



REVISED

BOARD MEETING AGENDA
Monday, September 28, 2015
Regular Meeting - 7:00 P.M.

Directors
Manny Fernandez
Tom Handley
Pat Kite
Anjali Lathi
Jennifer Toy

Officers
Paul R. Eldredge
*General Manager/
District Engineer*

Karen W. Murphy
Attorney

1. Call to Order.

2. Pledge of Allegiance.

3. Roll Call.

- Motion 4. Approve Minutes of the Special Meeting of August 17, 2015.

- Motion 5. Approve Minutes of the Special Meeting of August 27, 2015.

- Motion 6. Approve Minutes of the Meeting of August 24, 2015.

- Motion 7. Approve Minutes of the Meeting of September 14, 2015.

8. Monthly Operations Report for August 2015 *(to be reviewed by the Budget & Finance Committee)*.

9. Written Communications.

10. Oral Communications.
*The public may provide oral comments at regular and special Board meetings; however, whenever possible, written statements are preferred **(to be received at the Union Sanitary District office at least one working day prior to the meeting)**. This portion of the agenda is where a member of the public may address and ask questions of the Board relating to any matter within the Board's jurisdiction that is not on the agenda. If the subject relates to an agenda item, the speaker should address the Board at the time the item is considered. Oral comments are limited to three minutes per individuals, with a maximum of 30 minutes per subject. Speaker's cards will be available in the Boardroom and are to be completed prior to discussion.*

- Motion 11. Consider a Resolution Accepting a Sanitary Sewer Easement from Alameda County Flood Control and Water Conservation District *(to be reviewed by the Legal/Community Affairs Committee)*.

- Motion 12. Approve the 2015 SCADA Master Plan *(to be reviewed by the Budget & Finance Committee)*.

- Motion 13. Award Construction Contract for the Fremont and Paseo Padre Lift Stations Improvements Project to Mountain Cascade, Inc. *(to be reviewed by the Construction Committee)*.

- Motion 14. Authorize the General Manager to Execute Task Order No. 2 with RMC Water and Environment for the Alvarado Wastewater Treatment Plant Site Use Study *(to be reviewed by the Construction Committee)*.
-
- Motion 15. Consider First Amendment to Employment Agreement Between Union Sanitary District and Paul Eldredge.
-
- Motion 16. Consider Options Regarding Email and Communications Policy and Provide Direction *(to be reviewed by the ~~Legal/Community Affairs~~ Budget & Finance Committee)*.
-
- Information 17. Information Items:
- a. Check Register.
 - b. Award for Achievement of Excellence in Procurement.
 - c. Annual Report to Union City for Fiscal Year 2015 *(to be reviewed by the Legal/Community Affairs Committee)*.
 - d. Board Expenditures for the 4th Quarter of 2015 *(to be reviewed by the Budget & Finance Committee)*.
 - e. Report on the East Bay Dischargers Authority (EBDA) Commission meeting of September 17, 2015.
-
- Motion 18. Side Letter for Extension of SEIU (Service Employees International Union) Memorandum of Understanding (MOU)
-
- Information 19. Committee Meeting Reports. *(No Board action is taken at Committee meetings):*
- a. Construction Committee – scheduled for Wednesday, September 23, 2015, at 10:30 a.m.
 - b. Budget & Finance Committee – scheduled for Thursday, September 24, 2015, at 8:30 a.m.
 - c. Legal/Community Affairs Committee – scheduled for Friday, September 25, 2015, at 9:15 a.m.
 - d. Personnel Committee – will not meet.
-
- Information 20. General Manager’s Report. *(Information on recent issues of interest to the Board)*.
-
21. Other Business:
- a. Comments and questions. *Directors can share information relating to District business and are welcome to request information from staff.*
 - b. Scheduling matters for future consideration.
-
22. Adjournment – The Board will adjourn to a Website Board Workshop on Wednesday, September 30, 2015, at 11:00 a.m. The next scheduled Regular Meeting will be in the Boardroom on Monday, October 12, 2015, at 7:00 p.m.

The Public may provide oral comments at regular and special Board meetings; however, whenever possible, written statements are preferred (to be received at the Union Sanitary District at least one working day prior to the meeting).

If the subject relates to an agenda item, the speaker should address the Board at the time the item is considered. If the subject is within the Board’s jurisdiction but not on the agenda, the speaker will be heard at the time “Oral Communications” is calendared. Oral comments are limited to three minutes per individual, with a maximum of 30 minutes per subject. Speaker’s cards will be available in the Boardroom and are to be completed prior to discussion of the agenda item.

The facilities at the District Offices are wheelchair accessible. Any attendee requiring special accommodations at the meeting should contact the General Manager’s office at (510) 477-7503 at least 24 hours in advance of the meeting.

THE PUBLIC IS INVITED TO ATTEND

**NOTICE OF
COMMITTEE MEETING**

All meetings will be held in
the General Manager's Office
5072 Benson Road, Union City, CA 94587



BOARD MEETING OF SEPTEMBER 28, 2015

Committee Membership:

Budget and Finance	Directors Manny Fernandez and Pat Kite (Alt. – Jennifer Toy)
Construction Committee	Directors Tom Handley and Jennifer Toy (Alt. – Pat Kite)
Legal/Community Affairs	Directors Pat Kite and Anjali Lathi (Alt. – Tom Handley)
Legislative Committee	Directors Manny Fernandez and Tom Handley (Alt–Pat Kite)
Personnel Committee	Directors Manny Fernandez and Jennifer Toy (Alt. – Anjali Lathi)
Audit Committee	Directors Anjali Lathi and Jennifer Toy (Alt. Manny Fernandez)

Construction Committee, Wednesday, September 23, 2015, at 10:30 a.m.

13. Award Construction Contract for the Fremont and Paseo Padre Lift Stations Improvements Project to Mountain Cascade, Inc.
14. Authorize the General Manager to Execute Task Order No. 2 with RMC Water and Environment for the Alvarado Wastewater Treatment Plant Site Use Study.

Budget & Finance Committee, Thursday, September 24, 2015, at 8:30 a.m.

8. Monthly Operations Report for August 2015.
12. Approve the 2015 SCADA Master Plan.
16. Consider Options Regarding Email and Communications Policy and Provide Direction.
- 17d. Board Expenditures for the 4th Quarter of 2015.

Legal/Community Affairs Committee, Friday, September 25, 2015, at 9:15 a.m.

11. Consider a Resolution Accepting a Sanitary Sewer Easement from Alameda County Flood Control and Water Conservation District.
 - 17c. Annual Report to Union City for Fiscal Year 2015
-

Committee meetings may include teleconference participation by one or more Directors.
(Gov. Code Section 11123)
Committee Meetings are open to the public. Only written comments will be considered. No action will be taken.

**MINUTES OF THE SPECIAL MEETING OF THE
BOARD OF DIRECTORS OF
UNION SANITARY DISTRICT
August 17, 2015**

THIS MEETING WAS TELECONFERENCED WITH DIRECTOR LATHI FROM WEST OF THE
INTERSECTION OF PASEO PADRE PARKWAY AND OCASO CAMINO IN
FREMONT, CALIFORNIA.

CALL TO ORDER

President Toy called the special meeting to order at 4:00 p.m.

ROLL CALL

PRESENT: Manny Fernandez, President
Jennifer Toy, Vice President
Tom Handley, Secretary
Pat Kite, Director
Anjali Lathi, Director (*via teleconference*)

STAFF: Paul Eldredge, General Manager
Karen Murphy, General Counsel

ORAL COMMUNICATIONS

There were no oral communications.

CLOSED SESSION

The Board adjourned to Closed Session for the following matter:

PUBLIC EMPLOYEE PERFORMANCE EVALUATION
Pursuant to Government Code Section 54957
Title: General Manager

The Board (absent Director Lathi) reconvened to Open Session with no reportable action.

ADJOURNMENT:

The special meeting was adjourned at approximately 5:15 p.m. to the next Regular Board Meeting in the Boardroom on Monday, August 24, 2015, at 7:00 p.m.

SUBMITTED:

ATTEST:

REGINA McEVOY
SECRETARY TO THE BOARD

PAT KITE
SECRETARY

APPROVED:

JENNIFER TOY
PRESIDENT

Adopted this 28th day of September, 2015

**MINUTES OF THE SPECIAL MEETING OF THE
BOARD OF DIRECTORS OF
UNION SANITARY DISTRICT
August 27, 2015**

THIS MEETING WAS TELECONFERENCED WITH DIRECTOR LATHI FROM WEST OF THE
INTERSECTION OF PASEO PADRE PARKWAY AND OCASO CAMINO IN
FREMONT, CALIFORNIA.

CALL TO ORDER

President Toy called the special meeting to order at 11:30 a.m.

ROLL CALL

PRESENT: Manny Fernandez, President
 Jennifer Toy, Vice President
 Tom Handley, Secretary
 Pat Kite, Director
 Anjali Lathi, Director (*via teleconference*)

STAFF: Paul Eldredge, General Manager
 Karen Murphy, General Counsel

ORAL COMMUNICATIONS

There were no oral communications.

CLOSED SESSION

The Board adjourned to Closed Session for the following matters:

PUBLIC EMPLOYEE PERFORMANCE EVALUATION
Pursuant to Government Code Section 54957
Title: General Manager

CONFERENCE WITH LABOR NEGOTIATORS
Agency designated representatives: Tom Handley and Pat Kite
Unrepresented employee: General Manager

The Board (absent Director Lathi) reconvened to Open Session with no reportable action.

ADJOURNMENT:

The special meeting was adjourned at approximately 1:45 p.m. to the next Regular Board Meeting in the Boardroom on Monday, September 14, 2015, at 7:00 p.m.

SUBMITTED:

ATTEST:

REGINA McEVOY
SECRETARY TO THE BOARD

PAT KITE
SECRETARY

APPROVED:

JENNIFER TOY
PRESIDENT

Adopted this 28th day of September, 2015

**MINUTES OF THE MEETING OF THE
BOARD OF DIRECTORS OF
UNION SANITARY DISTRICT
August 24, 2015**

**THIS MEETING WAS TELECONFERENCED WITH DIRECTOR LATHI FROM THE
GUEST PARKING AREA ON OCASO CAMINO, WEST OF THE INTERSECTION OF
PASEO PADRE PARKWAY IN FREMONT, CALIFORNIA.**

CALL TO ORDER

President Toy called the meeting to order at 7:00 p.m.

PLEDGE OF ALLEGIANCE

ROLL CALL

PRESENT: Jennifer Toy, President
Tom Handley, Vice President
Pat Kite, Secretary
Manny Fernandez, Director
Anjali Lathi, Director (*via teleconference*)

STAFF: Paul Eldredge, General Manager
Karen Murphy, District Counsel
Rich Cortés, Business Services Manager
Armando Lopez, Treatment & Disposal Services Manager
Sami Ghossain, Technical Services Manager
James Schofield, Collection Services Manager
Robert Simonich, Fabrication, Maintenance, and Construction Manager
Kathy Destafney, Business Services Manager
Chris Pachmayer, Electrical/Support Team Manager
Sheila Tolbert, Human Resources Manager
Laurie Brenner, Organizational Performance Program Manager
Roslyn Fuller, Purchasing Agent
Todd Jacob, IT Administrator
Mike Marzano, Environmental Health and Safety Program Manager
Michelle Powell, Communications and Intergovernmental Relations Coordinator
Jamie Rojo, Accounting Technician
Maria Scott, Principal Financial Analyst
Kristina Silva, Administrative Specialist

GUEST: Alice Johnson, League of Women Voters

APPROVAL OF THE MINUTES OF THE MEETING OF AUGUST 10, 2015

It was moved by Secretary Kite, seconded by Vice President Handley, to Approve the Minutes of the Regular Meeting held August 10, 2015. Motion carried with the following vote:

AYES: Fernandez, Handley, Kite, Lathi, Toy (*via roll call*)
NOES: None
ABSENT: None
ABSTAIN: None

MONTHLY OPERATIONS REPORT

This item was reviewed by the Budget & Finance Committee.

- a. Monthly Odor Report & Financial Reports: General Manager Eldredge stated there was one odor reported during the month of July 2015, by a resident located on Bret Harte Court in Fremont. District staff inspected the USD mains and city storm drain inlets in the area, and no odor was detected. Staff followed up with the resident by providing information regarding how District lines are cleaned, and advised the individual to run water in their sinks to fill the P-Traps within their home.

Principal Financial Analyst Scott reported the following for the month of July:

- Revenues:
 - \$519,000 received in capacity fees for Washington Hospital Phase II
 - \$101,000 for new Ohlone College buildings
 - \$58,000 for Synergy Corporate Housing in Union City
 - \$329,000 received in State Revolving Fund proceeds for the Thickener project
- Expenses:
 - \$65,000 credit was received from ACWD for the washer rebate program
 - \$76,000 for actuators and pumpers purchased from the Plant & Pump Station Renewal & Replacement
 - \$411,000 payment made to the State Revolving Fund loan for the Boyce Pump Station

July 2015 investment activities for purchases, interest payments, and maturities were reviewed.

Internal fund activity and CalPERS Retiree Medical Trust Statements were reviewed.

- b. Annual Performance Report for District-wide Balanced Scorecard Measures: Operational Performance Program Manager Brenner stated the 2015 USD

Strategic Performance Report, included in the meeting packet, summarizes the District's progress meeting operational and safety objectives and targets for Fiscal Year 2014-15.

Operational Performance Program Manager Brenner highlighted several results, both positive and negative, included in the staff report.

- There were two incidents of critical asset failure with impacts. Both incidents were associated with rapid regrowth of roots in the sewer mains.
 - The District had two Category 1 sanitary sewer overflows. The first occurred on October 28, 2014, in Fremont on Palm Avenue. It was reported that 495 gallons had spilled; 445 gallons of the amount spilled were captured. The second overflow occurred on April 23, 2015, in Fremont on Mission Boulevard. It was reported that 3,911 had spilled; 300 gallons of the amount spilled were captured.
 - Operational expenditures were 93% of budget, missing the target of 95% by 2%.
 - District staff responded to 97.7% of all calls for service within one hour. The average response time was less than 42 minutes.
 - 94% of planned outreach activities were completed. California Association of Sanitation Agencies (CASA) presented the District with their Fiscal Year 15 Achievement Awards in the Outstanding Public Outreach and Education category at the CASA conference held in August 2015.
 - Employee turnover rate was 6.2%. 1.6% was due to resignations, the remaining amount was due to planned retirements.
 - Assessments of the training module program exceeded the annual target by 15%.
 - Three lost-time injuries occurred during Fiscal Year 2015
 - Three incidents of vehicle or equipment damage occurred.
 - 80% of employees were trained on mandatory safety subjects.
 - The Workers Compensation Experience Modifier (X-Mod) was decreased to 1.01 from 1.16.
 - 300 worksite inspections were performed by management.
- c. Business Services Balance Score Card Measurements and Results were displayed on poster boards at the back of the Boardroom. Those who were present reviewed the posters. The posters reflected the information included in the meeting packet.

WRITTEN COMMUNICATIONS

There were no written communications.

ORAL COMMUNICATIONS

There were no oral communications at either meeting location.

APPROVE THE PUBLICLY AVAILABLE PAY SCHEDULE

This item was reviewed by the Personnel Committee. Business Services Manager Cortes stated the salary changes contained in the current pay schedule reflect the salary for the newly created Communications and Intergovernmental Communications Coordinator, adjustment to the Buyer I salary, and adjustments made to the Unclassified employee pay ranges as the result of the 2014 salary survey.

It was moved by Director Fernandez, seconded by Secretary Kite, to Approve the Publicly Available Pay Schedule Effective August 22, 2015. Motion carried by the following vote:

AYES: Fernandez, Handley, Kite, Lathi, Toy (*via roll call*)
NOES: None
ABSENT: None
ABSTAIN: None

DISCUSS AND PROVIDE DIRECTION (AS NECESSARY) REGARDING PUBLIC OUTREACH, SCHEDULING, AND PROCEDURES FOR SEWER SERVICE RATES

This item was reviewed by the Legal/Community Affairs Committee. General Manager Eldredge stated that at a previous meeting Vice President Handley requested scheduling a discussion regarding public outreach for annual rate hearings, public outreach for Proposition 218 rate notification, and the District's procedure for responding to protest emails and customer communication.

It was agreed to have the District hold one town hall meeting for the Proposition 218 rate notification prior to the Public Hearing. The desired date for the Public Hearing is December 14, 2015. Concerns were expressed that the schedule of deadlines for preparation was too aggressive. A consensus was reached that an alternate date of January 25, 2016, could be used at Staff's discretion.

Information for fact sheets and notifications will be subject to legal review. The Board agreed an Ad Hoc Committee, consisting of two Board members, should review the content of the Proposition 218 notification mailer.

Board members agreed that it is important to acknowledge and respond in a timely manner to customer communications. Any protest emails and customer communications regarding sewer service rates will be incorporated into the public record and the author will be advised of the public hearing date. The Board also agreed that communications received which staff believe may warrant a more detailed response shall be presented and discussed at a regular Board meeting.

The Board agreed to the following by consensus:

1. Public outreach for annual rate hearing procedures will not change as proposed by staff.

2. Public outreach for Proposition 218 rate notification will include a town hall meeting. The Union Sanitary District Boardroom may be used if an outside location is not feasible. The town hall meeting is a one-time trial evaluation. A Public Hearing was tentatively scheduled for December 14, 2015. An alternate date of January 25, 2016, can be utilized if needed at staff's discretion. A two-member ad hoc committee will be created for the Proposition 218 rate notification information.
3. A standard acknowledgement response and fact sheet will be created for protest emails and customer communication regarding sewer service rates. Communications received which staff believes may require further response will be brought to the Board for direction.

It was moved by Secretary Kite, seconded by Director Fernandez, to direct staff to proceed with the addition of a town hall meeting to occur prior to the Public Hearing to consider rates; to proceed to schedule the Public Hearing for Proposition 218 rate notification with a desired date of December 14, 2015 (or alternate date of January 25, 2016); to create a two-member ad hoc committee to review content of the Proposition 218 rate notification information; and to have staff create a standard response to reply to communications regarding sewer service rates and provide a fact sheet if appropriate; communications received that staff believes may require further response will be brought to the Board for direction. Motion carried by the following vote:

AYES: Fernandez, Handley, Kite, Lathi, Toy (*via roll call*)
NOES: None
ABSENT: None
ABSTAIN: None

AUTHORIZE THE GENERAL MANAGER TO EXECUTE AN AGREEMENT AND TASK ORDER NO. 1 WITH WEST YOST ASSOCIATES FOR THE DESIGN OF THE SLUDGE DEGRITTER SYSTEM PROJECT

Technical Services Manager Ghossain stated the Degritter Building was constructed in 1985, and used to house five belt filter presses to dewater biosolids prior to disposal. The District replaced the belt filter presses with centrifuges, and replaced the original grit removal equipment with two degritter units. The two existing sludge degritters receive sludge flow from primary clarifiers 1 through 6. Both degritters are required to operate concurrently in order to handle the sludge flow from the primary clarifiers. When one of the degritters is out of service, the other unit does not have the capacity to process all of the primary sludge flow. This results in additional sludge accumulation in the primary clarifiers and the lower sludge flow rate could affect the ability of the thickeners to efficiently settle the solids. Therefore, operation staff determined an additional degritter was needed. Staff also identified a need to install a new chemical tank and pump system to dose ferrous chloride into the degrittled sludge pipeline. The proposed project will construct a third degritter, install new sludge piping, instrumentation, grit conveyor, chemical tank, and chemical metering pumps.

Staff prepared a Request for Proposal for design services for the project and contacted five firms from the District's consultant short list. Design of the project is schedule to be completed in the summer of 2016, with construction to follow in fall of 2016. Staff recommended the Board authorize the General Manager to execute an Agreement and Task Order No. 1 with West Yost Associates in the amount of \$180,629 for design of the Sludge Degritter System Project.

It was moved by Vice President Handley, seconded by Secretary Kite, to Authorize the General Manager to Execute an Agreement and Task Order No. 1 with West Yost Associates for the Design of the Sludge Degritter System Project. Motion carried with the following vote:

AYES: Fernandez, Handley, Kite, Lathi, Toy (*via roll call*)
NOES: None
ABSENT: None
ABSTAIN: None

DESIGNATE AND APPOINT TWO BOARD REPRESENTATIVES TO AD HOC SUBCOMMITTEE ON GENERAL MANAGER CONTRACT NEGOTIATIONS

District General Counsel Murphy stated that per the employment agreement between the District and Mr. Eldredge, the General Manager's salary should be reviewed annually. This agenda item requested two representatives be designated to an Ad Hoc Subcommittee.

It was moved by Director Fernandez, seconded by Vice President Handley, to appoint Secretary Kite and Vice President Handley to serve as representatives to the Ad Hoc Subcommittee on General Manager Contract Negotiations. Motion carried with the following vote:

AYES: Fernandez, Handley, Kite, Lathi, Toy (*via roll call*)
NOES: None
ABSENT: None
ABSTAIN: None

INFORMATION ITEMS:

Check Register

All questions were answered to the Board's satisfaction.

PG&E Net Metering Annual True-up for FY 15

This item was reviewed by the Budget & Finance Committee. Treatment & Disposal Services Manager Lopez stated the District's electrical service for the wastewater treatment plant was converted to a Net Energy Metering (NEM) tariff with the installation of the solar carport project in August 2011. The cost of electrical generation and related

non-generation charges are billed at the end of a 12-month period, which is known as the “true-up” bill. A true-up bill in the amount of \$770,152.28 was received in August which includes previously unbilled charges accumulated between July 2014 and June 2015. The payment appears on the current check register. The total FY15 cost for electricity at the treatment plant was \$1,361,495.54.

National Association of Clean Water Agencies (NACWA) Peak Performance Award for Calendar Year 2014

Treatment & Disposal Services Manager Lopez stated the District received a Platinum Peak Performance Award from NACWA for the 2014 calendar year. NACWA Peak Performance Awards recognize member agency facilities for outstanding compliance with their National Pollutant Discharge Elimination System (NPDES) permit limits. The Platinum Award recognizes facilities that have achieved 100% compliance with their NPDES permits for five consecutive calendar years. The District has been recognized through the Peak Performance Award Program for the past 22 years and has been presented with 2 Silver Awards, 16 Gold Awards, and 4 Platinum Awards. The Peak Performance Award reflects the District’s commitment to excellence in environmental protection.

The National Association of Clean Water Agencies (NACWA) Excellence in Management (EIM) Gold Award

Operational Performance Program Manager Brenner stated the District was selected to receive an Excellence in Management Gold recognition award from NACWA, based on our management practices, performance measures and results. In order to be eligible for this award, Peak Performance awards must have been previously achieved. This award is good for 3 years and enables the District to be eligible for other certifications.

Report from the East Bay Dischargers Authority (EBDA) Commission Meeting held August 13, 2015

Vice President Handley stated nutrient reduction was the main focus of the discussion at the meeting. The Managers Advisory Committee reviewed submitted proposals for the Hayward Effluent Pump Station and discussed the selection process. The Operations and Maintenance (O&M) Committee provided an update regarding EBDA performance.

COMMITTEE MEETING REPORTS:

The Budget & Finance, Construction, Legal/Community Affairs, and Personnel Committees met.

GENERAL MANAGER’S REPORT:

General Manager Eldredge reported the following:

- Sheila Tolbert, newly hired Human Resources Manager was introduced.
- Chris Pachmayer, recently promoted Electrical/Support Team Manager was introduced. Mr. Pachmayer was previously an Associate Engineer in the Capital Improvements Projects team.

- The Co-digestion Pilot program experienced minor operational issues; these type of issues are typical with pilot programs. An increase in gas emission has been documented and the District will continue to document progress for several months evaluate this program.
- A bike rack will be installed in front of the District Administration Building.
- The District will host a vendor fair on October 15, 2015.
- The General Manager will be out of the office September 7 - 18, 2015.
- The District received an award at the California Association of Sanitation Agencies (CASA) conference in recognition of our open house. Many agencies at the conference reached out to USD staff to enquire about the specifics of the open house.

OTHER BUSINESS:

There was no other business.

ADJOURNMENT:

The meeting was adjourned at 8:54 p.m. to the Special Meeting to be held in the Boardroom on Thursday, August 27, 2015, at 11:30 a.m.

The Board will then adjourn to the next scheduled Regular Board Meeting in the Boardroom on Monday, September 14, 2015, at 7:00 p.m.

SUBMITTED:

ATTEST:

REGINA McEVOY
SECRETARY TO THE BOARD

PAT KITE
SECRETARY

APPROVED:

JENNIFER TOY
PRESIDENT

Adopted this 14th day of September, 2015

**MINUTES OF THE MEETING OF THE
BOARD OF DIRECTORS OF
UNION SANITARY DISTRICT
September 14, 2015**

**THIS MEETING WAS TELECONFERENCED WITH DIRECTOR LATHI FROM THE
GUEST PARKING AREA ON OCASO CAMINO, WEST OF THE INTERSECTION OF
PASEO PADRE PARKWAY IN FREMONT, CALIFORNIA.**

CALL TO ORDER

President Toy called the meeting to order at 7:00 p.m.

PLEDGE OF ALLEGIANCE

ROLL CALL

PRESENT: Jennifer Toy, President
Tom Handley, Vice President
Pat Kite, Secretary
Manny Fernandez, Director
Anjali Lathi, Director (*via teleconference*)

STAFF: Rich Cortés, Business Services Manager
Karen Murphy, District Counsel
Leah Castella, Special Counsel
Armando Lopez, Treatment & Disposal Services Manager
Sami Ghossain, Technical Services Manager
James Schofield, Collection Services Manager
Robert Simonich, Fabrication, Maintenance, and Construction Manager
Todd Jacob, Information Technology Administrator
Michelle Powell, Communications and Intergovernmental Relations Coordinator
Rollie Arbolante, Customer Service Team Coach
Sol Cooper, Mechanic II
Rica Agbuya, Receptionist
Regina McEvoy, Assistant to the General Manager/Board Secretary

APPROVAL OF THE MINUTES OF THE MEETING OF AUGUST 24, 2015

Director Lathi requested staff review and provide more detail to the portion of the minutes which captured Board direction regarding public outreach, scheduling, and procedures for sewer service rates.

It was moved by Director Lathi, seconded by Vice President Handley, to direct staff to review and revise the minutes to capture Board direction regarding public outreach, scheduling, and procedures for sewer service rates and continue consideration of the

Minutes of the Regular Meeting held August 24, 2015, to a future Board meeting. Motion carried with the following vote:

AYES: Fernandez, Handley, Kite, Lathi, Toy (*via roll call*)
NOES: None
ABSENT: None
ABSTAIN: None

WRITTEN COMMUNICATIONS

There were no written communications.

ORAL COMMUNICATIONS

There were no oral communications at either meeting location.

CONSIDER PROPOSED CHANGES TO THE DISTRICT MISSION STATEMENT

Business Services Manager Cortes stated the District Mission Statement had been reviewed by the Executive Team and Union leadership. Staff brought the proposed changes to the Board and will submit to all stakeholders for review prior to final approval.

It was moved by Vice President Handley, seconded by Director Lathi, that the District Mission Statement will be reviewed by the Legal/Community Affairs Committee and stakeholders, and will be considered at a future Board meeting. Motion carried by the following vote:

AYES: Fernandez, Handley, Kite, Lathi, Toy (*via roll call*)
NOES: None
ABSENT: None
ABSTAIN: None

CONSIDER DRAFTING RESPONSE TO RECENTLY RECEIVED EMAILS AND PROVIDE DIRECTION TO STAFF

This item was reviewed by the Legal/Community Affairs Committee. District General Counsel Murphy summarized past Board actions regarding the process for responding to emails received by the full Board. Previous Board action did not address two emails which requested further information.

It was moved by Director Lathi, seconded by Director Fernandez, to Authorize Staff to Work with the Board President to Draft and Send a Response to the Two Emails Included as Attachments to this Item in the Board Packet. Motion carried by the following vote:

AYES: Fernandez, Handley, Kite, Lathi, Toy (*via roll call*)
NOES: None
ABSENT: None

ABSTAIN: None

CONSIDER THE CLAIM OF MR. FRED RAMOS (STAR ROOTER) FOR ALLEGED LOSSES RELATED TO AN ASSERTEDLY MISMARKED USD SEWER LINE

This item was reviewed by the Legal/Community Affairs Committee. District Special Counsel Castella stated Mr. Ramos submitted a claim to the District on April 15, 2015. Mr. Ramos' claim asserted that a line mismarked by the District in the vicinity of Cushing Parkway and Fremont Boulevard resulted in additional costs for a sewer lateral replacement performed by Star Rooter. The claim was forwarded to Carl Warren, the District's insurance adjuster, for processing. Mr. Warren requested Mr. Ramos provide additional information regarding the claim on multiple occasions, and received an inadequate response. At the time of the Board meeting, it had been more than 45 days since the claim was submitted, and it was deemed denied by operation of law which would allow the claimant two years to file a complaint. Public agencies can send a notice of rejection of claim even after a claim is deemed denied by operation of law, which would shorten the statute of limitations from two years to six months. Since Mr. Ramos failed to substantiate his claim, staff recommended the Board deny the claim and send notice of rejection to Mr. Ramos.

It was moved by Director Lathi, seconded by Secretary Kite, to Deny the Claim Submitted by Mr. Fred Ramos (Star Rooter) for Alleged Losses Related to an Assertedly Mismarked USD Sewer Line and Send Written Notice of Denial to Claimant. Motion carried with the following vote:

AYES: Fernandez, Handley, Kite, Lathi, Toy (*via roll call*)
NOES: None
ABSENT: None
ABSTAIN: None

CONSIDER AND PROVIDE DIRECTION TO STAFF REGARDING DISCLOSURE LANGUAGE PERTAINING TO EMAIL COMMUNICATIONS ON BOARD OF DIRECTORS WEBPAGE

This item was reviewed by the Legal/Community Affairs Committee. Intergovernmental Relations and Communications Coordinator Powell stated this item was generated in response to an inquiry from a constituent regarding staff receiving emails sent to the full Board. Board directed staff to draft a disclosure statement to address this item. A desk item was presented for this item which included proposed changes provided by the Legal/Community Affairs Committee.

It was moved by Director Lathi, seconded by Director Fernandez, to Approve Disclosure Language, Including Redline Changes in the Desk Item, to be Added to the Board of Directors Webpage. Motion carried with the following vote:

AYES: Fernandez, Handley, Kite, Lathi, Toy (*via roll call*)
NOES: None
ABSENT: None
ABSTAIN: None

DESIGNATE AND APPOINT TWO BOARD MEMBERS TO AD HOC SUBCOMMITTEE FOR CONTENT REVIEW OF PROPOSITION 218 NOTIFICATION

Intergovernmental Relations and Communications Coordinator Powell stated this item was the result of Board direction received at the regular Board meeting held August 24, 2015. Board direction included creation of a two-member ad hoc subcommittee to review content of Proposition 218 rate notification information. Staff requested the Board designate and appoint two representatives to serve on the ad hoc, and decide whether the ad hoc will provide final review and approval of the notification mailer without further Board review.

It was moved by Director Lathi, seconded by Director Fernandez, to appoint Director Lathi and Vice President Handley to serve on the ad hoc subcommittee and allow the ad hoc to provide final review and approval of the Proposition 218 notification content. Motion carried with the following vote:

AYES: Fernandez, Handley, Kite, Lathi, Toy (*via roll call*)
NOES: None
ABSENT: None
ABSTAIN: None

AUTHORIZE THE GENERAL MANAGER TO APPROVE AN AGREEMENT WITH LOOKINGPOINT, INC. FOR THE PHONE SYSTEM REPLACEMENT

This item was reviewed by the Budget & Finance Committee. Information Technology Administrator Jacob stated the District's current Nortel phone system was installed with the construction of our administration building 14 years ago. Nortel went bankrupt in 2009, and there is no existing upgrade path. Staff reviewed Cisco, Avaya, and Microsoft phone system solutions and selected Cisco based on the District's current and future needs as well as compatibility with the existing Cisco network infrastructure. Staff used the pre-negotiated CMAS (California Multiple Award Schedule) contract to obtain pricing from three vendors, and the Phone System Upgrade project team reviewed quotes which were received. Staff recommended the Board authorize the General Manager to execute an agreement with LookingPoint, Inc. for the phone system replacement for an amount not to exceed \$194,094.04, and \$82,000 in other project related costs.

Ch12 - It was moved by Secretary Kite, seconded by Director Fernandez, to Authorize the General Manager to execute an Agreement with LookingPoint, Inc. for the Phone System Replacement. Motion carried with the following vote:

AYES: Fernandez, Handley, Kite, Lathi, Toy (*via roll call*)
NOES: None
ABSENT: None
ABSTAIN: None

INFORMATION ITEMS:

Check Register

All questions were answered to the Board's satisfaction.

COMMITTEE MEETING REPORTS:

The Budget & Finance and Legal/Community Affairs Committees met.

GENERAL MANAGER'S REPORT:

Business Services Manager Cortes reported the following:

- There were no spills during the month of August 2015.
- The Board will conduct a Special Meeting Workshop at 6:30 p.m. on September 22, 2015. The special meeting will include a presentation on preliminary findings of sewer service charge rate analysis and discuss rate structure and next steps.
- The Environmental Compliance team will be hosting an Industrial Advisory Council Meeting on September 23, 2015.
- A District employee reported fraudulent activity on their recent CALcard statement.
- The District has hired a new Collection Services worker who will start work on September 28, 2015.
- The new Human Resources Analyst will start work on September 25, 2015.
- District staff will meet with the regional board on September 15, 2015, to discuss permit issues.

OTHER BUSINESS:

Director Kite stated she attended the Alameda County Special Districts Association meeting on September 9, 2015.

Director Kite requested, and the Board agreed, that staff contact Boardmembers who have not responded to Doodle polls sent to schedule special meetings within 48 hours.

ADJOURNMENT:

The meeting was adjourned at 7:28 p.m. to the Board Workshop to be held in the Boardroom on Tuesday, September 22, 2015, at 6:30 p.m. The next scheduled Regular Board Meeting will be in the Boardroom on Monday, September 28, 2015, at 7:00 p.m.

SUBMITTED:

ATTEST:

REGINA McEVOY
SECRETARY TO THE BOARD

PAT KITE
SECRETARY

APPROVED:

JENNIFER TOY
PRESIDENT

Adopted this 28th day of September, 2015



Directors
Manny Fernandez
Tom Handley
Pat Kite
Anjali Lathi
Jennifer Toy

Officers
Paul R. Eldredge
*General Manager/
District Engineer*

David M. O'Hara
Attorney

DATE: September 21, 2015

TO: Board of Directors - Union Sanitary District

FROM: Paul R. Eldredge, General Manager/District Engineer

SUBJECT: Agenda Item No. 8 - Meeting of September 28, 2015
Information Item: **Monthly Operations Report for August, 2015**

Background

Attached is the August 2015 Operations Report. Staff is available to answer questions regarding information contained in the report.

Work Group Managers

General Manager/Administration	Paul Eldredge	GM
Business Services	Rich Cortés	BS
Collection Services	James Schofield	CS
Technical Support	Sami Ghossain	TS
Treatment and Disposal Services	Armando Lopez	T&D
Fabrication, Maintenance, and Construction	Robert Simonich	FMC

General Manager's Summary

Below is a summary of major activities that occurred at the District during August 2015.

ODOR COMPLAINTS:

There were two odor complaints received in August 2015. The first complaint was received from a Fremont resident. District staff sampled the air in the USD mains, manholes, and adjacent storm drain inlets and no odor was detected. Staff relayed the findings to the reporting party, advised them to fill the P-traps in their home with water, and contact the District if they required further assistance. The second complaint was received from a restaurant in Union City. District staff sampled the air in the USD sewer mains, manholes, and storm drain inlets and no odor was detected. There is a garbage dumpster next to the restaurant and a grease interceptor near the patio area which may have contributed to the complaint. Staff relayed the findings to the reporting party, advised them to check their grease trap or dumpster if the odor returns, and contact the District should they need further assistance.

SAFETY:

- We had one incident where an employee slipped and fell in the admin building. The employee sprained her ankle but declined medical treatment.
- There was a reported near miss. A pipe burst after being isolated. The sludge in the pipe turned septic creating enough pressure to rupture the PVC pipe. Procedures have been put in place to prevent this type of incident from occurring in the future.
- The employee that had the work related injury reported in February, returned to work with no restrictions. There are no employees off because of work related injuries.
- We completed required annual training for Hazardous Materials management and spill response.
- We will be hosting a training class for CSRMA agencies about Managing Terminations. Liebert Cassidy Whitmore will be presenting the information.
- Our Training Program Manager left the District so we have a couple for employees working to keep up with the training requirements.

STAFFING & PERSONNEL:

Completed Recruitments Resulting in Promotions:

- Kim Truong was promoted to Buyer I on 8/24/15
- Chris Pachmayer was promoted to Electrical and Instrumentation Coach on 8/10/15

G.M. ACTIVITIES: For the month of August, the GM was involved in the following:

- Continued Attorney Orientation and Knowledge Transfer
- Provided a Plant Tour for Assemblymember Quirk
- Attended the California Association of Sanitation Agencies (CASA) Annual Conference
- Met with the General Manager from ACWD

Attachments: Odor Report and Map
Hours Worked and Leave Time by Work Group
Business Services
Technical Services
Collection Services
Fabrication, Maintenance, and Construction
Treatment and Disposal Services



ODOR REPORT August 2015

During the recording period from August 01, 2015 through August 31, 2015, there were two odor related service requests received by the District.

City: Fremont

1. Complaint Details:

Date: 8/21/2015

Location: ROCK AV

Wind (from): N/A

Temperature: 75 Degrees F

Time: 12:34 pm

Reported By: Nancy Weisenfeld

Wind Speed: 1 mph

Weather: Sunny

Response and Follow-up:

We sampled the air in USD mains, manholes and adjacent storm drain inlets and easements with a District gas detector and readings were normal. We relayed our findings to the reporting party and told them to fill their P-traps with water. We told them to call us back should they need further assistance.

City: Union City

2. Complaint Details:

Date: 8/17/2015

Location: UNION LANDING BL

Wind (from): North

Temperature: 65 Degrees F

Time: 9:00 am

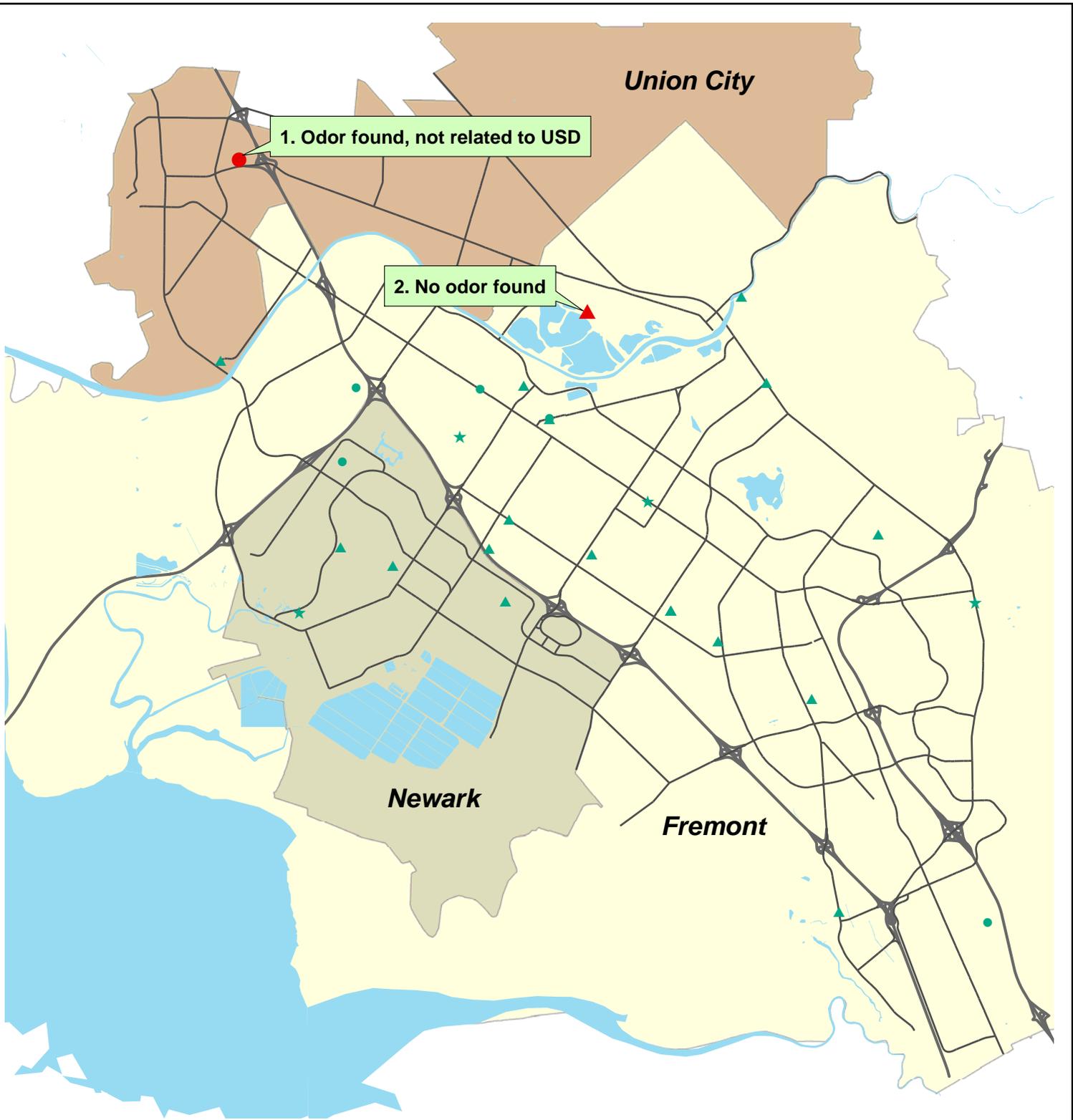
Reported By: Donna Liverpool

Wind Speed: 5 mph

Weather: Clear

Response and Follow-up:

We inspected the USD sewer mains, manholes and storm drain inlets and were unable to detect any strong odors. There is a garbage dumpster next to the restaurant and a grease interceptor at the patio area that may have contributed to the complaint. We relayed our findings to the reporting party and told them that the odor may be coming from the dumpster or grease trap due to the recent heat wave. We advised them to check their grease trap or dumpster if the odor returns, or to call us back should they need further assistance.



Legend

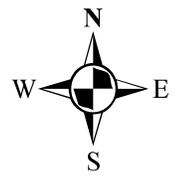
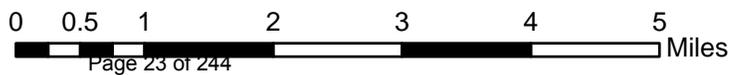
Odor Complaints: August 2015

- ★ Odor found, USD resolved (0)
- Odor found, not related to USD (1)
- ▲ No odor found (1)

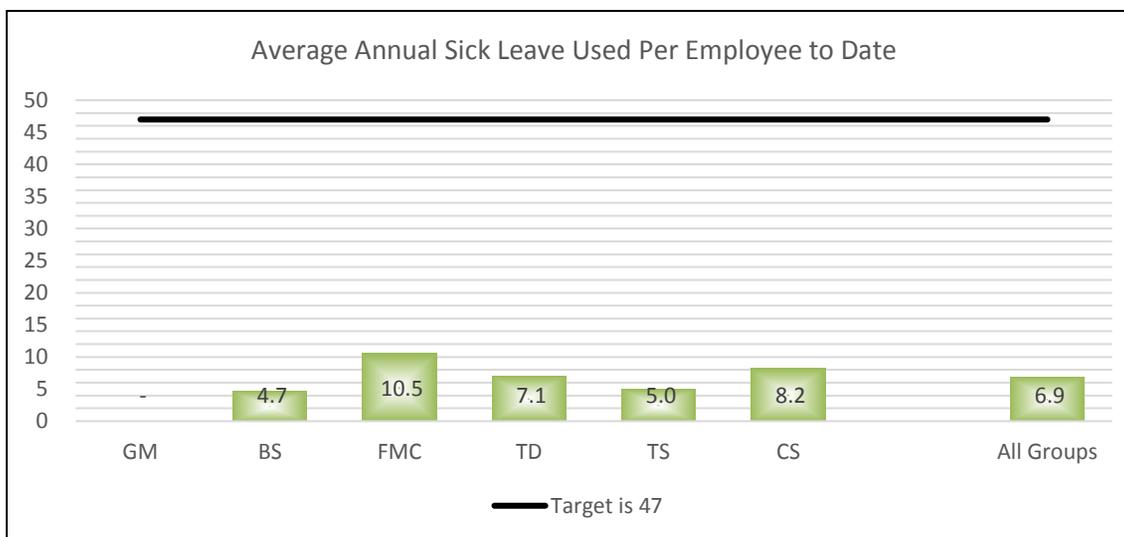
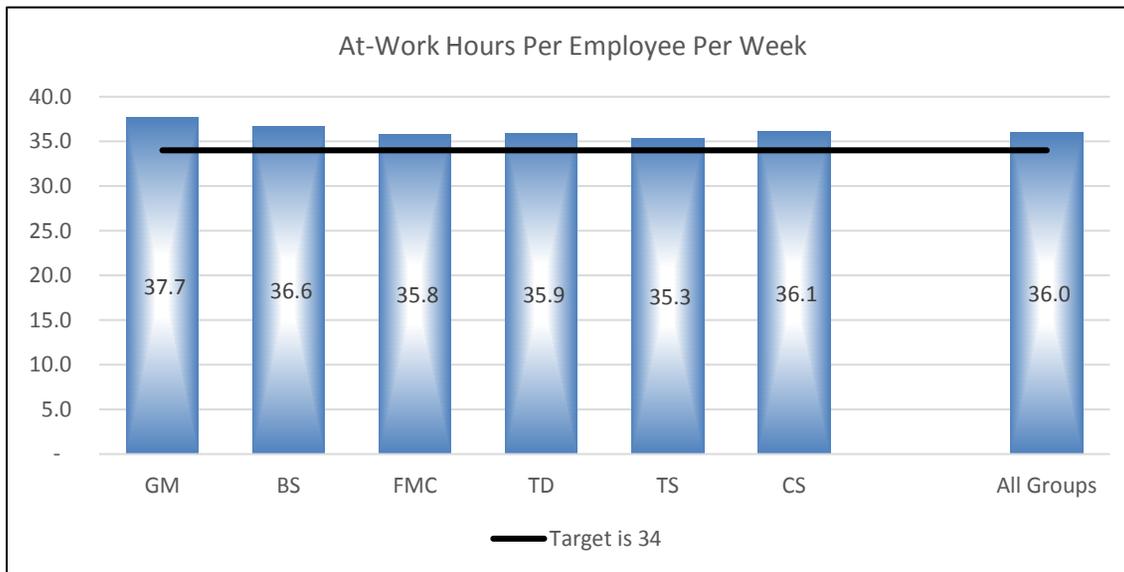
Odor Complaints: Sep. 2014 to Jul. 2015

- ★ Odor found, USD resolved (4)
- Odor found, not related to USD (5)
- ▲ No odor found (18)

**Location of Odor Reports
September 2014 to August 2015**



HOURS WORKED AND LEAVE TIME BY WORK GROUP
July 2, 2015 through September 9, 2015
Weeks to Date: 10 out of 52 (19.2%)



NOTES

- (1) Regular hours does not include hours worked by part-time or temporary employees.
- (2) Overtime hours includes call outs.
- (3) Discretionary Leave includes Vacation, HEC, Holiday, MAL, FLEX, Funeral, Jury Duty, Military, OT Banked Use, Paid Admin., SLIP, VRIP, Holiday Banked Use leaves.
- (4) Sick Leave includes sick and catastrophic sick leaves as well as protected time off, which the District has no discretion.

An employee using 15 vacation, 11 holiday, 2 HEC, and 5 sick days will work an average of **34.9** hours per week over the course of a year; with 20 vacation days, **34.2** hours per week.

HOURS WORKED AND LEAVE TIME BY WORK GROUP
July 2, 2015 through September 9, 2015
Weeks to Date: 10 out of 52 (19.2%)

Group	Average Number of Employees	AT-WORK HOURS		At-Work Hours Per Employee Per Week	LEAVE HOURS				Average Annual Sick Leave Used Per Employee To Date	FY15		
		Regular (1)	Overtime (2)		Discretionary (3)	Short Term Disability	Workers Comp	Sick (4)		Average Number of Employees	At-Work Hours Per Week Per Employee	Annual Sick Leave Used
GM	2	734.00	9.75	37.7	66.00	-	-	-	0.0	3	34.4	28.8
BS	23	8,170.50	136.57	36.6	890.00	-	-	108.50	4.7	22	35.3	30.2
FMC	22	7,570.00	196.56	35.8	1,029.00	13.14	-	231.86	10.5	23	34.2	52.4
TD	25	8,671.17	182.83	35.9	1,133.33	34.76	-	176.74	7.1	25	35.3	24.1
TS	30	10,381.76	50.67	35.3	1,227.99	-	-	150.25	5.0	30	35.0	28.1
CS	29	9,935.51	397.68	36.1	1,398.32	-	27.00	239.17	8.2	29	36.8	68.4
All Groups	131	45,462.94	974.06	36.0	5,744.64	47.90	27.00	906.52	6.9	132	35.3	40.8

SICK LEAVE INCENTIVE PROGRAM TARGETS

≥34

≤47

The Sick Leave Incentive Program target goals are 47 or less hours of sick leave per employee annually, and 34 or more hours of at-work time per week per employee.

NOTES

(1) Regular hours does not include hours worked by part-time or temporary employees.

(2) Overtime hours includes call outs.

(3) Discretionary Leave includes Vacation, HEC, Holiday, MAL, FLEX, Funeral, Jury Duty, Military, OT Banked Use, Paid Admin., SLIP, VRIP, Holiday Banked Use leaves.

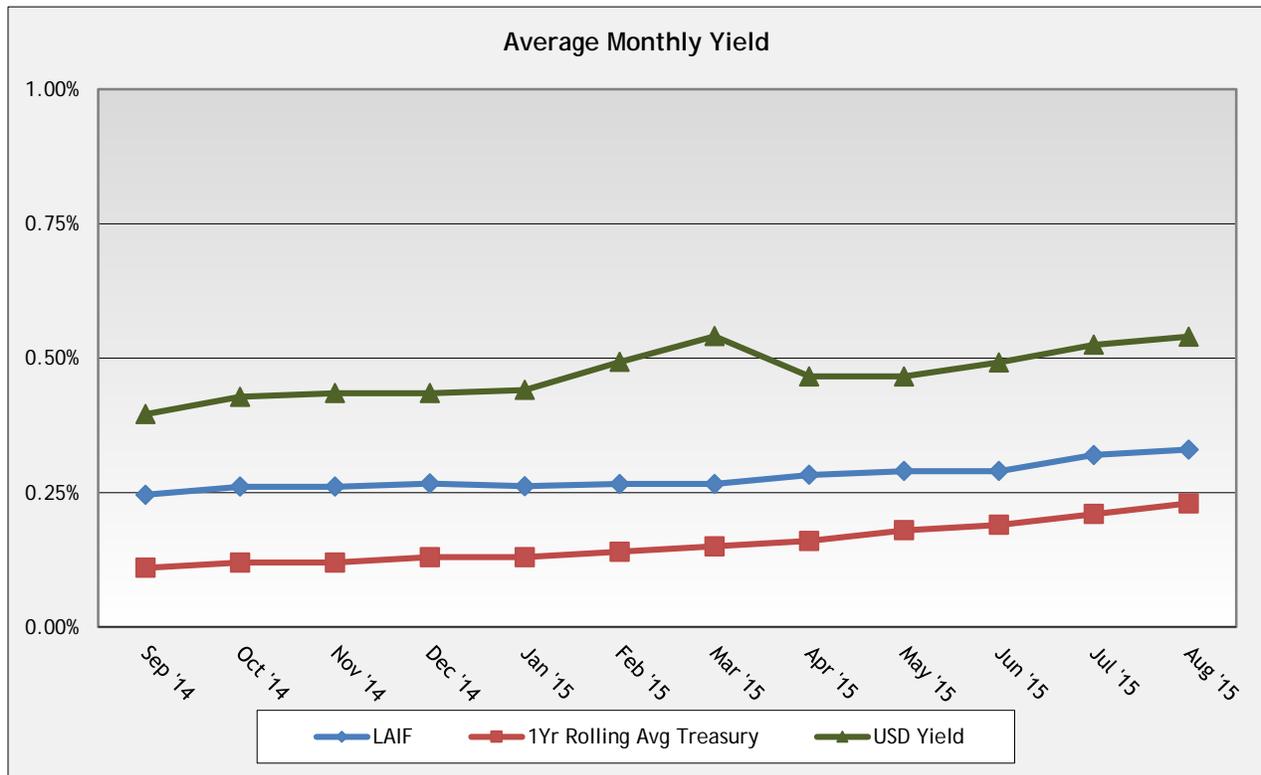
(4) Sick Leave includes sick and catastrophic sick leaves, as well as protected time off, of which the District has no discretion.

An employee using 15 vacation, 11 holiday, 2 HEC, and 5 sick days will work an average of **34.9** hours per week over the course of a year; with 20 vacation days, **34.2** hours per week.

**Business Services Group
Activities Report
August 2015**

- Green Business recertification application is submitted.
- CSDA award application for Leadership School is completed.
- Quality Star Point orientation session for FY16 is held.
- Team Coordinator Orientation for FY16 is held.
- The annual State Controller compensation report is completed.
- The recruitment for Receptionist was completed; Rica Agbuya was hired on 7/13/2015.
- The recruitment for Human Resources Manager was completed; Sheila Tolbert was hired on 7/17/2015.
- The recruitment for Electrical and Instrumentation Coach was completed; Chris Pachmayer was promoted on 8/10/15.
- The recruitment for Buyer I/II was completed; Kim Truong was promoted on 8/24/15.

AVERAGE MONTHLY YIELD



BUDGET AND FINANCE REPORT

FY 2016

Year-to-date as of 8/31/15

17% of year elapsed

Revenues

	Budget	Actual	% of Budget Rec'd	Unaudited Last Year Actuals 6/30/15
Capacity Fees	\$4,372,000	\$1,161,768	27%	\$4,820,637
Sewer Service Charges	48,430,260	3,496	0%	48,379,254
Operating	1,080,000	69,040	6%	1,143,435
Interest	345,000	96,722	28%	309,600
Misc. (incl. LAVWMA pymnt, solar, Cogen rebates)	493,000	137,383	28%	2,127,593
Subtotal Revenues	\$54,720,260	\$1,468,409	3%	\$56,780,519
SRF Loan Proceeds (Thickener)	5,500,000	769,248	14%	4,501,122
Total Revenues + SRF Proceeds	\$60,220,260	\$2,237,657	4%	\$61,281,641

Expenses

	Budget	Actual	% of Budget Used	Last Year Actuals
Capital Improvement Prog.				
Capacity Projects	\$4,523,000	\$285,732	6%	\$3,755,472
Renewal & Repl. Projects	10,553,000	443,823	4%	12,194,927
Operating	33,827,303	4,401,720	13%	33,084,890
Special Projects	1,522,970	12,239	1%	1,065,653
Retiree Medical (Annual Required Contribution)	561,205	140,301	25%	543,540
Vehicle & Equipment	379,500	0	0%	787,159
Information Systems	1,036,700	56,509	5%	616,117
Plant & Pump Station R&R	250,000	76,377	31%	168,089
Pretreatment Fund	12,000	419	3%	109,499
County Fee for Sewer Service Charge Admin.	106,000	0	0%	105,559
Debt Servicing:				
SRF Loans (Irv., Wilw, LHH, Cdr, NPS, Sub1, Boyc, Prim Cl)	3,127,110	1,319,228	42%	3,127,110
Total Expenses	\$55,898,788	\$6,736,348	12%	\$55,558,015
Total Revenue & Proceeds less Expenses	\$4,321,472	(\$4,498,691)		\$5,723,626

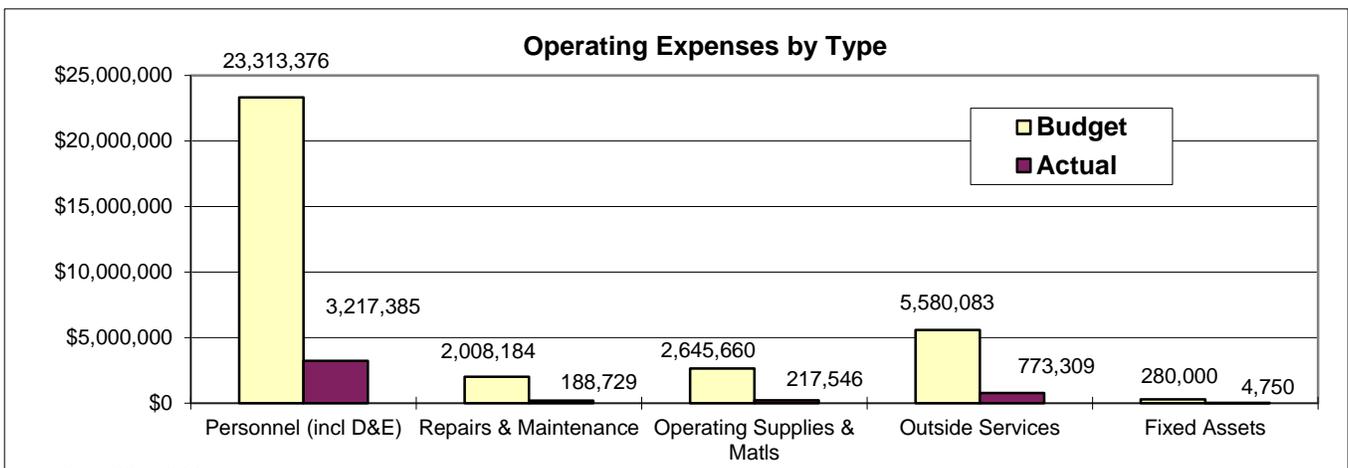
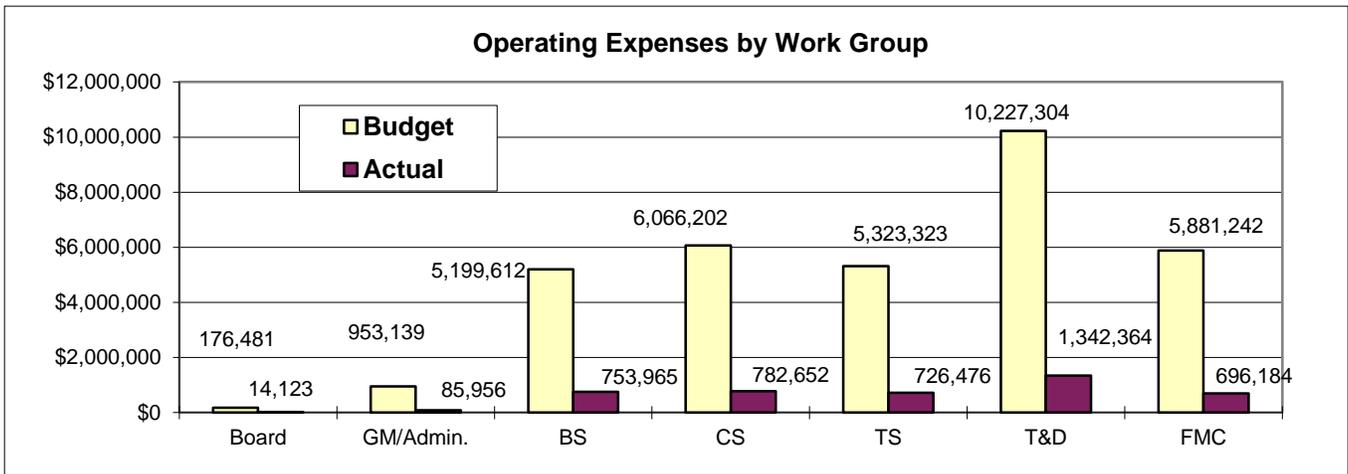
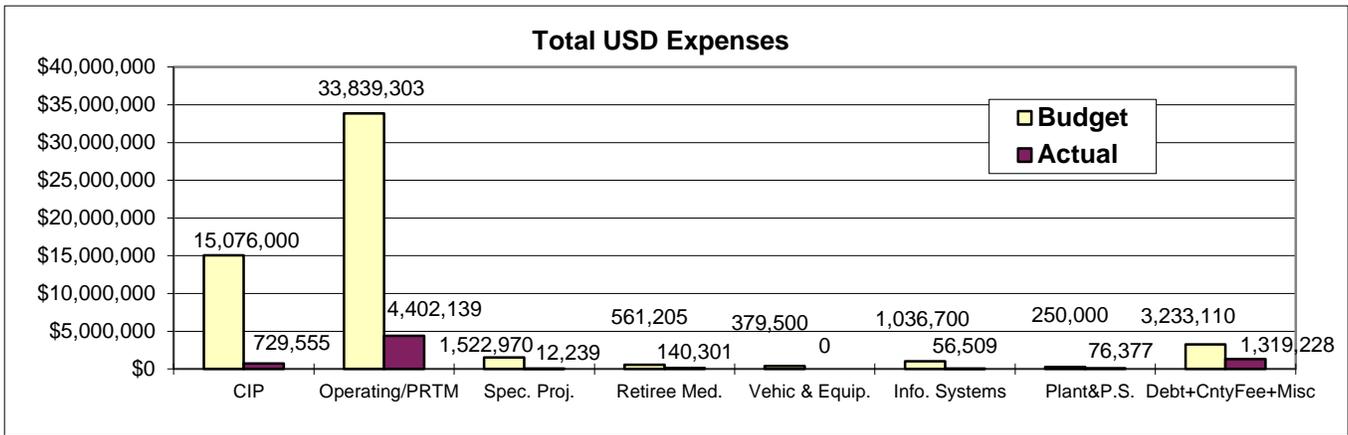
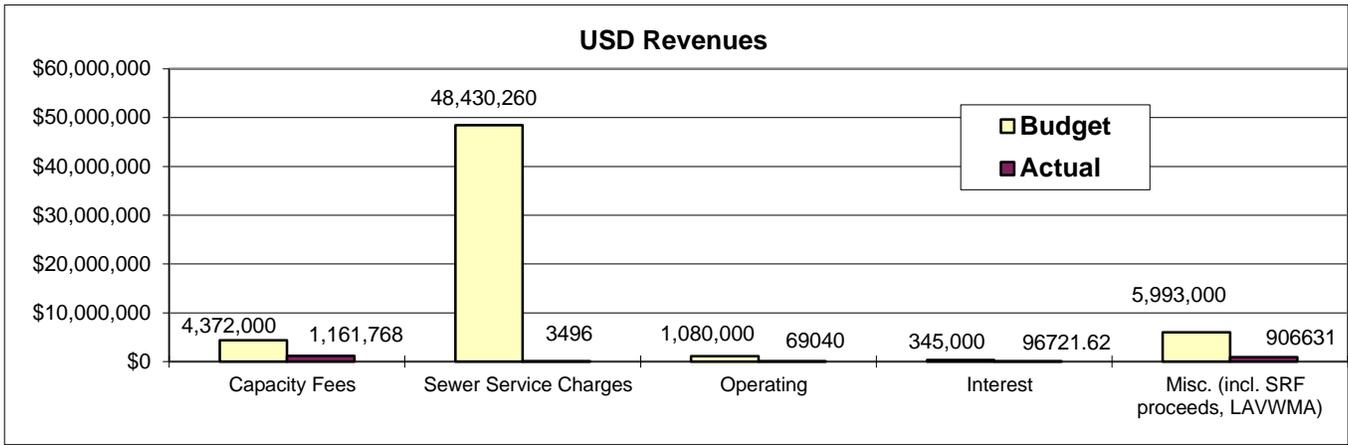
Gross Operating Expenses by Work Group

	Budget	Actual	% of Budget Used	Last Year Actuals
Board of Directors	\$176,481	\$14,123	8%	\$139,069
General Manager/Admin.	953,139	85,956	9%	1,095,486
Business Services	5,199,612	753,965	15%	5,057,133
Collection Services	6,066,202	782,652	13%	6,029,734
Technical Services	5,323,323	726,476	14%	5,362,159
Treatment & Disposal Services	10,227,304	1,342,364	13%	9,758,825
Fabrication, Maint. & Construction	5,881,242	696,184	12%	5,642,484
Total	\$33,827,303	\$4,401,720	13%	\$33,084,890

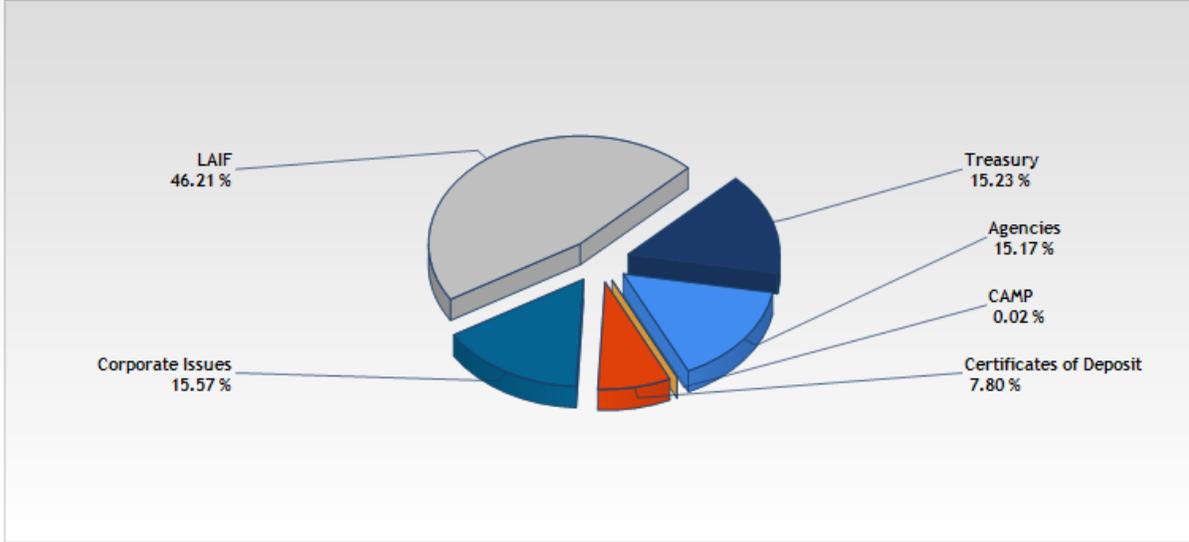
Operating Expenses by Type

	Budget	Actual	% of Budget Used	Last Year Actuals
Personnel (incl D&E)	\$23,313,376	\$3,217,385	14% (18%)*	\$23,927,932
Repairs & Maintenance	2,008,184	188,729	9%	1,804,750
Supplies & Matls (chemicals, small tools)	2,645,660	217,546	8%	2,253,627
Outside Services (utilities, biosolids, legal)	5,580,083	773,309	14%	4,961,560
Fixed Assets	280,000	4,750	2%	137,021
Total	\$33,827,303	\$4,401,720	13%	\$33,084,890

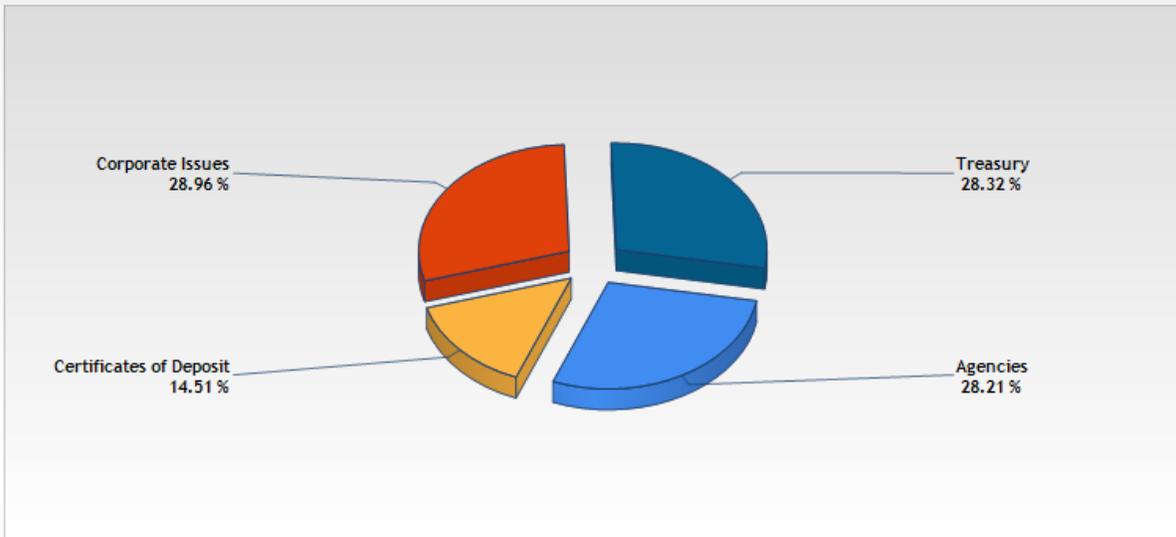
* Personnel Budget Target



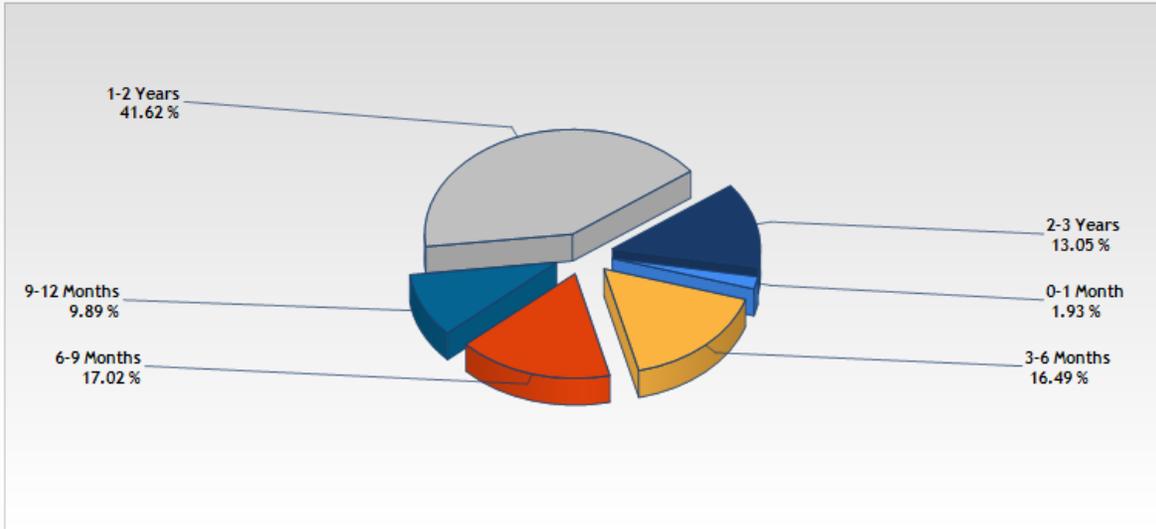
All Portfolio Holdings Distribution by Asset Class



Operating Fund Holdings Distribution by Asset Class



Operating Fund Maturity Distribution



Maturity Range	Face Amount/Shares	YTM @ Cost	Cost Value	Days To Maturity	% of Portfolio	Market Value	Book Value	Duration To Maturity
0-1 Month	480,000.00	0.400	480,000.00	3	1.93	480,007.72	480,000.00	0.01
3-6 Months	4,046,000.00	0.429	4,097,528.10	124	16.49	4,056,511.92	4,054,932.01	0.34
6-9 Months	4,240,000.00	0.547	4,227,115.56	241	17.02	4,234,491.37	4,233,020.07	0.66
9-12 Months	2,430,000.00	0.697	2,456,840.50	310	9.89	2,446,106.38	2,445,221.39	0.85
1-2 Years	10,223,000.00	0.882	10,338,651.92	583	41.62	10,307,145.45	10,310,352.87	1.58
2-3 Years	3,240,000.00	0.848	3,243,280.00	809	13.05	3,240,814.71	3,243,059.50	2.19
Total / Average	24,659,000.00	0.718	24,843,416.08	440	100	24,765,077.55	24,766,585.84	1.19

Union Sanitary District
Board Report - Holdings
Report Format: By Transaction
Group By: Asset Class
Portfolio/Report Group: All Portfolios
As of 8/31/2015

Description	CUSIP/Ticker	Credit Rating 1	Settlement Date	Face Amount/Shares	Cost Value	Coupon Rate	Market Value	YTM @ Cost	Next Call Date	Maturity Date	% of Portfolio
Agencies											
FHLB 0.75 7/28/2017-16	3130A4ZV7	Moodys-Aaa	4/28/2015	1,000,000.00	1,000,000.00	0.750	998,860.00	0.750	4/28/2016	7/28/2017	2.16
FHLB 0.8 3/17/2017-16	3130A4GT3	Moodys-Aaa	3/17/2015	1,000,000.00	1,000,000.00	0.800	1,001,080.00	0.800	3/17/2016	3/17/2017	2.16
FHLB 0.8 5/17/2017	3130A4Q54	Moodys-Aaa	3/27/2015	1,000,000.00	1,001,690.00	0.800	1,000,850.00	0.720		5/17/2017	2.17
FHLB 0.85 6/16/2017-16	3130A4GU0	Moodys-Aaa	3/16/2015	1,000,000.00	1,000,000.00	0.850	1,001,300.00	0.850	3/16/2016	6/16/2017	2.16
FHLB 0.9 9/28/2017	3130A5KH1	Moodys-Aaa	7/22/2015	1,000,000.00	1,001,140.00	0.900	1,000,660.00	0.847		9/28/2017	2.17
FHLMC 1 7/25/2017	3134G3ZH6	Moodys-Aaa	6/24/2015	1,000,000.00	1,004,540.00	1.000	1,002,020.00	0.780		7/25/2017	2.17
FNMA 0.5 3/30/2016	3135GOVA8	Moodys-Aaa	1/24/2014	1,000,000.00	1,000,750.00	0.500	1,000,900.00	0.465		3/30/2016	2.17
Sub Total / Average				7,000,000.00	7,008,120.00	0.800	7,005,670.00	0.745			15.17
CAMP											
CAMP LGIP	LGIP4000	None	5/31/2011	9,796.76	9,796.76	0.110	9,796.76	0.110	N/A	N/A	0.02
Sub Total / Average				9,796.76	9,796.76	0.110	9,796.76	0.110			0.02
Certificates of Deposit											
Ally Bank 1 10/24/2016	02006LKM4	None	10/23/2014	240,000.00	240,000.00	1.000	240,946.06	1.000		10/24/2016	0.52
American Express Bank 1.1 10/24/2016	02587CBZ2	None	10/23/2014	240,000.00	240,000.00	1.100	241,224.47	1.100		10/24/2016	0.52
	02587DYJ1	None	6/5/2015	240,000.00	240,000.00	1.050	240,964.26	1.050		6/5/2017	0.52

Description	CUSIP/Ticker	Credit Rating 1	Settlement Date	Face Amount/Shares	Cost Value	Coupon Rate	Market Value	YTM @ Cost	Next Call Date	Maturity Date	% of Portfolio
American Express Centurian 1.05 6/5/2017											
Bank of China NY 0.5 2/4/2016	06426TCH0	None	2/4/2015	240,000.00	240,000.00	0.500	240,082.31	0.500		2/4/2016	0.52
Bar Harbor Bank 0.7 1/30/2017	066851TT3	None	6/30/2015	240,000.00	240,000.00	0.700	239,927.87	0.700		1/30/2017	0.52
Beal Bank USA 0.45 9/2/2015	07370WLQ7	None	12/3/2014	240,000.00	240,000.00	0.450	240,003.46	0.450		9/2/2015	0.52
BMW Bank North America 0.5 3/14/2016	05568P6V4	None	3/31/2014	240,000.00	239,760.00	0.500	240,025.96	0.552		3/14/2016	0.52
Capital One Bank 1 10/24/2016	140420QG8	None	10/22/2014	240,000.00	240,000.00	1.000	240,946.06	1.000		10/24/2016	0.52
Capital One National Asso Bank 1.25 8/28/2017	14042E6B1	None	8/26/2015	245,000.00	245,000.00	1.250	246,891.60	1.250		8/28/2017	0.53
Compass Bank 0.95 6/5/2017	20451PLE4	None	6/5/2015	240,000.00	240,000.00	0.950	240,539.01	0.950		6/5/2017	0.52
Discover Bank 0.75 1/3/2017	254672QZ4	None	7/1/2015	240,000.00	240,000.00	0.750	240,093.57	0.750		1/3/2017	0.52
Goldman Sachs Bank 1 10/16/2017	38148JQX2	None	4/27/2015	240,000.00	239,520.00	1.000	240,464.71	1.069		10/16/2017	0.52
Great Midwest Bank 0.75 7/27/2016	39083PCK6	None	10/27/2014	240,000.00	240,000.00	0.750	240,314.58	0.750		7/27/2016	0.52
Mizuho Bank USA 0.35 9/4/2015	60688MKK9	None	3/4/2015	240,000.00	240,000.00	0.350	240,004.26	0.350		9/4/2015	0.52
Santander Bank 0.5 2/4/2016	80280JDH1	None	2/4/2015	240,000.00	240,000.00	0.500	240,082.31	0.500		2/4/2016	0.52
Sub Total / Average				3,605,000.00	3,604,280.00	0.791	3,612,510.49	0.799			7.80

Corporate Issues

	14912L5Z0		12/23/2014	1,313,000.00	1,307,603.57	1.000	1,310,439.65	1.190		3/3/2017	2.83
--	-----------	--	------------	--------------	--------------	-------	--------------	-------	--	----------	------

Description	CUSIP/Ticker	Credit Rating 1	Settlement Date	Face Amount/Shares	Cost Value	Coupon Rate	Market Value	YTM @ Cost	Next Call Date	Maturity Date	% of Portfolio
Caterpillar Financial 1 3/3/2017		Moodys-A2									
General Electric Capital Corp 5.4 2/15/2017	36962G2G8	Moodys-A1	3/2/2015	1,085,000.00	1,179,514.35	5.400	1,148,732.90	0.890		2/15/2017	2.55
Internaltional Business Machs 0.45 5/6/2016	459200HL8	Moodys-Aa3	11/26/2013	1,000,000.00	996,840.00	0.450	998,550.00	0.580		5/6/2016	2.16
JP Morgan Chase 2.6 1/15/2016	46625HHW3	Moodys-A3	12/1/2014	566,000.00	577,518.10	2.600	569,707.30	0.775		1/15/2016	1.25
JP Morgan Securities 0 5/13/2016	46640PED1	Moodys-P1	8/19/2015	1,000,000.00	995,235.56	0.000	995,695.41	0.653		5/13/2016	2.15
Royal Bank of Canada 2.3 7/20/2016	78008TLB8	Moodys-Aa3	12/23/2014	1,190,000.00	1,217,310.50	2.300	1,204,541.80	0.830		7/20/2016	2.63
US Bankcorp 2.2 11/15/2016	91159HHB9	Moodys-A1	3/31/2015	900,000.00	920,304.00	2.200	912,330.00	0.797		11/15/2016	1.99
Sub Total / Average				7,054,000.00	7,194,326.08	2.009	7,139,997.06	0.838			15.57

LAIF

LAIF LGIP	LGIP1002	None	4/30/2011	21,350,864.25	21,350,864.25	0.330	21,350,864.25	0.330	N/A	N/A	46.21
Sub Total / Average				21,350,864.25	21,350,864.25	0.330	21,350,864.25	0.330			46.21

Treasury

T-Bond 0.25 5/16/2016	912828VC1	Moodys-Aaa	1/24/2014	1,000,000.00	994,530.00	0.250	999,320.00	0.488		5/16/2016	2.15
T-Note 0.375 2/15/2016	912828UM0	Moodys-Aaa	1/24/2014	1,000,000.00	999,530.00	0.375	1,000,440.00	0.398		2/15/2016	2.16
T-Note 0.5 6/15/2016	912828VG2	Moodys-Aaa	3/27/2014	1,000,000.00	999,530.00	0.500	1,001,250.00	0.521		6/15/2016	2.16
T-Note 0.875 1/15/2018	912828H37	Moodys-Aaa	6/1/2015	1,000,000.00	1,001,560.00	0.875	999,230.00	0.815		1/15/2018	2.17
	912828G20		6/24/2015	1,000,000.00	1,001,060.00	0.875	1,000,460.00	0.830		11/15/2017	2.17

Description	CUSIP/Ticker	Credit Rating 1	Settlement Date	Face Amount/Shares	Cost Value	Coupon Rate	Market Value	YTM @ Cost	Next Call Date	Maturity Date	% of Portfolio
T-Note 0.875 11/15/2017		Moodys- Aaa									
T-Note 1.375 11/30/2015	912828PJ3	Moodys- Aaa	12/20/2013	2,000,000.00	2,040,480.00	1.375	2,006,200.00	0.330		11/30/2015	4.42
Sub Total / Average				7,000,000.00	7,036,690.00	0.807	7,006,900.00	0.529			15.23
Total / Average				46,019,661.01	46,204,077.09	0.771	46,125,738.56	0.539			100

All investment actions executed since the last report have been made in full compliance with the District's Investment Policy. The District will meet its expenditure obligations for the next six months. Market value sources are the LAIF, CAMP, and BNY Mellon monthly statements.

**Union Sanitary District
Board Report - Activity
Portfolio/Report Group: All Portfolios
From 8/1/2015 To 8/31/2015**

Description	CUSIP/Ticker	Face Amount/Shares	Principal	Interest/Dividends	Coupon Rate	YTM @ Cost	Settlement Date	Total
BUY								
Capital One National Asso Bank 1.25 8/28/2017	14042E6B1	245,000.00	245,000.00	0.00	1.250	1.250	8/26/2015	245,000.00
JP Morgan Securities 0 5/13/2016	46640PED1	1,000,000.00	995,235.56	0.00	0.000	0.653	8/19/2015	995,235.56
Sub Total / Average		1,245,000.00	1,240,235.56	0.00				1,240,235.56
CALLED								
FHLMC 0.75 2/13/2017-15	3134G6BQ5	1,000,000.00	1,000,000.00	0.00	0.750	0.000	8/13/2015	1,000,000.00
Sub Total / Average		1,000,000.00	1,000,000.00	0.00				1,000,000.00
DEPOSIT								
CAMP LGIP	LGIP4000	0.94	0.94	0.00		0.000	8/31/2015	0.94
LAIF LGIP	LGIP1002	700,000.00	700,000.00	0.00		0.000	8/14/2015	700,000.00
LAIF LGIP	LGIP1002	1,600,000.00	1,600,000.00	0.00		0.000	8/28/2015	1,600,000.00
Sub Total / Average		2,300,000.94	2,300,000.94	0.00				2,300,000.94
INTEREST								
Bar Harbor Bank 0.7 1/30/2017	066851TT3	0.00	0.00	142.68	0.700	0.000	8/30/2015	142.68
CAMP LGIP	LGIP4000	0.00	0.00	0.94		0.000	8/31/2015	0.94
FHLMC 0.75 2/13/2017-15	3134G6BQ5	0.00	0.00	3,750.00	0.750	0.000	8/13/2015	3,750.00
General Electric Capital Corp 5.4 2/15/2017	36962G2G8	0.00	0.00	29,295.00	5.400	0.000	8/15/2015	29,295.00
Great Midwest Bank 0.75 7/27/2016	39083PCK6	0.00	0.00	152.88	0.750	0.000	8/27/2015	152.88
T-Note 0.375 2/15/2016	912828UM0	0.00	0.00	1,875.00	0.375	0.000	8/15/2015	1,875.00
Sub Total / Average		0.00	0.00	35,216.50				35,216.50
WITHDRAW								

Description	CUSIP/Ticker	Face Amount/Shares	Principal	Interest/Dividends	Coupon Rate	YTM @ Cost	Settlement Date	Total
LAIF LGIP	LGIP1002	800,000.00	800,000.00	0.00		0.000	8/10/2015	800,000.00
LAIF LGIP	LGIP1002	1,000,000.00	1,000,000.00	0.00		0.000	8/18/2015	1,000,000.00
LAIF LGIP	LGIP1002	1,300,000.00	1,300,000.00	0.00		0.000	8/21/2015	1,300,000.00
LAIF LGIP	LGIP1002	800,000.00	800,000.00	0.00		0.000	8/26/2015	800,000.00
Sub Total / Average		3,900,000.00	3,900,000.00	0.00				3,900,000.00

MONTHLY OPERATIONS REPORT FOR THE MONTH OF AUGUST 2015
TECHNICAL SUPPORT WORK GROUP SUMMARY

Capital Improvement Program

Miscellaneous Spot Repairs, Phase 6 - Contractor began construction on August 18, 2015. The sewer main repairs to Site 3 (Pacific Street in Union City) and Site 6 (Blacow Road in Fremont) have been completed. The Contractor began construction on Site 1 (Alvarado-Niles Road in Union City) and anticipates to complete the sewer main replacement by the end of September.

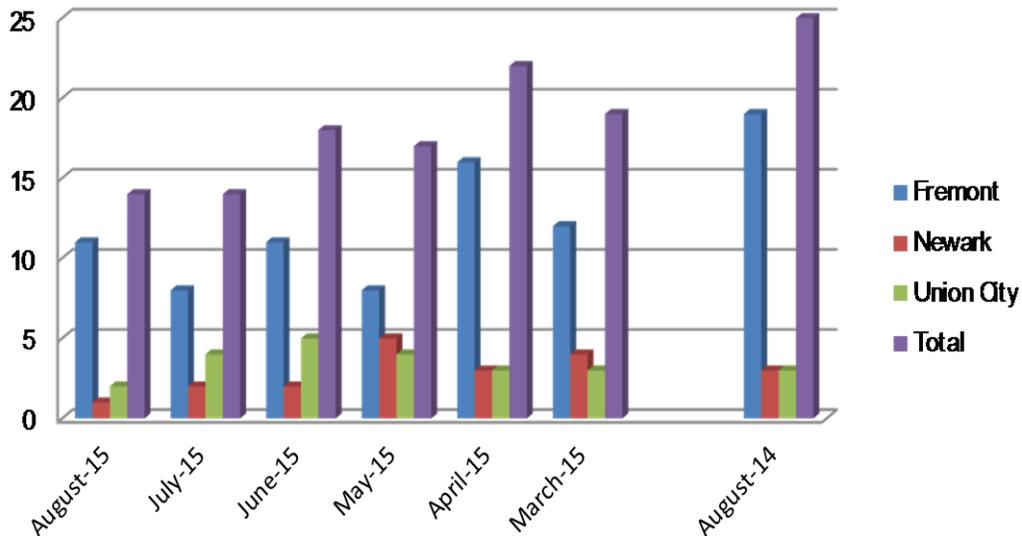
Thickener Control Building Improvements Project – Contractor has completed the replacement of two of the four primary scum pumps in Sludge Pump Room No. 1 and Sludge Pump Room No. 3. Bypass system piping tie-ins and equipment cutovers in Heating and Mixing Building No. 3 have been completed. Pressure testing of the bypass piping system has started. The replacement of the two remaining primary scum pumps and equipment cutovers in Heating and Mixing Building No. 2 are scheduled to take place in September.

Newark Backyard Sanitary Sewer Relocation Project Phase 2 – All sewer main installations for the project have been completed, except for two stubs for Phase 3 connections.

Customer Service

Trouble Calls dispatched from the Front Desk during business hours:

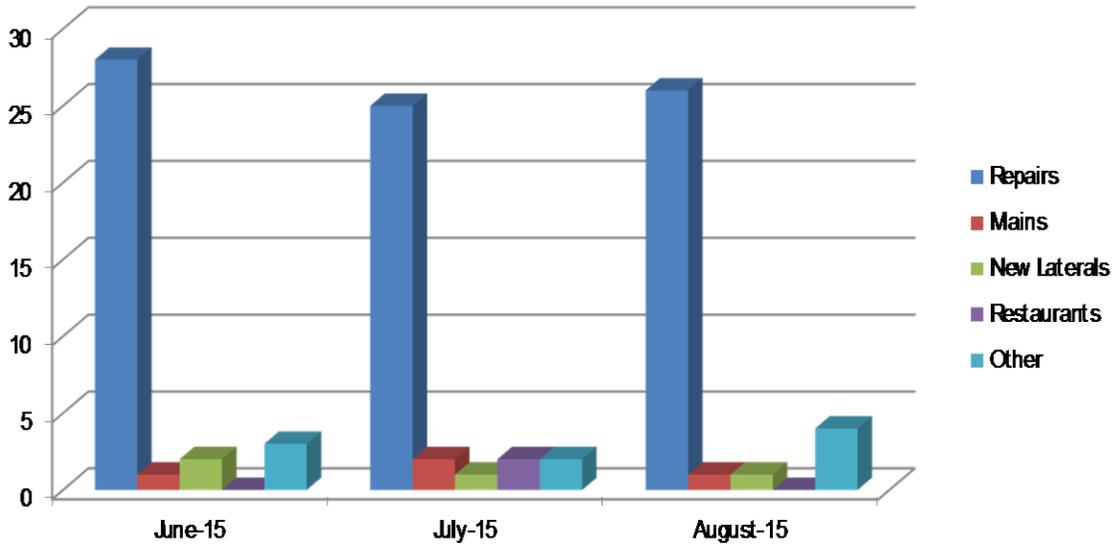
Month	Fremont	Newark	Union City	Total
August-15	11	1	2	14
July-15	8	2	4	14
June-15	11	2	5	18
May-15	8	5	4	17
April-15	16	3	3	22
March-15	12	4	3	19
August-14	19	3	3	25
6-Month Total				104



Sewer Permits Issued

Month	Repairs	Mains	New Laterals	Restaurants	Other
August-15	26	1	1	0	4
July-15	25	2	1	2	2
June-15	28	1	2	0	3

New Laterals- New residential lateral connections
 Other - Non-residential construction (except restaurants)



Communication & Graphics

- Attended CASA conference; received award for Exceptional Public Outreach for USD’s Open House
- Press release regarding ring in Sewer – interviewed customer and USD personnel; released to news outlets and social media
- Sewer Service Rates communication:
 - Continued edits to narrative documents/fact sheets regarding Sewer Service Rates; uploaded edited document after Board approval
- Uploaded finalized budget to Finance page on website
- Updated Ordinance 34.07 on website
- Public Website Redesign: Continue project work with designer
- Union City Chamber of Commerce: Continue to fulfill duties as Board President

Environmental Compliance

Pollution Prevention Program

USD’s Environmental Compliance team conducts pollution prevention inspections to restaurants, car wash businesses, and other commercial facilities. EC also conducts inspections and enforcement for the City of Fremont’s Environmental Services group. We conduct over 600 Stormwater compliance inspections every year to ensure that commercial facilities, including restaurants and auto shops, comply with City Ordinance requirements, and do not discharge pollutants to the creeks and bay.

For the past month, the EC team conducted 96 Stormwater (Urban Runoff), and 49 FOG (restaurant) inspections. In addition, we assisted the City of Fremont with Urban Runoff outreach and enforcement at the recent Indian Festival. During this reporting period, Inspectors identified 31 Stormwater and 15 FOG enforcement actions. Eight of the Stormwater enforcements resulted in administrative fines ranging from \$100 to \$500. Six of the administrative fines were for repeated violations. There were four illicit discharges, none of which impacted waters of the bay.

Urban Runoff Inspections and Enforcements

August 2015	No. of UR Inspections	VW	WL	NOV	AF	LA	Total Enforcements	No. of Illicit Discharge/s	4
	96	7	0	16	8	0	31	% enforcement	32.3%

FOG Inspections and Enforcements

August 2015	No. of FOG Inspections	VW	WL	NOD	AF	LA	Total Enforcements	% enforcement	30.6%
	49	7	8	1	0	0	15		

Enforcements:

VW – Verbal Warning

WL – Warning Letter

NOV – Notices of Violation

AF – Administrative Fine

LA – Legal Action

NOD – Notice of Deficiency

AO – Administrative Order

C&D – Cease & Desist Order

SNC – Significant Non Compliance

Dental Inspections, School Outreach, and Plant Tours

# of Dental Inspections	# of School Outreach Events including Sewer Science	# of Plant Tours
2	0	9

Industrial Pretreatment

The Industrial Pretreatment program has a number of pending permits as shown in the table below. USD inspectors are working with each of these companies to establish permitted industrial discharges.

Pending Permits

New Industrial/Groundwater Permits	Groundwater/Temporary
Preston Pipelines	Groundwater
Ghilotti Construction Company	Groundwater

Permits Issued

Company Name	Date Permit Issued
Silevo Inc. @ 47700 Kato Road	8/16/2015
Siteworks Construction (GW-15-008)	8/7/2015

Industrial Closures

Company Name	Date of Closure
None	

Reports (Annual & Semi-Annual Pretreatment Report, Union City Report, etc.)

Report Name	Date Report Completed and Submitted
Annual Stormwater Report for City of Fremont	8/10/2015

Enforcement Action

IU Name & Nature of Business	Comments	City	Parameters Violated	Discharge concentration (mg/L)	USD/Fed Limit Violated (mg/L)	Enforcement (1)
Sogo Bakery	pH 4.7 is below 6.0. Oil & Grease Animal / Vegetable of 307 mg/L exceeds limit of 300 mg/L. IU will be issued a Notice of Violation.	Newark	pH, Oil & Grease (Animal/Vegetable)	pH = 4.7 O/G (animal/vegetable) = 307 mg/L	pH = 6.0 O/G (animal/vegetable) = 300 mg/L	NOV

(1) WL – Warning Letter NOV – Notices of Violation AO – Administrative Order
 C&D – Cease and Desist Order SNC – Significant Non Compliance EM – Enforcement Meeting

Other - Team training, Special Meetings, Conferences, Special Recognition, IAC (topics)

Activity	Date of Event	Attendees
None		

Engineering/Construction

No. of projects under construction: 3

	Construction Projects	Capital (\$1000)	Scheduled Completion	Completed Scope	Completed Time	Comments for August 2015 Activities
1.	Thickener Control Building Improvements Project – Curtis	\$9,990	9/16	49%	52%	Pressure testing of bypass piping system has started.
2.	Newark Backyard SS Relocation – Phase 2 – Rollie/Al B.	\$2,100	10/15	80%	76%	All sewer main and lateral installations have been completed.
3.	Miscellaneous Spot Repairs Phase VI – Andrew	\$324	10/15	50%	48%	Sewer main repairs for two project sites have been completed.

Design/Study

No. of projects in design/study phase: 15

	Design/Study Projects	Capital (\$1000)	Scheduled Completion	Completed Scope	Completed Time	Comments for August 2015 Activities
1.	Irvington Basin Master Plan Update – Capacity Assessment - Rollie	\$231	6/15	99%	100%	Draft report has been reviewed and comments returned.
2.	Seismic Study - Raymond	\$210	6/15	95%	100%	Response to District comments is expected in early September.
3.	Cast Iron Lining Phase VI – Andrew	In-House	10/15	88%	50%	90% design submittal anticipated in September.
4.	Alvarado-Niles Road SS Rehabilitation – Chris E.	\$248	TBD	95%	95%	Project on hold; pending schedules of other construction activities on Alv.-Niles Rd.
5.	Pine St. Easement Improvements – Chris E.	\$59	8/15	100%	100%	Alternatives evaluation tech memo complete. 50% design complete. Task Order No. 2 scope & fee in progress.
6.	Plant Site Use Study – Curtis	\$200	6/15	100%	100%	Board approval for Task Order No. 2 anticipated in September.
7.	MCC and PLC Replacement Project, Phase 3 – Thomas	\$78	9/15	95%	95%	100% design submittal anticipated in September.
8.	Generator Controls Upgrade Project – Raymond	\$72	6/15	55%	100%	Predesign report draft anticipated in October.
9.	Plant Facilities Improvements Project – Thomas	\$158	10/15	80%	80%	90% design submittal anticipated in September.
10.	Hypo Tank and PVC Pipe Replacement at OCB and NPS - Thomas	\$160	12/15	50%	50%	50% plans and spec were submitted for review.
11.	Pump Station Master Plan – Raymond	\$175	7/15	90%	95%	Final draft of the report anticipated in September.
12.	Aeration Blower Project – Curtis	\$96	12/15	63%	65%	100% design submittal anticipated in October.
13.	Newark Backyard SS Relocation Phase 3 – Al/Rollie	\$160	02/16	65%	38%	Surveyed 72 of 72 backyards. Draft of individual lateral plans were submitted.

	Design/Study Projects	Capital (\$1000)	Scheduled Completion	Completed Scope	Completed Time	Comments for August 2015 Activities
14.	Recycled Water Feasibility Study Update – Chris E.	\$130	03/16	10%	23%	USD water quality laboratory testing in progress.
15.	Sludge Degritter System Project – Thomas	\$180	05/16	0%	2%	Executed agreement and Task Order No. 1 for design services on August 25 th .

**COLLECTION SERVICES
ACTIVITIES REPORT
July and August 2015**

Progress/Accomplishments

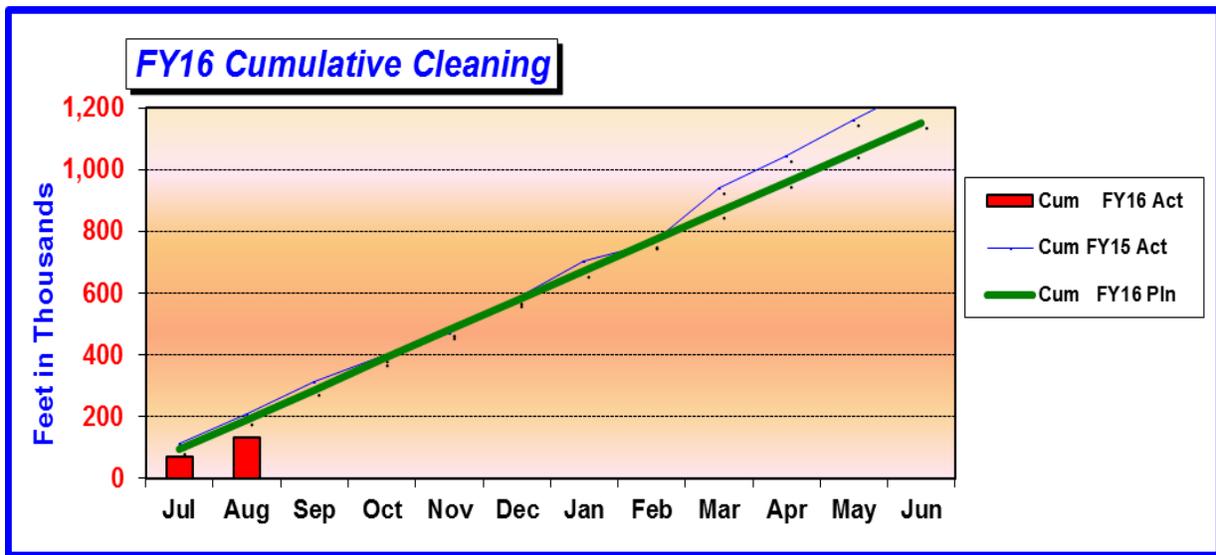
- Completed over 13 miles of cleaning and 13 miles of televising of sewer lines in July
- Completed over 12 miles of cleaning and 13 miles of televising of sewer lines in August
- Responded to 22 service request calls in July and 18 in August
- Completed a total of 17 main repairs in July and 24 in August
- Marked and located all sewer lines (Underground Service Alerts)
- Provided support on the following projects: City of Fremont and Union City chip seal and overlay projects.
- One Category 3 spill (42 gallons) in July, no spills in August.
- Steve Bullis obtained his commercial driver’s license.
- Steve Novak obtained his Qualified Applicators Certification for the District Root Control Program
- Safety Recognition Breakfast for the Work Group for going 180 days without a reportable injury
- Provided a root foaming demonstration for the City of San Jose

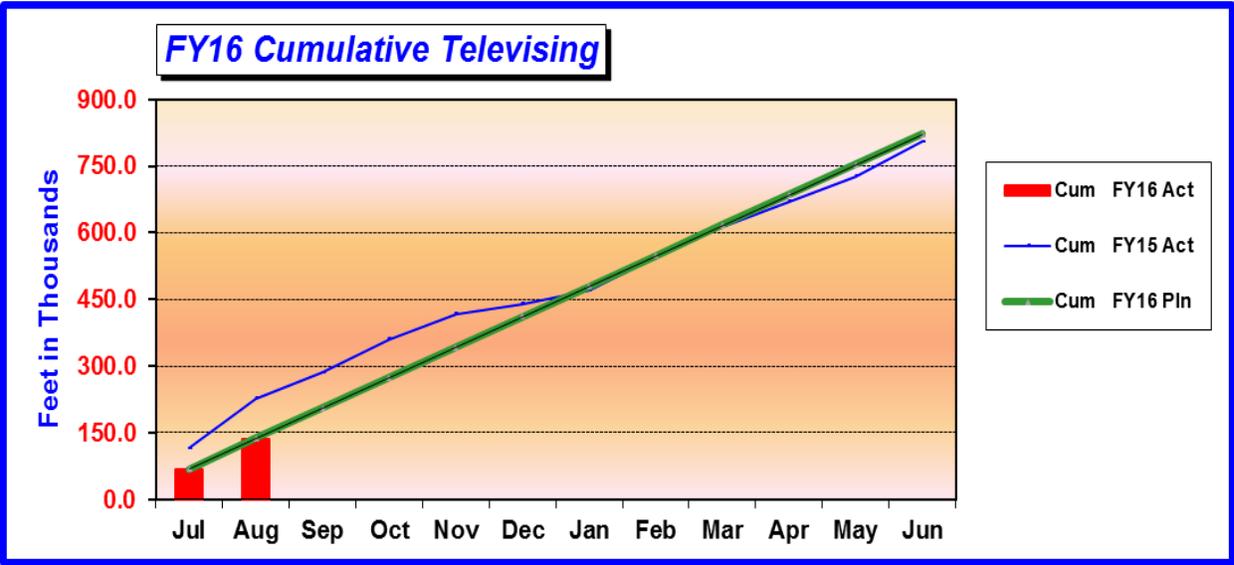
- Training for Collections included; Hazmat Handler Training, Skid Steer Loader Pre-Trip, Start-Up, Shut-Down. Skid Steer Loading and Unloading, Skid Steer Loader Bobtach Attachment System. Budget Point Training for one employee, Heat Illness Awareness for 6 employees.

Future Planning

- Evaluation of our Collection System Preventative Maintenance Program

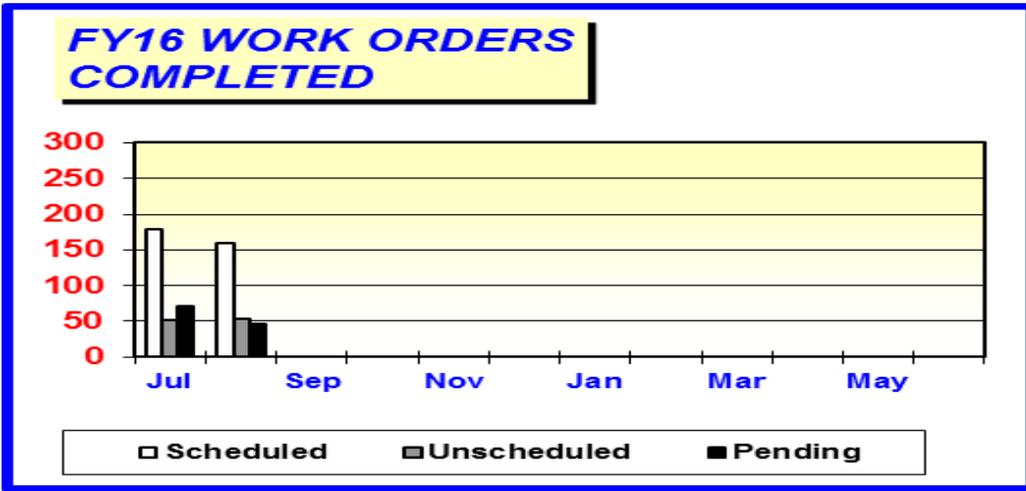
Performance Measures



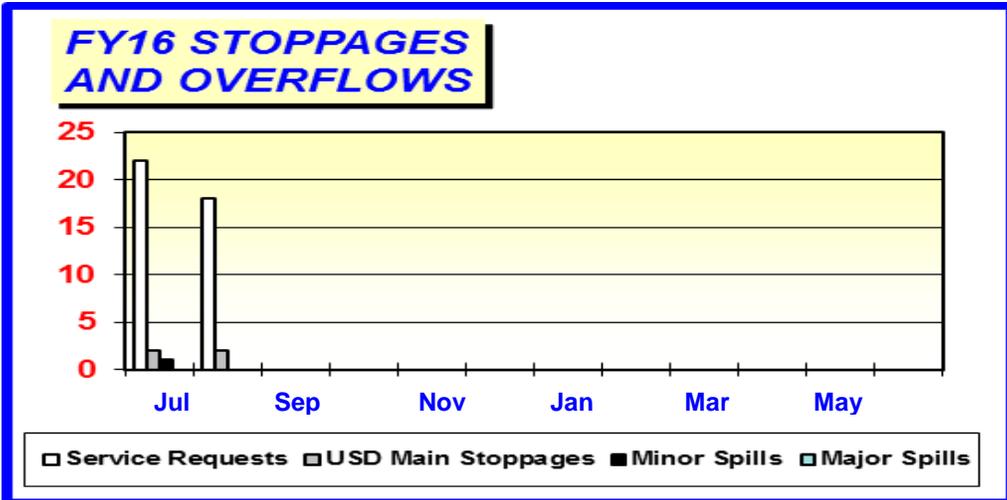


Other Collection Services Status Data:

Support Team Work Order Status:



C/S Maintenance Status:



**FMC
Activities Report
August 2015**

Progress/Accomplishments

- Completed 94% of preventive maintenance activities for the month of August
- Completed 133 corrective maintenance work orders for the month of August
- APS headgate cylinder installation
- Cogen 6K service
- Force main access point corrosion inspection
- 8" waterline repair/installation at Centrifuge

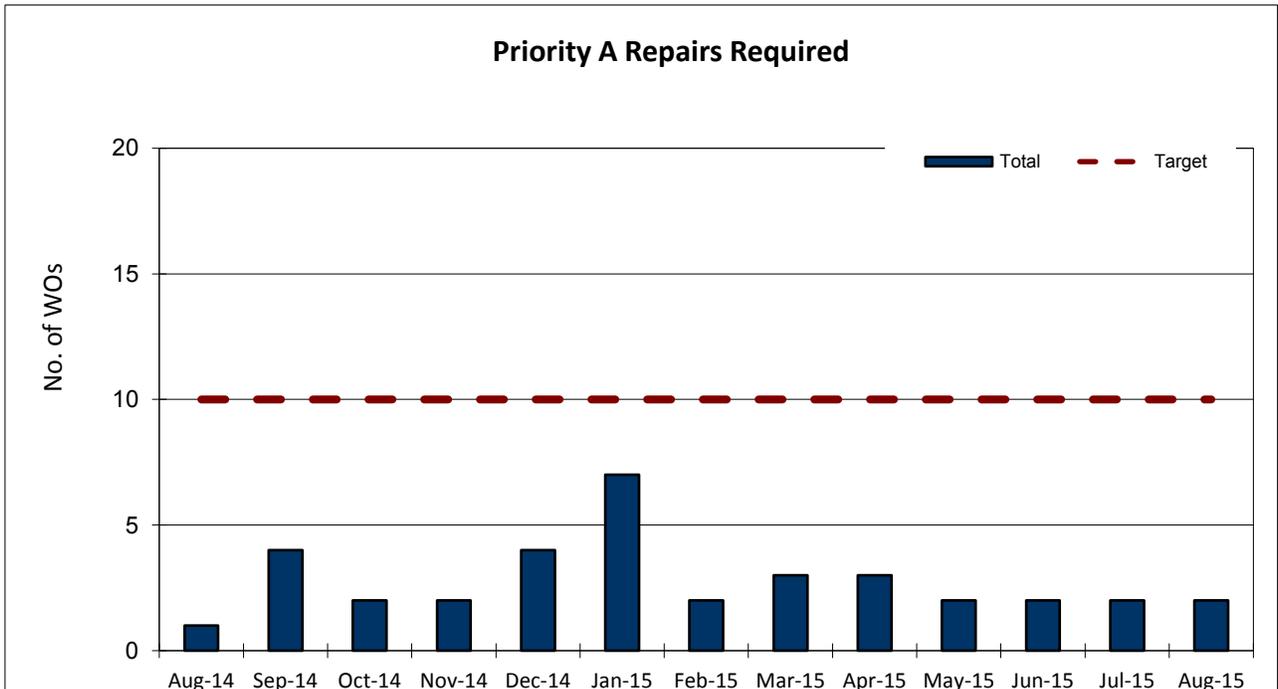
Future Planning

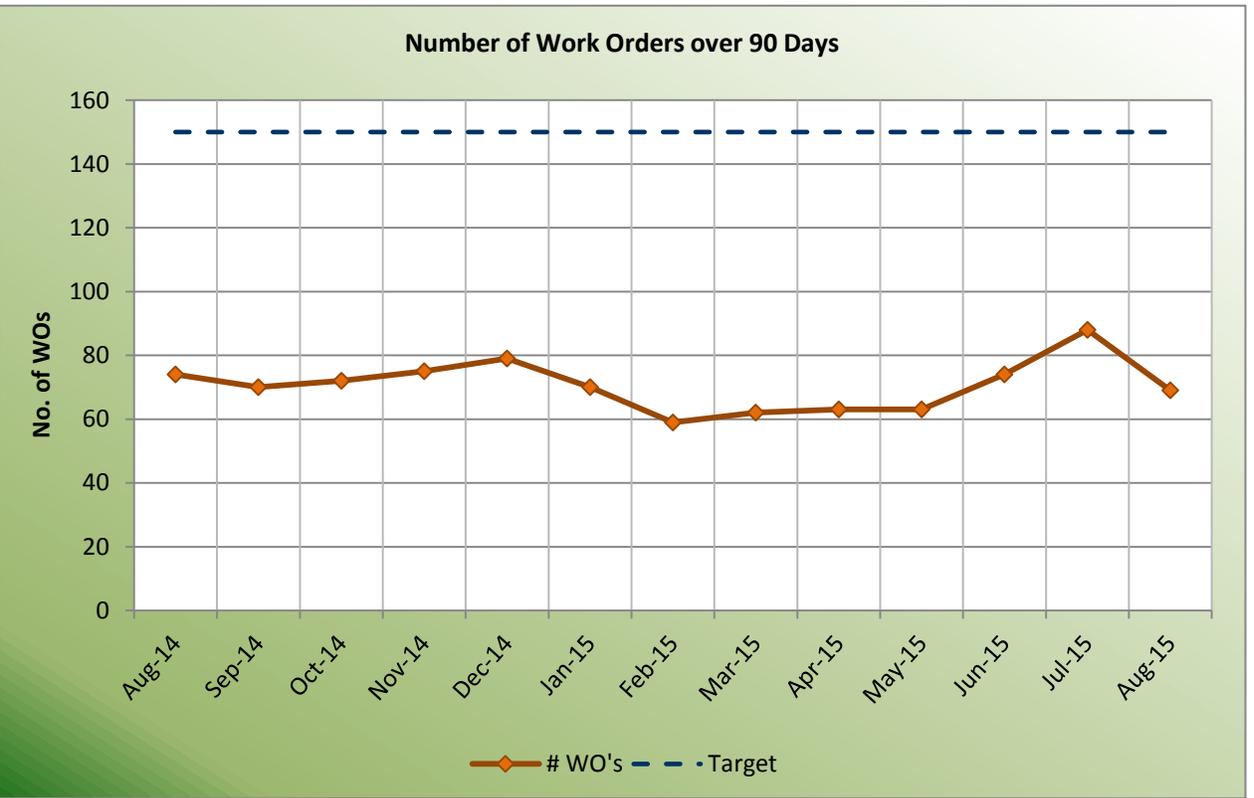
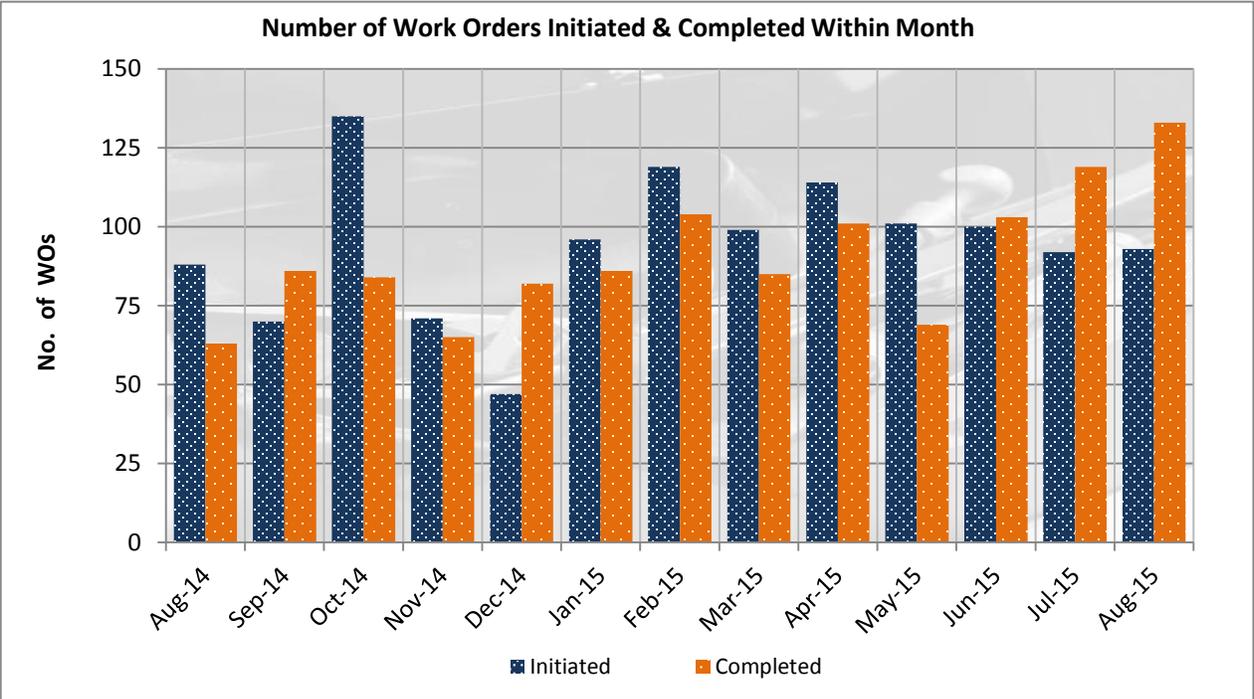
- Install Blower 7
- EBDA Pump #1 installation
- Cherry St. PH Probe Installation
- Paint IPS EQ Basin Piping
- Installation of Parking Lot Light Sensors

Other

- Mech. II Performance Testing
- Training of new Planner/Scheduler
- Continuation of FMC Training Plan

Performance Measurements





**Treatment & Disposal
Activities Report
August 2015**

Progress/Accomplishments

- Completed 82% preventive maintenance activities for the month of August.
- Conducted dye testing of the Old Alameda Creek intermittent wet weather discharge dechlorination system and confirmed that there is satisfactory mixing.
- Reviewed the administrative draft of the Old Alameda Creek Intermittant Wet Weather Discharge permit and provided comments to the Regional Board.
- The Laboratory worked with the State Environmental Laboratory Accreditation Program (ELAP) to gain accelerated acceptance for a modified chlorine residual method for use during wet season. Additional work with ELAP is needed to gain final approval.
- Conducted side stream sampling as part of the nutrient reduction project required by the nutrient watershed permit.
- Met with B&C to discuss draft recommendations for the Nutrient Watershed Permit evaluation of the treatment Plant.
- PG&E provided interactive software training to staff members of the TPO, FMC and CIP teams.
- Obtained sole sourcing agreement for pilot testing the Xylem in-situ aeration membrane cleaning system.
- Attended the WEF nutrient specialty conference in San Jose, California.
- Conducted final effluent sampling for the Recycled Water Feasibility Study Update project.

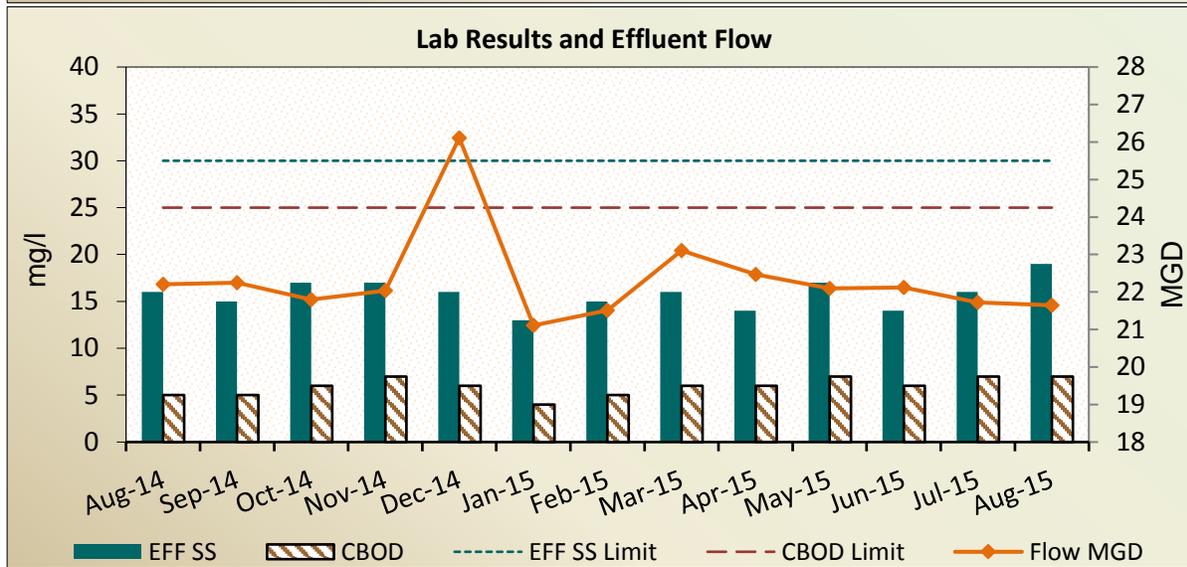
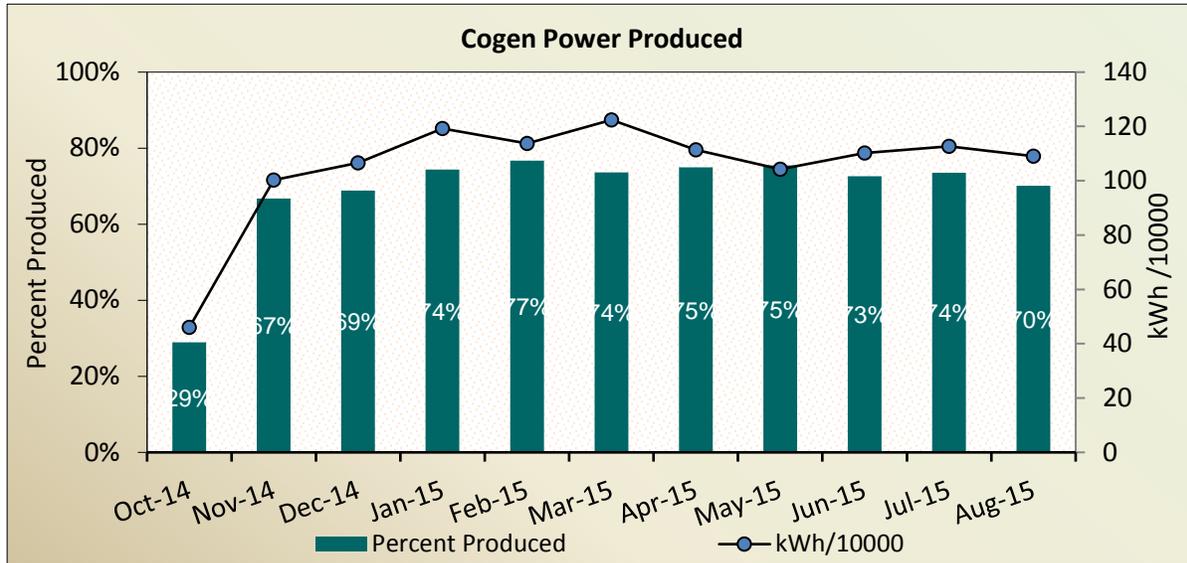
Future Planning

- Review Tentative Order of the Old Alameda Creek Intermittant Wet Weather Discharge permit. The permit is scheduled for adoption in December 2015.
- Continue to pursue accelerated approval by the State for the field measurement of chlorine residual by DPD during wet weather operations.
- Provide training to TPO staff on chlorine residual analysis for wet weather operations.
- Research opportunities for testing digester enzymes to increase digester gas production at the treatment plant.
- Investigate in-situ aeration basin membrane cleaning methods to improve aeration efficiency.
- Attend the Annual Regional Monitoring Program meeting.
- Redesign the Organics-codegestion Pilot study equipment and evaluate the cost for design alternatives and resume testing.
- Present status and results of the Hayward Marsh Rehabilitation Options Study to the Regional Board Staff.

Other

- Cogen system produced 70% of power consumed for the month of August.

Performance Measurements



USD's Final Effluent Monthly Monitoring Results				
Parameter	EBDA Limit	Jun 2015	Jul 2015	Aug 2015
Copper, µg/l	78	6.6	4.6	4.3
Mercury, µg/l	0.066	0.00450	0.00308	0.00371
Cyanide, µg/l	42	3.0 E	6.000	< 3
Ammonia- N, mg/L (Range)	130	36 - 42	41 - 44	39 - 42
Dioxin-Toxicity Equivalent (TEQ), µg/l	2.8 x 10 ⁻⁸	not tested	not tested	not tested
Fecal Coliform, MPN/100ml (Range)				
• 5-Sample Geometric Mean	500	19 - 37	15 - 45	28 - 59
• 11-Sample 90th Percentile	1100	40 - 57	32 - 54	73
Enterococci *				
• 5-Sample Geometric Mean	242	10 - 75	< 10 - 63	< 10 - 41

E = Estimated value, concentration outside calibration range. For SIP, E = DNQ, estimated concentration.
 * Enterococci values are the weekly concentration range not the 5-Sample Geometric Mean range.



Directors
Manny Fernandez
Tom Handley
Pat Kite
Anjali Lathi
Jennifer Toy

Officers
Paul R. Eldredge
*General Manager/
District Engineer*

Karen W. Murphy
Attorney

DATE: September 28, 2015

MEMO TO: Board of Directors – Union Sanitary District

FROM: Paul Eldredge, General Manager/District Engineer
Karen W. Murphy, General Counsel

SUBJECT: Agenda Item No. 11 – Meeting of September 28, 2015
Consider a Resolution Accepting a Sanitary Sewer Easement from Alameda County Flood Control and Water Conservation District

Recommendation:

Approve acceptance of easement and direct Legal Counsel to certify acceptance and have staff record the easement.

Background:

In 2013 the flood control district instituted an eminent domain action to acquire a small, 1/20th of an acre, property adjacent to I-880 in Fremont, which contains about 10 feet of a Fifteen foot wide sanitary sewer easement granted to Irvington Sanitary District in 1955. Flood control only sought surface rights, but as is the custom, named all owners of any interest in the area in question as defendants in the action.

USD filed a disclaimer as to any compensation in that action, on condition that the sanitary sewer easement rights are preserved. When the matter was settled among the other parties, the easement rights were inadvertently left out of the judgment. The flood control district has prepared and executed a new easement in favor of USD, which is attached.

It is recommended that this easement be accepted and counsel be authorized to certify the acceptance and staff record the easement documents. County Counsel has been apologetic for the oversight and prepared the instruments necessary to correct the situation.

**UNION SANITARY DISTRICT
RESOLUTION NO:**

**RESOLUTION ACCEPTING EASEMENT FROM ALAMEDA COUNTY FLOOD
CONTROL AND WATER CONSERVATION DISTRICT**

RESOLVED, by the Board of Directors of Union Sanitary District that it hereby accepts that certain sanitary sewer easement dated August 24, 2015, from Alameda County Flood Control and Water Conservation District to Union Sanitary District, as a substitute for a portion of an easement granted to Irvington Sanitary District in 1955, which was inadvertently eliminated, and authorizes the General Manager or his designee to execute a certificate of acceptance, record the sanitary sewer easement in the Official Records of Alameda County and to take such further action as may be necessary to effectuate the acceptance and recordation of the easement.

I hereby certify that the foregoing Resolution was duly and regularly adopted and passed by the Board of Directors of Union Sanitary District, Alameda County, California, at a meeting held on the 28th day of September, 2015.

AYES:
NOES:
ABSENT:
ABSTAIN:

Jennifer Toy
President, Board of Directors
UNION SANITARY DISTRICT

Attest:

Pat Kite
Secretary, Board of Directors
UNION SANITARY DISTRICT

Adopted: Sept. 28, 2015

Recording Requested By:

Union Sanitary District

And When Recorded, Mail To:

Union Sanitary District
P. O. Box 5050
Union City, CA 94587-2508

Documentary Transfer Tax \$Exempt
Alameda County Flood Control and Water Conservation District

By: _____
City of Fremont

Recording Fee \$0.00 Govt. Code 27383

Space Above This Line For Recorder's Use

GRANT OF EASEMENT
(Sewer)

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, a body corporate and politic, GRANTOR,

does hereby GRANT unto

UNION SANITARY DISTRICT, a public sanitary district, GRANTEE,

and to its heirs and assigns forever, an easement for sewer purposes over the following described real property:

FOR DESCRIPTION, SEE EXHIBIT "A" ATTACHED HERETO. (No. 8302)

The aforesaid easement is for the construction and maintenance of sewers and appurtenant structures therein by said GRANTEE, and GRANTEE shall have the right to enter such easement for maintenance and construction of said sewers.

GRANTEE and its successors and assigns shall indemnify and hold harmless GRANTOR, their successors and assigns against any loss or damage as may be caused by the exercise of the right herein granted.

Said sewer easement is being granted to restore a portion of a sewer easement that was inadvertently extinguished by Final Order in Condemnation, recorded May 8, 2015, Series Number 2015-123689, Official Records of Alameda County, State of California.

IN WITNESS WHEREOF, the Director of Public Works, duly authorized, does execute this Grant of Easement upon his finding that the conveyance of said easement is in the public interest and said easement will not substantially conflict or interfere with GRANTOR's use of the real property hereinabove described. (Gov't Code 25526.6; ACFC&WCD Ord. No. 0-85-11).

Date: August 24, 2015

ALAMEDA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

Approval Recommended:



Beth Perrill
Supervising Right of Way Agent
Alameda County Flood Control
and Water Conservation District

By: 
Daniel Woldesenbet, Ph.D. P.E.
Director of Public Works

Zone 6, Line E
No. 8302
Map: RB-99
APN: 519-0850-022-43 (Por.)

EXHIBIT "A"

ALAMEDA COUNTY FLOOD CONTROL AND
WATER CONSERVATION DISTRICT DESCRIPTION

ZONE 6, LINE E
GRANT OF EASEMENT FOR SEWER PURPOSES

MAP: RB-99
APN: 519-850-22-43 (Por.)

DESC. NO.: 8302
DATE: August 3, 2015

All that real property situate in the City of Fremont, County of Alameda, State of California, described as follows:

Being that portion of the real property conveyed in the grant of easement for sewer purposes as described in that certain document entitled "Resolution No. 124 NS Accepting Easement", recorded December 16, 1955 in Book 7882 of Official Records of Alameda County at Pages 57 through 59, Series Number AK 138112, that lies within the boundaries of the real property described in that certain document entitled "Alameda County Flood Control and Water Conservation District, Plaintiff, v. PSB Northern California Industrial Portfolio, LLC, et al., Defendants, Final Order in Condemnation", recorded May 8, 2015 under Series Number 2015123689, Official Records of Alameda County.

END OF DESCRIPTION

This real property description has been prepared by me or under my direction in conformance with the Professional Land Surveyors' Act.

Russell Reid Penland, Jr.

County Surveyor

LS 5726

By: 

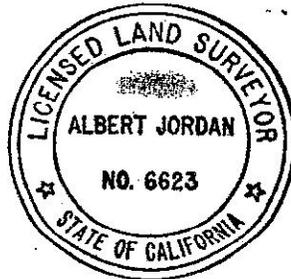
Albert Jordan

Professional Land Surveyor

LS 6623 Reg. Expires 12/31/2015

August 3, 2015

Date





Directors
Manny Fernandez
Tom Handley
Pat Kite
Anjali Lathi
Jennifer Toy

Officers
Paul R. Eldredge
*General Manager/
District Engineer*

Karen W. Murphy
Attorney

DATE: September 28, 2015

MEMO TO: Board of Directors - Union Sanitary District

FROM: Paul R. Eldredge, General Manager/District Engineer
Richard A. Cortes, Business Services Manager
Todd W. Jacob, Information Technology Administrator

SUBJECT: Agenda Item No. 12 - Meeting of September 28, 2015
Approve the 2015 SCADA Master Plan

Recommendation

Approve the 2015 SCADA Master Plan; funding for these projects will be included in the annual budget planning.

Background

The 2011 Information Technology Master Plan recommended a SCADA Master Plan project to provide a roadmap for the evolution of the District SCADA system over the next 5 years. This is the first SCADA Master Plan performed at the District.

The SCADA Master plan project team consisted of:

- Todd Jacob, Information Technology Administrator
- Armando Lopez, Treatment and Disposal Services Manager
- Raymond Chau, Capital Improvements Projects Coach
- David Leath, Electrical/Support Coach
- Trieu Nguyen, Senior Information Technology Analyst

The initial SCADA Master Plan contained recommendations for 24 projects with an estimated cost of \$6,440,000. The project team evaluated these projects and reduced them down to 13 projects with an estimated cost of \$ 2,225,000. Finally, the Executive Team reviewed and

made changes that reduced the SCADA Master Plan projects down to 10 IT projects with an estimated cost of \$1,025,000.

Descriptions of the 2015 SCADA Master Plan projects recommended are provided below:

Improvement Category	Project Description
SCADA Virtualization	<p>Control Building Improvements Plan and implement the replacement of obsolete SCADA servers and workstations utilizing server virtualization. Implement a distributed workstation and storage system so virtual machines for SCADA (including main servers) can run from more than one building. Upgrade iFIX and Historian to the current versions and migrate the SCADA screens for compatibility with the new software. Provide a backup solution.</p>
SCADA Virtualization	<p>Disaster Recovery Update the SCADA Disaster Recovery (DR) elements in the IT Disaster Recovery Plan to improve business continuity. Implement DR and security improvements to the data centers.</p>
SCADA Virtualization	<p>HMI Upgrades per Standards Once migrated, revise legacy SCADA screens in accordance with USD standards.</p>
SCADA Optimization	<p>Alarm Notification Plan Review, design, and implement improvements for secure wireless connectivity at the WWTP and for improving the effectiveness of in plant alarm notification.</p>
SCADA Optimization	<p>Predictive Maintenance Analytics Pilot Deployment Deploy predictive analytics for critical assets that already have adequate sensors in place using the existing Mtell infrastructure. Upgrade the Mtell software to the latest version. Train designated mechanical staff how to configure and manage the predictive analysis process.</p>
Network Improvements	<p>Admin, Control, and Dewatering Building 10 Gb Infrastructure Upgrades for Disaster Recovery Design and implement a network infrastructure to connect the Admin, Control, and Dewatering buildings together in a single star topology with 10 Gb fiber communications.</p>
Network	<p>Plant Network Improvement Study Perform an in-depth assessment of the fiber infrastructure to investigate,</p>

Improvement Category	Project Description
Improvements	test, and create as-built documentation, establish goals for remediation, create, design, and budget options for remediation, and support in the presentation of findings to upper management.
Network Improvements	Remote Access/Mobile Computing Implement secure wireless remote access connectivity to SCADA resources both at the WWTP and from off-site locations such as the pump stations. Provide full access to WWTP operational status from the remote pump stations HMI devices. Evaluate both Wi-Fi and cellular 4G alternatives and implement the best solution while minimizing security risks. Assess optional implementation of extending Wi-Fi to the 4 administration buildings: Admin, Control, CS, and FMC.
Support & Training	Standards Maintenance Define requirements, establish, and implement an electronic based process for continuous updates and improvements to the SCADA based standards (i.e. controls design specifications, instrumentation and panel design specifications, PLC programming, and HMI configuration/graphics/historian, etc.).
Support & Training	Support Level/Skills Development Identify and document means and methods to improve SCADA technical support by developing training plans for those tasks performed under District purview. Develop training levels, evaluation metrics, and skills assessment methods to validate staff training for SCADA specific support for IT, TPO, and FMC personnel.

Funding for these projects will be included in the annual budget planning for approval based on the proposed schedule in the table below.

Improvement Category	Project Name	Duration (months)	Total Contract Cost Over 5 yrs	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
				IT Funds	IT Funds	IT Funds	IT Funds	IT Funds
SCADA Virtualization	Control Building Improvements	6	\$ 20,000	\$ 20,000				
	Disaster Recovery	6	\$ 100,000		\$ 100,000			
	HMI Upgrades per Standards	24	\$ 250,000				\$ 125,000	\$ 125,000
SCADA Optimization	Alarm Notification Plan	6	\$ 25,000	\$ 25,000				
	Predictive Maintenance Analytics Pilot Deployment	6	\$ 25,000		\$ 25,000			
Network Improvements	Admin, Control, and Dewatering Building, & 10 Gb Infrastructure Upgrades for Disaster Recovery	6	\$ 100,000		\$ 100,000			
	Plant Network Improvement Study	12	\$ 65,000		\$ 65,000			
	Remote Access/Mobile Computing	12	\$ 90,000		\$ 90,000			
	Standards Maintenance	60	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Support & Training	Support Level/Skills Development	6	\$ 50,000		\$ 25,000	\$ 25,000		
	Project Management	24	\$ 300,000		\$ 150,000	\$ 150,000		
Rounded Totals			\$ 1,025,000	\$ 45,000	\$ 555,000	\$ 175,000	\$ 125,000	\$ 125,000

Note that \$300,000 for IT Project Management services is included to temporarily augment the IT staff during FY17 and FY18. This is done to alleviate upward pressure on IT staff resulting from managing the existing scheduled IT projects and these new SCADA Master Plan projects proposed.

The current Information Systems Renewal & Replacement five year budget projection from FY16 to FY20 is \$2,805,000. The scheduled IT Master Plan projects account for \$2,285,000, with \$520,000 not allocated to projects. The proposed SCADA Master Plan projects and project management services are estimated to be \$1,025,000, less the unallocated \$520,000, results in a difference of \$505,000 needed over the next five years.

Staff recommends the Board approve the 2015 SCADA Master Plan.

PRE/RAC/TWJ

Attachments: 2015 SCADA Master Plan



Union Sanitary District

SCADA Master Plan

September 15th 2015

Nicholas J. Peros, P.E.

1105 Cabrillo Avenue
Burlingame, CA 94010

(415) 350-7814

nickperospe@gmail.com

Table of Contents

List of Tables iii

List of Figures iv

List of Acronyms and Abbreviations v

List of Appendices vii

Section 1: Executive Summary 1-1

Master Plan Objective 1-1

Section 2 Reconnaissance & Needs Assessment 1-1

Section 3 Recommendations 1-1

Section 4 Implementation Plan 1-7

Program Road Map 1-12

Conclusion 1-13

Section 2: Reconnaissance & Needs Assessment 2-1

2.1 Introduction 2-1

2.2 Needs Assessment 2-2

 2.2.1 USD Expectations from this Project 2-2

 2.2.2 Overlap with Current USD Improvement Programs 2-4

 2.2.3 Treatment Plant Needs 2-5

 2.2.4 Pump Station Needs 2-5

2.3 Review Existing SCADA System and Processes 2-5

 2.3.1 SCADA System and Architecture 2-5

 2.3.1.1 Existing SCADA Computer Architecture 2-5

 2.3.1.2 Technology & Governance 2-11

 2.3.1.3 Network Design Including the Primary and Backup Architecture, Subnets, and Routing 2-13

 2.3.1.4 Remote Access Solution 2-15

 2.3.2 Operations 2-16

 2.3.2.1 SCADA Standard Operating Procedures 2-16

 2.3.2.2 Operations & Maintenance Metrics 2-16

 2.3.2.3 SCADA Alarm Notification System and Process 2-17

 2.3.2.4 Disaster Recovery Plan and Procedures 2-18

 2.3.2.5 Operations and Maintenance Manuals and References 2-18

 2.3.3 Maintenance 2-19

 2.3.3.1 SCADA System Replacement Practices 2-19

 2.3.3.2 SCADA to CMMS Interface for Generating Work Orders Based on Runtime Data 2-20

 2.3.3.3 Mtell Software for Generating Predictive Alerts Based on Sensor Data 2-21

 2.3.4 Business and Compliance Reporting 2-22

2.3.4.1	Data from the SCADA System.....	2-24
2.3.4.2	Operator Manual Data Entry.....	2-25
2.3.4.3	Lab Analysis Data.....	2-25
2.3.5	Support.....	2-25
2.3.5.1	SCADA Service Level Agreements.....	2-25
2.3.5.2	SCADA Job Competency Requirements and Answers.....	2-25
2.3.5.3	Use of Consultants	2-25

Section 3: Recommendations..... 3-1

3.1	Introduction.....	3-1
3.2	Recommendations.....	3-1
3.2.1	Vision, Goals, and Objectives for the District’s SCADA System.....	3-1
3.2.2	Training, Practices & Procedures: Enhance SCADA System.....	3-2
3.2.3	Technology, Practices, & Procedures; Security	3-7
3.2.4	O&M Metrics Including Charts, Trends, Alarms	3-10
3.2.5	SCADA Integration with Other Business Systems	3-14
3.2.6	Virtualization.....	3-16
3.2.7	Software Upgrade Philosophy	3-22
3.2.8	Remote Access Solution	3-27
3.2.9	Network Design Improvements-Reliability, Redundancy	3-29
3.2.10	Future SCADA Trends.....	3-37
3.2.11	Disaster Recovery Plans & Procedures.....	3-37
3.2.12	SCADA Support Levels, Skill Development.....	3-38
3.2.13	Project Management	3-40
3.3	Project Ranking	3-42

Section 4: Implementation Plan 4-1

4.1	Summary of Recommended Projects	4-1
4.2	SCADA Master Plan Budget.....	4-3
4.3	Master Plan Schedule	4-5

List of Tables

Table 1:	Attendees, Workshops 1 and 2
Table 2:	USD Expectations for the SCADA Master Plan and Standards
Table 3:	USD VLANs
Table 4:	Plant Scorecard
Table 5:	Support & Training Options
Table 6:	Recommended Project – Support & Training: Support Level/Skills Development
Table 7:	Recommended Project – Support & Training: Standards Maintenance
Table 8:	Plant Scorecard
Table 9:	Recommended Project – SCADA Optimization: Alarm Notification Plan
Table 10:	Recommended Project – Predictive Analytics - Pilot Deployment
Table 11:	Recommended Project – SCADA Virtualization: Control Building Improvements
Table 12:	Recommended Project – SCADA Virtualization: Disaster Recovery
Table 13:	Recommended Project – SCADA Virtualization: HMI Upgrades per Standards
Table 14:	HMI Improvement Options
Table 15:	Recommended Project – Network Improvements: Remote Access/Mobile Computing
Table 16:	Network Improvements Options
Table 17:	Recommended Project – Network Improvements: Admin, Control, and Dewatering Building, & 10 Gb Infrastructure Upgrades for Disaster Recovery
Table 18:	Recommended Project – Plant Network Improvement Study
Table 19:	Support & Training – Support Level/Skills Development
Table 20:	Recommended Project – Project Management
Table 21:	Project Ranking Metrics
Table 22:	Project Ranking Summary
Table 23:	Summary of Recommended Projects
Table 24:	SCADA Master Plan Budget
Table 25:	Estimated Internal Labor Loading

List of Figures

- Figure 1: Control Building Network
- Figure 2: Control Building Server Room Photograph
- Figure 3: Administration Building Network
- Figure 4: Admin Server Room Photograph
- Figure 5: Centrifuge Building Network
- Figure 6: Centrifuge Building DR Cabinet Photograph
- Figure 7: Current Remote Access Topology
- Figure 8: Control Room SCADA Workstations Photograph
- Figure 9: Data Flow Diagram
- Figure 10: Situational Awareness Displays for Key Performance Indicators (KPI's)
- Figure 11: Loop Topology (current simplified fiber arrangement)
- Figure 12: Single Star Topology (one fiber link per building)
- Figure 13: Dual Star Topology (two fiber links per building)
- Figure 14: SCADA Master Plan Implementation Schedule
- Figure 15: IT Workload Projections, Excluding Needs of SCADA Master Plan

List of Acronyms and Abbreviations

AAA	Authentication, Authorization, Accounting
CBC	California Building Standards Code, Title 24
CIP	Capital Improvement Program
CMMS	Computerized Maintenance Management System
CSV	Comma Separated Values
DH+	Allen Bradley DataHighway+
Domain Controller	A server which responds to security authentication requests (e.g. login)
DMZ	Demilitarized Zone
DR	Disaster Recovery
DRS	VMware vSphere® Distributed Resource Scheduler
EMS	Engine Monitoring System
EAM	Enterprise Asset Management
FMC	Fabrication, Maintenance, & Construction
F-R-O-M	Functionality, Reliability, Operability, Maintainability optimization model
GIS	Geographical Information System
HA	High Availability
Historian	SCADA Historian
HMI	Human Machine Interface
https	Hypertext Transfer Protocol Secure
iFIX	Software product also known as Proficy HMI/SCADA – iFix
HART	Highway Addressable Remote Transducer
IT	Information Technology
JCR	Job Competency Requirements
LAN	Local Area Network
MCC	Motor Control Center
MPLS	Multiprotocol Label Switching
NAS	Network Attached Storage
NAT	Network address translation
NIC	Network Interface Controller (or Card)
O&M	Operations and Maintenance
ODBC	Open Database Connectivity
ODMS	Operations Data Management System
OIT	Operator Control Interface Terminal
OS	Operating System
PLCs	Programmable Logic Controllers
PM	Preventive Maintenance
PoE	Power over Ethernet
RADIUS	Remote Access Dial In User Service
RD	Remote Desktop
RSA	Rivest-Shamir-Adleman cryptosystem for public-key encryption
RPO	Recovery Point Objective

RPVST	Rapid per-VLAN Spanning Tree
R&R	Renewal and Replacement
RTO	Recovery Time Objective
RTU	Remote Telemetry Unit
SAN	Storage Area Network
SCADA	Supervisory Control And Data Acquisition
SFP	Small Form-factor Pluggable (fiber transceiver)
SOP	Standard Operating Procedure
SSH	Secure Shell
SSL	Secure Sockets Layer
TACACS	Terminal Access Controller Access Control System
TPO	Total Productive Operations
URL	Uniform Resource Locator
USD	Union Sanitary District
VB	Visual Basic
VFD	Variable Frequency Drive
VLAN	Virtual LAN
vPC	Virtual Port Channels
VPN	Virtual Private Network
VRF	Virtual Routing and Forwarding
VSS	Virtual Switching System
WAN	Wide Area Network
WAP	Wireless Application Protocol
WWTP	Alvarado Wastewater Treatment Plant

List of Appendices

Appendix A: Workshops

- A.1 Workshop 1, SCADA Master Plan
- A.2 Workshop 2, SCADA Master Plan
- A.3 Workshop 3, SCADA Standards
- A.4 Workshop 4, SCADA Standards (HMI Screens)
- A.5 Workshop 5, Vetting SCADA Standards

Appendix B: Reference Figures

- B.1 Switch Location Plan, Alvarado Plant
- B.2 Network Diagram: USD LAN-WAN ver 15, 9/8/10
- B.3 Network Diagram: USD LAN-WAN ver 1.9, 11/26/14
- B.4 District Network Diagrams
- B.5 Integrated Solution Architecture – Future Target

Appendix C: Other References

- C.1 Historian Tags Linked to Mtell
- C.2 Hansen & Proficy Tag Cross-reference
- C.3 Operator Checklists
- C.4 Standard Operating Procedures

Appendix D: Low Priority Projects

- D.1 Instrumentation
- D.2 Manage & Retain Knowledge Assets
 - D.2A Asset Management Practice for SCADA & Network Hardware
 - D.2B Use of Consultants
- D.3 Use SCADA to Optimize Operations
- D.4 Consolidated View of Data to Manage & Optimize O&M
- D.5 SCADA Integration with Other Business Systems
- D.6 Automated Operator Collection Solutions

Section 1: Executive Summary

Master Plan Objective

The objective of the SCADA Master Plan is to provide a roadmap for the evolution of USD's SCADA system over the next 5 years, achieved through strategic projects sequenced to realize USD's planned vision and goals.

Section 2 Reconnaissance & Needs Assessment

Section 2 Reconnaissance & Needs Assessment summarizes investigations of USD's existing SCADA system and the supporting computer network. Investigations in December 2014 and January 2015 included review of electronic documentation, field reconnaissance, and workshops with groups of stakeholders. This section also assesses USD's needs from the perspectives of best practices for SCADA and related IT technologies. Finally it assesses needs for operations, maintenance, business reporting, compliance reporting, and support.

Section 3 Recommendations

Section 3 Recommendations identifies 10 high priority projects, grouped in 5 improvement categories, and recommends implementation via USD's capital improvement program. A ranking process was used to determine which projects were most beneficial, selecting from a field of 26 projects. **Section 3** includes detailed descriptions of each project and justifications for implementation. The improvement categories and recommended projects are as follows:

Improvement Category	Project Description	Project Justification & Consequences of Not Proceeding
SCADA Virtualization	<p>Control Building Improvements: Plan and implement the replacement of obsolete SCADA servers and workstations utilizing server virtualization. Implement a distributed workstation and storage system so virtual machines for SCADA (including main servers) can run from more than one building. Upgrade iFIX and Historian to the current versions and migrate the SCADA screens for compatibility with the new software. Provide a backup solution.</p>	<p>Justification:</p> <ul style="list-style-type: none"> • Replace obsolete SCADA computer hardware and software as part of USD's standard R&R plan. <p>Consequences:</p> <ul style="list-style-type: none"> • Continued vulnerability to known cyber-security risks. • Increased IT maintenance costs to maintain non-virtualized computer systems just for SCADA. • Increased chance of failure because hardware is older. • Longer time-to-repair because equipment is no longer in warranty.

Improvement Category	Project Description	Project Justification & Consequences of Not Proceeding
SCADA Virtualization	<p>Disaster Recovery Update the SCADA Disaster Recovery (DR) elements in the IT Disaster Recovery Plan to improve business continuity. Implement DR and security improvements to the data centers.</p>	<p>Justification:</p> <ul style="list-style-type: none"> • Need new DR for the new virtualized SCADA system because the existing DR will no longer work after SCADA upgrade. <p>Consequences:</p> <ul style="list-style-type: none"> • Potential complete loss of WWTP SCADA control and monitoring for a substantial period in the event of fire or flooding in the Control Building.
SCADA Virtualization	<p>HMI Upgrades per Standards Once migrated, revise legacy SCADA screens in accordance with USD standards.</p>	<p>Justification:</p> <ul style="list-style-type: none"> • More efficient, consistent, and informative controls to reduce the risk of SCADA operator error. • Use of standardized objects to streamline software development and maintenance. • Addition of new dashboard screens which help operators see process anomalies quicker. <p>Consequences:</p> <ul style="list-style-type: none"> • Continued potential for error and extra effort to train new operators to understand and work around inconsistencies from screen to screen. • Increased effort for development and maintenance of screens • Lost efficiencies from not have new dashboards and standardized screens

Improvement Category	Project Description	Project Justification & Consequences of Not Proceeding
SCADA Optimization	Alarm Notification Plan Review, design, and implement improvements for secure wireless connectivity at the WWTP and for improving the effectiveness of in plant alarm notification.	Justification: <ul style="list-style-type: none"> • More immediate notification of alarm conditions to those who can actually take action. • Improved clarity as to what's wrong so corrective action can be taken immediately. • Better use of existing voice radio system after existing alarm notification system is off loaded to a new platform • Replace obsolete Zetron alarming hardware. Consequences: <ul style="list-style-type: none"> • Alarms remain generalized, not informing operators of the specific situation needing attention which could lead to a longer time to react to alarms. • Will continue to have alarming over the radio causing inefficiencies. • Continued impact on existing voice radio system to carry both voice traffic and alarm notification. • Current alarming hardware is obsolete and could take a long time to fix if it fails.
SCADA Optimization	Predictive Maintenance Analytics Pilot Deployment Deploy predictive analytics for critical assets that already have adequate sensors in place using the existing Mtell infrastructure. Upgrade the Mtell software to the latest version. Train designated mechanical staff how to configure and manage the predictive analysis process.	Justification: <ul style="list-style-type: none"> • Leverage the existing Mtell infrastructure for predictive analysis. • Identify potential failures before they occur so downtime can be scheduled and equipment can be serviced before major failure occur. • Reduces maintenance costs and increases asset life. Consequences: <ul style="list-style-type: none"> • Lack the ability to identify failures before they occur leading to the higher risk of equipment failure and environmental incidents.

Improvement Category	Project Description	Project Justification & Consequences of Not Proceeding
Network Improvements	<p>Admin, Control, and Dewatering Building 10 Gb Infrastructure Upgrades for Disaster Recovery</p> <p>Design and implement a network infrastructure to connect the Admin, Control, and Dewatering buildings together in a single star topology with 10 Gb fiber communications.</p>	<p>Justification:</p> <ul style="list-style-type: none"> • Provides the infrastructure for a high-speed on-site disaster recovery solution for the new virtualized SCADA system. • Updates the existing fiber network which is based on old technology. • Provides the first phase of infrastructure improvements needed to switch from the existing fiber loop to a high-speed star. <p>Consequences:</p> <ul style="list-style-type: none"> • The lack of an in-plant 10 Gb fiber infrastructure will increase the recovery time for any local DR installation.
Network Improvements	<p>Plant Network Improvement Study</p> <p>Perform an in-depth assessment of the fiber infrastructure to:</p> <ul style="list-style-type: none"> • Investigate, test, and create as-built documentation • Establish goals for remediation • Create design and budget options for remediation • Support in the presentation of findings to upper management 	<p>Justification:</p> <ul style="list-style-type: none"> • Substantially improves network reliability via redundancy and improves performance to meet existing and future needs. • Provides infrastructure to accommodate future networked improvements such as VOIP, IP cameras, etc. • Alignment with networking best practices for maximizing up-time. (Best practices have changed in the last 25-years from loop topology to dual star.) • Future-proof the WWTP network by implementing new single mode fiber home runs. • Upgrading to dual fiber permits phase-out of the existing microwave backup communications system, resulting in less complexity and more reliability. <p>Consequences:</p> <ul style="list-style-type: none"> • Continued network reliability issue due to the use of a single core switch.

Improvement Category	Project Description	Project Justification & Consequences of Not Proceeding
		<ul style="list-style-type: none"> • Network reliability issue if the existing fiber loop is left unimproved or if only a single star fiber network replaces the loop. • Continued built-out of an ad hoc network would lead to further network stability issues. • Continued use of microwave for backup results in a network that is more complex and less reliable than a dual star.
Network Improvements	<p>Remote Access/Mobile Computing Implement secure wireless remote access connectivity to SCADA resources both at the WWTP and from off-site locations such as the pump stations. Provide full access to WWTP operational status from the remote pump stations HMI devices. Evaluate both Wi-Fi and cellular 4G alternatives and implement the best solution while minimizing security risks. Assess optional implementation of extending Wi-Fi to the 4 administration buildings: Admin, Control, CS, and FMC.</p>	<p>Justification:</p> <ul style="list-style-type: none"> • Quicker response to alarms and the ability to handle process disturbances immediately wherever staff is in the WWTP or pump stations. • Implement new remote access provisions consistent with the upgraded SCADA system. • Provide access by managers and call-out staff from home. <p>Consequences:</p> <ul style="list-style-type: none"> • Continued inefficiencies because staffs don't have SCADA resources with them as they make rounds. • Lack of secure remote access to SCADA.
Support & Training	<p>Standards Maintenance Define requirements, establish, and implement an electronic based process for continuous updates and improvements to the SCADA based standards (i.e. controls design specifications, instrumentation and panel design specifications, PLC programming, and HMI configuration/graphics/historian, etc.).</p>	<p>Justification:</p> <ul style="list-style-type: none"> • Provides a current updated set of standards for SCADA projects, based on present technology, minimizing the effort to operate and maintain the SCADA system. <p>Consequences:</p> <ul style="list-style-type: none"> • USD standards would get out of date quickly as technology advances, becoming less and less useful every year.

Improvement Category	Project Description	Project Justification & Consequences of Not Proceeding
Support & Training	Support Level/Skills Development Identify and document means and methods to improve SCADA technical support by developing training plans for those tasks performed under District purview. Develop training levels, evaluation metrics, and skills assessment methods to validate staff training for SCADA specific support for IT, TPO, and FMC personnel.	Justification: <ul style="list-style-type: none"> For each group, clarify tasks and skills needed to support the SCADA system. Provide for regular staff development to maintain and improve job skills. Provide cross training opportunities for backup support and to minimize down time. Consequences: <ul style="list-style-type: none"> Untrained support staff would take longer to resolve issues. Backup staff won't be able to handle as wide a variety of issues. Staff job competency will not grow.
Project Management	Project Management The projects for the IT Master Plan and the SCADA Master Plan will run concurrently and additional project management resources are required to address the IT labor gap in FY17 and FY18.	Justification: <ul style="list-style-type: none"> USD IT staff does not have sufficient projected availability to handle present duties and the additional work of managing two concurrent programs. Having necessary project management staff availability contributes to keeping both programs on time and within budget. Consequences: <ul style="list-style-type: none"> Insufficient oversight of the work for compliance with USD practices and standards Potential for lack of coordination between both programs and normal support activities.

In addition to the above 10 projects, Appendix D describes another 16 projects which received lower ranking scores. These projects might be worth revisiting after the 5 year planning horizon for this master plan or if additional funding resources become available before that time.

Finally, there are non-project-related recommendations in Sections 3 and 4 as follows:

Non-Improvement, Program-Related Recommendation	Master Plan Paragraph
Review industry practices and manufacturer's recommendation for replacement of equipment	3.2.7 Asset Management Practice for SCADA & Network Hardware
Plan to upgrade SCADA-related software at the recommended intervals	3.2.8 Software Upgrade Philosophy
Virtualize the development environment for PLC programming	3.2.8 Software Upgrade Philosophy
Incorporate new technology improvements	3.2.11 Future SCADA Trends
Develop an IT staffing/consultant plan	3.2.13 Use of Consultants
Hire contractors, as needed, to bolster USD's project management and implementation capabilities	4.3 Master Plan Schedule

Section 4 Implementation Plan

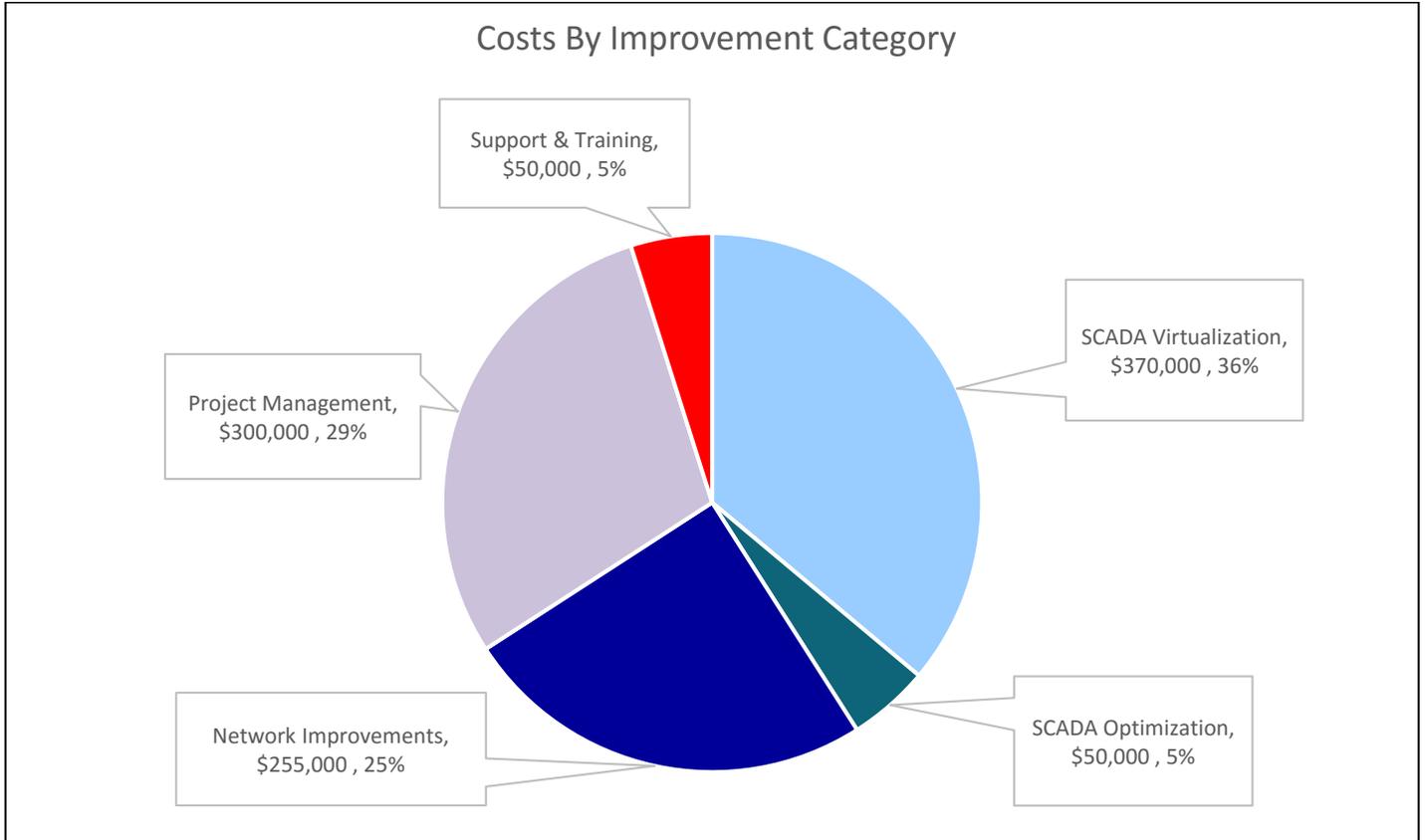
Cost Analysis

Due to the nature of the work, the 10 recommended projects will be managed by IT staff. The total 5-year program has a budgetary cost of \$1,025,000. These costs are in addition to the budgets for the current IS R&R program.

The cost breakdown by year is as follows:

Improvement Category	Project Name	Duration (months)	Total Contract Cost Over 5 yrs.	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
SCADA Virtualization	Control Building Improvements	6	\$20,000	\$20,000				
	Disaster Recovery	6	\$100,000		\$100,000			
	HMI Upgrades per Standards	24	\$250,000				\$125,000	\$125,000
SCADA Optimization	Alarm Notification Plan	6	\$25,000	\$25,000				
	Predictive Maintenance Analytics Pilot Deployment	6	\$25,000		\$25,000			
Network Improvements	Admin, Control, and Dewatering Building, & 10 Gb Infrastructure Upgrades for Disaster Recovery	6	\$100,000		\$100,000			
	Plant Network Improvement Study	12	\$65,000		\$65,000			
	Remote Access/Mobile Computing	12	\$90,000		\$90,000			
Support & Training	Standards Maintenance	60	\$0	\$0	\$0	\$0	\$0	\$0
	Support Level/Skills Development	6	\$50,000		\$25,000	\$25,000		
Project Management	Project Management	24	\$300,000		\$150,000	\$150,000		
Rounded Totals (no Escalation)			\$1,025,000	\$45,000	\$555,000	\$175,000	\$125,000	\$125,000

Costs for each improvement category and the distribution is as follows:



In order of decreasing cost, the key benefits from completing these improvements are:

Improvement Category	Key Benefit
Project Management	Efficient execution of both the IT and SCADA Master Plans
Network Improvements	Replace obsolete systems & improve resiliency to prepare for the future
SCADA Virtualization	Improve up-time and add the ability to mitigate the impact of disasters on critical SCADA hardware and systems.
SCADA Optimization	Improve effectiveness of WWTP staff and SCADA support contractors
Support & Training	Provide 3-deep support via a combination of additional training of USD staff and partnerships with contractors

The above cost projections are not complete because they do not include the support effort needed from USD staff. Activities include overseeing and providing guidance for all the projects and implementing significant portions of several projects. The total estimated labor hours to provide these services is substantial, approximately 4,400 labor hours over 5 years. The breakdown is estimated to be as follows:

Options for addressing these labor requirements are explored in the **Section 4** Implementation Plan. Contracting outside project

Improvement Category	Project Name	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				SCADA Master Plan Totals							
		IT	CIP	FMC	TPO	IT	CIP	FMC	TPO																				
SCADA Virtualization	Control Building Improvements	700			20																					700	-	-	20
	Disaster Recovery					400			40																	400	-	-	40
	HMI Upgrades per Standards												200	50	100	200	200	50	100	200	400	100	200	400	400	100	200	400	
SCADA Optimization	Alarm Notification Plan	20	20	40	40																					20	20	40	40
	Predictive Maintenance Analytics Pilot Deployment					20	20	20	20																		20	20	20
Network Improvements	Admin, Control, and Dewatering Building, & 10 Gb Infrastructure Upgrades for Disaster Recovery					40	20		20																	40	20	-	20
	Plant Network Improvement Study					40	20	20	20																	40	20	20	20
	Remote Access/Mobile Computing					250			50																	250	-	-	50
Support & Training	Standards Maintenance	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	100	100	100	100
	Support Level/Skills Development					120		120	60	120		120	60													240	-	240	120
Project Management	Project Management					175	25	25	25	125	25	25	25													300	50	50	50
Total Labor Hours		740	40	60	80	1,065	105	205	255	265	45	165	105	220	70	120	220	220	70	120	220	2,510	330	670	880				

Total Hours over 5 years 4,390

management was selected by the Executive Team to address the labor gap.

Finally, costs to implement technology-related improvements do not necessarily increase with time. Fiber-optic systems, for example, are much less expensive today than they were a decade ago. As part of USD’s annual review of IT and SCADA improvement projects, we recommend evaluating yearly whether newer, less expensive, or more capable technologies are available and should be considered.

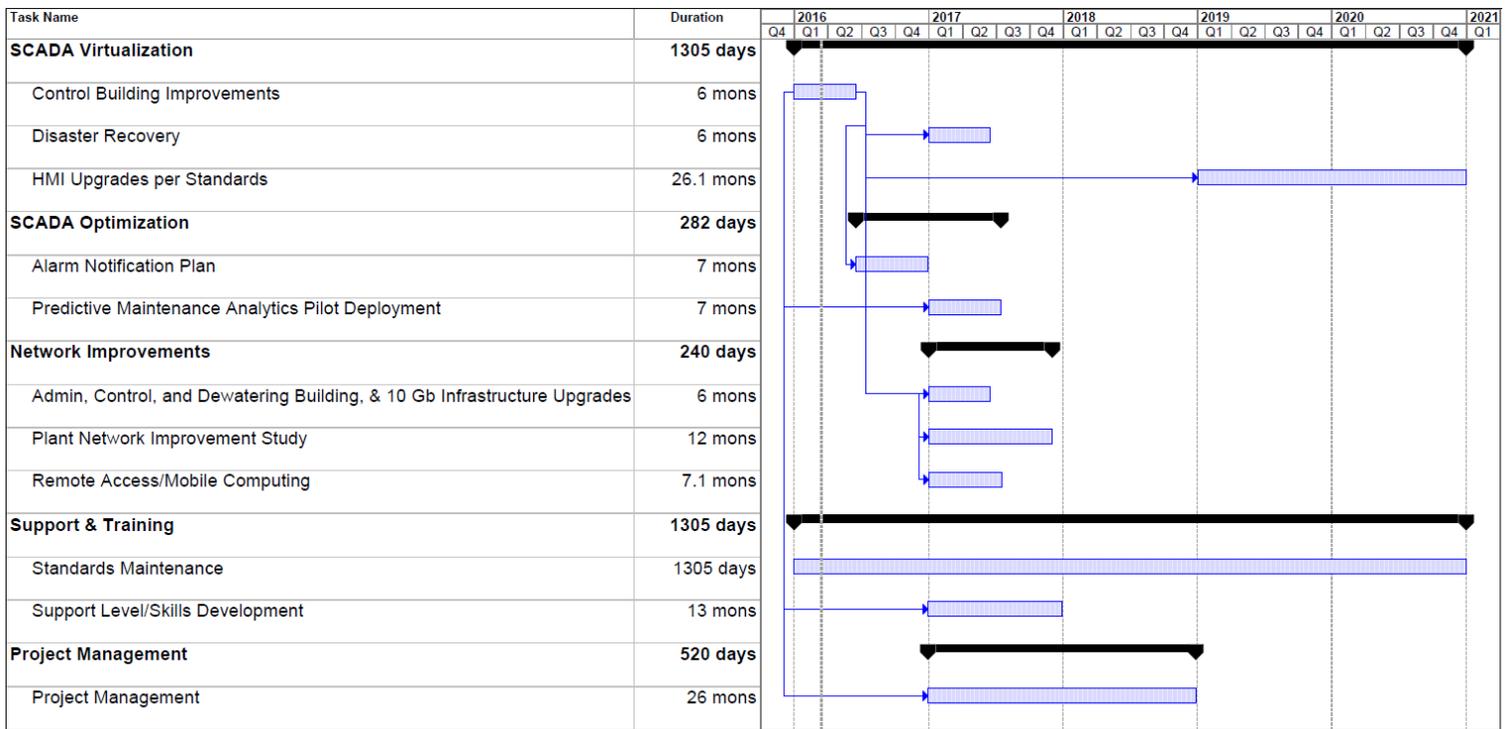
Schedule

The SCADA Master Plan schedule below is in GANTT chart form. While the above budget indicates annual expenditures, the GANTT chart adds dependencies (i.e. identification of which projects need to be completed before subsequent activities can commence).

Note: The SCADA Master Plan projects are a subset of all the IT Master Plan projects and need to be assessed as a whole for prioritization.

For example, the first project (SCADA Virtualization: Control Building Improvements) provides the infrastructure for 4 subsequent projects:

- SCADA Virtualization: Disaster Recovery
- SCADA Optimization: Alarm Notification Plan
- Network Improvements: Admin, Control, and Dewatering Building, & 10 Gb Infrastructure Upgrades for Disaster Recovery
- Network Improvements: Remote Access/Mobile Computing



Program Road Map

SCADA Capital Improvement Program Roadmap

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
SCADA Virtualization	Control Building Improvements Budget: \$20,000 IT: 700 hrs CIP: 0 FMC: 0 TPO: 20	Disaster Recovery Budget: \$100,000 IT: 400 hrs CIP: 0 FMC: 0 TPO: 40		HMI Upgrades per Standards Budget: \$250,000 IT: 400 hrs CIP: 100 FMC: 200 TPO: 400	
SCADA Optimization	Alarm Notification Plan Budget: \$25,000 IT: 20 hrs CIP: 20 FMC: 40 TPO: 40	Predictive Maintenance Analytics Pilot Deployment Budget: \$25,000 IT: 20 hrs CIP: 20 FMC: 20 TPO: 20			
Network Improvements		Admin., Control, & Dewatering Building & 10 Gb Infrastructure Upgrades for Disaster Recovery Budget: \$100,000 IT: 40 hrs CIP: 20 FMC: 0 TPO: 20			
		Plant Network Improvement Study Budget: \$65,000 IT: 40 hrs CIP: 20 FMC: 20 TPO: 20			
		Remote Access/Mobile Computing Budget: \$90,000 IT: 250 hrs CIP: 0 FMC: 0 TPO: 50			
Support & Training	Standards Maintenance Budget: \$0 IT: 20 hrs/year CIP: 20 hrs/year FMC: 20 hrs/year TPO: 20 hrs/year				
		Support Level/Skills Development Budget: \$50,000 IT: 240 hrs CIP: 0 FMC: 240 TPO: 120			
Project Management		Project Management Budget: \$300,000 IT: 350 hrs CIP: 50 FMC: 50 TPO: 50			

Conclusion

The 5-year budgetary cost of the proposed upgrade program is substantial - about \$1M. Internal labor costs, or support consultants, are likely to push the total closer to \$1.7M. Many systems, however, are currently operating well past their expected lifetime and the risks of catastrophic failures or cyber security issues are increasing.

Technological developments in just the last 10 years have dramatically improved how we access information. Mobile computing with smartphones and tablets have revolutionized how we access information and communicate. Replacing existing obsolete SCADA and related systems will make USD staff more efficient and effective. For example, the recommendation to enable mobile computing along with similar related projects, will empower staff to perform their job duties quicker, with better information, and from any location.

The recommended projects in this SCADA Master Plan will remove many of the present technological barriers affecting staff productivity, replace obsolete hardware and software, begin the process of implementing industry-standard best practices, and optimize operations.

In summary, this SCADA Master Plan recommends the following:

- Implement the 10 SCADA-related improvement projects,
- Implement the Non-Project-Related Recommendations,
- Implement projects pursuant to the Program Road Map, and
- Review the budget and scope for each project yearly. As typical for technology-related improvements, opportunities are likely to exist for achieving planned objectives at lower cost or with more benefits for the same investment.

Section 2: Reconnaissance & Needs Assessment

2.1 Introduction

Reconnaissance activities included review of a substantial amount of electronic documentation about the District’s SCADA system; field observations at the treatment plant and the Alvarado Pump Station; and workshops on the 9th, 11th, and 17th of December 2014. The purposes of these activities were to (1) gather information regarding the current supervisory control and data acquisition (SCADA) system environment and (2) identify needs which might be met with future capital improvement projects developed under this Master Plan. The Union Sanitary District (USD) staff and consultants participating in these activities were:

Table 1: Attendees, Workshops 1 and 2

Name	Organization	Name	Organization
Raymond Chau	USD	Mike Erwin	TJC & Associates
Dave Drake	USD	Paul Giorsetto	TJC & Associates
Mike Gill	USD	Ron Moeller	Kennedy/Jenks
Tim Grillo	USD	Steve Pallad	Consultant
Todd Jacob	USD	Nick Peros	Nicholas Peros, P.E.
David Leath	USD	Richard Pressler	AllConnected
Dave Livingston	USD	Paul Rahilly	Mtelligence Corp.
Armando Lopez	USD		
Trieu Nguyen	USD		
Wilson Wong	USD		
Rufus Tai	USD		

Workshop topics were as follows. Detailed notes from the workshops are in Appendix A.

Workshop 1:

- District Expectations for the SCADA Master Plan & SCADA Standards
- Current State of SCADA and support systems at the Plant & Pump Stations
- Infrastructure: Servers, Workstations, Network, Communications, Wireless
- Existing Virtualization & Disaster Recovery, Remote Access, Security, Mobile Computing

Workshop 2:

- Management & Retention of Knowledge Assets; Process Optimization
- SCADA to CMMS, Mtell Previs
- SCADA Reporting & Lab; Operator Data Entry
- Technology & Governance, Service Level Agreement
- SOPs & Job Competency
- O&M metrics, Alarms
- Project Metrics (Weighting Factors)

The remaining portions of this Chapter summarize our observations and discussions during the above activities.

2.2 Needs Assessment

2.2.1 USD Expectations from this Project

In a brainstorming session, USD staff identified their expectations for the SCADA Master Plan and the SCADA Standards Tasks. Their ideas are summarized in the **Table 2** which serves as guidance to the consulting team throughout the master planning and standards development tasks.

Table 2: USD Expectations for the SCADA Master Plan and Standards

Individual Contributor	USD Expectations for:	
	SCADA Master Plan	SCADA Standards
Raymond Chau Capital Improvements Projects Team Coach	<ul style="list-style-type: none"> ➤ Identification of future projects 	<ul style="list-style-type: none"> ➤ Project Consistency ➤ Guidance for applying standards to future projects. ➤ Topics should cover both hardware & software
David Leath Electrical/Support Team Coach	<ul style="list-style-type: none"> ➤ Guidance on better utilizing in-house expertise ➤ Guidance on cross-training staff ➤ Recommendations for innovations and new technology ➤ Remote SCADA access in the field 	<ul style="list-style-type: none"> ➤ Documentation so that integrators understand what's expected. ➤ Guidance for in-house staff for software application development and hardware procurement ➤ Guidance on how USD teams can work together more efficiently (e.g. IT and FMC)
Armando Lopez Total Productive Operations Coach	<ul style="list-style-type: none"> ➤ Learn how to use SCADA to its full capability 	

USD Expectations for:		
Individual Contributor	SCADA Master Plan	SCADA Standards
David Livingston Treatment and Disposal Services Manager	<ul style="list-style-type: none"> ➤ Long range vision of SCADA improvements. ➤ Guidance for keeping equipment up to date 	<ul style="list-style-type: none"> ➤ Common look and feel throughout the SCADA system even if different PLCs are used ➤ Documentation so that future work will maintain consistency
Wilson Wong Electrician	<ul style="list-style-type: none"> ➤ Clarification as to how much PLC software development will be done in house 	<ul style="list-style-type: none"> ➤ To be more efficient in his role as electrician and in PLC programming
Trieu Nguyen Senior Information Technology Analyst		<ul style="list-style-type: none"> ➤ To have more consistent & documented IT processes ➤ To use best practices in managing SCADA view nodes
Mike Gill Senior Network Administrator	<ul style="list-style-type: none"> ➤ SCADA running on modern hardware and software, virtualized under VMWare Hypervisor ➤ Virtual network boundaries formed by a product like vShield to interrogate east-west traffic. ➤ More streamlined IT systems supporting SCADA (less complexity) ➤ For remote communications, need to reduce the number of different types of media used for access 	<ul style="list-style-type: none"> ➤ Introduction of change control processes to allow for IT to validate the resiliency of any proposed solution that would affect SCADA infrastructure. (aka, new Ethernet PLC's that cannot tolerate an outage of any kind)

USD Expectations for:		
Individual Contributor	SCADA Master Plan	SCADA Standards
Todd Jacob Information Technology Administrator (Project Manager)	<ul style="list-style-type: none"> ➤ Per RFP: "provide a roadmap for our SCADA system evolution over the next 5-7 years" ➤ Increase SCADA resilience so that a physical outage does not result in an iFIX outage. 	<ul style="list-style-type: none"> ➤ Per RFP: "develop a comprehensive set of standards in a way that guides the uniform design, implementation, and management of the District's SCADA system; to optimize its operational value; to enhance its maintainability, and to lower its delivery cost and risk."

2.2.2 Overlap with Current USD Improvement Programs

Some potential SCADA Master Plan projects overlap planned improvements in the current IT Master Plan Program. To avoid duplication, these projects will not be included in the recommendations contained in Chapter 3 of this Master Plan. These improvements are:

1. PLC change-out to Allen Bradley type, USD's standard type. Projects which will complete this transition are as follows:
 - a. Thickener Project
 - b. Cogeneration Project
 - c. MCC and PLC Replacement Project – Phase 3. (This project is currently in design, scheduled to go to construction summer of 2015, and to be complete by winter of 2015/16. Complete conversion of all PLCs is expected to be complete in about two years.)
 - d. Standby Power System Upgrade. (This project will include replacement of PLCs 22 through 25.)
2. Improved bandwidth and communication reliability via either new Microwave Projects or improved fiber communication links provided by AT&T.
 - a. The Microwave Projects would implement primary communications to remote sites via licensed microwave links and backup via AT&T frame relay. The first element of this strategy is the design and installation of the microwave tower and repeater at the District's Stevenson site. Subsequent projects would install microwave radios at the remote sites to create a high speed microwave network as the primary communication means. At the conclusion of these projects, cellular communications to the remote sites will be removed. This project is presently in design but will likely not be constructed in favor of the fiber cable option described below.
 - b. The improved AT&T fiber links scheme includes new AT&T fiber provided to each remote site and the WWTP. The dedicated fiber connections will provide improved bandwidth and reliability using the third party AT&T infrastructure. The existing AT&T frame relay system would remain at selected remote sites until final completion of the AT&T fiber buildout. The AT&T cellular communications would remain as the backup

communication scheme at all remote sites. Presently the District is finalizing negotiations with AT&T to implement this communication option.

2.2.3 Treatment Plant Needs

Improvements to the District's SCADA system must be developed to maintain existing controls and historical data system while enhancing data acquisition capabilities to support future advanced applications. That is, any improvements to the SCADA system must be both backwards and forward compatible to ensure legacy systems/controls remain functional while also supporting potential upgrades going forward. As shown on the District's overall network topology (Appendices B1 – B4), the SCADA system is the primary source of most operational data used by other platforms. This fundamental role of the SCADA system is expected to continue so that any projects identified under this Master Plan must be compatible with the available process control data.

2.2.4 Pump Station Needs

Improvements to the District's SCADA system must be developed to maintain existing control and historical data system while enhancing data acquisition capabilities to support future advanced applications. That is, any improvements to the SCADA system must be both backwards and forward compatible to ensure legacy systems/controls remain functional while also supporting potential upgrades going forward. As shown on the District's overall network topology maps (Appendix B4), the SCADA system is the primary source of most operational data used by other platforms. This fundamental role of the SCADA system is expected to continue so that any projects identified under this Master Plan must be compatible with the available process control data.

In addition, the communication system to the pump stations must be improved and made more robust by reliable, secure, and faster network connections. It is expected that any projects specifically identified in this SCADA master plan for the pump stations will be compatible and complemented by the District's present communications project improvements. Compatibility is assumed to include the new AT&T fiber infrastructure for improved bandwidth and reliability.

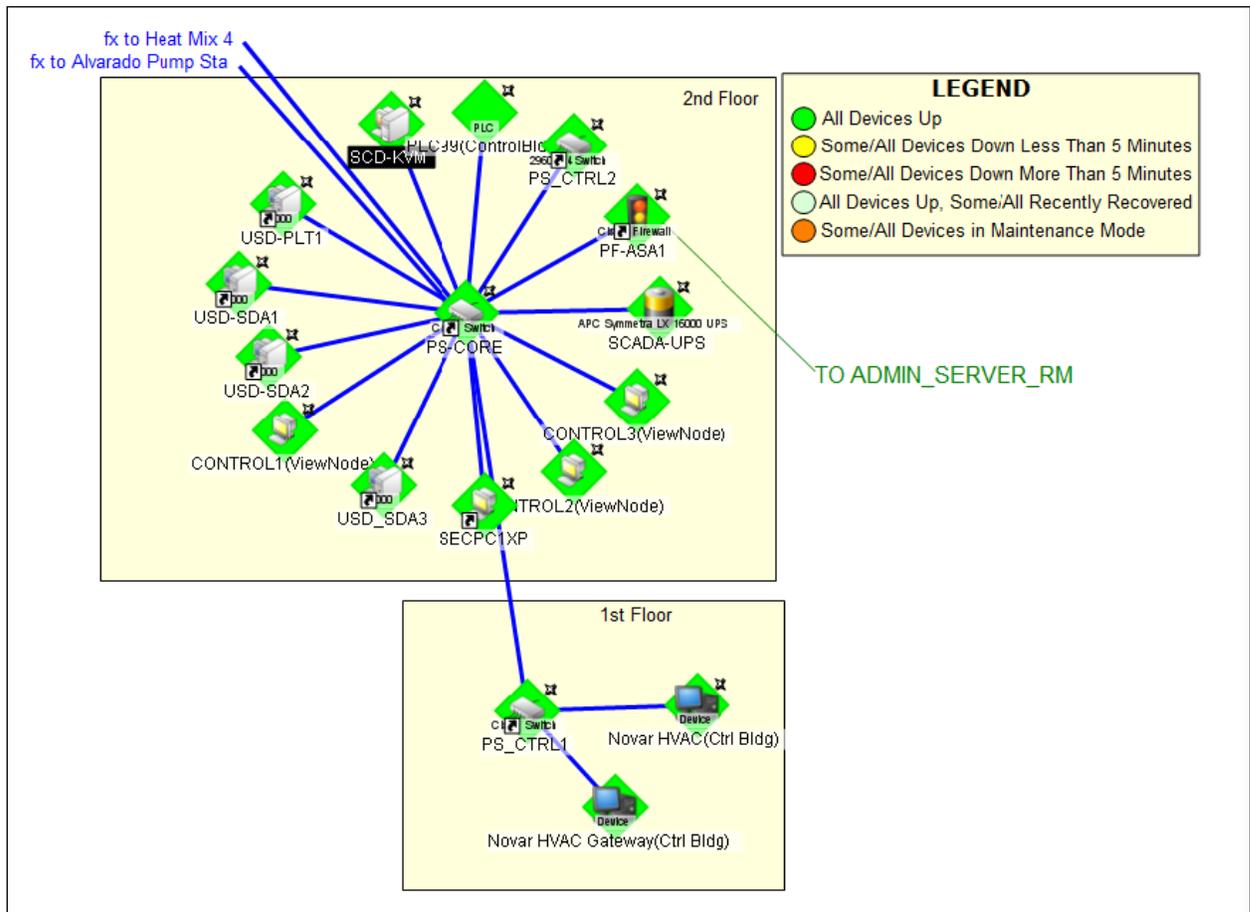
2.3 Review Existing SCADA System and Processes

2.3.1 SCADA System and Architecture

2.3.1.1 Existing SCADA Computer Architecture

Key components of the existing SCADA system are located in three buildings at the WWTP: Control Building, Administration Building, and Centrifuge Building. Network maps for each of these locations are shown in **Figures 1, 3, and 5**.

Figure 1: Control Building Network



The second floor Server Room in the Control Building has four [REDACTED] rack mount computers [REDACTED] as follows:

- USD-PLT1: Proficy Historian, Proficy Portal, Terminal Services for iFix TS clients, & Active Directory Controller
- USD-SCA1 iFix Server
- USD-SCA2 iFix Server (Backup)
- USD-SCA3 iFix Development Environment

The Server Room has keypad-enforced restricted access. Servers are installed on 2-post racks which appear to have lateral support.

The operator workstations in this building are three [REDACTED] computers operating as iFix HMI view nodes: Control1, Control2, and Control3. Among other workstations is SECPC for viewing security camera video. Additional [REDACTED] view nodes are distributed throughout the WWTP.

Figure 2: Control Building Server Room Photograph

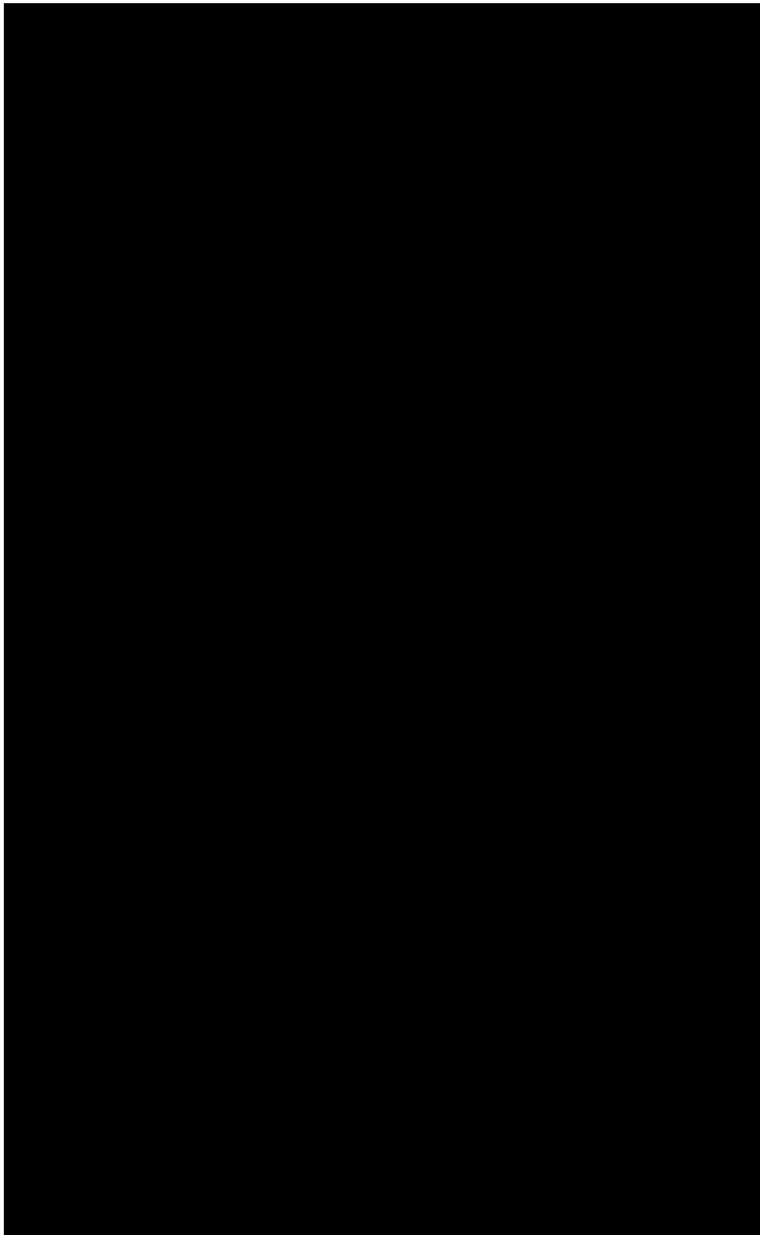


Figure 3: Administration Building Network



As shown in **Figure 3**, the Administration Building houses 5 VMware ESX hosts, 28 virtual machines, tape-based backup (including that for the SCADA system), and other systems. The video security system server USD-CCTV and storage are also located in this building but does not appear in the figure.

The Admin Server Room has keypad-enforced restricted access. As shown in **Figure 4**, four-post racks are used for the servers but it appears that there is no lateral support at the top for the racks.

Figure 4: Admin Server Room Photograph

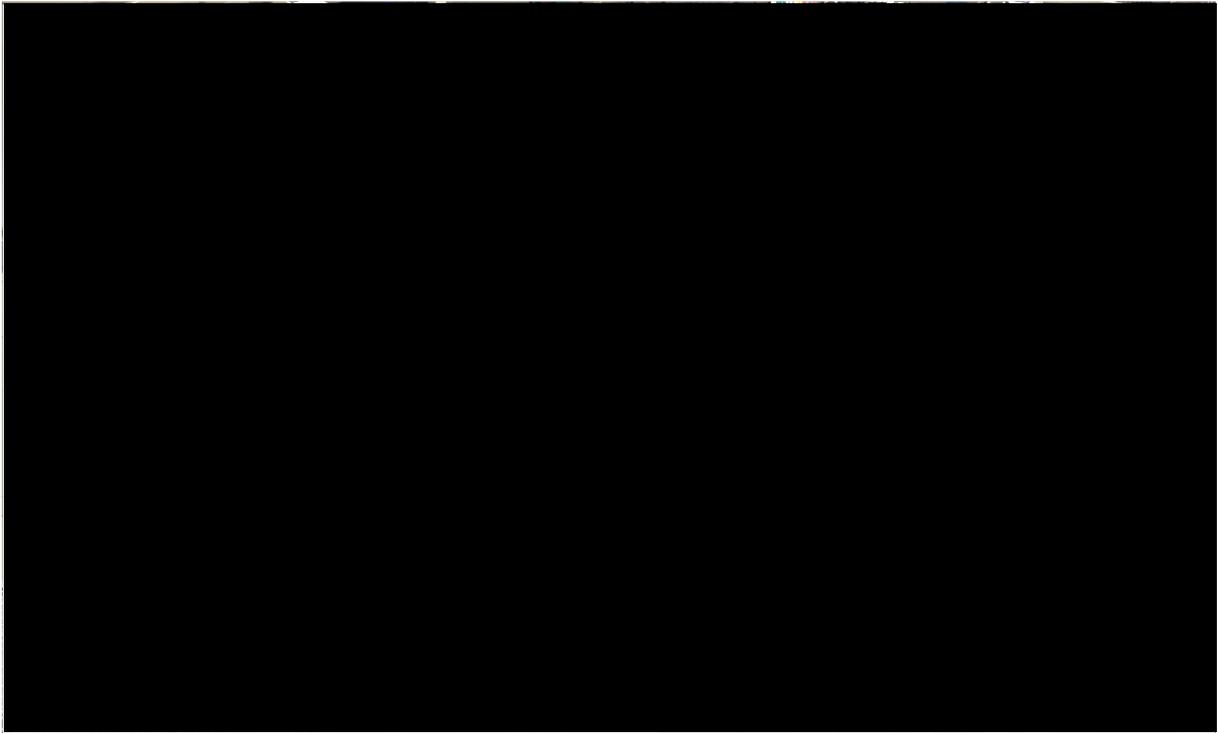
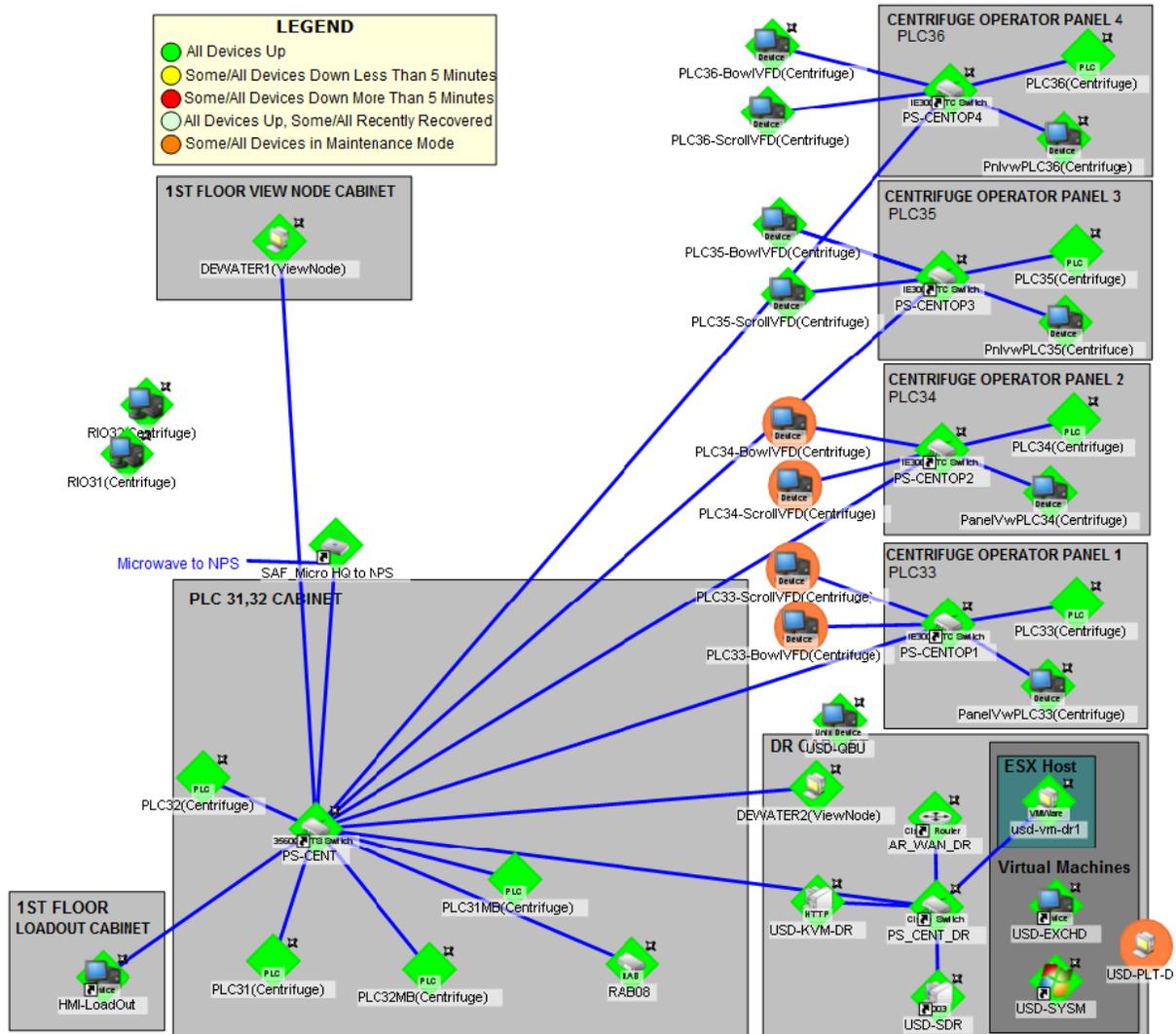


Figure 5: Centrifuge Building Network



A locked cabinet in the top floor of the Centrifuge Building houses USD’s disaster recovery (DR) provisions including a VMware ESX host USD-VM-DR1. Virtual machines running at this location include USD-SDR, the USDPLANT backup Domain Controller, and the backup Proficy Historian. As shown in **Figure 6**, it appears that there is no lateral support at the top for the cabinet.

Figure 6: Centrifuge Building DR Cabinet Photograph



2.3.1.2 Technology & Governance

Technology

With a few exceptions, the District has a reasonably well-defined deployment strategy for SCADA system hardware and software technologies. In some cases, some details remain to be established. It is expected that the SCADA Standards Task will further define and establish technology strategies over the planning horizon of this Master Plan. The following summarize key elements of the District's present technologies:

- Replacement of legacy ██████████ PLCs estimated to be complete over next year or two.
- Rockwell PLCs approved for sole sourcing by District Board: While Rockwell Automation based PLCs have been formally adopted, specific application of PLC make and model has not been specifically defined. ControlLogix and Compact Logix have been (informally) designated as the platforms of choice for complex installation (assumed within the WWTP) and less demanding applications (assumed at remote pump stations) respectively. Establishing an application criteria for use of these controller families is an important aspect of the standards process.
- Field Instrumentation: While generally open sourced, there is an identified need for incorporating enhanced data acquisition features from instruments, actuators and motor controls that include embedded “smart” capabilities.
- Rotork valve actuators approved for sole sourcing by District Board. Standardization of actuator network interface, data mapping, and common maintenance applications should improve the ability to integrate intelligent actuators into the District’s standard operating procedures.
- HMI shall remain based on iFIX (GE) platform; Historian shall remain based on Proficy (GE) platform.
- Presently, instrumentation replacement is based on a “run-to-failure” maintenance strategy. Better diagnostics could be useful to form a better preventive maintenance approach.

During the reconnaissance workshops, the following technology considerations were discussed for further consideration during the standards development phase of the project:

- Review use of intelligent field level equipment to improve process level reporting. Use of Rockwell AI cards with integral HART protocol could be a relatively simple and cost effective method for leveraging existing District HART instrumentation maintenance and diagnostic features.
- Review wireless networking: WWTP features several different technologies and protocols. Develop strategy to consolidate and limit number of systems; establish criteria for wireless applications (wireless Remote I/O, backup SCADA networks, Bluetooth).
- Develop strategies for wireless operator tools based on smart phones and tablets.
- Formalize requirements for SCADA network reliability and SCADA server redundancy.
- Extend SCADA historical data to power distribution and power monitoring. Review potential use of newer technologies to control arc flash levels. Upgrades to power monitoring to replace proprietary IMPACC/IQData has merit. Power use is a very important criterion for assessing the efficiency of plant operations. Any process improvement would need accurate and reliable power monitoring for making historical comparisons.

Governance

Governance is defined as the mechanisms, processes and relations by which organizations are controlled and directed. Governance structures identify the rights and responsibilities among stakeholders and includes the rules and procedures for making decisions. Governance mechanisms include monitoring actions, policies and decisions and are affected by aligning the interests of stakeholders.

Present District governance associated with SCADA is limited to Operator activities. Going forward, staff expectations are that SCADA governance will be established by standards development and enforcement on future projects.

2.3.1.3 Network Design Including the Primary and Backup Architecture, Subnets, and Routing

From our discussions during Workshop #1, the following areas have been determined as needing attention:

- Physical Topology: The current switching topology for the Alvarado Plant is a logical loop [REDACTED] Migration to a star topology seems desirable but would require physical fiber plant changes in order to implement.
- VLAN Architecture: The VLANs that were reviewed are in **Table 3**:

Table 3: USD VLANs



- The purpose of each of the plant VLANs is clear. VLAN [REDACTED] is in use throughout the Alvarado infrastructure, but the use of virtual routing and forwarding (VRF) isolate the routes and traffic on that VLAN, at least in the case of ps-ctrl-core switch.

- Subnet architecture and network boundaries: Subnets are in place to isolate broadcast domains and form security boundaries. Network boundaries for the SCADA infrastructure exist at the ps-ctrl-core switch and the pf-asa firewall in the Alvarado plant and at the PR-XXX routers for the lift and pump stations. These critical devices are single units, however, without high availability for the default route out of each VLAN. [REDACTED]

[REDACTED]

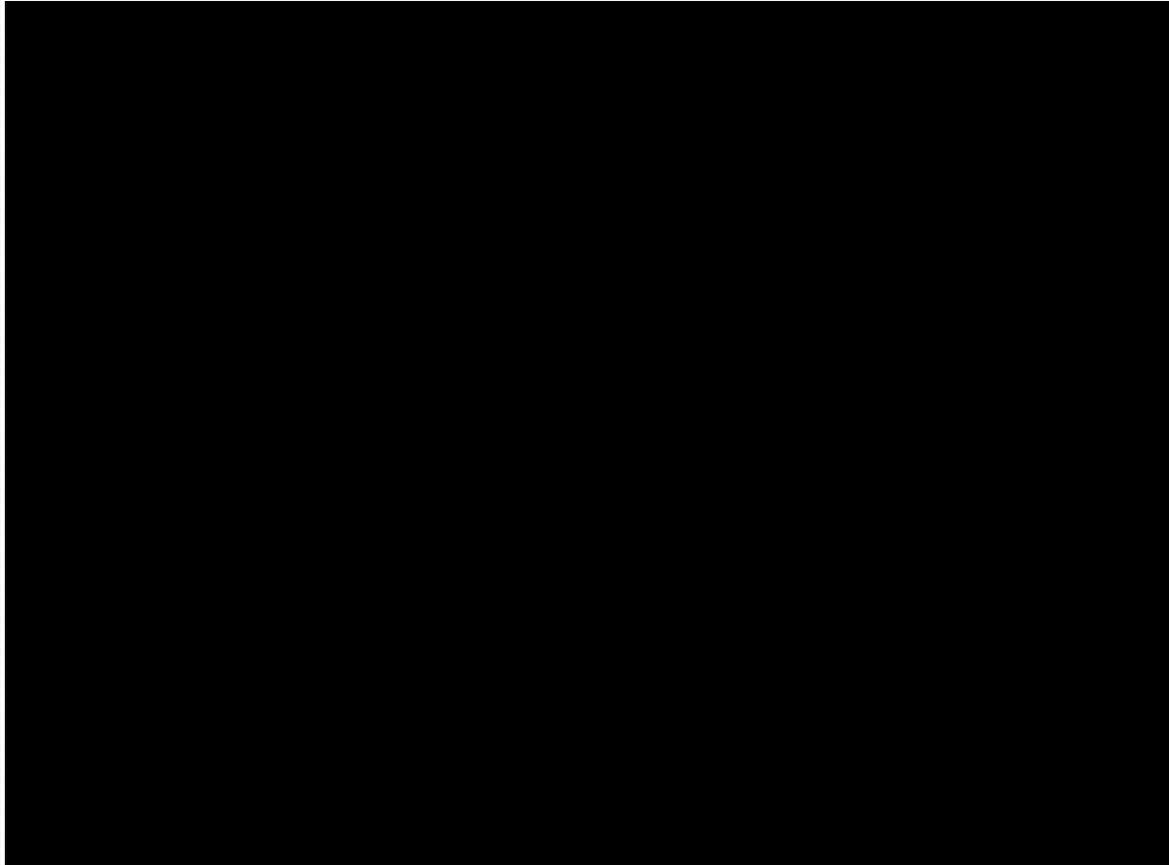
- Physical Device security and maintenance: All SCADA network device configurations that were provided restricted transport input for network management to secure shell (SSH), which is recommended. [REDACTED]

[REDACTED]

2.3.1.4 Remote Access Solution

Figure 7 depicts at a high level our understanding of the current remote access topology:

Figure 7: Current Remote Access Topology



[Redacted text block consisting of approximately 10 horizontal black bars of varying lengths.]

2.3.2 Operations

2.3.2.1 SCADA Standard Operating Procedures

Present Standard Operating Procedures (SOPs) are associated only with operations. Expectations are that this focus on operations will continue to be the case for the foreseeable future. It is not anticipated that the District will establish hard and fast SOPs for SCADA programming and development.

In lieu of SOPs, it will be critical to develop and document SCADA standards and establish project delivery methods that ensure the standards are met and applied consistently. While there may be different project delivery strategies between purely SCADA-centric projects (those that are primarily focused on SCADA improvements) and traditional capital projects (those that are focused on process or other infrastructure improvements), the application of the standards must still be consistent. Consistent standards are envisioned to serve in place of rigid SOPs to allow some flexibility with programming, configuration, and hardware integration while still achieving common equipment layouts, PLC logic development, HMI look-and feel, and documentation.

2.3.2.2 Operations & Maintenance Metrics

O&M metrics are available from existing spreadsheets such as the Plant Scorecard shown in **Table 4**. However simplifying data input, simplifying the format of the information, and maintaining data are pressing needs.

The result must be a simplified summary of operations suitable for presentation to Board. Board members are knowledgeable but not necessarily familiar with control system or information technology terminology; so, a clear presentation of understandable and “common sense” plant operation metrics is a fundamental requirement of the SCADA and reporting systems.

Table 4: Plant Scorecard

	Objectives	Measures	1st Quarter	Fiscal Year-to-Date	Target	Comments/ Progress Towards Target	Fiscal Year 2014	Responsible Team Members	Reporting Frequency
Customer	Operate & maintain the plant in compliance 24/365.	Number of adverse impacts (odor complaints, violations, spills, etc.)	0 Quarter Total	0 Total	0		6 Total		Quarterly
Financial	Optimize operating costs: Minimize energy, chemical, and water use.	Energy Usage:							
		Average/Day Kwh/MG - Alvarado Site	2,180 Ave per Month	2,180 Ave per Month	< 2,100		2,248 Ave per Month		Monthly
		Cogeneration - kwh/day	7,686 Ave per Day	7,686 Ave per Day	8,500		9,404 Ave per Day		
		Cogeneration - kwh/year	707,747 Quarter Total	707,747 Total	3,300,000		3,433,672 Total		
		Solar Production - kwh/day	706 Ave per Day	706 Ave per Day	Track & Report		592 Ave per Day		
		Solar Production - kwh/year	65,125 Quarter Total	78,101 Total			216,580 Total		
		Chemical Usage:							
		Ferrous Chloride							
		H2S Control - gal/hour	32 Ave GPH	32 Ave GPH	≤ 35		32 Ave GPH		
		H2S Control - gal/year	70,656 Quarter Total	70,656 FY Total	≤ 300,000		280,320 FY Total		
Hydrogen Peroxide									
H2S Control - gal/hour	9.5 Ave GPH	9.5 Ave GPH	≤ 8.5		8.4 Ave GPH				
H2S Control - gal/year	21,055 Quarter Total	21,055 FY Total	≤ 76,000		73,944 FY Total				
Hypochlorite									
Disinfection - gal/hour	30.2 Ave GPH	30.2 Ave GPH	≤ 43		32.2 Ave GPH				
Disinfection - gal/year	66,766 Quarter Total	66,766 FY Total	≤ 375,000		283,111 FY Total				
Polymer									
GBT - lbs/dry ton	3.7 Ave lbs/dry ton	3.7 Ave lbs/dry ton	≤ 5.5		4.9 Ave lbs/dry ton				
Dewatering - lbs/dry ton	33.3 Ave lbs/dry ton	33.3 Ave lbs/dry ton	≤ 33		34.1 Ave lbs/dry ton				
Water Usage:									
Gallons Used Per Day	24,918 Ave per Day	24,918 Ave per Day	≤ 30,000		29,952 Ave per Day				
Internal Processes	Environmental Protection - District-wide	Biosolids Class A Disposal Percent Disposed of as Class A Number of Wet Tons Disposed Class A	43% Ave per Month 2085 Quarter Total	43% Ave per Month 2085 FY Total	25% 4,800		19% Ave per Month 3809 FY Total		Monthly
	Maintain Plant processes within parameters.	Plant Operational Health Index Monthly Index Value Number of Days < 75% Maximum # of Consecutive Days < 75%	86% Ave 18 Days Total 3 Days	86% Ave 18 Days Total 3 Days	Ave ≥ 85 Track & Report ≤ 3		85% Ave 98 Days Total 2 Days		Monthly
	Complete preventative maintenance.	Percent preventative maintenance work orders completed within month scheduled (TPO)	99% Ave per Month	99% Ave per Month	≥ 95%		98% Ave per Month		Monthly
	Provide effective regulatory & laboratory services to support compliance.	Percent of Environmental Compliance Samples that Meet Turnaround Time (12 days)-R&S Lab Percent passed, State Proficiency Test (DHS-ELAP)	100% For Quarter N/A Areas Passed	100% Ave per Quarter N/A Areas Passed	≥ 95% ≥ 85%	Frequency of test is once per year.	100% Ave/Quarter 100% Areas Passed		Quarterly Annually
Employees	Enhance employee skills.	TPO							Quarterly
		No. of training modules updated	0	0 Total	8		7 Total		
		No. of training modules with competency assessment tools developed	0	0 Total	5		5 Total		

2.3.2.3 SCADA Alarm Notification System and Process

USD staff believes that the existing SCADA alarm notification system does not provide the means for timely and effective responses. Compared to other similar installations, USD’s alarm system provides the operator with much less information than average as to what the problem is and what the next steps are for resolution. Operators at USD typically receive an alarm, have to walk to an area of the plant with a SCADA terminal, and review the displays to determine next steps. Precious time is wasted getting to a terminal and seeking information before alarm response is possible. Note that in the best similar installations, operators get a clear identification of alarms and can begin immediately to take corrective action through mobile terminals.

It is desirable to do more with less. Toward this end, there is high interest in wireless technology for tablets or smart phones (1) for alarm notification everywhere in the plant and (2) to improve alarm messages to make response more effective. If implemented, plant-wide wireless technology could also provide local access to SCADA, CMMS, and other information systems.

Planning efforts should include a defined project to perform wireless network surveys including recommendations for locating base stations and repeaters that allow use of mobile devices (smart phones, tablets, or laptops) everywhere in the plant. Any such deployment must also include provisions for appropriate security. Alarm notification may also require a phased in process depending on the immediate and long term procedures to address this issue. Plant-wide coverage, while representing the ultimate goal, may be at the end of a long term process. The master planning effort should incorporate a project to address the alarm notification issue that incorporates the process to achieve the District's operational goal.

Similar study project should also be included to look at improving remote access/alarm response at all pump stations.

2.3.2.4 Disaster Recovery Plan and Procedures

Network Infrastructure:

- Network Infrastructure is currently protected [REDACTED]
[REDACTED]
[REDACTED] Recovery of a failed piece of network equipment would require the acquisition of replacement equipment and the restoration of the configuration; [REDACTED]
[REDACTED]

Server Infrastructure:

- Server Infrastructure is protected [REDACTED], The administrative infrastructure runs the backup system and there are rules in place to connect to key SCADA infrastructure servers for backups. The details of the backup jobs were not reviewed during the assessment, but a desire was expressed to take backups offsite and to build availability into the storage and server infrastructure that is located on premises.

2.3.2.5 Operations and Maintenance Manuals and References

Plant data currently resides on USD's network on the "I" drive. Current practice of managing information is probably not very intuitive for typical O&M staff. It also lacks the use of video for the WWTP; video is currently available only for Collections. Reconnaissance did not include confirming the extent to which O&M staff actually uses the "I" drive to get needed information. As shown in **Figure 8**, provisions to access existing electronic references does not appear to be centrally integrated among the Control Room SCADA workstations.

Figure 8: Control Room SCADA Workstations Photograph



Future functionality of O&M data is planned by the District to be via the Geographic Information System (GIS), yet most operators tend not to think in terms of geography but in terms of process units (i.e., primary, secondary, disinfection, etc.). USD may wish to determine if GIS is best suited for the intended purpose for use by plant O&M staff. Also, it is often preferred that O&M staff has a system that they will maintain themselves and take ownership of.

Examination of O&M SOPs is not within the scope of this Master Plan so we have no opinion of their adequacy to capture institutional knowledge, reduce risk, and save money. Future information management practices might also need to be extended to pump stations, since pump station performance can potentially affect treatment plant performance.

2.3.3 Maintenance

2.3.3.1 SCADA System Replacement Practices

SCADA system replacement practices are as follows (with some exceptions as necessitated by funding or staffing resources):

- SCADA servers and workstations – every 5 years
- Network switches, routers and firewalls – every 5 years
- Microwave radios – every 5 years
- Instrumentation – run to fail unless units become too expensive to maintain or if driven by technology
- Operating System patches – every 6 months
- HMI software updates – done on a case-by-case basis on evaluation of potential impacts to operations
- HMI – end of support for Allen Bradley devices, run to fail for all other devices
- PLCs – end of support or if justifiable by significant improvements in technology or PLC firmware updates. PLC upgrades could be a simple effort if limited to replacement of

obsolete processors within existing racks or more complex if full replacement of Rockwell modifies their PLC form factor (obsoleting their ControlLogix product line)

- Radio system – every 7 years



2.3.3.2 SCADA to CMMS Interface for Generating Work Orders Based on Runtime Data

Maintenance departments need efficient scheduling of inspections, service, and repairs based on actual equipment usage, but the run-time hour measurements are stored in the automation system. Additionally, process engineers may need to schedule work requests based on calculations from real-time equipment data values, but they have difficulty accessing the enterprise asset management (EAM) system. A good example of this is an oil change on your car, where you need to have it done every three months or 3000 miles; whichever comes first. The more you drive it, the sooner you will need to change the oil. However, if you do not drive it much, you should change the oil at least every three months.

Mtell software, presently in limited use at the WWTP acts as a gateway between SCADA/Automation systems (iFIX at the WWTP) and Enterprise Asset Management (EAM) systems, including Infor Hansen used by the District.

Mtell “PM Profiles” are generally used to provide scheduled work on assets based on their utilization or some calendar interval. The software uses a Preventive Maintenance (PM) panel to provide an interface for the EAM/CMMS to use preventative maintenance more effectively. The EAM/CMMS can map a real-time tag from a configured tag data source to data associated in an existing PM in EAM/CMMS System or define dedicated PM’s running within Mtelligence platform.

Mapping real-time data tag information in this way allows for automatic update of data to the District’s Hansen EAM/CMMS System. This approach prevents maintenance staff from having to spend time manually collecting meter readings from the plant floor devices. Automating this process also removes potential data-entry mistakes when manually entering the values. Mtell PM’s are processed and run by the software scheduling configured in the system settings. In USD’s case, cycles are presently configured to be uploaded daily.

SCADA-based asset run-time values are automatically queried from USD’s GE Proficy Historian on a tag-by-tag basis, each day. These daily update values are then uploaded to the usage indicator for each of the asset definitions in the Hansen software (see Appendix C1). The data mapping of Proficy tags to Hansen assets is managed internally in the Mtell software.

One known issue with USD’s Mtell deployment which needs to be addressed is the case where a Hansen asset is retired or “expired”. This situation presently causes errors on the automated uploading of runtime hour values for the expired asset. Solutions to investigate include (1) establishing a process (SOP) for adding and removing assets that will be maintained by runtime hours and (2) setting up email notification for assets that are expired with runtime hours greater than 0.

2.3.3.3 Mtell Software for Generating Predictive Alerts Based on Sensor Data

Mtell software performs pattern recognition of changes in field data from sensors on and around the equipment being monitored. The software is designed to detect early onset of degradation through differences across the data including changes in those signals offset by time. The software algorithms recognize operating and failure modes as patterns in the field data to recognize normal conditions, abnormal conditions, and indications of degradation and impending failures. The software predicts a time-to-failure and how the failure will likely occur. Knowing of an impending failure allows operations staff to mitigate the issue, prevent a breakdown, remediate the problem in the most efficient manner, or adjust operating procedures

Presently, the implementation of predictive alerts at the USD WWTP is in the prototype phase with only the centrifuges being monitored¹. Collaboration is needed with FMC to assess the prototype, reach agreement on the allocation of responsibilities, and define a process for further implementation.

If the consensus were to expand preventive maintenance implementation, a larger GE Proficy Historian license will be needed. The current tag license count is a limiting condition for preventive maintenance monitoring.

Recommendations for expanding predictive/preventive maintenance monitoring include:

- Evaluating the Influent pumps at the WWTP,
- Performing assessments at critical pump stations such as Irvington, Newark etc. to assess sensor retrofit options,
- Linking to the Jenbacher units at the WWTP cogeneration system. Work would include implementing additional generator engine “EMS” (engine monitoring system) data acquisition interfaces and additional historian storage of electrical tags to the GE Proficy Historian,
- Implementing smart VFD data acquisition network interfaces and historian storage of electrical tags to the GE Proficy Historian, and
- Implementing smart MCC data acquisition network interfaces and historian storage of electrical tags to the GE Proficy Historian.

Other considerations are:

- Consider potential benefits of upgrading to the next revision of the maintenance software

██

██

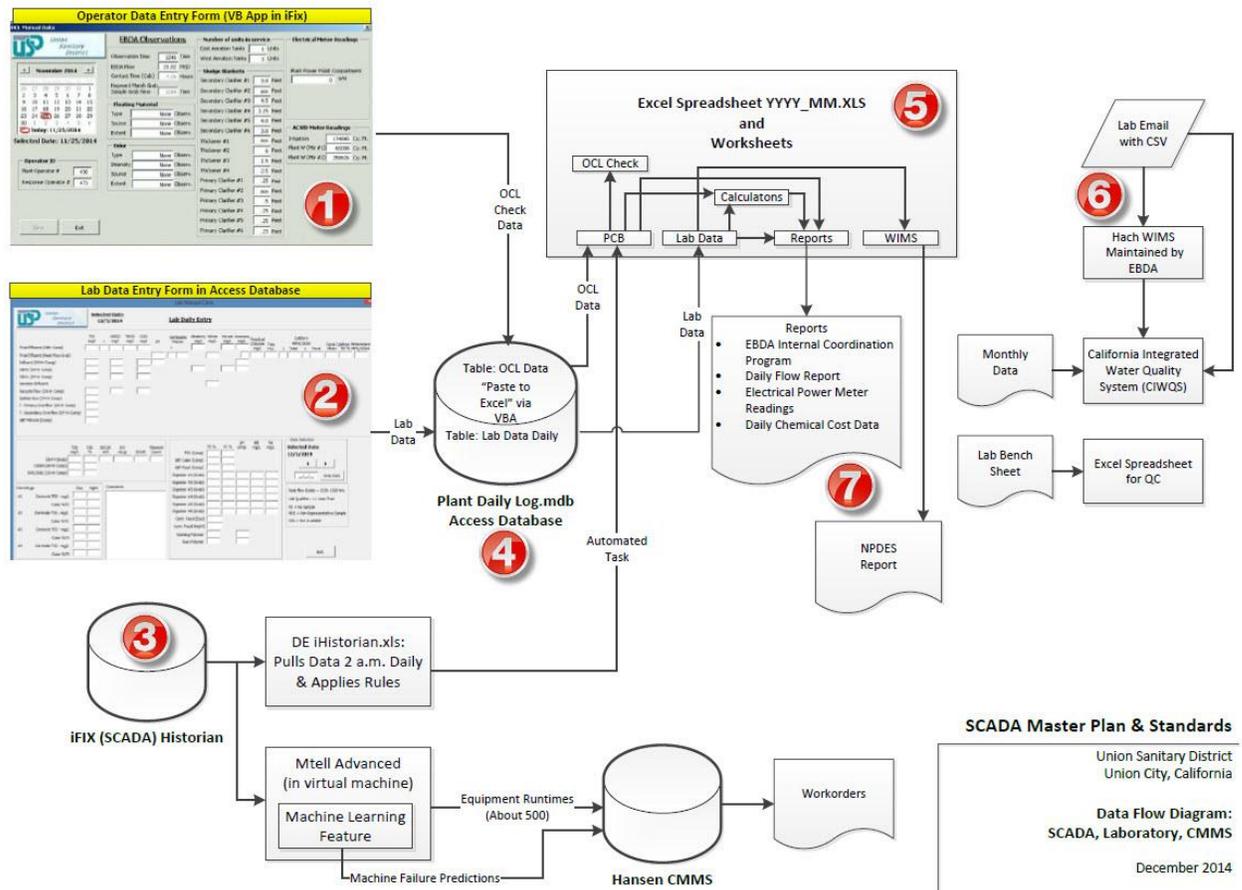
¹ Appendix C1 suggests Blower but it was not implemented)

2.3.4 Business and Compliance Reporting

Discussions during Workshop 2 reviewed the procedures used to produce monthly operations, management, laboratory, and regulatory reports. These procedures involve merging several sources of information, such as SCADA, operator manually-entered plant observations, and lab analytical results from various data sources into an Excel spreadsheet which produces the reports. The data sources include the iFix Proficy Historian database, an Access database, and analytical results emailed from external labs. The District would benefit from the efficiencies provided by updated procedures and systems which streamline data integration, simplify and extend querying and reporting, and enhance data security. To accomplish these objectives, the current procedures must first be clearly understood.

The following sections describe the existing information reporting processes and identify tasks that should be updated to improve the procedures. These sections refer to **Figure 9** below, which depicts the flow of information from various sources to the final reports and to other information systems.

Figure 9: Data Flow Diagram



This diagram shows seven points of data sources, integration, and reports as follows:

1. Operations data entered manually in the SCADA system via a Visual BASIC form;
2. Lab analysis data entered into a form stored in an Access database;
3. SCADA data from the iFIX Historian database;
4. An Access database file, 'Plant Daily Log.mdb' which stores the objects 1) Operations Data and 2) Lab Analysis Data.
5. An Excel spreadsheet, into which the Access data and SCADA data is loaded. Within the spreadsheet are worksheets which:
 - a. Store the imported data (PCB, Lab Data and OCL Check),
 - b. Produce analysis and calculations (Calculators), and
 - c. Produce tables and reports (Reports, WIMS).
6. Lab analysis data are received from external labs; and
7. Final operations, management and regulatory reports are produced.

As seen in the diagram, the various data sources are merged into an Excel spreadsheet which produces the reports. Each month, a spreadsheet is created for the reports. It uses the naming convention 'YYYY_MM.XLS', representing the year and month, such as '2014_11.XLS'. There

are several worksheets within the spreadsheet that store data, produce calculations, and format results into tables of reports for final printing.

This reporting system is made up of many different technologies, each with different development environments requiring different expertise to update. A database-driven solution, in contrast, uses a single development environment for the user interface, provides greater security for the data, an audit trail to identify adjustments made to automatically imported data, enhanced flexibility for changing and creating reports, and ad hoc querying of information extending for many months or even years.

The District noted that changes in regulatory reporting requirements occur from time to time. These change require additional data elements and format changes in the reports. A database solution isolates the data from the algorithms needed to calculate the reporting results. This safeguards the calculations, which in a spreadsheet may be broken easily such as when new columns of data are added incorrectly.

Additionally, a database solution allows for broader access as well as tighter security of information. Different segments of data may be displayed in reports and dashboards to show operations metrics to management and operations personnel, without delivering the entire set of data contained in a spreadsheet.

In 2015, the District will begin work on this database solution in a project named Operation Data Management System (ODMS). As one of the projects identified in USD's 2011 IT Master Plan, the ODMS will link to other database systems as shown in Appendix B5: "Integrated Solution Architecture – Future Target." ODMS will provide for advanced data query and retrieval, improved security, and broader distribution of information. It will also interface well to many reporting tools for producing flexible reports and graphic dashboards to display operations and management information.

One other important item to address is data gaps. It was reported that there are data in the iFix Proficiency Historian database that are not being utilized for plant operations and business reports. Also, there are data that are not presently but could be integrated into plant operations in real time to improve cost-effectiveness. Gaps in these two categories include flows, chemical usage, chemical costs, power use, and power costs by process area.

The following three sections discuss the three primary sources of data and how they are presently used to produce the monthly reports.

2.3.4.1 Data from the SCADA System

Item 3 in the Data Flow Diagram depicts SCADA data export from the iFix Proficiency Historian database. There is a daily process that exports data into an Excel spreadsheet called 'DE iHistorian.xls' and another process which exports runtime data via the Mtell Previs software to the Infor Hansen CMMS application.

The Excel data is imported into the monthly 'YYYY_MM' Excel spreadsheet (Figure 9, Item 5), in the 'PCB' worksheet, and is used to produce portions of the reports as explained in the previous section. It appears that ODMS may replace both Excel spreadsheets. The iFIX Proficiency Historian data either could be linked electronically or imported as copies into the ODMS database.

2.3.4.2 Operator Manual Data Entry

Items 1 and 2 in the Data Flow Diagram depict manually entered data for both plant operations and Lab results. The data is stored initially in an Access database (Figure 9, Item 4) and then subsequently imported into the monthly 'YYYY_MM' Excel spreadsheet (Figure 9, Item5), in the 'PCB' and 'Lab Data' worksheets.

ODMS will streamline the process. Rather than storing the data in an intermediate Access database then copying to Excel, data would be stored once, in a more robust database solution, such as Microsoft's SQL Server.

2.3.4.3 Lab Analysis Data

Items 2 and 6 in the Data Flow Diagram (Figure 9) show both internal and external sources of lab analysis data. These data are distributed among multiple "silos" of information, some of which are linked together and some of which are not. These data repositories include the Plant Log database (Access), the monthly Excel spreadsheets, emails with CSV data, Hach WIMS, the lab bench spreadsheet, and the California Integrated Water Quality System. A unified storage, retrieval, and data security platform will likely be a core component of ODMS.

2.3.5 Support

2.3.5.1 SCADA Service Level Agreements

District existing service level agreements are dated and require review and updates to reflect current policies. Note that some service level agreements may require direction or development of other documentation (e.g., standards) before they can be completed.

2.3.5.2 SCADA Job Competency Requirements and Answers

Presently job competency documents are limited to operation's use of SCADA. It does not appear there is sufficient interest in extending formal job competencies to SCADA technicians or electricians.

2.3.5.3 Use of Consultants

USD expects that critical resources will be "3-deep" i.e. there needs to be 3 choices for each resource. Applying this policy to system integrators one would expect USD to utilize at least 3 different companies for system integration which includes PLC programming and iFIX programming. At present, however, only a single firm has provided consistent results to USD's satisfaction: Automated Network Controls of Elk Grove, CA. Their programmer lives in Napa, CA, increasing costs and impacting responsiveness for on-site support.

Travel time costs from Napa and the speed of on-site response during emergencies has added some urgency to correcting this situation.

The SCADA Standards tasks for this project will document SCADA requirements in 6 technical areas, allowing USD the opportunity to expand the list of acceptable system integrators over time. Those technical areas are:

1. PLC Programming Standards
2. SCADA Programming Standards
3. Control Panels Standards
4. Instrumentation Standards
5. Networking Standards
6. SCADA Design Methodology Standard

Section 3: Recommendations

3.1 Introduction

The development of recommendations was an iterative process. Steps included brainstorming alternatives to address USD's needs, clarifying scopes, refining budgets, and selecting the best set of projects consistent with USD's plans over the next 5 years. The following is a distillation of that process.

3.2 Recommendations

3.2.1 Vision, Goals, and Objectives for the District's SCADA System

This Master Plan is a roadmap for the evolution of SCADA and related systems over the next 5 years. Workshops attended by key District stakeholders and consultant specialists clarified the vision, goals, and objectives for this plan as described in detail within this Section.

Vision:

USD's vision for its SCADA system can be summarized as follows²:

- *Provide a highly reliable means for monitoring and control of [wastewater collection, transport, and treatment].*
- *Provide accurate and timely information about system operations through intuitive local and remote interfaces.*
- *Support reductions in system operating and maintenance costs.*
- *Support integration of SCADA data in [...] information systems including ...LIMS, CMMS, [and the future ODMS and Asset Management].*
- *Accommodate system growth and expansion*
- *Develop ... proactive upgrade and management of SCADA systems to prevent obsolescence*
- *Provide Reliable and Updated System Documentation*
- *Implement Security for Systems that align with Department of Homeland Security Recommendations*

Goals:

The general guidelines for what this Master Plan is to achieve are as follows:

- Replace obsolete SCADA computers and software and institute a program of routine upgrades and replacements;
- Improve the availability and resilience of the SCADA system through virtualization and improved disaster recovery systems;
- Increase the visibility of key performance indicators to improve management of processes, power, and chemical use;

² Watercon 2012 Conference, "Complete SCADA System Replacement, Where do we go from Here?"
<http://c.ymcdn.com/sites/www.isawwa.org/resource/resmgr/watercon2012-tuesday-pdf/tuemgtpot100.pdf>

- Furnish need-to-know information throughout the WWTP and at pump stations securely for TPO and FMC staff to improve effectiveness;
- Provide a road map for upgrades and maintenance of the SCADA system;
- Standardize HMI screens to improve operator effectiveness and standardize PLC programming to support multi-sourcing and competitive pricing for software integration;
- Upgrade the SCADA operations console;
- Improve operations and maintenance without the need for additional FTE's for TPO and FMC – Note however that additional IT responsibilities could require additional IT FTEs to support IT projects;
- Implement 3-deep staffing in all critical skills and in consulting support;
- Implement improvements regarding cybersecurity;
- Improve the resilience and performance of the WWTP fiber optic network;
- Improve the resilience and performance of the WWTP wireless network(s);
- Improve availability of the process systems using machine learning for visibility of incipient failures; and
- Coordinate with planned improvements per USD's IT Master Plan and overall Capital Improvement Program planning.

Implementation:

The implementation steps recommended to achieve the above goals are described in detail in **Section 4:**

3.2.2 Training, Practices & Procedures: Enhance SCADA System

This section describes master planning training considerations specific to SCADA. Such training includes training FMC staff in maintaining the District's system. Training considerations should also extend to training of TPO staff on the features and capabilities of an improved SCADA system with the goal of improving how the plant works. Thus, the goal of the training discussion is to outline training to address the needs of both of these key sets of stakeholders.

Note that routine training of TPO staff related to day-to-day plant operations is presently addressed using standard operating procedures (SOPs), Job Competency Requirements (JCRs), and Standard Answers. Many of the SOPs use some elements of the SCADA graphic screens to communicate operational protocol and procedures to staff. These routine SOPs are also used as the basis for normal operator training. However, these routine plant operation training efforts should be considered separate and distinct from the enhanced SCADA training suggested in this Section. The goal of the enhanced SCADA training is to achieve higher level of efficiency and functionality for operations staff using elements and features of SCADA not presently used for routine tasks. Ultimately, should the additional training suggested in this section become routine, these features may become SOPs or be incorporated in JCRs in the future.

To achieve these enhanced goals for maintenance and operations staff, three broad training areas are identified:

- a. Operational training:
 - i. Using data available from the present SCADA system in new ways to improve plant performance and staff efficiency (short term training)
 - ii. Understanding new technological features available from an improved SCADA system that could further improve operational performance (short term training)
 - iii. Using new operational features implemented as part of an improved SCADA system (long term training)
- b. Process and infrastructure maintenance training:
 - i. Using SCADA as an interface to the CMMS system for work order creation and management (short term training)
 - ii. Using SCADA directly for diagnostic, data management, and analytical tools to improve maintenance of plant processes; e.g., monitor motor load Ampere changes for preventive maintenance (medium term training)
 - iii. Using add-on platforms for diagnostic, data management, and analytical tools to improve maintenance of plant processes; e.g., condition assessment (long term training)
- c. SCADA maintenance training
 - i. Providing emergency SCADA maintenance necessary for immediate response to SCADA upsets; e.g., reloading control program after PLC failure (short term training)
 - ii. Performing in-house support of the SCADA-related training described under a. and b. above including means and methods for providing the necessary diagnostic and operational parameters (medium term training)
 - iii. Performing advanced SCADA support of PLC hardware and software (long term training)
 - iv. Performing advanced SCADA support of HMI hardware and software (long term training - IT staff training based on current USD organizational structure)
 - v. Performing advanced SCADA support of databases and historian hardware and software (long term training- IT staff training based on current USD organizational structure)
 - vi. Performing advanced SCADA support of network infrastructure (long term training- IT staff training based on current USD organizational structure)

Reconnaissance Findings:

Based on discussions during the Workshops #1 and #2 the District goal is to provide “three-deep” level of support for key maintenance personnel skills. This standard provides for backup resources to cover vacations, holidays, and – to a lesser extent – after-hours support needs. In several key maintenance areas³, there is only one USD employee with the required skills and knowledge and the workload apparently does not justify a second resource much less a third.

The requirement for three-deep support complicates training processes for both learning and maintaining particular skills. As such, the District has in the past and will likely continue to rely

³ SCADA-related technical skills which presently do meet the three-deep standard with in-house staff include HMI programming (1 internal resource), PLC programming (1 internal resource), and network support (1 internal resource).

on third parties for more complex SCADA and IT support. Thus, some of the training processes outlined above may ultimately be outside the normal level of in-house support needs.

To provide the understanding of SCADA capabilities and features as described above, the training tasks may consist of site visits to other operating plants. The training process would then consist of on-site questions to staff at other facilities to determine what SCADA features may be suitable for implementation at the District.

An IT network issue which arose during the course of this master plan raised the question that the network at the WWTP may already be too complex to support adequately with existing staff at existing levels of training and with the present third-party support contracts. USD's network is not unlike that at other similar facilities. What's different, however, is that those similar facilities typically have monitoring and support from private network operations centers which are staffed 24x7 and are under contract to take corrective action proactively as electronic alerts arise. Many of those alerts are precursors to avoidable IT system failures. Prompt corrective action can avoid the failures while delay may not.

USD's present network support contracts, on the other hand, reportedly require the off-duty employees to be available – regardless of the time of day or night – and to initiate action.

Because of this situation, our recommendation below for support and training is two-fold: (1) enter into a contract for proactive network operation center support and (2) develop an enhanced training regimen as outlined above. Options are summarized in **Table 5**:

Table 5: Support & Training Options

Option	Description	Advantages	Disadvantages	Cost
1	<p>Train existing IT or operational personnel: to handle additional network administrative duties.</p> <p>(See Table 6, below for the detailed recommendation regarding training.)</p>	<ul style="list-style-type: none"> Existing personnel are familiar with risks and internal processes. The responsibilities can be part of an existing FTE workload rather than a new position. 	<ul style="list-style-type: none"> Requires gradual delegation of responsibilities, may take some time for the employee to be proficient. Does not force procedures to be written for network maintenance, tasks may end up defaulting to the existing administrator. 	<p>Low</p> <p>(See Table 6)</p>
2	<p>Use contract assistance for operational and emergency support:</p> <p>Establish a contract with IT support company to handle some ongoing maintenance tasks and to maintain familiarity. Bring them in as needed in the future. May require manufacturer contracts.</p>	<ul style="list-style-type: none"> Expert assistance on-call from the 3rd party familiar with the infrastructure. Forces specific tasks to be documented and handled by the 3rd party. 3rd party can be responsible to make recommendations based on industry best practices. 24x7 monitoring and response is commonly supported by IT support companies. 	<ul style="list-style-type: none"> A remote 3rd party cannot respond onsite as quickly as local personnel (Note: SLA's vary.) Value of contract needs to be reevaluated on an ongoing basis. Some tools (such as Cisco's Smart Care appliance) require manufacture contracts on each device in inventory. PLC integration (and integration issues) may not be within the 3rd parties' expertise. 	<p>Moderate, estimated at \$40k/year for 18 switches, 1 firewall, and 1 layer 3 switch.</p>

Option	Description	Advantages	Disadvantages	Cost
3	<p>Hire additional personnel:</p> <p>Hire network administrator to handle network administration duties and to be on-call for network emergencies.</p>	<ul style="list-style-type: none"> Expertise in specific technologies can be evaluated through the hiring process. Rotating shifts for on call responsibility can be shared with this person. 	<ul style="list-style-type: none"> High cost. It may be difficult to find a person who knows PLC networking so they may have to still be trained. “Network Administrator” is not likely a full time position yet, so duty distribution will be needed to keep a FTE utilized properly. 	<p>High, approximately \$98-129k/year plus salary burden. (Number based on USD’s Senior Network Administrator salary range)</p>

Recommended Project:

Table 6: Recommended Project – Support & Training: Support Level/Skills Development

Project	Support & Training: Support Level/Skills Development
Background	The District uses a combination of in-house and outside consultants for technical support of SCADA/PLC systems. Training and staff development relate to present and planned District staffing levels.
Scope	<p>Identify and document means and methods to provide better support via well-defined training plans for those tasks that are performed under District purview. Address gaps in IT training, certification (e.g. Cisco Certified Network Associate), documentation; address gaps in 3-deep support for IT. Develop training levels, metrics, and skills assessment methods to validate staff training as it relates to SCADA support for IT, TPO, and FMC.</p> <p>Outline and implement a structured cross training program to support the SCADA system support roles within the IT and E&S as well as across the IT and E&S teams.</p> <ol style="list-style-type: none"> 1. Network support 2. SCADA HMI software infrastructure support

Project	Support & Training: Support Level/Skills Development	
	<ol style="list-style-type: none"> 3. SCADA HMI programming 4. SCADA PLC programming 5. SCADA data collection and reporting <p>To cover support after normal business hours, weekends, and holidays, add 24x7 proactive monitoring by a service organization of the portion of USD's IT infrastructure which impacts WWTP and collection system SCADA. Include on-site after hours service for major IT issues which cannot be resolved remotely.</p>	
Justification	To help meet the District's goal of three deep support for SCADA related support, including IT, for day-to-day operations and emergency diagnostics and troubleshooting.	
Prerequisites & Dependencies	<ul style="list-style-type: none"> • Prerequisites: None • Dependencies: Standards Development (SCADA Master Plan) 	
Necessary Resources (Labor and Materials)	<ol style="list-style-type: none"> 1. District Labor 2. Consultant 	
Budgetary Cost Estimate (Nearest \$10,000)	District Labor Hours	240 IT
	Cost includes development of training and training.	120 TPO
		<u>240</u> FMC
		600 hrs.
	Consultant/Trainer	\$50,000
	Contractor	\$0
	Total estimated funds needed	\$50,000
Duration (months)	60 Months	
Agency Lead Department	Information Technology	

3.2.3 Technology, Practices, & Procedures; Security

The purpose of this section is discuss technology improvements, industry best practices, and procedures related to security of the District's SCADA system. Security on networking systems is a concern at any level within the District's organization. However, due to the implication of a security breach on WWTP process control and operations, security of the SCADA system is of particular interest to District staff. The security concerns are further complicated by other ongoing projects, planned projects, and system improvements requested by staff. These projects include:

- Expand in-plant use of wireless devices to facilitate additional monitoring without hardwired infrastructure;
- Complete network expansion at the backup control room in the Centrifuge Building;
- Evaluate new fiber runs to Irvington, Newark, Boyce, and Fremont. Evaluate new copper runs to the remaining remote sites. The microwave project is currently on hold due to cost.
- wireless connectivity within the plant to support new wireless devices and create better identity controls on the remote access solution used to process control data in real time

These and other ongoing or proposed SCADA and networking upgrades present potential new security vulnerabilities to both the SCADA network and other IT LANs and WANs. Addressing these vulnerabilities must also consider the existing system presently in operation as well as the proposed enhancements. Further, security related to the SCADA system must be coordinated with other District IT security policies, protocols, procedures, and projects previously identified under the District's IT Master Plan. For example, MPLS or other quality of service/security enhancement protocols could be implemented under the IT Master Plan to maintain performance of SCADA data in and out of the IT/SCADA firewalls.

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

Recommended Project: See Network Design Improvements, Section 3.2.10.

Standards Maintenance

The SCADA Standards developed in conjunction with this SCADA Master Plan will become a vital asset for ensuring quality and consistency in future contracts. The technology underlying these standards is dynamic; so, the SCADA Standards themselves will need to be updated at regular intervals – typically as new projects come on line or new software revisions are rolled out; typical update cycles are approximately every 3 years as a reasonable compromise between technology upgrades and limiting frequency of operational (HMI) changes.

Recommended Project:

Table 7: Recommended Project – Support & Training: Standards Maintenance

Project	Support & Training: Standards Maintenance	
Background	District has included development of standards for: <ol style="list-style-type: none"> 1. Design specifications: control philosophy, P&IDs, tagging, software development and testing, Process Control Narratives 2. PLC programming, HMI configuration and graphics, and Historian 3. Instrumentation 4. Control Panel Construction Following initial development of these standards, a continuous, dynamic process of updates and improvements must be established to ensure continued usefulness and applicability of the standards.	
Scope	Define requirements, establish, and implement an electronic based process for continuous updates and improvements to the SCADA based standards (i.e. controls design specifications, instrumentation and panel design specifications, PLC programming, and HMI configuration/graphics/historian, etc.).	
Justification	Provides a current updated set of standards for SCADA projects, based on present technology, minimizing the effort to operate and maintain the SCADA system.	
Consequences	USD standards would get out of date quickly as technology advances, becoming less and less useful every year.	
Prerequisites & Dependencies	<ul style="list-style-type: none"> • Prerequisites: Established approved standards • Dependencies: None 	
Necessary Resources (Labor and Materials)	1. District Labor 2. Consultant	
Budgetary Cost Estimate (Nearest \$10,000)	District Labor Hours	20 IT Project Management 20 TPO 20 CIP <u>20</u> FMC 80 hrs. annually
	Consultant	Varies
	Contractor	None
	Total estimated funds needed	Varies
Duration (months)	Initial development 3 months; Implementation: Continuous	
Agency Lead Department	Information Technology	

3.2.4 O&M Metrics Including Charts, Trends, Alarms

During Workshops #1 and #2, District staff described the existing tools from SCADA used for monitoring plant performance and responding to alarm conditions. Needs to be addressed under this Section include providing more comprehensive plant performance metrics in the form of reports or graphic indicators (charts and trends); and addressing concerns regarding timely delivery of and responses to alarms.

O&M Metrics

Currently, plant metrics are addressed in a somewhat haphazard fashion. A single well-defined report, the Plant Scorecard is in place for presenting a succinct summary of operations primarily for District Board members. The Plant Scorecard, **Table 5**, is in the format of a traditional annual report with performance data periodically inserted for monthly review by the Board. However, the Plant Scorecard assimilates data from a variety of data sources and requires significant manual effort to acquire data and prepare the report. As discussed in Section 3.2.4, improved access to plant knowledge assets will make development of the Plant Scorecard more efficient and accurate.

Table 8: Plant Scorecard

	Objectives	Measures	1st Quarter	Fiscal Year-to-Date	Target	Comments/ Progress Towards Target	Fiscal Year 2014	Responsible Team Members	Reporting Frequency
Customer	Operate & maintain the Plant in compliance 24/365.	Number of adverse impacts (odor complaints, violations, spills, etc.)	0 Quarter Total	0 Total	0		6 Total		Quarterly
Financial	Optimize operating costs: Minimize energy, chemical, and water use.	Energy Usage:							
		Average/Day Kwh/MG - Alvarado Site	2,180 Ave per Month	2,180 Ave per Month	< 2,100		2,248 Ave per Month		
		Cogeneration - kwh/day	7,686 Ave per Day	7,686 Ave per Day	8,500		9,404 Ave per Day		
		Cogeneration - kwh/year	707,747 Quarter Total	707,747 Total	3,300,000		3,433,672 Total		
		Solar Production - kwh/day	706 Ave per Day	706 Ave per Day	Track & Report		592 Ave per Day		
		Solar Production - kwh/year	65,125 Quarter Total	78,101 Total			216,580 Total		
		Chemical Usage:							
		Ferrous Chloride							
		H2S Control - gal/hour	32 Ave GPH	32 Ave GPH	≤ 35		32 Ave GPH		
		H2S Control - gal/year	70,656 Quarter Total	70,656 FY Total	≤ 300,000		280,320 FY Total		
Hydrogen Peroxide									
H2S Control - gal/hour	9.5 Ave GPH	9.5 Ave GPH	≤ 8.5		8.4 Ave GPH				
H2S Control - gal/year	21,055 Quarter Total	21,055 FY Total	≤ 76,000		73,944 FY Total				
Hypochlorite									
Disinfection - gal/hour	30.2 Ave GPH	30.2 Ave GPH	≤ 43		32.2 Ave GPH				
Disinfection - gal/year	66,766 Quarter Total	66,766 FY Total	≤ 375,000		283,111 FY Total				
Polymer									
GBT - lbs/dry ton	3.7 Ave lbs/dry ton	3.7 Ave lbs/dry ton	≤ 5.5		4.9 Ave lbs/dry ton				
Dewatering - lbs/dry ton	33.3 Ave lbs/dry ton	33.3 Ave lbs/dry ton	≤ 33		34.1 Ave lbs/dry ton				
Water Usage:									
Gallons Used Per Day	24,918 Ave per Day	24,918 Ave per Day	≤ 30,000		29,952 Ave per Day				
Internal Processes	Environmental Protection - District-wide	Biosolids Class A Disposal Percent Disposed of as Class A Number of Wet Tons Disposed Class A	43% Ave per Month 2085 Quarter Total	43% Ave per Month 2085 FY Total	25% 4,800		19% Ave per Month 3809 FY Total		Monthly
	Maintain Plant processes within parameters.	Plant Operational Health Index Monthly Index Value Number of Days < 75% Maximum # of Consecutive Days < 75%	86% Ave 18 Days Total 3 Days	86% Ave 18 Days Total 3 Days	Ave ≥ 85 Track & Report ≤ 3		85% Ave 98 Days Total 2 Days		Monthly
	Complete preventative maintenance.	Percent preventative maintenance work orders completed within month scheduled (TPO)	99% Ave per Month	99% Ave per Month	≥ 95%		98% Ave per Month		Monthly
	Provide effective regulatory & laboratory services to support compliance.	Percent of Environmental Compliance Samples that Meet Turnaround Time (12 days)-R&S Lab Percent passed, State Proficiency Test (DHS-ELAP)	100% For Quarter N/A Areas Passed	100% Ave per Quarter N/A Areas Passed	≥ 95% ≥ 85%	Frequency of test is once per year.	100% Ave/Quarter 100% Areas Passed		Quarterly Annually
Employees	Enhance employee skills.	TPO							Quarterly
		No. of training modules updated	0	0 Total	8		7 Total		
		No. of training modules with competency assessment tools developed	0	0 Total	5		5 Total		

Beyond the plant Scorecard though, there are a variety of trends, reports, and presentation of data used by TPO. However, there does not appear to be systematic criteria in place for establishing detailed plant performance for continuous use by TPO.

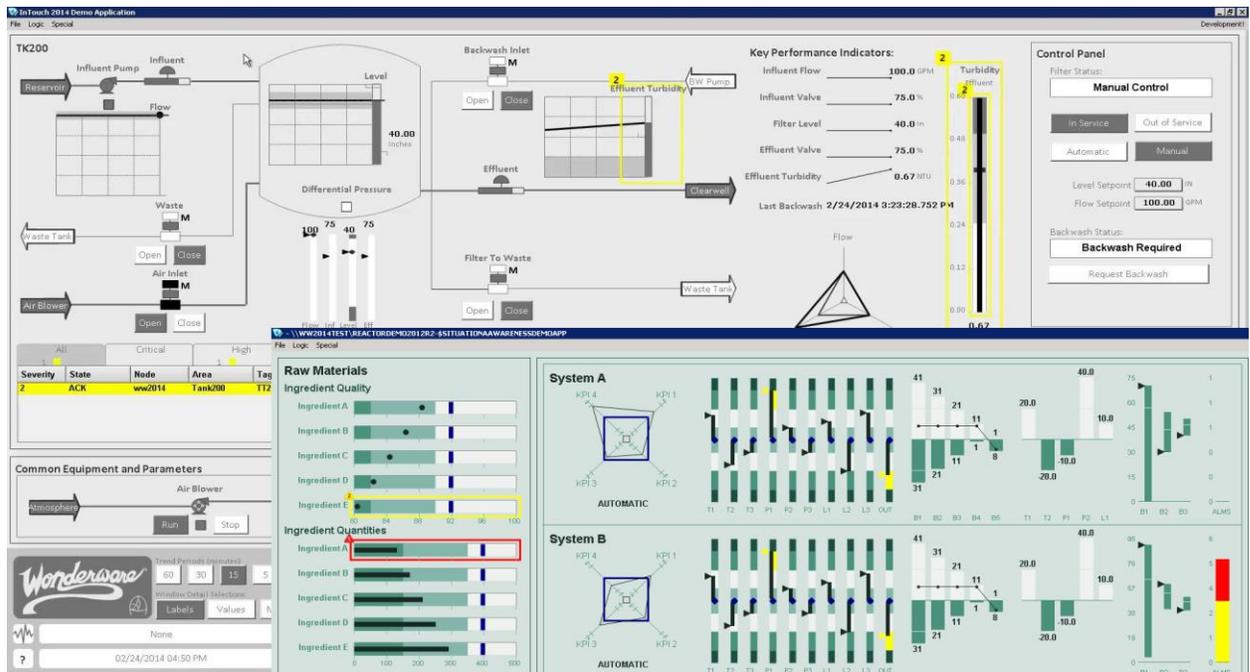
As described in **Section 3.2.5**, SCADA should be used as a tool for improving performance of the treatment plant. To achieve this end, well defined metrics should be established using the F-R-O-M⁴ or similar methodology. Once operational performance metrics are identified, standardized optimization tools in the form of dedicated graphic screens and reports can be developed to present the related data. Using industry techniques such as Situational Awareness

⁴ Functionality, Reliability, Operability, and Maintainability. For more information, see Appendix D.2 “Use SCADA to Optimize Operations”

graphics can be used to alert and highlight out of tolerance plant conditions for timely responses by operations. **Figure 10** presents an example of Situational Awareness graphic showing how the performance metric can be highlighted and displayed efficiently to operations.

Figure 10: Situational Awareness Displays for Key Performance Indicators (KPI's)

Note use of color to make issues stand out & distinguish alarm severity. Note also performance bands around trends & bar-charts



The details of establishing plant metrics and presentation overlaps with several other topics discussed in this plan including access to knowledge assets (Section 3.2.4), use of SCADA for plant optimization and F-R-O-M workshops (Appendix D, Low Priority Project – SCADA Optimization: Optimization Plan), Data Consolidation (Appendix D, Section D-2), HMI standards development and maintenance (Project Support & Training: Standards Maintenance), and the ODMS work being performed under the IT Master Plan. Identifying and incorporating Situational Awareness techniques within these other areas of development is recommended.

Alert/Alarm Notification and Response

The existing alarm notification systems at the plant and outlying pump stations rely on digital radio devices for notification. Once received, alarms require operators or maintenance staff to navigate to a few widely spaced local graphical panels to obtain information of the alarm and determine the most appropriate method of response. Depending on the nature of the alarm, staff must then travel to other locations to gather tools or supplies before actually addressing the alarm condition. Historically cellular notification technology has had poor reception within

multilevel concrete structures at the WWTP. [REDACTED]

[REDACTED] Further research is needed to identify all the low/no cellular signal and throughput areas.

Under Recommended Project “SCADA Optimization: Wireless and Alarm Notification Plan” a strategy to make alarm notification more reliable, shorten response time, and generally improving effectiveness to system alarm conditions is identified. The objective of this project is to address alarm situations quickly to potentially limit impact of “out of tolerance” condition on plant operations. The project will proceed in two steps:

- Step 1: Communication feasibility study to analyze dedicated wireless communications network including optimum transceiver locations for widest plant coverage. Identify and define the wireless system infrastructure necessary for comprehensive and reliable alarm notification coverage of the entire treatment plant.
- Step 2: Feasibility study to review alarm system notification platforms and develop recommended improvements for message delivery. Feasibility study to review system coverage, network technologies, message delivery platform (tablet, smart phone), message delivery content and speed (e.g., SMS Messaging), and both SCADA and Mtell Previs condition status notification interfaces.

Recommended Project:

Table 9: Recommended Project – SCADA Optimization: Alarm Notification Plan

Project	SCADA Optimization: Alarm Notification Plan
Background	Existing alarm notification system relies on digital radio devices for notification and requires operators or maintenance staff to navigate to a few widely spaced local graphical panels to obtain information. Depending on the nature of the alarm, staff must then travel to other locations to gather tools or supplies before actually addressing the alarm condition. Cellular notification technology also has poor reception within concrete structures 3 levels down, somewhat typical within the WWTP.
Scope	<ul style="list-style-type: none"> • Review, design, and implement improvements for secure wireless connectivity at the WWTP and for improving the effectiveness of in plant alarm notification.

Project	SCADA Optimization: Alarm Notification Plan	
Justification	<ul style="list-style-type: none"> • More immediate notification of alarm conditions to those who can actually take action. • Improved clarity as to what's wrong so corrective action can be taken immediately. • Better use of existing voice radio system after existing alarm notification system is off loaded to a new platform • Replace obsolete [REDACTED] alarming hardware. 	
Consequences	<ul style="list-style-type: none"> • Alarms remain generalized, not informing operators of the specific situation needing attention which could lead to a longer time to react to alarms. • Will continue to have alarming over the radio causing inefficiencies. • Continued impact on existing voice radio system to carry both voice traffic and alarm notification. • Current alarming hardware is obsolete and could take a long time to fix if it fails 	
Prerequisites & Dependencies	<ul style="list-style-type: none"> • Prerequisites: Control Building Improvements. • Dependencies: None. 	
Necessary Resources (Labor and Materials)	<ol style="list-style-type: none"> 1. District Labor 2. Consultant 	
Budgetary Cost Estimate (Nearest \$10,000)	District Labor Hours	20 IT Project Management 40 TPO 20 CIP 40 FMC 120 hrs.
	Consultant Contractor	\$25,000
	Total estimated funds needed	\$25,000
Duration (months)	6 Months	
Agency Lead Department	Information Technology	

3.2.5 SCADA Integration with Other Business Systems

USD presently uses Mtell Previsio to link equipment runtimes to Infor Hansen for runtime-based scheduling of routine maintenance. Mtell's software has other powerful capabilities - called predictive analytics - which analyzes information from SCADA with the goal of providing prior notice of incipient machine failures. These features are presently not being used by the District.

It is recommended that the advanced predictive and preventive maintenance features of the platform be reviewed and, if determined to have potential value to the District, be deployed.

As with any new deployment of technology, it is wise to start with a small pilot to assess both costs and benefits and we so recommend. On analysis of pilot findings, additional phases of implementation can commence if justified.

In defining the scope for the first phase or pilot project, consideration of asset diversity should be considered. Factors to consider are:

- Mtell has previously developed data connectors for certain assets such as the new Jenbacher Cogeneration Units.
- Mtell recommends a minimum of 4 process variables per machine for predictive analytics to be effective
- Implementation at other facilities indicates that the software is most effective when implemented with a mix of sensor types e.g. electrical, bearing temperature, pressure, vibration, etc.

These and other factors affecting deployment are further documented in the meeting minutes for Workshop 2 (Appendix A1).

Recommended Project:

Based on the above, the recommended projects for achieving more complete integration of SCADA with the Infor Hansen CMMS are as follows:

Table 10: Recommended Project – Predictive Analytics - Pilot Deployment

Project	Predictive Maintenance Analytics: Pilot Deployment
Background	<p>Mtell Previsio is a product line which integrates SCADA with CMMS. It presently is used by USD to transfer runtime information from iFIX to Infor Hansen for maintenance scheduling based on runtimes.</p> <p>This projects enables for evaluation the predictive analytics features of Mtell Previsio for a small sample of equipment assets. The goal is to assess the ability of the software to provide prior notice of incipient machine failures likely to cause process disturbances.</p>
Scope	<p>Deploy predictive analytics for critical assets that already have adequate sensors in place using the existing Mtell infrastructure. Upgrade the Mtell software to the latest version. Train designated mechanical staff how to configure and manage the predictive analysis process.</p>

Project	Predictive Maintenance Analytics: Pilot Deployment	
Justification	<ul style="list-style-type: none"> • Leverage the existing Mtell infrastructure for predictive analysis. • Identify potential failures before they occur so downtime can be scheduled and equipment can be serviced before major failure occur. • Reduces maintenance costs and increases asset life. 	
Consequences	Lack the ability to identify failures before they occur leading to the higher risk of equipment failure and environmental incidents.	
Prerequisites & Dependencies	<ul style="list-style-type: none"> • Prerequisites: None • Dependencies: None 	
Necessary Resources (Labor and Materials)	<ol style="list-style-type: none"> 1. District Labor 2. Consultant 3. Mtelligence Corporation (dba Mtell) 	
Budgetary Cost Estimate (Nearest \$10,000)	District Labor Hours	20 IT Project Management 20 TPO 20 CIP 20 FMC 80 hrs.
	Consultant Mtell Contractor/Supplier	\$0 \$25,000 \$0
	Total estimated funds needed	\$25,000
Duration (months)	3 Months	
Agency Lead Department	Information Technology	

3.2.6 Virtualization

Recommendation: Currently VMware is utilized for a virtual farm environment that supports administrative computing and storage needs, along with virtual desktop needs. Neither SCADA servers nor workstations are presently included. Adding SCADA virtualization would provide the benefits of having a highly available, reliable, and distributed virtual architecture. Additional benefits would include the option to introduce east-west and north-south⁵ security using

⁵ Networking traffic is often described by points of the compass. North-south traffic is flow in and out of the data center (a.k.a. “client-server”). East-west traffic is flow within the data center, between servers or virtual machines. <https://chrisneale.wordpress.com/2014/10/15/network-north-south-east-west-dont-be-embarrassed-to-ask/> and <http://www.networkworld.com/article/2177684/lan-wan/the-growth-in-east-west-traffic.html>.

virtualized network components that would live within the same environment. These goals are addressed in greater detail in the projects described in this Section.

Project “SCADA Virtualization: Control Building Improvements” includes new computers and storage environment with the associated licenses and power equipment required to support the new environment in a single building. The budget is based on the following assumptions:

- Quantity 2 High Powered servers running VMWare ESXi Enterprise Plus with VMware NSX for virtual Network features. The Enterprise Plus feature set also allows for the use of distributed resource scheduling, host profiles, and storage IO controls, all of which would have a place in the solution.
- Quantity 1 Storage System that allows for future stretch clustering. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].
- Quantity 4 [REDACTED] licenses to run iFIX servers and two additional licenses for Active Directory controllers
- Quantity 20 Windows Workstation licenses for [REDACTED] iFIX view nodes.

Project “SCADA Virtualization: Disaster Recovery” extends what had been built under the Control Building Improvements Project to another building (likely to be the Centrifuge or Administration Buildings). The other building would have identical infrastructure, and the same Layer 2 networks would be extended between buildings, preferably on dedicated 10 Gb fiber, to allow virtual machines to be dynamically migrated between buildings.

Once the implementation phase of this project has been completed, rules could be established within DRS to keep the primary iFIX servers running in one building, while the secondary servers run from the other building.

Recommended projects:

Table 11: Recommended Project – SCADA Virtualization: Control Building Improvements

Project	SCADA Virtualization: Control Building Improvements	
Background	To provide high reliability contemporary computer systems for SCADA, similar to those already in place for all of USD’s critical business systems, except for SCADA.	
Scope	Plan and implement the replacement of obsolete SCADA servers and workstations utilizing server virtualization. Implement a distributed workstation and storage system so virtual machines for SCADA (including main servers) can run from more than one building. Upgrade iFIX and Historian to the current versions and migrate the SCADA screens for compatibility with the new software. Provide a backup solution. Validate storage IO and capacity utilization	
Justification	Replace obsolete SCADA computer hardware and software as part of USD’s standard R&R plan.	
Consequences	<ul style="list-style-type: none"> Continued vulnerability to known cyber-security risks. Increased IT maintenance costs to maintain non-virtualized computer systems just for SCADA. Increased chance of failure because hardware is older. Longer time-to-repair because equipment is no longer in warranty. 	
Prerequisites & Dependencies	<ul style="list-style-type: none"> Prerequisites: None except for work included in this project scope: FMC-provided environmental site preparation (i.e. Air conditioning, power/backup, etc.) and IT-provided (a) readiness for the new computing infrastructure and (b) fiber optic readiness for a stretch storage implementation.⁶ Dependencies: 20RU Rack space per server room location, Fiber Optic infrastructure for stretch storage 	
Necessary Resources (Labor and Materials)	<ol style="list-style-type: none"> District Labor Consultant 	
Budgetary Cost Estimate (Nearest \$10,000)	District Labor Hours	700 IT Project Management 20 TPO 0 CIP

⁶ For a SAN that stretches over IP (Datacore, Compellent), we would need 10 GB connectivity with low latency and the two SANs that are capable of sync (real-time) replication. For a SAN that stretches over FC (EMC VMax, Compellent), we would require dark fiber connectivity between buildings.

Project	SCADA Virtualization: Control Building Improvements	
		0 FMC 720 hrs.
	Consultant (Planning, Design) Purchase Contracts ⁷	\$20,000 \$0
	Total estimated funds needed	\$20,000
Duration (months)	6 Months	
Agency Lead Department	Information Technology	

Note: The designated DR location is still under review and may change based on actual implementation. The cost of this project is designed to increase the existing SCADA upgrade project already underway in FY16.

Table 12: Recommended Project – SCADA Virtualization: Disaster Recovery

Project	SCADA Virtualization: Disaster Recovery
Background	Add Disaster Recovery to provide resilience and better business continuity for the virtualized SCADA system in accordance with industry best practices.
Scope	Update the SCADA Disaster Recovery (DR) elements in the IT Disaster Recovery Plan to improve business continuity. Implement DR and security improvements to the data centers
Justification	Need new DR for the new virtualized SCADA system because the existing DR will no longer work after SCADA upgrade
Consequences	Potential complete loss of WWTP SCADA control and monitoring for a substantial period in the event of fire or flooding in the Control Building

⁷ UPS and Environmental equipment – \$8,000
Licensing (VMware (4 CPU's+vCenter) – \$35,000
Storage Hardware including SAN and Fabric- \$60,000
Hypervisor Hardware – \$36,000

Project	SCADA Virtualization: Disaster Recovery	
Prerequisites & Dependencies	<ul style="list-style-type: none"> Prerequisites: Control Building Improvements Project including (a) storage system with stretch capabilities (at least between buildings), (b) evaluation of the Admin VMWare environment with modifications to provide failover capabilities for the virtualized SCADA servers, which would reduce the expense of placing a VMware farm in the centrifuge building. Dependencies: Direct Fiber Optic connectivity between the primary and secondary buildings capable of 10 Gbps. (Project Network Improvements/ Admin, Control, and Dewatering Building, & 10 Gb Infrastructure Upgrades for Disaster Recovery) 	
Necessary Resources (Labor and Materials)	3. District Labor 4. Consultant	
Budgetary Cost Estimate (Nearest \$10,000)	District Labor Hours	400 IT Project Management 40 TPO 0 CIP 0 FMC 440 hrs.
	Consultant (Planning, Design) Purchase Contracts ⁸	\$20,000 \$80,000
	Total estimated funds needed	\$100,000
	Duration (months)	6 Months
Agency Lead Department	Information Technology	

Note: The designated DR location is still under review and may change based on actual implementation.

Table 13: Recommended Project – SCADA Virtualization: HMI Upgrades per Standards

⁸ UPS and Environmental equipment – \$8,000
Licensing (VMware (4 CPU's+vCenter) – \$35,000
Storage Hardware including SAN and Fabric- \$25,000
Hypervisor Hardware – \$32,000

Project	SCADA Virtualization: HMI Upgrades per Standards	
Background	There is a range of iFIX and PLC programming upgrade options described in Section 3.2.7, Table 14 . This HMI upgrades project recommends a balanced approach, staying with the present iFIX platform, migrating to the latest release, and overhauling the HMI applications per the new HMI standards. Overhauling all PLC applications to conform uniformly to newly defined PLC Programming standard was considered but is not recommended because the existing PLC programs function satisfactorily and the substantial additional costs for complete replacement far outweigh benefits.	
Scope	Once migrated, revise legacy SCADA screens in accordance with USD standards	
Justification	<ul style="list-style-type: none"> • More efficient, consistent, and informative controls to reduce the risk of SCADA operator error. • Use of standardized objects to streamline software development and maintenance. • Addition of new dashboard screens which help operators see process anomalies quicker 	
Consequences	<ul style="list-style-type: none"> • Continued potential for error and extra effort to train new operators to understand and work around inconsistencies from screen to screen. • Increased effort for development and maintenance of screens • Lost efficiencies from not have new dashboards and standardized screens 	
Prerequisites & Dependencies	<ul style="list-style-type: none"> • Prerequisites: Development and approval of HMI standards & Completion of the Control Building Improvements Project. • Dependencies: <ul style="list-style-type: none"> ○ Phasing: Upgrades to the current revision of iFIX ○ Phasing: Review of screen formats to determine potential incorporation of new graphical presentation strategies (e.g., situational awareness): reuse or revise present screen formats 	
Necessary Resources (Labor and Materials)	<ol style="list-style-type: none"> 1. District Labor 2. Consultant 3. Contractor 	
Budgetary Cost Estimate (Nearest \$10,000)	District Labor Hours	400 IT Project Management 400 TPO 100 CIP <u>200</u> FMC 1,100 hrs.

Project	SCADA Virtualization: HMI Upgrades per Standards	
	Consultant ⁹	\$250,000
	Contractor	\$0
	Total estimated funds needed	\$250,000 ¹⁰
Duration (months)	24 Months	
Agency Lead Department	Information Technology	

3.2.7 Software Upgrade Philosophy

It takes a significant expenditure of resources to create a SCADA system, make it operational, and verify that it is bug free; so, there is a natural tendency to minimize changes over time. There are many layers of SCADA software at USD; so, the update philosophy for each is discussed separately below.

Operating Systems and HMI Software (manufacturer supplied)

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]

- [REDACTED]

⁹ Phase 1 – \$50,000
Phase 2A – \$100,000 - \$300,000 (range dependent on nature of changes to existing HMI graphics)
Phase 2B - \$50,000 (implemented on newly written PLC programs only – implementation costs assumed incorporated as part of future associated process improvement projects)

¹⁰Note: Funding estimate does include costs for iFIX platform upgrades and installation

- [REDACTED]

Virtualization, recommended elsewhere in this master plan, provides significant savings and other benefits. Server hardware can be replaced on, say, a five-year schedule but virtual machine operating systems can be updated or upgraded any time without buying new hardware. This flexibility applies also to view nodes via desktop virtualization, a technology which is currently being rolled out at USD.

Recommendation:

With this background, we recommend:

- Upgrading HMI software every three to five years because of the flexibility virtualization provides, the compelling business case of not relying on obsolete HMI software to run the WWTP, and the minimization of cybersecurity risks.
- Upgrading virtual machine server operating system software every five years.
- Upgrading virtual machine workstation operating system software every three to five years.
- Allowing for more frequent upgrades that are limited in scope and on a case-by-case basis can accommodate the rapid pace of technological advances for mobile devices¹¹ and, to a lesser extent, for workstation virtual machines.

Given these recommendations, it should be noted that workstation and mobile device technology are changing rapidly today. On a case-by-case basis, we recommend planning more frequent but minor changes to HMI software infrastructure to accommodate these devices.

¹¹ The EPA states that the average lifetime of a cell phone is 18 months.
<http://www.epa.gov/osw/education/pdfs/life-cell.pdf>

HMI Applications (Custom)

Below are options for how to proceed regarding updating the existing iFIX software application. These options include:

Table 14: HMI Improvement Options

Option	Description	Advantages	Disadvantages	Cost
1	Migrate existing computers: only virtualize what exists, no screen migration or OS upgrade.	Quickest to deploy	<ul style="list-style-type: none"> • Still running obsolete iFIX software and operating systems • Could simply leave the existing servers in place and reduce costs further. 	lowest
2	Migrate existing screens and OS's: use iFIX [REDACTED] running on [REDACTED] workstations and [REDACTED] Server [REDACTED].	Minimum effort needed to be running current software systems	Must address the limitations inherent in the existing 300 screens, the trending system, and the reporting system	low
3	HMI overhaul current OS's: Develop new standards-based screens, trends, & alarms which are likely to include: <ul style="list-style-type: none"> • Adding 4-20 mA loop limit checking provisions • Adding indication that equipment is "available" or "locked out" • Adding normal ranges to screens to assist unfamiliar or weekend staff • Implementing object oriented software techniques to simplify standardization. 	All-new standards-based user interface tailored to the needs of the modern operator at USD	<ul style="list-style-type: none"> • Resource issue: USD's primary programming support resource has only one iFIX customer (USD) and no experience with version [REDACTED] 	high
4	Migrate to new HMI platform (e.g. Wonderware InTouch,	<ul style="list-style-type: none"> • Standards based HMI (same as Option 3) 	Substantial retraining needed for in-house	Highest

Option	Description	Advantages	Disadvantages	Cost
	Rockwell Automation RSVIEW)	<ul style="list-style-type: none"> • Opportunity to choose among all of today's leading brands (Wonderware is claimed to be the current global leader with Rockwell Automation a major contender) • RSVIEW – integration with AB PLCs & supports AB drives, and other AB hardware. Ability to program through the RSVIEW interface directly to the PLC. Prebuilt libraries and HMI panels. These features are claimed to make RSVIEW easier to maintain. 	<p>support/programming staff and for TPO.</p> <p>May require identification and integration of new programming support resource</p>	

While there are advantages to all four of these options, the recommended choice for the 5-year planning period of this Master Plan is Option 3 because:

- Option 1 leaves in-place existing obsolete operating systems with their present cyber-security issues, obsolete iFIX environments, and screen inconsistencies caused by multiple upgrades by changes in developers over many years.
- Option 2 would update operating systems and iFIX environments but would deliver no standards-based HMI improvements for operators.
- Option 3 would update both operating systems and iFIX environments and add standards-based HMI improvements for operators. Changes to the HMI could be tailored to the capital budget to maximize benefits; much in the existing screens could be re-used and the Historian could simply be migrated to the latest version.
- Option 4 involves completely throwing away the present investment in the HMI software application and starting over. The incremental cost of Option 4 compared with Option 3 is probably in the range of and additional \$500,000 to \$1,500,000.

Regardless of which option is chosen in 2015, it seems likely that another major HMI programming effort may be needed less than 5 years out. [REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

Handicapping the schedule for software updates is inherently a risky business but planning on the capital expense for the necessary updates in the HMI application and programming/configuration support every 3 to 4 years, is fiscally wise and recommended.

PLC Programming Environment & PLC Applications

PLC software programming environments and even the custom applications running the processes also have finite lifetimes. The PLC hardware platforms or families historically have a product life-cycle of between 15 and 20 years. However, during the product life cycle, there may be many hardware and firmware revisions for individual components that don't necessarily maintain forward and backward compatibility with other components within the same product family.

USD currently specifies and maintains two different PLC hardware families [REDACTED]

[REDACTED]

- Rockwell Automation ControlLogix [REDACTED] for large area controllers with multiple I/O drops.
- Rockwell Automation CompactLogix [REDACTED] for smaller applications that don't require remote I/O.

[REDACTED]

[REDACTED]

[REDACTED]

There are several factors to consider when deciding to upgrade to a new version [REDACTED]. These factors include:

- Does the new version provide additional features and capabilities that are beneficial to USD?
- Is the latest [REDACTED] software compatible with the programming computers and operating systems that are currently in use by USD?
- Is the latest [REDACTED] software compatible with all of the processors and applications that are currently installed at USD facilities?
- If older processors are not compatible with the latest version, what is the total cost to upgrade the hardware?

It should be noted that Rockwell allows multiple versions [REDACTED] to be installed concurrently on the same computer. While not ideal, this feature can be used to maintain older PLC systems until time and budgets allow for a full hardware upgrade.

Hardware upgrades should be performed when products reach their end of life and are designated as “Silver Series” by Rockwell.

Recommendation:

To provide machine independence for the PLC programming environment, it is recommended that the program development environment be virtualized, for convenient LAN accessibility as well as easy deployment to laptops for field use.

3.2.8 Remote Access Solution

The existing remote access solution [REDACTED] has proven itself for remote users, SCADA Virtualization Project: Control Building Improvements, expands the remote access strategy to encompass all the operator desktops (estimated at approximately 20 desktops in total). It is envisioned that [REDACTED] will be integrated on the new computer and storage infrastructure. However, the [REDACTED] security server is not expected to be required for internal connections between SCADA thin clients and the virtual infrastructure.

Network Improvements Project: Remote Access/Mobile Computing considers changing the remote access to SCADA infrastructure [REDACTED]

[REDACTED]

Project “Network Improvements: Remote Access/Mobile Computing” also prepares the plant for uniform wireless (based on 2.4 GHz/5 GHz) in order to allow access to local resources without coming in through the Internet via a 4G (or similar) connection. Secure access via wireless

would be provided through 802.1x authentication via RADIUS, only allowing authorized devices/users access to the wireless infrastructure.

Recommended Project:

Table 15: Recommended Project – Network Improvements: Remote Access/Mobile Computing

Project	Network Improvements: Remote Access/Mobile Computing
Background	Improve remote access experience, create better auditing of remote and localized users, and validate the [REDACTED] infrastructure to handle local tablets.
Scope	Implement secure wireless remote access connectivity to SCADA resources both at the WWTP and from off-site locations such as the pump stations. Provide full access to WWTP operational status from the remote pump stations HMI devices. Evaluate both Wi-Fi and cellular 4G alternatives and implement the best solution while minimizing security risks. Assess optional implementation of extending Wi-Fi to the 4 administration buildings: Admin, Control, CS, and FMC
Justification	<ul style="list-style-type: none"> • Quicker response to alarms and the ability to handle process disturbances immediately wherever staff is in the WWTP or pump stations. • Implement new remote access provisions consistent with the upgraded SCADA system. • Provide access by managers and call-out staff from home.
Consequences	<ul style="list-style-type: none"> • Continued inefficiencies because staffs don't have SCADA resources with them as they make rounds. • Lack of secure remote access to SCADA.
Prerequisites & Dependencies	<ul style="list-style-type: none"> • Prerequisites: completion of the Control Building Improvements Project and <ul style="list-style-type: none"> ○ PoE (for wireless access points), ○ Hypervisor capacity for any additional virtual desktops required. • 3rd party Security Assessment to determine how the wireless environment can be implemented with minimal risk to the network infrastructure • Dependencies: [REDACTED], RADIUS (for 802.1x wireless authentication)
Necessary Resources (Labor and Materials)	<ol style="list-style-type: none"> 1. District Labor 2. Consultant

Project	Network Improvements: Remote Access/Mobile Computing	
Budgetary Cost Estimate (Nearest \$10,000)	District Labor Hours	250 IT 50 TPO 0 CIP 0 FMC 300 hrs.
	Consultant	\$50,000 ¹²
	Purchase Contracts	\$40,000 ¹³
	Total estimated funds needed	\$90,000
Duration (months)	6 Months	
Agency Lead Department	Information Technology	

3.2.9 Network Design Improvements-Reliability, Redundancy

The District's fiber infrastructure is 20 years old and fiber technology has improved substantially over the years. Additional fiber runs have been added in an ad hoc manner that created a network with compromised resilience. In order to maintain consistency with the existing network, additions to the network were based on old multimode fiber technology which has created distance and throughput limitations that need to be addressed at some point. This master plan presents the District an opportunity to design a network infrastructure from the ground up using current fiber and switching technologies to position the District for the future.

The project described in **Tables 17** accommodates a new virtualized SCADA system and makes the minimum improvements needed to enhance disaster recovery. The project described in **Table 18** assesses alternatives to address the need for network redundancy by introducing redundancy at the core and the firewall edge of the plant infrastructure. These projects do not, however, address redundancy within the Admin infrastructure or at the Internet level and it is assumed that the outage of an access switch represents an acceptable amount of downtime to that portion of the plant.

For most locations, therefore, we recommend continuing to maintain a sparing strategy (relying on use of spares) for access switches and adoption of a Cisco 24x7x4 support contract. In this way, maximum downtime of any piece of infrastructure should be limited to roughly 4 to 6 hours.

Security penetration testing - \$30,000

¹³ Wireless equipment – \$40,000

New cable and conduit - \$20,000

However, for locations where a switch outage is more critical, such as a switch providing communication between a PLC and a RIO unit, more robust solutions are called for.

A major design consideration that could result in increased uptime and resilience is to change from the ring based topologies to a star or dual star based topology. The star topology would be complemented by all redundancy handled via port channels or through non-blocking architecture. [REDACTED]

[REDACTED] However, on a star or dual star topology, a loop free design should be attainable.

Regardless of the topology choice, the fiber plant needs to be evaluated for readiness since there appears to be Multi-Mode fiber installed that exceeds the maximum distance for maintaining 1 Gbps or 10 Gbps bandwidth.

The low priority project described in **Appendix D, Table 5** estimates the budget for 10 Gbps uplinks between buildings from the network equipment perspective. This suggestion again requires that the fiber infrastructure operate at 10 Gbps; that appears problematic with the installed multi-mode fibers. [REDACTED]

For manageability and security, we recommend implementing Terminal Access Controller Access Control System (TACACS) or Remote Access Dial In User Service (RADIUS) for Authentication, Authorization, and Accounting. However, RADIUS can also be used together with Syslog for true command level accounting. Management can be performed on this size network using the Cisco Network Assistant tool, found online¹⁵.

All management of network devices should be performed via secure protocols as the standard method of managing network devices (SSH or HTTPS). Further, any network modifications made per **Table 17** must be coordinated with work being performed under the IT Master Plan.

Three options were studied for improving the fiber network at the WWTP, listed in order of increasing network resilience in **Table 16**. **Tables 17 and 18** describe the recommended projects.

¹⁴ http://www.cisco.com/c/en/us/products/collateral/interfaces-modules/transceiver-modules/data_sheet_c78-455693.html

¹⁵ <http://www.cisco.com/c/en/us/products/cloud-systems-management/network-assistant/index.html>

Table 16: Network Improvements Options

Option	Description	Advantages	Disadvantages	Cost
1	<p>Keep current loop topology and improve Spanning Tree Protocol:</p> <p>Use per VLAN rapid spanning tree to reduce convergence time but leave the loop architecture in place.</p>	<ul style="list-style-type: none"> • Quickest to deploy. • Use of per VLAN spanning tree will reduce failover time on a fiber cut. • Least capital expense. 	<ul style="list-style-type: none"> • Single point of failure: loss of the core/layer 3 switch or of premises power would be catastrophic to the network. • Buildings could be isolated by 2 fiber optic outages (nature of loop) 	Lowest
2	<p>Migrate to single star topology with 10 Gb interconnections:</p> <p>Dedicate fiber optic connections from a single core switch to each edge switch with a loop free topology.</p> <p>(See Table 18 below for detailed recommendation.)</p>	<ul style="list-style-type: none"> • Removes present spanning tree convergence time issues. • Reduces dependencies: each building connects directly to each core. 	<ul style="list-style-type: none"> • Requires new core switch for 10 Gb connectivity and high fiber aggregation count. • Each building needs 2 strands of fiber to the core. • Fiber optic distance will likely exceed manufacturer specifications for multimode; new single mode fiber optic cables would likely be required 	Low to Moderate based on fiber optic distances
3	<p>Migrate to dual star topology with 10 Gb interconnections:</p> <p>Dedicate fiber optic connections from 2 core switches to each edge switch (building switch) to have a loop-free topology.</p> <p>(See Table 19 below for detailed recommendation.)</p>	<ul style="list-style-type: none"> • Removes present spanning tree convergence time issues. • Reduces dependencies: each building connects directly to each core. • Network would remain operational even in the event of a single core switch loss. • New core switch would support 10 Gb connectivity for robust disaster recovery. 	<ul style="list-style-type: none"> • Requires new core switching equipment to support distributed switch protocols. • Each building needs 2 strands of fiber to each new core. • Fiber optic distance will likely exceed manufacturer specifications for multimode; new single mode fiber optic cables would likely be required to support this topology. 	Moderate to high based on fiber optic distances

These 3 network improvement options are illustrated in the **Figures 11, 12, and 13.**

Figure 11: Loop Topology (current simplified fiber arrangement)

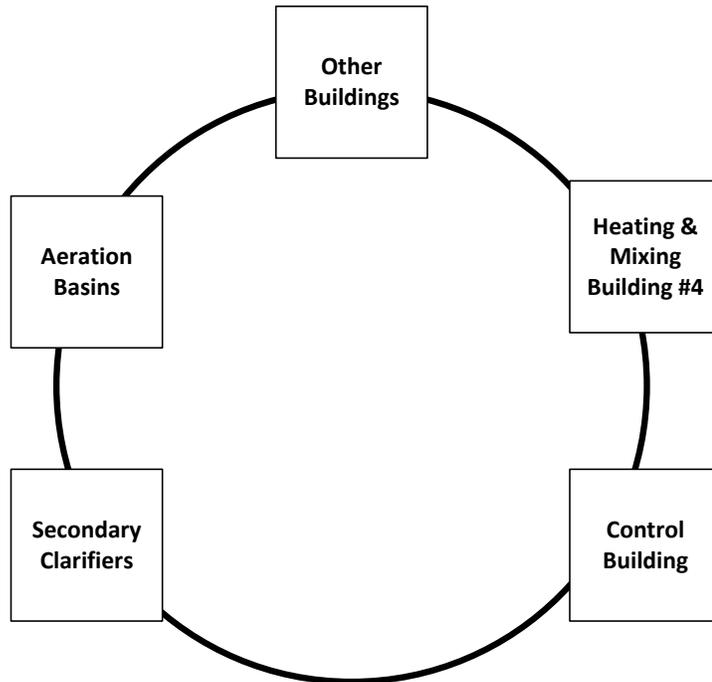


Figure 12: Single Star Topology (one fiber link per building)

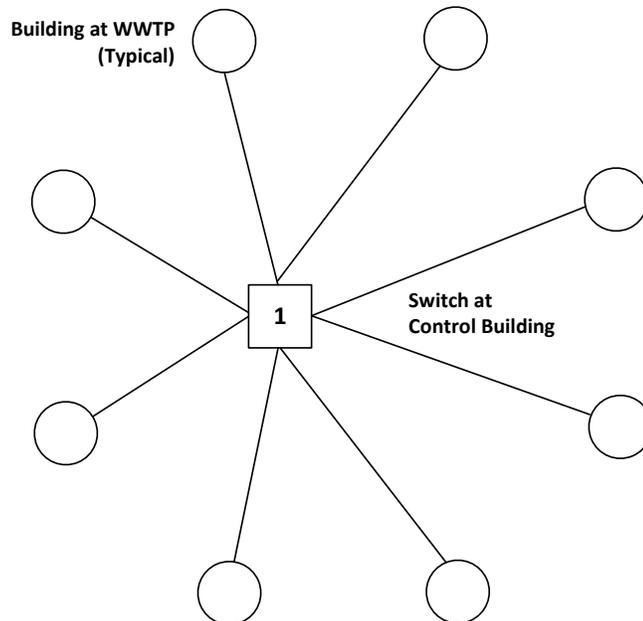
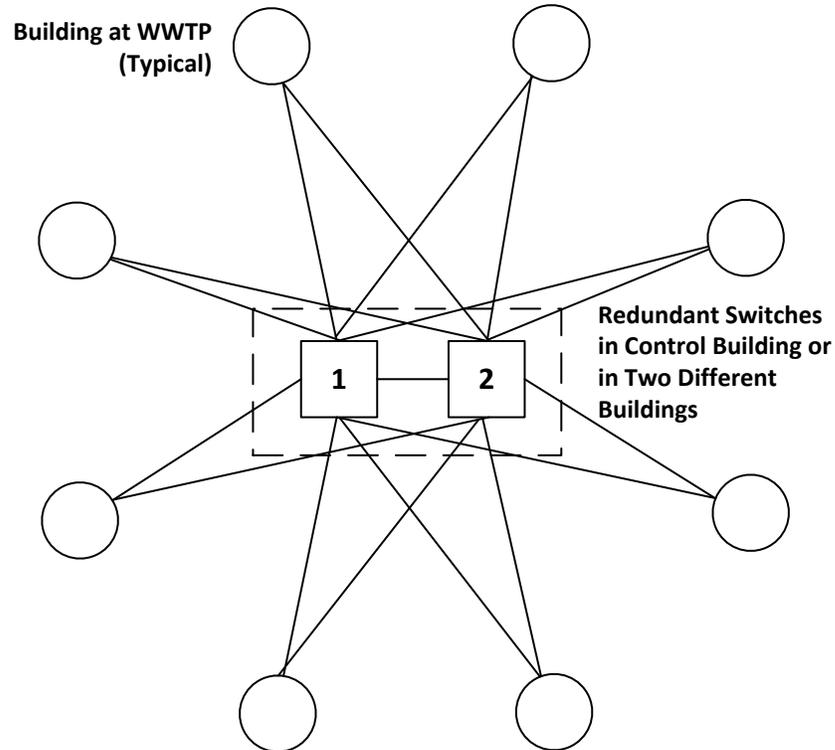


Figure 13: Dual Star Topology (two fiber links per building)



There are two recommended phases for updating the local area network at the WWTP from the present loop topology to either a dual star or dual loop. The first phase is to implement improvements at the Admin, Control, and Dewatering Buildings needed for virtualization. These improvements will also add high speed (10 Gb) data connectivity for SCADA system resilience and for rapid system recovery in the event of a disaster. The second phase will be a study to identify and price alternatives for additional network improvements. Phase 1 is described in **Table 17** and Phase 2 in **Table 18**.

Recommended Project:

Table 17: Recommended Project – Network Improvements: Admin, Control, and Dewatering Building, & 10 Gb Infrastructure Upgrades for Disaster Recovery

Project	Network Improvements: Admin, Control, and Dewatering Building, & 10 Gb Infrastructure Upgrades for Disaster Recovery	
Background	The WWTP has virtualization equipment at the Administration and Dewatering Buildings. The proposed addition of virtualized SCADA servers and workstations will necessitate upgrades at both of these buildings and the Control Building as well as some of the interconnecting fiber.	
Scope	Design and implement a network infrastructure to connect the Admin, Control, and Dewatering buildings together in a single star topology with 10 Gb fiber communications.	
Justification	<ul style="list-style-type: none"> • Provides the infrastructure for a high-speed on-site disaster recovery solution for the new virtualized SCADA system. • Updates the existing fiber network which is based on old technology. • Provides the first phase of infrastructure improvements needed to switch from the existing fiber loop to a high-speed star. 	
Consequences	<ul style="list-style-type: none"> • The lack of an in-plant 10 Gb fiber infrastructure will increase the recovery time for any local DR installation. 	
Prerequisites & Dependencies	<ul style="list-style-type: none"> • Prerequisites: completion of the Control Building Improvements Project. Note that implementing a star topology would first require fiber plant assessment which is the first item in this project scope. • Dependencies: Fiber Optic plant 	
Necessary Resources (Labor and Materials)	<ol style="list-style-type: none"> 1. District Labor 2. Consultant 3. Contractor 	
Budgetary Cost Estimate (Nearest \$10,000)	District Labor Hours	40 IT Project Management 20 TPO 20 CIP 0 FMC 80 hrs.

Project	Network Improvements: Admin, Control, and Dewatering Building, & 10 Gb Infrastructure Upgrades for Disaster Recovery	
	Consultant ¹⁶	\$0
	Contractor ¹⁷	\$30,000
	Purchase Contracts ¹⁸	\$70,000
	Total estimated funds needed	\$100,000
Duration (months)	6 Months	
Agency Lead Department	Information Technology	

This estimate is based on the assumption that there is ample room in the pull boxes and duct banks to install new fiber optic cables and no new underground infrastructure is needed. Verification of this is beyond the scope of this project.

Table 18: Recommended Project – Plant Network Improvement Study

Project	Network Improvements: Plant Network Improvement Study
Background	Technology has improved significantly since the existing plant fiber network was installed and extensions to the network over the years have reduced overall resilience.
Scope	Perform an in-depth assessment of the fiber infrastructure to: <ul style="list-style-type: none"> • Investigate, test, and create as-built documentation • Establish goals for remediation • Create design and budget options for remediation • Support in the presentation of findings to upper management
Justification	<ul style="list-style-type: none"> • Substantially improves network reliability via redundancy and improves performance to meet existing and future needs. • Provides infrastructure to accommodate future networked improvements such as VOIP, IP cameras, etc. • Alignment with networking best practices for maximizing up-time. (Best practices have changed in the last 25-years from loop topology to dual star.) • Future-proof the WWTP network by implementing new single mode fiber home runs.

¹⁶ Fiber optic assessment of path from dewatering to control to admin building by USD staff.

¹⁷ Fiber Optic Plant Improvements to the path from dewatering to control to admin building - \$10,000 allowance; Deployment of Switching equipment - \$20,000

¹⁸ New edge switches in dewatering, and admin with 10Gb optics - \$20,000; New Core switch in Control - \$50,000

Project	Network Improvements: Plant Network Improvement Study	
	<ul style="list-style-type: none"> Upgrading to dual fiber permits phase-out of the existing microwave backup communications system, resulting in less complexity and more reliability. 	
Consequences	<ul style="list-style-type: none"> Continued network reliability issue due to the use of a single core switch. Network reliability issue if the existing fiber loop is left unimproved or if only a single star fiber network replaces the loop. Continued built-out of an ad hoc network would lead to further network stability issues. Continued use of microwave for backup results in a network that is more complex and less reliable than a dual star. 	
Prerequisites & Dependencies	<ul style="list-style-type: none"> None. 	
Necessary Resources (Labor and Materials)	<ol style="list-style-type: none"> District Labor Consultant 	
Budgetary Cost Estimate (Nearest \$10,000)	District Labor Hours	40 IT Project Management 20 TPO 20 CIP 20 FMC 100 hrs.
	Consultant ¹⁹	\$65,000
	Contractor ²⁰	\$0
	Purchase Contracts ²¹	\$0
	Total estimated funds needed	\$65,000
Duration (months)	6 Months	
Agency Lead Department	Information Technology	

¹⁹ Fiber optic assessment of path from dewatering to control to admin building by USD staff.

²⁰ Fiber Optic Plant Improvements to the path from dewatering to control to admin building - \$10,000 allowance; Deployment of Switching equipment - \$20,000

²¹ New edge switches in dewatering, and admin with 10Gb optics - \$20,000; New Core switch in Control - \$50,000

3.2.10 Future SCADA Trends

The District presently has standard hardware and software in place for SCADA system operations at the WWTP and at the remote site pump stations. These standards are based on Rockwell Automation PLCs, [REDACTED] and iFIX SCADA platforms. However, over the planning horizon of this Master Plan, consideration must be given to the next technology cycle of SCADA hardware and software to establish a robust SCADA system Master Plan that acknowledges the rapidly changing technology associated with digital control systems. The purpose of the Section is to describe how these future SCADA trends will be incorporated into the overall system master planning effort.

When considering the nature of future trends and how these may impact District planning, typical lifecycles of hardware and software should be considered. [REDACTED]

[REDACTED]

[REDACTED] However, at some point product end of life and obsolescence become a concern as repairs and spare parts become difficult or impossible to source. A similar situation exists for software where backward compatibility between old applications and new product revisions can be difficult to achieve over time.

For the purposes of this Master Plan, we recommend reviewing hardware and software technology trends that could be considered for future upgrades. The study focus will be on using the District's existing SCADA elements as a starting point and identify migration paths to avoid locking the District into specific products indefinitely.

Recommendation:

Incorporate consideration of technology improvements and SCADA trends into the master plan.

Areas to be addressed include:

- Review alternative SCADA HMI software as potential alternatives to iFIX. HMI software can be considered a relatively “easy” change since little field wiring and hardware changes are involved. Technology considerations and criteria of an HMI upgrade could include security, remote web access, native support for tablets or other wireless devices, historical database servers, and integration of controllers and smart instruments;
- Review feasibility of Allen-Bradley PlantPax to allow integrated “DCS” type of SCADA system based on the District's existing ControlLogix standard hardware platform; and
- Identify specific migration path design features for reducing impact of future hardware or software changes. Some examples are standardized use of open format wiring harnesses to eliminate rewiring of replacement controllers; object oriented and modular program strategies to simplify code translation and reduce reprogramming efforts.

Review potential advantages and shortcomings of a complete SCADA system replacement of hardware and software. Replacement in this case is defined as a “clean slate” revamp using alternative platforms based on DCS or PLC/HMI platforms.

3.2.11 Disaster Recovery Plans & Procedures

The multi-site storage solution described in SCADA Virtualization Project: Disaster Recovery allows for high availability of the virtualized SCADA environment. The virtual servers could be run from either of two buildings (The Administration and Control Buildings are most ready for

this architecture today, but the Centrifuge Building has been identified as a desirable site in the event of a disaster), and in the event of a catastrophic failure at one building, VMware HA could recognize the loss of heartbeat and restart the downed virtual machines automatically in the surviving building.

For switching redundancy, most switches could be replaced using a sparing strategy. SCADA Virtualization Project: Disaster Recovery allows for an additional spare switch to be purchased. The minimal downtime would not result in a disaster since the configuration files are protected [REDACTED], and the operators could manually operate the equipment as long as the PLC can communicate with the RIO. Currently, there is a known issue where RIO's can be isolated from the PLC during a switch outage. This situation can be addressed by migrating to a dual port Ethernet NIC on the PLC with one port facing the Ethernet switch and the other facing the RIO, but this situation may not be desirable from a monitoring and troubleshooting perspective. Further analysis into this solution is needed.

For core switching redundancy, Network Improvements Project: Admin, Control, and Dewatering Building, & 10 Gb Infrastructure Upgrades for Disaster Recovery addresses the loss of a physical core switch [REDACTED]. During a failure event, the downstream port channels would be reduced in bandwidth but would not suffer any logical disconnect as the secondary star failed, and no spanning tree convergence would occur. A temporary reduction in bandwidth is anticipated to have little impact on process control where bandwidth requirements are typically relatively low. However, suitable means for bandwidth management (e.g. QOS or MPLS) might be needed to ensure prioritization of the SCADA/process control real time operational data.

Recommended Project for Disaster Recovery is described above in **Section 3.2.6**.

3.2.12 SCADA Support Levels, Skill Development

As noted in Section 3.2.18, the District uses a combination of in-house and outside consultants for technical support of SCADA/PLC systems. This Section reviews training and development processes as they relate to present and planned District staffing levels. The goal is to identify means and methods to provide better support for those tasks that are performed under District purview.

Recommendation

A review of present and planned SCADA and PLC staffing, over the planning horizon of the Master Plan, is included in **Section 4.3**. Based on the identified USD internal staffing levels and required skill sets, a Master Plan project will be developed to formalize staff training and development requirements that are specific to support in-house SCADA/PLC. Training will emphasize use of those specific vendors responsible for providing equipment, software, and services to USD. Note this support and skills development is separate from the SCADA application training described previously under **Section 3.2.2**.

Skills development will also reflect application of the three deep support rule used by the District to ensure in-house support services are suitable for meeting the support criteria and

complement the selection criteria used for the consultant selection process described in **Section 4.3**.

Recommended Project:

Table 19: Support & Training – Support Level/Skills Development

Project	Support & Training: Support Level/Skills Development	
Background	The updating and modernizing of SCADA and related systems recommended by this master plan necessitates additional training of USD staff to accommodate significant upgrades of iFIX software, implementation of newer IT technologies such as 10 Gb networking, etc.	
Scope	Identify and document means and methods to improve SCADA technical support by developing training plans for those tasks performed under District purview. Develop training levels, evaluation metrics, and skills assessment methods to validate staff training for SCADA specific support for IT, TPO, and FMC personnel.	
Justification	<ul style="list-style-type: none"> • For each group, clarify tasks and skills needed to support the SCADA system. • Provide for regular staff development to maintain and improve job skills. • Provide cross training opportunities for backup support and to minimize down time. 	
Consequences	<ul style="list-style-type: none"> • Untrained support staff would take longer to resolve issues. • Backup staff won't be able to handle as wide a variety of issues. • Staff job competency will not grow. 	
Prerequisites & Dependencies	<ul style="list-style-type: none"> • Prerequisites: None. • Dependencies: None 	
Necessary Resources (Labor and Materials)	1. District Labor 2. Consultant	
Budgetary Cost Estimate (Nearest \$10,000)	District Labor Hours	240 IT Project Management 120 TPO 0 CIP <u>240</u> FMC 600 hrs.
	Consultant ²²	\$50,000
	Contractor	\$0
	Purchase Contracts	\$0

²² Off-site and in-service cost for training by third parties.

Project	Support & Training: Support Level/Skills Development	
	Total estimated funds needed	\$50,000
Duration (months)	24 Months	
Agency Lead Department	Information Technology	

3.2.13 Project Management

The subject of program management was not discussed during the Task 1 workshops. Managing the 10 Recommended Projects in this Master Plan, however, will require a substantial effort – approximately equivalent to one full time employee for fiscal years 2017 and 2018 (based on the combination of IT and SCADA master plan projects scheduled).

Program management activities would include assisting with the RFP processes, overseeing the schedules for the various studies and upgrade activities, and recommending payments.

While retaining a consultant to perform project management solves the resource issue, hiring a new full time employee would result in significant cost savings and is recommended. Many of the activities described in the Recommended Projects have been allocated to consultants. To the extent that the new recommended employee is available, some of the planned consultant activities could be reassigned, providing additional cost savings.

Recommended Project:

Table 20: Recommended Project – Project Management

Project	Project Management
Background	The projects for the IT Master Plan and the SCADA Master Plan will run concurrently and additional project management resources are required to address the IT labor gap in FY17 and FY18.
Scope	<ul style="list-style-type: none"> • Management of the various IT and SCADA Master Plan Projects, • Assist in the creation of RFP's, evaluation of proposals, and negotiation of contracts, and • As-needed coordination with USD's staff and the construction manager.
Justification	<ul style="list-style-type: none"> • USD IT staff does not have sufficient projected availability to handle present duties and the additional work of managing two concurrent programs.

Project	Project Management	
	<ul style="list-style-type: none"> Having necessary project management staff availability contributes to keeping both programs on time and within budget. 	
Consequences	<ul style="list-style-type: none"> Insufficient oversight of the work for compliance with USD practices and standards Potential for lack of coordination between the IT and SCADA improvement programs and normal support activities. 	
Prerequisites & Dependencies	<ul style="list-style-type: none"> Prerequisites: None Dependencies: All other master plan project 	
Necessary Resources (Labor and Materials)	<ol style="list-style-type: none"> District Labor Consultant 	
Budgetary Cost Estimate (Nearest \$10,000)	District Labor Hours	175 IT Project Management 25 TPO 25 CIP <u>25</u> FMC 250 hrs. annually
	Consultant	\$300,000.00 ²³
	Contractor	\$0.00
	Total estimated funds needed	\$0.00
Duration (months)	60 Months	
Agency Lead Department	Information Technology	

²³ The projects for the IT Master Plan and the SCADA Master Plan will run concurrently. The budgetary costs for a consultant will fill in for in-house resource shortages needed to manage both programs.

3.3 Project Ranking

Table 21 has project ranking criteria, attributes, and weights as developed by USD. These metrics were applied to all of the projects. Those projects with the highest scores were included above in **Section 3.2 Recommendations** and are listed with rankings in **Table 22**. Those projects with lower scores are included for completeness in **Appendix D**.

Table 21: Project Ranking Metrics

Criteria	Attributes	Weight
Required legal, compliance, or regulatory mandates	0: Not required/mandated 9: Required/mandated	5
Reliability Redundancy, Resiliency, Performance	0: little improvement/change 3: Some improvement/change 6: A lot of improvement/change 9: High improvement/change	5
Risk Management Safety, Security, Disaster Recovery, Asset Management	0: little risk to District 3: Some risk to District 6: A lot of risk to District 9: High risk to District	4
Process Improvement Standardization, Usability, Keep current with technology, Modernization	0: Little benefit to customers/District 3: Some benefit to customers/District 6: A lot of benefit to customers/District 9: High benefit to customers/District	3
Cost ROI, Efficiency, Value, Amount of known costs, Qualified vendors	0: little value to the customer(s) 3: some value to the customer(s) 6: a lot of value to customer(s) 9: essential/critical to customer(s)	2
Strategic Alignment Sequencing, Urgency, Resource management	0: No strategic alignment elements 3: Some strategic alignment elements 6: A lot of strategic alignment elements 9: High/Total strategic alignment	2

Note that the **Cost** criterion is based on a perceived value compared with the amount of money spent.

Table 22: Project Ranking Summary

Criteria		Required legal, compliance, internal requirement, or regulatory mandates	Reliability Redundancy, Resiliency, Performance	Risk Management Safety, Security, Disaster Recovery, Asset Management	Process Improvement Standardization, Usability, Keep current with technology, Modernization	Cost ROI, Efficiency, Value, Amount of known costs, Qualified vendors	Strategic Alignment Sequencing, Urgency, Resource management			
Suggested Scoring Values		0: Not required/ mandated 9: Required/ mandated	0: little improvement/ change 3: Some.. 6: A lot.. 9: High..	0: little risk to District 3: Some.. 6: A lot.. 9: High..	0: Little benefit to customers/ District 3: Some.. 6: A lot.. 9: High..	0: little value to the customer(s) 3: some value 6: a lot of value to customer 9: essential/ critical to customer(s)	0: No strategic alignment elements 3: Some.. 6: A lot.. 9: High/Total strategic alignment	Total Score	Normalized Score (% of max)	Rank
Weight		5	5	4	3	2	2	189	100%	
Improvement Category	Project Name									
SCADA Virtualization	Control Buliding Improvements	9	9	8	6	6	5	162	86%	2
SCADA Virtualization	Disaster Recovery	9	9	9	3	3	5	151	80%	3
SCADA Virtualization	HMI Upgrades per Standards	0	5	5	9	6	6	96	51%	9
SCADA Optimization	Alarm Notification Plan	9	9	9	5	8	5	167	88%	1
SCADA Optimization	Predictive Maintenance Analytics Pilot Deployment	0	6	4	5	5	3	77	41%	10
Network Improvements	Admin, Control, and Dewatering Building, & 10 Gb Infrastructure Upgrades for Disaster Recovery	0	9	9	5	6	2	112	59%	6
Network Improvements	Plant Network Improvement Study	0	9	9	7	6	6	126	67%	5
Network Improvements	Remote Access/Mobile Computing	0	6	7	9	7	5	109	58%	7
Support & Training	Standards Maintenance	0	6	7	8	6	6	106	56%	8
Support & Training	Support Level/Skills Development	9	7	6	5	6	8	147	78%	4
Project Management	Project Management	0	3	5	3	3	1	52	28%	11

Section 4: Implementation Plan

4.1 Summary of Recommended Projects

Thirteen projects have been recommended for implementation under the Master Plan and are ranked above in **Table 22**. These projects fall under five improvement categories and are summarized in **Table 23**.

Eleven additional projects were ranked so low as to not justify inclusion in the 5-year planning horizon of this Master Plan; these projects are described in the **Appendix D** titled “Low Priority Projects.”

Table 23: Summary of Recommended Projects

Improvement Category	Project Description
SCADA Virtualization	<p>Control Building Improvements: Plan and implement the replacement of obsolete SCADA servers and workstations utilizing server virtualization. Implement a distributed workstation and storage system so virtual machines for SCADA (including main servers) can run from more than one building. Upgrade iFIX and Historian to the current versions and migrate the SCADA screens for compatibility with the new software. Provide a backup solution.</p>
SCADA Virtualization	<p>Disaster Recovery Update the SCADA Disaster Recovery (DR) elements in the IT Disaster Recovery Plan to improve business continuity. Implement DR and security improvements to the data centers.</p>
SCADA Virtualization	<p>HMI Upgrades per Standards Once migrated, revise legacy SCADA screens in accordance with USD standards.</p>
SCADA Optimization	<p>Alarm Notification Plan Review, design, and implement improvements for secure wireless connectivity at the WWTP and for improving the effectiveness of in plant alarm notification.</p>

Improvement Category	Project Description
SCADA Optimization	<p>Predictive Maintenance Analytics Pilot Deployment Deploy predictive analytics for critical assets that already have adequate sensors in place using the existing Mtell infrastructure. Upgrade the Mtell software to the latest version. Train designated mechanical staff how to configure and manage the predictive analysis process.</p>
Network Improvements	<p>Admin, Control, and Dewatering Building 10 Gb Infrastructure Upgrades for Disaster Recovery Design and implement a network infrastructure to connect the Admin, Control, and Dewatering buildings together in a single star topology with 10 Gb fiber communications.</p>
Network Improvements	<p>Plant Network Improvement Study Perform an in-depth assessment of the fiber infrastructure to:</p> <ul style="list-style-type: none"> • Investigate, test, and create as-built documentation • Establish goals for remediation • Create design and budget options for remediation • Support in the presentation of findings to upper management
Network Improvements	<p>Remote Access/Mobile Computing Implement secure wireless remote access connectivity to SCADA resources both at the WWTP and from off-site locations such as the pump stations. Provide full access to WWTP operational status from the remote pump stations HMI devices. Evaluate both Wi-Fi and cellular 4G alternatives and implement the best solution while minimizing security risks. Assess optional implementation of extending Wi-Fi to the 4 administration buildings: Admin, Control, CS, and FMC.</p>
Support & Training	<p>Standards Maintenance Define requirements, establish, and implement an electronic based process for continuous updates and improvements to the SCADA based standards (i.e. controls design specifications, instrumentation and panel design specifications, PLC programming, and HMI configuration/graphics/historian, etc.).</p>
Support & Training	<p>Support Level/Skills Development Identify and document means and methods to improve SCADA technical support by developing training plans for those tasks performed under District purview. Develop training levels, evaluation metrics, and skills assessment methods to validate staff training for SCADA specific support for IT, TPO, and FMC personnel.</p>
Project Management	<p>Project Management The projects for the IT Master Plan and the SCADA Master Plan will run concurrently and additional project management resources are required to address the IT labor gap in FY17 and FY18.</p>

4.2 SCADA Master Plan Budget

There were two meetings to review options for sequencing the projects. The first was with the IT Administrator and CIP coach and the second added Management from FMC and TPO.

All attendees assessed project priorities, project dependencies, projected availability of capital resources, and the opportunities to utilize in-house labor resources. **Table 24** shows the resulting 5-year plan, covering Fiscal Years 2016 – 2020 and totaling \$1,025,000.

Table 24 does not, however, include internal costs borne by each workgroup/team. To give a more complete picture of costs, labor loading by workgroup/team by year was extracted from Section 3: Recommendations and is shown in **Table 25**

Table 24: SCADA Master Plan Budget

Improvement Category	Project Name	Duration (months)	Total Contract Cost Over 5 yrs.	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
SCADA Virtualization	Control Building Improvements	6	\$20,000	\$20,000				
	Disaster Recovery	6	\$100,000		\$100,000			
	HMI Upgrades per Standards	24	\$250,000				\$125,000	\$125,000
SCADA Optimization	Alarm Notification Plan	6	\$25,000	\$25,000				
	Predictive Maintenance Analytics Pilot Deployment	6	\$25,000		\$25,000			
Network Improvements	Admin, Control, and Dewatering Building, & 10 Gb Infrastructure Upgrades for Disaster Recovery	6	\$100,000		\$100,000			
	Plant Network Improvement Study	12	\$65,000		\$65,000			
	Remote Access/Mobile Computing	12	\$90,000		\$90,000			
Support & Training	Standards Maintenance	60	\$0	\$0	\$0	\$0	\$0	\$0
	Support Level/Skills Development	6	\$50,000		\$25,000	\$25,000		
Project Management	Project Management	24	\$300,000		\$150,000	\$150,000		
Rounded Totals (no Escalation)			\$1,025,000	\$45,000	\$555,000	\$175,000	\$125,000	\$125,000

Table 25: Estimated Internal Labor Loading

Improvement Category	Project Name	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				SCADA Master Plan Totals			
		IT	CIP	FMC	TPO	IT	CIP	FMC	TPO																
SCADA Virtualization	Control Building Improvements	700			20																	700	-	-	20
	Disaster Recovery					400			40													400	-	-	40
	HMI Upgrades per Standards												200	50	100	200	200	50	100	200		400	100	200	400
SCADA Optimization	Alarm Notification Plan	20	20	40	40																	20	20	40	40
	Predictive Maintenance Analytics Pilot Deployment					20	20	20	20														20	20	20
Network Improvements	Admin, Control, and Dewatering Building, & 10 Gb Infrastructure Upgrades for Disaster Recovery					40	20		20													40	20	-	20
	Plant Network Improvement Study					40	20	20	20													40	20	20	20
	Remote Access/Mobile Computing					250			50													250	-	-	50
Support & Training	Standards Maintenance	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	100	100	100	100
	Support Level/Skills Development					120		120	60	120		120	60									240	-	240	120
Project Management	Project Management					175	25	25	25	125	25	25	25									300	50	50	50
Total Labor Hours		740	40	60	80	1,065	105	205	255	265	45	165	105	220	70	120	220	220	70	120	220	2,510	330	670	880

Total Hours over 5 years 4,390

Funding:

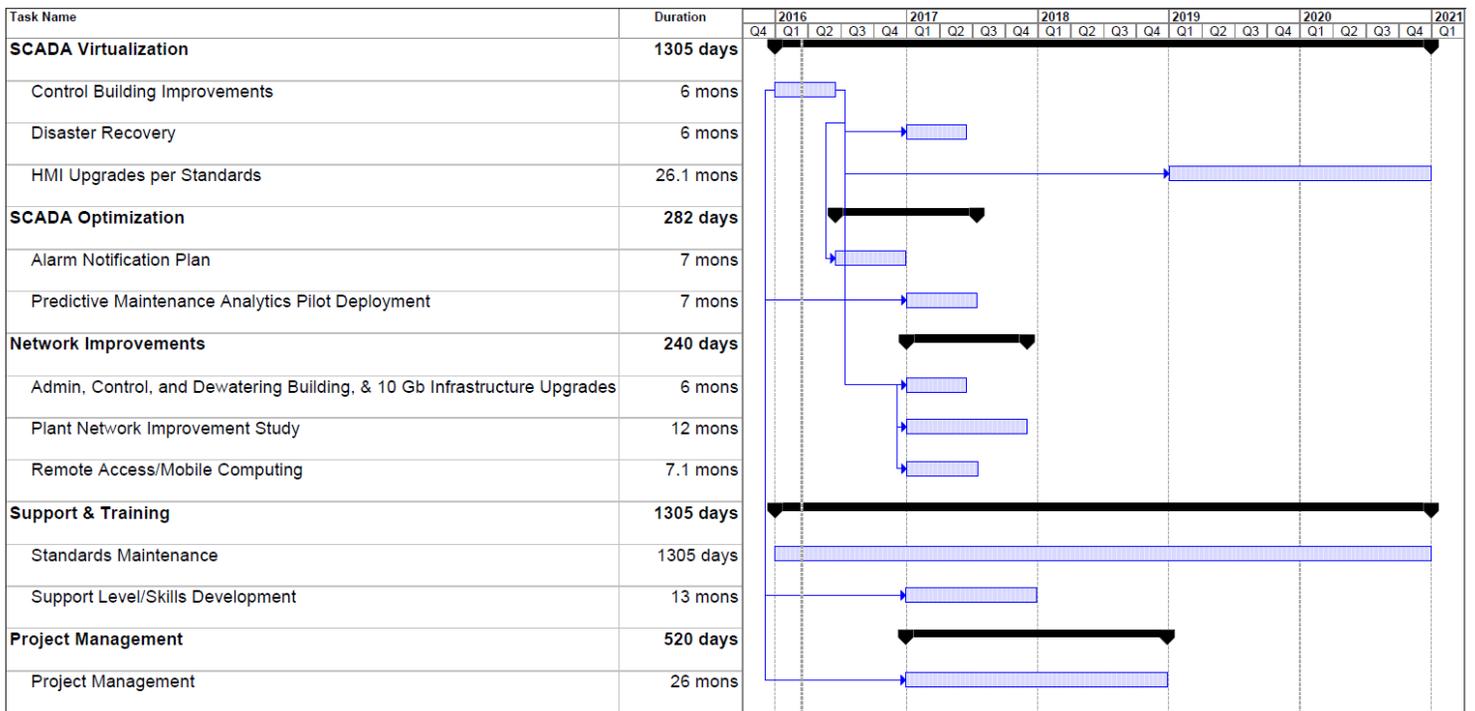
- IT projects will be funded out of the IS R&R fund
- CIP projects will be funded out of the CIP R&R fund

4.3 Master Plan Schedule

The schedule for the SCADA Master Plan Program is shown in **Figure 14** and is based on the SCADA Master Plan as budgeted in **Table 24**.

We recommend reviewing the Implementation Schedule annually to assess changes in project priorities and the availability of funds.

Figure 14: SCADA Master Plan Implementation Schedule



Options for Successful Implementation

IT is currently not staffed to take on the additional workload required to implement the proposed SCADA Master Plan projects. Projections by the IT Master Plan consultant, shown in **Figure 15**, indicate that the demands on the existing IT staff of 5 cannot be met throughout the first 4 years of SCADA Master Plan implementation (2016 - 2019). The demands of the SCADA Master Plan Projects will make this overload situation worse.

Figure 15: IT Workload Projections, Excluding Needs of SCADA Master Plan

	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019
IS Administrator	1.00	1.39	1.51	1.67	1.93	1.73	1.40	1.68	1.56
Network Administrator	1.00	1.22	1.07	1.14	1.13	1.18	1.14	1.08	1.10
Help Desk	1.00	1.02	1.00	1.00	1.02	1.04	1.06	1.07	1.11
GIS Developer / DBA	1.00	1.50	1.63	1.34	1.48	2.03	2.35	2.23	2.01
DBA / BI Developer	-	0.31	0.24	0.67	0.17	0.52	0.72	1.06	1.08
Other	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
TOTALS:	4.00	5.45	5.46	5.81	5.73	6.51	6.68	7.11	6.86

Not only will IT have to do many labor-intensive portions of the SCADA Master Plan work but will also need to manage the program itself including:

- Assisting in the creation of RFP’s,
- Evaluating proposals,
- Negotiating contracts,
- Managing the execution of various master plan projects, and
- Coordinating with USD’s staff including construction management.

Options to achieve successful implementation of the SCADA Master Plan projects include:

- 1) **Hiring one additional IT project manager.** This choice addresses all of the above 5 bullet items. It does not, however, address doing the technical work in the SCADA Master Plan scheduled to be completed by IT resources. This option, alone, therefore does not provide the mix of skill sets needed.
- 2) **Contracting out IT project management and implementation services.** This is a complete solution but labor costs might be about double²⁴ what it would cost using in-house resources. Using the **Table 25** estimate for the level of effort needed from IT, SCADA Master Plan implementation costs might increase by \$400k to \$800k if outside resources are utilized²⁵ to implement tasks earmarked for IT. If a higher level staffer is hired as project manager, USD would lose access to that person’s knowledge about the project when the contract is over. If a lower level IT person (intern/apprentice) is contracted to offload work from the existing IT staff, they would be able to implement more projects; the con would be that more training and direction would be needed by the IT staff/coach.
- 3) **Extending the time it takes to implement the SCADA and IT Master Plan projects.** This solution spreads out expenditures to match resources but ignores the urgency of many of the improvements. SCADA servers and workstations, for example, are running on obsolete operating systems with unacceptable cyber-security vulnerability. Also, known network

²⁴ This is based on the assumption that overhead is about 40% of direct (1.4 multiplier) and outside services would be at a multiplier of about 3.0.

²⁵ 2,000 to 4,000 hours at \$200/hour.

deficiencies and vulnerabilities, described elsewhere in this master plan, can result in unacceptable system outages if recommended improvements are not made.

- 4) **Reducing the number of proposed SCADA master plan projects.** This approach is always an option. It would not, however, apply to the most urgently needed improvements recommended by this master plan. Also, the workload projections shown in **Figure 20** indicate resource overload even if no SCADA Master Plan projects are undertaken.

Recommendation:

Implement Option 2. This is the only option which appears to accomplish all recommended SCADA Master Plan tasks within the 5-year master planning period. Contractors could bring in specialists as needed to get improvements done quickly, minimizing the impacts to operations and maintenance activities. Existing staff could oversee rather than do the work, ensuring quality. USD could minimize the increased cost of this option by hiring an additional IT resource (i.e. Option 1).

**Directors**

Manny Fernandez
Tom Handley
Pat Kite
Anjali Lathi
Jennifer Toy

Officers

Paul R. Eldredge
*General Manager/
District Engineer*

Karen W. Murphy
Attorney

DATE: September 21, 2015

MEMO TO: Board of Directors - Union Sanitary District

FROM: Paul R. Eldredge, General Manager/District Engineer
Sami E. Ghossain, Manager of Technical Services
Raymond Chau, CIP Coach
Derek Chiu, Assistant Engineer

SUBJECT: Agenda Item No. 13 - Meeting of September 28, 2015
Award the Construction Contract for the Fremont and Paseo Padre Lift Stations Improvements Project to Mountain Cascade, Inc.

Recommendation

Staff recommends the Board award the construction contract for the Fremont and Paseo Padre Lift Stations Improvements Project (Project) to Mountain Cascade, Inc. in the amount of \$2,801,500.

Funds for the project have been budgeted in the Renewal and Replacement Fund (50%) and the Capacity Fund (50%).

Background

The District employs three small lift stations to convey wastewater in the gravity sewer system to larger pump stations that, in turn, transport wastewater to the Alvarado Wastewater Treatment Plant. The Fremont Lift Station (LS) and Paseo Padre LS were constructed in 1984 and no major improvements have been made since being built over 30 years ago. Figure 1 shows the location of the two lift stations within the District's transport system.

The Paseo Padre LS and Fremont LS are in need of improvements to maintain reliability and to improve operation. Staff conducted a condition assessment in September 2014 of the two 24-inch diameter enclosed screw pumps at Fremont LS and discovered significant corrosion of the steel flights inside the pumps. In some areas, the steel was corroded all the way through, leaving holes and thus reducing the capacity of the pumps. The enclosed screw pumps at Paseo Padre LS are assumed to be in similar condition because they are of the same age and operate in similar conditions as the pumps at Fremont LS. Figure 2 includes a photo of the corroded steel flights inside one of the existing enclosed screw pumps at Fremont LS.

In addition to the replacement of the pumps, the electrical systems at both lift stations are in need of improvement. Variable frequency drives (VFDs) are needed to reduce the wear and tear on the pumps from the sudden starts and stops each time the pumps are turned on and off. The existing 208-volt electric service at the lift stations needs to be upgraded to 480-volt for the VFDs to be used. The existing motor control centers (MCCs) are 30 years old and spare parts are difficult to source. The generators also need to be replaced when the electric service is upgraded to 480-volt electric service as they are not compatible with the new service.

Scope of Work

Carollo Engineers commenced with the Project's final design in February 2015 and completed it in July 2015. The Project's major elements are as follows:

- Replacement of four enclosed screw pumps, two 24-inch diameter pumps at Fremont LS and two 30-inch diameter pumps at Paseo Padre LS.
- Installation of VFDs.
- Erection of steel canopy structures over the enclosed screw pumps to protect them from the elements.
- Installation of a step-up transformer to convert and upgrade the existing 208-volt electric service to 480-volt electric service at both lift stations.
- Replacement of the MCCs and standby generators at both lift stations.
- Replacement of the hydraulic power unit at Paseo Padre LS.
- Rehabilitation and repair of coatings and concrete in the pump pits and wet wells at both lift stations.
- Miscellaneous site work including the replacement of fencing, the installation of containment curbing, and paving at both lift stations.
- Installation of a new manhole and drainage piping at Paseo Padre LS to direct all on-site runoff into the collection system.
- Replacement of the existing vehicle gates at Newark Pump Station and the addition of electric vehicle gate operators to the gates at Newark Pump Station, Fremont LS, and Paseo Padre LS.

Bid Results

Staff advertised the Project for bids on August 4, 2015. Staff received and opened eight (8) bids on September 10, 2015. The bid results are summarized in the table below. Please refer to the attached bid tabulation table for a detailed breakdown of the bids.

Contractor	Total Base Bid Plus Bid Alternate A
Engineer's Estimate	\$2,500,000
Mountain Cascade, Inc. Livermore, CA	\$2,801,500
Valentine Corporation San Rafael, CA	\$2,830,869
JMB Construction, Inc. South San Francisco, CA	\$2,937,100
Western Water Constructors, Inc. Santa Rosa, CA	\$2,972,500
Monterey Mechanical Co. Oakland, CA	\$3,028,000
Con-Quest Contractors, Inc. San Francisco, CA	\$3,146,500
GSE Construction Company Inc. Livermore, CA	\$3,232,800
D. W. Nicholson Corporation Hayward, CA	\$3,739,000

Mountain Cascade was the apparent low bidder with a bid of \$2,801,500, which is 12% higher than the Engineer's Estimate of \$2.5 million. Staff believes the bid came in higher due to the temporary system complexity and schedule constraints in the project scope. Both lift stations must be kept in operation during pump and electrical equipment replacement, which will require additional manpower to plan, construct and monitor the various systems during the replacement work. Additionally, the project schedule requires working simultaneously at the two lift station sites with significant manpower, which is difficult to estimate.

Staff reviewed Mountain Cascade's bid and determined it to be the lowest responsive and responsible bid, which the contractor has verified and confirmed. Mountain Cascade is a General Engineering Class A licensed contractor who has successfully constructed several pump and lift station projects since 2011 for the County of San Luis Obispo, Oro Loma Sanitary District, Sacramento County, and City of Alameda. Staff contacted three of these agencies and received positive comments on Mountain Cascade's performance on the projects.

Additionally, Mountain Cascade has successfully constructed several pipeline projects for the District in the 1990's and 2000's.

Bid Alternate

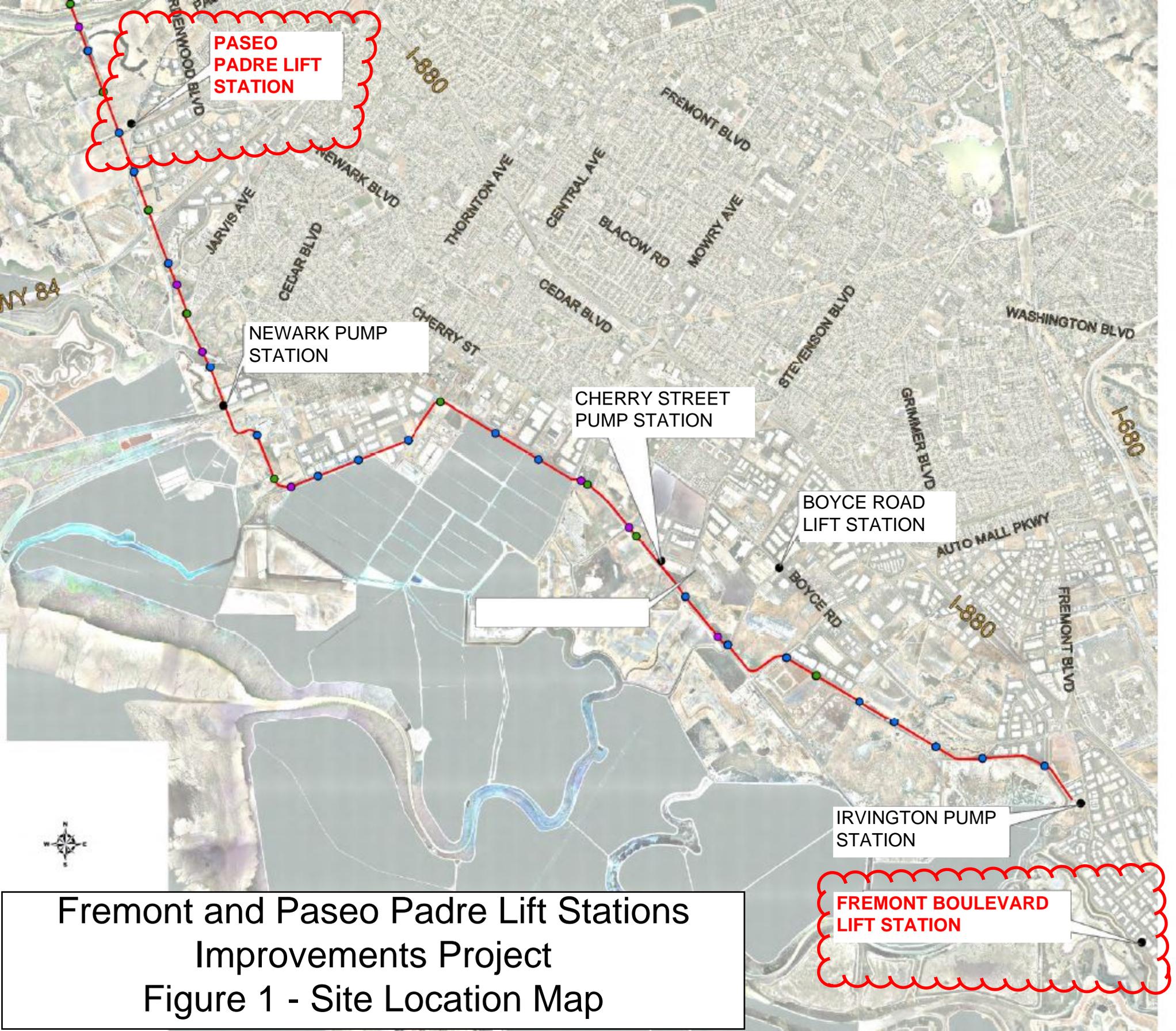
The Project's bid schedule included one bid alternate. Bid Alternate A provides the cost for the contractor to procure builder's risk insurance coverage. Builder's risk insurance is a special type of property insurance that indemnifies against the loss of or damage to a building or facility under construction. Mountain Cascade submitted a bid amount of \$7,500 for this insurance. Staff recommends including this bid alternate in the construction contract.

Construction

The Project's construction period will be three hundred and sixty (360) calendar days with an estimated completion in October 2016. Staff will provide construction management services but will hire an inspector from a consultant firm to assist with construction inspection services.

PRE/SEG/RC/DC:ks

Attachments: Figure 1 – Site Location Map
Figure 2 – Photo of Existing Pump Interior at Fremont LS
Table 1 – Bid Tabulation
Construction Contract Agreement



**PASEO
PADRE LIFT
STATION**

**NEWARK PUMP
STATION**

**CHERRY STREET
PUMP STATION**

**BOYCE ROAD
LIFT STATION**

**IRVINGTON PUMP
STATION**

**FREMONT BOULEVARD
LIFT STATION**

**Fremont and Paseo Padre Lift Stations
Improvements Project
Figure 1 - Site Location Map**



Figure 2 – Photo of Existing Pump Interior at Fremont Lift Station
Note the significant corrosion of the internal flights of the pump.

**Fremont and Paseo Padre Lift Stations Improvements Project
Table 1 - Bid Tabulation Sheet**

Item	Description	Quantity	Unit	Mountain Cascade, Inc. (Livermore, CA)	Valentine Corporation (San Rafael, CA)	JMB Construction, Inc. (South San Francisco, CA)	Western Water Constructors, Inc. (Santa Rosa, CA)	Monterey Mechanical Co. (Oakland, CA)	Con-Quest Contractors, Inc. (San Francisco, CA)	GSE Construction Company Inc. (Livermore, CA)	D. W. Nicholson Corporation (Hayward, CA)
1	Completion of all Work at Fremont Lift Station included as part of Contract Documents for Project No. 800-444, except as specified under items 2 through 3, for the amount of:	1	LS	\$331,000	\$353,700	\$391,000	\$380,000	\$460,000	\$367,000	\$517,400	\$561,900
2	Enclosed screw pumps located at Fremont Lift Station.	1	LS	\$547,000	\$522,400	\$410,000	\$497,000	\$488,000	\$591,000	\$472,400	\$603,400
3	Electrical Work at Fremont Lift Station.	1	LS	\$373,000	\$379,569	\$416,000	\$423,000	\$352,000	\$420,000	\$439,900	\$529,500
4	Completion of all Work at Paseo Padre Lift Station included as part of Contract Documents for Project No. 800-444, except as specified under items 5 through 6, for the amount of:	1	LS	\$542,000	\$487,300	\$571,000	\$587,000	\$690,000	\$615,000	\$700,000	\$697,500
5	Enclosed screw pumps located at Paseo Padre Lift Station.	1	LS	\$547,000	\$582,400	\$620,000	\$558,000	\$547,000	\$591,000	\$528,500	\$687,700
6	Electrical Work at Paseo Padre Lift Station.	1	LS	\$354,000	\$380,000	\$414,000	\$420,000	\$362,000	\$415,000	\$408,000	\$504,300
7	Completion of all Work at Newark Pump Station included as part of Contract Documents for Project No. 800-444, for the amount of:	1	LS	\$76,000	\$100,000	\$90,000	\$80,000	\$76,000	\$85,000	\$106,200	\$93,600
8	Allowance for time and material costs associated with any required concrete repairs as directed by the District.	1	T&M	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
9	Allowance for time and material costs associated with any required anchor bolt modifications as directed by the District.	1	T&M	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
10	Cost for providing all shoring and bracing on all Bid Items above including but not limited to that as required by Sections 6700-6708 of the Labor Code.	1	LS	\$4,000	\$1,000	\$2,100	\$1,000	\$20,000	\$35,000	\$1,700	\$1,100
Total Base Bid				\$2,794,000	\$2,826,369	\$2,934,100	\$2,966,000	\$3,015,000	\$3,139,000	\$3,194,100	\$3,699,000
Bid Alternate A	Add Builder's Risk Insurance coverage described in Section 00800-Article 2.1.3a	1	LS	\$7,500	\$4,500	\$3,000	\$6,500	\$13,000	\$7,500	\$38,700	\$40,000
Basis of Award: Contract Price (Total Base Bid + Bid Alternate A)				\$2,801,500	\$2,830,869	\$2,937,100	\$2,972,500	\$3,028,000	\$3,146,500	\$3,232,800	\$3,739,000

AGREEMENT FOR THE CONSTRUCTION OF
Fremont and Paseo Padre Lift Stations Improvements Project
Project No. 800-444

THIS AGREEMENT, made and concluded, in duplicate, this ____ day of September, 2015, between the UNION SANITARY DISTRICT ("District"), Union City, California, and MOUNTAIN CASCADE, INC. ("Contractor"), License No. 422496.

W I T N E S S E T H :

1. That for and in consideration of the payments and agreements hereinafter mentioned, to be made and performed by the District, and under the conditions expressed in the two bonds, bearing even date with these presents, and hereunto annexed, the Contractor agrees with the District, at his/her own proper cost and expense, to do all the work and furnish all the materials necessary to construct and complete in good workmanlike and substantial manner the project entitled: Fremont and Paseo Padre Lift Stations Improvements Project (800-444) in strict conformity with the plans and specifications prepared therefor, which said plans and specifications are hereby specially referred to and by said reference made a part hereof.

2. Now, therefore, in consideration of the mutual covenants and agreements of the parties herein contained and to be performed, the Contractor hereby agrees to complete the work in accordance with the terms and conditions stipulated in the Contract Documents for the sum of **Two Million Eight Hundred One Thousand Five Hundred Dollars (\$2,801,500.00)** (the "Contract Price") computed in accordance with Contractor's accepted proposal dated September 10, 2015, which accepted proposal is incorporated herein by reference thereto as if herein fully set forth. This sum includes the following bid alternates that have been accepted by the District and are hereby incorporated in the Agreement: Bid Alternate A. Compensation shall be based upon the lump sum bid items plus the unit prices stated in the Bid Schedule times the actual quantities or units of work and materials performed or furnished. The further terms, conditions, and covenants of this Agreement are set forth in the Contract Documents, each of which is by this reference made a part hereof. Payments are to be made to the Contractor in accordance with the provisions of the Contract Documents and the Technical Specifications in legally executed and regularly issued warrants of the District, drawn on the appropriate fund or funds as required by law and order of the District thereof.

3. The District hereby promises and agrees with the said Contractor to employ, and does hereby employ, the said Contractor to provide the materials and to do the work according to the terms and conditions herein contained and referred to, for the Contract Price, and hereby contracts to pay the same at the time, in the manner and upon the conditions set forth in the Contract Documents; and the said parties for themselves, their heirs, executors, administrators, successors and assigns, do hereby agree to the full performance of the covenants herein contained.

4. The Contractor and any subcontractor performing or contracting any work shall comply with all applicable provisions of the California Labor Code for all workers, laborers and mechanics of all crafts, classifications or types, including, but necessarily limited to the

following:

(a) The Contractor shall comply with all applicable provisions of Section 1810 to 1815, inclusive, of the California Labor Code relating to working hours. The Contractor shall, as a penalty to the District, forfeit the sum of twenty-five dollars (\$25) for each worker employed in the execution of the Contract by the Contractor or by any subcontractor for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any one calendar day and forty (40) hours in any one calendar week, unless such worker receives compensation for all hours worked in excess of eight (8) hours at not less than 1-1/2 times the basic rate of pay.

(b) Pursuant to the provision of California Labor Code, Sections 1770 et. seq., the Contractor and any subcontractor under him shall pay not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations. Pursuant to the provisions of California Labor Code Section 1773.2, the Contractor is hereby advised that copies of the prevailing rate of per diem wages and a general prevailing rate for holidays, Saturdays and Sundays and overtime work in the locality in which the work is to be performed for each craft, classification, or type of worker required to execute the Contract, are on file in the office of the District, which copies shall be made available to any interested party on request. The Contractor shall post a copy of said prevailing rate of per diem wages at each job site.

(c) As required by Section 1773.1 of the California Labor Code, the Contractor shall pay travel and subsistence payments to each worker needed to execute the work, as such travel and subsistence payments are defined in the applicable collective bargaining agreements filed in accordance with this Section.

(d) To establish such travel and subsistence payments, the representative of any craft, classification, or type of workman needed to execute the contracts shall file with the Department of Industrial Relations fully executed copies of collective bargaining agreements for the particular craft, classification or type of work involved. Such agreements shall be filed within 10 days after their execution and thereafter shall establish such travel and subsistence payments whenever filed 30 days prior to the call for bids.

(e) The Contractor shall comply with the provisions of Section 1775 of the California Labor Code and shall, as a penalty to the District, forfeit not more than two hundred dollars (\$200) for each calendar day, or portion thereof, for each worker paid less than the prevailing rate of per diem wages for each craft, classification, or type of worker needed to execute the contract. The Contractor shall pay each worker an amount equal to the difference between the prevailing wage rates and the amount paid worker for each calendar day or portion thereof for which a worker was paid less than the prevailing wage rate.

(f) As required under the provisions of Section 1776 of the California Labor Code, Contractor and each subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, and straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work. Said payroll shall be certified and shall be available for

inspection at all reasonable hours at the principal office of the Contractor on the following basis:

(1) A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or his or her authorized representative on request.

(2) A certified copy of all payroll records enumerated in Paragraph 4(f), herein, shall be made available for inspection or furnished upon request to the District, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations.

(3) A certified copy of all payroll records enumerated in Paragraph 4(f), herein, shall be made available upon request by the public for inspection or for copies thereof; provided, however, that a request by the public shall be made through the District, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to subparagraph 4(e) herein, the requesting party shall, prior to being provided the records, reimburse the costs of preparation by the Contractor, subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal offices of the Contractor.

The certified payroll records shall be on forms provided by the Division of Labor Standards Enforcement or shall contain the same information as the forms provided by the division.

Each Contractor shall file a certified copy of the records, enumerated in Paragraph 4(f) with the entity that requested the records within 10 days after receipt of a written request. Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the District, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address, and social security number. The name and address of the Contractor awarded the contract or performing the contract shall not be marked or obliterated. The Contractor shall inform the District of the location of the records enumerated under Paragraph 4(f) including the street address, city and county, and shall, within 5 working days, provide a notice of change of location and address. The Contractor shall have 10 days in which to comply subsequent to receipt of written notice specifying in what respects the Contractor must comply with this Paragraph 4(f). In the event that the Contractor fails to comply within the 10-day period, he or she shall, as a penalty to the state or the District, forfeit one hundred dollars (\$100) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due. Responsibility for compliance with Paragraph 4(f) lies with the Contractor.

(g) The Contractor and any subcontractors shall, when they employ any person in

any apprenticeable craft or trade, apply to the joint apprenticeship committee administering the apprenticeship standards of the craft or trade in the area of the construction site for a certificate approving the Contractor or subcontractor under the apprenticeship standards for the employment and training of apprentices in the area or industry affected; and shall comply with all other requirements of Section 1777.5 of the California Labor Code. The responsibility of compliance with California Labor Code Section 1777.5 during the performance of this contract rests with the Contractor. Pursuant to California Labor Code Section 1777.7, in the event the Contractor willfully fails to comply with the provisions of California Labor Code Section 1777.5, the Contractor shall be denied the right to bid on any public works contract for up to three (3) years from the date noncompliance is determined and be assessed civil penalties.

(h) In accordance with the provisions of Article 5, Chapter 1, Part 7, Division 2 (commencing with Section 1860), and Chapter 4, Part 1, Division 4 (commencing with Section 3700) of the California Labor Code, the Contractor is required to secure the payment of compensation to its employees and for that purpose obtain and keep in effect adequate Workers' Compensation Insurance. If the Contractor, in the sole discretion of the District satisfies the District of the responsibility and capacity under the applicable Workers' Compensation Laws, if any, to act as self-insurer, the Contractor may so act, and in such case, the insurance required by this paragraph need not be provided.

The Contractor is advised of the provisions of Section 3700 of the California Labor Code, which requires every employer to be insured against liability for Workers' Compensation or to undertake self-insurance in accordance with the provisions of that Code and shall comply with such provisions and have Employer's Liability limits of \$1,000,000 per accident before commencing the performance of the work of this Contract.

The Notice to Proceed with the Work under this Contract will not be issued, and the Contractor shall not commence work, until the Contractor submits written evidence that it has obtained full Workers' Compensation Insurance coverage for all persons whom it employs or may employ in carrying out the work under this Contract. This insurance shall be in accordance with the requirements of the most current and applicable state Workers' Compensation Insurance Laws. In accordance with the provisions of Section 1861 of the California Labor Code, the Contractor in signing this agreement certifies to the District as true the following statement: "I am aware of the provisions of Section 3700 of the Labor Code which requires every employer to be insured against liability for Workers' Compensation or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the work of this contract."

A subcontractor is not allowed to commence work on the project until verification of Workers' Compensation Insurance coverage has been obtained and verified by the Contractor and submitted to the Construction Manager for the District's review and records.

(i) In accordance with the provisions of Section 1727 of the California Labor Code, the District, before making payment to the Contractor of money due under a contract for public works, shall withhold and retain therefrom all wages and penalties which have been forfeited pursuant to any stipulation in the contract, and the terms of Chapter 1, Part 7, Division 2 of the California Labor Code (commencing with Section 1720). But no

sum shall be withheld, retained, or forfeited, except from the final payment, without a full investigation by either the Division of Labor Standards Enforcement or by the District.

5. It is further expressly agreed by and between the parties hereto that should there be any conflict between the terms of this Agreement the instrument and the bid proposal of said Contractor, then this Agreement instrument shall control, and nothing herein contained shall be considered as an acceptance of the said terms of said proposal conflicting herewith.

6. The Contractor agrees to provide and maintain insurance coverage, and to indemnify and save harmless the parties named and in the manner set forth in Section 00800-2.0, **LIABILITY AND INSURANCE**, of the Supplementary General Conditions of the Specifications.

The duty of Contractor to indemnify and save harmless, as set forth herein, shall include a duty to defend as set forth in Section 2778 of the California Civil Code; provided, however, that nothing herein shall be construed to require Contractor to indemnify against any responsibility or liability in contravention of Section 2782 of the California Civil Code.

7. The Contractor shall diligently prosecute the work so that it shall be substantially completed within the time specified in Section 00800-1.1, **Time Allowed for Completion**.

8. Except as otherwise may be provided herein, Contractor hereby expressly guarantees for one (1) full year from the date of the substantial completion of the work under this agreement and acceptance thereof by the District, to repair or replace any part of the work performed hereunder which constitutes a defect resulting from the use of inferior or defective materials, equipment or workmanship. If, within said period, any repairs or replacements in connection with the work are, in the opinion of the District, rendered necessary as the result of the use of inferior or defective materials, equipment or workmanship, Contractor agrees, upon receipt of notice from District, and without expense to District, to promptly repair or replace such material or workmanship and/or correct any and all defects therein. If Contractor, after such notice, fails to proceed promptly to comply with the terms of this guarantee, District may perform the work necessary to effectuate such correction and recover the cost thereof from the Contractor and/or its sureties.

In special circumstances where a particular item of work or equipment is placed in continuous service before substantial completion of the Work, the correction period for that item may start to run from an earlier date. This date shall be agreed upon in writing by the Contractor and District on or before the item is placed in continuous service.

Any and all other special guarantees which may be applicable to definite parts of the work under this agreement shall be considered as an additional guarantee and shall not reduce or limit the guarantee as provided by Contractor pursuant to this paragraph during the first year of the life of such guarantee.

9. The Contractor shall provide, on the execution of this Agreement, a good and sufficient corporate surety bond in the penal sum of one hundred percent (100%) of the Contract Price,

Agreement for the Construction of
Fremont and Paseo Padre Lift Stations Improvements Project

which bond shall be on the form provided by the District in Section 00610, **FORM OF PERFORMANCE BOND**, and be conditioned upon the faithful performance of all work required to be performed by the Contractor under this Agreement. Said bond shall be liable for any and all penalties and obligations which may be incurred by Contractor under this Agreement. The corporate surety bond shall be issued by a corporate surety that possesses a minimum rating from A. M. Best Company of A:VII and that is approved by the District. The corporate surety shall be authorized to conduct business in California. At its discretion, the District may request that a certified copy of the certificate of authority of the insurer issued by the Insurance Commissioner of the State of California be submitted by the surety to the District. At its discretion, the District may also require the insurer to provide copies of its most recent annual statement and quarterly statement filed with the Department of Insurance pursuant to Article 10 (commencing with Section 900) of Chapter 1 of Part 2 of Division 1 of the Insurance Code.

10. In addition to the bond required under Paragraph 9, hereof, Contractor shall furnish a good and sufficient corporate surety bond in the penal sum of one hundred percent (100%) of the Contract Price, which bond shall be on the form provided by the District in Section 00620, **PAYMENT BOND**, and conform strictly with the provisions of Sections 9550 et seq. of the Civil Code, and all amendments thereto. The corporate surety bond shall be issued by a corporate surety that possesses a minimum rating from A. M. Best Company of A:VII and that is approved by the District. The corporate surety shall be authorized to conduct business in California. At its discretion, the District may request that a certified copy of the certificate of authority of the insurer issued by the Insurance Commissioner of the State of California be submitted by the surety to the District. At its discretion, the District may also require the insurer to provide copies of its most recent annual statement and quarterly statement filed with the Department of Insurance pursuant to Article 10 (commencing with Section 900) of Chapter 1 of Part 2 of Division 1 of the Insurance Code.

11. The Contractor may substitute securities for the amounts retained by the District to ensure performance of the work in accordance with the provisions of Section 22300 of the Public Contract Code.

12. The Contractor shall be provided the time period specified in Section 01340-2.0, **MATERIAL AND EQUIPMENT SUBSTITUTIONS**, for submission of data substantiating a request for a substitution of an "or equal" item.

13. As required by Section 6705 of the California Labor Code and in addition thereto, whenever work under the Contract involves the excavation of any trench or trenches five feet or more in depth, the Contractor shall submit in advance of excavations, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches. If such plan varies from the shoring system standards established by the Construction Safety Orders of the Division of Industrial Safety in Title 8, Subchapter 4, Article 6, California Code of Regulations, the plan shall be prepared by a registered civil or structural engineer employed by the Contractor, and all costs therefore shall be included in the price named in the Contract for completion of the work as set forth in the Contract Documents. Nothing in this Section shall be deemed to allow the use of a shoring, sloping, or other protective system less effective than that

required by the Construction Safety Orders. Nothing in this Section shall be construed to impose tort liability on the District, the Design Consultant, Construction Manager or any of their agents, consultants, or employees. The District's review of the Contractor's excavation plan is only for general conformance to the California Construction Safety Orders.

Prior to commencing any excavation, the Contractor shall designate in writing to the Construction Manager the "competent person(s)" with the authority and responsibilities designated in the Construction Safety Orders.

14. In accordance with Section 7104 of the Public Contract Code, whenever any work involves digging trenches or other excavations that extend deeper than four feet below the surface, the provisions of Section 00700-7.2, **Differing Site Conditions**, shall apply.

15. In accordance with Section 7103.5 of the Public Contract Code, the Contractor and subcontractors shall conform to the following requirements. In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or subcontractor offers and agrees to assign to the District all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act [Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code], arising from purchases of goods, materials or services pursuant to this Contract or the subcontract. Such assignment shall be made and become effective at the time the District tenders final payment to the Contractor, without further acknowledgment by the parties.

16. In accordance with Section 4552 of the Government Code, the Contractor shall conform to the following requirements. In submitting a bid to the District, the Contractor offers and agrees that if the bid is accepted, it will assign to the District all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act [Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code], arising from purchase of goods, materials, or services by the Contractor for sale to the District pursuant to the bid. Such assignment shall be made and become effective at the time the District tenders final payment to the Contractor.

17. Pursuant to Public Contract Code Section 7100, the acceptance by the Contractor of an undisputed payment made under the terms of the Contract shall operate as, and shall be, a release to the District, and their duly authorized agents, from all claim of and/or liability to the Contractor arising by virtue of the contract related to those amounts. Disputed contract claims in stated amounts may be specifically excluded by the Contractor from the operation of the release.

18. In accordance with California Business and Professions Code Section 7030, the Contractor is required by law to be licensed and regulated by the Contractors' State License Board which has jurisdiction to investigate complaints against contractors if a complaint regarding a patent act or omission is filed within four years of the date of the alleged violation. A complaint regarding a latent act or omission pertaining to structural defects must be filed within

10 years of the date of the alleged violation. Any questions concerning the Contractor may be referred to the Registrar, Contractors' State License Board, P.O. Box 26000, Sacramento, California 95826.

19. INDEMNIFICATION. To the fullest extent permitted by law, Contractor shall indemnify and hold harmless the District from any claims, choices in action or lawsuits, whereby any subcontractor, material or equipment supplier, laborer or any person who supplies work or materials to said work of improvement may claim damages, losses and expenses thereto arising out of or resulting from any claim for performance of work, including the legal defense of any stop notice action as well as attorney fees and costs. District may be required to engage separate legal counsel from that of the Contractor should District and Contractor be both named as defendants, cross-defendants or other parties to any such stop notice action in District's sole discretion. Contractor shall be fully liable for any judgment or damages resulting from any claim for stop notice relief or other liability regarding payment for materials, supplies, labor or equipment under this contract. In claims against any person or entity indemnified under this paragraph by an employee of Contractor, a subcontractor, anyone directly or indirectly employed by them for whose acts they may be liable, the indemnification obligation under this paragraph shall not be limited in amount or type of damages, compensation or benefits payable by or for the Contractor or a subcontractor. In all cases, indemnification shall include attorney fees and court costs.

Unless arising solely out of the active negligence, gross negligence or willful misconduct of the District or the Design Consultant, the Contractor shall indemnify, defend and hold harmless: (1) the District and its Board of Directors, officers, employees, agents and representative; (ii) the Design Consultant and its consultants for the Work and their respective agents and employees; and (iii) if one is designated by the District for the work, the Construction Manager and its agents and employees (collectively "the Indemnified Parties"). The Contractor's obligations hereunder include indemnity, defense and hold harmless of the Indemnified Parties from and against any and all damages, losses, claims, demands or liabilities whether for damages, losses or other relief, including, without limitation attorney's fees and costs which arise, in whole or in part, from the Work, the Contract Documents or the acts, omissions or other conduct of the Contractor or any subcontractor or any person or entity engaged by them for the Work. The Contractor's obligations under the foregoing include without limitation: (i) injuries to or death of persons; (ii) damage to property; or (iii) theft or loss of property; (iv) stop notice claims asserted by any person or entity in connection with the Work; and (v) other losses, liabilities, damages or costs resulting from, in whole or part, any acts, omissions or other conduct of Contractor, any of Contractor's Subcontractors, of any tier, or any other person or entity employed directly or indirectly by Contractor in connection with the Work and their respective agents, officers or employees. If any action or proceeding, whether judicial, administrative, arbitration or otherwise, shall be commenced on account of any claim, demand or liability subject to Contractor's obligations hereunder, and such action or proceeding names any of the Indemnified Parties as a party thereto, the Contractor, at its sole cost and expense, shall defend the District and the Design Consultant in such action or proceeding with counsel reasonably satisfactory to the Indemnified Parties named in such action or proceeding. In the event that there shall be any judgment, award, ruling, settlement, or other relief arising out of any such action or proceeding to which any of the Indemnified Parties are bound by, Contractor shall pay, satisfy or otherwise discharge any such judgment, award, ruling, settlement or relief. Contractor shall indemnify and hold harmless the Indemnified Parties from any and all liability or responsibility arising out of any such judgment, award, ruling, settlement or relief. The Contractor's obligations hereunder are

binding upon Contractor's Performance Bond Surety and these obligations shall survive notwithstanding Contractor's completion of the Work or the termination of the Contract.

IN WITNESS WHEREOF, the parties hereto have executed this agreement this _____ day of September, 2015.

MOUNTAIN CASCADE, INC.

By: _____

Name: _____

Title: _____

Address: P.O. Box 5050, Livermore, California 94551

UNION SANITARY DISTRICT

By: _____

Pat Kite
Board Secretary

Address: 5072 Benson Road, Union City, California 94587

ATTEST:

Karen W. Murphy
Attorney for Union Sanitary District



Directors
Manny Fernandez
Tom Handley
Pat Kite
Anjali Lathi
Jennifer Toy

Officers
Paul R. Eldredge
*General Manager/
District Engineer*

Karen W. Murphy
Attorney

DATE: September 21, 2015

MEMO TO: Board of Directors - Union Sanitary District

FROM: Paul R. Eldredge, General Manager/District Engineer
Sami E. Ghossain, Manager of Technical Services
Raymond Chau, CIP Coach
Curtis Bosick, Associate Engineer

SUBJECT: Agenda Item No. 14 - Meeting of September 28, 2015
Authorize the General Manager to Execute Task Order No. 2 with RMC Water and Environment for the Alvarado Wastewater Treatment Plant Site Use Study

Recommendation

Staff recommends the Board authorize the General Manager to execute Task Order No. 2 with RMC Water and Environment (RMC) in the amount of \$37,905 for the Alvarado Wastewater Treatment Plant Site Use Study.

Background

The Alvarado Wastewater Treatment Plant (WWTP) currently treats approximately 23 million gallons of wastewater per day and contains a total of 53 facilities located within the 33-acre site. Over the next ten years, the District has planned the construction of several process, electrical, maintenance, storage, and green-energy facilities. In addition, staff anticipates that future environmental regulations will reduce the ammonia discharge limits in the plant's final effluent that will require new process facilities.

Prior to proceeding with the design of these facilities, staff deemed it important to evaluate and properly plan for the long term site layout of the WWTP. On August 11, 2014, the Board authorized the General Manager to execute an Agreement and Task Order No. 1 with RMC in the amount of \$199,681 for the Alvarado Wastewater Treatment Plant Site Use Study (Project). The purpose of this project was to develop a high-level planning tool to guide the optimization of USD's Alvarado WWTP to meet future operational and maintenance needs.

On June 25, 2015, staff conducted a Board workshop to present the findings and recommendations from the Project's final report. During this workshop, it was determined that a property acquisition plan should be developed in the event the District needs to acquire any property in the future and that a life cycle cost analysis should be prepared for the preferred future WWTP development alternative to get a better understanding of the total cost implications.

Task Order No. 2 – Additional Professional Services

The scope of services for Task Order No. 2 includes the following tasks:

Task 1 – Develop a Land Acquisition Strategy

With oversight from RMC Water and Environment (RMC), PPC Land Consultant (PPC) will serve as the lead for the land acquisition strategy development. RMC and PPC will meet with staff to discuss the details of what will be involved with developing a particular land acquisition strategy that coincides with the District's plan for future expansion.

The goal is to provide staff with the information and knowledge necessary to develop the strategy. PPC will deliver a final letter report detailing the determined land acquisition strategy.

Task 2 – Develop & Assess Incremental Lifecycle Costs for the New Plant Alternative

RMC will develop the incremental lifecycle costs associated with the New Plant Alternative, which includes a new liquid treatment train with nitrification/denitrification processes, and compare it to the Baseline Alternative, which primarily uses existing liquid process infrastructure.

The lifecycle cost estimate will consist of two components: 1) development of a lifecycle cost estimate for the new liquid process facilities associated with the New Plant Alternative; and, 2) development of detailed lifecycle cost estimates for the Baseline Alternative. The lifecycle cost estimates will include capital costs, operating and maintenance costs, equipment replacement costs, and capital improvement program avoided project costs. For the Baseline Alternative, the costs for rehabilitating or upgrading existing facilities will be included.

The lifecycle cost estimates will be developed using cost information from previous projects and published information. Operation and maintenance estimates will include labor, electricity, and chemical costs. Existing operation and maintenance costs will be used as the basis for developing costs for existing and new facilities. Estimates of labor requirements for new or expanded process will be based on the District's existing labor demands and adjusted based on process complexity.

Because the lifecycle costs for solids handling, facility storage, administrative functions, and recycled water facilities will be the same for both alternatives, lifecycle estimates will only be developed for the liquid treatment process.

Task 3 – Project Management & Coordination

RMC will hold regular project progress update conference calls with District’s staff to discuss the work being done, request additional information, and monitor project schedule. RMC will prepare for and attend two workshops with District’s staff to discuss the land acquisition strategy and the lifecycle cost estimate. Other activities under this task include internal budget management, invoicing, and project controls.

The budget for this work is summarized in the following table:

Task	Description	Amount
1	Develop a Land Acquisition Strategy	\$11,798
2	Develop & Assess Incremental Lifecycle Costs for the New Plant Alternative	\$17,790
3	Project Management & Coordination	\$8,317
	Total	\$37,905

Staff has reviewed this price proposal and found it to be reasonable, considering the required scope of work. All work under this task order is expected to be completed by June 30, 2016.

The total amounts for the Project’s agreement with RMC are summarized in the table below:

Description	Amount
Task Order No. 1 – Alvarado WWTP Site Use Study	\$199,681
Task Order No. 2 – Additional Services	\$37,905
Total for this Agreement	\$237,586

Staff recommends the Board authorize the General Manager to execute Task Order No. 2 with RMC Water and Environment in the amount of \$37,905 for the Alvarado Wastewater Treatment Plant Site Use Study.

PRE/SEG/RC/CB:ks

Attachments: Task Order No. 2
 Figure 1 – New Plant Alternative

**ALVARADO WASTEWATER TREATMENT PLANT SITE USE STUDY
PROJECT NO. 800-438**

TASK ORDER NO. 2

to

AGREEMENT

BETWEEN

UNION SANITARY DISTRICT

AND

RMC WATER AND ENVIRONMENT

FOR

PROFESSIONAL SERVICES

Dated August 12, 2014

1. PURPOSE

The purpose of Task Order No. 2 is to provide additional professional services for the Alvarado Wastewater Treatment Plant Site Use Study, Project Number 800-438, as recommended in the Final Report, dated June 2015.

These services include the development of a land acquisition strategy for acquiring parcels to the north of the Alvarado Wastewater Treatment Plant and the development of incremental lifecycle cost estimates associated with the New Plant Alternative relative to the Baseline Alternative.

2. PROJECT COORDINATION

All work related to this task order shall be coordinated through the District's Project Manager, Curtis Bosick.

3. SCOPE OF SERVICES

The task numbers in this Scope of Services are associated with the cost data presented in Exhibits A and B.

Task 1 – Develop a Land Acquisition Strategy

With oversight from RMC Water and Environment (RMC), PPC Land Consultant (PPC) will serve as the lead for the land acquisition strategy development. RMC and PPC will meet with USD staff to discuss the details of what will be involved with developing a particular land acquisition strategy that coincides with USD's plan for expansion.

The goal is to provide USD with the information and knowledge necessary to develop the strategy. PPC will deliver a final letter report detailing the determined land acquisition strategy. A preliminary outline for the land acquisition strategy is included in Exhibit D.

Task 2 – Develop & Assess Incremental Lifecycle Costs for the New Plant Alternative

Based on the recommendations of the Alvarado Wastewater Treatment Plant Site Use Study Final Report, dated June 2015, RMC will assess the incremental lifecycle costs associated with the New Plant Alternative (all new liquid treatment train with nitrification/denitrification) compared to the Baseline Alternative, which primarily uses existing liquid process infrastructure.

The lifecycle cost estimate will consist of two components: 1) development of a lifecycle cost estimate for the new liquid process facilities associated with the New Plant Alternative and 2) development of detailed lifecycle cost estimates for the Baseline Alternative. The lifecycle cost estimates will include capital costs, operating and maintenance costs, equipment replacement costs, and capital improvement program avoided project costs. For the Baseline Alternative the costs for rehabilitating or upgrading existing facilities will be included. The lifecycle cost estimates will be developed using cost information from previous projects and published information. Operation and maintenance estimates will include labor, electricity, and chemical costs. To the extent information is provided by USD, existing operation and maintenance costs will be used as the basis for developing costs for existing and new facilities. Estimates of labor requirements for new or expanded process will be based on existing labor demands at the USD site and adjusted based on process complexity.

Because the lifecycle costs for solids handling, facility storage, administrative functions, recycled water facilities, etc., will be the same for both alternatives, lifecycle estimates will only be developed for the liquid treatment process. The table below provides a list of the facilities that lifecycle estimates will be developed for.

Facilities to be Included in the Lifecycle Assessment

New Plant Alternative	Baseline Alternative
- New Yard Piping	- New Yard Piping, plus an allowance for rehab of existing piping
- New Pump / Lift Stations	- New Pump / Lift Stations, plus an allowance for rehab of existing pump / lift stations
- New Headworks	- Existing Headworks
- New Grit Removal	- New Grit Removal / Coarse Screens
- 6 New Primary Clarifiers (86' diameter)	- 6 Existing Primary Clarifiers
- New Aeration and Anoxic Tanks (Nutrient Removal, 18 MG total tank) including Aeration Blowers	- 7 Existing Aeration Basins including Aeration Blowers
- 6 New Secondary Clarifiers (124' diameter)	- New Aeration and Anoxic Tanks (9.4 MG) including Aeration Blowers
- New Chlorine Contact Tank	- 6 Existing Secondary Clarifiers
- New EBDA Pump Station	- 2 New Secondary Clarifiers (85' diameter)
- New Odor Control Facility	- Expansion of Existing Chlorine Contact Tank
- New Moving Bed Biofilm Reactor (MBBR) for Side-stream treatment of centrate	- Existing EBDA Pump Station
	- Existing Odor Control Facilities
	- New Moving Bed Biofilm Reactor (MBBR) for Side-stream treatment of centrate

The Association for the Advancement of Cost Engineering International (AACEI) developed metrics to classify estimating accuracy thru project development. The cost estimates to be developed are considered planning-level estimates based on a 5% to 10% level of project development. Based on AACEI guidelines, actual project costs are typically within +40% to -30% of the planning-level cost estimate.

Task 3 – Project Management & Coordination

RMC will hold project progress update phone calls with USD staff to discuss the work being completed. RMC will prepare for and attend two workshops with USD staff to discuss the land acquisition strategy and the lifecycle cost estimate. Other activities under this task include internal budget management, invoicing, and project controls.

4. DELIVERABLES

Project deliverables are listed below:

Task 1 – Develop a Land Acquisition Strategy

Deliverables:

- Draft Land Acquisition Strategy report in electronic (pdf) format
- Final Land Acquisition Strategy report in electronic (pdf) format

Task 2 – Develop & Assess Incremental Lifecycle Costs for the New Plant Alternative

Deliverables:

- Draft Lifecycle Cost Technical Memorandum in electronic (pdf) format
- Final Lifecycle Cost Technical Memorandum in electronic (pdf) format

Task 3 – Project Management & Coordination

Deliverables:

- Agenda and meeting minutes for the Workshop #1
- Agenda and meeting minutes for Workshop #2
- Monthly progress reports and invoices

5. PAYMENT TO THE ENGINEER

Payment to the Engineer shall be as called for in Article 2 of the Agreement. The billing rate schedule is equivalent to an overall labor multiplier of 3.22, including profit. Subconsultants and outside services will be billed at actual cost plus 5%; other direct costs will be billed at actual cost; and mileage will be billed at prevailing IRS standard rate.

Total charges to the DISTRICT not-to-exceed amount shall be \$37,905. A summary of the anticipated distribution of cost and manpower between tasks is shown in Exhibit A.

The following table summarizes the previously-executed and proposed task orders and amendments under the Agreement:

Task Order / Amendment	Not to Exceed Amount	Board Authorization Required? (Yes/No)	District Staff Approval
Task Order No. 1 – Site Use Study	\$199,681	Yes	Rich Currie
Task Order No. 2 – Site Use Study Additional Services	\$37,905	Yes	Paul Eldredge
Total	\$237,586		

6. TIME OF COMPLETION

All work defined in this Task Order shall be complete in 110 calendar days after the execution of this Task Order and subject to the conditions of Article 3 of this Agreement. A summary of the anticipated schedule of work is shown in Exhibit C.

7. KEY PERSONNEL

Engineering personnel assigned to this Task Order No. 2 are as follows:

<u>Role</u>	<u>Key Person to be Assigned</u>
Principle-In-Charge	Steve Clary
Project Manager	Dave Richardson
Project Engineer	Mark Takemoto

Key personnel shall not be changed except in accordance with Article 8 of the Agreement.

IN WITNESS WHEREOF, the parties hereto have made and executed this Task Order No. 2 as of September ____, 2015 and therewith incorporate it as part of the Agreement.

DISTRICT

ENGINEER

Union Sanitary District

RMC Water and Environment

By: _____
Paul R. Eldredge, P.E.
General Manager/District Engineer

By: _____

Name: _____

Title: _____

Date: _____

Date: _____



EXHIBIT A

Cost Proposal

Union Sanitary District

8/13/15

Alvarado Wastewater Treatment Plant Site Use Study - Additional Tasks

Tasks	Labor					Total Hours	Total Labor Costs (1)	Outside Services		ODCs	Total	
	Steve Clary	Dave Richardson	Mark Takemoto	Christy Nelson	Admin.			PPC Land Consultants	Subtotal	Sub Consultant Total Cost (2)	ODCs	Total Fee
	PIC	PM	PE	PE	Admin.			Land Acquisition Strategy				
	\$299	\$295	\$244	\$146	\$114							
Task 1: Develop a Land Acquisition Strategy												
1.1 Develop a Land Acquisition Strategy	2	6	6	2	1	17	\$4,238	\$7,200	\$7,200	\$7,560	\$0	\$11,798
Subtotal Task 1:	2	6	6	2	1	17	\$4,238	\$7,200	\$7,200	\$7,560	\$0	\$11,798
Task 2: Develop & Assess Lifecycle Costs												
2.1 Develop & Assess Lifecycle Costs	2	4	24	68	2	100	\$17,790	\$0	\$0	\$0	\$0	\$17,790
Subtotal Task 2:	2	4	24	68	2	100	\$17,790	\$0	\$0	\$0	\$0	\$17,790
Task 3: Project Management & Coordination												
3.1 Meeting/Coordination with USD Team	6	6	6	2	1	21	\$5,434	\$0	\$0	\$0	\$200	\$5,634
3.2 Project Management Activities	1	4	4		2	11	\$2,683	\$0	\$0	\$0	\$0	\$2,683
Subtotal Task 3:	7	10	10	2	3	32	\$8,117	\$0	\$0	\$0	\$200	\$8,317
TOTAL	13	20	40	72	6	149	\$30,145	\$7,200	\$7,200	\$7,560	\$200	\$37,905

1. The individual hourly rates include salary, overhead and profit.
2. Subconsultants will be billed at actual cost plus 5%.
3. Other direct costs (ODCs) such as reproduction, delivery, mileage (rates will be those allowed by current IRS guidelines), and travel expenses, will be billed at cost.
4. RMC reserves the right to adjust its hourly rate structure and ODC markup at the beginning of the calendar year for all ongoing contracts.

EXHIBIT B



RMC Water and Environment 2015 Standard Billing Rates

Billing Classifications	2015 Rates
Engineer-Planner-Scientist	
EPS-1	\$ 146.00
EPS-2	\$ 162.00
EPS-3	\$ 174.00
EPS-4	\$ 190.00
EPS-5	\$ 199.00
EPS-6	\$ 212.00
EPS-7	\$ 223.00
EPS-8	\$ 234.00
EPS-9	\$ 244.00
EPS-10	\$ 259.00
EPS-11	\$ 274.00
EPS-12	\$ 286.00
EPS-13	\$ 295.00
EPS-14	\$ 299.00
Intern	\$ 55.00
Technician	
TECH-1	\$ 131.00
TECH-2	\$ 135.00
TECH-3	\$ 140.00
TECH-4	\$ 145.00
TECH-5	\$ 151.00
TECH-6	\$ 159.00
TECH-7	\$ 161.00
Administrative	
AD-1	\$ 95.00
AD-2	\$ 100.00
AD-3	\$ 107.00
AD-4	\$ 118.00
AD-5	\$ 130.00
AD-6	\$ 140.00
AD-7	\$ 150.00

Note: The individual hourly rates include salary, overhead and profit. Other direct costs (ODCs) such as reproduction, delivery, mileage (as allowed by IRS guidelines), and travel expenses will be billed at actual cost plus 10%. Subconsultants will be billed as actual cost plus 10%. RMC reserves the right to adjust its hourly rate structure at the beginning of each year for all ongoing contracts.

EXHIBIT C

ID	Task Name	Duration	Start	Finish	September 2015					October 2015					November 2015					December 2015					January 2016				
					September 1					October 1					November 1					December 1					January 1				
					9/6	9/13	9/20	9/27	10/4	10/11	10/18	10/25	11/1	11/8	11/15	11/22	11/29	12/6	12/13	12/20	12/27	1/3	1/10	1/17					
1	Alvarado Wastewater Treatment Plant Site Use Study - Task Order 2	77 days	Tue 9/29/15	Wed 1/13/16																									
2	Notice to Proceed	1 day	Tue 9/29/15	Tue 9/29/15																									
3	Task 1: Develop a Land Acquisition Strategy	74 days	Wed 9/30/15	Mon 1/11/16																									
4	Develop Land Acquisition Strategy	15 days	Wed 9/30/15	Tue 10/20/15																									
5	Land Acquisition Workshop (WS #1)	1 day	Wed 10/21/15	Wed 10/21/15																									
6	Draft Land Acquisition Strategy Report	16 days	Thu 10/22/15	Thu 11/12/15																									
7	Submit Draft Land Acquisition Strategy Report	1 day	Fri 11/13/15	Fri 11/13/15																									
8	USD Draft Report Review	15 days	Mon 11/16/15	Fri 12/4/15																									
9	Final Land Acquisition Strategy Report	25 days	Mon 12/7/15	Fri 1/8/16																									
10	Submit Final Land Acquisition Strategy Report	1 day	Mon 1/11/16	Mon 1/11/16																									
11	Task 2: Develop & Assess Incremental Lifecycle Costs for the New Plant Alternative	76 days	Wed 9/30/15	Wed 1/13/16																									
12	Submit Information Request	3 days	Wed 9/30/15	Fri 10/2/15																									
13	USD Information Collection	10 days	Mon 10/5/15	Fri 10/16/15																									
14	Review Existing Information	5 days	Mon 10/19/15	Fri 10/23/15																									
15	Develop Lifecycle Cost Estimates	10 days	Mon 10/26/15	Fri 11/6/15																									
16	Draft Lifecycle Cost TM	10 days	Mon 11/9/15	Fri 11/20/15																									
17	Submit Draft Lifecycle Cost TM	1 day	Mon 11/23/15	Mon 11/23/15																									
18	USD Draft Report Review	15 days	Tue 11/24/15	Mon 12/14/15																									
19	Lifecycle Cost Workshop (WS #2)	1 day	Tue 12/15/15	Tue 12/15/15																									
20	Final Lifecycle Cost TM	20 days	Wed 12/16/15	Tue 1/12/16																									
21	Submit Final Lifecycle Cost TM	1 day	Wed 1/13/16	Wed 1/13/16																									
22	Task 3: Project Management & Coordination	76 days	Wed 9/30/15	Wed 1/13/16																									

Project: USD_site_study_schedule_20 Date: Wed 8/26/15	Task		External Milestone		Manual Summary Rollup	
	Split		Inactive Task		Manual Summary	
	Milestone		Inactive Milestone		Start-only	
	Summary		Inactive Summary		Finish-only	
	Project Summary		Manual Task		Progress	
	External Tasks		Duration-only		Deadline	

EXHIBIT D

USD Property Acquisition Program (Preliminary Outline)

1) Schedule Development

- a) Allow time for team strategy development, property valuation and title diligence.
- b) May need to allow for additional time in the schedule for the eminent domain process, if required.
- c) Allow six mos. more or less per tract to close. Will need to know funds are available by a specific date before closing.

2) Title Diligence

- a) Select title insurance provider and negotiate service and fees.
- b) Open title order.
 - i) Analyze title report and identify all parties of interest to the title, i.e.: voluntary and involuntary liens, easements, restrictions on use, etc.

3) Property Valuation

- a) Select Appraiser and secure appraisal for each targeted tract. This may obviate a landowner demand for a second appraisal.
- b) Upon receipt, analyze and develop formal offer in conjunction with title diligence review.
- c) Prepare draft formal offer for District review and approval.

4) Special Circumstances

- a) City of Union City Zoning and General Plan Update
 - i) Will be monitored; impact if any is undetermined. It is assumed the District will maintain an ongoing role in this process.

5) Acquisition

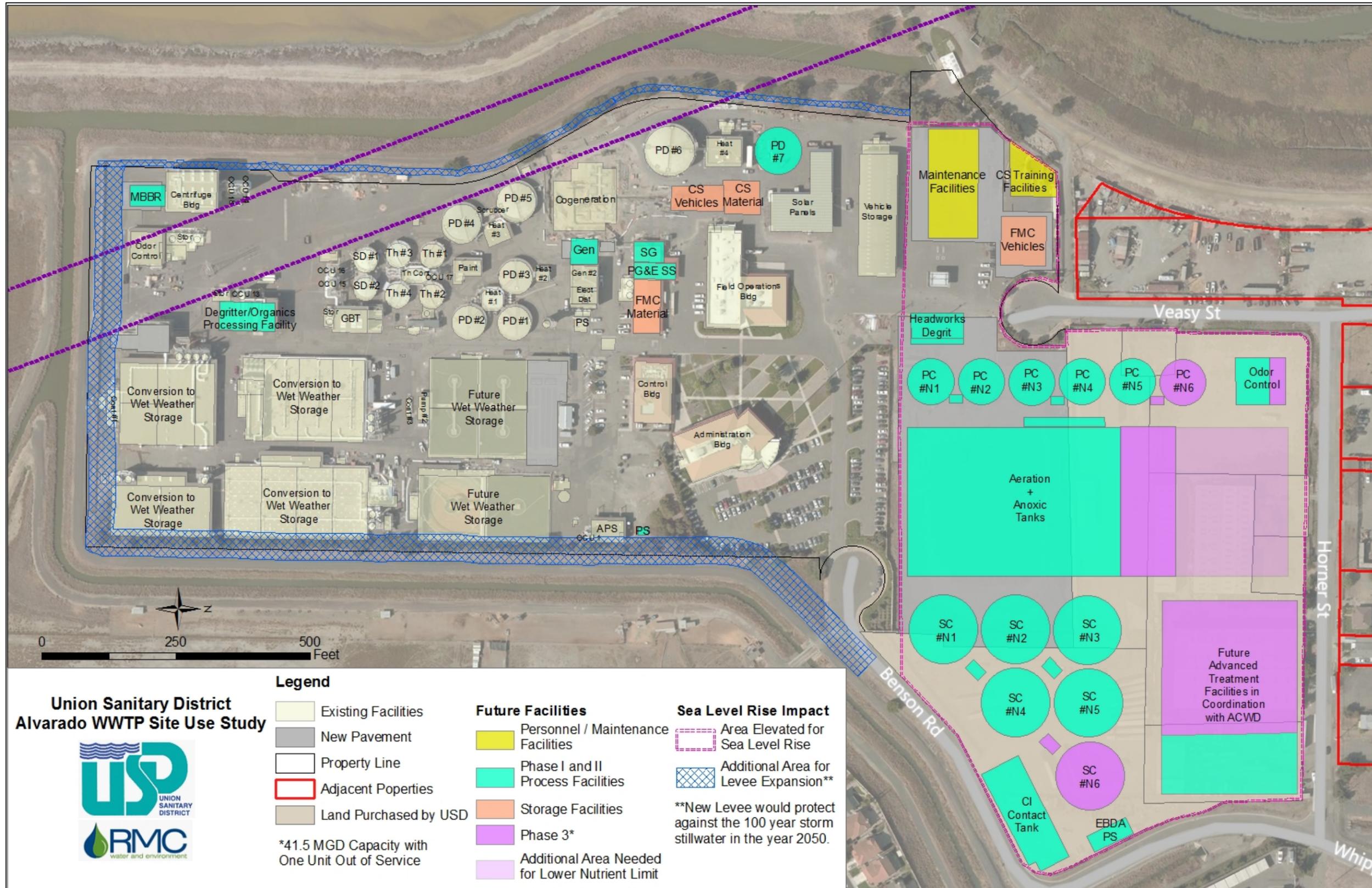
- a) A Senior Landman (acquisition specialist) will solicit our offers personally, consecutively and will negotiate on parallel paths. Conduct transparent transaction make the process as acceptable, seamless and comfortable as possible.
- b) Will request a District single point of contact for real-time support and to serve as a referral to landowners wishing to speak with the District, in the event this should prove necessary.
- c) Develop project relocation policy, share with Landowner and provide assistance *only upon specific approval of District*.
- d) The subject of condemnation will not be broached by the Landman. If asked, it will be explained the authority is present but our approach is to negotiate fairly, reserving and deferring the right of eminent domain to a last resort item.

e) This type of acquisition is very sensitive to many, if not all, impacted landowners and this is recognized as a thread through the process. Landmen are talented and skilled in the art of negotiating both friendly and unfriendly transactions. It is possible an impasse will be reached forcing a decision to proceed judicially at any time in this process.

6) Project Documents

- a) Purchase and Sale Agreement (PSA), Escrow Instructions, reporting protocol, Term Sheet and/or Memorandum of Understanding
 - i) PSA will be negotiated and will control transaction.
 - i) Will define the formal diligence period
 - ii) Environmental analysis would typically be conducted in this period. At minimum a Phase 1 report is recommended unless circumstances dictate otherwise.
 - iii) Determine resolution to unacceptable exceptions to title.
 - iv) Upon completion, initiate escrow file with Title Company.
 - v) Close escrow, take possession and celebrate.

Figure 1: New Plant Alternative





Directors
Manny Fernandez
Tom Handley
Pat Kite
Anjali Lathi
Jennifer Toy

Officers
Paul R. Eldredge
*General Manager/
District Engineer*

Karen W. Murphy
Attorney

DATE: September 22, 2015

MEMO TO: Board of Directors - Union Sanitary District

FROM: Sheila Tolbert, Human Resources Manager
Karen Murphy, General Counsel

SUBJECT: Agenda Item No. 15 - Meeting of September 28, 2015
Consider First Amendment to Employment Agreement between Union Sanitary District and Paul Eldredge

Recommendation

Approve First Amendment to Employment Agreement.

Background

The Union Sanitary District entered into an Employment Agreement with Paul Eldredge to serve as General Manager/District Engineer on June 25, 2014 (the "Agreement"). Section 4 of the Agreement provides that the General Manager's base salary may be annually adjusted following his annual performance evaluation.

The Board of Directors conducted Mr. Eldredge's annual performance evaluation on August 17 and 27, 2015. On August 24, 2015, the Board appointed an ad hoc subcommittee of Vice President Handley and Secretary Kite to negotiate any contract amendments with Mr. Eldredge. The following amendments to the Agreement were negotiated: (1) remove the automobile allowance in Section 5 and incorporate such amount into Mr. Eldredge's base salary; and (2) increase Mr. Eldredge's salary by \$7,250.00, or approximately three percent. The automobile allowance is currently \$450.00 per month, which would amount to \$5,400.00 moved to base salary.

The attached First Amendment modifies the Agreement to increase the General Manager's salary to \$254,075.00, and to remove the automobile allowance, both effective as of September 1, 2015.

Attachment

FIRST AMENDMENT TO EMPLOYMENT AGREEMENT

This First Amendment to Employment Agreement (the “**First Amendment**”) is made and entered into on September 28, 2015 (the “**Effective Date**”) by and between Union Sanitary District, a public sanitary district (“**USD**” or “**District**”) and Paul R. Eldredge (the “**Manager**”).

Recitals

A. District and Manager entered into that certain Employment Agreement dated June 25, 2014, wherein District hired Manager and Manager accepted employment as General Manager and District Engineer of Union Sanitary District (the “**Agreement**”).

B. Section 4 of the Agreement provides that Manager’s base salary may be annually adjusted following the Manager’s annual performance evaluation.

C. District and Manager both desire to amend the Agreement to: (1) remove the automobile allowance in Section 5 and incorporate such amount into Manager’s base salary; and (2) increase salary by \$7,250.00, or approximately three percent.

NOW, THEREFORE, THE DISTRICT AND MANAGER AGREE AS FOLLOWS:

1. Section 4 of the Agreement is hereby amended to increase Manager’s annual base salary to \$254,075.00.

2. Section 5 of the Agreement is hereby amended to add the following sentence:

“Manager shall not receive any automobile allowance as of September 1, 2015.”

3. The terms and conditions of this First Amendment are effective as of September 1, 2015.

4. Except as amended by this First Amendment, the Agreement remains in full force and effect.

[signatures follow on next page]

IN WITNESS WHEREOF, the District and Manager have signed and executed this Agreement as of the Effective Date.

UNION SANITARY DISTRICT

MANAGER

By: _____
Jennifer Toy
President

By: _____
Paul R. Eldredge

ATTEST:

By: _____
Pat Kite
Secretary

APPROVED:

DISTRICT LEGAL COUNSEL

By: _____
Karen W. Murphy

REVISED



Directors
Manny Fernandez
Tom Handley
Pat Kite
Anjali Lathi
Jennifer Toy

Officers
Paul R. Eldredge
*General Manager/
District Engineer*

Karen W. Murphy
Attorney

DATE: September 28, 2015

MEMO TO: Board of Directors - Union Sanitary District

FROM: Paul R. Eldredge, General Manager/District Engineer
Karen W. Murphy, General Counsel
J. Leah Castella, Assistant General Counsel

SUBJECT: Agenda Item No. 16 – Consider Options Regarding Email and Communications Policy

Background

In April 2014, the Board adopted Policy 3210, which addresses Board member Use of Email for District Business (the “Email Policy”), which is attached. In sum, the Email Policy provides that any email communication by a Director relating to the conduct of District business will be through the use of a District e-mail account.

It is staff’s understanding that an outstanding concern of the Board is how Board Members should respond to District-related correspondence, particularly emails, received as individuals, rather than the full Board. In addition, staff understands there are unresolved issues regarding (1) how to respond in a timely fashion if there is not enough time to bring an item to the full Board’s attention, particularly if it is not appropriate for the General Manager to respond; (2) how to avoid challenges with the Brown Act; and (3) how to preclude responses from appearing to represent the District’s position on a topic. Staff believes that these issues would be better addressed in Policy 3060 (attached), as a companion to any revisions to the Email Policy. Policy 3060 currently focuses on correspondence with the media and other public officials, and not the District’s constituents (the “Communications Policy”). In sum, the Communications Policy currently states that communications with the media or public officials representing the Board must be approved by a majority of the Board and that individual communications should be reported to the Board.

Staff is currently working on amendments to both the Email Policy, which could benefit from some updates, and the Communications Policy, and desires to seek Board direction prior to

REVISED

finalizing the drafts for the Board's consideration. The intent is to ensure the proposed revisions accurately reflect the desires of the Board.

The following represent best practices that we would propose to address in the revised Communications Policy:

1. When speaking or writing on behalf of the District, it is important that Board members clearly share the District's adopted position, even if an individual's views are different. If a Board member expresses a view that differs from the District's adopted view, the distinction should be made clear in any written or oral communication. Board members communicating as individuals should be clear that they are not representing the views of the Board.
2. The policy should include rules for individual Board Member's use of District letterhead.
3. The policy should include guidelines for written communications with stakeholders via e-mail and social media, such as:
 - a. Transparency about identity and relationships.
 - b. Acknowledgement that such communications are public records.
 - c. Identification of circumstances where it is more appropriate for a response to come from District staff as opposed to a Board Member.
4. The policy should include procedures for ensuring that the public has meaningful opportunities for engagement in Board decisions. Public meetings are one of the best opportunities for the Board to communicate with the public. Therefore, the policy should include procedures for clearly articulating at public meetings the decisions the Board is being asked to make, the decision that is made, and the reasons for that decision.

Staff would also include the recent direction by the Board on responding to emails received by the public in the Communications Policy, including timely acknowledgement of emails and responding with additional information.

With respect to the Email Policy, staff recommends incorporating the District's policy to have emails addressed to the entire Board forwarded to certain staff members, as noted in the new website disclaimer recently approved by the Board.

In addition to seeking direction from the Board on the proposed amendments discussed above, staff is interested in any additional amendments that the Board may desire and information on any provisions that are working well, or not working, for the Board.

Attachments: **Board Policy 3210 – Boardmember Use of E-mail for District Business**
 Board Policy 3060 – Letters to the Media and Publicly-Elected Officials by
 Members of the Board of Directors

Management Responsibility

Management is responsible for assigning e-mail accounts to Directors and maintaining those accounts on a District server.

Management is also responsible for providing training to Board members as needed in the use of such e-mail accounts.

This revision supersedes the versions listed below, which are no longer effective.

Title	Policy #	Effective Date
None – original policy		

Approved by: Board of Directors
 Author/owner: General Manager
 Reviewers: District Legal Counsel
 Notify Person: General Manager
 Revision frequency: Every 3 years
 Next Review: April 2017

Union Sanitary District
Policy and Procedure Manual

Effective: 04/2013	Communication with the Media and Publicly-Elected Officials by Members of the Board of Directors	Policy Number 3060 Page 1 of 2
-----------------------	---	-----------------------------------

Policy

Boardmembers are to seek prior approval from a majority of the Board of Directors when wishing to express a point of view that is representative of the Board.

When Boardmembers want to express their own personal opinions on matters pertaining to USD, they are to use caution to ensure that letters, electronic correspondence, or other communication with the media or publicly-elected officials are not construed to represent the “Board” or “Union Sanitary District” when written or communicated as an “individual.”

Purpose

The Board recognizes that individual Boardmembers are also members of the public and may want to express their own personal opinions on issues pertaining to USD, or correspond with media representatives or publicly-elected officials. The intent of this policy is to clarify the procedure for “individual” contact so that it is not mistaken as representing the view of the entire Board.

Definitions

Individual refers to a Boardmember acting as a “individual,” not as an official “District Representative.”

District Representative refers to a Boardmember acting in his/her role as a “member of the Board of Directors of Union Sanitary District”; i.e., the majority of the Board has formally authorized the Boardmember to speak on behalf of the Board of Directors.

Media refers to newspapers, magazines, television stations, or electronic news outlets, including on-line newspapers, blogs or social media sites.

Procedure

1. Letters, e-mails or other electronic correspondence, or other communications to the media or publicly-elected officials representing the Board of Directors, must be approved by a majority of the Board before being sent.
2. As a courtesy to other Boardmembers, a Boardmember writing in his/her capacity as an individual, should let other Boardmembers know of the pending communication with the media or publicly-elected officials. In this way, other Boardmembers are aware of the action.
3. Correspondence with the media or publicly-elected officials written by an “individual,” should not be signed as “Boardmember.”
4. Boardmembers may endorse a candidate for political office, or a ballot measure, and indicate their affiliation with the USD Board of Directors without obtaining prior approval of the Board. However, an individual may not make an endorsement on behalf of the entire Board or the District without prior approval.

Management Responsibility

The General Manager will be responsible for keeping all Boardmembers informed of media contacts made by Boardmembers when they are acting as a “District Representative.”

This revision supersedes the versions listed below, which are no longer effective.

Title	Policy #	Effective Date
Communication with the Media and Publicly Elected Officials by Members of the Board of Directors	3050	7/1991
Communication with the Media and Publicly Elected Officials by Members of the Board of Directors	3050	12/2000
Communication with the Media and Publicly Elected Officials by Members of the Board of Directors	3050	02/2008

Author/owner: General Manager
Approved by: Reviewed and Approved by Board April 22, 2013
Reviewers: Board of Directors, General Manager
Notify Person: General Manager
Review Frequency: Every 5 years
Next Review: April 2018

**UNION SANITARY DISTRICT
CHECK REGISTER
9/05/2015-9/18/2015**

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
158733	9/10/2015	143417	CAROLLO ENGINEERS	FREMONT & PASEO PADRE LS IMPROVEMENTS	\$40,898.58	\$40,898.58
158796	9/17/2015	81553	BEECHER ENGINEERING	STANDBY POWER SYSTEM UPGRADE	\$5,755.10	\$30,915.10
	9/17/2015	81556		MCC & PLC REPLACEMENT - PHASE 3	\$25,160.00	
158798	9/17/2015	27832	CALIFORNIA WATER TECHNOLOGIES	44,560 LBS FERROUS CHLORIDE	\$4,667.70	\$29,787.25
	9/17/2015	27864		42,600 LBS FERROUS CHLORIDE	\$4,936.76	
	9/17/2015	27867		43,220 LBS FERROUS CHLORIDE	\$4,887.23	
	9/17/2015	27865		44,760 LBS FERROUS CHLORIDE	\$5,108.33	
	9/17/2015	27868		44,920 LBS FERROUS CHLORIDE	\$5,097.72	
	9/17/2015	27866		44,280 LBS FERROUS CHLORIDE	\$5,089.51	
158764	9/10/2015	224720150824	PACIFIC GAS AND ELECTRIC	SERV TO 08/23/15 CS TRAINING TRAILER	\$27.60	\$27,727.77
	9/10/2015	666720150901		SERV TO 08/31/15 PASEO PADRE PS	\$237.37	
	9/10/2015	898220150901		SERV TO 08/31/15 FREMONT PS	\$288.56	
	9/10/2015	892820150901		SERV TO 08/31/15 HAYWARD MARSH	\$59.57	
	9/10/2015	761520150828		SERV TO 08/27/15 NEWARK PS	\$26,756.27	
	9/10/2015	380420150901		SERV TO 08/28/15 CHERRY ST PS	\$283.79	
	9/10/2015	096020150901		SERV TO 08/31/15 CATHODIC PROJECT	\$74.61	

**UNION SANITARY DISTRICT
CHECK REGISTER
9/05/2015-9/18/2015**

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
158838	9/17/2015	34781	WECO INDUSTRIES LLC	1 OZIII PAN & TILT CAMERA LED BULBS		
					\$24,527.10	\$24,877.87
	9/17/2015	34722		2 SHAFT/SPROKETS, MID, FRONT, WHEEL DRIVE		
					\$350.77	
158735	9/10/2015	58100	CDW GOVERNMENT LLC	1 ADMIN SERVER ROOM UPS BATTERY REPACEMENT		
					\$24,768.00	\$24,768.00
158745	9/10/2015	20150814	ENFO TECH & CONSULTING INC	ECMS IMPLEMENTATION		
					\$24,007.50	\$24,007.50
158770	9/10/2015	6999	RGW CONSTRUCTION INC	REFUND # 18370		
					\$15,000.00	\$21,275.12
	9/10/2015	6647		REFUND # 18369		
					\$6,275.12	
158835	9/17/2015	533620150824	US BANK CORP PAYMENT SYSTEM	MONTHLY CAL CARD STMT - AUG 2015		
					\$20,340.78	\$20,340.78
158806	9/17/2015	14348	EEC ENVIRONMENTAL INC	CWT & PRETREATMENT PROGRAM ASSISTANCE		
					\$12,573.20	\$18,819.86
	9/17/2015	14282		CWT & PRETREATMENT PROGRAM ASSISTANCE		
					\$6,246.66	
158741	9/10/2015	410885	CORNERSTONE TECHNOLOGIES LLC	SOPHOS RENEWAL - 5 YEARS		
					\$18,140.68	\$18,140.68
158805	9/17/2015	9106	DC FROST ASSOCIATES INC	MEMBRANE DIFFUSER REPLACEMENT EQUIP - AERATION BASIN I		
					\$15,129.90	\$15,129.90
158772	9/10/2015	7547666521	ROYAL WHOLESALE ELECTRIC	2 1GBIT M-MODE SWITCH FIBER ADAPTERS		
					\$1,240.21	\$9,785.77
	9/10/2015	7547666123		ASTD PARTS & MATERIALS		
					\$8,545.56	
158759	9/10/2015	129314	KNAPP POLLY PIG INC	1 EA PIG		
					\$8,382.51	\$8,382.51
158800	9/17/2015	21637	CLI METRICS SERVICE COMPANY	COGEN BUILDING PORTABLE AC UNIT RENTAL FOR SUMMER MOI		
					\$4,000.00	\$8,000.00
	9/17/2015	1049		RENTAL COGEN BUILDING PORTABLE AC UNIT - SUMMER MONTH		
					\$4,000.00	

**UNION SANITARY DISTRICT
CHECK REGISTER
9/05/2015-9/18/2015**

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
158833	9/17/2015	702702	UNIVAR USA INC	5,027 GALS SODIUM HYPOCHLORITE	\$2,273.27	\$7,621.32
	9/17/2015	702710		5,030 GALS SODIUM HYPOCHLORITE	\$2,274.62	
	9/17/2015	702647		300 GALS SULFURIC ACID 36%	\$799.71	
	9/17/2015	703574		5,028 GALS SODIUM HYPOCHLORITE	\$2,273.72	
158766	9/10/2015	988412	POLYDYNE INC	42,760 LBS CLARIFLOC WE-539	\$7,525.76	\$7,525.76
158781	9/10/2015	701050	UNIVAR USA INC	5,033 GALS SODIUM HYPOCHLORITE	\$2,275.98	\$6,721.21
	9/10/2015	700821		4,799 GALS SODIUM HYPOCHLORITE	\$2,170.16	
	9/10/2015	701638		5,031 GALS SODIUM HYPOCHLORITE	\$2,275.07	
158748	9/10/2015	21605725	GLOBAL KNOWLEDGE TRAINING	QUERYING MICROSOFT SQL SERVER TRNG - NGUYEN	\$1,996.67	\$5,990.01
	9/10/2015	21605724		QUERYING MICROSOFT SQL SERVER TRNG - TAI	\$1,996.67	
	9/10/2015	21605723		WINDOWS POWERSHELL SCRIPTING & TOOLMAKING TRNG - TAI	\$1,996.67	
158820	9/17/2015	24850807	MOTION INDUSTRIES INC	1 EA MOTOR	\$3,351.33	\$5,113.18
	9/17/2015	24850225		1 EA BEARING	\$1,066.38	
	9/17/2015	24850353		8 EA AIR FILTER ELEMENTS	\$695.47	
158788	9/17/2015	4017274120150903	ALAMEDA COUNTY WATER DISTRICT	SERV TO: 09/02/15 - FREMONT BLVD	\$4,327.88	\$4,535.74
	9/17/2015	4017275220150903		SERV TO: 09/02/15 - FREMONT BLVD	\$120.32	
	9/17/2015	4017420220150903		SERV TO: 09/02/15 - FREMONT BLVD	\$87.54	
158787	9/17/2015	64329	3T EQUIPMENT COMPANY INC	10 PIPEPATCH KIT - WINTER	\$4,389.00	\$4,389.00
158779	9/10/2015	130790	TOTAL WASTE SYSTEMS INC	AUGUST 2015 GRIT DISPOSAL	\$3,828.85	\$3,828.85

**UNION SANITARY DISTRICT
CHECK REGISTER
9/05/2015-9/18/2015**

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
158734	9/10/2015	7567	CATELLUS DEVELOPMENT CORP	REFUND # 18374		
					\$3,470.00	\$3,470.00
158742	9/10/2015	257974	CURTIS & TOMPKINS LTD	53 LAB SAMPLE ANALYSIS		
					\$2,940.00	\$3,410.00
	9/10/2015	257850		8 LAB SAMPLE ANALYSIS		
					\$470.00	
158810	9/17/2015	1098492	FLUID COMPONENTS INTERNATIONAL	FCI GAS FLOW METER INSPECTION		
					\$2,726.87	\$2,726.87
158823	9/17/2015	013720150904	PACIFIC GAS AND ELECTRIC	SERV TO 09/03/15 BOYCE RD PS		
					\$2,606.50	\$2,632.24
	9/17/2015	140120150904		SERV TO 09/02/15 IRVINGTON PS		
					\$25.74	
158771	9/10/2015	1229	ROCKWELL SOLUTIONS INC	1 MECHANICAL SEAL		
					\$2,268.30	\$2,268.30
158769	9/10/2015	916002505932	REPUBLIC SERVICES #916	RECYCLE & ROLL OFF - AUGUST 2015		
					\$2,216.88	\$2,216.88
158775	9/10/2015	2783	SIGNET TESTING LABS INC	NEWARK BACKYARD SS RELOCATION - PHASE 2		
					\$2,157.98	\$2,157.98
158738	9/10/2015	44084741	CINTAS FIRE PROTECTION	FIRE SPRINKLER REPAIRS		
					\$2,099.10	\$2,099.10
158797	9/17/2015	10868900	BLAISDELL'S	ASTD OFFICE SUPPLIES		
					\$540.61	\$2,090.86
	9/17/2015	10811880		CUSTOM DESK 96X96" PER QUOTE #23093-0		
					\$1,424.00	
	9/17/2015	10883330		ASTD OFFICE SUPPLIES		
					\$36.88	
	9/17/2015	10880460		ASTD OFFICE SUPPLIES		
					\$19.73	
	9/17/2015	10885580		ASTD OFFICE SUPPLIES		
					\$69.64	
158814	9/17/2015	9543131	HACH COMPANY	1 EA REPAIR - HACH TSS PROBE 8/2015		
					\$452.11	\$2,081.05
	9/17/2015	9540067		ASTD SAMPLING SUPPLIES		
					\$721.46	
	9/17/2015	9537869		1 EA HACH PH PROBE PD1P1		
					\$907.48	

**UNION SANITARY DISTRICT
CHECK REGISTER
9/05/2015-9/18/2015**

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
158829	9/17/2015	6200	THORNTON ENVIRONMENTAL CONST	CALL OUT FOR LOW ALARM WHILE TANK FULL	\$729.57	\$2,074.57
	9/17/2015	16717		ANNUAL VAPOR TESTING	\$1,345.00	
158739	9/10/2015	1197095	CLEAR EDGE FILTRATION INC	2 GBT BELTS	\$2,035.12	\$2,035.12
158831	9/17/2015	41505471	UNICO MECHANICAL CORP	HOFFMAN BLOWER LASER ALIGNMENT	\$1,995.63	\$1,995.63
158819	9/17/2015	38529481	MCMASTER SUPPLY INC	ASTD PARTS & MATERIALS	\$1,027.37	\$1,932.66
	9/17/2015	38839405		2 EA EXTENDED-LIFE SEALED LEAD-ACID BATTERIES	\$106.20	
	9/17/2015	38851659		1 EA HEAVY DUTY SHELVING, COMPLETE CLOSED UNIT	\$475.45	
	9/17/2015	38657130		1 EA STEEL SAFETY CONTAINER FOR OILY WASTE	\$82.06	
	9/17/2015	37666366		ASTD PARTS & MATERIALS	\$241.58	
158746	9/10/2015	227809	CITY OF FREMONT	SACGISA	\$1,827.34	\$1,827.34

**UNION SANITARY DISTRICT
CHECK REGISTER
9/05/2015-9/18/2015**

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
158761	9/10/2015	38348374	MCMaster SUPPLY INC	ASTD PARTS & MATERIALS	\$716.76	\$1,789.67
	9/10/2015	38158955		6 EA WATER RESISTANT APRONS	\$126.22	
	9/10/2015	38314243		1 EA AIR-ADJUSTABLE STOOL WITH FABRIC SEAT	\$322.37	
	9/10/2015	38402882		ASTD PARTS & MATERIALS	\$138.56	
	9/10/2015	37979536		2 EA EXTENDED LIFE SEALED LEAD-ACID BATTERIES	\$106.14	
	9/10/2015	38266108		CREDIT FOR INV 38266108 CUTTER HEADS	\$-184.87	
	9/10/2015	38491144		4 EA WELD-ON TIE DOWN RINGS	\$66.33	
	9/10/2015	38428270		ASTD PARTS & MATERIALS	\$31.10	
	9/10/2015	38383160		CREDIT FOR CALIBRATION COLUMNS INV 37666366	\$-146.41	
	9/10/2015	38226884		50 PACKS DISPOSABLE LITHIUM BATTERY	\$585.44	
	9/10/2015	38314242		1 EA WELD-ON TIE-DOWN RING	\$28.03	
158725	9/10/2015	5123101	ALL INDUSTRIAL ELECTRIC SUPPLY	6 WELDING RECEPTACLES	\$1,749.00	\$1,749.00
158732	9/10/2015	333939	CALTROL INC	4 PRESSURE GAUGES	\$1,626.41	\$1,626.41
158765	9/10/2015	263708	PETROLEUM MARKETING EQUIPMENT	FREMONT & PASEO PADRE LS IMPROVEMENTS	\$1,610.35	\$1,610.35
158830	9/17/2015	180900215	TRENCH PLATE RENTAL COMPANY	28 DAYS TRENCH PLATE & EYEBOLT RENTAL	\$1,542.80	\$1,542.80
158740	9/10/2015	21690	CLI METRICS SERVICE COMPANY	SERVICE REQUEST: BLDG 80 AC BLOWING COOL AIR INTO MCC R	\$1,507.72	\$1,507.72

**UNION SANITARY DISTRICT
CHECK REGISTER
9/05/2015-9/18/2015**

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
158776	9/10/2015	3276601071	STAPLES CONTRACT & COMMERCIAL	ASTD JANITORIAL & BREAKROOM SUPPLIES - INVENTORY	\$204.08	\$1,457.32
	9/10/2015	3276601075		ASTD JANITORIAL & BREAKROOM SUPPLIES - INVENTORY	\$524.50	
	9/10/2015	3276601064		ASTD JANITORIAL & BREAKROOM SUPPLIES - INVENTORY	\$472.66	
	9/10/2015	3276601074		240 PAPER TOWEL ROLLS	\$256.08	
158744	9/10/2015	410085	ECOM AMERICA LTD	ECOM SPAN GAS FOR CALIBRATION	\$1,450.00	\$1,450.00
158723	9/10/2015	7666426	ABC IMAGING, INC.	FREMONT & PASEO PADRE LS IMPROVEMENTS	\$1,374.90	\$1,374.90
158825	9/17/2015	7586447900	RS HUGHES CO INC	ASTD PPE & SAFETY SUPPLIES	\$494.46	\$1,283.48
	9/17/2015	7585581700		ASTD PPE & SAFETY SUPPLIES	\$789.02	
158839	9/17/2015	3507553	WESTERN ENERGY SYSTEMS	4 COMPENSATORS & 8 GASKETS	\$1,178.36	\$1,178.36
158804	9/17/2015	20150825.25	DALE HARDWARE INC	08/15 - ASTD PARTS & MATERIALS	\$1,144.17	\$1,144.17
158756	9/10/2015	20150908	TIM HUGHES	COMPUTER NOTE - HUGHES	\$1,122.63	\$1,122.63
158808	9/17/2015	52490	ENVIRONMENTAL LOGISTICS INC	HAZARDOUS MATERIAL DISPOSAL	\$1,089.05	\$1,089.05
158751	9/10/2015	9536246	HACH COMPANY	HACH REPAIR CB4 TSS PROBE	\$1,067.60	\$1,067.60
158791	9/17/2015	518931	A-PRO PEST CONTROL INC	AUG PEST CONTROL	\$1,005.00	\$1,005.00
158750	9/10/2015	9806334182	GRAINGER INC	ASTD PARTS & MATERIALS	\$232.45	\$916.98
	9/10/2015	9808285127		ASTD PARTS & MATERIALS	\$676.71	
	9/10/2015	9803590893		1 EA HOLDER, FUSE, 20A, 250V, PANEL MOUNT	\$7.82	

**UNION SANITARY DISTRICT
CHECK REGISTER
9/05/2015-9/18/2015**

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
158802	9/17/2015	258182	CURTIS & TOMPKINS LTD	8 LAB SAMPLE ANALYSIS	\$115.00	\$895.00
	9/17/2015	258004		6 LAB SAMPLE ANALYSIS	\$290.00	
	9/17/2015	258100		11 LAB SAMPLE ANALYSIS	\$490.00	
158758	9/10/2015	1022356	INDUSTRIAL SAFETY SUPPLY	ASTD CAL GAS	\$892.25	\$892.25
158824	9/17/2015	20150915	JOSE RODRIGUES JR	EXP REIMB: HANSEN INFOR CONF - REGISTRATION & AIRFARE	\$852.00	\$852.00
158836	9/17/2015	8042355261	VWR INTERNATIONAL LLC	2 PKS VIAL COD DIGESTION HR	\$402.84	\$839.45
	9/17/2015	8042363789		2 PKS VIAL COD DIGESTION LR	\$436.61	
158729	9/10/2015	6923269	AT&T	SERV: 07/13/15 - 08/12/15	\$641.26	\$823.73
	9/10/2015	6936535		SERV: 07/13/15 - 08/12/15	\$42.47	
	9/10/2015	6936406		SERV: 07/13/15 - 08/12/15	\$42.47	
	9/10/2015	6932440		SERV: 07/13/15 - 08/12/15	\$97.53	
158828	9/17/2015	3709	T&D DIESEL SMOKE TESTNG LLC	11 CALIFORNIA (PSIP) DIESEL SMOKE TESTS	\$797.50	\$797.50
158736	9/10/2015	446621	CENTERVILLE SAW AND TOOL	ASTD PARTS & MATERIALS	\$195.36	\$781.67
	9/10/2015	446462		1 SHARPEN & RETOOTH	\$150.00	
	9/10/2015	446461		ASTD PARTS & MATERIALS	\$416.95	
	9/10/2015	446345		4 BLK FUEL LINES	\$8.54	
	9/10/2015	446533		ASTD PARTS & MATERIALS	\$10.82	
158790	9/17/2015	7388	AMERICAN DISCOUNT SECURITY	AUGUST SECURITY GUARD SERVICES	\$759.00	\$759.00
158812	9/17/2015	1841072321	GOODYEAR COMM TIRE & SERV CTRS	1 EA TIRE	\$757.27	\$757.27

**UNION SANITARY DISTRICT
CHECK REGISTER
9/05/2015-9/18/2015**

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
158754	9/10/2015	601738005	HILLYARD/SAN FRANCISCO	ASTD JANITORIAL SUPPLIES	\$578.98	\$720.53
	9/10/2015	601741927		1 CS PAPER BOWLS	\$141.55	
158730	9/10/2015	10867090	BLAISDELL'S	10 STD CLIPBOARD	\$25.19	\$715.37
	9/10/2015	10866530		1 TONER	\$182.36	
	9/10/2015	10869950		2 DRAWER ORGANIZERS	\$34.08	
	9/10/2015	10868740		ASTD OFFICE SUPPLIES	\$211.26	
	9/10/2015	10868760		3 ENGN PAPER PAD	\$44.52	
	9/10/2015	10872910		ASTD OFFICE SUPPLIES	\$39.18	
	9/10/2015	10873980		ASTD OFFICE SUPPLIES	\$138.14	
	9/10/2015	108/68741		5 MESH PENCIL CUP	\$13.15	
	9/10/2015	10870300		1 BX LTR FOLDERS	\$27.49	
158822	9/17/2015	816042	PACHECO BROTHERS GARDENING INC	TREE REMOVAL - MISSION BLVD	\$700.00	\$700.00
158727	9/10/2015	7334	AMERICAN DISCOUNT SECURITY	AUGUST SECURITY GUARD SERVICES	\$690.00	\$690.00
158794	9/17/2015	91719	ATS ELECTRO LUBE INC	15 AUTOLUBERS	\$678.54	\$678.54
158728	9/10/2015	87896581208252015 AT&T		SERV: 07/18/15 - 08/17/15	\$677.25	\$677.25
158752	9/10/2015	81025423.3	HAMPTON INN AND SUITES	PRE-PAY LODGING - 11/17 - 11/19 - S. NOEGEL	\$223.10	\$669.30
	9/10/2015	81025423.2		PRE-PAY LODGING - 11/17 - 11/19 - E. SEPULVEDA	\$223.10	
	9/10/2015	81025423.1		PRE-PAY LODGING - 11/17 - 11/19 - D. STRASBURG	\$223.10	
158815	9/17/2015	1597970	HANSON AGGREGATES INC	8.10 TONS 1/2 MED TYPE A AC-R	\$611.34	\$611.34

**UNION SANITARY DISTRICT
CHECK REGISTER
9/05/2015-9/18/2015**

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
158763	9/10/2015	20150831	NAPA AUTO PARTS	MONTHLY AUTO PARTS STMT - AUG 2015	\$546.15	\$546.15
158784	9/10/2015	9750995161	VERIZON WIRELESS	WIRELESS SERV 07/21/15-08/20/15	\$541.57	\$541.57
158803	9/17/2015	20150910	RICHARD CZAPKAY	TRAVEL REIMB: CWEA NORTHERN REGIONAL TRAINING CONF	\$295.64	\$501.44
	9/17/2015	2015091115		EXP REIMB: FOOD FOR CUES EQUIPMENT USER GROUP	\$205.80	
158783	9/10/2015	31134	VALLEY OIL COMPANY	1 DR 5W30 OIL	\$500.94	\$500.94
158737	9/10/2015	7952	SHINING CHEN	REFUND # 18368	\$500.00	\$500.00
158777	9/10/2015	7448	STREAMLINE PLUMBING & DRAIN	REFUND # 18379	\$500.00	\$500.00
158799	9/17/2015	7974	CLASSICS 36120 RUSCHIN, L.P.	REFUND # 18373	\$500.00	\$500.00
158818	9/17/2015	8076	KING TRENCHLESS	REFUND # 18388	\$500.00	\$500.00
158762	9/10/2015	802379	MOBILE MODULAR MANAGEMENT CORP	FMC TRAILER RENTAL - SEPT 2015	\$493.90	\$493.90
158747	9/10/2015	1083718438	G&K SERVICES CO	UNIFORMS AND MATS	\$59.22	\$450.72
	9/10/2015	1083718433		UNIFORM LAUNDERING SERVICE	\$117.72	
	9/10/2015	1083718436		UNIFORM LAUNDERING SERVICE	\$27.17	
	9/10/2015	1083718437		UNIFORM LAUNDERING SERVICE	\$15.16	
	9/10/2015	1083718439		UNIFORM LAUNDERING SERVICE	\$11.20	
	9/10/2015	1083718440		ASTD DUST MOPS, WET MOPS & TERRY TOWELS	\$33.78	
	9/10/2015	1083718434		UNIFORM LAUNDERING SERVICE	\$95.98	
	9/10/2015	1083718435		UNIFORM LAUNDERING SERVICE	\$90.49	
158795	9/17/2015	246767	AUTO BODY TOOLMART	ASTD PARTS & MATERIALS	\$403.86	\$403.86

**UNION SANITARY DISTRICT
CHECK REGISTER
9/05/2015-9/18/2015**

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
158757	9/10/2015	292115993	IDEXX DISTRIBUTION INC	ASTD COLILERT-18 & ENTEROLERT SAMPLING SUPPLIES	\$402.10	\$402.10
158753	9/10/2015	316692	HARRINGTON INDUSTRIAL PLASTICS	ASTD PARTS & MATERIALS	\$377.14	\$377.14
158755	9/10/2015	5556869	HOSE & FITTINGS ETC	1 EA F471TC-01-07-06-06-302.5	\$148.71	\$375.48
	9/10/2015	5557262		1 EA FS25UL-01-01-04-04-06-240	\$226.77	
158743	9/10/2015	8616	EAST BAY MUNI UTILITY DISTRICT	8 LAB SAMPLE ANALYSIS	\$370.70	\$370.70
158807	9/17/2015	20150916	PAUL ELDREDGE	EXP REIMB: J. BERZON ET RETIREMENT DINNER	\$358.31	\$358.31
158809	9/17/2015	902298268	EVOQUA WATER TECHNOLOGIES	DI WATER SYSTEM	\$345.00	\$345.00
158816	9/17/2015	601744229	HILLYARD/SAN FRANCISCO	2 CS PAPER PLATES	\$339.61	\$339.61
158749	9/10/2015	78785	GORILLA METALS	METAL, STEEL, STAINLESS, AND ALUMINUM	\$330.83	\$330.83
158813	9/17/2015	9810643420	GRAINGER INC	3 EA THERMAL UNITS	\$146.55	\$287.57
	9/17/2015	9809844617		10 EA FUSES	\$93.06	
	9/17/2015	9813960599		8 EA GROUND BAR KITS	\$47.96	
158832	9/17/2015	20160083	CITY OF UNION CITY	MISC SPOT REPAIRS PHASE VI	\$262.15	\$262.15
158767	9/10/2015	239409	PRESTIGE LENS LAB	VDT GLASSES - BRENNER	\$244.19	\$244.19
158834	9/17/2015	9853345.0	UPS - UNITED PARCEL SERVICE	SHIPPING CHARGES W/E 08/22/15	\$236.51	\$236.51
158792	9/17/2015	20150910	ROLLIE ARBOLANTE	EXP REIMB: CUSTOMER SERVICE TEAM 1ST Q SAFETY RECOGNIT	\$225.00	\$225.00
158827	9/17/2015	20150901	SPOK INC	SEPTEMBER 2015 PAGER SERVICE	\$217.66	\$217.66
158789	9/17/2015	5507230	ALPINE AWARDS INC	5 WALL NAMEPLATE HOLDERS/8 DESKTOP NAMEPLATE HOLDERS	\$217.18	\$217.18
158811	9/17/2015	1243523801	GLACIER ICE COMPANY INC	156 7-LB BAGS OF ICE	\$216.84	\$216.84

**UNION SANITARY DISTRICT
CHECK REGISTER
9/05/2015-9/18/2015**

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
158768	9/10/2015	8200000008678	RED WING SHOE STORE	SAFETY SHOES - GASKINS	\$202.55	\$202.55
158786	9/10/2015	20150903	WILSON WONG	EXP REIMB: SAFETY SHOES	\$189.95	\$189.95
158837	9/17/2015	20150916.2	JANINNE WARD	EXP REIMB: MANAGEMENT MEETING LUNCH	\$14.51	\$185.03
	9/17/2015	20150916.1		EXP REIMB: MANAGEMENT MEETING LUNCH	\$170.52	
158780	9/10/2015	16547861	TRI DIM FILTER CORPORATION	100 TRI-DEK 15/40 2 PLY PADS	\$184.39	\$184.39
158840	9/17/2015	11836	WESTERN MACHINE & FAB INC	1 1" DRIVE SHAFT MFG PER SAMPLE	\$181.50	\$181.50
158801	9/17/2015	5181102	CORT	OFFICE FURNITURE RENTAL FOR J. BERZON	\$168.76	\$168.76
158726	9/10/2015	373075	ALLIANT INSURANCE SERVICES INC	QUARTERLY REPORT&PREMIUM-PHYSICAL DAMAGE POLICY	\$149.00	\$149.00
158774	9/10/2015	875917541	SHARP BUSINESS SYSTEMS	MTHLY MAINTENANCE BASED ON USE	\$115.88	\$115.88
158731	9/10/2015	20150908	CURTIS BOSICK	EXP REIMB: PE LICENSE RENEWAL	\$115.00	\$115.00
158785	9/10/2015	8042276422	VWR INTERNATIONAL LLC	1 PK PH INDICATOR PAPER	\$104.57	\$104.57
158821	9/17/2015	20150911.2	SHAWN NESGIS	EXP REIMB: SAFETY RECOG GIFT CARDS - AUGUST 2015	\$90.00	\$100.00
	9/17/2015	20150911.1		EXP REIMB: MSA COMMITTEE MEETING	\$10.00	
158817	9/17/2015	5558212	HOSE & FITTINGS ETC	ASTD PARTS & MATERIALS	\$16.71	\$89.57
	9/17/2015	5558293		ASTD PARTS & MATERIALS	\$34.45	
	9/17/2015	5558256		ASTD PARTS & MATERIALS	\$16.71	
	9/17/2015	5558493		ASTD PARTS & MATERIALS	\$21.70	
158773	9/10/2015	7584206900	RS HUGHES CO INC	4 EMPTY FIRST AID KITS	\$74.90	\$74.90
158724	9/10/2015	4088644120150825	ALAMEDA COUNTY WATER DISTRICT	SERV TO: 08/25/15 - BOYCE ROAD	\$49.21	\$49.21

**UNION SANITARY DISTRICT
CHECK REGISTER
9/05/2015-9/18/2015**

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
158826	9/17/2015	20150914	AARON SHONG	EXP REIMB: LIVESCAN FEE	\$35.00	\$35.00
158778	9/10/2015	20150903	EDWARD TATOLA	EXP REIMB: LIVESCAN FEE	\$30.00	\$30.00
158760	9/10/2015	20150901	RICHARD LEBON	REIMBURSE LIVESCAN FEE	\$25.00	\$25.00
158793	9/17/2015	6957274	AT&T	SERV: 07/20/15 - 08/19/15	\$18.49	\$18.49
158782	9/10/2015	9853335.0	UPS - UNITED PARCEL SERVICE	SHIPPING CHARGES W/E 08/15/15	\$15.10	\$15.10

Invoices:

Credit Memos :	2	-331.28
\$0 - \$1,000 :	143	38,821.50
\$1,000 - \$10,000 :	56	165,862.52
\$10,000 - \$100,000 :	11	247,302.01
Over \$100,000 :	0	
Total:	212	451,654.75

Checks:

\$0 - \$1,000 :	64	26,055.93
\$1,000 - \$10,000 :	42	128,910.41
\$10,000 - \$100,000 :	12	296,688.41
Over \$100,000 :		
Total:	118	451,654.75



Directors
Manny Fernandez
Tom Handley
Pat Kite
Anjali Lathi
Jennifer Toy

Officers
Paul R. Eldredge
*General Manager/
District Engineer*

Karen W. Murphy
Attorney

DATE: September 28, 2015

MEMO TO: Board of Directors – Union Sanitary District

FROM: Paul Eldredge, General Manager/District Engineer
Rich Cortes, Business Services Manager
Roslyn Fuller, Purchasing Agent

SUBJECT: Agenda Item No. 17.b – Meeting of September 28, 2015
Information Item: **Award for Achievement of Excellence in Procurement**

Recommendation:

Present the Materials Management Team (MMT) with the Award for Achievement of Excellence in Procurement for 2015.

Background:

The National Purchasing Institute (NPI), the official public sector purchasing affiliate of the Institute for Supply Management, established a program designed to recognize organizational excellence in public procurement.

The award is earned by those public sector organizations that demonstrate excellence in the principles and processes of procurement by obtaining a high score based on standardized criteria in 18 performance areas. The criteria are designed to measure innovation, professionalism, productivity, e-procurement implementation and leadership attributes of the procurement functions of an organization.

NPI has awarded the prestigious Achievement of Excellence in Procurement Award for 2015 to Union Sanitary District. This is the ninth consecutive year the District has received the award. USD is one of only 50 government agencies in California and 29 special districts in the United States to receive the award.



Directors
Manny Fernandez
Tom Handley
Pat Kite
Anjali Lathi
Jennifer Toy

Officers
Paul R. Eldredge
*General Manager/
District Engineer*

Karen W. Murphy
Attorney

DATE: September 25, 2015

MEMO TO: Board of Directors - Union Sanitary District

FROM: Paul Eldredge, General Manager/District Engineer
Armando Lopez, Manager, Treatment and Disposal Services
Tim Grillo, Coach, Research and Support Team

SUBJECT: Agenda Item No. 17c - Meeting of September 28, 2015
Information Item: **Annual Report to Union City Fiscal Year 2015**

Recommendation

Information Only.

Background

Union City Use Permit UP-4-95 requires the District to submit a report annually to the City Manager's Office. The purpose of the report is to:

1. Document the existing wastewater treatment plant flow
2. Provide a projection of the plant flow for the following year
3. Review compliance with effluent discharge limits
4. Provide a status report on progress made in the development of any new treatment facilities outside of the Union City limits.

A copy of the District's annual report to Union City for FY 2015 is attached for review.



Directors
Manny Fernandez
Tom Handley
Pat Kite
Anjali Lathi
Jennifer Toy

Officers
Paul R. Eldredge, P.E.
General Manager
District Engineer

Karen W. Murphy
Attorney

August 31, 2015

Mr. Tony Acosta
City Manager, City of Union City
34009 Alvarado-Niles Road
Union City, CA 94587

SUBJECT: SUBMISSION OF ANNUAL REPORT FOR UNION SANITARY DISTRICT FOR FISCAL YEAR 2015

Dear Mr. Acosta,

Pursuant to Union City use permit (UP-4-95), Union Sanitary District hereby submits its Annual Report for Fiscal Year 2015.

Introduction

The Union City Planning Commission approved use permit No.UP-4-95 (Use Permit) on July 20, 1995, that allowed for the expansion of the Union Sanitary District (USD) Alvarado Wastewater Treatment Facility from a capacity of 35 million gallons per day (MGD) to 38 MGD. The Use Permit requires the District to submit an annual report to the City Manager's Office documenting the current wastewater flow received at the Alvarado Treatment Plant, a projection of flows for the next year, the current discharge limits imposed by the Regional Water Quality Control Board (RWQCB), and a status report on progress made toward development of a new facility outside of Union City limits (Condition 9).

A second condition (Condition 6) requiring an annual operations audit by an independent expert was eliminated by mutual agreement of Union Sanitary District's General Manager, Richard Currie, and Union City's City Manager, Larry Cheeves, in January 2005 following more than 10 years of perfect NPDES Permit compliance.

Background

Union Sanitary District, founded in 1918, collects and treats wastewater from the communities of Union City, Newark, and Fremont, California. The District owns

5072 Benson Road Union City, CA 94587-2508
P.O. Box 5050 Union City, CA 94587-8550
(510) 477-7500 FAX (510) 477-7505
www.unionsanitary.com

and operates a wastewater treatment plant located in Union City. Treated effluent is discharged through the East Bay Dischargers Authority (EBDA) outfall into San Francisco Bay. A portion of the effluent is diverted to Hayward Marsh from the EBDA force main as a beneficial use of reclaimed wastewater.

The Alvarado Wastewater Treatment Facility was completed in 1981 and was originally rated for a design flow of 19.7 MGD. The Plant Expansion Project increased treatment capacity in 1985. The Plant Upgrade Project set the firm reliable treatment capacity at 33 MGD in 1997. The upgrade project replaced the original secondary treatment technology with three aeration basins, and included a new blower room, headworks, generator building, new digester and other miscellaneous improvements. Construction of a centrifuge dewatering facility was completed in 2004. Replacement of the treatment plant cogeneration system and its associated building was completed in 2015. Construction to renew and replace aging equipment is a continual and ongoing process.

Current Wastewater Flow

The following is a summary of the average dry weather flow (ADWF) and annual average daily flow (AADF) for recent fiscal years. The Alvarado treatment facility is permitted to treat an ADWF flow of 33 MGD under the current national pollution discharge elimination system (NPDES) permit. The ADWF is defined as the average flow during the summer months of May through September. The AADF is defined as the annual average daily flow throughout the fiscal year including both wet and dry seasons.

<u>Fiscal Year</u>	<u>ADWF Permitted by NPDES, MGD</u>	<u>Actual ADWF, MGD</u>	<u>Actual AADF, MGD</u>
<u>2011</u>	<u>33</u>	<u>25.2</u>	<u>26.0</u>
<u>2012</u>	<u>33</u>	<u>26.0</u>	<u>25.1</u>
<u>2013</u>	<u>33</u>	<u>24.3</u>	<u>24.6</u>
<u>2014</u>	<u>33</u>	<u>24.1</u>	<u>23.5</u>
<u>2015</u>	<u>33</u>	<u>22.6</u>	<u>22.9</u>

During FY 2015, an average effluent flow of 3.12 MGD was reused at the Hayward Shoreline Marsh.

Projected Wastewater Flow

The annual average daily flow (AADF) has been trending downward for the past several years due to the loss of some water intensive industries from the service area and to impacts from the draught and water conservation efforts by ACWD. The AADF for FY 2015 was 22.9 MGD, which is a decrease of 0.6 MGD from the FY 2014 average. There are predictions of a heavy rainy season this winter. If

this occurs, we anticipate an increase in flow. If a heavy rainy season does not ensue, we predict that flow will continue to decrease by approximately 0.5 MGD in FY 16.

Discharge Compliance and Permit Limits

The regional board reissued the NPDES permit for the East Bay Dischargers Association in 2012. The NPDES permit includes an effluent limit for ammonia at the combined final effluent discharged to the San Francisco Bay. It is currently easy to comply with this limit. However, we anticipate that future changes to the ammonia limit could require substantial improvements to the treatment plant for ammonia removal.

There were no violations of the EBDA Discharge permit in FY 2015. Union Sanitary District was presented with the Peak Performance Award (Platinum Award) from the National Association of Clean Water Agencies (NACWA) for Calendar Year 2014. The NACWA Platinum Award recognizes perfect National Pollutant Discharge Elimination System (NPDES) permit compliance for a second five consecutive year period. Union Sanitary District has been recognized through the Peak Performance Award Program for the past 22 years.

However, in December 2015, the treatment plant released a small amount of chlorinated water to the Old Alameda Creek during an exercise of the wet weather outfall valve. The release constitutes an excursion of the NPDES permit final effluent chlorine residual limitation of 0.0 mg/L. The release was traced to the timing of valves and associated automation that was installed to provide better control of the flow to the Old Alameda Creek. The automation has since been tuned and the performance was verified.

Development of Facilities Outside Union City

The District has no plans for construction of additional treatment outside the facility. However, a planning study is underway to determine the siting of treatment plant improvements that may be necessary to meet treatment needs in the future.

If you have any questions or need additional information, please contact me at (510) 477-7517 or email armando_lopez@unionsanitary.ca.gov.

Sincerely,

Armando Lopez
Manager, Treatment & Disposal Services

BOARD OF DIRECTORS
QUARTERLY TRAVEL AND TRAINING EXPENDITURE REPORT
4TH QTR, FISCAL YEAR 2015

Board Members	Description	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Beginning Balance	Y-T-D Expense	Balance Available
FERNANDEZ, MANNY	Union City - State of the City Luncheon: Registration	30.00						
TOTAL		30.00	0.00	0.00	0.00	5000.00	30.00	4970.00
HANDLEY, TOM	Union City - State of the City Luncheon: Registration 59th CASA Conference: Registration Fremont Chamber of Commerce - State of the State Luncheon: Registration CSDA Webinar: Must Have Communication Protocols - Board & Staff CASA 2015 Winter Conference: Registration CASA 2015 Winter Conference: Lodging CASA 2015 Winter Conference: Air Fare CASA D.C. Conference: Registration CASA D.C. Conference: Meals Fremont - State of the City Luncheon: Registration	30.00 500.00	46.00	69.00 500.00 598.08 328.70 600.00 34.38				
TOTAL		530.00	46.00	2,130.16	45.00	5000.00	2,751.16	2248.84
HARRISON, JENNIFER	Newark - State of the City Luncheon: Registration				42.00			
TOTAL		0.00	0.00	0.00	42.00	5000.00	42.00	4958.00
KITE, PAT	CSDA Webinar: Must Have Communication Protocols - Board & Staff CSDA Webinar: Annual Employment Law Update: Recent Cases, Trends Newark - State of the City Luncheon: Registration			69.00 69.00				
TOTAL		0.00	0.00	138.00	42.00	5000.00	180.00	4820.00
LATHI, ANJALI	Union City - State of the City Luncheon: Registration 59th CASA Conference: Registration 59th CASA Conference: Lodging 59th CASA Conference: Meals 59th CASA Conference: Mileage & Tips Fremont Chamber of Commerce - State of the State Luncheon: Registration CSDA Webinar: Must Have Communication Protocols - Board & Staff CWEA Membership Renewal Fremont - State of the City Luncheon: Registration	30.00 500.00 652.70 20.36 101.64	46.00	69.00 156.00				
TOTAL		1,304.70	46.00	225.00	45.00	5000.00	1,620.70	3379.30
GRAND TOTAL		1,864.70	92.00	2,493.16	174.00	25000.00	4,623.86	20376.14

The Board of Directors' Quarterly Expenditure Report is attached as part of the check register in accordance with Board Member Business Expense policy adopted September 5, 1991

Regina McEvoy

From: agoldsmith@fremontbusiness.com
Sent: Thursday, March 19, 2015 1:57 PM
To: Regina McEvoy
Subject: [BULK] Event Registration

Fremont Chamber of Commerce

Thank you for registering for State of the City Luncheon

3/27/2015 12:00 Noon - 2:00 PM
Marriott Fremont Silicon Valley
46100 Landing Pkwy.
Fremont, CA 94538

Thank you for your purchase. Please bring your confirmation print out to the event.

Below are the details of your registration.

Sign Up Date: 3/19/2015
Sign Up Information: Regina McEvoy
Union Sanitary District
5072 Benson Road
Union City, CA 94587
510-477-7503
reginam@unionsanitary.ca.gov

Registration Item	Confirmation #	Quantity	Price
Fremont Chamber Member Regular Meal	91	2	\$90.00
List Names First Last of Additional Attendees:	USD General Manager Paul Eldredge, USD Director Anjali Lathi, USD Director Tom Handley		
Attendees:	<div style="border: 1px solid black; padding: 5px;"> paule@unionsanitary.ca.gov List Names First Last of Additional Attendees: USD General Manager Paul Eldredge thandley@unionsanitary.ca.gov </div>		

List Names First Last of Additional Attendees: USD Director Tom Handley

Fremont Chamber
Member Vegetarian
Meal

92 1 \$45.00

List Names First
Last of Additional
Attendees:

USD General Manager Paul Eldredge, USD Director Anjali
Lathi, USD Director Tom Handley

Attendees:

alathi@unionsanitary.ca.gov

List Names First Last of Additional Attendees: USD Director Anjali Lathi (Please
note: special dietary restrictions:
vegan, gluten-free, no soy, no bell
peppers, no celery)

Sub-Total \$135.00

Taxes \$0.00

Total \$135.00

Amount Paid \$135.00

Amount Due \$0.00

State of the City 2015

Luncheon Presentation - Mayor Al Nagy



NEWARK
CHAMBER OF
COMMERCE

Thursday, April 16, 2015

DoubleTree by Hilton, 39900 Balentine Drive, Newark
11:30 a.m. to 12:00 p.m. – Early Bird Networking & “Mini Showcase”
12:00 p.m. to 12:45 p.m. – Luncheon & Entertainment
12:45 p.m. to 1:30 p.m. – State of the City Address



NEWARK
CHAMBER OF
COMMERCE

Reservation Options: Register & pay by credit card at www.newark-chamber.com, or by phone 510-744-1000; Scan & email this form to info@newark-chamber.com; Fax to (844) 245-8925; or, Mail form with check payable to the Newark Chamber of Commerce, to 37101 Newark Blvd., Newark 94560. *For more details about sponsorships or luncheon, call 510-744-1000.

For this event – ADVANCE RESERVATIONS ONLY – Reserve by April 12th!

Name _____
Company Name Union Sanitary District
Name(s) of Guest(s) Paul Eldredge, General Manager; Pat Kite, Director;
Jennifer Toy, Director
Address 5072 Benson Rd. City Union City Zip 94587
Phone 477-7503 Fax _____ Email regina.m@union-sanitary.ca.gov

Attendees must have prepaid luncheon reservations. Reminder: There is no “gallery” seating at this event.
Chamber members attending may reserve a “table top” business display space, NO COST! But space IS limited!

Sponsorship Opportunities

Presenting Sponsorship (One only) \$2,000
SOLD!

Platinum Event Sponsorship \$1,000

Gold Event Sponsorship \$750

Table Sponsorship \$500

Program Sponsorship \$150

Table for 8, introductory comments, recognition at event, full page ad or profile in program, website block or banner ad, & space for display & grand-size banner at event.
Table for 8, recognition at event, full page ad or profile in program, website logo ad, & space for display & grand-size banner at event.

Table for 8, recognition at event, ½ pg ad or profile in program, & space for large banner.
Table for 8, recognition at event, ¼ pg ad or profile in program.
Seating for 2, recognition at event, ¼ pg logo ad in program.

All sponsorship funds are used to support Chamber business programs, services and events in the Newark area. Please ask about other event & program sponsorships, including specially priced multi-event sponsorship packages. Thank you!

Chamber Members \$42/ticket: | 1 Chicken 2 Salmon _____ Veg | Total # 3 Total \$ 126.⁰⁰
Non-Members \$55/ticket: | _____ Chicken _____ Salmon _____ Veg | Total # _____ Total \$ _____

SPONSORSHIP: Please list my company as a State of the City SPONSOR at the \$ _____ level.

½ TABLE TOP DISPLAY: Please reserve a display space * Set up by 11:15 a.m. (11:30 a.m. – 12:00 p.m. Mini Showcase)

My check is enclosed. For ticket confirmation please email me at: _____

Please charge my: Visa Mastercard American Express Or, I will pay online at www.newark-chamber.com

Name (as it appears on the Credit Card) provided over the phone -

Card # _____ Exp Date _____ Security Code _____

Billing Address of Card (incl. zip) _____

Signature _____ Date _____

Reservation Deadline: must be received by April 12th, 2015



**Summary of the EBDA Commission Meeting
Thursday, September 17, 2015 at 9:30 a.m.**

Prepared by: P. Eldredge

- Commissioners Handley, Dias, Johnson, Peixoto, and Prola were present.
- The Consent Calendar was approved unanimously and included the Commission Meeting Minutes, List of Disbursements, and Treasurer's Report.
- The Commission unanimously approved the reports from the General Manager, Managers Advisory, Financial Management, Regulatory Affairs, and Operations & Maintenance committees. The following items were discussed:
- **General Managers Report** discussed a recent presentation from the WEF Nutrient Symposium on future wastewater discharge possibilities.
- **Managers Advisory Committee (MAC)** with the General Manager on September 16, 2015. The Committee discussed the use of peracetic acid as an alternative to sodium hypochlorite. With the Water Boards approval, a pilot test will be performed within the next three to six months. The MAC reviewed the four spending resolutions and supports approval of all resolutions.

The Oro Loma Sanitary District will hold an open house to celebrate the Horizontal Levee on November 14 from 10a to 1p. Also, an open house will be held on October 26, 4p to 6p at the San Leandro Water Pollution Control Plant to commemorate the completion of the plant upgrade project.

- **Financial Management Committee** approved the August list of disbursements and Preliminary Treasurer's Reports. The Fiscal Year 2014/15 expenses are under budget ~300K with an additional ~200K from the State Coastal Conservancy for the Sea Level Rise Grant. The Committee reviewed 20-year expenses of the Renewal and Replacement Fund.
- **Regulatory Affairs Committee** reviewed July permit compliance. The General Manager reviewed the EBDA final report to the State Coastal Conservancy on Sea Level Rise Adaptation.
- **Operations and Maintenance (O&M) Committee** met with the General Manager on September 14, 2015 and was updated on EBDA performance. The Committee expressed its support for Commission approval of four spending resolutions: 1) Beecher Engineering, Inc. contract for design of the HEPS switch gear replacement; 2) A contract to Kennedy Jenks Consultants for cost benefit analysis of the HEPS repair or replacement; 3) A purchase order to D.W. Nicholson Corporation for replacement of the utility water system at the OLEPS; and 4) A purchase order to H&R Plumbing and Drain Cleaning, Inc. for coating the force main manways and LAVWMA vault.
- **Ad-Hoc Committee** discussed holding EBDA vision workshops and determined that a series of two-hour evening meetings would work best. Topics will include the history of EBDA and the historical and current cost factors of the EBDA system.

The Commission unanimously passed the following resolutions:

- Commissioner Prola moved to adopt the resolution authorizing a contract with Beecher Engineering, Inc. in the amount of \$55,080 for Phase II Design of the Replacement Electrical Switch Gear. The motion was seconded by Commissioner Johnson and carried unanimously (Handley, Johnson, Prola, Peixoto, Dias; ayes).
- Commissioner Johnson moved to adopt the resolution authorizing a contract with Kennedy/Jenks Consultants in the amount of \$25,000 for a special study cost analysis to determine the future repair or replacement of the HEPS. The motion was seconded by Commissioner Peixoto and carried unanimously (Handley, Johnson, Prola, Peixoto, Dias; ayes).
- Commissioner Handley moved to adopt the resolution authorizing a purchase order to D.W. Nicholson Corp. in the amount of \$42,400 for the replacement of the utility water system at the OLEPS. The motion was seconded by Commissioner Peixoto and carried unanimously (Handley, Johnson, Prola, Peixoto, Dias; ayes).
- Commissioner Prola moved to adopt the resolution authorizing a purchase order to H&R Plumbing and Drain Cleaning, Inc. in the amount of \$74,077 for the coating of the force main manways and the LAVWMA vault. The motion was seconded by Commissioner Peixoto and carried unanimously (Handley, Johnson, Prola, Peixoto, Dias; ayes).

Information items from the Commission and Staff:

Staff advised that the new programmable system at OLEPS is in place and being tested on Thursday afternoon. Commissioner Dias shared a Sewer Rates and Connection Fees Survey for FY 2015-16 performed by Oro Loma staff.

On September 10, the Hayward Area Recreation & Park District staff hit the Skywest line causing a break at the San Lorenzo Park & Community Center. The General Manager thanked Oro Loma Collection crew for their assistance with the clean-up.



Directors
Manny Fernandez
Tom Handley
Pat Kite
Anjali Lathi
Jennifer Toy

Officers
Paul R. Eldredge
*General Manager/
District Engineer*

Karen W. Murphy
Attorney

DATE: September 24, 2015

MEMO TO: Board of Directors – Union Sanitary District

FROM: Paul Eldredge, General Manager/District Engineer
Sheila Tolbert, Human Resources Manager

SUBJECT: Agenda Item No. 18 - Meeting of September 28, 2015
Approve Side Letter for Extension of SEIU 1021 (Service Employees International Union) Memorandum of Understanding (MOU)

Recommendation

Approve Side Letter to Extend MOU.

Background

Representatives of SEIU Local 1021 and the District have agreed to a two (2) year extension of the MOU between the District and SEIU 1021 which is currently set to expire August 31, 2016. The most notable terms of this extension are summarized below:

- The increase to the contribution the District makes to Employee Benefit Account, which includes medical insurance, will increase by 4% effective January, 2017, and January, 2018, (which is the same percentage increase in the current contract).
- Effective July 1, 2017, the retiree medical benefit will increase by \$25 for each benefit level which is consistent with the terms of the current MOU.
- Classified employees will receive the same cost of living adjustment (COLA) in 2017 and 2018, which is 3.5%.

All other terms and conditions of the MOU remain the same. The attached Side Letter of Agreement extends the labor contract, by mutual agreement, to August 31, 2018.

Attachment: Side Letter of Agreement Regarding Memorandum of Understanding Extension Between Union Sanitary District and SEIU Local 1021

**SIDE LETTER OF AGREEMENT
REGARDING
MEMORANDUM OF UNDERSTANDING EXTENSION
BETWEEN
UNION SANITARY DISTRICT
AND
SEIU LOCAL 1021**

September 10, 2015

Representatives for the Union Sanitary District (District) and representatives for SEIU Local 1021 (Union) have met and mutually agreed to the following modifications of the Memorandum of Understanding between the District and the Union.

Section 39 Duration

This MOU shall be in full force through August 31, 2018 and shall continue thereafter except those portions which may be amended, deleted, or modified after a reasonable notice by either party and the opportunity to meet and confer as provided by law resulting in a mutual agreement between the parties.

Section 5.2 Salary Increases

- e) Effective March 1, 2017, there will be a 3.5% cost of living increase in all steps of all classifications.
- f) Effective March 1, 2018, there will be a 3.5% cost of living increase in all steps of all classifications.

Section 12.6(b) The District shall not treat this payment as compensation subject to income tax withholding or reporting unless the Internal Revenue Service or Franchise Tax Board indicates that such contributions are income subject to taxation. Each employee shall be solely responsible for any federal, state, or local tax liability arising out of the implementation of this section.

Designation	Effective 1/1/17	Effective 1/1/18
Employee only	\$ 1,025.62	\$ 1,066.65
Employee + 1	\$ 2,018.98	\$ 2,099.74
Employee + Family	\$ 2,428.80	\$ 2,582.11

Added to Packet 9/25/15

Section 12.6(c) The minimum monthly employee contribution towards medical shall be in accordance with the table below:

Employee Only	\$20.00
Employee + 1	\$30.00
Family	\$40.00

If the employees select plan that are more expensive than District contribution, employees are responsible for paying the difference.

Section 23.3(f) For employees who retire from the District on or after July 1, 2017, the monthly reimbursement for medical coverage shall be as follows:

Employees with less than ten (10) years of District service	\$0 or MEC if eligible
Employees with ten (10) but less than fifteen (15) years of District service	\$400
Employees with fifteen (15) but less than twenty (20) years of District service	\$500
Employees with more than twenty (20) years of District service	\$600

Section 23.3(g) The District shall not treat the District reimbursement to the medical retirement plan as compensation subject to income tax withholding unless the Internal Revenue Service or the Franchise Tax Board indicates that such reimbursements are taxable income subject to withholding. Each retired employee shall be solely and personally responsible for any federal, state, or local tax liability or penalty that may arise out of the implementation of this section.

If the foregoing is in accordance with your understanding, please indicate your acceptance and approval in the space provided below.

Approved and Accepted

Date: _____

For the SEIU Local 1021

For the DISTRICT

By: _____
Jamie Rojo
President

By: _____
Paul Eldredge
General Manager/District Engineer

By: _____
Mohammad Ghoury
Vice President

By: _____
Glenn Berkheimer
IEDA

By: _____
Greg Cross
Field Representative

Reclamation study spotlights shortfalls in Santa Fe Basin water supply

WASHINGTON, DC, Sept. 10, 2015

Today, the Bureau of Reclamation released a study of the Santa Fe Basin that found the water supply for the city -- absent of newly implemented strategies -- is not adequate to meet future demands even without the influence of climate change. The research identifies shortages in the water supply and potential adaptation strategies to meet the water needs described in the basin's 40-year water demand projections.

The area's population is expected to increase about 80 percent by 2055 and, unless action is taken, would be expected to result in a shortfall of about 5,155 acre-feet of water per year -- the amount of water that provides for more than 20,000 people. When different climate change scenarios were incorporated into the study, water shortfalls of between 6,342 acre-feet to 9,323 acre-feet per year were projected.

"Basin Studies provide important information on projected water supplies and demands so water managers can develop strategies to meet the water needs of their residents," Reclamation Commissioner Estevan López said. "Working collaboratively is the most effective way to manage water resources, and the city and county of Santa Fe will benefit from the results of this study."

Reliability of the San Juan-Chama Project was also studied under various climate change scenarios. The study found that projected flows within the project would decrease by 25 percent overall. Flows would decrease in the summer but would increase in the spring. Storage in Heron Reservoir is projected to be reduced, and sufficient water for a full allocation to contractors will be available less frequently.

Developing strategies to adapt to expected changes in water supplies is another important component of the Santa Fe Basin Study and included input from the public, the city of Santa Fe and the county of Santa Fe. The portfolio of items selected to study further include the use of reclaimed water, water conservation, direct injection, and infiltration for aquifer storage and recovery, and obtaining additional water rights.

Reclamation, the city of Santa Fe and the county of Santa Fe, which co-funded the study, developed the Santa Fe Basin Study. The basin includes the upper Rio Grande watershed, tributaries within the San Juan River watershed, a portion of water delivered to Santa Fe through Reclamation's San Juan-Chama Project, and groundwater aquifers of the Santa Fe area. The basin includes the city of Santa Fe, the main municipality in the watershed, and the northern portion of Santa Fe County.

CA sanitary district receives 2015 'WuHoo' Pollution Prevention Award

OAKLAND, CA, Sept. 11, 2015 -- The San Francisco Bay Regional Water Quality Control Board recently presented the Central Contra Costa Sanitary District of California with the "WuHoo!" Pollution Prevention Award for its education efforts about problems caused by flushable wipes.

The Water Board presents the WuHoo Award annually in memory of former Board employee Dr. Teng-chung Wu, an early advocate for pollution prevention. Wu believed the best way to keep San Francisco Bay clean was to keep pollutants from getting into wastewater, instead of constructing expensive treatment works to remove them.

These so-called "flushable" wipes do not break down in sewers and can cause sewage blockages and backups that overflow onto streets and homes. Overflows pose enormous environmental and public health hazards. Further, flushed wipes also cause major damage at wastewater treatment facilities that can cost hundreds of thousands of dollars to repair.

Melody LaBella, the District's Pollution Prevention Program Coordinator, accepted the WuHoo Award. "Disposable wipes, even those labeled 'flushable,' are a problem for all wastewater collection and treatment agencies," she said. "Significantly more maintenance work is required to remove wipes from sewer pipes, pumps and treatment plant equipment. We feel it's important to do what we can to minimize the sewer overflows they cause."

The District's leadership with education about wipes began in 2009. More recently, it launched a vigorous "Wipes Clog Pipes!" campaign, spreading the message at community events and through newsletters, social media ads and a giant billboard along Interstate 680. The District is also working with industry groups to develop new flushability guidelines and improve wipes' design and labeling.

California Lawmakers Want Special Session to Tackle Drought

By Juliet Williams, Associated Press

SACRAMENTO, Calif. — Sep 11, 2015, 9:40 PM ET

A bipartisan group of 47 state Assembly members delivered a letter to Gov. Jerry Brown on Friday asking him to declare a special session to tackle problems related to California's ongoing drought.

In the letter provided to The Associated Press, they say a special session is needed to address the unprecedented water crisis, which could worsen as California faces the prospect of an El Nino weather pattern that could bring severe flooding.

"We have seen from widespread reports that as much as half of the \$687 million set aside to help drought-stricken communities remains unspent in state accounts - and will remain there until 2016," says the letter. "In addition, we are seeing the same slow and lethargic project pace with the funds raised as a result of last year's Proposition 1 ballot measure."

The AP reported in June that more than \$320 million that was supposed to be rushed to drought-stricken California communities was sitting unspent in government bank accounts, more than a year after lawmakers voted to use the money to provide water, protect wells from contamination and upgrade outdated water systems.

A special session addressing the drought should also include "thoughtful and careful review of environmental policies that — even if well-meaning — may be doing more harm than good," the letter says.

Assemblyman Devon Mathis, a Republican who represents some of the hardest hit areas of the state, spearheaded the effort.

"It just makes me sad. This is one of the worst public health epidemics that we have, this is up and down the state, and we have to do something about it," he said in an interview before taking the letter into the governor's office. "We talk about all these problems about water and we don't really have a solid plan."

He said while lawmakers have been talking about the drought for much of the regular session scheduled to wrap up late Friday, little has been accomplished.

A spokesman for Brown, Gareth Lacy, said the administration has taken hundreds of coordinated actions to address the drought, and a sound process is in place to ensure assistance is distributed properly.

"To date, hundreds of millions have been committed to emergency drought relief, disaster assistance, water conservation and infrastructure projects across California - with much more on the way," Lacy said in an email. "This investment and response is the product of Republicans

and Democrats setting aside politics and working together, without any need for a special session."

He cited new rebate programs to replace old appliances and tear out water-guzzling lawns, and groundwater legislation to preserve vulnerable basins.

Democratic Assemblyman Luis Alejo, of Watsonville, said in a statement that the Legislature must ensure disadvantaged communities that rely on wells have access to safe drinking water.

"Additionally, as forecasters predict strong El Nino storms to hit California this winter, we must ensure our communities have flood controls in place and healthy rivers that can act as safeguards to the storms," he said.

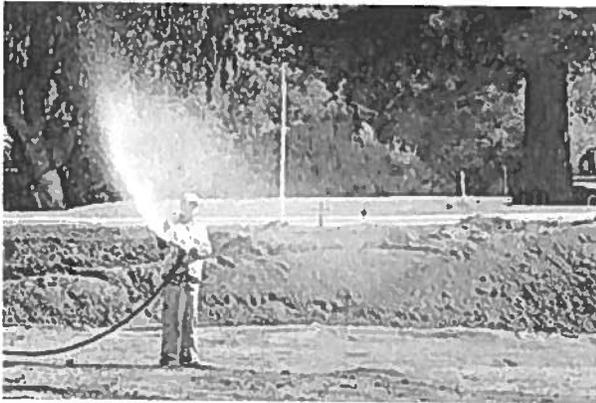
Republican Sen. Andy Vidak, of Hanford, also added to the call for a special session.

Brown called special sessions this year to address a \$59 billion transportation infrastructure backlog over the next decade and figure out a new funding mechanism for Medi-Cal, the state's health insurance program for the poor, but lawmakers were set to wrap up Friday without proposals to address either.

CONSERVATION

Golf course prepares to receive recycled water

conservation



20 HOURS AGO • BARRY EBERLING
 BEBERLING@NAPANNEWS.COM

Napa Valley Country Club is fighting the drought by creating a pond.

It is digging a depression to hold 10.4 acre-feet of water, enough to fill five Olympic swimming pools. This will be more than just another golf course water hazard. Rather, it will be filled with recycled water from the Napa Sanitation District.

Wastewater from the city of Napa that is treated until it meets irrigation quality standards will help keep the rural golf course green.

“Aesthetically, environmentally, everybody wins,” golf course General Manager Todd Meginness said. “We’ll be recharging the water table at the same time.”

Napa Valley Country Club is located on Hagen Road about 1.5 miles east of the city of Napa. The Napa Sanitation District plant is located more than eight miles away as the crow flies, along the Napa River near the Napa County Airport.

Other golf courses in the area use recycled water, among them the Eagle Vines and Chardonnay courses, but those are much closer to the Napa Sanitation District plant.

The \$14 million, 5.1-mile-long Milliken-Sarco-Tulocay (MST) pipeline will bridge the gap between Napa Valley Country Club and an existing recycled water pipeline. It will also bring irrigation water to rural homes and vineyards along the way.

Construction of the MST pipeline is nearing the end of the line. The work of burying pipe beneath various rural roads is to be finished by year’s end.

Meginness expects to fill up that pond with recycled water next year. Then the bulk of the golf course will no longer depend on well water and a creek for irrigation.

The golf course began its life a century ago by getting water from an artesian well that flowed to the surface. Today, the water level in the well used to irrigate the front nine holes is 150 feet deep. That reflects the falling groundwater levels in the Milliken-Sarco-Tulocay area.

Once the recycled water arrives, the golf course will hardly need to use the well at all, Meginness said.

Water for the back nine holes comes from a creek and is stored in ponds. But the creek needs storms to make it flow. During the drought, storms are less frequent and a key water supply more iffy, with no back-up.

"It's pretty scary every year," Meginness said.

The golf course expects to use about 220 acre-feet of recycled water annually. It will have a pump station next to the pond that will provide pressure to the golf course sprinkler system.

MST customers pay an annual assessment, and Napa Valley Country Club is the largest customer of all. The golf course will pay \$125,000 a year for 20 years. It will also pay for the recycled water it uses. The pond that it is carving out and the pump station will cost about \$900,000, officials said.

"It's an enormous amount of money," Meginness said. "But without water, we don't have a golf course."

Fifty-one customers have signed up to take water from the MST pipeline for irrigation, said Phillip Miller, the Napa County Public Works deputy director. The annual assessment for a home is \$2,000, while the price for vineyards varies with the acreage. The 20-year assessments secured a state construction loan.

Residents along the pipe route can still sign up for the recycled irrigation water by calling Miller at 259-8620.

Groundbreaking for the MST pipeline project took place in July 2014, and the ensuing work has caused traffic delays. Workers last week stopped traffic for 10 minutes and longer on Fourth Avenue north of Skyline Wilderness Park and at North Avenue as they dug into the roadways.

Now the end of the work and the day the spigot will finally turn on are both in sight.

Price of conservation

Water rates likely to rise due to use reductions

Wholesale supplier Zone 7 plans hike as sales evaporate

By Denis Cuff dcuff@bayareanewsgroup.com

LIVERMORE — Drought-conscious residents in some East Bay communities have outdone the rest of the state, slashing their water use even more than they were asked.

But their success is causing trouble for a local water provider that has watched its sales dry up — and now plans to charge more for water to make up the difference.

The provider — the Alameda County Zone 7 Water Agency — intends to hike rates to its customers, the big water retailers that serve Livermore, Pleasanton, Dublin and part of San Ramon. But how those rates will show up on household bills remains to be determined.

ONLINE EXTRA

More coverage of the state's water woes at www.cadrought.com.

Zone 7 hasn't determined yet how much of an increase to propose for the water it sells to Pleasanton, Dublin San Ramon Services District, Livermore and the Cal Water private water company that serves part of Livermore. But a substantial increase is warranted or Zone 7's reserves will be like the state's reservoirs — nearly dry — within a year or two, financial consultants warned in a report.

Tri-Valley residents this year have slashed water use by more than 30 percent, more than expected or asked. As a result, Zone 7 sold \$5 million less water than expected in the budget year that ended July 1.

"We are very pleased that our customers have done such a good job saving water. They should be proud," said Jill Duerig, Zone 7 general manager. "But the drought has delivered a big financial hit to us." To offset the reduced income, financial consultants have suggested the district impose a temporary drought surcharge for 30 months, starting Jan. 1.

Any increase likely would be passed on to water users by the local retail agencies that set the price of water on household bills. Each agency will decide independently who should pay the additional costs and whether to spare the biggest conservers.

The Zone 7 water board will discuss the size of the rate increase when directors meet at 7 p.m. Wednesday at district headquarters at 100 N. Canyons Parkway in Livermore.

The board also will consider options for overhauling rates permanently so Zone 7 is less vulnerable to financial trouble in future dry spells.

Consultants recommend that Zone 7 collect a much higher fixed charge as part of its rates so it does not have to depend almost entirely on volume charges for revenue.

A manager at Dublin San Ramon Services District, one of Zone 7's customers, said he understands the wholesaler is in a bind because of the drought.

"They need some type of fee change. We want to make sure it's temporary with a sunset date," said John Archer, DSRSD's administrative services manager.

Zone 7 is lagging behind other agencies that took preventive measures earlier.

Many retail water agencies, including Dublin San Ramon, the East Bay Municipal Utility District and Contra Costa Water District, anticipated reduced sales when they adopted higher rates over the past two years. The Santa Clara Valley Water District also allowed for reduced revenue when it raised rates July 1 for wholesale water sold to cities and local water districts for nearly 1.9 million people in Santa Clara County. "We have large fixed costs to provide a reliable water supply to our customers even if we don't sell as much water," said Marty Grimes, a district spokesman. "If you produce water, you have to have someone maintaining the dams, the pipes and the controls even if you sell less water." The Santa Clara Valley Water District also spent extra to buy water supplies on the open market — a cost built into its recent rate increase, Grimes said.

Central Contra Costa Sanitary District's campaign to discourage flushing wipes receives regional award

Bay Area News Group

Updated: 09/16/2015 09:35:41 AM PDT

ContraCostaTimes.com

MARTINEZ -- The Central Contra Costa Sanitary District received the 2015 Dr. Teng-chung Wu Pollution Prevention Award, affectionately known as the "WuHoo Award," by the San Francisco Bay Regional Water Quality Control Board on Sept. 9.

The WuHoo Award recognizes Central San's efforts in discouraging flushing of disposable wipes.

"Disposable wipes, even those labeled as flushable, are a problem for all wastewater collection and treatment agencies," said Melody LaBella, the district's pollution prevention program coordinator. "Significantly more maintenance work is required to remove masses of flushed wipes from sewer pipes, pumps, and treatment plant equipment."

Central San's effort to limit disposable wipes began in 2009, when tangled masses of wipes began clogging its Moraga pumping station. Since then, the district's "Wipes Clog Pipes!" campaign has spread the message at community events and through newsletters, social media ads, and a large billboard along Interstate 680.

The annual WuHoo Award is presented in memory of former water quality control board employee Dr. Teng-chung Wu, an early advocate for pollution prevention..

WATER & DROUGHT SEPTEMBER 21, 2015

Two major water agencies consider buying Delta islands

HIGHLIGHTS

Environmentalists say 'water grab' could result from land deals

Districts – one in L.A., one in Fresno – have discussed four Delta islands

Owning land also could expedite tunnels project



BY DALE KASLER AND RYAN SABALOW
dkasler@sacbee.com

Two of California's largest and most aggressive water agencies have discussed buying four islands in the Sacramento-San Joaquin Delta, prompting accusations by environmentalists and Delta farmers that the land purchases could be used to engineer a south state water grab.

Westlands Water District and Metropolitan Water District of Southern California have considered buying a collection of islands known as the Delta Wetlands Properties, according to recent meeting agendas for the two agencies. However, a Westlands spokesman said Monday the big Fresno-area agricultural district doesn't expect to make a purchase offer.

Control of the islands could yield significant advantages as water agencies both south and north of the Delta continue to wrestle over limited water supplies in the fourth year of drought. Buying the islands would not automatically give the new owners control of the associated water rights. But they could apply to the state for the right to take more water in wet years.

In normal years, enough water is pumped out of the Delta to serve 3 million acres of farmland and 25 million urban Southern Californians.

The four Delta islands, now used for farming, are controlled by Zurich American Corp., the U.S. subsidiary of a Swiss insurer. Zurich has been trying for 20 years to convert the islands into giant for-profit reservoirs that could be used to store and ship water to big customers south of the Delta.

Purchase of the islands also could play into ongoing negotiations over the Delta tunnels project, a controversial \$16 billion plan to channel water from the north part of the Delta to existing pumping stations in the south. By purchasing the islands, Metropolitan and Westlands would eliminate the need for contentious eminent domain proceedings in that part of the project, said Craig Wilson, a former staff attorney with the State Water Resources Control Board.

The project, championed by Gov. Jerry Brown, has been touted as a way to improve the reliability of water deliveries to Metropolitan, Westlands and other agencies south of the Delta. The four islands are adjacent to the path of the proposed tunnels.

Michael George, the state's Delta watermaster, said one of the islands could be used to stockpile fill dirt unearthed by the twin 30-mile-long tunnels, at least temporarily. George said he wasn't aware of possible interest in the islands by Metropolitan and Westlands.

Wilson said Metropolitan and Westlands also could be interested in the islands simply for their access to generous amounts of water. The four islands come with riparian water rights that can be used only on the adjacent lands. But the two agencies could seek state approval to store that water during wet years, for later shipment south.

"It's a potential two-for-one for them," said Wilson, who previously served as the Delta watermaster, overseeing the enforcement of water rights in the 600,000-acre region. The four islands total 20,000 acres of land.

Metropolitan spokesman Bob Muir declined comment Monday. The agency's real property committee is scheduled to discuss the issue in closed session Tuesday, according to agenda materials.

Westlands hasn't made any offer to acquire the properties "and I do not anticipate that the district will make such an offer," said Johnny Amaral, the district's deputy general manager of external affairs, in an email to The Sacramento Bee. Agenda materials show that Westlands' water policy committee discussed the matter in closed session last week.

Barbara Barrigan-Parrilla, executive director of Restore the Delta, a coalition of environmentalists and Delta farmers, said it's not surprising that Metropolitan, with its deeper pockets, would be more interested than Westlands in trying to acquire the islands.

"This is a way for the Metropolitan Water District to get a foothold in the Delta for greater water supply," she said. Owning the islands, with its access to water, could be a great strategic advantage for Metropolitan whether the tunnels get built or not, she said.

Rick Stephens, asset manager for Martinez-based Delta Wetlands Properties, said he couldn't comment on the agenda items. He said the company is forging ahead with its plans for a storage project, but the land could be for sale once the permitting for that is done.

“We’re working on our project,” Stephens said. Asked about Metropolitan’s interest, he said, “I don’t know what’s going on with them. You saw what I saw. You saw Met’s agenda. I don’t have any input on their agenda.”

As currently conceived, the Delta Wetlands project revolves around two islands: Webb Tract and Bacon Island, located just seven miles from the pumping plants near Tracy that ship water to the San Joaquin Valley and Southern California. The two bowl-shaped islands, which sit below sea level, would be flooded during wet years and could store up to 215,000 acre-feet of water. That’s 70 billion gallons.

“In dry years, it can be delivered where it is needed,” reads a description of the project on Delta Wetlands’ website. An influential Kern County water agency, the Semitropic Water Storage District, has worked with Delta Wetlands as a partner in the project.

Two other nearby islands, Bouldin Island and Holland Tract, would continue to be farmed but would also be used for habitat management to offset the impact of flooding Webb and Bacon, according to environmental documents on Delta Wetlands’ website.

Dale Kasler: 916-321-1066, @dakasler

L.A. Now

California: This just in

California seeks to build one of world's largest recycled water programs

By MATT STEVENS

SEPTEMBER 22, 2015, 7:22 AM

The Metropolitan Water District of Southern California is in talks with Los Angeles County sanitation districts about developing what could be one of the largest recycled water programs in the world.

In a committee meeting Monday, the agency's staff presented the framework of a plan to purify and reuse as much as 168,000 acre-feet of water a year – enough to serve about twice that number of households for a year.

Doing so would require MWD to build a treatment plant and delivery facilities and comply with various environmental regulations. Officials say similar projects have cost about \$1 billion.

[See the most-read stories this hour >>](#)

It would also signal a shift for the region's water titan away from the business of importing water from elsewhere and toward developing local supply.

"I'm not afraid of talking about another business model," said Board Chairman Randy Record. "None of us should be."

Currently, coastal communities in California flush hundreds of billions of gallons of treated sewage into the Pacific Ocean each year. In the last couple of decades, however, water managers have attempted to recycle some of this water for human use.

So-called purple pipe systems take sewage that has been filtered and cleansed and use it to irrigate crops, parks and golf courses. This water, however, is not used as drinking water.

Potable reuse systems, on the other hand, use a variety of methods to purify water that has already been processed at a sewage treatment facility. The end result of this "toilet to tap"

process is a substance that is cleaner than most bottled waters, and is intended for human consumption.

Recycled potable water can either be added to municipal water systems directly or indirectly. In an indirect potable reuse system, such as the Orange County Groundwater Replenishment System, purified water is placed in an “environmental buffer,” such as an underground aquifer or surface water reservoir. After a period of storage, the water undergoes processing at a traditional drinking water treatment plant and enters the tap system.

As drought places increasing strain on traditional sources of drinking water, water managers have looked to expand water recycling systems and thereby increase local water supply.

In the city of Los Angeles, Mayor Eric Garcetti has directed the Department of Water and Power to reduce its purchase of imported potable water by 50% by 2024. He has also called for the creation of an “integrated water strategy that increases local water supplies and that improves water security.”

Interested in the stories shaping California? Sign up for the free Essential California newsletter >>

Officials in Orange County say their Groundwater Replenishment System -- which can treat up to 100 million gallons per day – will eventually be able to purify 130 million gallons a day for reuse. They say it is the largest such system in the world.

MWD officials hope that in about a decade, their treatment plant will produce 150 million gallons per day, eclipsing their neighbors to the south.

“Met has always been very supportive of water recycling,” said MWD Assistant General Manager Debra Man in an interview. “This takes it to the next level.”

MWD and a partnership of two dozen county wastewater purveyors – known as Sanitation Districts of Los Angeles County – have been working together on feasibility reports and pilot studies since 2010, according to informational documents on the recycling project. MWD officials said they want the board to authorize a memorandum of understanding between the two groups as early as November.

If the board gives its OK, the agencies could launch on a “demonstration project” at the sanitation districts’ Joint Water Pollution Control Plant in Carson in about 20 months. There, the treatment processes would be perfected on 1 million gallons of water per day while officials conduct additional studies and develop a financing plan, according to an MWD memo.

Man told board members the demonstration phase would cost about \$15 million. In an interview, she said it was not clear where the funding would come from, though MWD officials have said it is possible that some of the costs may be covered by a water bond passed by voters last year.

Funding was just one of many concerns raised by MWD board members representing the San Diego County Water Authority. In a letter to the board, the San Diego representatives said MWD staff should identify a source of funding other than the existing rates.

“We request that a cost of service analysis be conducted to identify which agencies will benefit in order to determine how the costs of this project should be allocated,” the San Diego board members wrote.

They also said creating a new recycled water program was “premature” because local and regional water plans are still being updated, and those plans “will provide vital information regarding water supply and demand forecasts.”

In addition, they noted that “recycled water supply and reuse projects already exist throughout the MWD service area.”

“We do not understand -- and the Board Memo does not explain -- why MWD believes a new recycled water program is necessary,” the San Diego contingent wrote.

Experts have also raised concerns about what happens when waters of varying chemistries are mixed in aquifers.

A study published recently in the journal *Environmental Science & Technology* found that when highly purified wastewater was stored in an Orange County aquifer, the water caused arsenic to escape from clay sediments in a way that naturally infiltrating water did not.

The solution, according to Stanford University researchers, was to add calcium to the purified water before adding it to the aquifer.

The full MWD board is set to hear a presentation on the recycled water supply program at its Tuesday meeting.

For more drought news, follow @ByMattStevens and @montemorin.

ALSO:

L.A. lawmakers to declare 'state of emergency' on homelessness

3.9 million pieces a day

Plastic debris fouling the bay

Concentrations of 'microbeads' dwarf those in other busy U.S. bodies of water, study finds

By Paul Rogers

progers@mercurynews.com

San Francisco Bay is contaminated with widespread pollution from billions of tiny pieces of plastic in greater concentrations than the Great Lakes, Chesapeake Bay and other major U.S. bodies of water, according to a groundbreaking new study.

At least 3.9 million pieces of plastic pour into the bay every day from eight large sewage treatment plants — a relentless torrent of litter that ranges from tiny "microbeads" found in cosmetics, facial scrubs and toothpastes, to bits of synthetic fabric from fleece jackets, pants and other clothes, which break down as they are washed.

"We're concerned about these high levels. This



SGYRES/OREGON STATE UNIVERSITY

"Microbeads," seen on a penny, pollute the bay in high concentrations.

was unexpected," said Rebecca Sutton, a senior scientist at the San Francisco Estuary Institute, a nonprofit research center based in Richmond.

Not only does the plastic contaminate the bay and wildlife, experts say, it is also working its way up the food chain, binding to chemicals in the water and posing a potential health risk to people eating fish caught in the bay.

In the study, the first of its kind to broadly document pollution from "microplastic" in the bay, researchers dragged tight-meshed nets along the surface of the water in nine areas of the bay, from Oakland and Treasure Island to locations near San Jose. They found on average 1 million pieces of tiny plastic per square kilometer — an area of about 250 acres — at the water's surface or a few inches below it in the South Bay, a concentration nine times higher than levels of similar plastics found in Lake Erie.

Further north, off Oakland and San Francisco, they found 310,000 pieces per square kilometer, still double the highest levels in Chesapeake Bay and triple the levels in Lake Erie, the most polluted of the Great Lakes.

Sutton, a lead author of the study who has a doctorate in environmental chemistry from UC Berkeley, said that researchers also accidentally captured nine small fish while taking their water samples. Inside each fish they found an average of six pieces of plastic.

Other scientific studies have found that tiny pieces of plastic in the world's oceans and water bodies, sometimes so dense that they outnumber plankton, can absorb contaminants such as pesticides and PCBs, which accumulate in fish when they mistake the plastic for food. The small fish are then eaten by larger fish. And people who eat the affected fish can be exposed to the chemicals when they consume the plastic.

Additional research

Sutton said Monday that more research is needed to measure the health effects and to pinpoint exactly how much plastic is getting into the bay and from what sources. As part of the study, which began last fall, researchers also sampled the treated wastewater coming from some of the bay's largest sewage treatment plants, including San Jose, the East Bay Municipal Utility District, the Central Contra Costa Sanitary District and Palo Alto.

They found tiny plastic pieces flowing through all the plants — regardless of how advanced the technology — because the facilities were designed to treat sewage, not filter tiny plastic debris.

Sewage treatment plants in San Jose and in Oakland released the most plastic, in large part because of the dense populations they serve. The study sampled eight of the 42 sewage treatment plants that discharge into the bay. And that is only part

“The micro-particles are of concern to us. We’ve known for some time that there are things that our plants just don’t remove.”

— David Williams, Bay Area Clean Water Agencies, an association of sewage treatment plants

of the problem: Plastic also flows in from storm drains, creeks, rivers and illegal dumping.

Retrofitting all the sewage treatment plants with fine membranes to catch the particles, many of which are like confetti, would cost hundreds of millions of dollars, said David Williams, executive director of Bay Area Clean Water Agencies, an association of the sewage treatment plants.

“The micro-particles are of concern to us,” he said. “We’ve known for some time that there are things that our plants just don’t remove.”

Williams said in the short term, the solution is for people to avoid putting any type of trash, particularly plastic, into toilets. He said consumers also should not buy cosmetics, facial scrubs or toothpastes containing plastic “microbeads.”

Pending legislation

Meanwhile, state lawmakers passed a bill earlier this month that would ban plastic microbeads in cosmetics and other personal care products sold in California. The bill, AB 888, by Assemblyman Richard Bloom, D-Santa Monica, would impose the ban starting Jan. 1, 2020.

Gov. Jerry Brown has not indicated if he will sign or veto the bill, the toughest such ban in the nation.

Supporters note there are already products for sale with natural alternatives, apricot shells and cocoa beans. Industry groups tried to get an exemption in the bill for biodegradable plastics but failed.

Jennifer Killinger, a spokeswoman for the American Chemistry Council, said in an email Monday that plastics companies have supported recycling and beach cleanup programs and that “America’s plastics makers are on record supporting legislation to phase out synthetic microbeads in personal care products that can be washed off and end up in marine environments.”

Environmentalists, however, said the companies knowingly polluted the oceans, San Francisco Bay and other bodies of water and should not only have the plastic additives banned but also should be required to pay to retrofit sewage treatment plants with better filters.

“I’m not sure this is a problem that taxpayers should have to take responsibility for,” said Mark Murray, executive director of Californians Against Waste, a Sacramento group. “It’s a problem that companies should take responsibility for.”

San Francisco Bay polluted by plastic

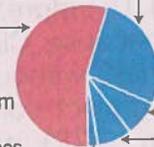
A new study found 3.9 million tiny plastic pieces flow into San Francisco Bay daily from sewage treatment plants and that bay waters have more plastic pollution than other U.S. bodies of water.

Plastic in the bay

Waste plastic particles found in surface water samples

55%

Fragments: Microbead fragments from personal care products, pieces from plastic bottles and other trash



27% Fiber: Synthetic fabric, clothing and fishing lines

8% Film: Plastic bags and packaging

8% Foam: Styrofoam, cigarette butts and other items

2% Pellet: Microbeads and pellets used to manufacture plastic products

Amount of plastic found

From waste water treatment plants

Treatment plant	Particles per gallon	Particles per day
San Jose-Santa Clara	0.01	1,000,000
East Bay MUD	0.02	870,000
Palo Alto	0.03	670,000
Central Contra Costa	0.02	560,000
Fairfield-Suisun	0.02	290,000
EBDA/San Leandro	0.01	290,000
San Mateo	0.02	140,000
SFO (sanitary plant)	0.05	32,000

Source: San Francisco Estuary Institute

How the bay compares

Waste plastic particles found in surface water samples

Region (particles per sq. km)	Average
South S.F. Bay	1,000,000
Central S.F. Bay	310,000
Chesapeake Bay*	155,000
Lake Erie	110,000
Lake Superior	5,000
Lake Huron	3,000

*At Patapsco River

BAY AREA NEWS GROUP

Fireplace retrofit plan killed

Proposal requiring cleaner devices gets strong opposition

By Denis Cuff

dcuff@bayareanewsgroup.com

SAN FRANCISCO

— Scorching public opposition has sunk a proposal to phase out old-fashioned wood-burning fireplaces in Bay Area homes.

The rule proposed earlier this year by the Bay Area Air Quality Management District would have barred homes from being sold or

rented in the nine Bay Area counties unless open-hearth fireplaces were replaced or retrofitted with cleaner wood-burning devices, or gas- or electric-fueled ones. To comply, homeowners also could have sealed off their fireplaces.

District officials said the rule was designed to protect the public against the dangers of wood smoke.

But in a series of public hearings last spring, hundreds of homeowners, landlords and real estate representatives attacked

LEARN MORE

To view information about proposed changes in a Bay Area smoke rule regulating fireplaces, go to <http://bit.ly/1KvSXDt>. Comments are due by 9 a.m. Oct 19. The Bay Area Air Quality Management District will hold a public hearing on the changes at 9:45 a.m. Oct. 21 at 939 Ellis St., San Francisco.

the requirement as too obtrusive and expensive.

Homeowners com-

plained it could cost from several hundred dollars to \$3,000 to comply depending on the home and device installed.

Now the district says it's dropping the proposal in favor of a less expensive idea: To require home sellers and landlords whose properties have wood-burning fireplaces to disclose the health hazards of smoke.

"We're responding to public comments and including that in the draft of

See BAN, Page 2

Ban

Continued from Page 1

the rule amendment" said Ralph Borrmann, an air district spokesman.

The district also proposes to ban any type of wood-burning heating devices in new homes — whether or not they are federally certified as low emission.

To provide a carrot to homeowners to reduce smoke, the district is creating a \$3 million fund to give rebates and subsidies to replace old-fashioned fire-

places with cleaner alternatives. Details of the program are yet to be worked out.

The amendments to the district smoke rule are scheduled to be considered by the air board on Oct. 21 after a public comment period that ends Oct. 19.

"These changes are to move the Bay Area toward cleaner air and reduce public exposure to fine particulates in smoke," said Wayne Kino, the air district's director of enforcement.

A real estate industry leader said he is glad the district dropped the retrofit requirement.

"This requirement would have added thousands of dollars to the cost of a home and made housing prices in the region even higher," said David Stark, public affairs director of the Bay East Association of Realtors, which is active in southern and eastern Alameda County.

Stark said he is concerned that the smoke hazard disclosure requirement could complicate and even block the sale of homes.

"The district has limited staff," he said. "It's unrealistic of them to monitor every real estate transaction."

Mark Ross, a Martinez city councilman on the air board, said he thinks the disclosure requirement is a good idea. "The hazards of wood smoke should be known," he said.

Patricia Weisselberg of Families for Clean Air said the proposed rule is too weak because landlords in areas without access to natural gas are not required to provide tenants with cleaner alternatives than a wood-burning device.

Contact Denis Cuff at 925-943-8267. Follow him at [Twitter.com/deniscuff](https://twitter.com/deniscuff).



Secretary Kite riding in a USD vector truck during the Newark Days Parade on September 19, 2015