



# Optimizations, Innovations, and Achievements



June 30, 2017

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## INTRODUCTION

This report was originally produced in December 2016 under the title “Optimizations & Opportunities,” as part of my second rotation in the Mentorship Program with Ann Sasaki, Deputy General Manager.

That report, which focused on optimizations, has now been updated and re-titled to include innovations and other notable achievements by staff, both “in progress / completed” and “planned / future,” as of the end of FY 2016-17, and focusing on projects completed under the leadership of Roger S. Bailey, General Manager, since he joined Central San in 2013. In putting together this document, I met with managers and key staff throughout Central San to learn about each process, its implementation, and positive outcomes.

Optimization and innovation is the answer to our challenge of doing more for less. It shows productivity and continuous improvement in response to aging infrastructure, tight public finances, regulatory requirements, and other challenges facing our industry.

The projects in this report all serve Central San’s Strategic Plan in some way and benefit our organization by achieving one or more of the following goals: reduce staff time; improve accuracy; operate more cost effectively; eliminate hazards and promote safety; enhance customer service; be environmentally sustainable; utilize new technologies; maximize use of existing infrastructure; and forge leadership in the wastewater industry.

With any new ideas, there are challenges to be faced. There can be resistance to change; competing priorities; limitations in budget and staffing; shortcomings in current resources or software; or a potential domino effect on other workgroups or processes. Moreover, conflicting schedules and differences of approach may become an obstacle when working in collaboration with others.

Despite these challenges, Central San has accomplished so much. The interdepartmental teamwork and creative thinking that is bringing these projects to completion is particularly impressive. Central San is comprised of many divisions and hundreds of minds, and together we have worked to bring continued ingenuity, technology, collaboration, and excellence to the agency.

## ADMINISTRATION

### COMMUNICATION SERVICES & INTERGOVERNMENTAL RELATIONS

## SOCIAL MEDIA

To supplement Central San's external website, social media allows Central San to communicate with its stakeholders and peers in a variety of ways that are more friendly and informal than the website. Central San can share news, public service announcements, cross-promotions with sister agencies and informational videos about the services we provide. Social media **increases the efficiency of staff time by rerouting resources** used to produce one *Pipeline* to several social media accounts to reach many different demographics.

In October 2015, the Board approved Board Policy BP No. 021 on Social Media Communication. The official comment policy regulates the information exchanged on the sites. Staff launched the websites in January 2016 and maintains these on a regular basis.



Twitter Page



YouTube Channel



Facebook Page



Blog

## VIDEOS FOR TARGETED OUTREACH



Videos produced in house by staff are used for both internal and external communication. They are carefully scripted and produced to maximize the message of the video. Public service announcements were **delivered to an estimated 113,000-137,000 viewers, or 34.8% of the households in our service area.**

Staff created the videos in house and negotiated pricing and strategic placement with Comcast, at a cost savings when compared to publication costs through a newspaper. Videos aired throughout the year at appropriate times; for example, the “Dispose Your Cooking Oil Properly!” video (screenshot pictured) aired around the Thanksgiving holiday during cooking shows. Staff also installed a display monitor in the Headquarters Office Building (HOB) lobby (pictured) to provide a continuous presentation of customer information.

## OUTREACH FOR THE COMPREHENSIVE WASTEWATER MANAGEMENT PLAN (CWMP)



Three public workshops, one for residential customers and one for commercial customers (pictured), were held to discuss the CWMP recommendations, infrastructure improvements, financial outlook, and other programs and services. Staff also made presentations to city councils, taxpayer associations, televised broadcasts, *Pipeline* newsletter articles, and community events and meetings. These were creative techniques to engage customers in the CWMP and infrastructure improvements planned for Central San.

## 70<sup>th</sup> ANNIVERSARY OPEN HOUSE EVENT



Central San's first ever customer engagement event of its magnitude, an Open House to celebrate our 70<sup>th</sup> anniversary, was held Saturday, July 16, 2016 and **hosted over 1,000 customers and 20 elected officials**. The attendees learned more about our programs, services, and operations and took tours of our Treatment Plant and Household Hazardous Waste Collection Facility (HHWCF). It was a family friendly event which included live music, toilet races, corn hole, face painting, and other activities.

Staff presented the idea to the Board for approval and held Planning Committee and Subcommittee meetings in preparation for the event, which was staffed by volunteer Central San employees.



## ADDITIONAL ACHIEVEMENTS

- Negotiating the printing costs to optimize the budget of the *Pipeline* saved **\$15,000**. The savings were realized over two printing cycles in FY 2016-17.
- Reducing the number of *Pipeline* issues per year from three to two **saved approximately \$42,000**.

**ADMINISTRATION  
HUMAN RESOURCES****FLEXIBLE SPENDING ACCOUNT ADMINISTRATION**

A third-party company, P&A Group, administers the flexible spending account (FSA), including health care and dependent care. This decreases the amount of in-house staff time needed to process reimbursements. Employees are able to utilize a benefits MasterCard (pictured) for eligible expenses, set up their own accounts for self-service, submit claims electronically and confidentially, and request claim reimbursements at any time via direct deposit or a paper check.

Staff began searching for a vendor in 2014 and found P&A via our benefits broker, Alliant. The program was rolled out in October 2016, taking effect on January 1, 2017.

**MENTORSHIP PROGRAM**

This was the first mentorship program at Central San, and it set itself apart from similar programs at other companies by being project based. Each mentee was required to complete a project with their mentor and present it to the Executive Team, and in some cases, the Board. Many of these projects gave the mentees experience in a different field from their usual job duties and exposed them to leadership opportunities, responsibilities, and networking with staff from other departments and divisions.

Staff rolled out the program in 2015 by soliciting applications. Five applicants were chosen as mentees for the pilot program, and each mentee had a different mentor each quarter, from July 2016 to July 2017. Staff plans to roll out the second mentorship program, with longer (six-month) rotations to allow for further relationship building and more time to develop the mentees' projects, in January 2018.

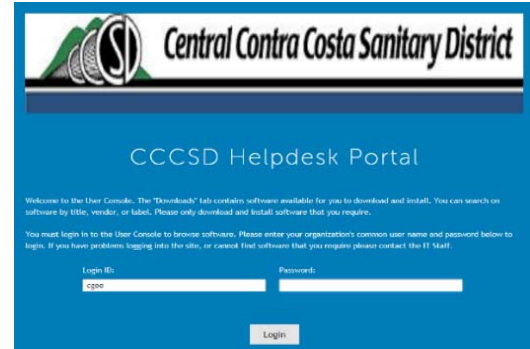
**EXTERNSHIP PROGRAM**

The Externship Program through Earn & Learn East Bay connects employers to regional efforts designed to help grow the future workforce in our community. Central San volunteered to participate in this program, offering a Life and Earth Sciences teacher from the Mt. Diablo Unified School District exposure to different divisions in Central San. This helped him develop a curriculum to prepare his students for a career in wastewater treatment. This was an innovative program, as it was new to Central San and beneficial to the community we serve.

Teji O'Malley, HR Manager, offered Central San as a host agency, and Earn & Learn East Bay placed the teacher with us. Teji developed the program via a series of questionnaires over about a month. The teacher's externship was one week long, and he spent two to three hours with each main functional area of Central San, including the Laboratory (Lab), Treatment Plant, and Resource Recovery.

**ADMINISTRATION  
INFORMATION TECHNOLOGY****HELPDESK**

The Helpdesk software collects support requests filed through a website portal or by email. This centralizes records for IT to track the usage of its staff and the issues experienced by a single user, and it is a platform through which staff can be dispatched in matters pertaining to their individual expertise. The extension 811 phone line provides exceptional customer service as it rolls over to IT staff until the caller reaches a live person.



The faster an issue is corrected, the more productive staff can be, and the Helpdesk is an effective way of routing IT assistance. Surveys indicated that **96% of users rated their experience 5 out of 5 in 2016 – a 4% increase from 92% in 2015**, showing that customer service satisfaction is high and has only increased while the Helpdesk has been in effect.

**REPLICATION OF BACKUPS TO CO-LOCATION FACILITY**

While IT backups are actively being generated daily, very few of these backups were sent to an offsite location. Sending a duplicate copy of all IT backups allows Central San to recover data from a separate geographic area should a major natural disaster (fire, flood, or earthquake) or cyber disaster (virus, worm, or malware) occur. The ability to recover data quickly is a critical component of our disaster recovery and business continuity plan. Without it, key business processes vital to our operation could be negatively impacted. This, in turn, could have negative repercussions with our customer base as well as the environment, depending on which systems were impacted by the data loss. A new tape backup system was also implemented to complement the primary disk based-backup system, which provides another viable recovery method. In part because of the co-location (co-lo) facility, Central San's **2015 security rating of "critical" was upgraded to "high."**

Competing proposals from three different co-lo facilities were solicited. Initial discussion with potential providers began in April 2016, and the contract was awarded in June 2016 to the vendor with the lowest price, Wave Communications. Data connectivity to Wave's co-lo facility (pictured), near Sacramento, was established in December 2016. The facility was fully functional in 2017.



**ADMINISTRATION**  
**OFFICE OF THE SECRETARY OF THE DISTRICT****VIDEO TAPING OF BOARD MEETINGS & BOARD ROOM UPGRADES**

The projectors were replaced with sharper, brighter models and a third projector and viewing screen were added; the control panel on the podium (top picture) was replaced with an electronic tablet (bottom picture); single-camera video recording equipment was added; and electrical outlets were installed on the dais and managers' table with USB ports for charging tablets and laptops during meetings.



The new equipment provided improved presentation capabilities. Making videos of meetings available to staff and the public provides better customer service and transparency; reduces the waiting period for learning what transpires at meetings to the next day; enables Secretary of the District (SOD) staff to produce briefer minutes; and reduces Public Records Act requests for transcripts or recordings. Additional wiring was laid at no additional cost for a possible future multi-camera setup. The new control panel is a one-touch system that activates all projectors and lowers the screens simultaneously. The bulbs are

energy efficient and do not need to be deactivated during meetings.

SOD staff determined the equipment needs and worked with members of IT and Communication Services to have the equipment installed and maintained. The process took approximately four to six months to complete in 2015.

**PUBLISH SUMMARIES OF NOTICES TO CONTRACTORS**

The cost of publishing legal notices in local newspapers, such as Notices to Contractors (NTCs), is based on lines of text. Summaries are roughly one-third the length of a full NTC. In 2016, the average cost per full NTC posting was \$1,598 (13 postings total). In 2017 thus far, after only publishing the NTC summaries, the average cost per posting was \$519 (8 postings as of June 30, 2017), resulting in a **68% reduction in publication costs**.

This idea was suggested by an Associate Engineer in Capital Projects. SOD staff met with the Capital Projects Division Manager, who worked with District Counsel to review the Public Contract Code requirements for NTCs. It was determined that summaries would be sufficient if they included a link to where additional information may be obtained. District Counsel worked with Capital Projects staff to develop a summary template that meets legal requirements.

After review by the Capital Projects Division Manager in October 2016, the mechanisms were put into place and the first summarized NTC was published in December 2016.

## REVISED BID SPECS TO STANDARDIZE CLOCK FOR BID OPENINGS

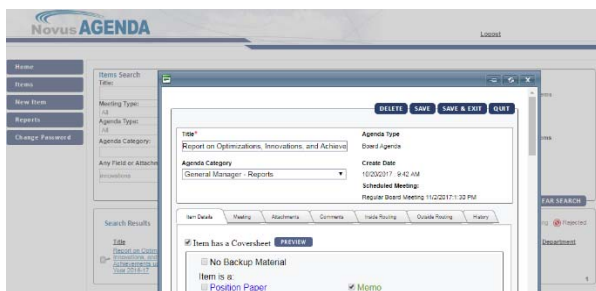
Previously, the atomic clock in the lobby was used as the time source for public bidding, as stated in the bid specs. The time reflected on that clock did not always sync with cell phones or computers, which could be problematic for last-minute bid submissions. Using *time.gov* ensures that all bidders and staff are using the same time source with no room for discrepancies as to when bids are closed.

SOD staff worked with Capital Projects and IT to implement this. Changes to the bid specs were approved by the Bid Spec Committee. During bid openings, a monitor in the lobby is now switched to *time.gov* (pictured) so that anyone present can see the same clock being used by staff. In the event of internet disruption, anyone can simply go to *time.gov* on their smart phone or tablet.



This idea was suggested to the Capital Projects Division Manager in October 2016. The first bid opening utilizing this new method took place in December 2016.

## AGENDA MANAGEMENT SOFTWARE



NovusAgenda (pictured) facilitates the drafting of position papers and other items for Board and Committee agendas by standardizing templates and automating document routing. The software also offers the capability to lock out items that are submitted beyond their due dates and postpone them to the next agenda, which will encourage the timely submission of items.

Other major benefits include the following: version control; automated assembly of electronic agenda packets; elimination of the need to number every item and have Reprographic Services scan the packets in house; automated hyperlinking and bookmarking; hosting and tagging the agenda materials and video recordings; seamless integration with Laserfiche; and capability to livestream Board meetings. In addition, it is a cloud-based solution that runs through a browser, with no client side software needed, and it is database driven with no "apps" needed, meaning that the agendas are available to the public through any device.

This process began in the spring of 2016. SOD staff worked with IT and Purchasing to prepare a Request for Proposal (RFP), received bids from multiple vendors, and participated in several vendor demonstrations of their products' features. After that, NovusAgenda was selected. A 90-day pilot program began in January 2017 with SOD and IT staff, but the advance work required to develop templates and workflows took a full six months.

Mandatory trainings were held for staff in June and scheduled for the Board Members in July, in advance of the full switch to the automated agenda beginning with the July 20, 2017 Board meeting and associated Committee meetings. Several features remain to be implemented, including video hosting, the interface with Laserfiche, and livestreaming. IT staff is actively working with Novus, which has since been acquired by Granicus, on each of these features.

## ADMINISTRATION PURCHASING & MATERIALS SERVICES

### AGREEMENT COVER MEMO

The cover sheet consolidates the information needed by Purchasing to execute professional services agreements into one place and encourages the end user to provide all the information at once. It organizes and standardizes submitted requests and reduces the back and forth that might otherwise occur to clarify or collect the information.

Staff compiled the list of data needed to execute the agreements and put them in checklist form, with feedback and buy-in from Capital Projects staff. Capital Projects has provided positive feedback during its test uses with the memo, so Purchasing has slowly started using the document with other departments.

PURCHASING DEPARTMENT CONSULTANT AGREEMENT TRANSMITTAL MEMO			
ROUTING	INITIALS	DATE	REVIEWED
1. Project Engineer			
2. District Contact			
3. _____ Division Manager	_____	_____	
4. Stephanie King, Purchasing Manager	_____	_____	
5. Kenton L. Alm, Counsel for the District	_____	_____	
6. Roger S. Bailey, General Manager	_____	_____	
Return to: Anthony Hoff, Senior Buyer			
GENERAL			
Work Description:			
Requisition number:			
Consultant contact information: Physical and email address			
Check agreement type:	<input type="checkbox"/> Professional Engineering <input type="checkbox"/> Professional Consulting <input type="checkbox"/> Technical Consulting		
DIR registration: <input type="checkbox"/> Yes <input type="checkbox"/> No	(if necessary) registration #		Contractors License #
Scope of Work Attached <input type="checkbox"/> Exhibit A	If not attached please explain		
Fee Schedule attached <input type="checkbox"/> Exhibit B	If not attached please explain		
Compensation type	<input type="checkbox"/> hourly with not to exceed cost ceiling <input type="checkbox"/> lump sum <input type="checkbox"/> other (please explain)		
Agreement start and end date			
Position Paper attached (if Board Approved) <input type="checkbox"/>			
Revision to current agreement year/ no	(if necessary) agreement #		
Insurance requirements (Exceptions need to be approved by Safety and Risk)	<input type="checkbox"/> General Liability - \$1M per occurrence / \$2M general aggregate with additional and primary/ non-contributory language <input type="checkbox"/> Auto Liability \$1M single limit <input type="checkbox"/> Workers Compensation with waiver of subrogation <input type="checkbox"/> Professional Liability <input type="checkbox"/> other (please explain)		
ADDITIONAL INFORMATION			

### CELL PHONE PROGRAM TRANSFER TO INFORMATION TECHNOLOGY

For at least ten years, Purchasing handled the cell phone program for both smart and flip phones for all non-managerial staff, including phone issuance and technical support. As of April 2017, IT assumed responsibility for the entire mobile technology program, including cell phones, tablets, air cards and accessories. Their knowledge enables them to provide an enhanced level of service for staff's needs, and the transfer consolidated all mobile technology to one division. Staff was notified of this change via email.

### SIMPLIFIED REQUISITION APPROVAL LEVELS

Purchasing streamlined approval levels for purchase requisitions down to three levels of approval. The signature authority matrix was previously more complex than necessary with 18 different levels of approvals, which were not consistently applied amongst staff. Staff **reduced those 18 levels of approval to 3**, and they are now based on job title to ensure consistency and to eliminate the need to determine an employee's approval authority every time a new employee is hired or a current employee changes positions.

**ADMINISTRATION**  
**RISK MANAGEMENT****DEVELOPMENT OF A RISK INVENTORY AND  
USE IN RISK CONTROL MEASURES**

As part of a Mentorship Program rotation from May to July 2017, a project was initiated to identify areas of Central San's business which present inherent risks and may require management and further attention. Interviews were conducted with each manager, and over 70 risks were identified and categorized (Regulatory, Operational Reliability, Capital Projects, Reputational, Safety, Regulatory/Legal, Labor, Board, and Engineering). Next steps include identifying existing and planned risk mitigation measures, quantifying inherent and residual risk levels, and considering how this information could be used in the development of an enterprise risk management program (ERM). In an ERM program, risks are centrally monitored, mitigation measures tracked, and risks reported on periodically to the Board of Directors.

Additionally, from this information, Central San intends to develop an internal audit program to conduct internal audits on a limited number of high risks functions annually. For FY 2017-18, Central San has committed to completing three internal audits. Funding has been budgeted for that audit work in this year's budget, and work has begun to develop an internal audit framework, under which these internal audits will be conducted and presented to the Board.

**ENGINEERING & TECHNICAL SERVICES**  
**CAPITAL PROJECTS****TRENCHLESS GUIDED BORING SYSTEM**

During the Pleasant Hill Grayson Creek Trunk Sewer Project, the construction team decided to change pipe installation methods on Pleasant Hill Road, an arterial roadway, from traditional open trench to a trenchless guided boring system. This reduced traffic impacts and other disruptions normally experienced during open trench work. The system was able to reach lengths up to 400 linear feet (LF) and was successfully implemented under Pleasant Hill Road. A total of approximately 2,000 LF were installed by this method. This project utilized three different trenchless guided boring methods to install about 7,200 LF (75% of total project footage) of large diameter trunk sewer pipeline.

**SLUDGE SCREENING**

This pilot was an attempt to remove plastics from sludge in order to lower furnace HCl emissions. The screening equipment was installed for 3 months in 2015 and was temporarily operated by staff; however, there were no measurable benefits found in piloting this process.



## PLANT ENERGY

This project will modify the main power generation unit for the Treatment Plant – the cogeneration (cogen) system – to allow operation at full load. Added oxidation catalyst technology can **reduce carbon monoxide (CO) output by 50% to 75%**, and the evaporative cooling technology added to the inlet may improve fuel efficiency. A CO catalyst has been added to the exhaust ducting as well. These improvements reduce emissions and costs of imported electricity, while simultaneously increasing operational flexibility and electricity generation.

Staff performed two business case analyses and hired Carollo Engineers for design services, including field investigation, project specifications and drawings for bid.

Capital Projects staff coordinated with the Comprehensive Wastewater Master Plan (CWMP) Team in Planning & Development Services to ensure the potential future replacement of the cogen does not negatively impact this project.

This process began after the Board approved it in November 2016. The project is scheduled to be completed by the end of November 2017.

### CO CATALYST LOCATION



### EVAPORATIVE COOLER AT INLET



**ENGINEERING & TECHNICAL SERVICES**  
**ENVIRONMENTAL & REGULATORY COMPLIANCE**

## ROOT CAUSE ANALYSIS

A Root Cause Analysis program has been implemented to identify underlying cause(s) of a permit deviation event that may potentially lead to a Title V or NPDES regulatory violation. With continuous improvement as a goal, the analysis involves thorough investigation with the assistance of Plant Operations and Maintenance staff and identification of corrective

actions. Past root cause analysis efforts have successfully reduced and prevented recurrence of permit deviation events. This was initiated in 2016.

## REGULATORY IMPACT ANALYSIS

Regulatory Impact Analysis (RIA) was developed as an effective communication tool to inform internal staff of upcoming regulations that may impact capital improvement plans, treatment plant operations, and maintenance practices. The RIA serves as a summary of the new or proposed regulations and includes a technical analysis of impacts and potential actions necessary to meet new obligations. This was initiated in 2017.

## CAUSTIC INJECTION DOSAGE STUDY

Switching the caustic injection point for the wet scrubber of Furnace No. 2 from the first stage to the quench stage should reduce the amount of caustic soda required to remain above the wet scrubber effluent minimum pH limit. Optimizing the dosage rate will reduce the amount of caustic soda purchased and, thus, reduce chemical costs. Once the official minimum pH limit is established by the Environmental Protection Agency, there is a **potential to save up to \$130,000 per year in caustic consumption.**



Environmental & Regulatory Compliance staff worked in conjunction with Plant Operations to conduct a study to test different caustic injection rates to the quench stage. An optimal injection rate was identified based on HCl emissions and the wet scrubber effluent pH. Extensive emissions testing was conducted at the optimal injection rate to confirm compliance with the existing HCl emissions limit. The project was initialized in July 2016, with testing from December 12 – 20, 2016, results received in February 2017, and the final switch to quench stage in March 2017.

Positive test results indicated reduced caustic usage ensured compliance with Furnace No. 2's HCl limit. New design criteria for the system is now in place.

## ZEOLITE-ANAMMOX PILOT



This was a pilot project to evaluate the technology’s feasibility for mainstream nutrient removal. The results did not indicate that this method was compatible with Central San’s operations. However, the Regional Water Quality Control Board recognized the completion of the pilot as Central San’s continual commitment to advance understanding of nutrient removal in the 2017 National Pollutant Discharge Elimination System (NPDES) Discharge Permit. The pilot was conducted from July 2014 to October 2015.

## PERMIT MATRIX

The matrix serves as a single repository for all permit-related information and helps Central San track its Strategic Plan Goal 2 – Strategy 1 of 100% permit compliance in air, water, land and other regulations. It streamlines permits management and saves staff time by having the permits all in one central repository.

Type	Index	Permit/Regulation	Required Regeneration	Renewal Cycle	Expiration Date	Renewal Due Date	Start Renewal Preparation	Site Deadline	Mainstream Asset Number	Additional Information
Air	Air-1	<a href="#">SAGHEFD-CO2</a>	Intermittent SAGHEFD-CO2HS	Annual	04/01/17	03/01/17	02/01/16	02/01/17	NA	*Annual throughout term due to 10% annuals *Renewal information is received 7 days and permit is received prior to expiration date.
Air	Air-2	<a href="#">SAGHEFD-CO2FuelDispensing</a>	Intermittent SAGHEFD-CO2HS	Annual	07/01/17	07/01/17	06/01/17	NA	NA	*SAGHEFD manages the program for ABE *Engine Serial No. 100001110001
Air	Air-3	<a href="#">CARB/DP-CO2FuelDisp</a>	Intermittent SAGHEFD-CO2HS	2 Years	05/31/16	05/31/16	05/31/16	NA	NA	*Engine must meet Tier 4 emissions standards by 07/01/2017
Air	Air-4	<a href="#">SAGHEFD-AreasIS</a>	Intermittent SAGHEFD-CO2HS	2 Years	04/01/17	04/01/17	04/01/17	Values	NA	
Air	Air-5	<a href="#">SAGHEFD-CokeIS</a>	Intermittent SAGHEFD-CO2HS	2 Years	02/01/16	02/01/16	02/01/16	Values	NA	
Air	Air-6	<a href="#">SAGHEFD-CokeFuelAreasIS</a>	Intermittent SAGHEFD-CO2HS	2 Years	04/01/17	04/01/17	04/01/17	Values	NA	
Air	Air-7	<a href="#">SAGHEFD-CokeFuelIS</a>	Intermittent SAGHEFD-CO2HS	2 Years	07/01/16	07/01/16	07/01/16	Values	NA	*5-6 hour near Tier 4 emissions standards by 07/01/2017
Air	Air-8	<a href="#">SAGHEFD-FuelAreaIS</a>	Intermittent SAGHEFD-CO2HS	2 Years	04/01/17	04/01/17	04/01/17	Values	NA	
Air	Air-9	<a href="#">SAGHEFD-FuelAreaIS</a>	Intermittent SAGHEFD-CO2HS	2 Years	04/01/16	04/01/16	04/01/16	Values	NA	
Air	Air-10	<a href="#">SAGHEFD-FuelAreaIS</a>	Intermittent SAGHEFD-CO2HS	2 Years	04/01/17	04/01/17	04/01/17	Values	NA	
Air	Air-11	<a href="#">SAGHEFD-FuelAreaIS</a>	Intermittent SAGHEFD-CO2HS	2 Years	04/01/17	04/01/17	04/01/17	Values	NA	
Air	Air-12	<a href="#">SAGHEFD-FuelAreaIS</a>	Intermittent SAGHEFD-CO2HS	2 Years	07/01/16	07/01/16	07/01/16	Values	NA	*5-7 hour near Tier 4 emissions standards by 07/01/2017
Air	Air-13	<a href="#">SAGHEFD-LandIS</a>	Intermittent SAGHEFD-CO2HS	2 Years	04/01/17	04/01/17	04/01/17	Values	NA	
Air	Air-14	<a href="#">SAGHEFD-LandIS</a>	Intermittent SAGHEFD-CO2HS	2 Years	07/01/16	07/01/16	07/01/16	Values	NA	
Air	Air-15	<a href="#">SAGHEFD-LandIS</a>	Intermittent SAGHEFD-CO2HS	2 Years	05/01/17	05/01/17	05/01/17	Values	02000 04000	
Air	Air-16	<a href="#">CO2GHGReporting</a>	NA	NA	NA	NA	NA	NA	Multiple	*All anthropogenic GHG emissions exceed 25,000 MT CO2e (CO2e) must submit a report *CO2e GHG emissions are below the threshold and are checked annually to confirm GHG emissions remain below that threshold *Questions or reporting can be submitted through the Help Desk on the reporting website.
Air	Air-17	<a href="#">AIRGHGReportingandValidation</a>	Every 3 Years Interimly Interimly Annual	NA	NA	NA	NA	NA	Multiple	
Air	Air-18	<a href="#">CokeIS</a>	Intermittent SAGHEFD-CO2HS	2 Years	03/01/16	03/01/16	03/01/16	03/01/16	NA	*5 was included in Annual SAGHEFD house

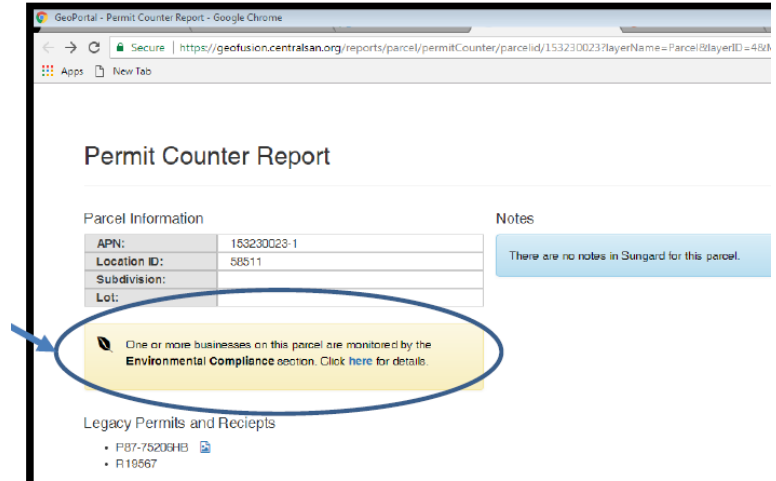
Central San had a plethora of information located in many different places, so staff reorganized the network drives and commissioned the creation of a central matrix, to be viewable via OTIS and to include hyperlinks to PDFs of the various permits. Assistant Engineer, Robert Hess, is the sole editor of the document. Staff developed the matrix for several months, then published it in OTIS on September 22, 2016 with a District-wide email announcing its launch. So the document stays updated, macros automatically notify responsible parties of any permits which are set to expire. Staff will consider integration of the matrix into an environmental management system that can improve efficiency of routine updates and notifications.

## MOBILE DEPLOYMENT FOR INSPECTORS

Environmental Compliance inspectors have been given mobile devices to improve their workflow and capabilities in the field. Inspectors are able to access information through their mobile devices and can input information into their databases while in the field, lessening the amount of time spent entering data when they return to the office. The tablets also allow inspectors to have more information available to them in the field, such as site history, inspection reports, plan review history, etc. After pilot testing multiple devices beginning in summer 2016, the inspectors have been outfitted with Microsoft Surface tablets and are using them in the field.

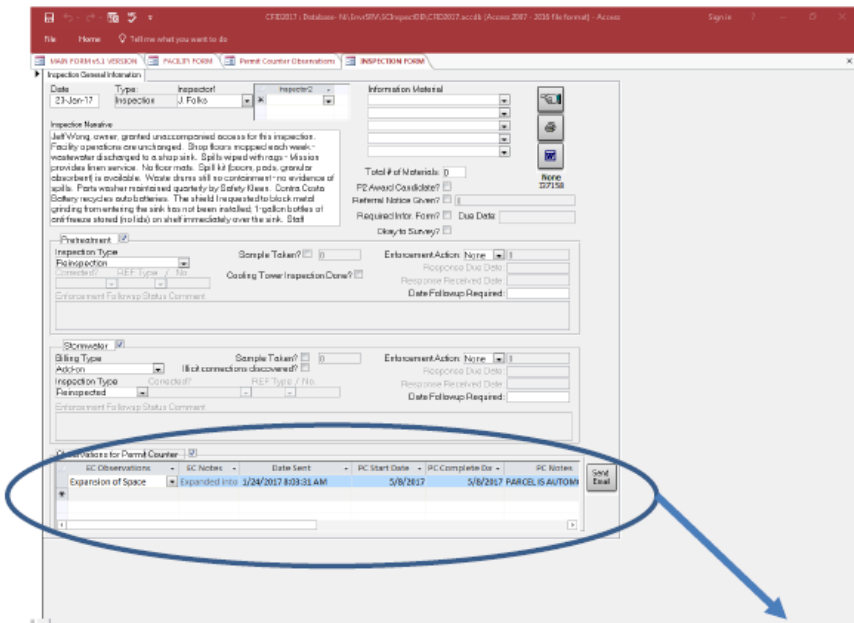
# DATA TRANSFER BETWEEN ENVIRONMENTAL COMPLIANCE AND PERMIT COUNTER

GIS and Permit Counter staff, with assistance from IT, helped upgrade the Inspectors' database to a more robust, multi-user, secure database (SQL server) and developed a module for the Inspectors to communicate observations to the Permit Counter such as change in use, expansion of space, patio dining addition, and lack of Central San plan review. Also, GeoPortal has been connected to access real-time data from the Environmental Compliance database (pictured above). Inspectors enter their observations via their Surface tablets (pictured below), which sends an e-mail to the Permit Counter, prompting them to investigate.



*Data as of October 2017:* Since the database module was launched in November 2016, **out of about 1,200 inspections, 28 observations were reported at 22 facilities, with 4 observations requiring additional research.**

This began as a Mentorship Program project conducted by Rita Cheng, Associate Engineer, and Ian Morales, GIS Analyst, in fall 2016.



EC Observations	EC Notes	Date Sent	PC Start Date	PC Complete Date	PC Notes
Expansion of Space	Expanded into	1/24/2017 8:03:31 AM	5/8/2017	5/8/2017	PARCEL IS AUTOM



## FIELD TESTS FOR PRETREATMENT COMPLIANCE MONITORING

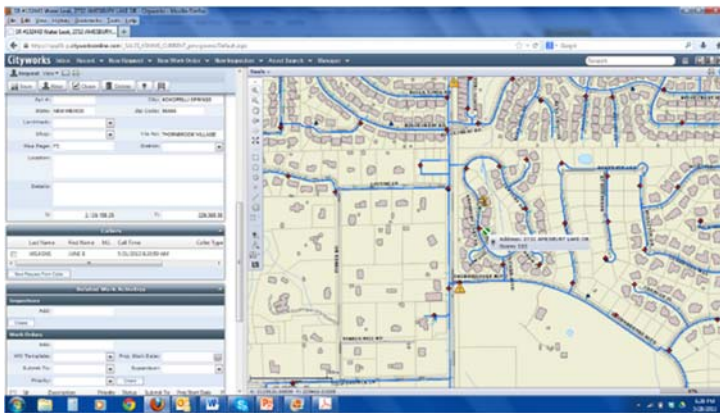
Central San led the effort through the Bay Area Clean Water Agencies Pretreatment Committee to request that the San Francisco Bay Regional Water Quality Control Board (SWRCB) allow the use of field pH instruments for compliance sampling at required industrial users. Previously, only an Environmental Laboratory Accreditation Program (ELAP) certified laboratory could analyze pH samples, which sometimes resulted in missed holding times due to sample collection and travel time to the ELAP certified laboratory. The SWRCB granted the request of the Bay Area Clean Water Agencies (BACWA) Pretreatment Committee, which means a pH sample can be taken in the field and analyzed immediately using a properly calibrated pH meter.

## OTHER ACHIEVEMENT

- New Lab instrumentation was installed to automate back samples and accommodate sample loads for optimization of pilot testing on nutrient removal.

## ENGINEERING & TECHNICAL SERVICES PLANNING & DEVELOPMENT SERVICES

## CMMS REPLACEMENT



The Accela and Mainsaver computerized maintenance management systems (CMMS) databases are now combined in one system: Cityworks (pictured). Prior to this, Accela, used by Collection System Operations (CSO), and Mainsaver, used by the Plant, were separated, and the two maintenance groups used different terms for the same assets, resulting in a difficulty by others to interpret the meanings. Staff across the organization can now keep better track of the assets

District wide. Cityworks uses the ESRI geodatabase for asset inventory and is browser based, making it easy to access on a mobile device. It also offers a mobile app for disconnected environments, creating a paperless workflow and reducing paperwork and manual data entry at CSO, while providing almost real-time access to maintenance results.

The Asset Management workgroup managed and contracted with a consultant to provide implementation services. Replacing the software began with planning and discovery, which included numerous workshops with stakeholders, followed by several rounds of configurations, then user acceptance testing. Cityworks was configured with pick-lists to ease data entry, and customized fields were added to capture all necessary data in one system and to produce reports customized to meet the divisions' needs.

Cityworks went live on September 27, 2016 for CSO, which includes fleet and recycled water distribution. See CSO's optimizations for additional information on their setup. The Plant, Pumping Stations, and facility assets are also live.

## SEWER SUMMIT

The Sewer Summit was a three-session event hosted by the Development Services Division for stakeholders (planners, engineers, building inspectors, and city and county representatives) to better understand what we do and why it is important that we review development projects early in the planning phase. The sessions covered pretreatment, capacity, connection fee, and easement issues.

With the upturn in the economy in 2016, agencies have been re-staffing, leading to an influx of new employees at the various county and city agencies who may not be familiar with Central San. Developed with a tradeshow concept in mind, staff had five tables ready for the **approximately 100 attendees**, with posters, information, handouts, and staff ready to answer questions. Staff also provided networking time, so attendees could get to know our staff and their counterparts at other agencies, and a Treatment Plant tour at the end of the session.



The event (pictured) was held in three sessions on March 24, April 26, and May 19, 2016. It was a collaborative effort, including presenters from the Environmental Compliance and Recycled Water workgroups. Staff plans to hold these annually, with the next session scheduled for August 2017.

## PRIMARY SEDIMENTATION TANK BAFFLES

Baffles (pictured) were installed to analyze effectiveness in improving total suspended solids and carbonaceous biochemical oxygen demand (cBOD) removal in the Primary Sedimentation Tanks.

The baffles **increased total suspended solids removal from 60% to 75%** and **appeared to have improved centrifuge dewatering performance from around 21% cake solids up to approximately 23% cake solids.**



Following the pilot that was performed in 2013, the remaining three sets of baffles were installed as part of the Primary Treatment Renovation Project in FY 2015-16.

## **AUTOMATED COMMERCIAL RECYCLED WATER FILL STATION**

Prior to the implementation of the Automated Commercial Recycled Water Fill Station (pictured), contractors had access to recycled water recycled water hydrants with a portable recycled water meter. These portable meters are expensive (>\$1,000 each) and required Central San labor for the addition of a special brass fitting. During non-drought conditions, there is a significant reduction in hydrant meter usage and the request for meters drops off significantly. For these reasons, staff only has a small supply of them (approximately 20).

During the 2015 drought, Central San had far more demand for meters than the available number of recycled water meters. When mandatory water restrictions were implemented, many cities will prohibit contractors from using potable water hydrants and will direct them to Central San. To meet the increased demand, Planning staff would meet customers at a nearby hydrant to dispense recycled water.



In addition, obtaining monthly water usage readings from holders of Central San's portable recycled water meters consumes significant staff resources.

As a result of these issues, staff pursued development of an automated Commercial Recycled Water Fill Station for the following reasons:

1. Automatic tracking of recycled water use – The station provides each user with a unique account code that logs their recycled water usage. All staff has to do is go out to the station and allow the data to wirelessly transfer to a laptop, dramatically reducing time and effort in routinely calling customers to obtain monthly meter readings.
2. Easier access to recycled water truck filling – Instead of having to lug a heavy portable meter to a hydrant, connect it to the hydrant at one end and to their fill hose on the other, water truck drivers only have to pull up under the overhead hose fill and press a few buttons.
3. Elimination of the bottleneck of meter availability – In times of drought, when there is high demand for recycled water for construction uses, Central San has been limited in its ability to respond, based on the size of our inventory of expensive portable meters. The automated station removes that bottleneck and allows Central San to more effectively assist customers during drought conditions and will help expand the use of recycled water in the service area.

The Board approved the project in November 2015, and construction of the Station was completed in the summer of 2016.

## **COMPREHENSIVE WASTEWATER MASTER PLAN (CWMP)**

The CWMP, consisting of the Collection System Master Plan and the Wastewater Treatment Plant Master Plan, is a living document that will be updated as new drivers impact the Plan. Given that Central San turned 70 years old in 2016, much of its \$4 billion infrastructure is aging and in need of replacement. The CWMP ensures that Central San has a strategy to address infrastructure needs, foresee new regulatory requirements, and keep up with modern technology to maintain Central San's commitment to innovation and environmental sustainability. The CWMP is a management tool that allows a wholesale view of optimizing projects over a 20-year planning horizon as they are driven by age and condition, regulatory requirements, capacity, and sustainability.

Central San selected a two-consultant team, Carollo Engineers and CH2M, through an RFI (Request for Interest) - RFP process. The CWMP assessed the condition, capacity and reliability of the current system; strategized with regard to regulations, risks, needs, and opportunities; identified gaps with a view toward maximizing existing infrastructure and promoting innovation and industry leadership; and prioritized projects. In addition to identifying projects, several models were developed: BioWin treatment process model, Hydraulix treatment plant hydraulic model, InfoWorks collection system hydrodynamic model, and InfoMaster sewer risk and renovation model.

The CWMP kicked off in late 2015 and is a roadmap for the next 20 years. The Board accepted the CWMP on June 1, 2017, and it is complete. Its recommendations and findings were used to develop the capital budget and 10-Year Capital Improvement Plan.

## **APPLIED RESEARCH & OPTIMIZATIONS COMMITTEE**

Representatives from the Planning, Capital Projects, Regulatory Compliance, Operations, Maintenance and Lab workgroups meet quarterly to discuss pilot opportunities, new technologies, and optimization concepts related to the Treatment Plant and Recycled Water.

The Committee setting allows for efficient interdepartmental coordination and creates a space for considering investigations into existing processes for optimization opportunities and piloting of innovative technologies. Staff is launching a separate committee for Collection Systems and Recycled Water Distribution.



## SOLAR PHOTOVOLTAIC SYSTEMS

Through a public-private partnership, Central San installed solar photovoltaic systems at the Household Hazardous Waste Collection Facility (HHWCF) and Collection System Operations Building (CSOB). The panels were constructed by a third party and are owned, operated and maintained by them. Staff will be pursuing opportunities for the Treatment Plant and/or buffer properties in FY 2017-18.



These were installed in 2016 and, as mentioned, it is an ongoing effort to look at expanding use of renewable energy throughout the District. The HHWCF and CSO panels are expected to generate **over \$300,000 in electricity savings over the 20-year agreement term.**

## SECURITY STUDY

This is a multi-departmental effort to evaluate District-wide vulnerabilities and physical security improvements. The assessment identified vulnerabilities in both electronic security and physical security, and incorporated vulnerabilities due to natural hazards such as earthquakes and flooding.

This is an ongoing joint effort with Planning & Development Services and Risk Management and includes support from the Plant Operations, CSO, Plant Maintenance Divisions, and the Administration Department including IT and Finance. The findings were presented to the Board in closed session. Staff are working to implement the recommended improvements in phases and will be working on developing recommended policies and programs.

## ULTRAVIOLET TRANSMITTANCE STUDY



This study investigates the decreasing ultraviolet transmittance (UVT) trend and identification of UVT of different wastewater streams. If UVT can be improved, it will help reduce costs by reducing the energy demand and sizing for the future UV replacement.

A UV transmittance probe was installed in FY 2015-16 to improve monitoring of the secondary effluent quality. The long-term decreasing UVT trend appears to be due to water conservation; however, staff will be continuing to gather additional UVT data. Other optimization efforts related to improving secondary effluent quality may also help to lower the UVT.

## WET SCRUBBER / AIR POLLUTION CONTROL PILOT



This is a comprehensive pilot to test new wet scrubber technology, which is part of the Solids Handling Facilities Improvements Predesign Project. It will confirm performance and design criteria for reliable compliance with current and potential future emission requirements and will evaluate boiler bypass performance and scrubber water potential impacts.

The pilot plant began operation in May 2017 and is scheduled for completion by October 2017. Data was collected to determine which air pollution control equipment is needed to meet regulatory limits and whether or not the scrubber water requires treatment. The pilot results will

help inform the design team on anticipated performance on upwards of \$40M worth of air pollution control equipment and potential scrubber water treatment.

## SELECTOR EVALUATION

Testing the selector may identify optimization opportunities and unlock secondary treatment capacity. A well operating selector improves the performance of the secondary treatment process, hopefully resulting in a more consistent sludge volume index (SVI), reduction in bulking, and increase in treatment and filter capacity, with the ultimate goal of achieving the wet weather capacity needed using existing infrastructure through improved performance. If successful, selector optimization **could help avoid over \$10M of future capital improvements needs** for another secondary clarifier for reliable peak wet weather capacity.

A consultant is on board and currently helping to guide staff on performing field sampling. Testing will need to be conducted on a long-term basis to acquire reliable results for determining next step optimization actions. It is anticipated to continue through FY 2017-18. This work is being coordinated with the Automated SRT control work with Plant Operations. See related optimizations and innovations being performed by Plant Operations.



## LIME REDUCTION TESTING

Adding lime to sludge in the Sludge Blend Tank before incineration is thought to help condition the sludge for optimal dewatering, bind metals to the sludge, and increase the temperature at which ash will melt. Ash melting would cause a major issue for operating our multiple hearth furnaces so it was important that this testing look into the issue. Reducing the lime dosage has the **potential to save \$200,000-300,000 per year in chemical costs** and relieve capacity in the furnace.

This was a collaborative effort led by Planning with help from Capital Projects, Regulatory Compliance, Plant Operations, and the Lab to perform small-scale experiments involving adding lime to sludge. A centrifuge pilot study completed by the Control Systems Group in 2014 suggested that it may be possible to reduce lime dosages without causing ash melting. In February 2017, Staff Engineer, Michael Cunningham (pictured with samples) performed bench-scale experimentation, adding different dosages of lime to the sludge samples before placing them in the bench-top centrifuge. After which, the centrate (mostly liquid) and some cake were sent to the Lab for further analysis. In addition, ash fusion testing was repeated in 2017 and confirmed the previous findings by the Control Systems Group that it appears to be possible to reduce lime without causing ash melting in the furnaces. The second phase, full scale lime reduction testing, is scheduled for early 2018 during the furnace turnaround schedule. The full project is currently scheduled for completion by the end of FY 2017-18.



## **FILTER TESTING**

During the CWMP, staff completed several field studies on the existing Filter Plant, including filter media depth measurements, coring, and sieve analysis, backwash turbidity profiling, filter bed expansion tests, and filterability testing including particle size distribution testing and bench-scale coagulant testing. In addition, staff worked collaboratively with the Control Systems Group, Plant Operations Division, and Plant Maintenance Division to perform limited filter flow tests.

The testing confirmed previous findings that the existing filter plant is operating well and that the backwash operations have been optimized to minimize the amount of recycled water needed for backwashes. The filter flow tests demonstrated that there may be additional capacity in the filters but that additional testing would be needed to confirm the reliable capacity of the recycled water facilities.

## **ENGINEERING & TECHNICAL SERVICES** **RESOURCE RECOVERY**

### **SATELLITE RECYCLED WATER FACILITY**

A facility at Diablo Country Club to provide recycled water to the golf course serves the Strategic Plan Goal 6 – Strategy 1, to Augment the Region’s Water Supply, and is innovative as the first of its kind for Central San. In FY 2016-17, a Planning Agreement was executed with Diablo Country Club (DCC), and the California Environmental Quality Act (CEQA) environmental review process was initiated, including completion and release of the Initial

Study and Notice of Preparation of an Environmental Impact Report, and conducting two Open House public meetings to receive community input on the project. In addition to acting as the CEQA lead agency, Central San staff is also supporting DCC's efforts to procure a design-build team for the project.

The current schedule for the project is to complete the CEQA process in early Spring 2018, procure the design-build team in late Spring 2018, start construction in Winter 2018, and finish construction and start up the facility in Fall 2019 for a year of commissioning prior to turning the facility over to Central San for operation in 2020.

## **RECYCLED WATER EXCHANGE/TRANSFER**



The concept of this project is that an end user(s) in need of water supply would invest in the cost of the treatment for Central San to produce and convey 22,000 acre-feet per year of recycled water to Contra Costa Water District (CCWD) to serve the Shell and Tesoro refineries in Martinez. The Central Valley Project raw water supply currently used by the Martinez refineries would then be freed up and either transferred or exchanged, through CCWD via existing and future-planned infrastructure, to the same end user(s) in need of the water supply. This is an innovative approach to expanding beneficial use of Central San's treated effluent.

Central San is currently in discussions with CCWD and Santa Clara Valley Water District regarding the development of a three-way memorandum of understanding (MOU) to fully explore this concept and determine if it is economically and contractually feasible to execute this exchange/transfer concept. The current goal for executing this MOU is Winter 2018.

## **SOLIDS HANDLING PUBLIC-PRIVATE PARTNERSHIP (P3) DEMONSTRATION PROJECT**

This project will explore innovative solids handling technologies that have the potential to reduce long-term capital and operations and maintenance costs under a P3 model.

An RFI was issued in April 2017 to solicit interest from private companies to design, build, finance, operate, and maintain a demonstration solids handling facility. Eight letters of interest were received; four teams were invited to interview to present more information on their proposed solutions. *Update:* Interviews took place in September 2017, and three teams were short-listed – two teams are proposing gasification and one team is proposing thermal hydrolysis with anaerobic digestion. On a parallel track, an RFP was issued in June 2017 to select P3 advisors for technical, financial, and specialty legal support for the development of this project. Six proposals were received and the successful team is currently working to develop the overall RFP for the P3 project. The RFP process was initiated in October 2017, with the goal of awarding a service contract prior to June 30, 2018.



## COLLECTION SYSTEM OPERATIONS

### IT PIPES INSTALLATION / CCTV DATABASE CONSOLIDATION

The WINCAM and Granite XP CCTV software was replaced with IT Pipes, a more up to date, user friendly software that is widely used in the industry. WINCAM was used for approximately a decade, and Granite XP was furnished with the last CCTV Truck purchase. WINCAM and Granite XP data have now been merged into one database, reducing maintenance needs and making it easier for staff to access CCTV videos (sample pictured), due to them all being in one location. It also allows the CCTV operators to become proficient on one software package instead of two. In FY 2016-17, 22 miles of sewers were televised for quality assurance purposes.

This was a joint effort with the Asset Management and IT workgroups, which began in May 2016. While planning to install Cityworks, the new CMMS, staff identified the opportunity to upgrade the CCTV database. Staff found a consultant who did the work and trained CSO field crews on how to access the data. Implementation on all three CCTV trucks has been completed.



### MOBILE DEVICE DEPLOYMENT

CSO and Fleet staff now use mobile devices to access data and log work. Mobile deployment enables field crews to access desktop information such as maps, work order history and CCTV results and to complete work orders in real-time, so office support can see the results as they are recorded. Additionally, field staff can take pictures with the tablets and attach them to service requests or work orders.

While difficult to quantify as a cost savings, these benefits are significant to CSO and potentially to engineers in the future when evaluating renovation projects. When combined with the new CMMS, mobile

deployment reduces paperwork and manual data entry, **estimated to save almost 1 full-time equivalent (FTE) per year**. This staff time can be redirected to cleaning pipes, proactive maintenance activities, and higher level data analysis to improve the overall CSO preventive maintenance program. In FY 2016-17, 744 miles of pipe were cleaned, and, of those miles, 98.58% were cleaned on time and on schedule. The Vehicle and Equipment Shop also uses field tablets to perform vehicle inspections, work orders, and inventories.

The new computerized maintenance management system (CMMS), Cityworks, was configured with pick-lists to ease data entry, and customized fields were added to capture all necessary data in one system and produce reports customized to meet the Division's needs. Cityworks went live on September 27, 2016 for CSO, which includes fleet and recycled water distribution.

The Asset Management/GIS Group, with support from IT, worked with CSO staff to pilot tablets in the field during October and November 2016. The pilot included 2 crew leaders, 3 fleet mechanics, 4 supervisors and 1 superintendent. Additional tablets were procured and configured by IT in mid-November, which was followed by basic tablet training by IT and Cityworks training by GIS staff. All CSO field staff began using mobile devices on December 1, 2016.



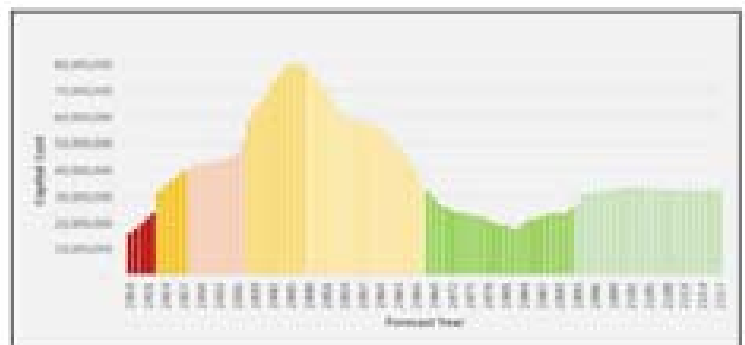
### **VERIZON NETWORKFLEET AUTOMATIC VEHICLE LOCATION AND FLEET DIAGNOSTICS**

Staff selected Verizon's Networkfleet for its ease of use and wide use in the industry. Contra Costa County Public Works Department and Caltrans are a couple of the agencies that have purchased and have fully implemented the system into their workforce.

This project will reduce Central San's response time to emergencies, reduce fuel consumption, and track vehicle diagnostic reports to create proactive maintenance plans which will help control repair costs and reduce downtime. The pilot project will occur in July 2017 and, if successful, a decision will be made for full implementation.

### **DATA INTEGRATION FROM ASSET MANAGEMENT PROGRAM TO DETERMINE CCTV NEEDS**

InfoMaster software calculates pipe renovation schedules by leveraging data from the Asset Management Program, such as closed circuit televised scores and cleaning frequency, to calculate and consider the likelihood of failure and consequence of failure. It also analyzes and prioritizes gravity sewer pipe renovation needs.



Planning staff completed the implementation of InfoMaster software, and CSO staff uses InfoMaster to determine lines that need to be CCTV'ed.

**OPERATIONS**  
**PLANT MAINTENANCE – ELECTRICAL SHOP****MOTOR QUICK DISCONNECTS**

Motor quick disconnects were installed on key pumping station motors, auxiliary boiler blower motors, and waste heat boiler (WHB) rotary air lock (RAL) motors, improving production and reducing downtime. When a motor needs to be disconnected for maintenance for any reason, an electrical technician now does not need to be called to disconnect the motor saving manpower, increasing production and reducing downtime for operations.

Staff submitted a work request, coordinated with Operations, ordered parts and materials, scheduled the work, shut down the equipment, performed lockout/tagout, completed the work and turned it over to Operations, all in two months' time.

**THC ANALYZER**  
**FOR**  
**UNINTERRUPTIBLE**  
**POWER SUPPLY**

A THC Analyzer was installed on the Solids Conditioning Building (SCB) Uninterruptible Power Supply (UPS). The analyzer will ride through power switching more effectively without damaging the circuitry in the analyzer. This saves money and downtime by not having to send the analyzer out for repairs.

Staff submitted a work request, coordinated with Operations, installed a temporary portable UPS, ordered the parts and materials, installed scaffolding, scheduled the work, shut down the equipment, performed lockout/tagout, completed connecting the analyzer to the UPS, and turned it over to Operations. This was completed in six months in December 2016.



## AERATION & NITRIFICATION TANK CONDUIT



The old conduit and wire on the inside of the tank were badly corroded. By replacing it with stainless steel conduit, staff eliminated downtime due to a future emergency repair. Using stainless steel also removed the potential for corrosion years later.

Staff submitted a work request, coordinated with Operations, ordered parts and materials, scheduled the work, installed the conduit and wire, shut down the equipment and terminated the wires and turned it over to Operations. The process took six months.



OPERATIONS  
PLANT MAINTENANCE – MECHANICAL SHOP

## BAR SCREEN GRINDER LIFTING TREE



The grinder lifting device, or tree (pictured), was developed to simplify the process of replacing a worn out bar screen grinder in the Treatment Plant Headworks. With the lifting tree, a grinder and its gearbox can be removed and replaced as one piece instead of being handled separately, making it easier to transport and simplifying the rigging required.

This **shortens the job time by 30 minutes**, saving 9 hours of staff time per year assuming the grinder is replaced 6 times per year; reduces three technicians' exposure time to the inlet channels atmosphere; and reduces the need to manhandle the individual components, thus reducing the probability of incurring back injuries for staff.



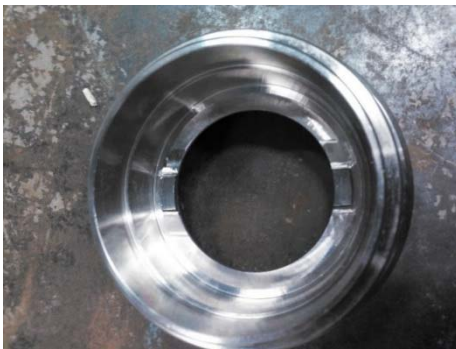
## PIPE REPLACEMENT AT MARTINEZ PUMPING STATION

When a wet weather pipe at the Martinez Pumping Station began to leak, the Pumping Station workers looked to the Mechanical Maintenance staff for assistance. While assessing the pipe, staff realized the elbow of the pipe was beyond repair and needed replacement. This replacement occurred in an innovative way which showcased staff's collaboration and quick thinking.

The leaky pipe was discovered during early February 2017, during wet weather season, so time was of the essence to get it repaired. Technicians Don "Bo" Botelli, Bernard Martinez, and Paul Serrato created a plan to cut out the leaky section of the pipe and weld a new pipe in its place. Bo welded a new pipe in their shop (pictured above) with the skill and precision needed for the pipe to line up perfectly. Lifting the pipe was heavy and limited space would make welding difficult, so Paul suggested building a rigging system like those used in hospitals after knee surgeries. After testing the rigging in their shop, the team rushed to the Pumping Station in late February and used it to successfully replace the pipe (pictured at right).



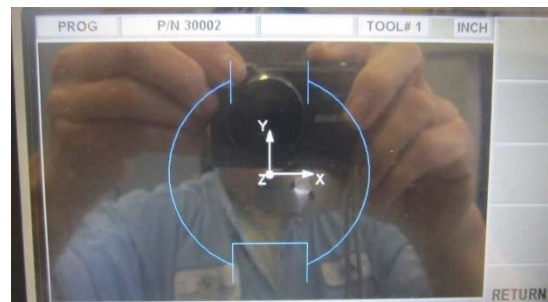
## OPERATIONS PLANT MAINTENANCE – MACHINE SHOP



## AUTOCAD FOR CUTTER PATHS

In computer numerical controlled machining, a cutter path (top picture) can be more easily obtained through AutoCAD. Profile milling and pockets are just one example, and repeatability is consistent. The use of AutoCAD enhances the ability to plot out cutter paths on the Computer Numerical Control (CNC) Mill and JWC grinder rebuilds.

Another benefit in using AutoCAD is that staff is able to show and explain to a vendor flaws in its design. Demonstrating exact plots on an accurate digital drawing (at right) convinces the vendor to correct their component.



Mark Benedetti, Machinist, was tasked with rebuilding sludge grinders and correcting an issue with the seal cartridges. Because he was well versed in AutoCAD, it was purchased by Central San to be used as a tool for the Machine Shop. This task in particular took Mr. Benedetti approximately one week to complete in July 2016.

## **CONE TYPE DIVERTERS FOR GEARBOX SEALS**



The Cake Pump Gearbox is a heavy-duty piece of equipment that should run for many years; however, the conveyor it drives extrudes unwanted cake through its packing, through the gearbox seals, and into the gearbox. Staff has had to rebuild the gearboxes many times over the years due to the damage this causes to the bearings. Staff created cone-type diverters (pictured) to protect the gearbox seals, which has curbed the symptoms but not cured the root

of the problem. However, it does reduce the amount of times the gearboxes have to be rebuilt. Staff identified what caused the seal to fail and designed diverters to send the cake away from the gearbox. This took approximately two weeks in November 2016.

## **REORGANIZATION OF SHOP**



The reorganization of the material and welding shop improves workflow and creates additional capacity and a more organized system for storage of materials.

A contractor removed an abandoned plenum and the wall between the two shops. Staff moved equipment and storage racks to better accommodate its needs, plumbed supplied air lines, and asked the Electrical Shop to wire the machines that were moved. This began on August 25, 2016 and is almost complete (shop pictured as of December 2016).

## ADDITIONAL ACHIEVEMENTS

- Modified portable stairs in the Solids Conditioning Building to be more stable and safe. The wheels and feet on the stairs are fairly narrow and unstable when on the grid panels, so staff removed the casters and welded on new, wider wheels and feet.
- Designed and fabricated a piping system, water separator and waste chute to save time and improve safety when the Operators perform maintenance on the grit washers every six months. During this time, the Operators empty the tanks filled with grit and water, using a heavy vacuum and with precarious access.
- Designed a hub from 4140 steel that was heavier and had a double bearing output end for a mower that Buildings & Grounds purchased, whose cutter blade hub broke shortly after purchase. The mower has now run a couple of seasons of mowing and still works.
- Installed an auto-lube system in the cake pump packing well, which breaks down rapidly when not greased every eight hours. The system stopped cake migration and is now on three of the four cake pumps, with a fourth one on order. The system has been so successful that it will be installed on other assets, such as induced draft (ID) fans.
- Designed and installed a stair with a platform and outrigger to assist the Operators during their daily task of attending to the grit bin, whose access required climbing a short ladder which was hard to navigate.
- Designed and fabricated components that incorporate two different methods of control (rotary and linear actuators) for a hydraulic pump for the center shaft drive of both furnaces. They had old servos that could not maintain speed control.
- Designed and fabricated bracketry to mount a VFD motor, which may eliminate the need for the old hydraulic system on the furnace centerdrive.
- Designed and fabricated console boxes for CSO's new vector trucks. This improved staff's ability to maintain maps, paperwork and other tools.
- For the CSO rodder truck operators:
  - Designed multiple variations of control handles to custom fit each operator, hopefully limiting physical issues cited by the operators due to the size and shape of the control lever.
  - Designed and fabricated a three-legged sling with hooks that allowed one man to set the hooks, lift the coil with a forklift and set the coils into the carousel for loading as part of the operators' task of loading 1,400 feet of coiled ½" dia rod. This saves time and manpower on a task that sometimes required three men to perform.
- Building an Oil Distribution System to maintain quality control of its lubrication materials (in process).

## OPERATIONS PLANT MAINTENANCE – PUMPING STATIONS

### PREVENTIVE MAINTENANCE TASKS TO CMMS

Each asset has a physical service record that contains the maintenance history going back to 1980. The new CMMS, Cityworks, keeps these records in an electronic database that can be remotely accessed and stored indefinitely.

PJ Turnham, Maintenance Planner, was given the task of checking and updating the Pumping Station asset numbers, including some equipment that did not have an asset number. She tagged the equipment, assigned asset numbers as needed, and input them into the CMMS. As of February 2017, the new CMMS asset registry has all Pumping Station assets in the database. Plant Maintenance Planners are currently working with the Pumping Stations personnel to develop preventive maintenance tasks.

### BRACING AND FIBERGLASS PLATFORMS FOR SAFETY

Pumping Stations and the Maintenance Shop worked together to fabricate bracing and fiberglass platforms for the emergency bypass vaults. This saves a minimal amount of staff time but, most importantly, is a safety precaution to guard against falls and to provide an area on which the workers can stand.

## OPERATIONS PLANT MAINTENANCE – RELIABILITY ENGINEERING

### PORTABLE OIL FILTRATION PROGRAM

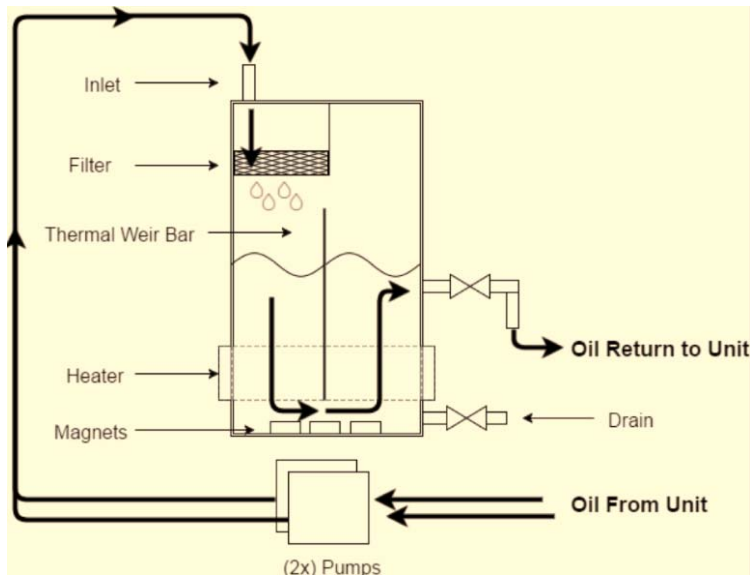
Staff created a portable system which filters all oil before use, increasing the versatility in the places staff can filter oil, preventing damage to the machinery, extending its life and improving its reliability.

Reliability Engineering and the Machine Shop also collaborated on a hot oil recirculation system for fixed equipment. This recirculation system **won first place in the 2016 California Water Environment Association (CWEA) Gimmicks and Gadgets of the Year category.**



*Machinist Mark Benedetti uses the awesome new portable hot oil recirculation system to flush particulates out of a clarifier gearbox.*





Glen Bradley, Maintenance Planner, modified off-the-shelf equipment to create a portable filtration system. Staff has since proven this has improved the orders of magnitude in the quality of the oil.

Around the end of 2015, Mr. Bradley started with a custom-made filtration system, which he has constantly been improving and upgrading. He also uses an off-the-shelf filtration device. Refining the portable filtration system is an ongoing process that does not have a completion date. The hot oil recirculation system was Mr. Bradley's concept, which the Machine Shop made reality.



One instance where staff uses the recirculation system (schematic pictured) is to drain used and contaminated oil from the Secondary Clarifier Sludge Collector Drive Assemblies. The hot oil recirculation system cleans the particulates out of the gearboxes without removal or disassembly.

## **FIXED VIBRATION SENSORS ON BEARINGS**

Fixed vibration sensors and monitoring on the induced draft (ID) fan were installed to allow for predictive maintenance. The ID fan pulls air from the furnace and is critical to Treatment Plant operation. Maintenance staff has been using more condition-based technologies to help diagnose component failure. In the past, vibration switches have been used to shut down the ID fans due to excessive vibration. Although vibration switches effectively protect equipment, they give no early warning of high vibration.

The new vibration sensors record ID fan vibration and are set to notify staff of elevated vibration levels. When a vibration alarm is received, staff will analyze the data to identify and correct the issue before the vibration becomes excessive. Thus, the new sensors enable proactive repair and avoid costly unplanned ID fan outages.

Staff purchased the sensors from a local vendor. Electrical, Instrumentation and Control Systems staff worked together to install them. One of the two sensors has been installed, and the second was scheduled for installation in early in 2017 when Furnace No. 2 was shut down.

## NEW OIL FILTRATION AND STORAGE AREA



An unused space has been converted into a consolidated and enhanced work area for oil product receiving, storage and dispensing. This reduces the amount of space needed for the same amount of work to be done and created a better workflow to receive, store and dispense oil filtration needs and other supplies.

Staff identified an old chlorine room in the Plant Operations Building. Then, a team effort brought the vision of this room to life. Engineering installed a new door; the Electric Shop put in improved lighting; the Machine Shop installed racks with oil filtration methods

built into them; and Buildings & Grounds leveled the floor, closed the drain in the floor, and painted the walls. This process began in mid-2015 and the room is under construction (current state pictured above).

## USE OF OIL MIST ADAPTERS ON CENTRIFUGES

Installation of VaporGuard oil mist adapters on the sludge-dewatering centrifuge better controls lubrication on key equipment. The adapters isolate the lubrication system from the atmosphere to prevent ingress of particulate contamination, as it contains a particulate filter and can optionally be fitted with a quality desiccant breather.

Staff looked at products on the market that would lubricate the machinery and selected the VaporGuard mist adapter because of its compact size and relative low price. This very device



has also been tested and proven effective on another wastewater facility's Alfa Laval decanter centrifuges, which are identical to Central San's.

VaporGuard was selected in September 2016, and the Mechanical Maintenance Shop installed them on Centrifuges 1 and 3. The installation on Centrifuges 2 and 4 are in progress.

## **RELIABILITY CENTERED MAINTENANCE PILOT**

This pilot was performed on two subsystems as part of an Asset Management program to establish a framework to improve maintenance efficiency and functional reliability of assets that, when combined with the CMMS, is a repeatable program with documented processes and procedures. This is a systematic approach to developing a comprehensive maintenance program based on asset criticality and consequence of failure, using a qualitative decision methodology. The framework provides methods that identify and analyze the equipment and systems that cause a majority of reactive work orders based on cost and work order count. This creates better knowledge of the assets, modifies existing preventive maintenance tasks and adds new ones, identifies hidden failures, enhances documentation, and increases cost effectiveness.

During FY 2016-17, staff performed two pilots: 1) Dewatering System, Centrifuge Subsystem and 2) Steam System, Waste Heat Boiler Subsystem. The pilot results were presented to the Board on April 6, 2017 as part of the Asset Management update.

### **OPERATIONS** **PLANT MAINTENANCE – ALL SHOPS**

## **CONDITION-BASED AND PREDICTIVE TECHNOLOGIES**

Staff expanded the use of condition-based and predictive technologies to identify potential problems. Problems that can be identified via these methods include the following:

- 1) incorporating new vibration analysis equipment in reoccurring PM procedures - not just repairs and new installations;
- 2) incorporating new infrared (IR) equipment in the expanding IR Program, beyond electrical equipment to include mechanical equipment and furnace burner leaks and refractory issues; and
- 3) documenting the use of ultrasonic equipment, including inspections, and exceptions.

Advanced diagnostics provide early indication of potential issues, and more thorough record keeping provides staff with better history on an asset's repairs. This has been used to identify potential problems, including in the following cases:

- Digital Low Resistance Ohmmeter (DLRO) meter use on electrical equipment
- Use of Dissolved Gas Analysis (DGA) testing on transformers
- Vacuum testing on breakers/protective devices
- Use of stray current detection
- Battery system testing equipment
- Ultrasonic probe tester to be used with the thermal image preventive maintenance
- Ultrasonic grease gun for motor grease PM.

## TRAINING AND DEVELOPMENT CHECKLIST

These status sheets are designed to provide a system to track an individual technician's training and development progress. The checklists ensure a consistent level of knowledge, skills and ability, including certification and asset/Plant specific knowledge. This aids an individual at any level entering the shop, from a Trainee to a journeyman Maintenance Mechanic or to new Technicians hired from the outside.

This is in development for all Plant Maintenance Shops.

<p><b>CENTRAL CONTRA COSTA SANITARY DISTRICT</b></p> <p><b>PLANT MAINTENANCE DIVISION</b> <b>MECHANICAL SHOP</b></p> <p><b>MAINTENANCE TECHNICIAN</b> <b>TRAINING AND DEVELOPMENT CHECKLIST</b></p> 	<p style="text-align: center;"><b><u>CONTENTS</u></b></p> <p>The Program</p> <ul style="list-style-type: none"> <li>• Trainee to Journeyman</li> <li>• New Technicians from the Outside</li> </ul> <p>District Values for the Plant Maintenance Division</p> <p>Performance Standards</p> <p>Training Status Sheet</p> <p>Progression</p> <p style="text-align: center;"><b><u>APPENDICES</u></b></p> <p>Appendix A – TPC Manuals</p> <p>Appendix B – Mechanical Equipment, Skills and Abilities (Welding)</p> <p>Appendix C – Asset Specific Knowledge and Familiarity</p> <p>Appendix D – Machine Shop Assignment</p> <p>Appendix E – Recommended Skills/Certifications</p> <p>Appendix F – Key Supervisory Functions</p> <p>Appendix G – Voluntary Preparatory Study Aids for Acquiring a CWEA Certification</p>
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## TRAINING MANUALS

Versions of the “yellow book” from CSO specific to each Maintenance shop contain information on shop-specific skills for all positions, from trainees to Maintenance Technicians III to the Shop Supervisor, with preventive maintenance training and development. This manual will provide a reference for staff and make it easier to train people on new tasks.

The Machine Shop and Mechanical Shop have completed their manuals, and the other shops are on target to complete theirs by the end of 2017.

## OPERATIONS PLANT OPERATIONS

## SLUDGE RETENTION CONTROL USING A CALCULATOR

Targeted sludge retention time (SRT) time control uses lab data and calculated sludge wasting rates to achieve consistent SRT and sludge volume index (SVI). Theoretically, more consistent SRT will lead to more consistent SVI and, in turn, improve effluent quality, which will reduce chemical costs for recycled water, create better control of the biological process and the potential to improve capacity. The change has **held SRT mostly steady**, but there has been no appreciable benefit yet in sludge volume index (SVI) or turbidity.

Operations staff worked with the Lab to determine how SRT was being calculated in their database. Then, they created an SRT calculator (pictured on the next page), provided the tool to the Shift Supervisors for training and implemented it. This took six months and was finished in March 2016.

Planning & Development Services staff has hired a consultant to evaluate the selector tank, which affects SRT and SVI, as mentioned earlier in this report. A related Real-Time SRT Control future optimization is ongoing for the Control Systems group, discussed later in this report.

Mg/l	
Eff TSS 3 days ago	7.4
Eff TSS 2 days ago	7.6
Eff TSS 1 day ago	7.3
A&N SS 3 days ago	1010
A&N SS 2 days ago	1050
A&N SS 1 day ago	912
RAS 3 days ago	2920
RAS 2 days ago	3180
RAS 1 days ago	3120

MG		
Number of A&N Passes in service	8	8.48
Number of North Clarifiers in Service	3	1.02
Number of South Clarifiers in Service	3	1.27
<b>Total</b>		<b>10.77</b>

Previous Days Total Eff Flow	36.6	MG
Previous 3 Days Avg. Eff SS	7.4	mg/l
Previous 3 Days Avg A&N SS	991	mg/l
Previous 3 Days Avg RAS	3073	mg/l
WAS Rate	1500	GPM

Adjust WAS GPM to get MCRT to Target

Lbs in Inventory 3 Day Avg	73,323
Lbs Wasted 3 Day Avg	57,633
<b>MCRT</b>	<b>1.27</b> Days

Lbs inventory includes All A&N in service plus all Clarifiers in service with 1ft blanket (blanket based on RAS mg/l)

Yellow = Operator entered  
Orange = Calculated  
Red = Final

Password = mcrct

61	Labsheet Todays Desired lbs WAS
2920	RAS 3 days ago
3180	RAS 2 days ago
3120	RAS 1 days ago
1853	Set WAS GPM to

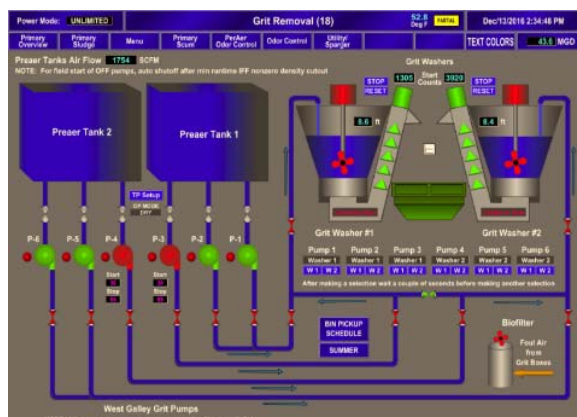
Rules for Targeted WAS:

- 1 If one of 3 RAS numbers is 500 mg/l more or less than the other 2, only use the average of the 2 similar values
- 2 Make RAS GPM changes no greater than 50 GPM/day
- 3 Make lbs/day WAS changes no greater than 2000 lbs higher or lower than the "Previous Days 24hr"
- 4 Always use your best judgement on RAS changes based on Data sheet and visual observations. This sheet is only a guide.

## FILTER PLANT BACKWASH TESTING

There are a total of four filters, and only one to two would be used at a time in the past. Theoretically, when three filters are used, they process more water per filter before the need to backwash, which increases the amount of time between filters, thereby reducing labor and energy costs. To verify this, the Operators performed tests every other week, alternating between three filters and two filters. According to data from Dynac trends, this **reduced the number of backwashes per week by 35%**.

Robert Maroon, Shift Supervisor, approached Doug Little, Plant Operations Superintendent, with the idea. Doug approved and directed him to keep track of the results. Doug notified Operations staff of the project while it was in progress. The test was a short one, running for two months from August 6 to September 23, 2016, before being curtailed by wet weather and the corresponding decrease in recycled water demand, when there is no need to operate three filters.



## GRIT SYSTEM WET WEATHER CONTROLS

A button activates “wet weather mode” in the supervisory control and data acquisition (SCADA) computer system to streamline the switch from normal operation to wet weather and reduce the opportunity for errors. Pushing a single button (pictured in the SCADA screenshot on the next page, circled in yellow) sets times to wet weather

sequencing of the six pumps (as seen in the SCADA screenshot on the previous page). Too many pumps running at once can overwhelm the grit washers.

Operations staff provided the requirements needed, and Rohit Upadhy, Control Systems Engineer, created the program. The idea was conceived around February 2016 and was completed in time for the 2016 wet weather season.



## WASTE HEAT BOILER WATER LEVEL

The software controller for the water level in the waste heat boiler (WHB) was improved to maintain a more stable boiler level and enhance its ability to respond to rapid changes in the steam system.

When the water level in the WHB (pictured) gets too low, furnace exhaust gas must be bypassed around the boiler and wet scrubber to avoid damage to the boiler. Although important for safe operation, these bypasses are considered to be a violation of Central San's air emissions permit. Improving the level control in the WHB prevents bypass events, which reduces potential permit violations and reduces natural gas use. During a bypass, WHB steam production stops, and auxiliary boilers must be used to make up the difference by use of natural gas.



**Low boiler water level events have decreased significantly as a result of this optimization. There were 12 in 2015, 2 in 2016 and none to date in 2017.**

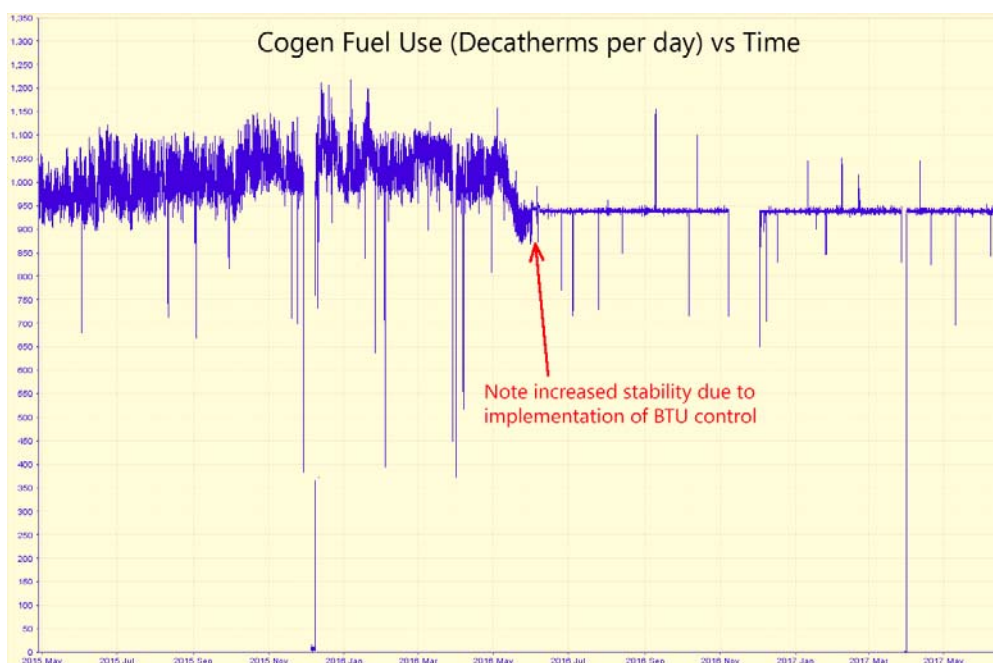
Chuck Burnash, Associate Control Systems Engineer, planned and implemented the level control improvements with encouragement from the Regulatory group. The effort was started in the fall of 2015 and implemented incrementally through the spring of 2016.

## COGENERATION CONTROL

A control mode automatically limits cogeneration (cogen) based on fuel usage. In the past, Operators had to manually change the PG&E power import set point in the cogen system (pictured) multiple times per day. The operator's manual changes were generally conservative, causing greater PG&E import than necessary. The automatic mode tightly controls fuel usage and minimizes excess PG&E import power usage. The mode also limits the amount of natural gas used, which addresses concerns about exceeding regulatory limits. It has been in operation for over a year and has been **highly effective at maintaining a steady cogen fuel usage**, as seen in the chart (pictured below). Plant Operators no longer need to manually change PG&E import values to ensure compliance with air regulations.



The Shift Supervisors conceived the control mode and Chuck Burnash designed and implemented the change. This effort was first discussed in March 2015 and was implemented in May 2016.



## REPLACEMENT OF AIR WASTING VALVE

A valve actuator in the aeration blowers was replaced to prevent undesired valve opening. Before this was fixed, the air wasting valve that adjusts air flow for stable operation in the aeration blowers was continuously opening and closing slightly. Replacing the actuator stopped the valve from unnecessarily opening and wasting air without purpose, thereby reducing the volume of air being generated by the blowers, reducing steam demand by the blowers, and directly reducing Treatment Plant energy costs in air saving of 800 standard cubic feet per minute, equating to a **savings of about \$15,000 annually in natural gas fuel costs.**

Chuck Burnash updated the valve control program and worked with Capital Projects and a contractor to replace the valve actuator and install the additional wiring required. The project was conceived in late 2015 and implemented in early 2016.

## AUTOMATED SLUDGE RETENTION TIME CONTROL

Field instrumentation calculates sludge age on a real-time basis. Solids Retention Time (SRT) is a critical operating parameter for the activated-sludge process. Currently, Operators use data that is provided once per day to control SRT. An automated system will continuously monitor and adjust the process to maintain a stable SRT. More consistent SRT has the potential to improve settling, which would improve effluent quality, plant capacity, filter plant operation, and dissolved air flotation operation. Improvements in each of these areas will result in cost savings.

This is a follow up project to Plant Operations' Sludge Retention Control Using a Calculator optimization, discussed earlier in this report. In 2016, three process monitoring probes were installed, which provide real-time data. SRT Control Software is expected to be installed in late 2017, which will use the probe data to accurately control SRT.



## CONTROL SYSTEM NETWORK

Currently, the network is comprised of single, non-redundant Ethernet switches and communication links. Improving this network to have both redundant Ethernet switches and redundant communication links will greatly increase the reliability of the Plant control system. If a network connection is damaged or a switch fails, the backup will keep communication active, maintaining the Operators' ability to monitor and control the Treatment Plant.

Staff designed the new system, bid the switch purchase and contracted the installation of new fiber optic cables (pictured). The installation of the upgraded system requires a team that includes the Control Systems group, Capital Projects, IT, the Electrical Shop and communications contractors. The effort is largely complete, with final redundancies scheduled to be installed as part of the Server Room Relocation project in late 2018.



## **SAFETY DATA SHEET (SDS) ONLINE DATABASE**

The online database allows employees to access chemical hazard information via a mobile device application and web browser.

The SDS documents are automatically kept up to date to ensure the most accurate information is available to staff.

*Planned/Future  
Optimizations,  
Innovations, and  
Achievements*

**ADMINISTRATION**

**COMMUNICATION SERVICES & INTERGOVERNMENTAL RELATIONS**

## HHW 20<sup>th</sup> ANNIVERSARY COLLECTION DRIVE



A week-long customer awareness engagement event will take place in honor of the 20<sup>th</sup> anniversary of the HHWCF, and a flagship reception event will be held for the District Board and leadership to celebrate with elected officials and valued partners.

Central San will host a week-long customer awareness and engagement event from Monday, October 16 through Saturday, October 21, 2017, to increase first-time and repeat use of the HHWCF in support of Central San's Strategic Plan Goal One - Foster Customer Engagement and Awareness and further increase pollution prevention outreach and education.



On Wednesday, October 18, 2017, the Central San Board and leadership will hold a flagship reception event to include awards and comments from elected officials and staff. The event will also offer a VIP Plant Tour for elected officials and community partners.

Communication Services will be conducting significant outreach in the months leading up to the event, to ensure the collection drive is a success.

*Update: The event was a success; Central San met its goal of 750 visitors from October 16 – October 21, 2017. The flagship event (pictured above) hosted community leaders, elected officials, sister agency representatives, and prior Central San Board Members.*

**ADMINISTRATION**  
**FINANCE****ELECTRONIC TIMEKEEPING**

An automated time-reporting and leave-tracking tool for use District wide will save the cost of paper to print leave request forms and timesheets and reduce staff time by eliminating the need to reconcile the hard copy forms. Employees will have easy access to their pay stubs with leave accruals and other related information, which staff would usually have to request from the Payroll Analyst.

Staff from IT, Human Resources, and Finance met with potential vendors and selected one; however, after a few trial pay periods with pilot user groups in 2016, it was found that the vendor could not meet Central San's needs. Staff is now working on securing a new vendor. Once the timekeeping software is finalized, it will be rolled out organization wide.

**PAYROLL ANALYST TRANSITION FROM FINANCE TO HUMAN RESOURCES**

Due to the alignment of the payroll function to several functions within Human Resources, this organizational change will provide for a more effective structure. This change will be reflected on the organizational chart but the Payroll Analyst will remain at the same office location and same phone number. *Update: This change went into effect on October 24, 2017 without disruption.*

**ACCOUNTS PAYABLE IMPROVEMENTS**

Functions in a new enterprise resource planning (ERP) software and modifications to internal practices will allow electronic transfer of funds to pay vendors and reimburse expenses to employees, as well as billing system improvements to ensure accurate commercial billing, circulating, and processing.

Currently, there are several processes in need of improvement, including the electronic transfer of funds, automation of internal signatures, and reduction in the amount of signature authority levels. Another issue that continues to arise is that vendors are sending invoices in duplicate to multiple people throughout the organization. Being able to perform these tasks electronically and more accurately will expedite current business operations and reduce the amount of errors that can stall efficiency.

SunGard was on site in November 2016 working with Purchasing & Materials Services (Purchasing) staff and other internal business groups. At that time, some potential improvements were identified for Finance, but it was later found that SunGard had significant limitations and will be replaced as an ERP. The project is on hold until that ERP is in place.

# SIGNATURE AUTHORITY MATRIX

Contra Costa Sanitary District  
Authorized Signature List and Approved Limits (revised 8-17-17)

Authorization Limits

Put check mark in relevant box:

#	Type of Expenditure or Commitment	GM	DEPUTY GM	DIRECTOR	MANAGER	SR. ENGINEERS & SUPERINTENDENTS*	SUPERVISORS & ASSOCIATE ENGINEERS**	SIGNING STAFF***
1	Construction Progress Payment	No Limit	No Limit	No Limit	\$5M Engineering, Plant, POC/CSO Only	\$1M Sr. Engineers Only	\$150K Associate Engineers, Only	0
2, 3	Purchasing PO's, Contracts, Agreements	No Limit	No Limit	Dir Fin/Adm. \$75K	Purchasing Manager \$50K	0	Sr. Buyer \$25K	0
4a, 5a, 6a	Purchase Requisitions	No Limit	No Limit	No Limit	50K	10K	10K	0
4b, 5b, 6b	Payments for Goods & Services (All Invoices) (O&M and Capital)	No Limit	\$ 1 million	No Limit	250K	50K	25K	5K
7	Mileage	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
8	Payment Auth. (Warrants)	100K	75K	75K	50K	0	0	0
9a	Payroll - Deferred Comp/Insurances/Direct Deposit/Taxes/Transfers	No Limit	No Limit	Dir. Fin. & Adm. \$1.5M	Fin Manager \$1.5M	0	0	0
9b	Inter-Fund Transfer/Investment Instructions	No Limit	No Limit	Dir. Fin. & Adm. \$5 M	Fin Manager \$1.5 M	0	0	0
9c	Prepay Retirement (GM approval required)	No Limit	No Limit	0	0	0	0	0
9d	Debt Payments/Trust Accounts	No Limit	No Limit	0	0	0	0	0
9e	Liability Insurances/Settlements	No Limit	No Limit	0	0	0	0	0
10	Petty Cash	90	90	90	90	90	90	90
11a / 11b	Transfers of Funds Between Capital Projects	500K	0	0	0	0	0	0
12	Travel Reimb & Training Approval (Per individual)	No Limit	10K	10K	5K	2K	0	0
13	Correction Notification Forms	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14	Payroll Time Sheets	Yes	Yes	Yes	Yes	Yes	Yes	Yes
15	Vacation/Leave Forms	Yes	Yes	Yes	Yes	Yes	Yes	Yes
16, 17	Construction Change Order Memos (Additive or Deductive)	Additive 100K / Deductive No Limit	75K	75K	50K	15K	5K	0
18	Encroachment Permit Fees	100K	75K	75K	50K	10K	5K	0
19	Equipment Purchases	100K	75K	75K	50K	10K	5K	0
20, 21	Legal Expenditures (O&M or Capital)	No Limit	No Limit	No Limit	10 hrs	5 hr	1 hr	0
22	Utility Bills	No Limit	500K	500K	250K	25K	5K	0

Notes regarding titles:

- \* SR. ENGINEERS & SUPERINTENDENTS: Sr. Engineer, Plant Operations Supt, Plant Maintenance Supt, Field Operations Supt, Laboratory Supt, Environmental Compliance Supt.
- \*\* SUPERVISORS & ASSOCIATE ENGINEERS: All Supervisors, Senior Buyers, Senior Chemist, Land Surveyor, Associate Engineers, Safety Officer, GIS/CMMS Administrator, Control System Engineer
- \*\*\* SIGNING STAFF: Assistant Engineers, Safety Specialist, GIS Analyst, Sr. Right of Way Agent, Sr. Engineering Assistant, Chemist (I/II), Community Affairs Rep, Sr. Environmental Compliance Insp., Control Systems Tech, Executive Assistant

Signing Individual Name: \_\_\_\_\_ Signature: \_\_\_\_\_  
 Department Director: \_\_\_\_\_ Signature: \_\_\_\_\_

The Signature Authority Matrix (pictured at top) will be modified to be less complicated and more in line with similar agencies'. The new version will be easier to read and will save staff time in interpretation.

Matrices from other agencies were gathered in June 2017. Staff will work on redesigning Central San's Signature Authority Matrix to be more consistent with our sister agencies'. Update: the new form (pictured at left) was rolled out to staff on August 24, 2017.

## ADMINISTRATION INFORMATION TECHNOLOGY

# BUSINESS PROCESS MAPPING IN PREPARATION FOR NEW ERP

A consultant will perform a study on what select workgroups do, how responsibilities are divided, to what standard their business process should be completed, and how the success of the business process can be determined. The scope of the agreement includes analysis and

documentation of our current business processes, an assessment of organizational readiness, and assistance in the procurement of a new ERP. This will help identify inefficiencies in the processes and best set up Central San for the acquisition of a new ERP system.

The consultant was procured in summer 2017 and will review critical functions and map workflows within the framework of determining Central San's readiness for a new ERP system. It is anticipated that the work will be completed by the fall of 2017.

## NEW INTERNET SITE

The current platform and website (pictured) lacks a great deal of functionality, and the interface is difficult for staff to use to maintain content. Many of the employees who knew how to use the system have retired, and there are only a few employees left who can provide support for it. A new internet platform will improve and facilitate communication of important business information, allow webmasters to maintain better control of the content, and offer the possibility of improved customer service such as live chat capability with stakeholders.



A selection committee received demos from multiple vendors and issued an RFP. A vendor has been selected and staff is working with them to redesign our internet.



## NEW INTRANET SITE

The current platform and internal website (pictured) is difficult to use to maintain content. Staff will benefit from modernizing this site by being able to easily access policies, procedures, division information, and documents related to ongoing projects.

A selection committee received demos from multiple vendors and issued an RFP. A vendor has been selected and staff is working with them to redesign our intranet as well as our internet site. Staff plans to update the intranet during FY 2017-18.

## **CORE NETWORKING SWITCH**

Replacing the core networking switch will provide a higher level of reliability of data delivery for every device that has access to the network. The built-in failover mechanisms will provide a method of automatic redundancy in case any piece of the switch fails.

IT staff will solicit bids from three technology providers and will work closely with the selected vendor to implement the new core switch and cutover from the existing switch. The anticipated project completion date is September 2017.

### **ADMINISTRATION** **PURCHASING & MATERIALS SERVICES**

## **E-PROCUREMENT / IMPROVED ELECTRONIC WORKFLOW**

Automation in the procurement process is essential to improving efficiencies for all users. The current ERP has a procurement module that is designed specifically for the procurement of commodities and is significantly limited in function, leaving contracted services to be managed manually. Purchasing will be working with a consultant and IT to determine its needs in a new ERP, while also considering contract management software and an insurance tracking program to automate the procurement function. E-procurement will increase efficiency, accessibility, increase cost savings, improve transparency, and provide meaningful reports in procurement.

Purchasing staff met with SunGard representatives on site at the end of November 2016. Based on the limitations identified in this visit, staff determined that focusing on identifying its needs for a new ERP and implementing it would be a better use of staff time than trying to make improvements on a program with significant limitations.

## **PURCHASING POLICIES AND PROCEDURES MANUAL**

Staff will reorganize and edit the current Policies and Procedures manual, including the addition of specific and concise diagrams, definitions, and bullet point outlines of processes, documents, and procedures required to procure goods and services for Central San. This will provide a more succinct and accessible document.

Staff is currently reviewing and evaluating the reorganization of this document and plans to complete the edit in early 2018 and provide training workshops later that year.

## **ENGINEERING & TECHNICAL SERVICES** **CAPITAL PROJECTS**

### **UV DISINFECTION UPGRADES**

The current UV disinfection equipment is obsolete and lacks the controls and automated cleaning capabilities that newer UV technology has. In addition, its electrical connections (pictured) are worn. Staff will address these issues with near-term improvements in order to reliably operate the existing equipment, followed by installation of a new system in five to 10 years. Performing this replacement with common equipment will make future replacements easier because the parts will be easier to find.



Staff presented this project as Key Finding 7 in the CWMP Recommendations to the Board on November 10, 2016. Staff will monitor the equipment over the next few years to ensure this is done at the proper time.

The equipment will be fully evaluated in about three years, depending on the status of the equipment, with planning and design in the fourth year, with construction starting in the fifth year and taking up to five years to complete.

### **AERATION AND ENERGY PROJECT**

The existing aeration system was built in the 1970's and is outdated, experiences significant air leaks, and has limited turndown capabilities. Also, the existing steam piping and valves are corroding. Although it is advantageous to recover waste heat for generating steam for secondary aeration, this also creates a complicated interconnection. Disruptions in solids handling and steam systems can impact the reliability of the secondary process. Similarly, disruptions in blower operation can impact the boiler and steam system, impacting solids emission controls. Separating this connection will improve operational resiliency.





## **ENGINEERING & TECHNICAL SERVICES PLANNING & DEVELOPMENT SERVICES**

### **PROGRAM MANAGEMENT INFORMATION SYSTEM (PMIS)**

The program management tool, e-Builder, is an online software tool to track scheduling and cash flow. It is efficient, easily accessible, and can manage and track all aspects of capital projects from inception through completion, including financial planning, project scheduling, integration, monitoring and reporting capability. Once implemented, it will alleviate repetitive, manual data entry that is inefficient and time consuming.

This is a collaborative effort with Capital Projects, Finance, and IT. A consultant was contracted by the Asset Management workgroup to evaluate and determine the functional requirements for the system. A professional consulting services agreement with CDM Smith to implement e-Builder PMIS software was authorized by the Board on July 20, 2017. A three-phase implementation process will occur over the following 18 months.

### **WATER ENVIRONMENT RESEARCH FOUNDATION (WERF) HYPOWERS PROJECT**

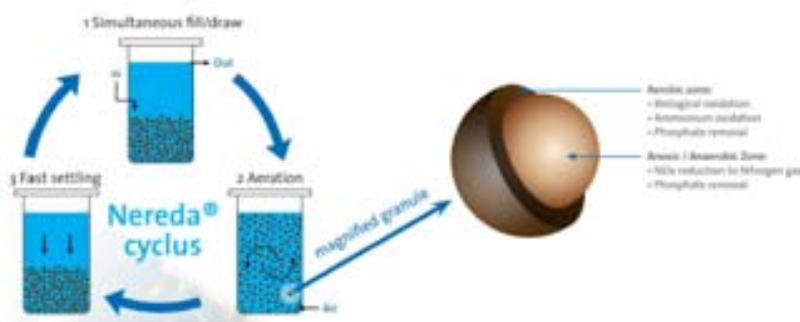
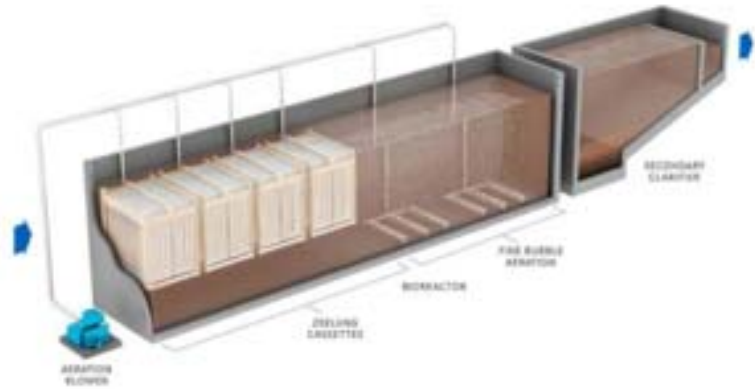


Central San is part of the HYPOWERS bioenergy project team that was awarded a \$1.2 million Department of Energy grant in December 2016 for an emerging hydrothermal resource recovery process (converting wastewater solids to biofuel, renewable gas, fertilizers, etc.), to test new solids handling/renewable energy (or bioenergy) technology. Central San was selected as the location for the pilot project because of our

proximity to refineries, who are potential end users of the recovered biocrude byproduct. Other potential recovered resources include liquid/solid fertilizer byproducts and biogas that can be treated to renewable natural gas standards. Phase 1 will entail pilot planning, design, and permitting for a 3-ton per day pilot, and Phase 2 will be construction and operation of the pilot. This is a multi-agency collaboration with the Water Environment & Reuse Foundation (WE&RF), Pacific Northwest National Laboratory, Genifuel, Merrick & Co., Tesoro Corporation, MicroBio Engineering, SoCal Gas, Utility Advisory Panel, and others. This is a joint effort with Resource Recovery.

## MEMBRANE AERATED BIOREACTORS

This potential pilot to test nutrient removal technology is innovative and involves installing the membrane aerated bioreactors in Central San's existing aeration tanks to intensify the treatment capacity of existing infrastructure. In an anaerobic zone, the membranes deliver oxygen to a biofilm attached to the membrane surface. This technology would potentially enhance nutrient removal treatment capacity using existing tankage, possibly eliminating the need to expand tankage and deal with contaminated soils. Staff is completing a feasibility report for the innovative technology and is exploring pilot and demonstration opportunities.

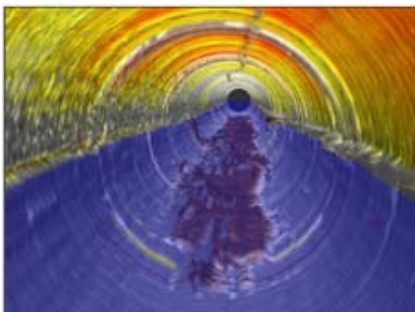


## ANAEROBIC GRANULAR SLUDGE

This is a possible pilot nutrient removal process that reduces energy demands for nutrient removal, does not require external carbon addition, and uses minimal mechanical equipment. The

aerobic granular sludge process uses sequencing batch reactors to grow fast settling granules that performs simultaneous nitrification/denitrification in order to meet nutrient limits. The innovative technology offers a compact nutrient removal method that may also require a lower lifecycle cost than conventional nutrient removal technologies. Staff is completing a feasibility report for the innovative technology and is exploring pilot and demonstration opportunities.

## COLLECTION SYSTEM OPERATIONS



## LARGE DIAMETER PIPE INSPECTIONS

Cutting edge inspection technologies, such as laser scanning, 3-D HD cameras, and sonar can better inspect over 76 miles of large diameter sewers from 24" to 102" in diameter, mostly made of reinforced concrete pipe, and over 50% of which are over 50 years old. This technology will offer better viewing ability than CCTV. The data will be used to update condition scores and investigate corrosion, sediment, and defects. Inspections will be prioritized by risk score.

## **FORCE MAIN INSPECTIONS**

Pressure transient monitoring, acoustic leak detection, and electromagnetic technologies will be used to inspect over 21 miles of force main up to 30" in diameter (concrete, ferrous, plastic pipe materials). This technology is non-intrusive, and the data collected will be used to update condition scores and investigate corrosion, defects, etc. to ensure the force mains are in good condition. Inspections will be prioritized by criticality.



**OPERATIONS**  
**PLANT MAINTENANCE – ELECTRICAL SHOP**

## **REPLACE EXISTING LIGHTING AT THE HOUSEHOLD HAZARDOUS WASTE COLLECTION FACILITY (HHWCF)**

At the HHWCF, there are numerous high intensity discharge (HID) lights which are not energy efficient. Upgrading these to energy efficient LED fixtures will save energy and maintenance costs by using less energy and not having to replace lamps as often. Staff will purchase and order the fixtures, submit a work request, order additional materials for installation, install and the complete work. This process is expected to take three months.

**OPERATIONS**  
**PLANT MAINTENANCE – MECHANICAL SHOP**

## **COLOR CODED SUPPLIES (GREASE GUNS & ZERK FITTINGS)**



If the Operations and Maintenance staff had a chart that identified the grease by color, time would be saved in finding the correct grease. This would be a small investment to eliminate the maintenance needed as a result of cross contamination of grease. For this optimization, staff would have to inventory the grease guns and zerk fittings needing to be classified, assign the color codes, create a chart, make copies of the chart and distribute them to staff.

**OPERATIONS**  
**PLANT MAINTENANCE – PUMPING STATIONS****GRINDER INSTALLATION  
AT MORAGA PUMPING  
STATION**

Currently, the station has a mechanical bar screen. All Pumping Stations crews from the Supervisor down to the Operators manually rake the debris (as Operators Anthony MacArthur and Mike Muhlestein are doing in the picture), using the rake to wring the water out as much as possible, then putting the heavy rags into trash bags, carrying them out of

the wet well, and placing them in the dumpsters. Some of the larger pump stations, like Martinez and Lower Orinda and San Ramon and Concord Industrial already have grinders, because they were installed at the time the stations were built. Once installed, the grinder will break down the debris that would normally collect on the bar screen or get stuck in the pump.

This project was started in the summer of 2016 and is currently in the planning stage. Pumping Stations is working with the engineers as part of a larger project for pumping station rehabilitations and improvements. Capital Projects has hired an outside firm to do pre-design, and the schedule is to be determined.

## CONCLUSION / ACKNOWLEDGEMENTS

It is clear that Central San has a commitment to optimization and innovation. Studying these projects has been an exercise in recognizing staff's teamwork, communication, resourcefulness, and constant attention toward improving the status quo. Optimization and innovation would not be possible without leadership to drive progress; a Strategic Plan to help track and give credit; and the staff to design, implement, and achieve these optimizations.

Thank you to Ann Sasaki for her mentorship and to the Executive Team, Teji O'Malley, Dr. Larry Bienati, and the Board for their support of the Mentorship Program. Creating and updating this report has been an immense opportunity to enrich my general knowledge of Central San, learn tips on how to design efficient and effective workflows, and be inspired by the achievements of staff.

There are too many people who were involved with the reporting of these optimizations to list individually. I would like to extend a "thank you" to all of the Managers and key staff who took the time to meet with me and help ensure a complete report of all of our accomplishments as an organization. I look forward to continuing the discussion and recording the progress and positive outcomes of all the steps we are making toward being industry leaders in optimizations and innovations.