the first federal law to regulate water pollution.

1950: Santa Clara County implements two separate collection systems for stormwater and wastewater to return the amount of water requiring treatment.

1954: The City of San José conducts the first test for treatment facilities designed to treat the organic waste stream.

1960: The City of San Jose helps fud upstate, gaining an approximate 40 percent ownership stake.

1990 - 2010

2000

2010

our future
The Plant Master Plan
Aging equipment and facilities, a growing population, and evolving state and federal wastewater and ars regulations have created the need for the Plant to look at how best to continue its critical functions of protecting our health, Bay, and economy.

In 2009, the Plant launched a three-year master planning project, engaging stakeholders and the community on how to address aging infrastructure, incorporate new technologies, be a good neighbor, and use the Plant’s 2,500-acre site.

The Plant Master Plan will guide decisions on how to upgrade and improve the Plant so that it functions well through 2040 and beyond. Some urgent projects are underway, including replacing electrical cables, rebuilding the digesters, and replacing damaged concrete.

Adapting technologies that address climate and operational hazards creates the opportunity to consider new uses for the Plant lands. The master plan is exciting as it invites the public to consider how to best reshape our shoreline to provide economic, environmental, and social benefits for the entire South Bay region.

For more information, visit: rebuil dheplant.org

1966: The Plant expands to include secondary treatment to meet state regulations and accommodate a growing population.


1977: The Plant expands to include tertiary treatment to meet Clean Water Act regulations.

1998: The South Bay Water Reuse Facility is constructed.

2000: The Plant receives its 30 years of service.

2006: The Plant expands to include tertiary treatment to improve water quality.

2008: Construction begins on a new water treatment facility to capture recycled water.

2010: Construction begins an advanced water treatment facility to improve water quality.

1998: The South Bay Water Reuse Facility is constructed.

1998: The South Bay Water Reuse Facility is constructed.
Laboratory

The San Jose/Santa Clara Water Pollution Control Plant’s laboratory is one of the highest performing labs in the nation. Operating 365 days a year since its inception in 1996, the 12,000 square foot lab analyzes about 70,000 samples annually.

Employing technicians, chemists, biologists, microbiologists, and chemical engineers, the lab’s primary job is to test Plant performance, saving operational costs and protecting public health and the environment. The lab analyzes wastewater and biosolids samples before, during, and after treatment, and checks for compliance with state and federal standards. The Plant also monitors industrial discharge and Bay water quality, and participates in local, state, and national research projects.

Computer Network

All of the Plant’s treatment processes are monitored and controlled using a state-of-the-art computer network. At control terminals located throughout the Plant, operators can make instantaneous adjustments to the treatment process as needed.
• The Plant cleans about 110 million gallons of wastewater per day, which is enough to fill the HP Pavilion in downtown San José.

• The Plant has the capacity to clean 167 million gallons of wastewater per day.

• Ten percent of treated wastewater is recycled through South Bay Water Recycling each day.

• The Plant treats to tertiary level (99 percent clean) to protect the sensitive ecosystem of the southern Bay, where treated wastewater is discharged. The Plant is unlike many other U.S. wastewater treatment facilities, which treat wastewater to secondary level (95 percent clean). All three South Bay plants treat to a tertiary level.

• The Environmental Protection Agency named the Plant National Plant of the Year in 2000 based on its operations and maintenance excellence.

• The Plant’s annual budget is approximately $75 million.
Four-Stage Step-Feed BNR Process

Primary Settling (facilitates fermentation)

Primary Effluent / Settled Sewage

- P released
- NH₃ → NO₃
- Q₁ (anaerobic)
- Q₂ (DO ~ 2.5 mg/l)
- Q₄ (DO ~ 4.5 mg/l)
- Q₃ (anoxic, DO < 0.5 mg/l)

RAS = 97%

Secondary Clarifier

Mixed Liquor

N₂↑

Sludge Blanket

Waste = 3%

O₂↓

NH₃ → NO₃

N₂↑

Process conditions:
- Alkalinity = 200 to 300 mg/l
- pH = 7.4 to 7.5
- Temp = 15 to 24°C
- SRT = 8 to 10 days

Effluent concentrations:
- TN = 12 to 16 mg/l
- TP = 0.5 to 1.1 mg/l
Facility has 2 BNR Areas

- Both areas are divided into A & B Batteries
- Each Battery has 8 Aeration Basins
- Basins are divided into 4 “Quad Tanks” (Q1 thru Q4)
- Anaerobic first Quad (Q1) serves as a “selector” that favors nitrifying bacteria.

BNR-2 “Nitrification Area” inaugurated in 1979

Key Lessons Learned Over the Decades

<table>
<thead>
<tr>
<th>Year</th>
<th>Change or Addition</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964</td>
<td>Secondary (BNR-1) Area in Operation</td>
<td>Bay didn’t stink as much, but aeration required much energy.</td>
</tr>
<tr>
<td>1979</td>
<td>Nitrification (BNR-2) Area in Operation</td>
<td>Bay stopped stinking altogether, but more energy required.</td>
</tr>
<tr>
<td>1980-</td>
<td>More electric blowers added</td>
<td>This increased treatment capacity because the facility could not keep up with Summer-time demand.</td>
</tr>
<tr>
<td>1984</td>
<td>Converted to hybrid BNR process</td>
<td>Aeration became stable &amp; efficient.</td>
</tr>
<tr>
<td>1997</td>
<td>Fine bubble diffusers tested</td>
<td>Aeration efficiency improved (50% less air required).</td>
</tr>
<tr>
<td>2002</td>
<td>Switched from EPDM rubber to polyurethane</td>
<td>Polyurethane increased diffuser life from one to over three years.</td>
</tr>
<tr>
<td>2003</td>
<td>Different sizes of openings were tested</td>
<td>Smaller openings (1 to 2 mm) provide optimal aeration efficiency.</td>
</tr>
<tr>
<td>2004</td>
<td>Long (4”) fine bubble diffusers tested</td>
<td>Long diffusers improve aeration but disrupt circulation. Short (2”) diffusers provide optimal mixing.</td>
</tr>
<tr>
<td>2009-11</td>
<td>Basins taken out of service for installation of automated valves, new butterfly valves, &amp; stainless steel piping</td>
<td>Improved valve control saves energy.</td>
</tr>
<tr>
<td>2010</td>
<td>Pulse aeration tested</td>
<td>Pulse aeration saves energy in the aeration basins.</td>
</tr>
<tr>
<td>2013</td>
<td>Monitoring of electrical loads now tracked</td>
<td>Now able to accurately track power use.</td>
</tr>
</tbody>
</table>

Typical number of blowers needed at peak load
Would you like to know more?

1. Google search for "San Jose pollution annual"
2. San Jose CA - Official Website - Environmental Services
3. Environmental Services on sanjoseca.gov
4. Regulatory Reports: Water Pollution Control Plant Annual Report

Answers here!!
I. Presenter: Steve Twitchell, Treatment Plant Supervisor V, Santa Clara Valley Water District

Presenter: Hugh Logan, Wastewater Operations Division Manager, San José-Santa Clara Regional Wastewater Facility

II. Treatment Plant Characteristics:

- MGD Advanced Water Purification Center
- 731 employees
- Commercial and irrigation use

III. Innovation:

A. Description

Membrane filtration, reverse osmoses, and UV disinfection

B. Type of Innovations

- Increased use of Information Technology
- New treatment process
- Modification of workflow processes or classifications
- New approach to documentation, technical training, staff development, or knowledge management
- Optimization of existing resources

C. Motivation for Innovations

Implement state-of-the-art facility to reduce Total Dissolved Solids (TDS) to recycled water retailers. Pilot advanced treatment for indirect potable reuse and direct potable reuse to reduce importing water.
IV. Information Sharing:

- Willing to host on-site tour

- Willing to visit another regional water/wastewater facility to provide presentation on innovation

- Willing for a staff member from other utility to conduct a follow-up visit to your utility to learn more about your innovation

- Interested in on-line forum to discuss water/recycling/wastewater treatment issues
An introduction to advanced water purification

The new advanced water purification process will not only improve water quality but also reduce the water footprint, making it more sustainable. This process will also reduce the amount of water used and increase its efficiency, making it more environmentally friendly.

1. Microfiltration
   - In this filtration process, the water is forced through a membrane with pores that are smaller than the size of bacteria, viruses, and microorganisms. This results in clearer and safer water for consumption.

2. Reverse Osmosis
   - A process that removes dissolved solids, organic matter, and other impurities from water. It uses a semipermeable membrane to allow water molecules to pass through while retaining other substances.

3. Ultraviolet Light
   - A process that uses ultraviolet (UV) light to kill or deactivate microorganisms in water. This process is effective against a wide range of microorganisms, including viruses.

Frequently asked questions about advanced water purification

Q: Is recycled water a good source of water for drinking?
A: Yes, recycled water is a good source of water for drinking. It is treated to meet the same standards as drinking water and can be used for various purposes, including drinking.

Q: What is the future of water reuse in Santa Clara County?
A: The future of water reuse in Santa Clara County is bright. The county is investing in advanced water treatment technologies and expanding its recycling programs to ensure a sustainable water supply.

As the primary water resource agency for Santa Clara County, we are proactively diversifying our water supply to increase long-term regional reliability.
I. Presenter: John Cook, Water Plant Supervisor, Santa Clara Valley Water District

II. Treatment Plant Characteristics:
   - Water Distribution Pump Station
   - Three employees a couple days per month
   - Three retail agencies serving the east San José foothills

When active, the Intertie could serve most of east San José including portions of Milpitas, if the pump station were operating at capacity, which is 40 MGD. The Intertie is staffed only when it is being prepared for service. One or two operators can prepare the facility for service. Once it is operational, it is checked twice-per-day by one operator. It is basically operated remotely from the Penitencia Water Treatment Plant. Maintenance staff performs monthly preventive and corrective maintenance. Three crafts (electrical, mechanical, and control systems) spend one to two days per month at the site.

III. Innovation:

A. Description

The Intertie pump station has allowed both agencies to maintain treated water to its customers while preventive or corrective maintenance has been performed on treated water pipelines or treatment plants. The station is a bi-directional facility allowing movement of water from or to each agency.

B. Type of Innovations

- Increased use of Information Technology
- Inter-agency agreements or other administrative changes
- Optimization of existing resources
C. Motivation for Innovations

Back-up supply for SFPUC and SCVWD

D. Barriers/Challenges

Getting two large agencies to work together on a relatively small project and still meet everyone’s objectives in a timely manner.

E. Benefits

Able to complete major pipeline and treatment plant rehabilitation project without affecting customer delivery

F. Effect on Staff Training

The pump station has added to the knowledge base of both Operations and Maintenance staff. Equipment at the pump station varies from what is found at the treatment plants. More frequent refresher training is needed for a facility that is not in operation more than two to three times a year.

G. Lessons Learned

Less use of a facility doesn’t necessarily mean less maintenance. All involved with the project, from engineers to operator and maintenance staff, learned a lot about each other’s operations.

IV. Information Sharing:

- Willing to host on-site tour
- Willing to visit another regional water/wastewater facility to provide presentation on innovation
- Willing for a staff member from other utility to conduct a follow-up visit to your utility to learn more about your innovation
- Interested in on-line forum to discuss water/recycling/wastewater treatment issues
I. **Presenter:** Adam Feffer, Water Quality Engineer  
**Email:** adam.feffer@sjwater.com  
**Phone:** 408-918-7254

II. **Treatment Plant Characteristics:**

- Water Treatment and Distribution
- Montevina Water Treatment Plant – 30 MGD direct filtration
- Saratoga Filter Plant – 5 MGD membrane, groundwater, and imported water
- 374 employees
- 1,000,000+ customers served

III. **Innovation:**

A. **Description**

San José Water Company has recently been given the American Water Works Association Director’s Award for completion of our distribution optimization assessment. This assessment was conducted as phase III of AWWA’s Partnership for Safe Water program. This program provides tools and benchmarks for understanding current strengths and weaknesses, as well as providing a framework to prioritize and pursue improvements.

B. **Type of Innovations**

- Increased use of Information Technology
- Modification of workflow processes or classifications
- New approach to documentation, technical training, staff development, or knowledge management
- Optimization of existing resources
C. Motivation for Innovations

Desire to improve generally
Help in prioritizing expenditures
Guidelines to address nitrification problems

D. Barriers/Challenges

Getting ownership buy-in and information from other stakeholders, departmentally

E. Benefits

Improved distribution system residuals
Improved inter-departmental communication and sharing

F. Effect on Staff Training

None yet – in progress

G. Lessons Learned

Change is difficult to orchestrate across large groups
Vision-casting and persistence with key individuals is critical
IV. **Information Sharing:**

- Willing to host on-site tour
- Willing to visit another regional water/wastewater facility to provide presentation on innovation
- Willing for a staff member from other utility to conduct a follow-up visit to your utility to learn more about your innovation
- Interested in on-line forum to discuss water/recycling/wastewater treatment issues
Background

AWWA Partnership for Safe Water-Distribution System Optimization Program

- Came out of 2007 WRF project
- Provides framework for improvement
- Includes utility benchmarks
- Commitment to quality and organizational improvement
Background

- Four Phase Process
  - Phase I: Commitment
    Utilities commit to engage staff, collect and assess data, and pursue improvement
  - Phase II: Data Collection
    Annual Data submission focusing on disinfectant residuals, pressure data, and main break statistics
  - Phase III: Self-Assessment
    Narrative report analyzing data, and identifying "performance limiting factors"
  - Phase IV: Optimized Performance
    Achieve highest level of optimization

Prioritize Actions for Optimization

- Ranked based on "Impact" and "Urgency"
- Team effort to Improve going forward
- First Optimization Team Meeting was March, 2014
Background

- SJWC Completed Distribution Assessment (Phase III) as of December, 2013
  - Reviewed 85 Assessment Categories
  - Recognized performance limiting factors (if any) for each category
  - One of four Director’s Award Recipients
  - Currently no Phase IV recipients

Top Priorities

- Review Top Three Priority “Performance Limiting Factors”
  1. Disinfectant Residual
  2. Pressure Monitoring
  3. Nitrification

- For each factor:
  1. Partnership Benchmarks/Recommendations
  2. SJWC Current Status
  3. Potential Steps for Optimization and Improvement
Priority 1: Disinfectant Residual

Partnership Recommendations/Targets
- 95% of monthly routine residual measurements above target levels
- Free Chlorine Residuals $\geq 0.20$ mg/L
- Total Chlorine Residuals $\geq 0.50$ mg/L

Steps to improve residuals:
- SCADA WQ function
- Targeted DS dosing systems (piloting)
- Minimize blending
Priority 2: Pressure Monitoring

Assessment Targets

▪ 20 psi minimum in 99.5% daily minimum measurements
▪ 125 psi maximum in 95% of measurements
▪ Daily pressure fluctuations do not exceed 125 psi in 95% of measurements
▪ Pressure collected at a minimum of two critical sites in each pressure zone

Priority 2: Pressure Monitoring

Optimization Steps

▪ Online pressure analyzers at critical points
▪ Pressure data analytics and alarms
  Use to:
  ▪ Change Zone boundaries
  ▪ Change reservoir set points
  ▪ Install regulators
  ▪ Install SCADA controlled Operational Valves
  ▪ Manage for leak reduction and energy savings
Priority 3: Nitrification

Assessment Recommendations

- Monitoring of free ammonia, nitrite, HPC, ATP
- Established Action Levels
- Total Chlorine residual maintained > 0.5 mg/L
- Storage tank turnover monitoring
I. **Presenter:** Francois Rodigari, Director of Water Quality and Environmental Services  
   **Email:** francois.rodigari@sjwater.com  
   **Phone:** 408-279-7967

II. **Treatment Plant Characteristics:**
   - Water Treatment Facility
   - 374 employees
   - 1,000,000+ customers served

III. **Innovation:**

   A. **Description**
   
   Integrated consumer complaints related to water quality

   B. **Type of Innovations**
   
   - Increased use of Information Technology
   - Modification of workflow processes or classifications
   - New approach to documentation, technical training, staff development, or knowledge management

   C. **Motivation for Innovations**
   
   We needed to improve the ability to respond quickly to water quality complaints and to more quickly be able to identify underlying trends in the nature of those complaints.

   D. **Barriers/Challenges**
   
   The ability to get the IT resources to pull together information from various databases
E. Benefits

The ability to easily review and understand the number and nature of consumers’ water quality complaints

F. Effect on Staff Training

Staff has had to learn how to query SJWC databases to obtain background information on water quality and to learn new software to enter field data for later upload into SJWC information systems.

G. Lessons Learned

Change is difficult and the amount of training for staff was greater than anticipated.

Staff has come to appreciate the ability to be better informed when responding to consumer complaints and to provide overall better service to customers.

IV. Information Sharing:

- Willing to host on-site tour
- Willing to visit another regional water/wastewater facility to provide presentation on innovation
- Willing for a staff member from other utility to conduct a follow-up visit to your utility to learn more about your innovation
- Interested in on-line forum to discuss water/recycling/wastewater treatment issues
Managing WQ Complaints

South Bay BAYWORK WOW - Francois Rodigar
06/04/14

Business Rules

- Calls related to water quality complaints are answered by Customer Service Representative (CSR), categorized, and stored in SJWC’s Customer Care & Billing (CC&B) database.
- Escalated calls are referred to Water Quality Supervisor.
- Water Quality Supervisor may initiate a field investigation if complaint cannot be resolved over the phone.
- Field investigation includes a home visit and field analyses of chlorine residuals, pH, and total coliform (inside and outside the home).
- Customers are provided with test results and interpretation of the results.
Complaints Categorization & Numbers

- WQ Categories:
  - Taste & Odor
  - Dirty Water
  - Turbidity
  - Larger Organisms (nematodes, etc.)
  - Illness/Gastro
  - Other

- April 2014 statistics:
  - 31 Water Quality Related Phone Calls
    - 20 Complaints Resolved over Phone by CSRs
    - 10 Complaints Resolved by WQ Supervisor
    - 1 WQ field investigation

Automated Alerts

- Ability to map complaints temporally and spacially
- Automated emails when more than 4 Water Quality Calls are received within an 8 hour period.
SILICON VALLEY'S WATER COMPANY

Real Time Mapping and Analysis

WQ Quality Data Tracking
Summary

- Water Quality field investigations are responded to by the Water Quality Department staff.
- Water Quality Complaints management is integrated through a GIS interface.
- GIS interface and layers facilitates coordination between Operations, Distribution Systems, and Engineering to implement corrective actions if appropriate.
I. **Presenter:** Curt Rayer, Director of Operations

II. **Treatment Plant Characteristics:**

- Water Treatment and Distribution
- 374 employees
- 1,000,000+ customers served

III. **Innovation:**

A. **Description**

SCADA time of use pump controls

B. **Type of Innovations**

- Increased use of Information Technology
- New treatment process
- Modification of workflow processes or classifications
- New approach to documentation, technical training, staff development, or knowledge management
- Optimization of existing resources

C. **Motivation for Innovations**

Cost of operation – energy management

D. **Barriers/Challenges**

Unique programming in SCADA PLCs and HMI
E. Benefits

Maintain effective time of use pumping operations

F. Effect on Staff Training

Staff must be trained on PG&E time of use schedules and how SCADA will manage pump starts and stops.

G. Lessons Learned

More elaborate SCADA controls require increased support from company IT staff

IV. Information Sharing:

- Willing to host on-site tour
- Willing for a staff member from other utility to conduct a follow-up visit to your utility to learn more about your innovation
- Interested in on-line forum to discuss water/recycling/wastewater treatment issues
SJWC Energy Management Strategy

- Three key elements
  1. Annual pump testing program
  2. Time-of-Use (TOU) pump operations
  3. Automated pump operations based on efficiency
Annual Pump Test Program

- Each pump tested once every two years
  - Field test performed by SJWC staff (system operator and electrician)
  - Includes ground water wells and booster pumps
  - Approximately 140 pump tests annually

- Each test consists of three data points
  - Compare results to original pump curve
  - Motor efficiency/performance
  - Key efficiency data from pump test;
    1. Overall plant efficiency (OPE) for each pump
    2. Total kWh per million-gallons of water produced for each pump

Time-of-Use (TOU) Pump Operations

- Pump operations managed by SCADA
- Control for each pump incorporates PG&E TOU schedules
  - PG&E rate schedule
    - Summer/Winter
    - Time of day
    - Weekdays, weekends, holidays
  - SCADA assigns each pump a set-point table that incorporates appropriate on/off points (24 hrs, in 15 min intervals)
## Time-of-Use (TOU) Pump Operations

### Current Status
- **Period:** Peak
- **Season:** Summer
- **Day:** Thursday
- **Day/Type:** WeekDay
- **Time:** 1734
- **Day of Year:** 135
- **TimeSegment:** 86

### Holidays
1. New Year’s Day
2. Presidents Day
3. Memorial Day
4. Independence Day
5. Labor Day
6. Veterans Day
7. Christmas

### Setpoint Index Upload Counter
- **Successful:** 3
- **Failures:** 0
- **TimeScript:** 59244

### Rate Schedule

**First Day of Summer 172:**
- Partial 1 Begins: 3
- Peak Begins: 3
- Partial 2 Begins: 3
- Off Peak Begins: 3
- First Day of Winter 305:
- Partial Begins: 3
- Off Peak Begins: 3

### PGE Power Generation
- **Period:** SuperPeak
- **Shoulder 1 Begins:** 34
- **Shoulder 2 Begins:** 35
- **Super Peak Begins:** 36
- **Night 1 Begins:** 37
- **Night 2 Begins:** 38

### System Econ Setpoints Table

<table>
<thead>
<tr>
<th>DONR</th>
<th>PISRWR</th>
<th>RESL</th>
<th>CV</th>
<th>Summer</th>
<th>WeekDay</th>
<th>Time</th>
<th>Interval</th>
<th>Start</th>
<th>Stop</th>
<th>Time</th>
<th>Interval</th>
<th>Start</th>
<th>Stop</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
</tr>
<tr>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
</tr>
<tr>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>6.00</td>
<td>6.00</td>
<td>6.00</td>
<td>6.00</td>
<td>6.00</td>
<td>6.00</td>
<td>6.00</td>
<td>6.00</td>
<td>6.00</td>
<td>6.00</td>
<td>6.00</td>
<td>6.00</td>
<td>6.00</td>
<td>6.00</td>
</tr>
<tr>
<td>7.00</td>
<td>7.00</td>
<td>7.00</td>
<td>7.00</td>
<td>7.00</td>
<td>7.00</td>
<td>7.00</td>
<td>7.00</td>
<td>7.00</td>
<td>7.00</td>
<td>7.00</td>
<td>7.00</td>
<td>7.00</td>
<td>7.00</td>
</tr>
<tr>
<td>8.00</td>
<td>8.00</td>
<td>8.00</td>
<td>8.00</td>
<td>8.00</td>
<td>8.00</td>
<td>8.00</td>
<td>8.00</td>
<td>8.00</td>
<td>8.00</td>
<td>8.00</td>
<td>8.00</td>
<td>8.00</td>
<td>8.00</td>
</tr>
<tr>
<td>9.00</td>
<td>9.00</td>
<td>9.00</td>
<td>9.00</td>
<td>9.00</td>
<td>9.00</td>
<td>9.00</td>
<td>9.00</td>
<td>9.00</td>
<td>9.00</td>
<td>9.00</td>
<td>9.00</td>
<td>9.00</td>
<td>9.00</td>
</tr>
<tr>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
</tr>
<tr>
<td>11.00</td>
<td>11.00</td>
<td>11.00</td>
<td>11.00</td>
<td>11.00</td>
<td>11.00</td>
<td>11.00</td>
<td>11.00</td>
<td>11.00</td>
<td>11.00</td>
<td>11.00</td>
<td>11.00</td>
<td>11.00</td>
<td>11.00</td>
</tr>
<tr>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td>13.00</td>
<td>13.00</td>
<td>13.00</td>
<td>13.00</td>
<td>13.00</td>
<td>13.00</td>
<td>13.00</td>
<td>13.00</td>
<td>13.00</td>
<td>13.00</td>
<td>13.00</td>
<td>13.00</td>
<td>13.00</td>
<td>13.00</td>
</tr>
<tr>
<td>14.00</td>
<td>14.00</td>
<td>14.00</td>
<td>14.00</td>
<td>14.00</td>
<td>14.00</td>
<td>14.00</td>
<td>14.00</td>
<td>14.00</td>
<td>14.00</td>
<td>14.00</td>
<td>14.00</td>
<td>14.00</td>
<td>14.00</td>
</tr>
<tr>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
</tr>
<tr>
<td>16.00</td>
<td>16.00</td>
<td>16.00</td>
<td>16.00</td>
<td>16.00</td>
<td>16.00</td>
<td>16.00</td>
<td>16.00</td>
<td>16.00</td>
<td>16.00</td>
<td>16.00</td>
<td>16.00</td>
<td>16.00</td>
<td>16.00</td>
</tr>
</tbody>
</table>

**Notes:**
- **System Clock Setpoint Index Upload Request:** 1
- **System Clock Setpoint Index Upload EXEC Counter:** 2
- **System Clock Setpoint Index Upload Request:** 1

---

**San Jose Water Company**
Pump Operations Based on OPE

- Annual pump test data used to calculate cost of production for each rate period ($/MG)
  - energy unit price ($/kWh) x pump kWh/MG + purchased water (Import) + basic user charge (GW) + chemical
- SCADA assigns pump on/off set-point table(s) based on estimated cost of production for current rate period
  - Most efficient to least efficient
- System ensures that operation of most cost effective source of supply is maximized on a daily basis

SJWC Energy Management Strategy

Thank you...
Questions?
I. **Presenter:** Kelvin Hatchett, Operations Supervisor  
**Email:** khatchett@westvalleyca.org  
**Phone:** 408-378-2407

**Respondent:** Edward H. Oyama, Director of Engineering and Operations  
**Email:** eoyama@westvalleyca.org  
**Phone:** 408-385-3011

II. **Treatment Plant Characteristics:**

- Wastewater Collections
- 28 employees
- 108,000 customers served

III. **Innovation:**

A. **Description**

Implementation of Computerized Maintenance Management Systems (CMMS)/Geographical Information Systems (GIS) and Field Integration Technology

B. **Type of Innovations**

- Increased use of Information Technology
- Modification of workflow processes or classifications
- New approach to documentation, technical training, staff development, or knowledge management
- Optimization of existing resources
- Reduction of sanitary sewer overflow (SSO) volumes and reduction of Category 1 spill rates

C. **Motivation for Innovations**

Eliminate dependency on paper mapping and provide an interactive mapping system to assist the maintenance workers to enable them to perform their jobs more effectively and efficiently.
D. Barriers/Challenges

Finding software and hardware that is very user-friendly and has an excellent track record to avoid discouraging the relatively non-technical maintenance worker.

E. Benefits

In addition to saving 45 days-per-year of labor associated with paper maps, the field integration has provided the novice maintenance worker immediate access to information that the seasoned maintenance worker knew from memory.

F. Effect on Staff Training

Raised the competency level of all maintenance worker staff and specialized training in the use of the field software and hardware was required.

G. Lessons Learned

Time spent panning, researching, and assembling a representative team of stakeholders was key to a successful outcome.

IV. Information Sharing:

- Willing to host on-site tour

- Willing to visit another regional water/wastewater facility to provide presentation on innovation

- Willing for a staff member from other utility to conduct a follow-up visit to your utility to learn more about your innovation
Implementation of CMMS/GIS, and Field Integration Technology

Edward H. Oyama, P.E.

Map of WVSD
System Info

- Total Service Area: 28.4 sq. miles
- Population Served: 108,000
- Sewer Mains: 415 mi.
- Laterals: 210 mi.

CMMS/GIS Milestones

Pre-1983
Spreadsheet tracking and paper map work orders

1983-2002
- COSMO (Computerization of Sewer Maint Operations)
- CCTV Inspections and Condition Assessment (VHS)

2003
- Lucity (formerly GBA Master Series)/GIS
- CCTV Inspections and Condition Assessment (DVD)
CMMS/GIS Milestones

2006
    Initiated Geozone Cleaning (1st application of GIS)
    GIS mapping & scanned paper maps used in office

2008
    Acquired GIS Analyst
    Implemented Lateral Maint Program (expanded use of GIS)
    Corrected GIS mapping/lateral mapping began

Post-2008
    Use of GIS w/ Risk Model, Hydraulic Model, & other uses
    InfraMap – Field Accessible WO & GIS Mapping
    NO MORE paper maps (almost)

Conversion of Paper Maps
Elimination of Paper Maps

Applications of CMMS/GIS
**Risk Model Map**

- Quito Basin 7, Area 3&4
- Quito Basin 5&7, Area 1
- Quito Basin 7, Area 1

---

**GIS Utilization for Risk Model**

District Risk Model is used to help prioritize CIP projects

Risk = Likelihood of Failure (LoF) x Consequence of Failure (CoF)
Risk Model Map

Screen Shots

Lines completed
**Aerial View & Redline Edits**

**Use of Aerial View**

Provides MW w/ Reference Point to Find Manholes & Locate Property (especially on stormy nights)

---

**Aerial View & Redline Edits**

Field crews can provide edits and comments as they encounter them which are incorporated in system within a matter of days
I. **Presenter:** Steve Twitchell, Water Plant Supervisor V, Santa Clara Valley Water District

II. **Treatment Plant Characteristics:**
   - Rinconada Water Treatment Plant: 80 MGD
   - 731 employees
   - Millions of customers served

III. **Innovation:**

   A. **Description**
   
   We are in the process of rebuilding the current 80 MGD WTP to 105 MGD WTP using the Best Management Practices (BMP) and the Best Available Technology (BAT)

   B. **Type of Innovations**
   
   - Increased use of Information Technology
   - New treatment process

   C. **Motivation for Innovations**
   
   Reliability

   D. **Barriers/Challenges**
   
   The existing water treatment plant has to stay in operation while the new plant is built around it
IV. Information Sharing:

- Willing to host on-site tour

- Willing to visit another regional water/wastewater facility to provide presentation on innovation

- Willing for a staff member from other utility to conduct a follow-up visit to your utility to learn more about your innovation

- Interested in on-line forum to discuss water/recycling/wastewater treatment issues
Rinconada Water Treatment Plant Reliability Improvement Project
Engineering Services for Design Phase
Project No. 93294057

April 14-18, 2014

60% Design Review
Santa Clara Valley Water District

Technical Review Focuses on Greater Details as Design Progresses

- Planning Study
  - Process choice
  - Basic design criteria

- Equipment choices
  - Design criteria
  - Final

- Layout Final
  - Hydraulics
  - Updated construction cost

- Landscaping/aesthetics
  - Confirm process and control strategies
  - Updated construction cost

- Final Staging approach
  - Incorporate ER (emergency) requirements
  - Develop commissioning plan and regulatory requirements

- Address 90% review comments
  - Final construction cost estimate
Topics

1. Overview
2. Construction Phases
3. Current Construction Schedule
4. Schedule and What Else is Going On
5. Environmental Impact Report
6. California Department of Health – Amended Operating Permit
7. Traffic Flow
8. Staging and Parking Areas
10. Work hours

1 – Overview
The District Selected Treatment Train

Planned Improvements – As Envisioned
(February 4, 2014)
Risks Deemed Significant by District

- Schedule
- Safety
- Costs
- Interim operations: water quality and capacity
- Start-up
- Environmental and neighborhood issues

2 – Construction Phases
3 – Current Construction Schedule

Other Projects Will Overlap with the Construction of Rinconada Improvements

- Seismic
- Residuals-Valves
- Quito Bridge
- Montevina WTP
4 – Schedule and What Else is Going On

Other Projects Will Overlap with the Construction of Rinconada Improvements

- Seismic
- Residuals-Valves
- Quito Bridge
- Montevina WTP

Months
5 – EIR Schedule

Major EIR Milestones

- April
- May
- June
- July
- August
- September
- October
- November
- December

45-day Public Review Period

Draft EIR

EIR Certification

Final EIR
6– California Department of Health
Amended Operating Permit

Rinconada Improvements Will be Discussed at
Annual CDPH-District Meetings

2014

May  June  July  August  September  October  November  December

Annual Meeting

Background package 3 weeks prior to CDPH Meeting

2015

May  June  July  August  September  October  November  December

Annual Meeting

Draft Technical Report

Amended Permit 3 weeks prior to meeting
Managing Risks to Preserve Safety is Important

- Increased traffic in neighborhood associated with construction.
- Amongst the risks this introduces is:
  - Speeding
  - Congestion
- Of particular concern is the uphill left turn into plant.
Potential Truck Traffic Paths to Reduce Safety Risks – Construction Phase 1

Granada Way Entrance  Potential construction staging area  Connector Road

Potential Truck Traffic Paths to Reduce Safety Risks – Construction Phase 2

Solids hauling  Chemical delivery  Construction traffic
Truck Traffic Paths at Final Configuration

8– Contractor Parking and Staging (plus District parking)
Construction Staging and Parking Areas

9 – Nine Months in 2016
Quito Road Closure: Increased Traffic on More Ave

10 – Work Hours

RELIABILITY + SUSTAINABILITY
proactive risk management
I. **Presenter:** Dan Stevenson, Wastewater Operations Manager

II. **Treatment Plant Characteristics:**

- City of Sunnyvale Collection System: Water distribution and treatment, wastewater collections and treatment, and recycling
- 41 employees in Water and Sewer Division
- 145,000 customers served

III. **Innovation:**

The installation of storm water trash capture devices is consistent with the National Pollution Discharge Elimination System (NPDES) requirements. Sunnyvale has participated in a pilot project and has installed several styles of trash capture devices throughout the city.

A. **Description**

I am most proud of our organization staying on top of and actually being out in front of regulatory requirements. The city of Sunnyvale was a pioneer in storm water trash capture devices in the South Bay. The city participated in a pilot project sanctioned by Santa Clara Valley Urban Runoff Pollution Prevention that attempted to look at trash loading and quantifying organic and inorganic materials.

Sunnyvale was instrumental in assisting the Regional Water Board assess and quantify the amount of trash loading occurring locally, and storm water drainage systems.

B. **Type of Innovations**

- New treatment process
- Modification of workflow processes or classifications
- Inter-agency agreements or other administrative changes
- New approach to documentation, technical training, staff development, or knowledge management
- Optimization of existing resources
C. Motivation for Innovations

Regulatory compliance was a primary factor; however, Sunnyvale has always been an industry leader in environmental integrity. The city continues to be a leader in issues that can lead to environmental sustainability.

D. Barriers/Challenges

Funding is typically the primary challenge faced by local agencies, and this issue is no different. Any time there are massive changes for regulatory compliance, they usually come with resource costs. Government functioning on limited funding always faces unfunded mandate challenges.

E. Benefits

The reduction of trash entering local waterways and the Bay

F. Effect on Staff Training

Staff has needed to be retrained on the importance of trash capture devices and how to clean and maintain them on a regular basis. Staff “buy-in” was critical to facilitate an industry sea-change.

G. Lessons Learned

We learned that the small local trash capture devices are maintenance-intensive and not sustainable to install in every storm drain inlet. There are over 3,800 storm drain inlets in Sunnyvale, and after installing 77 screen devices inside catch basins, we quickly learned that we would not be able to install them everywhere in town. We have begun installing larger trash capture units called “vortex separators.” These devices can be installed on large diameter pipes and collect trash from many storm drain inlets at once. There is a much larger upfront capital cost, but much lower long-term maintenance.
IV. Information Sharing:

- Willing to host on-site tour
- Willing to visit another regional water/wastewater facility to provide presentation on innovation
- Willing for a staff member from other utility to conduct a follow-up visit to your utility to learn more about your innovation
Storm Water Trash Capture Devices and Pumping

Baywork Workshop on Wheels- WOW

June 4, 2014

Dan Stevenson
City of Sunnyvale

A little bit about me..... Dan Stevenson

City of Sunnyvale,
Wastewater Operations Manager (2009)

B.A. in Leadership and Organizational Studies from St. Mary’s College

BACWA Collections System Committee Chair

CWEA State Collections Systems Committee Board member, CSM Grade 4 certified, P|C|K and Golden Manhole Recipient

CDPH Water Distribution, D3 Certified (passed D4 test)
Background

- City of Sunnyvale
  - Bordered by Stevens Creek and Calabazas Creek
  - 2 Large Artificial Channels
  - ~142,000 Residents
  - ~23 Sq. Mi. Area
  - ~330 miles of Storm Drain Piping

Sunnyvale
Trash Control Strategies

- Catch basins - once a year
- Street Sweeping - every other week
- Pump Station - weekly visits
- Outreach - events, demos, etc.
- Site Inspections - BMPs, enforcement, illicit discharges

Current Field Program

- Clean DIs Once a Year - July - Oct.
  - ~ 3,800 Storm Drain Inlets
- Trash Capture Devices - more frequently
  - Inlet Devices - 77
  - CDS Units - 4
Current Field Program

- Trash Capture Devices - more frequently
  - 13 installed with pilot program
  - 64 additional units with ABAG grant ($113K)

- Work in Progress - What We Discovered

(Interval/Freq.)

Current Field Maint. Program

- Work in Progress - What We Discovered

- Loading Rate Factors
  - Rainfall
  - Location
  - Time of Year (Leaf Drop)

- Inlet Devices - 77
- CDS Units - 4
Cleaning Activities

- Tools
- Clean and remove all debris from catch basins
  - Vacuum and/or ‘Clam’

Trash Capture Device - Stormtek
Manual Cleaning

Process with Vacuum Unit
Process with Vacuum Unit

Process with Vacuum Unit
Process- Trash Capture Units

Process- Trash Capture Units
Process- Trash Capture Units

Process- Trash Capture Units
Process - Trash Capture Units

Process - Trash Capture Units
Process - Trash Capture Units

Process - Trash Capture Units
Process - Trash Capture Units

Process - Trash Capture Units
Process - Trash Capture Units

ARS - Units
Vortex Separators

Pump Stations

- Screens at Inlets
Summary

- Time Consuming
  - Takes ~ 20-30 mins/each

- Device Reliability
  - ARS Tends to ‘Load’ and Lock Open

- Equipment Needed
  - Vacuum Unit or Crane Equip

- All these issues require additional staff time-
  - Meaning additional funding (i.e.; MONEY)

Summary

- Never Forget-
  - Every Activity We Perform is Intended to Improve Water Quality!

WATER’S WORTH IT

OUR PASSION  OUR RESPECT  OUR EFFORT  OUR HEALTH  OUR FUTURE
Questions?