Dedicated to Satisfying our Community's Water Needs

AGENDA
MESA WATER DISTRICT
BOARD OF DIRECTORS
Thursday, December 17, 2020
1965 Placentia Avenue, Costa Mesa, CA 92627
3:30 p.m. Adjourned Regular Board Meeting

BOARD OF DIRECTORS COMMITTEE MEETING

IN AN EFFORT TO MITIGATE THE SPREAD OF COVID-19 (CORONAVIRUS), AND IN ACCORDANCE WITH THE GOVERNOR'S EXECUTIVE ORDER N-29-20, THERE WILL BE NO PUBLIC LOCATION FOR ATTENDING THIS BOARD MEETING IN PERSON. MEMBERS OF THE PUBLIC MAY LISTEN AND PROVIDE PUBLIC COMMENT TELEPHONICALLY BY CALLING THE FOLLOWING NUMBER:
DIAL: (949) 207-5455
CONFERENCE ID: 130371#

CALL TO ORDER

PLEDGE OF ALLEGIANCE

PUBLIC COMMENTS

Items Not on the Agenda: Members of the public are invited to address the Board regarding items which are not on the agenda. Each speaker is limited to three minutes. The Board will set aside 30 minutes for public comments.

Items on the Agenda: Members of the public may comment on agenda items before action is taken, or after the Board has discussed the item. Each speaker is limited to three minutes. The Board will set aside 60 minutes for public comments.

ITEMS TO BE ADDED, REMOVED, OR REORDERED ON THE AGENDA
At the discretion of the Board, all items appearing on this agenda, whether or not expressly listed as an Action Item, may be deliberated and may be subject to action by the Board.

CONSENT CALENDAR ITEMS:
Approve all matters under the Consent Calendar by one motion unless a Board member, staff, or a member of the public requests a separate action.

1. Approve minutes of adjourned regular Board meeting of November 19, 2020.
2. Receive and file the Developer Project Status Report.
3. Receive and file the Mesa Water and Other Agency Projects Status Report.
4. Receive and file the Water Quality Call Report.
5. Receive and file the Water Operations Status Report.
6. Receive and file the Accounts Paid Listing.
7. Receive and file the Monthly Financial Reports.
8. Receive and file the Major Staff Projects.
9. Receive and file the State Advocacy Update.
10. Receive and file the Orange County Update.
11. Receive and file the Outreach Update.

ACTION ITEMS:

12. PROGRAMMABLE LOGIC CONTROLLER UPGRADES:

    Recommendation: Approve a contract with Prime Systems for $118,035 and a 10% contingency for an amount not to exceed $129,838 to furnish, install, and integrate new programmable logic controllers and power supplies at the 19 remote sites, and authorize execution of the contract.

13. LEGISLATIVE PLATFORMS:

    Recommendation: Approve the proposed 2021 Legislative Platforms.

PRESENTATION AND DISCUSSION ITEMS:

14. WATER SUPPLY, ENERGY, AND SUPPLY CHAIN RELIABILITY ASSESSMENT:

    Recommendation: Recommend that the Board of Directors approve the proposed recommendations for the Water Supply, Energy, and Supply Chain Reliability Assessment as identified in the Executive Summary and Technical Memorandums 1, 2 and 3, and implement as part of the Capital Improvement Program Renewal.

15. ASSEMBLY BILL 992:

    Recommendation: Receive the presentation.

REPORTS:

16. REPORT OF THE GENERAL MANAGER

17. DIRECTORS' REPORTS AND COMMENTS

INFORMATION ITEMS:

18. OTHER (NO ENCLOSURE)

In compliance with California law and the Americans with Disabilities Act, if you need disability-related modifications or accommodations, including auxiliary aids or services in order to participate in the meeting, or if you need the agenda provided in an alternative format, please contact the District Secretary at (949) 631-1206. Notification 48 hours prior to the meeting will enable Mesa Water District (Mesa Water) to make reasonable arrangements to accommodate your requests.

Members of the public desiring to make verbal comments utilizing a translator to present their comments into English shall be provided reasonable time accommodations that are consistent with California law.

*Agenda materials that are public records, which have been distributed to a majority of the Mesa Water Board of Directors (Board), will be available for public inspection at the District Boardroom, 1965 Placentia Avenue, Costa Mesa, CA and on Mesa Water's website at **www.MesaWater.org**. If materials are distributed to the Board less than 72 hours prior or during the meeting, the materials will be available at the time of the meeting.*

ADJOURN TO A REGULAR BOARD MEETING SCHEDULED FOR THURSDAY, JANUARY 14, 2021 AT 6:00 P.M.

Dedicated to Satisfying our Community's Water Needs

MINUTES OF THE BOARD OF DIRECTORS
MESA WATER DISTRICT
Tuesday, November 19, 2020
1965 Placentia Avenue, Costa Mesa, CA 92627
3:30 p.m. Adjourned Regular Board Meeting

BOARD OF DIRECTORS COMMITTEE MEETING

CALL TO ORDER The meeting of the Board of Directors was called to order at 3:32 p.m. by President Dewane.

PLEDGE OF ALLEGIANCE Director Atkinson led the Pledge of Allegiance.

Directors Present
Shawn Dewane, President *(teleconference)*
Marice H. DePasquale, Vice-President *(teleconference)*
Jim Atkinson, Director *(teleconference)*
Fred R. Bockmiller, P.E., Director *(teleconference)*
James R. Fisler, Director *(teleconference)*

Directors Absent
None

Staff Present
Paul E. Shoenberger, P.E., General Manager *(teleconference)*
Phil Lauri, P.E., Assistant General Manager *(teleconference)*
Denise Garcia, Administrative Services Manager/ District Secretary
Wendy Duncan, Records Management Specialist/ Assistant District Secretary *(teleconference)*
Tracy Manning, Water Operations Manager *(teleconference)*
Stacy Taylor, Water Policy Manager *(teleconference)*
Celeste Carrillo, Public Affairs Coordinator *(teleconference)*
Jennifer Blackwell, Temporary Public Affairs Specialist *(teleconference)*

Others Present
Jonathan Aparicio, IT Support Engineer, T2 Technology Group
John Lewis, President, Lewis Consulting Group, LLC *(teleconference)*
Lanae O'Shields, Public Affairs Manager, Southern California Gas Company *(teleconference)*
Timothy McLarney, Ph.D., President, True North Research, Inc. *(teleconference)*
Maris Ensing, Founder, Mad Systems *(teleconference)*
Anthony Zorrilla, Designer, Mad Systems *(teleconference)*

President Dewane stated that the Board of Directors was attending the meeting via teleconference per Governor Newsom's Executive Order N-29-20 which suspended certain provisions of the Ralph M. Brown Act.

President Dewane stated that for each action, a roll call vote was taken in accordance with California Government Code Section 54953(b)(2) which states, "all votes taken during a teleconferenced meeting shall be by roll call."

President Dewane proceeded with the meeting.

PUBLIC COMMENTS

There were no public comments on non-agendized topics and President Dewane proceeded with the meeting.

ITEMS TO BE ADDED, REMOVED, OR REORDERED ON THE AGENDA

General Manager Shoenberger pulled Item 9 for discussion. There were no objections.

President Dewane requested the addition of Item 16.5, Critical Workers Exempt from Curfew Order, to discuss that essential workers are not subject to the curfew order announced by Governor Newsom.

MOTION

Motion by Director Bockmiller, second by Vice President DePasquale, to add to the agenda Item 16.5, Critical Workers Exempt from Curfew Order, as the item arose after the agenda was posted and requires discussion and/or action by the Board. Motion passed 5-0, by the following roll call vote:

AYES:	DIRECTORS	Atkinson, Bockmiller, Fisler, DePasquale, Dewane
NOES:	DIRECTORS	None
ABSENT:	DIRECTORS	None
ABSTAIN:	DIRECTORS	None

Director Fisler pulled Item 8 for discussion. There were no objections.

CONSENT CALENDAR ITEMS:
Approve all matters under the Consent Calendar by one motion unless a Board member, staff, or a member of the public requests a separate action.

1. Receive and file the Developer Project Status Report.
2. Receive and file the Mesa Water and Other Agency Projects Status Report.
3. Receive and file the Water Quality Call Report.
4. Receive and file the Water Operations Status Report.
5. Receive and file the Accounts Paid Listing.
6. Receive and file the Monthly Financial Reports.
7. Receive and file the Major Staff Projects.
8. Receive and file the State Advocacy Update.
9. Receive and file the Orange County Update.
10. Receive and file the Outreach Update.
11. Receive and file the Fiscal Year 2021 First Quarter Financial Update.

President Dewane asked for comments from the Board. There were no comments.

MOTION

Motion by Director Bockmiller, second by Vice President DePasquale, to approve Items 1 - 7 and 10 - 11 of the Consent Calendar. Motion passed 5-0, by the following roll call vote:

AYES:	DIRECTORS	Atkinson, Bockmiller, Fisler, DePasquale, Dewane
NOES:	DIRECTORS	None
ABSENT:	DIRECTORS	None
ABSTAIN:	DIRECTORS	None

ITEM 8 - RECEIVE AND FILE THE STATE ADVOCACY UPDATE.

General Manager Shoenberger introduced Water Policy Manager Taylor who provided the State Advocacy Update.

ITEM 9 - RECEIVE AND FILE THE ORANGE COUNTY UPDATE.

President Dewane introduced Lewis Consulting Group, LLC, President Lewis who provided the Orange County Update.

Mr. Lewis responded to questions from the Board and they thanked him for the update.

President Dewane asked for comments from the Board. There were no comments.

MOTION

Motion by President Dewane, second by Director Atkinson, to approve Items 8 and 9 of the Consent Calendar. Motion passed 5-0, by the following roll call vote:

AYES:	DIRECTORS	Atkinson, Bockmiller, Fisler, DePasquale, Dewane
NOES:	DIRECTORS	None
ABSENT:	DIRECTORS	None
ABSTAIN:	DIRECTORS	None

ACTION ITEMS:

12. STRATEGIC PLAN:

GM Shoenberger introduced the topic.

Discussion ensued amongst the Board.

President Dewane asked for comments from the Board. There were no comments.

MOTION

Motion by Director Atkinson, second by Vice President DePasquale, to approve the 2020 Strategic Plan, as amended and with modifications. Motion passed 5-0, by the following roll call vote:

AYES:	DIRECTORS	Atkinson, Bockmiller, Fisler, DePasquale, Dewane
NOES:	DIRECTORS	None
ABSENT:	DIRECTORS	None
ABSTAIN:	DIRECTORS	None

PRESENTATION AND DISCUSSION ITEMS:

13. BALANCED ENERGY SOLUTIONS:

GM Shoenberger provided an overview of the topic and introduced Southern California Gas Company Public Affairs Manager Lanae O'Shields who proceeded with a presentation that highlighted the following:

- California Clean Air Goals
- Why We Need to Work Together
- Using an Integrated Approach

Ms. O'Shields responded to questions from the Board and they thanked her for the presentation.

The Board agreed to move forward with the adoption of a resolution in support of a Balanced Energy Solution. Staff will draft a resolution and place it on the agenda for the next Board Meeting.

14. TRUE NORTH RESEARCH POLLING ANALYSIS:

GM Shoenberger provided an overview of the topic and introduced Public Affairs Coordinator Carrillo who introduced True North Research, Inc. President Timothy McLarney who proceeded with a presentation that highlighted the following:

- From Bad to Worse
- What is Going On

Mr. McLarney responded to questions from the Board and they thanked him for the presentation.

15. MESA WATER DISTRICT 2020 CUSTOMER SURVEY:

Mr. McLarney proceeded with a presentation that highlighted the following:

- Methodology of Study
- Most Important Issue Facing the Community
- Aided & Unaided Awareness of Mesa Water
- Awareness of Mesa Water (by Own vs. Rent)
- Opinion of Mesa Water District (by Study Year)
- Overall Satisfaction with Service Provision (by Study Year)
- Satisfaction with Services Tiers 1 & 2
- Changes in Satisfaction 2019 to 2020
- Satisfaction with Communication Efforts (by Study Year)
- Key Findings

Mr. McLarney responded to questions from the Board and they thanked him for the presentation.

16. MESA WATER EDUCATION CENTER:

GM Shoenberger provided an overview of the topic and introduced Public Affairs Coordinator Carrillo who introduced Mad Systems, Inc. Founder Maris Ensing who proceeded with a presentation that highlighted the following:

- Floor Plans
- Telling a Story
- Technology Used
- Visitor Flow
- Exhibits and Layout Concept
- Mission Statement

Mr. Ensing responded to questions from the Board and they thanked him for the presentation.

President Dewane asked for comments from the Board. There were no comments.

MOTION

Motion by Director Bockmiller, second by Vice President DePasquale, to amend the contract with Mad Systems for $500,000 for additional exhibits and design elements at the Mesa Water Education Center. Motion passed 4-1, by the following roll call vote:

AYES:	DIRECTORS	Bockmiller, Fisler, DePasquale, Dewane
NOES:	DIRECTORS	Atkinson
ABSENT:	DIRECTORS	None
ABSTAIN:	DIRECTORS	None

ITEM 16.5 - CRITICAL WORKERS EXEMPT FROM CURFEW ORDER:

Discussion ensued amongst the Board.

President Dewane asked for comments from the Board. There were no comments.

MOTION

Motion by Director Atkinson, second by Vice President DePasquale, to direct General Legal Counsel to draft a letter - with the signatures of the Board President, General Manager, and General Legal Counsel - for employees and Board to carry with them that identifies them as essential workers during curfew orders. Motion passed 5-0, by the following roll call vote:

AYES:	DIRECTORS	Atkinson, Bockmiller, Fisler, DePasquale, Dewane
NOES:	DIRECTORS	None
ABSENT:	DIRECTORS	None
ABSTAIN:	DIRECTORS	None

REPORTS:

17. REPORT OF THE GENERAL MANAGER

18. DIRECTORS' REPORTS AND COMMENTS

INFORMATION ITEMS:

19. FISCAL YEAR ANNUAL REIMBURSEMENT REPORT

20. OTHER (NO ENCLOSURE)

RECESS

President Dewane declared a recess at 6:13 p.m.

The Board meeting reconvened at 6:14 p.m.

President Dewane announced that the Board was going into Closed Session at 6:14 p.m.

CLOSED SESSION:

21. PURSUANT TO CALIFORNIA GOVERNMENT CODE SECTION 54957.6:
PUBLIC EMPLOYEE PERFORMANCE EVALUATION
Title: General Manager

The Board returned to Open Session at 6:54 p.m.

President Dewane announced that the Board conducted one Closed Session with the General Manager pursuant to California Government Code Section 54957.6. There was no further announcement.

ACTION ITEMS (CONT.):

22. ANNUAL PERFORMANCE EVALUATION FOR THE GENERAL MANAGER:

President Dewane asked for comments from the Board. There were no comments.

MOTION

Motion by Vice President DePasquale, second by Director Atkinson, to approve an increase of the General Manager's base salary of 4.5 percent effective mid-shift September 28, 2020 and a one-time performance incentive of $15,000 payable Pay Period ending November 20, 2020 . Motion passed 5-0, by the following roll call vote:

AYES:	DIRECTORS	Atkinson, Bockmiller, Fisler, DePasquale, Dewane
NOES:	DIRECTORS	None
ABSENT:	DIRECTORS	None
ABSTAIN:	DIRECTORS	None

President Dewane adjourned the meeting at 6:56 p.m. to a Regular Board Meeting scheduled for Thursday, December 10, 2020 at 6:00 p.m.

Approved:

____
Shawn Dewane, President

____
Denise Garcia, District Secretary

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0013-20-01	3175 Airway Avenue	Homeless Shelter	Plans received on 5/10/20 and plan check fees are waived. Application for New Service received on 5/4/20. 1st Plan check submitted on 5/8/20 and redlines returned on 5/10/20 after required field investigation. 2nd Plan check submitted on 5/14/20 and redlines returned on 5/16/20. 3rd Plan check submitted on 6/17/20 and redlines returned on 6/19/20. 4th Plan check submitted on 6/22/20 and redlines returned on 6/23/20. Permit issued 7/16/20. Precon held on 9/23/20. Hot Tap completed on 9/24/20. Meters installed on 9/30/20. Backflow tests performed on 10/7/20, 10/27/20. (12/4/20)
C0013-20-02	570 W. 18th Street	Lion's Park Project	Plans received on 5/21/20 and plan check fees are waived. Application for New Service received on 6/15/20. 1st Plan check submitted on 5/21/20 and redlines returned on 6/23/20 after required field investigation. 2nd Plan check submitted on 10/5/20 and returned on 10/6/20. Permit issued on 10/27/20. (12/4/20)
C0014-21-01	1170 Baker Street, Units C and D	Commercial Building	Plans received on 7/15/20 and plan check fees paid on 7/20/20. Redlines returned on 7/23/20. 2nd Plan check submitted 8/13/20 and redlines returned on 8/14/20. 3rd Plan check submitted 8/31/20 and returned on 9/6/20. Permit issued on 10/23/20. (12/4/20)
C0043-21-01	2032 President Place	CMSD Pump Station	Plan check fees (Not Application) and Application for New Service submitted on 8/18/20. 1st Plan Check submitted on 6/30/20 and returned on 7/4/20. 2nd Plan check submitted on 9/8/20 and returned on 9/12/20. Permit issued on 11/12/20
C0053-18-01	1908 Tustin	Single Family Home	Plans received and plan check fees paid on 3/8/18. Fees paid and permit issued on 3/13/18. Meter upgraded on 4/15/19. Contacting Owner to schedule flow thru test. Issued water termination letter to Owner on 11/12/20 due to non-responsiveness to complete inspection requirements. (12/4/20)
C0058-19-01	585 & 595 Anton Boulevard (P2)	Apartment Complex	Final permit fees paid on 5/8/19. Permit issued on 5/8/19. Precon meeting held on 5/16/19. Waiting for revised Easements and Quit Claims regarding legal entities. Services installed 6/28/19. Pressure tests done on 7/2/19, Bac-T tests done on 7/8/19. Fireline charged on 9/12/19. Mesa Water staff removed two fire hydrants from jobsite on 9/18/19. Pipeline installed on 11/19/19. Raised valve can to grade on 4/22/20. Coordinating with Conractor for the large meters to be installed mid-December, 2020.

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0063-19-01	1375 Sunflower	Commercial Building	Plans received and plan check fees paid on 12/14/18. Customer picked up redlines on 12/31/18. 2nd plan check submitted on 1/11/19, and redlines returned on 1/29/19. 3rd plan check submitted on 1/31/19. Final permit fees paid on 6/20/19 and permit issued on 6/25/19. Precon held on 1/10/20. Mainline excavation done on 1/14/20. Pipeline installed on 1/16/20. Raised service line to grade and installed 3" Domestic meter on 5/5/20. Two (2) 2-inch services found to be abandoned and Contractor requested letter with direction from Mesa Water. Abandonment of existing meter and install of new 4" meter on 5/28/20. Meters installed on 7/14/20. Another PreCon meeting held for multiple utilities on 7/29/20. (12/4/20)
C0071-20-01	2277 Harbor Boulevard	Apartment Complex	Plans received and plan check fees paid on 3/17/20 and redlines returned on 3/26/20. 2nd Plan check received on 3/31/20. 2nd plan check submitted on 4/5/20 and redlines returned on 4/8/20. Received quitclaim exemption on 10/9/20. (12/4/20)
C0079-19-01	1957 Newport Boulevard	38 New Townhomes	Plans received and plan check fees paid on 2/5/19. Customer picked up redlines on 2/27/19. Meeting on 3/5/19 with customer to discuss easement. 2nd plan check was submitted on 4/23/19 and redlines to be picked up on 5/6/19. 3rd plan check submitted on 5/16/19. Permit approved on 8/23/19. Precon held on 9/3/19. Shutdown to tie in tee & valve service line placement and pipeline installation completed on 9/11/19. Services installed on 10/2/19 and 10/2/19. Pressure test performed on 10/9/19. Hot tapping completed on 10/14/19. Shutdown to tie-in valves on 10/24/19. Meters installed on 12/23/19. Backflow tested on 1/10/20. First phase of meters installed and locked on 2/26/20, 2/27/20, and again on 3/23/20. Backflow tested on 4/21/20. Inspector visited site for update on 7/13/20. Flow Thru tests completed on 10/5/20, and 10/13/20 on 18 meters only. Meter installed on 11/10/20.

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0092-19-01	2089 Harbor Blvd (Harbor and Hamilton)	28 New Townhomes	Plans received and plan check fees paid on 4/23/19. 1st plan check submitted 4/23/19 and redlines to be picked up on 5/6/19. 2nd plan check submitted on 6/11/19 and redlines picked up on 6/18/19. 3rd Plan Check submitted on 11/25/19 and redlines returned to customer on 11/27/19. 4th Plan Check submitted on 2/4/20 and redlines emailed to customer on 2/12/20. Permit issued 6/6/20. Precon meeting held on 6/25/20. Hot taps done on 10/9/20, 10/12/20, 10/13/20. 29 Meters installed on 10/15/20. Shutdown to tie in the fireline on 10/15/20. Two Backflows tested on 10/23/20. Abandonment completed on 10/28/20. Meter install on 11/2/20.
C0101-19-01	1275 Bristol Avenue	Car Dealership	Plans received and plan check fees paid on 6/11/19. 1st Plan check submitted 6/11/19 and redlines picked up on 6/18/19. 2nd Plan check submitted on 8/13/19 and picked up on 8/20/19. 3rd Plan check submitted 9/3/19 and returned on 9/10/19. 4th Plan check submitted 1/29/20 and picked up on 2/4/20. Final permit fees paid on 2/10/20. Permit issued on 2/24/20. PreCon held on 3/5/20 and again on 7/24/20. Services installed on 7/24/20. Chlorination swab, flushing, pressure test and health samples done on 7/30/20. Backflow placed on 8/4/20. Meters installed on 8/5/20. Fireline charged and Backflow tested on 8/6/20. 2" Meter installed and locked off on 9/10/20. Backflow tested on 9/11/20 and failed. Backflow retested on 10/5/20 and passed. Concrete pad inspected on 10/8/20. (12/4/20)
C0102-20-02	3550 Cadillac Avenue	Commercial	Plans received and plan check fees paid on 11/25/19. 1st Plan check submitted 11/25/19 and redlines emailed on 12/4/19. Issued plan check application termination to Owner due to non-responsiveness to complete plan check process. 2nd Plan check submitted on 7/2/20 and returned on 7/5/20. (12/4/20)
C0104-19-01	413 E. 20th Street	Single Family Home	Plans received and plan check fees paid on 7/1/19. 1st Plan check submitted 7/1/19 and redlines picked up on 7/1/19. 2nd Plan check submitted on 1/7/20 and redlines emailed on 1/15/20. Permit issued on 4/12/20. Precon held on 9/21/20. Meter upgraded on 10/14/20. (12/4/20)

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0105-20-01	3333 Avenue of the Arts	Commercial	Plans received and plan check fees paid on 7/24/19. 1st Plan check submitted 7/26/19 and redlines to be picked up on 7/26/19. 2nd Plan check submitted on 8/30/19 and resubmitted on 9/11/19. 3rd plan check resubmitted on 10/8/19. Permit approved and final fees paid on 10/24/19. Precon held on 11/24/19. Temporary RW pipeline inspected and approved on 11/27/19 and report sent to DDW on 12/4/19. Construction is ongoing. (12/4/20)
C0120-20-01	934 Congress Street	Single Family Home	Plans received and plan check fees paid on 10/28/19. 1st Plan check submitted 10/28/19 and redlines picked up on 11/5/19. 2nd Plan check submitted on 3/11/20, and redlines emailed to customer on 3/18/20. 3rd Plan check submitted on 3/24/20 and redlines remailed to customer on 3/26/20. Customer put project on hold on 3/27/20. Verified construction has started on 5/7/20. Issued water termination letter to Owner on 6/1/20 due to non-responsiveness to complete plan check process. (12/4/20)
C0122-20-01	925 W. 18th Street	Commercial	Plans received and plan check fees paid on 10/28/19. 1st Plan check submitted 10/28/19 and redlines picked up on 10/29/19. 2nd plan check submitted 12/4/19. 3rd Plan check submitted on 1/2/20 and redlines picked up on 1/6/20. Final plan check fees paid on 2/26/20. Inspector did a site pre-survey on 3/4/20. Permit issued on 4/18/20. Construction in progress. (12/4/20)
C0124-20-01	2209 Fairview Road	Commercial	Plans received and plan check fees paid on 11/18/19. 1st Plan check submitted 11/5/19 and redlines picked up on 11/19/19. 2nd Plan check submitted on 11/21/19 and redlines picked up on 11/27/19. 3rd Plan check submitted on 2/3/20 and redlines returned to customer on 2/4/20. Permit issued on 6/2/20. Precon meeting held on 7/9/20. Mainline and trench excavation inspected on 7/10/20. Meeting to refresh Precon with new Contractor held on 10/30/20. (12/4/20)
C0125-20-01	3080 Airway Avenue	Commercial	Plans received and plan check fees paid on 11/18/19. 1st Plan check submitted 11/7/19 and redlines picked up on 11/27/19. 2nd Plan check submitted on 1/16/20 and redlines picked up on 2/11/20. Permit issued on 3/6/20. Precon meeting held on 4/28/20. Mainline excavation done on 5/21/20. Backflow placement and test for final inspections done on 11/10/20.

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0128-20-01	901 B South Coast Drive	Commercial	Plans received and plan check fees paid on 11/25/19. 1st Plan check submitted 11/25/19 and redlines picked up on 12/3/19. 2nd Plan check submitted on 2/21/20 and redlines returned on 3/5/20. 3rd Plan check submitted on 3/16/20 and redlines returned on 3/18/20. 4th Plan check submitted on 6/25/20. (12/4/20)
C0131-20-01	1975 Wallace Avenue	6 Unit Apartments	Plans received and plan check fees paid on 11/18/19. 1st Plan check submitted 11/18/19 and redlines picked up on 11/22/19. 2nd Plan check submitted on 12/2/19 and redlines picked up on 12/3/19. Final permit fees paid on 3/6/20 and permit issued on 3/6/20. (12/4/20)
C0137-20-01	3001 Murray Lane	Single Family Home	Plans received and plan check fees paid on 2/28/20. 1st Plan check submitted on 2/28/20 and redlines returned on 3/9/20. 2nd submittal submitted on 9/30/20 and returned on 10/11/20. (12/4/20)
C0138-20-01	1966 Wallace Avenue	Five Single Family Homes	Plans received and plan check fees paid on 3/4/20. 1st Plan check submitted on 3/4/20. 2nd Plan check submitted on 3/20/20 and redlines returned on 3/22/20. Issued permit on 6/2/20. Precon meeting held on 10/5/20. Services installed and backfilled on 11/9/20. Meters installed and locked off on 11/16/20. Flowthru tests completed on 12/2/20.
C0139-20-01	1592 Riverside Place	Two Single Family Homes	Plans received and plan check fees paid on 3/4/20. 1st Plan check submitted on 3/4/20 and redlines returned on 3/13/20. 2nd Plan check submitted on 4/17/20 and redlines returned on 4/18/20. Issued Payment Voucher and Water Service Agreement for payment and signature. Followed up with Owner on 6/25/20, 8/3/20, 9/18/20 regarding status. Permit issued on 11/23/20. Precon meeting held on 12/3/20.
C0140-20-01	2163 National Avenue	Single Family Home	Plans received and plan check fees paid on 3/4/20. 1st Plan check submitted on 3/4/20 and redlines returned on 3/13/20. Followed up with Owner on 8/15/20 expecting 2nd submittal late December 2020.
C0142-20-01	2309 Santiago Drive	Single Family Home	Plans received on 4/23/20 and plan check fees paid on 4/29/20. 1st Plan check submitted on 4/23/20 and redlines returned on 5/9/20. 2nd Plan check submitted on 5/15/20 and redlines returned on 5/28/20. Issued Permit on 6/10/20. Inspector sent to check status of construction on 11/2/20.

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0143-20-01	359 Nassau Road	Single Family Home	Plans received on 4/23/20 and plan check fees paid on 4/24/20. 1st Plan check submitted on 4/23/20. 2nd Plan check submitted on 5/13/20 and redlines returned on 5/16/20. 3rd Plan check submitted on 9/28/20 and returned on 9/28/20. (12/4/20)
C0148-20-01	2094 Balmoral Place	Single Family Home	Application for New Service received on 5/15/20. 1st Plan check submitted on 6/15/20 and redlines returned on 6/21/20. Plan check fees paid on 7/3/20. (12/4/20)
C0149-20-01	1964 Raymond Avenue	Single Family Home	Application for New Service received on 5/15/20 and plan check fees paid on 6/21/20. 1st Plan check submitted on 6/10/20 and redlines returned on 6/21/20. 2nd Plan check submitted on 6/22/20 and redlines returned on 6/23/20. Issued permit on 7/16/20. (12/4/20)
C0150-20-01	220 E. 21st Street	Single Family Home	Plans received on 7/3/20 and plan check fees paid on 6/25/20. 1st Plan check submitted on 6/25/20 and redlines returned on 7/5/20. 2nd Plan check submitted on 7/7/20 and redlines returned 7/12/20. Issued permit on 7/29/20. Precon held on 8/14/20. Meter box moved, installed and locked off on 8/27/20. Backflow tested and passed on 11/19/20.
C0150-20-02	165 Merrill Place	Single Family Home	Plans received on 7/3/20 and plan check fees paid on 6/25/20. 1st Plan check submitted on 6/25/20 and redlines returned on 7/5/20. Rescinded permit on 9/16/20. 2nd Plan check submitted 9/28/20 and returned on 9/29/20. Issued permit on 10/27/20. (12/4/20)
C0151-20-01	2219 Santa Ana Avenue	Single Family Home	Plans received on 7/7/20 and plan check fees paid on 7/7/20. 1st Plan check submitted on 7/7/20 and redlines returned on 7/12/20. 2nd Plan check submitted on 7/17/20 and redlines returned on 7/19/20. Issued permit on 7/29/20. Precon held on 8/11/20. Meter installed on 8/13/20. (12/4/20)
C0152-21-01	369 Costa Mesa Street	Single Family Home	Plans received on 7/21/20 and plan check fees paid on 7/15/20. 1st Plan check submitted on 7/22/20 and redlines returned on 7/22/20. Followed up with Owner on 9/18/20 regarding status. (12/4/20)

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0153-21-01	265 Briggs Avenue	Commercial	Plans received on 7/15/20 and plan check fees paid on 6/25/20. 1st Plan check submitted on 7/15/20 and redlines returned on 7/24/20. 2nd Plan check submitted on 8/6/20 and redlines returned on 8/13/20.Issued permit on 8/20/20. Precon held on 9/28/20. Meter installed and locked on 10/6/20. Backflow placement inspected on 10/20/20. Final Backflow tests (x4) completed on 12/7/20.
C0155-21-01	451 Cabrillo Street	Single Family Home	Plans received on 7/21/20 and plan check fees paid on 7/21/20. 1st Plan check submitted on 7/22/20 and redlines returned on 7/22/20. 2nd Plan check submitted on 9/29/20 and response submitted on 9/29/20. (12/4/20)
C0156-21-01	2870 Clubhouse Road	Single Family Home	Plans received on 8/4/20 and plan check fees paid on 8/4/20. 1st Plan check submitted on 8/4/20 and returned on 8/13/20. 2nd Plan check submitted on 9/15/20 and redlines returned on 9/15/20. Permit issued on 9/30/20. Precon held on 10/8/20. Meter installed and locked on 10/14/20. (12/4/20)
C0157-21-01	251 E. 20th Street	Single Family Home	Plan check fees paid on 8/5/20 and Application for New Service submitted on 8/5/20. 1st Plan check submitted on 8/5/20 and returned on 8/13/20. 2nd Plan check submitted on 8/19/20 and returned on 8/20/20. Issued permit on 9/17/20. Precon meeting held on 9/22/20. Contractor requested meter box only on 9/30/20. (12/4/20)
C0158-21-01	396 E. 21st Street	Mobile Home Park	Plan check fees paid on 8/13/20 and Application for New Service submitted on 8/7/20. 1st Plan check submitted on 7/30/20 and returned on 8/15/20. 2nd Plan check submitted on 9/2/20 was rejected. Revised 2nd Plan check submitted on 9/10/20 and returned on 9/12/20. Issued permit on 10/27/20. (12/4/20)
C0159-21-01	2734 San Lucas Lane	Single Family Home	Plan check fees paid and Application for New Service submitted on 8/14/20. 1st Plan check submitted on 8/18/20 and returned on 8/20/20. 2nd Plan check submitted on 8/25/20 and returned on 8/26/20. Issued permit on 11/12/20.
C0160-21-01	272 Rose Lane	Single Family Home	Plan check fees paid and Application for New Service submitted on 8/24/20. 1st Plan check submitted on 8/2420 and returned on 8/30/20. 2nd Plan check submitted on 8/31/20 and returned on 9/6/20. Issued permit on 9/30/20.

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0161-21-01	1775 and 1781 Monrovia Ave.	Commercial	Plan check fees paid and Application for New Service submitted on 8/27/20. 1st Plan check submitted on 8/20/20 and returned on 8/30/20. 2nd Plan check submitted on 9/21/20 and returned on 9/23/20. Issued permit on 11/12/20.
C0162-21-01	355 E. 19th Street	Single Family Home	Plan check fees paid and Application for New Service submitted on 8/27/20. 1st Plan check submitted on 8/27/20 and returned on 8/30/20. 2nd Plan check submitted on 9/2/20 and returned on 9/6/20. Issued permit on 9/17/20. Precon meeting held on 10/9/20. (12/4/20)
C0163-21-01	South Coast Drive (Fire Hydrant #51)	Commercial	Plan check fees paid 9/1/20. Waiting for Precon with OC405 Partners who are having to coordinate with Caltrans. (12/4/20)
C0164-21-01	282 E. 18th Street	Single Family Home	Plan check fees paid and Application for New Service submitted on 9/3/20. 1st Plan check submitted on 8/31/20 and returned on 9/6/20. Issued permit on 9/30/20. (12/4/20)
C0165-21-01	2110 Monrovia Ave	Single Family Home	Plan check fees paid and Application for New Service submitted on 9/3/20. 1st Plan check submitted on 9/2/20 and returned on 9/6/20. Issued permit on 9/17/20. (12/4/20)
C0166-21-01	470 Walnut Place	Single Family Home	Plan check fees paid and Application for New Service submitted on 9/3/20. 1st Plan check submitted on 9/2/20 and returned on 9/6/20. Issued permit on 9/17/20. (12/4/20)
C0167-21-01	2125 Orange Ave.	Single Family Home	Plan check fees paid and Application for New Service submitted on 9/9/20. 1st Plan check submitted on 9/2/20 and returned on 9/12/20. 2nd Plan check submitted on 9/17/20 and returned on 9/17/20. Issued permit on 9/30/20. Precon meeting held on 10/15/20. Installed new services on 10/30/20. Meter installed on 11/6/20. Shutdown for Abandonment completed on 11/9/20.
C0168-21-01	3152 Country Club Drive	Single Family Home	Plan check fees paid and Application for New Service submitted on 9/9/20. 1st Plan check submitted on 9/9/20 and returned on 9/12/20. 2nd Plan check submitted on 10/9/20 and returned on 10/9/20. Permit issued on 10/23/20. Precon meeting held on 11/4/20. Meter installed and locked off on 11/13/20. Final Flowthru tested on 11/19/20.

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0169-21-01	785 Center Street	Single Family Home	Plan check fees paid and Application for New Service submitted on 9/14/20. 1st Plan check submitted on 9/14/20 and returned on 9/18/20. 2nd Plan check submitted on 9/24/20 and returned on 9/25/20. Issued permit on 10/5/20. (12/4/20)
C0170-21-01	446 Flower Street	Single Family Home	Plan check fees paid and Application for New Service submitted on 9/25/20. 1st Plan check submitted on 9/25/20 and returned on 9/28/20. 2nd Plan check submitted on 9/29/20 and returned on 9/29/20. Permit issued on 10/23/20. (12/4/20)
C0171-21-01	1719 Samar Drive	Single Family Home	Plan check fees paid and Application for New Service submitted on 9/25/20. 1st Plan check submitted on 9/25/20 and returned on 10/3/20. 2nd Plan check submitted on 10/6/20 and returned on 10/6/20. Permit issued on 10/23/20. (12/4/20)
C0172-21-01	377, 379, 385 and 387 La Perle Place	4 Single Family Homes	Application for New Service submitted on 10/9/20 and waiting for Plan check fees to arrive via check. 1st Plan check submitted on 10/9/20 and returned on 10/12/20. 2nd Plan check submitted on 10/20/2020 and returned on 10/20/20. 3rd Plan check submitted on 10/27/20 and returned on 10/28/20. (12/4/20)
C0173-21-01	1815 Anaheim Ave	Kiddie Academy	Application for New Service and plan check fees submitted on 10/14/20. 1st Plan check submitted on 10/14/20 and returned on 10/27/20. (12/4/20)
C0174-21-01	461 E. 20th Street	Single Family Home	Application for New Service and plan Check Fees submitted on 10/14/20. 1st Plan check submitted on 10/27/20 and returned on 10/27/20. 2nd Plan check submitted on 11/2/20 and returned on 11/3/20. 3rd Plan check submitted on 11/4/20 and returned on 11/4/20. Permit issued on 11/23/20.

MESA WATER AND OTHER AGENCY PROJECTS STATUS REPORT
December 2020

Project Title: OC-44 Replacement and Rehabilitation Evaluation and Cathodic Protection Study

File No.: M 2034

Description: Evaluate potential repair and replacement options.

Status: Request for Bids sent out to contractors on February 6, 2019. Six bids received on 3/6/19. E&O Committee recommended award of the contract to lowest bidder (E.J. Meyer Company) on 3/19/19. Kick-off meeting held on 4/25/2019. Reviewed submittals. Met with SARWQB on 5/24/19 and discussed permit requirements w/ Susan Beeson. On 5/30/19 met with OCSD and went over requirements for the Special Purpose Discharge Permit (SPDP). Project Progress meeting on 6/6/19 and coordination meeting with MWD on 6/20/19. Held Permit Status Meeting on 7/11/2019, Traffic Coordination Meeting with Fletcher Jones on 7/23/2019 and Project Progress Meeting on 7/23/2019. Submitted Application Package to OCSD for SPDP on 7/31/2019. Received Special Purpose Discharge Permit from OCSD on 9/1/2019. Coordination meeting with Fletcher Jones and Project Progress Meeting held on 9/11/19. Contractor mobilized on 9/15/19 and started dewatering efforts. Project is substantially complete and line is ready for use. Native planting is complete and the contractor is providing maintenance of planted vegetation. The post-construction walk-through meeting held on 4/30/20. Planting Establishment and 120-day Maintenance Period completed on 7/2/20. The final inspection and walk-though meeting held on 7/23/20. Planting Establishment and Maintenance Report submitted to the regulatory agencies on September 29, 2020. Non-native plant herbiciding performed on 11/14/20. (12/4/20)

Project Title: Pipeline Testing Program

File No.: MC 2141

Description: Implement Resolution No. 1442 Replacement of Assets to annually perform non-destructive testing of 1% of the distribution system, and destructive testing of segments that are shown to have less than 70% of original wall thickness by non-destructive testing.

Status: Three miles of AC pipe constructed in 1956 were selected for non-destructive wall thickness measurement, which occurred during the week of January 14, 2019. The report was received on February 8, 2019. Five AC pipe samples are planned to be collected and sent for wall thickness measurements as part of routine valve replacements in April 2019. Samples were sent to the testing lab in May 2019, and the wall thickness measurement report was received on June 24, 2019. With more data collected from AC pipe samples, a proposed update of the Res. 1442 Replacement of Assets was approved by the E&O Committee in September 2019. Staff developed a process for classifying pipeline breaks, and provided a class to the Distribution crews on November 21, 2019. Four AC pipe samples collected during valve replacements were sent for EDS testing on January 28, 2020. Lab reports were received on March 19, 2020 and evaluation of the lab results was received on June 12, 2020. MWDOC performed approximately 40 miles of leak detection and found one suspected pipeline leak. Staff performed a follow up leak detection and could not replicate the suspected leak. Thirteen (13) AC pipe samples collected by staff during valve replacements and break responses were sent for wall thickness measurement, EDS testing, and remaining useful life estimates. (12/4/20)

Project Title: Chandler & Croddy Wells and Pipeline Project

File No.: M18-113

Description: Design, documentation, and permitting for two new wells located on Chandler Avenue and Croddy Way in the City of Santa Ana and the distribution pipeline connecting the wells to Mesa Water's supply system.

Status: Tetra Tech has been contracted to complete the design, documentation, and permitting for the Chandler and Croddy Wells and Pipeline Project. Initial data request sent to Tetra Tech on September 7, 2017. Met with Division of Drinking Water regarding well locations on September 20, 2017. Preliminary hydrological evaluation received on September 29, 2017. Board approved demolition of existing structures and dedicated well facility with option to evaluate long-term lease potential as market conditions dictate at both sites at November 2017 E&O. Butier Engineering has been contracted to provide Construction Management Services. Preliminary Design Report (PDR) for the distribution pipeline was reviewed and returned on March 6, 2018. Well site layouts were presented to the Board in May. DDW waiver for 50-foot control zone is currently being drafted. The revised PDR for the pipeline and the well sites was received in June 2018. A workshop to discuss review comments was held on August 14, 2018. 50% design for the Croddy Pipeline was received and the design review workshop occurred on November 26, 2018. 50% design for the wells is scheduled for submittal in February 2019. The draft CEQA Mitigated Negative Declaration was received on January 22, 2019, and filed for 30-day public comment on February 20, 2019 and completed on March 22, 2019. Four agencies submitted minor comments. A public meeting to adopt the Mitigated Negative Declaration has been noticed for the April 11, 2019 Board of Directors meeting. The revised Preliminary Design Report for the Chandler and Croddy Wells was received on March 5, 2019. 50% design documents for the existing building demolitions and well drilling were received on April 16, 2019. 50% design documents for well equipping were received on September 9, 2019 and reviewed by staff. The design team met on October 7, 2019, to review design options for the Croddy Pipeline. A corrosion potential report for the Croddy pipeline alignment was received on December 23, 2019, and reviewed by staff. A design team workshop was held on February 13, 2020. 90% design deliverables for building demolition and well drilling were received on February 11, 2020 and February 28, 2020, and were reviewed by staff. Well equipping package 90% design package was received in September 2020 and was reviewed by staff. A well equipping workshop was held on November 3, 2020, to address comments on the design documents and discuss maintainability of equipment. 100% Well Equipping Design is expected on December 16, 2020. Site demolition request for bids was released on May 21, 2020. The Board approved a contract with the low bidder, Standard Demolition, Inc., on July 9, 2020. Demolition of is complete and Standard Demolition demobilized on October 14, 2020. Well Drilling Request for bid was released on June 18, 2020A contract award for well drilling was made to the low bidder, Zim Industries bda Bakersfield Well and Pump (BWP) at the August 13, 2020 Board meeting. A preconstruction meeting for drilling was held on September 2, 2020. Permits for well drilling were received from Orange County Heath Care Agency (OCHCA) on October 7, 2020. Mobilization for drilling at the Croddy Well

14 site started on October 12, 2020. Construction of sound walls is complete, and the conductor casing for the drill rig is installed. The pilot hole was drilled, and water quality samples are being collected and analyzed. The encroachment permit applications for the pipeline were submitted to the City of Costa Mesa and Santa Ana. Permit comments from both cities have been received and addressed, and permit applications have been resubmitted. (12/4/2020)

Project Title: Meter Technology Evaluation

File No.: MC 2248

Description: The lifespan of a water meter is approximately 15 years. As a meter ages, the accuracy drops off due to wear. In preparation for its annual water meter replacement, staff has been reviewing water meter technology determining what water meter and reading solutions would be the best fit for Mesa Water's aging register technology. With today's technology, there are several types of meters and meter reading solutions available. The most common are as follows: Fixed Network, Automatic Meter Reading (AMR) System, Handheld or Touch Technology, and Advanced Metering Analytics - Cellular Endpoint.

Status: Mesa Water prepared a Technical Memo with information of the existing aging metering technology in comparison with proposed new meter reading solutions. The Technical memo was presented to the April E&O Committee and approved by the Board at the May 2019 Board meeting. Recommendations approved by the Board for early implementation include ensuring competitive pricing from the standardized meter supplier, making cellular endpoint meters available to customers who wish to have access to real-time water use data, and working with the meter reading software vendor to configure a software upgrade. Staff has complied the total installed cost of the cellular endpoint meters and presented an implementation plan to the Engineering and Operations Committee on August 20, 2019. Staff also negotiated a contract with National Meter and Automation for preferred customer pricing and limiting annual price escalation, and presented the contract to the Engineering and Operations Committee on August 20, 2019. Staff is working with Badger Meter and Cogsdale to add cellular endpoints to large customer meters to automate meter reading and billing. Staff evaluated each Route 600 meter and vault for meter, register, and end point replacement to assist with installation activities. The first set of cellular endpoints were installed on February 26, 2020. The data is being received by Badger's Beacon system. Route 600 meter vaults were evaluated for construction challenges. Two sites were identified for attempting challenging replacements with and without vault demolition. A proposal was received from Badger on April 28, 2020, for upgrading meter reading field tools and is being evaluated. A proposal was requested from Sprypoint on April 29, 2020 to integrate traditional meter reads into the Badger Beacon system. A request for quote for Route 600 meters, registers, and endpoints is in process. A request for bids was sent out the on-call contractors for the installation of the Route 600 Meter Technology Pilot Project Meters. Bids from the on-call contractors were received on October 15, 2020 and reviewed by staff. W.A. Rasic was selected from the bids received. The preconstruction meeting will be held on 11/12/2020. Kickoff meeting with Contractor was held on November 12, 2020. Contractor is in process of providing submittals for equipment approval. Meter installations are scheduled to be initiated on within the next two weeks.(12/04/2020)

Project Title: Reservoirs 1 & 2 Chemical Systems Design

File No.: M18-117

Description: Improve disinfection and mixing in both reservoirs to improve water quality and minimize nitrification.

Status: Final Design Contract awarded to Hazen & Sawyer on February 14, 2018. 50% design report received on July 17, 2018. Design review workshop took place in September 2018. A site visit to Laguna Beach County's El Morro reservoirs occurred on November 8, 2018, to evaluate the Vortex mixing system. Staff met with the designer on December 5, 2018, to incorporate design-for-reliability and design-for-maintainability principals into the mixing system design. The consultant provided a Technical Memo summarizing the options for maintainability and reliability of the Vortex mixer system on April 4, 2019. The 90% design deliverable was received on June 4, 2019, and is being reviewed by staff. Per the E&O Committee's request, the Preliminary Design Report describing the basis of this project was included in the October E&O Committee package. The consultant is working with the reservoir management system supplier to use Mesa Water's standardized analytical equipment to maintain disinfectant residual in the reservoirs. 100% design deliverable was received on April 29, 2020 and was reviewed by staff. Revised 100% was received on June 23, 2020 and reviewed by staff. Resolution to final comments is expected to be completed in December 2020. (12/4/2020)

Project Title: District Wide Security System

File No.: M20-600

Description: Planning and Design Services for a District-Wide Security System

Status: The District-Wide security system is among the first new projects to be awarded as part of the Capital Improvement Program Renewal (CIPR). The draft scope of work was developed and sent for consultant review on June 16, 2020. Consultant comments were received on June 23, 2020. The final Request for Task Order proposal was issued on July 21, 2020. Three proposals were received on August 3, 2020 and evaluated. A Task Order authorization was issued to HDR. Kickoff and site visits were conducted on August 25-27, 2020. The consults is conducting the evaluation. The draft white paper was received on October 12, 2020, and was reviewed by staff. The revised white paper was received on November 9, 2020, and was being reviewed by staff. A meeting was held on November 18, 2020, to discuss the options. A revised white paper was received on December 4, 2020, and is being reviewed by staff. (12/04/2020)

Project Title: Mesa Water Education Center Project

File No: M20-105

Description: Mesa Water Education Center and Storage Facility

Status: In November 2019, the Board directed staff to proceed with Design Concept 2 of the Mesa Water Reliability Facility Outreach Center. Mesa Water obtained a cost proposal from IBI Group to provide professional design services and construction support services for the Mesa Water® Education Center. The scope of work also incorporates the design of a MWRF spare parts storage building (located at the MWRF) and wells spare parts storage building (located at Well 9 or other well site) as part of the design services. Board approved this item at its 4/9/2020 Board Meeting. The pre-design kick-off meeting was held on 4/27/20. Conceptual design reviewed on 6/10/20 and preliminary cost estimate discussed on 7/9/2020. At the August 25, 2020 Committee Meeting the Mesa Water® Education Center building concept was approved by the Board. Additionally, a contract was awarded to Mad Systems for the exhibit design. On September 17, 2020 a final design kick-off meeting was held with the architect and exhibit design teams. On October 6, 2020, the Mesa Water® team toured the Albert Robles Center for Water Recycling and Environmental Learning with Mad Systems. On October 15, 2020 the design team held a site visit at the MWRF to discuss landscaping and courtyard concepts. The design team held progress meetings on 10/29/20, 11/12/20, and 11/25/20 to discuss project alternatives and progress. (12/4/20)

Project Title: Well 1 Sound Mitigation Enclosure Project

File No: M17-100

Description: Install Well 1 Noise Mitigation Enclosure

Status: In January 2020, Mesa Water's design Consultant completed the design, specifications, and bid package for Well 1 Noise Mitigation Enclosure. Mesa Water invited eight prospective contractors for a site visit (March 9, 2020) and a request to submit a bid. Bids closed on March 17, 2020, and one bid was received from Paulus Engineering. The Board approved this item at the April 9, 2020 Board Meeting. Project in progress. The pre-construction meeting held on 11/4/20. Construction started on 11/16/20. Sound panel installation is substantially complete. Punchlist items will be completed within the next few weeks. (12/4/20)

Project Title: Wilson Avenue and 1951 Cohort Pipeline Replacement Projects

File No.: M21-220A

Description: Design, documentation, and permitting for replacement of pipeline in Wilson Avenue between Newport Blvd and Harbor Blvd.

Status: Scope of Work and Request for Quotes for the design, documentation, and permitting for the Wilson Avenue Pipeline Replacement Project was prepared and sent to the design consultants on 7/13/2020. Received five proposals on 8/27/20. Water Systems Consultants, Inc (WSC) selected to prepare the design. Kick-off meeting held on 8/13/2020. Technical Memorandum No. 1 providing alternative pipeline layout submitted for review on 10/12/20. Design in process. (12/4/20)

Project Title: 1951 Cohort Pipeline Replacement Project

File No.: TBD

Description: Design, documentation, and permitting for replacement of 3.5 miles of pipeline in Hamilton St., Pomona Ave., Wallace Ave., Anaheim Ave., and Maple Ave.

Status: Scope of Work and Request for Proposals for providing CM services for the Wilson Avenue and 1951 Cohort Pipeline Replacement Projects sent out to As-Needed Consultants on 11/30/20.

Scope of Work and Request for Proposals for providing design services for the 1951 Cohort Pipeline Replacement sent out to On-Call Consultants on 12/1/20 (12/4/20)

Project Title: Mainline Valve Replacement Project Phases I and II

File No.: M21-001MV

Description: Design, documentation, and permitting for replacement of mainline valves within the distribution system per the Mainline Valve Spacing Policy.

Status: At the October 8, 2020 Board Meeting the Mainline Valve Spacing Policy was approved by the Board. A Scope of Work and Request for Quote for the design, documentation, and permitting for the Mainline Valve Replacement Project was prepared and was sent to on-call design consultants the week of October 19, 2020. Received four proposals on 11/3/20. Four proposals were received and a Task Order award is pending. (12/4/20)

Project Title: Mainline Valve Replacement Project Phases I and II

File No.: M21-001MV

Description: Design, documentation, and permitting for replacement of mainline valves within the distribution system per the Mainline Valve Spacing Policy.

Status: At the October 8, 2020 Board Meeting the Mainline Valve Spacing Policy was approved by the Board. A Scope of Work and Request for Quote for the design, documentation, and permitting for the Mainline Valve Replacement Project was prepared and was sent to on-call design consultants the week of October 19, 2020. Received four proposals on 11/3/20. Four proposals were received and a Task Order award is pending. (12/4/20)

Project Title: Mainline Valve Replacement Project Phases III and IV

File No.: TBD

Description: Design, documentation, and permitting for replacement of mainline valves within the distribution system per the Mainline Valve Spacing Policy.

Status: At the October 8, 2020 Board Meeting the Mainline Valve Spacing Policy was approved by the Board. A Scope of Work and Request for Quote for the design, documentation, and permitting for the Mainline Valve Replacement Project Phase III and IV are being prepared by the Mesa Water team. Design of Phases III and IV will be completed by the On-Call Consultants performing the Phases I and II design. Work will start once Phases I and II design efforts are complete. (12/04/20)

Project Title: Water and Energy Supply Chain Reliability Study

File No.: M21-210B

Description: The study will evaluate Mesa Water's water and energy supplies and backup capabilities under normal and emergency operations, identify potential water and energy supply reliability gaps, evaluate Mesa Water's supply chain system relative to emergency readiness, and provide recommendations to improve water and energy supply reliability.

Status: A scope of work and request for task order proposals were sent to on-call design consultants on June 5, 2020. Five task order proposals were received on June 19, 2020. Brown and Caldwell was selected to perform the study. The project Kick-off Meeting and site visits were held the week of July 27, 2020. The draft version of TM-1 Water Supply Reliability was received on August 21, 2020. The project team held Single-Point of Failure meetings on September 14 and 21 to evaluate single-points of failure and criticality of the failure for the clear wells, Reservoirs, and MWRF. The draft version of TM-2 Energy Supply Reliability Assessment was delivered on September 15, 2020. The final version of TM-1 was received on October 5, 2020. The project team is currently working to resolve comments and questions regarding TM-2 and TM-3. The anticipated delivery date for the final version of TM-2 and draft version of TM-3 is the week of October 26, 2020. Final versions of TMs 1 and 2 were delivered on 10/30/20 and 11/5/20, respectively. The draft version of TM-3 was delivered on 11/4/20 and is currently being reviewed by the Mesa Water team. This item will be presented at the December Committee Meeting. (12/04/20)

Project Title: Excavation Slurry Dewatering Pit Project

File No.: M21-250D

Description: Design, documentation, and permitting for a dewatering process that will be constructed in Mesa Water's Operations Yard to provide dewatering for the hydrovac excavation slurry.

Status: A Scope of Work and Request for Quote for the design, documentation, and permitting for the Excavation Slurry Dewatering Pit Project was prepared and sent to on-call design consultants the week of October 19, 2020. The task order and notice to proceed are being developed by the Mesa Water team for the selected consultant. The kick-off meeting held on 11/30/20. Project in process. (12/4/20)

Water Quality Call Report November 2020

Date: 11/4/2020
Source: Phone
Address: 554 Pierpont
Description: Customer inquired about water hardness level for his water softener.

Outcome: Provided average and range of water hardness levels to customer.

Date: 11/17/2020
Source: Phone
Address: 1645 Corsica
Description: Customer noticed black particles coming from a tap that does not go through her water softener. She also reported dark stains in her toilet at one point. She wants to know what the black particles in the tap water might be.

Outcome: Explained to customer that it is possible the internal water hose lines may be degrading over time and releasing the black particles. She was not having the black particles at that moment so there was no site visit. Provided customer with direct phone number and asked her to call back if she sees the black particles in the water and we can go verify if it is an internal issue.

Water Operations Status Report

July 1, 2020 - November 30, 2020

Operations Department Status Report	**Wk Unit**	**Plan Days**	**Act Days**	**Plan Qty**	**Act Qty**	**Plan Cost**	**Actual Cost**
01 - HYDRANTS							
WD-0101 - HYDRANT MAINTENANCE	HYDRANTS	75	71	1421	1388	$30,083	$32,874
WD-0102 - HYDRANT PAINTING	HYDRANTS	6	0	178	2	$2,497	$125
WD-0103 - HYDRANT REPAIR	HYDRANTS	17	23	25	37	$6,325	$21,207
Program 01 TOTAL		97	95			$38,905	$54,206
02 - VALVES							
WD-0201 - DISTRIBUTION VALVE MAINTENANCE	VALVES	51	63	1010	1227	$22,512	$28,932
WD-0202 - NIGHT VALVE MAINTENANCE	VALVES	6	0	82	0	$3,004	$0
Program 02 TOTAL		57	63			$25,516	$28,932
03 - METERS							
CS-0301 - NEW METER INSTALLATION	METERS	4	6	43	35	$18,333	$17,006
CS-0302 - RAISE REPLACE METER BOX	BOXES	3	1	32	7	$1,435	$576
CS-0303 - METER LEAK INVESTIGATION/REPAIR	INV/REP	9	7	134	68	$3,618	$2,677
CS-0305 - ANGLE STOP/BALL VALVE REPLACE	REPLACE	14	17	34	41	$8,375	$6,988
CS-0306 - LARGE METER TEST/REPAIR - C	TESTS	10	0	49	0	$3,971	$0
WD-0305 - ANGLE STOP/BALL VALVE REPLACE	REPLACE	11	7	22	15	$3,979	$3,502
Program 03 TOTAL		51	38			$39,711	$30,749
04 - MAIN LINES							
WD-0401 - MAIN LINE REPAIR	REPAIRS	42	29	8	5	$25,622	$20,613
WD-0402 - AIR VAC MAINTENANCE/REPAIR	REPAIRS	11	2	67	1	$4,409	$812
Program 04 TOTAL		53	31			$30,031	$21,425
05 - SERVICE LINES							
WD-0501 - SERVICE LINE REPAIR	REPAIRS	24	43	9	23	$12,345	$29,891
Program 05 TOTAL		24	43			$12,345	$29,891
06 - CAPITAL							
CAP AV - CAPITAL AIR VACUUM REPLACE	AIR VACS	0	0	0	0	$0	$0
CAP BI - CAPITAL BYPASS & METER INSTALL	REPLACE	0	0	0	0	$0	$0
CAP FH - CAPITAL HYDRANT UPGRADE	HYDRANTS	42	174	7	25	$41,022	$160,396
CAP MV - CAPITAL MAINLINE VALVE REPLACE	VALVES	48	78	8	16	$38,203	$63,765
CAP SL - CAPITAL SERVICE LINE REPLACE	SERVICES	16	6	4	4	$10,256	$3,533
CAP SS - CAPITAL SAMPLE STATION REPLACE	STATIONS	0	8	0	12	$0	$3,874
CAP LM - CAPITAL LARGE METERS	METERS	3	1	21	2	$8,325	$1,540
CAP SM - CAPITAL SMALL METERS	METERS	7	7	105	65	$10,178	$8,799
Program 06 TOTAL		116	273			$107,984	$241,907
TOTAL						$254,492	$407,110

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Vendor Name	Check #/Count	Payment Date	Invoice Number	Invoice Description	Payment Amount
CAPITAL					
DITCH WITCH SOUTHERN CALIFORNIA	000002314	11/12/20	354227.	DITCH WITCH PARTS	$164.12
	1				**$164.12**
MICHAEL BAKER INTERNATIONAL	000002299	11/05/20	1090884	M18-118 OC44 PIPELINE REHAB	$10,172.61
		11/05/20	1098535	M20-004A OC44 APPUR RELOCATION	$8,955.60
	000002326	11/12/20	1098377	M17-002A SANTA ANA PRESSURE	$1,727.00
	2				**$20,855.21**
TETRA TECH, INC	000002333	11/12/20	51655247	OCTA 2246INSP-405 WIDENING	$2,100.00
	1				**$2,100.00**
Total CAPITAL	**4**				**$23,119.33**
CHECK SIGNATURE EXEMPT					
SOUTHERN CALIFORNIA EDISON CO	000002240	11/05/20	2236281499OCT 20	ELECTRICITY - OCTOBER 2020	$139,301.19
	1				**$139,301.19**
Total CHECK SIGNATURE EXEMPT	**1**				**$139,301.19**
DEPARTMENT EXPENSE					
4 IMPRINT	000002262	11/05/20	8543621	MWD PROMO ITEMS	$1,334.16
	1				**$1,334.16**
ACWA JOINT POWERS INSURANCE AUTHORITY	000002358	11/19/20	100120	AUTO&GENERAL THRU 10/2021	$118,377.00
	1				**$118,377.00**
CA DEPT OF PUBLIC HEALTH	000002367	11/19/20	VENDING 2021	VENDING MACHINE PERMIT FEE	$40.00
	1				**$40.00**
CALPERS BENEFIT PAYMENTS	0157816	11/04/20	16202637	CALPERS PA HEALTH NOV. 20	$6,406.34
	0157817	11/04/20	16202634	CALPERS HEALTH NOV. 20	$53,479.55
	0157819	11/12/20	111220	CALPERS RETIRE PPE 10/23/20	$36,547.41
	0157824	11/25/20	110520	PPE 11/5/20	$35,679.08
	4				**$132,112.38**
HOOVER PRINTING	000002295	11/05/20	95436	PRINTING - NEWSLETTER	$2,494.41

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Vendor Name	Check #/Count	Payment Date	Invoice Number	Invoice Description	Payment Amount
HOOVER PRINTING	000002295	11/05/20	95435	PRINTING - WATER BILL INSERTS	$1,142.15
		11/05/20	95360	DESIGN WORK	$160.00
	1				**$3,796.56**
RED WING BUSINESS ADVANTAGE ACCT	000002383	11/19/20	20201015009986	SAFETY SHOES	$583.71
	1				**$583.71**
SHARON D BRIMER	000002297	11/05/20	OCT20	BOARD MINUTES - OCT 2020	$360.00
		11/05/20	SEP2020	BOARD MINUTES - SEPTEMBER 2020	$180.00
	1				**$540.00**
SOUTHERN CA PUB LABOR RELATIONS COUNCIL	000002332	11/12/20	08012020	NEW FY21 MEMBERSHIP FOR HR	$200.00
	1				**$200.00**
TRACKER, A DIVISION OF C2, LLC	000002276	11/05/20	20-0000-186-Q3	PORTFOLIO ACCTING & REPORTING	$1,200.00
	1				**$1,200.00**
ULTIMATE STAFFING SERVICES	000002277	11/05/20	13943666	TEMP LABOR, PA, WE 10/25	$1,374.96
	000002391	11/19/20	13948833	TEMP LABOR, PA WE 11/08	$1,374.96
		11/19/20	13946237	TEMP LABOR, PA WE 11/08	$1,374.96
	2				**$4,124.88**
VISTA DEL VERDE LANDSCAPE	000002337	11/12/20	34416	LANDSCAPE MAINTENANCE - NOV20	$2,532.80
	1				**$2,532.80**
Total DEPARTMENT EXPENSE	**15**				**$264,841.49**
FINANCIAL OBLIGATIONS					
US BANK	000002392	11/19/20	12346124	ADMIN FEE	$241.94
	1				**$241.94**
Total FINANCIAL OBLIGATIONS	**1**				**$241.94**
GENERAL AND ADMINISTRATIVE					
360 BC GROUP INC.	000002362	11/19/20	20600	WEBSITE MIGRATION	$7,660.00
	1				**$7,660.00**
ABATIX CORP	000002245	11/05/20	8041237	ASBESTOS LABELS	$156.35
	1				**$156.35**

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ACI PAYMENTS INC.	000002379	11/19/20	1000034276	ONLINE PAYMENT MAINT FEE	$150.00
	1				**$150.00**
ALAN'S LAWNMOWER & GARDEN CENTER	000002304	11/12/20	986623	HUSQVARNA FUEL	$196.65
	1				**$196.65**
APOLLO PRINTING & GRAPHICS	000002248	11/05/20	262749	PRINTING - BUSINESS CARDS	$36.64
	1				**$36.64**
AT&T MOBILITY	000002249	11/05/20	87295684390X10162020	WIRELESS COMM 10/09-11/08	$1,609.87
	1				**$1,609.87**
BEST BEST & KRIEGER	000002363	11/19/20	890700	PROFESSIONAL SERVICES	$1,437.90
	1				**$1,437.90**
BYRON NAJARRO	000002398	11/19/20	CHEQ00099007655	07920901 Cheque Deposits 07920	$38.49
	1				**$38.49**
CALIFORNIA ADVOCATES INC.	000002309	11/12/20	112059	PROFESSIONAL SERVICES	$7,000.00
	1				**$7,000.00**
CCS ORANGE COUNTY JANITORIAL INC.	000002251	11/05/20	490517	M20-099 DAY PORTER SERVICE	$3,031.00
		11/05/20	490516	JANITORIAL SERVICES	$3,798.08
	1				**$6,829.08**
CITY OF COSTA MESA	000002365	11/19/20	CITY81783	ADJUST MWD VALVES TO GRADE	$7,260.00
	1				**$7,260.00**
COMPONETICS	000002310	11/12/20	1728	FABRICATE WATER KEY BRACKETS	$2,852.45
	1				**$2,852.45**
CONSTANT AND ASSOCIATES, INC.	000002311	11/12/20	CA2020_574	COMMUNICATIONS PLAN & TRAINING	$28,485.57
	1				**$28,485.57**
COSTCO WHOLESALE	000002366	11/19/20	11/18/2020	2020 TURKEYS FOR EMPLOYEES	$1,453.02
	1				**$1,453.02**
DEMPSEY CONSTRUCTION	000002394	11/19/20	CHEQ00099007659	20073900 Cheque Deposits 20073	$492.40
	1				**$492.40**

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E.H. WACHS	000002368	11/19/20	INV182633	CONTROLLER-DATALOGGER	$3,513.04
	1				**$3,513.04**
EAN SERVICES LLC	000002254	11/05/20	25632406	M20-099 TRUCK RENTAL	$1,969.50
	1				**$1,969.50**
EASI FILE CORPORATION	000002293	11/05/20	84721	MYLAR FILE HANGERS	$180.16
	1				**$180.16**
ELVIRA T FLORES	000002345	11/12/20	CHEQ00099007652	00605600 Cheque Deposits 00605	$125.68
	1				**$125.68**
EMPLOYEE RELATIONS INC	000002255	11/05/20	89114	PRE-EMPLOYMENT VEHICLE REPORT	$8.22
	1				**$8.22**
EMPOWER	0157820	11/12/20	111220	PPE 11/6/20	$1,028.96
	0157821	11/12/20	111201	PPE 11/6/20	$13,098.86
	0157822	11/25/20	112520	PPE 11/20/20	$1,028.96
	0157823	11/25/20	1120201	PPE 11/20/20	$14,123.86
	4				**$29,280.64**
ENTERPRISE FM TRUST	000002315	11/12/20	FBN4071704	AUTO LEASES - NOVEMBER 2020	$1,026.83
	1				**$1,026.83**
ERIC UPCHURCH	000002286	11/05/20	CHEQ00099007648	02008501 Cheque Deposits 02008	$16.82
	1				**$16.82**
EWING IRRIGATION	000002369	11/19/20	12961057	IRRIGATION SUPPLIES	$58.05
	1				**$58.05**
FERN E MIRO	000002397	11/19/20	CHEQ00099007654	07305301 Cheque Deposits 07305	$134.20
	1				**$134.20**
FOGCO SYSTEMS INC	000002257	11/05/20	0060580-IN	FOGGER MOTOR	$349.59
	1				**$349.59**
FOLEY & MANSFIELD, P.L.L.P.	000002294	11/05/20	2601411	LEGAL FEES - SEPTEMBER 2020	$840.00
		11/05/20	2601412	LEGAL FEES - SEPTEMBER 2020	$2,430.00
	1				**$3,270.00**
FULL CIRCLE RECYCLING	000002258	11/05/20	25663	RECYCLING SERVICES	$133.50

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Vendor Name	Check #/Count	Payment Date	Invoice Number	Invoice Description	Payment Amount
	1				**$133.50**
GENUINE PROPERTY MGMT	000002285	11/05/20	CHEQ00099007644	02408800 Overpayment	$458.01
	1				**$458.01**
HDR ENGINEERING INC	000002261	11/05/20	1200302274	M20-600 DIST SECURITY SYSTEM	$27,925.00
	000002372	11/19/20	1200304699	M20-600 SECURITY SYSTEM	$30,993.75
	2				**$58,918.75**
HOLLY HEDEMANN	000002399	11/19/20	CHEQ00099007656	05811300 Overpayment	$139.89
	1				**$139.89**
INFOSEND INC	000002321	11/12/20	179989	CUSTOMER BILLING SERVICE	$899.18
		11/12/20	180176	CUSTOMER BILLING SERVICE	$1,803.62
	000002374	11/19/20	180947	CUSTOMER BILLING SERVICE	$1,896.00
	2				**$4,598.80**
JAKE DAWSON	000002395	11/19/20	CHEQ00099007657	05150027 Cheque Deposits 05150	$98.16
	1				**$98.16**
JEFF LOWERY	000002346	11/12/20	CHEQ00099007623	06601700 Cheque Deposits 06601	$263.49
	1				**$263.49**
JILL ROSOFF	000002242	11/05/20	CHEQ00099007643	08700953 Cheque Deposits 08700	$28.77
	1				**$28.77**
JOHN ROBINSON CONSULTING, INC.	000002264	11/05/20	MW202001-04	M20-100 METER TECH IMPLEMENT	$1,200.00
		11/05/20	MW201901-19	CONSULTING SERVICES	$9,600.00
	1				**$10,800.00**
JUNIPER SYSTEMS INC.	000002265	11/05/20	113324	SHIELDING & INSTALLATION	$678.78
	1				**$678.78**
KLEEN KRAFT SERVICES	000002266	11/05/20	1051452	UNIFORMS, MATS, TOWELS	$231.60
	000002356	11/12/20	1052102	UNIFORMS, MATS, TOWELS	$328.85
	000002376	11/19/20	1052751	UNIFORMS, MATS, TOWELS	$220.13

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Vendor Name	Check #/Count	Payment Date	Invoice Number	Invoice Description	Payment Amount
	3				$780.58
LIEBERT CASSIDY WHITMORE	000002268	11/05/20	1507417	PROFESSIONAL SERVICES - SEPT	$616.00
	1				$616.00
LOUIE A RINCON	000002396	11/19/20	CHEQ00099007 658	06421601 Cheque Deposits 06421	$58.27
	1				$58.27
LUKE WOOD	000002357	11/12/20	CHEQ00099007 650	05610600 Cheque Deposits 05610	$363.30
	1				$363.30
MARIBEL LARIOS DBA FIDUCIARY EXPERTS LLC	000002317	11/12/20	000061	QUARTERLY FEE - 3RD QTR FY20	$2,000.00
	1				$2,000.00
MORAN CONSULTING, INC.	000002270	11/05/20	3699	CS ONGOING SUPPORT	$5,375.00
	1				$5,375.00
NOVATIME TECHNOLOGY INC	000002378	11/19/20	SI-085661	MONTHLY FEE - TIME CARDS	$192.50
	1				$192.50
ORANGE COUNTY TREASURER - TAX COLLECTOR	000002402	11/19/20	140-041-57-FY21	FY21 SPECIAL ASSESSMENT	$169.50
		11/19/20	422-301-03-FY21	FY21 SPECIAL ASSESSMNT-1965PLA	$1,462.96
		11/19/20	415-024-17-FY21	FY21 SPECIAL ASSESSMENT-CRODDY	$212.42
		11/19/20	415-014-03-FY21	FY21 SPECIAL ASSESSMNT-CHANDLR	$269.42
	1				$2,114.30
PETE'S ROAD SERVICE	000002272	11/05/20	453007-00	TIRE REPAIR	$451.00
	1				$451.00
PROCARE WORK INJURY CENTER (DBA)	000002329	11/12/20	299893	MEDICAL SERVICES	$120.00
		11/12/20	299591	MEDICAL SERVICES	$367.35
		11/12/20	299514	MEDICAL SERVICES	$120.00
	1				$607.35
RAFTELIS FINANCIAL CONSULTANTS	000002382	11/19/20	17130	CONSULTING-WATER COST ANALYSIS	$660.00
	1				$660.00
RAYNE WATER SYSTEMS	000002273	11/05/20	30486NOV20	SOFT WATER SERVICE NOV 20	$41.42

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Vendor Name	Check #/Count	Payment Date	Invoice Number	Invoice Description	Payment Amount
	1				**$41.42**
ROBERT THOMAS	000002312	11/12/20	CHEQ00099007627	00203600 Deposit refund	$91.81
	1				**$91.81**
ROBERT WHITNEY	000002243	11/05/20	CHEQ00099007645	08617301 Overpayment	$2.54
	1				**$2.54**
ROY E HANSON JR MFG	000002274	11/05/20	96753	ASME DATA SHEET & DRAWING	$1,300.00
	1				**$1,300.00**
SOUTH ORANGE COUNTY ECONOMIC COALITION (SOCEC)	000002404	11/19/20	21M-023	2020 AFFLIATE MEMBERSHIP	$1,500.00
	1				**$1,500.00**
STAFFING SOLUTIONS	000002386	11/19/20	32283	TEMP LABOR, CUS SVC, WE 11/8	$1,107.22
	1				**$1,107.22**
STILLWELL CONSTRUCTION, INC.	000002343	11/12/20	CHEQ00099007649	20071700 Cheque Deposits 20071	$1,272.00
	1				**$1,272.00**
SUSAN ELLING	000002347	11/12/20	CHEQ00099007651	00550204 Cheque Deposits 00550	$44.35
	1				**$44.35**

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Vendor Name	Check #/Count	Payment Date	Invoice Number	Invoice Description	Payment Amount
WE SAVE BEES	000002341	11/12/20	7959	BEE REMOVAL SERVICES	$195.00
	1				**$195.00**
WESTERN EXTERMINATOR COMPANY	000002283	11/05/20	8609510	PEST CONTROL - DISTRICT	$92.50
		11/05/20	8605460	PEST CONTROL - MWRF	$92.50
	1				**$185.00**
YORKE ENGINEERING, LLC	000002302	11/05/20	23531	AQ & ES ENVIROMENTAL SERVICES	$715.25
	1				**$715.25**
Total GENERAL AND ADMINISTRATIVE	**79**				**$564,085.18**
RETIREE CHECKS					
ALAN COOK	000002247	11/05/20	110120	NOV 2020 INSURANCE SUBSIDY	$98.83
	1				**$98.83**
ART HERNANDEZ	000002292	11/05/20	110120	NOV 2020 INSURANCE SUBSIDY	$183.08
	1				**$183.08**
COLEEN L MONTELEONE	000002250	11/05/20	110120	NOV 2020 INSURANCE SUBSIDY	$245.00
	1				**$245.00**
DIANA LEACH	000002252	11/05/20	110120	NOV 2020 INSURANCE SUBSIDY	$271.06
	1				**$271.06**
JOHN CERNEK	000002263	11/05/20	110120	NOV 2020 INSURANCE SUBSIDY	$66.28
	1				**$66.28**
LORI MULLER	000002269	11/05/20	110120	NOV 2020 INSURANCE SUBSIDY	$98.56
	1				**$98.56**
PATTI REYNOLDS	000002271	11/05/20	110120	NOV 2020 INSURANCE SUBSIDY	$1.06
	1				**$1.06**
Total RETIREE CHECKS	**7**				**$963.87**
VARIOUS					
AMAZON BUSINESS	000002288	11/05/20	14V7-KDPF-RN6M	OFFICE SUPPLIES	$28.59

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AMAZON BUSINESS	000002288	11/05/20	1XDT-YWVM-RVXF	OFFICE SUPPLIES	$28.00
		11/05/20	1VGJ-FFWQ-JG41	OFFICE SUPPLIES	$28.00
	000002400	11/19/20	1NV6-RYLJ-7FXX	OFFICE SUPPLIES	$20.23
	REMIT0000000000009 48	11/12/20			$0.00
	3				**$104.82**
AT&T	000002289	11/05/20	9337NOV20	714-435-9337 NOVEMBER 2020	$2,487.36
	000002290	11/05/20	8315NOV20	714-241-8315 NOVEMBER 2020	$938.02
	000002306	11/12/20	000015542750	ACCT# 9391055284 OCTOBER 2020	$2,587.38
		11/12/20	000015543608	ACCT# 9391061444 OCTOBER 2020	$55.69
	000002348	11/12/20	8274OCT20	949-722-8274 OCTOBER 2020	$387.16
	000002349	11/12/20	8883NOV20	949-631-8883 NOVEMBER 2020	$368.73
	000002350	11/12/20	9024NOV20	339-264-9024 NOVEMBER 2020	$353.82
	000002351	11/12/20	0779NOV20	339-263-0779 NOVEMBER 2020	$1,597.31
	000002352	11/12/20	3044NOV20	949-574-3044 NOVEMBER 2020	$2,880.83
	000002353	11/12/20	3066NOV20	960-350-3066 NOVEMBER 2020	$4,871.55
	000002354	11/12/20	0926NOV20	949-650-0926 NOVEMBER 2020	$1,628.72
	10				**$18,156.57**
AUTOMATED GATE SERVICES INC.	000002359	11/19/20	200166	GATE REPAIR	$158.00
	1				**$158.00**
BEHRENS AND ASSOCIATES, INC.	000002308	11/12/20	1108478	SOUND PANEL RENTAL	$1,551.60
	1				**$1,551.60**
CAROLLO ENGINEERS	000002364	11/19/20	0191703	E400-0012 GIS HYDRAULIC MODL	$7,687.50
	1				**$7,687.50**
FEDERAL EXPRESS CORPORATION	000002316	11/12/20	7-165-72891	SHIPPING SERVICES	$122.44
	1				**$122.44**

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Vendor Name	Check #/Count	Payment Date	Invoice Number	Invoice Description	Payment Amount
GRAINGER	000002259	11/05/20	9698717775	SAFETY TOOLS & EQUIPMENT	$210.25
	000002370	11/19/20	9701774607	SAFETY TOOLS & EQUIPMENT	$81.25
	2				**$291.50**
HACH COMPANY	000002318	11/12/20	12185790	WATER QUALITY SUPPLIES	$659.23
	000002371	11/19/20	12187194	WATER QUALITY SUPPLIES	$99.30
	2				**$758.53**
HASHTAG PINPOINT	000002260	11/05/20	1331	STRATEGIC COMMUNICATIONS	$4,000.00
	1				**$4,000.00**
HUB AUTO SUPPLY	000002320	11/12/20	207875	AUTO SUPPLIES	$39.77
	1				**$39.77**
LEHR AUTO	000002325	11/12/20	SI53189	TRUCK PARTS & INSTALLATION	$1,654.47
	1				**$1,654.47**
LEWIS CONSULTING GROUP	000002267	11/05/20	2020-139	GOV'T RELATIONS SERVICES	$5,000.00
	1				**$5,000.00**
PRINTERS LITHO INC	000002296	11/05/20	34488	PROCLAMATION SHEETS	$1,346.88
	1				**$1,346.88**
SBE CONTRACTING/STOUT & BURG	000002387	11/19/20	001280	ELECTRICAL/IRRIGA TION REPAIR	$664.00
	1				**$664.00**
SHERWIN WILLIAMS COMPANY	000002275	11/05/20	3732-0	PAINTING SUPPLIES	$147.36
	1				**$147.36**
SOUTHERN CALIFORNIA GAS CO	000002331	11/12/20	05060829008OC T20	NATURAL GAS, WELL, 5 OCT 2020	$7,838.04
	1				**$7,838.04**
SPRYPOINT SERVICES INC	000002385	11/19/20	INV-0587	M21-100,M21-101 CONSULTING	$36,750.00
	1				**$36,750.00**
STIVERS & ASSOCIATES INC.	000002405	11/19/20	12-761	M20-105 GISLER PARKING PROJECT	$2,400.00
		11/19/20	12-770	M20-105 GISLER PARKING PROJECT	$491.00
	1				**$2,891.00**

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11/1/2020 - 11/30/2020

Vendor Name	Check #/Count	Payment Date	Invoice Number	Invoice Description	Payment Amount
TANGERINE PROMOTIONS, A DIVISION OF BAMKO LLC	000002388	11/19/20	65894	MESA WATER WEAR	$105.39
	1				**$105.39**
THE HOME DEPOT COMMERCIAL ACCT	000002319	11/12/20	1915OCT20	TOOLS & EQUIPMENT	$1,138.18
	1				**$1,138.18**
UNITED INTERIORS	000002335	11/12/20	5114	FURNITURE	$2,219.25
	1				**$2,219.25**
VALLEY POWER	000002280	11/05/20	B42996	WELL #5 ENGINE REPAIR	$3,005.61
	1				**$3,005.61**
VONAGE HOLDINGS CORPORATION	000002282	11/05/20	2023610	TELEPHONE SERVICES	$10,444.73
	1				**$10,444.73**
WHITTINGHAM PUBLIC AFFAIRS ADVISORS	000002284	11/05/20	000882	SCAQMD CONSULTING	$1,237.50
	1				**$1,237.50**
Total VARIOUS	**37**				**$107,313.14**
WATER SUPPLY					
AIRGAS USA LLC	000002246	11/05/20	9975178127	CYLINDER RENTAL	$162.45
	1				**$162.45**
AVISTA TECHNOLOGIES	000002360	11/19/20	91035	MWRF - ROCLEAN CLEANER	$2,787.32
	1				**$2,787.32**
BRAY SALES CALIFORNIA	000002291	11/05/20	220/90011240	SEAL KIT	$831.86
	1				**$831.86**
CULLIGAN OF SANTA ANA	000002313	11/12/20	1192510	SOFTENER REPAIR	$763.64
	1				**$763.64**
HILL BROTHERS CHEMICAL CO.	000002373	11/19/20	07076262	AMMONIA	$3,458.50
	1				**$3,458.50**
JCI JONES CHEMICAL CO.	000002323	11/12/20	1600.08	CAUSTIC SODA	$1,600.08
	000002375	11/19/20	837946	CAUSTIC SODA	$2,839.69
	2				**$4,439.77**
LINDE INC.	000002381	11/19/20	99241522	EQUIPMENT ANNUAL PROPERTY TAX	$588.72
	1				**$588.72**
MUNICIPAL WATER DISTRICT OF OC	000002327	11/12/20	10304	SEPT WTR DELIVERIES	$185.61

Payment Listing by Class

11/1/2020 - 11/30/2020

Vendor Name	Check #/Count	Payment Date	Invoice Number	Invoice Description	Payment Amount
	1				**$185.61**
OCWD	0157818	11/04/20	22145	GAP WATER SEPT. 2020	$101,595.30
	1				**$101,595.30**
PACIFIC STAR CHEMICAL DBA NORTHSTAR CHEMICAL	000002328	11/12/20	181231	SOD HYPO	$251.37
		11/12/20	180728	SOD HYPO	$2,285.14
		11/12/20	181630	SOD HYPO	$1,704.06
		11/12/20	181629	SOD HYPO	$1,414.61
		11/12/20	181230	SOD HYPO	$2,317.79
		11/12/20	181632	SOD HYPO	$2,176.33
		11/12/20	180729	SOD HYPO	$2,611.59
		11/12/20	181232	SOD HYPO	$1,958.69
	000002401	11/19/20	182209	SOD HYPO	$195.87
		11/19/20	182212	SOD HYPO	$4,470.18
		11/19/20	182213	SODIUM BISULFITE	$1,715.70
	2				**$21,101.33**
SEPARATION PROCESSES, INC	000002384	11/19/20	9950	SUPPORT SERVICES	$2,686.40
	1				**$2,686.40**
UNITED WATERWORKS INC.	000002336	11/12/20	S100091808.001	WATER OPS SUPPLIES	$5,296.81
		11/12/20	S100091824.001	WATER OPS SUPPLIES	$2,934.64
	1				**$8,231.45**
Total WATER SUPPLY	**14**				**$146,832.35**
WATER SYSTEM					
ALS TRUESDAIL LABORATORIES INC	000002300	11/05/20	522004224	WATER QUALITY TESTING	$11.00
		11/05/20	522004206	WATER QUALITY TESTING	$62.00
	000002406	11/19/20	522004530	WATER QUALITY TESTING	$51.00
		11/19/20	522004516	WATER QUALITY TESTING	$62.00
		11/19/20	522004443	WATER QUALITY TESTING	$11.00
		11/19/20	522004500	WATER QUALITY TESTING	$22.00
	2				**$219.00**

Payment Listing by Class
11/1/2020 - 11/30/2020

Vendor Name	Check #/Count	Payment Date	Invoice Number	Invoice Description	Payment Amount
ARMORCAST PRODUCTS CO	000002305	11/12/20	0210438-IN	METER BOXES AND LIDS	$13,125.76
	1				**$13,125.76**
BADGER METER INC.	000002307	11/12/20	1397631	M20-100 PROJECT MANGEMENT	$14,000.00
		11/12/20	1387571	METERS	$330.25
	1				**$14,330.25**
BATTERY MART INC	000002355	11/12/20	37280	BATTERIES	$389.79
		11/12/20	37249	BATTERIES	$360.00
	000002361	11/19/20	37302	BATTERIES	$124.77
	2				**$874.56**
DIG SAFE BOARD	000002253	11/05/20	DSB20196023	DIG SAFE BOARD FEES	$328.04
	1				**$328.04**
EXPRESS PIPE & SUPPLY CO. INC	000002256	11/05/20	S109486781.001	PIPE SUPPLIES	$187.31
	1				**$187.31**
IRVINE PIPE & SUPPLY	000002322	11/12/20	1005415	PIPE FITTINGS AND SUPPLIES	$18.27
	1				**$18.27**
LARRY'S BUILDING MATERIALS	000002324	11/12/20	CM-127621	M21-001FH PAVING MATERIALS	$186.68
	000002377	11/19/20	CM-127683	PAVING MATERIALS	$185.06
	2				**$371.74**
OMAR & SON'S TRUCKING	000002403	11/19/20	5429	DIRT HAULING	$808.00
	1				**$808.00**
PRAXAIR DISTRIBUTION, INC.	000002380	11/19/20	99637947	Receivings Transaction Entry	$130.06
	1				**$130.06**
S & J SUPPLY CO.	000002330	11/12/20	S100159211.003	PIPELINE MATERIALS	$234.47
	1				**$234.47**
UNDERGROUND SERVICE ALERT/SC	000002278	11/05/20	1020200435	UNDERGROUND DIG ALERT	$666.70
	1				**$666.70**
VULCAN MATERIALS	000002301	11/05/20	72745858	PAVING MATERIALS	$343.59
	000002338	11/12/20	72760037	PAVING MATERIALS	$166.06
		11/12/20	72751250	M21-001FH PAVING MATERIALS	$249.64
		11/12/20	72743931	M21-001MV PAVING MATERIALS	$382.38

Payment Listing by Class
11/1/2020 - 11/30/2020

Vendor Name	Check #/Count	Payment Date	Invoice Number	Invoice Description	Payment Amount
VULCAN MATERIALS	000002338	11/12/20	72760038	PAVING MATERIALS	$219.32
		11/12/20	72756373	M21-001FH PAVING MATERIALS	$100.51
	000002393	11/19/20	72766601	M21-001FH PAVING MATERIALS	$170.16
		11/19/20	72764378	M21-001FH PAVING MATERIALS	$133.29
	3				**$1,764.95**
WEST COAST SAND & GRAVEL	000002342	11/12/20	310896	FILL SAND	$458.07
	1				**$458.07**
Total WATER SYSTEM	**19**				**$33,517.18**
Total Payments (All)	**177**				**$1,280,215.67**

MEMORANDUM

Mesa Water DISTRICT®

Dedicated to Satisfying our Community's Water Needs

TO: Board of Directors
FROM: Marwan Khalifa, CPA, MBA, Chief Financial Officer
DATE: December 17, 2020
SUBJECT: Monthly Financial Reports

RECOMMENDATION

Receive and file the Monthly Financial Reports.

STRATEGIC PLAN

Goal #3: Be financially responsible and transparent.

PRIOR BOARD ACTION/DISCUSSION

None.

DISCUSSION

The attached Treasurer's status report reflects the performance of Mesa Water's cash and investment accounts.

The Treasurer's Status Report on Investments as of 11/30/20 will be provided at the December 17, 2020 meeting.

FINANCIAL IMPACT

None.

ATTACHMENTS

Attachment A: Monthly Treasurer's Status Report on Investments as of 10/31/20

Mesa Water District
Monthly Treasurer's Status Report on Investments
As of 10/31/2020

Investments are in compliance with the Investment Policy adopted as Resolution 1506 of the Mesa Water District Board of Directors. The liquidity of investments will meet cash flow needs for the next six months except under unforeseen catastrophic circumstances.

Investments	Maturity Date	Days to Maturity	YTM@Cost	Cost Value	% of Portfolio	Policy % Limit	Market Value
Local Agency Investment Fund (LAIF)	Liquid	1	0.62%	1,079.66	0.00%	No Limit	1,079.66
Orange County Investment Pool (OCIP)	Liquid	1	0.90%	2,810,881.25	7.87%	No Limit	2,810,881.25
Miscellaneous Cash (Petty, Emergency, etc.)	Liquid	1	0.00%	14,000.00	0.04%	N/A	14,000.00
US Bank Custody Account							
Negotiable Certificate of Deposit	Various	1,035	1.66%	10,362,000.00	30.00%	30.00%	10,714,226.17
US Agency Bonds	Various	1,124	1.13%	10,085,380.51	28.53%	No Limit	10,192,689.35
Sub Total / Average		1,078	1.40%	20,447,380.51			20,906,915.52
US Bank Custody Account	Liquid	1	0.01%	1,575,119.30	4.41%	No Limit	1,575,119.30
Union Bank Account	Liquid	1	0.45%	1,148,190.49	3.21%	No Limit	1,148,190.49
Pacific Premier Bank	Liquid	1	0.00%	9,267,940.51	25.94%	No Limit	9,267,940.51
Total / Average		**631**	**0.91%**	**$ 35,264,591.72**	**100.00%**		**$ 35,724,126.73**

PARS OPEB & Pension Trust	* Monthly Rate of Return	Cost Value	Market Value
Public Agency Retirement Services (PARS)			
Capital Appreciation HighMark PLUS Fund			
OPEB	-2.50%	1,437,903.42	1,618,005.23
Pension Trust	-2.56%	12,329,001.98	13,556,744.18
		$ 13,766,905.40	**$ 15,174,749.41**

Local Agency Investment Fund (LAIF)

LAIF includes funds designated for allocation of working capital cash to reserves, working capital cash and advances for construction. LAIF market value on Monthly Treasurer's Status Report on Investments for months between quarters is the dollar amount invested times the fair market value Fair Value factor of prior quarter end. The general ledger LAIF carrying value reflects market value (unrealized gains and losses) only at fiscal year end. LAIF provides the Fair Value factor as of March 31, June 30, September 30 and December 31 each year. LAIF market value on this report is based on the September 2020 Fair Value Factor of 1.004114534.

Orange County Treasurer's Investment Pool (OCIP)

The MY 2020 net asset value factor is estimated at 1.00, and the interest rate is the Monthly Net Yield.

Weighted Average Return

Mesa Water® Funds | 0.91%
Benchmark: 3 Month Treasury Bill - October 2020 | 0.10 %

Weighted Average Maturity

Years | 1.7
Days to Maturity | 631

PARS OPEB & Pension Trust Benchmark - S & P 500 Index

1 Month | -2.77 %

** PARS Monthly Rate of Return not available at reporting deadline | 2020 September Rates Published*

Mesa Water District
Transactions Summary
Monthly Treasurer's Status Report - Investment Activity
Group By: Action
Portfolio / Report Group: Report Group | Treasurer's Report
Begin Date: 09/30/2020, End Date: 10/31/2020

Description	CUSIP/Ticker	YTM @ Cost	Settlement Date	Maturity Date	Face Amount/Shares	Principal	Interest/Dividends	Total
Buy								
Farm Bureau Bank NV 0.25 7/9/2024	307660LK4	0.250	10/9/2020	7/9/2024	249,000.00	249,000.00	0.00	249,000.00
Sub Total / Average Buy					**249,000.00**	**249,000.00**	**0.00**	**249,000.00**

Mesa Water District
Date To Date
Monthly Interest | Received
Report Format: By Transaction
Group By: Asset Category
Portfolio / Report Group: Report Group | Treasurer's Report
Begin Date: 9/30/2020, End Date: 10/31/2020

Description	CUSIP/Ticker	Settlement Date	Maturity Date	Coupon Rate	Ending Face Amount/Shares	Interest/Dividends	Sell Accrued Interest
LAIF | Policy - No Limit							
	LGIP0012	6/30/2010	N/A	N/A	1,079.66	2.29	0.00
Sub Total/Average					**1,079.66**	**2.29**	**0.00**
Orange County LGIP - OCIP | Policy - No Limit							
	LGIP9LC	9/30/2011	N/A	N/A	2,810,881.25	2,779.69	0.00
Sub Total/Average					**2,810,881.25**	**2,779.69**	**0.00**
Miscellaneous Cash (Petty | Emergency)							
	CASH	6/30/2015	N/A	N/A	14,000.00	0.00	0.00
Sub Total/Average					**14,000.00**	**0.00**	**0.00**
Negotiable CD 30%							
First Technology CU CA 1.75 6/30/2021	33715LAD2	6/30/2016	6/30/2021	1.750	247,000.00	0.00	0.00
Wells Fargo SD 1.6 8/3/2021	9497486Z5	8/3/2016	8/3/2021	1.600	247,000.00	324.82	0.00
Privatebank and Trust IL 1.5 8/30/2021	74267GVM6	8/29/2016	8/30/2021	1.500	247,000.00	0.00	0.00
Mercantil Commerce Bank FL 1.65 9/28/2021	58733ADJ5	9/28/2016	9/28/2021	1.650	247,000.00	0.00	0.00
Countryside Federal CU NY 1.65 10/28/2021	22239MAL2	10/28/2016	10/28/2021	1.650	247,000.00	334.97	0.00
Beneficial Mutual Savings PA 1.55 11/16/2021	08173QBU9	11/16/2016	11/16/2021	1.550	247,000.00	0.00	0.00
Bank of Baroda 1.85 11/23/2021	06062QXG4	11/23/2016	11/23/2021	1.850	247,000.00	0.00	0.00
Business Bank MO 2 1/20/2022	12325EHH8	1/20/2017	1/20/2022	2.000	247,000.00	406.03	0.00
First National Bank MI 2 1/20/2022	32110YJT3	1/20/2017	1/20/2022	2.000	201,000.00	330.41	0.00
Franklin Synergy Bank TN 2 1/31/2022	35471TCV2	1/31/2017	1/31/2022	2.000	247,000.00	419.56	0.00
Synchrony Bank UT 2.3 2/24/2022	87165FPA6	2/24/2017	2/24/2022	2.300	247,000.00	0.00	0.00
Capital One Bank VA 2.3 3/1/2022	140420Y53	3/1/2017	3/1/2022	2.300	247,000.00	0.00	0.00
State Bank India NY 2.35 3/14/2022	8562846V1	3/14/2017	3/14/2022	2.350	247,000.00	0.00	0.00
Amercian Express 2.45 4/5/2022	02587DN38	4/5/2017	4/5/2022	2.450	247,000.00	3,034.04	0.00
Ally Bank UT 1.85 10/24/2022	02007GML4	10/24/2019	10/24/2022	1.850	247,000.00	2,291.01	0.00
Preferred Bank CA 0.25 7/17/2023	740367LV7	7/17/2020	7/17/2023	0.250	249,000.00	51.16	0.00
Merrick Bank UT 3 7/31/2023	59013J6G9	1/30/2019	7/31/2023	3.000	249,000.00	613.97	0.00
Enterprise Bank & Trust 1.75 11/8/2023	29367SJR6	11/8/2019	11/8/2023	1.750	249,000.00	358.15	0.00

Description	CUSIP/Ticker	Settlement Date	Maturity Date	Coupon Rate	Ending Face Amount/Shares	Interest/Dividends	Sell Accrued Interest
Raymond James Bank 1.75 11/8/2023	75472RAH4	11/8/2019	11/8/2023	1.750	247,000.00	0.00	0.00
Third Federal Savings 1.75 11/13/2023	88413QCJ5	11/12/2019	11/13/2023	1.750	247,000.00	0.00	0.00
Marlin Business Bank UT 1.7 12/4/2023	57116ATG3	12/2/2019	12/4/2023	1.700	249,000.00	347.92	0.00
Goldman Sachs NY 3.3 1/16/2024	38148P4E4	1/16/2019	1/16/2024	3.300	245,000.00	0.00	0.00
Bankwell Bank CT 0.35 1/30/2024	06654BCM1	7/30/2020	1/30/2024	0.350	249,000.00	0.00	0.00
Morgan Stanley UT 3.05 1/31/2024	61690UDV9	1/31/2019	1/31/2024	3.050	246,000.00	0.00	0.00
Morgan Stanley NY 3.05 1/31/2024	61760AVF3	1/31/2019	1/31/2024	3.050	246,000.00	0.00	0.00
Enerbank UT 1.15 4/29/2024	29278TNY2	4/29/2020	4/29/2024	1.150	249,000.00	235.36	0.00
First Freedom Bank 1.1 4/30/2024	32027BAM9	4/30/2020	4/30/2024	1.100	249,000.00	225.12	0.00
Capital One VA 2.65 5/22/2024	14042RLP4	5/22/2019	5/22/2024	2.650	246,000.00	0.00	0.00
Eaglebank MD 2.5 5/24/2024	27002YEN2	5/24/2019	5/24/2024	2.500	249,000.00	511.64	0.00
Farm Bureau Bank NV 0.25 7/9/2024	307660LK4	10/9/2020	7/9/2024	0.250	249,000.00	0.00	0.00
Sallie Mae Bank UT 1.9 10/16/2024	7954504P7	10/17/2019	10/16/2024	1.900	247,000.00	2,352.93	0.00
Celtic Bank UT 1.65 10/23/2024	15118RSV0	10/23/2019	10/23/2024	1.650	249,000.00	337.68	0.00
Garnett State Bank 1.7 11/19/2024	366526AW1	11/19/2019	11/19/2024	1.700	249,000.00	347.92	0.00
Citizens State Bank 1.7 11/22/2024	176688CR8	11/22/2019	11/22/2024	1.700	249,000.00	347.92	0.00
BMO Harris Bank IL 0.5 3/28/2025-20	05600XAY6	9/28/2020	3/28/2025	0.500	249,000.00	0.00	0.00
First Commercial Bank MS 0.3 3/31/2025	31984GFK0	9/30/2020	3/31/2025	0.300	249,000.00	61.40	0.00
Anchor D Bank OK 1.15 4/29/2025-20	033034AN9	4/29/2020	4/29/2025	1.150	249,000.00	235.36	0.00
Flagstar Bank MI 1.25 4/30/2025	33847E3A3	4/30/2020	4/30/2025	1.250	248,000.00	1,554.25	0.00
Apex Bank TN 0.95 5/8/2025	03753XBK5	5/8/2020	5/8/2025	0.950	249,000.00	194.42	0.00
Seattle Bank WA 0.75 6/2/2025-20	81258PKJ1	6/2/2020	6/2/2025	0.750	249,000.00	153.49	0.00
Medallion Bank UT 0.6 7/15/2025	58404DHM6	7/15/2020	7/15/2025	0.600	249,000.00	122.79	0.00
BMW Bank UT 0.5 9/25/2025	05580AXF6	9/25/2020	9/25/2025	0.500	249,000.00	0.00	0.00
Sub Total/Average					**10,362,000.00**	**15,192.32**	**0.00**
US Agency - No Limit							
FHLB 2 11/10/2021-18	3130A9S44	11/10/2016	11/10/2021	2.000	750,000.00	0.00	0.00
FNMA 1.875 4/5/2022	3135G0T45	3/23/2020	4/5/2022	1.875	500,000.00	4,687.50	0.00
FNMA 1.375 9/6/2022	3135G0W33	11/8/2019	9/6/2022	1.375	500,000.00	0.00	0.00
FHLB 3 12/9/2022	3130AFE78	1/9/2019	12/9/2022	3.000	1,000,000.00	0.00	0.00
FFCB 2.125 6/5/2023	3133EKPT7	11/8/2019	6/5/2023	2.125	500,000.00	0.00	0.00
FHLMC 0.375 7/14/2023-22	3134GV5F1	7/14/2020	7/14/2023	0.375	250,000.00	0.00	0.00
FHLMC 0.5 8/28/2023-21	3134GVXS2	5/28/2020	8/28/2023	0.500	249,000.00	0.00	0.00
FAMC 3.05 9/19/2023	3132X06C0	1/9/2019	9/19/2023	3.050	500,000.00	0.00	0.00
FFCB 0.25 9/21/2023-22	3133EMAM4	9/24/2020	9/21/2023	0.250	500,000.00	0.00	0.00
FHLMC 0.4 10/23/2023-21	3134GV6D5	7/23/2020	10/23/2023	0.400	250,000.00	0.00	0.00
FFCB 0.8 4/22/2024-21	3133ELXC3	4/22/2020	4/22/2024	0.800	750,000.00	3,000.00	0.00
FHLMC 0.5 5/20/2024-22	3134GVXR4	5/21/2020	5/20/2024	0.500	500,000.00	0.00	0.00

Description	CUSIP/Ticker	Settlement Date	Maturity Date	Coupon Rate	Ending Face Amount/Shares	Interest/Dividends	Sell Accrued Interest
FAMC 2.15 6/5/2024	31422BGA2	11/8/2019	6/5/2024	2.150	500,000.00	0.00	0.00
FHLMC 0.45 7/8/2024-22	3134GV4S4	7/13/2020	7/8/2024	0.450	750,000.00	0.00	0.00
FHLMC 0.35 9/30/2024-22	3134GWVM5	9/30/2020	9/30/2024	0.350	250,000.00	0.00	0.00
FFCB 1.3 3/24/2025-21	3130AJF95	3/24/2020	3/24/2025	1.300	750,000.00	0.00	0.00
Baycoast Bank MA 0.9 3/31/2025	072727BG4	3/31/2020	3/31/2025	0.900	248,000.00	0.00	0.00
FHLMC 0.85 4/29/2025-21	3134GVPK8	5/1/2020	4/29/2025	0.850	500,000.00	2,125.00	0.00
FHLMC 0.7 5/13/2025-21	3134GVSY5	5/13/2020	5/13/2025	0.700	500,000.00	0.00	0.00
FHLMC 0.4 9/30/2025-21	3134GWVP8	9/30/2020	9/30/2025	0.400	250,000.00	0.00	0.00
Sub Total/Average					**9,997,000.00**	**9,812.50**	**0.00**
US Bank Custody | Policy 50%							
	MM65000	7/31/2020	N/A	N/A	1,575,119.30	8.90	0.00
Sub Total/Average					**1,575,119.30**	**8.90**	**0.00**
Union Bank Accounts | Policy - No Limit							
	MM2110	11/30/2013	N/A	N/A	1,148,190.49	0.00	0.00
Sub Total/Average					**1,148,190.49**	**0.00**	**0.00**
Pacific Premier Bank | Policy - n/a							
	CASH0831	5/28/2020	N/A	N/A	9,267,940.51	0.00	0.00
Sub Total/Average					**9,267,940.51**	**0.00**	**0.00**
Total / Average					**35,176,211.21**	**27,795.70**	**0.00**

Mesa Water District
Portfolio Holdings
Investment Report | PARS Trust
Report Format: By CUSIP / Ticker
Group By: Portfolio Name
Average By: Market Value
Portfolio / Report Group: PARS OPEB Trust
As of 10/31/2020

Description	CUSIP/Ticker	Security Type	Face Amount/Shares	Cost Value	Market Value
PARS OPEB Trust					
Columbia Contrarian Fund	19766M709	Mutual Fund	4,701.47	112,759.51	134,038.26
DFA Large Cap	233203868	Mutual Fund	3,404.78	70,495.70	71,159.59
Dodge & Cox International	256206103	Mutual Fund	1,318.11	49,435.61	46,014.60
Dodge & Cox Stock Fund	256219106	Mutual Fund	605.96	104,469.84	98,978.31
Doubeline Core Fix Income	258620301	Mutual Fund	9,994.84	109,751.02	111,542.24
Harbor Capital Appreciation	411512528	Mutual Fund	690.31	48,438.49	68,471.96
Hartford Schroders	41665X859	Mutual Fund	6,311.99	97,107.29	108,818.86
iShares Russell Mid Cap	464287499	Mutual Fund	1,412.00	23,002.72	81,543.00
iShares SP500	464287408	Mutual Fund	365.00	45,365.99	40,292.35
MFS International	552746356	Mutual Fund	1,223.79	35,771.99	45,292.26
PGIM Total Return Bond	74440B884	Mutual Fund	7,567.95	110,824.77	111,475.12
Pimco Total Return Fund	693390700	Mutual Fund	10,290.67	107,874.73	111,756.63
Price T Rowe Growth	741479406	Mutual Fund	799.40	50,470.74	69,948.03
Undiscovered	904504479	Mutual Fund	1,259.04	71,958.41	61,781.34
US Bank PARS - OPEB Trust MM	MM4900	Money Market	15,623.40	15,623.40	15,623.40
Vanguard Growth & Income	921913208	Mutual Fund	3,546.12	256,256.69	305,286.66
Vanguard Real Estate	922908553	Mutual Fund	242.00	20,413.20	18,534.78
Vanguard Short Term	922031836	Mutual Fund	5,291.71	56,762.36	58,049.92
Victory RS	92647Q363	Mutual Fund	642.76	51,120.96	59,397.92
Sub Total / Average PARS OPEB Trust			**75,291.30**	**1,437,903.42**	**1,618,005.23**
Total / Average			**75,291.30**	**1,437,903.42**	**1,618,005.23**

Mesa Water District
Portfolio Holdings
Investment Report | PARS Trust
Report Format: By CUSIP / Ticker
Group By: Portfolio Name
Average By: Market Value
Portfolio / Report Group: PARS Pension Trust
As of 10/31/2020

Description	CUSIP/Ticker	Security Type	Face Amount/Shares	Cost Value	Market Value
PARS Pension Trust					
Columbia Contrarian Fund	19766M709	Mutual Fund	39,585.26	1,014,499.98	1,128,575.47
DFA Large Cap	233203868	Mutual Fund	28,666.85	597,222.34	599,137.17
Dodge & Cox International	256206103	Mutual Fund	11,099.84	462,455.28	387,495.25
Dodge & Cox Stock Fund	256219106	Mutual Fund	5,102.11	948,448.49	833,377.17
Doubeline Core Fix Income	258620301	Mutual Fund	84,152.75	920,088.47	939,144.43
Harbor Capital Appreciation	411512528	Mutual Fund	5,812.41	423,568.90	576,533.24
Hartford Schroders	41665X859	Mutual Fund	53,151.30	817,183.64	916,328.56
iShares Russell Mid Cap	464287499	Mutual Fund	11,881.00	98,626.03	686,127.75
iShares SP500	464287408	Mutual Fund	3,066.00	387,130.53	338,455.74
MFS International	552746356	Mutual Fund	10,303.79	341,881.46	381,343.46
PGIM Total Return Bond	74440B884	Mutual Fund	63,553.13	924,957.73	936,137.88
Pimco Total Return Fund	693390700	Mutual Fund	86,462.52	895,493.14	938,982.91
Price T Rowe Growth	741479406	Mutual Fund	6,730.95	449,991.32	588,958.98
Undiscovered	904504479	Mutual Fund	10,603.35	626,416.20	520,305.97
US Bank PARS - Pension Trust MM	MM4901	Money Market	71,438.74	71,438.74	71,438.74
Vanguard Growth & Income	921913208	Mutual Fund	29,858.35	2,284,357.63	2,570,505.25
Vanguard Real Estate	922908553	Mutual Fund	2,033.00	164,640.99	155,707.47
Vanguard Short Term	922031836	Mutual Fund	44,483.59	476,208.02	487,984.77
Victory RS	92647Q363	Mutual Fund	5,412.86	424,393.09	500,203.97
Sub Total / Average PARS Pension Trust			**573,397.80**	**12,329,001.98**	**13,556,744.18**
Total / Average			**573,397.80**	**12,329,001.98**	**13,556,744.18**

Mesa Water District
Transactions Summary
PARS Monthly Treasurer's Status Report - Investment Activity
Group By: Action
Portfolio / Report Group: PARS OPEB Trust
Begin Date: 09/30/2020, End Date: 10/31/2020

Description	CUSIP/Ticker	YTM @ Cost	Settlement Date	Maturity Date	Face Amount/Shares	Principal	Interest/Dividends	Total
Buy								
Columbia Contrarian Fund	19766M709	0.000	10/2/2020	N/A	153.14	4,483.88	0.00	4,483.88
Hartford Schroders	41665X859	0.000	10/6/2020	N/A	553.88	9,465.82	0.00	9,465.82
Vanguard Growth & Income	921913208	0.000	10/6/2020	N/A	108.49	9,589.38	0.00	9,589.38
Undiscovered	904504479	0.000	10/6/2020	N/A	104.36	5,043.78	0.00	5,043.78
Dodge & Cox Stock Fund	256219106	0.000	10/6/2020	N/A	5.23	878.57	0.00	878.57
Dodge & Cox International	256206103	0.000	10/6/2020	N/A	34.06	1,237.37	0.00	1,237.37
Price T Rowe Growth	741479406	0.000	10/6/2020	N/A	32.91	2,954.19	0.00	2,954.19
Vanguard Short Term	922031836	0.000	10/6/2020	N/A	2,151.90	23,627.85	0.00	23,627.85
Victory RS	92647Q363	0.000	10/6/2020	N/A	45.08	4,266.77	0.00	4,266.77
Harbor Capital Appreciation	411512528	0.000	10/6/2020	N/A	28.24	2,935.49	0.00	2,935.49
Pimco Total Return Fund	693390700	0.000	10/31/2020	N/A	21.50	233.47	0.00	233.47
PGIM Total Return Bond	74440B884	0.000	10/31/2020	N/A	19.69	290.05	0.00	290.05
Vanguard Short Term	922031836	0.000	10/31/2020	N/A	8.37	91.80	0.00	91.80
Sub Total / Average Buy					**3,266.85**	**65,098.42**	**0.00**	**65,098.42**
Dividend								
DFA Large Cap	233203868	0.000	10/31/2020	N/A	0.00	0.00	389.16	389.16
Pimco Total Return Fund	693390700	0.000	10/31/2020	N/A	0.00	0.00	233.47	233.47
PGIM Total Return Bond	74440B884	0.000	10/31/2020	N/A	0.00	0.00	290.05	290.05
Vanguard Short Term	922031836	0.000	10/31/2020	N/A	0.00	0.00	91.80	91.80
Doubeline Core Fix Income	258620301	0.000	10/31/2020	N/A	0.00	0.00	291.57	291.57
Sub Total / Average Dividend					**0.00**	**0.00**	**1,296.05**	**1,296.05**
Interest								
US Bank PARS - OPEB Trust MM	MM4900	0.000	10/31/2020	N/A	0.00	0.00	2.85	2.85
Sub Total / Average Interest					**0.00**	**0.00**	**2.85**	**2.85**
Sell								
iShares SP500	464287408	0.000	10/5/2020	N/A	6.00	686.59	0.00	686.59
Vanguard Real Estate	922908553	0.000	10/5/2020	N/A	9.00	739.91	0.00	739.91
iShares Russell Mid Cap	464287499	0.000	10/5/2020	N/A	69.00	4,083.66	0.00	4,083.66
DFA Large Cap	233203868	0.000	10/6/2020	N/A	4.70	102.90	0.00	102.90
Pimco Total Return Fund	693390700	0.000	10/6/2020	N/A	338.14	3,692.52	0.00	3,692.52

Description	CUSIP/Ticker	YTM @ Cost	Settlement Date	Maturity Date	Face Amount/Shares	Principal	Interest/Dividends	Total
PGIM Total Return Bond	74440B884	0.000	10/6/2020	N/A	217.09	3,223.71	0.00	3,223.71
MFS International	552746356	0.000	10/6/2020	N/A	10.40	402.77	0.00	402.77
Doubeline Core Fix Income	258620301	0.000	10/6/2020	N/A	312.07	3,504.51	0.00	3,504.51
Sub Total / Average Sell					**966.40**	**16,436.57**	**0.00**	**16,436.57**

Mesa Water District
Transactions Summary
PARS Monthly Treasurer's Status Report - Investment Activity
Group By: Action
Portfolio / Report Group: PARS Pension Trust
Begin Date: 09/30/2020, End Date: 10/31/2020

Description	CUSIP/Ticker	YTM @ Cost	Settlement Date	Maturity Date	Face Amount/Shares	Principal	Interest/Dividends	Total
Buy								
Hartford Schroders	41665X859	0.000	10/6/2020	N/A	4,199.01	71,761.05	0.00	71,761.05
Vanguard Growth & Income	921913208	0.000	10/6/2020	N/A	605.41	53,512.03	0.00	53,512.03
Undiscovered	904504479	0.000	10/6/2020	N/A	784.70	37,924.50	0.00	37,924.50
Dodge & Cox Stock Fund	256219106	0.000	10/6/2020	N/A	27.16	4,561.66	0.00	4,561.66
Columbia Contrarian Fund	19766M709	0.000	10/6/2020	N/A	880.99	25,795.39	0.00	25,795.39
Dodge & Cox International	256206103	0.000	10/6/2020	N/A	183.51	6,666.75	0.00	6,666.75
Price T Rowe Growth	741479406	0.000	10/6/2020	N/A	205.36	18,434.96	0.00	18,434.96
Vanguard Short Term	922031836	0.000	10/6/2020	N/A	17,871.60	196,230.16	0.00	196,230.16
Victory RS	92647Q363	0.000	10/6/2020	N/A	341.64	32,336.36	0.00	32,336.36
Harbor Capital Appreciation	411512528	0.000	10/6/2020	N/A	175.82	18,276.00	0.00	18,276.00
Sub Total / Average Buy					**25,275.20**	**465,498.86**	**0.00**	**465,498.86**
Dividend								
DFA Large Cap	233203868	0.000	10/1/2020	N/A	0.00	0.00	3,308.09	3,308.09
Doubeline Core Fix Income	258620301	0.000	10/1/2020	N/A	0.00	0.00	2,482.32	2,482.32
Pimco Total Return Fund	693390700	0.000	10/31/2020	N/A	0.00	0.00	1,969.31	1,969.31
PGIM Total Return Bond	74440B884	0.000	10/31/2020	N/A	0.00	0.00	2,446.85	2,446.85
Vanguard Short Term	922031836	0.000	10/31/2020	N/A	0.00	0.00	773.74	773.74
Sub Total / Average Dividend					**0.00**	**0.00**	**10,980.31**	**10,980.31**
Interest								
US Bank PARS - Pension Trust MM	MM4901	0.000	10/1/2020	N/A	0.00	0.00	17.27	17.27
Sub Total / Average Interest					**0.00**	**0.00**	**17.27**	**17.27**
Sell								
iShares SP500	464287408	0.000	10/5/2020	N/A	94.00	10,762.29	0.00	10,762.29
Vanguard Real Estate	922908553	0.000	10/5/2020	N/A	106.00	8,713.03	0.00	8,713.03
iShares Russell Mid Cap	464287499	0.000	10/5/2020	N/A	732.00	43,334.90	0.00	43,334.90
DFA Large Cap	233203868	0.000	10/6/2020	N/A	315.87	6,914.42	0.00	6,914.42
Pimco Total Return Fund	693390700	0.000	10/6/2020	N/A	3,681.32	40,200.05	0.00	40,200.05
PGIM Total Return Bond	74440B884	0.000	10/6/2020	N/A	2,402.09	35,671.09	0.00	35,671.09
MFS International	552746356	0.000	10/6/2020	N/A	195.29	7,561.63	0.00	7,561.63
Doubeline Core Fix Income	258620301	0.000	10/6/2020	N/A	3,595.78	40,380.58	0.00	40,380.58
Sub Total / Average Sell					**11,122.35**	**193,537.99**	**0.00**	**193,537.99**

MesaWater DISTRICT

MONTHLY COMMITTEE

Major Staff Projects

Title	Comments	Status
Human Resource Information System/Payroll System	Human Resource Information System/Payroll System	In Process
Invoice Cloud	Invoice Cloud (New Billing System)	In Process

MEMORANDUM

Dedicated to Satisfying our Community's Water Needs

TO: Board of Directors
FROM: Stacy Taylor, Water Policy Manager
DATE: December 17, 2020
SUBJECT: State Advocacy Update

RECOMMENDATION

Receive and file the State Advocacy Update.

STRATEGIC PLAN

Goal #7: Actively participate in regional water issues.

PRIOR BOARD ACTION/DISCUSSION

This item is provided at the monthly Board of Directors Committee meeting.

DISCUSSION

An updated State Advocacy report will be provided at the December 17, 2020 meeting.

FINANCIAL IMPACT

In Fiscal Year 2021, $175,000 is budgeted for Support Services; $82,145 has been spent to date.

ATTACHMENTS

None.

Mesa Water DISTRICT®

Dedicated to Satisfying our Community's Water Needs

MEMORANDUM

TO: Board of Directors
FROM: Stacy Taylor, Water Policy Manager
DATE: December 17, 2020
SUBJECT: Orange County Update

RECOMMENDATION

Receive and file the Orange County Update.

STRATEGIC PLAN

Goal #7: Actively participate in regional water issues.

PRIOR BOARD ACTION/DISCUSSION

This item is provided at the monthly Board of Directors Committee meeting.

DISCUSSION

Mesa Water District's (Mesa Water®) government relations program includes monitoring local and regional political issues and policy-setting authorities (i.e., County of Orange, Orange County Local Agency Formation Commission, etc.). An updated Orange County report will be provided at the December 17, 2020 meeting.

FINANCIAL IMPACT

In Fiscal Year 2021, $175,000 is budgeted for Support Services; $82,145 has been spent to date.

ATTACHMENTS

None.

MesaWater DISTRICT

Dedicated to Satisfying our Community's Water Needs

MEMORANDUM

TO: Board of Directors
FROM: Celeste Carrillo, Public Affairs Coordinator
DATE: December 17, 2020
SUBJECT: Outreach Update

RECOMMENDATION

Receive and file the Outreach Update.

STRATEGIC PLAN

Goal #4: Increase public awareness about Mesa Water® and about water.
Goal #6: Provide outstanding customer service.
Goal #7: Actively participate in regional water issues.

PRIOR BOARD ACTION/DISCUSSION

This item is provided at the monthly Board of Directors Committee meeting.

DISCUSSION

Mesa Water District's (Mesa Water®) outreach program aims to connect Mesa Water with its constituents in order to achieve Goal #4 of the Board of Directors' (Board) Strategic Plan. Outreach activities are also designed to achieve the Strategic Plan goals related to customer service and/or regional water issues involvement by educating and informing the District's constituents about Mesa Water, water issues, and water in general. Mesa Water's constituents include external audiences, such as customers, community members, elected officials, industry colleagues, media, water districts and special districts – as well as internal audiences, such as staff, retirees and Board members.

Upcoming Fiscal Year 2021 Events

No Upcoming Events

The benefits of Mesa Water's outreach program include:

- Informing constituents about Southern California's perpetual drought, the historical drought facing California, and the importance of developing local and cost-effective sources of safe, reliable water for Mesa Water's service area and the region at large;
- Educating constituents about the importance of water and water stewardship, in order to sustain Southern California's population, quality of life, business, and economy;
- Educating constituents about Mesa Water's stewardship of ratepayer funds and financial responsibility to fund, invest in, and save for the current and future provision of safe and reliable water for the District's service area;
- Informing constituents of the District's infrastructure improvements to ensure water quality and water reliability for its service area;

- Learning from constituents and evolving as a well-informed Board of Directors;
- Promoting water use efficiency to Mesa Water's customers and community members to help them save water, money, and the environment;
- Ensuring, for public health and safety reasons, that Mesa Water customers and community members identify the District as their water provider and as the source of information about water in emergency situations;
- Supporting Mesa Water's service area as an actively involved participant in programs that provide added value and benefits to the community;
- Informing the media of Mesa Water's activities that benefit the District's customers and community;
- Empowering Mesa Water's Board and staff with information that will help them provide the best possible service to the District's customers and community members; and,
- Strengthening Mesa Water's industry relations to provide opportunities for improving the District's business and operations -- including the areas of financial and human resources strength, infrastructure and technological innovation, and setting/supporting policies that have a positive impact on Mesa Water's service area -- so that the District can continue to provide safe, high-quality, reliable, and affordable water to its customers.

FINANCIAL IMPACT

In Fiscal Year 2021, $595,330 is budgeted for the District's Public Affairs department expenses; $263,585 has been spent to date.

ATTACHMENTS

None.

Mesa Water District

Dedicated to Satisfying our Community's Water Needs

MEMORANDUM

TO: Board of Directors
FROM: Tracy E. Manning, Water Operations Manager
DATE: December 17, 2020
SUBJECT: Programmable Logic Controller Upgrades

RECOMMENDATION

Approve a contract with Prime Systems for $118,035 and a 10% contingency for an amount not to exceed $129,838 to furnish, install, and integrate new programmable logic controllers and power supplies at the 19 remote sites, and authorize execution of the contract.

STRATEGIC PLAN

Goal #1: Provide a safe, abundant, and reliable water supply.
Goal #2: Practice perpetual infrastructure renewal and improvement.

PRIOR BOARD ACTION/DISCUSSION

At its June 8, 2017 meeting, the Board of Directors (Board) awarded a contract for a period of five years with two one-year renewable options with an average annual amount of $92,775 to Prime Systems Industrial Automation, Inc. to provide maintenance and support of the Supervisory Control and Data Acquisition System (SCADA).

At its October 11, 2018 meeting, the Board awarded a contract to TJC and Associates, Inc. in the amount of $70,050 and a contingency of $15,000 for an amount not to exceed $85,050 to provide a Programmable Logic Controllers and Supervisory Computer System Assessment.

At its February 14, 2019 meeting, the Board awarded a contract to Prime Systems Industrial Automation, Inc. (Prime Systems) for $199,200 and a 10% contingency for an amount not to exceed $219,120 to furnish, install, and integrate new programmable logic controllers at the Mesa Water Reliability Facility.

At its June 18, 2019 meeting, the Board received a Programmable Logic Controllers and Supervisory Computer System Assessment presentation.

BACKGROUND

Programmable Logic Controllers (PLCs) are industrial computers designed and adapted for the control of automated processes. Mesa Water District (Mesa Water®) uses PLCs throughout its water supply facilities. This equipment allows for both facility automation and real time adjustments and response to the water supply system by Operators, ensuring a safe and reliable water supply to the rate payers.

In 2018, TJC and Associates, Inc. (TJC) was retained to perform a District-wide assessment of Mesa Water's PLCs and supervisory control systems. The report included an inventory of all PLC and supervisory control equipment, life cycle status for each, and short-term and long-term replacement recommendations. Staff have been planning for replacements based on this projected schedule.

There are 19 remote sites consisting of clear wells, reservoirs, imported water turnouts, Santa Ana Station, and pressure monitoring stations with Rockwell Automation CompactLogix 1769-L35E PLCs that were identified within the study as being in the “active mature” stage in the lifecycle with the expectation that they would move to “end-of-life” stage and then the “discontinued” stage within five to seven years.

Earlier this year, the manufacturer identified this model PLC as end-of-life and announced it will be discontinued on December 19, 2020. The in-service PLCs are currently functional and Mesa Water owns one spare of this model. The replacement model recommended by both TJC and Prime Systems is the Rockwell Automation L33ER CompactLogix controller, which is already in use in other locations within the system.

DISCUSSION

Staff requested a proposal from Prime Systems to furnish, install, and integrate the replacement PLCs and power supplies. Single power supplies are to be replaced with redundant power supplies and programmed with an alarm notification to the operator in the event of a power supply failure. The proposal also adds an alarm notification for power supply failure.

As Mesa Water’s SCADA integrator, Prime Systems is familiar with the existing PLCs installed at each site. Prime Systems was competitively selected in 2017 to provide SCADA maintenance and support. Staff recommends that the Board approve a contract with Prime Systems for $118,035 and a 10% contingency for an amount not to exceed $129,838 to furnish, install, and integrate new programmable logic controllers and power supplies at the 19 remote sites, and authorize execution of the contract.

FINANCIAL IMPACT

Funds for this project will come from the Capital Improvement Renewal Program budget.

ATTACHMENTS

Attachment A: Prime Systems Industrial Automation, Inc. Quotation for Distribution PLC Upgrades

Prime Systems
Industrial Automation, Inc.

November 29, 2020 | Letter: 2020-11 Distribution PLC Upgrades v1.docx

Tracy Manning
Mesa Water District
1965 Placentia Avenue
P.O. Box 5008
Costa Mesa, CA 92628-5008

Phone: 949-574-1000
Direct: 949-207-5468
E-Mail: tracym@mesawater.org

Subject: **Mesa Water District**
Distribution System PLC & Power Supply Upgrades
Revision 1 – Breakout Material and Labor Costs

Tracy,

Thank you for this opportunity for *Prime Systems Industrial Automation, Inc.* to present the following quotation for the Distribution System PLC & Power Supply Upgrades.

Prime Systems Industrial Automation, Inc. prides itself on being responsive to our customer's needs. With no formal marketing or sales force, Prime Systems relies completely on customer repeat business and "word of mouth" recommendations. With this marketing strategy, we have continued to grow our customer base and support our existing customers with the high-quality work standards they have come to expect from our professional services.

Prime Systems Industrial Automation, Inc. has a proven track record for many installed PLC based control systems, similar to your systems. If there is any interest in seeing one of these installations, or contacting a current client, please let us know.

We appreciate the opportunity to support you in your Control System and Automation needs and we look forward to demonstrating our reputation for quality work done in a timely manner. If there is anything we can do to assist you, please don't hesitate to contact me at our office.

Sincerely,

Marc Smith
President
Prime Systems Industrial Automation, Inc.

Scope of Work:
This quotation is submitted to summarize the cost associated with the Distribution System PLC & Power Supply Upgrades.

The Allen Bradley CompactLogix (P/N: 1769-L35E) PLCs installed at the nineteen (19) remote Distribution Sites are currently categorized as “End of Life” by Allen Bradley with a “Discontinuation” date of December 19, 2020. After December 19, 2020 replacement L35E PLCs will no longer be available from the Manufacturer.

The Scope of Work for this quotation is to replace the nineteen Allen Bradley 1769-L35E PLCs with the current version 1769-L33ER. In addition, the corresponding PLC Power Supply will be replaced. The new 1769-L33ER uses the same I/O Modules and therefore the PLC upgrade will require no I/O rewiring.

The Distribution System PLC Panel Idec 24VDC power supplies have exceeded the manufacturers recommended run time of 70,000 hours. As part of the PLC Upgrades, the Idec 24 Vdc Power Supplies with be replaced with redundant 24VDC power supplies. The Redundant Module provides 24 Vdc “OK” status hat will be wired to the PLC Discrete Input module for a power supply failure alarm to alert the Operators when there is a 24 Vdc Power Supply problem.

The Distribution System PLC and Power Supply upgrade consists of the following tasks at each of the nineteen (19) remote sites:

1. Purchase and install the PLCs and PLC power supplies
2. Purchase and install the redundant 24VDC power supplies to replace the 24VDC power supply
3. Program new PLCs
4. Wonderware System Platform SCADA System Programming and Testing
5. On-Site Program Testing, Startup, and Commissioning
    a. PLC Program Installation and Checkout
    b. I/O Checkout
    c. SCADA Programming Checkout
    d. Remote Alarm Notification Checkout

In addition to the nineteen (19) PLC and Power Supply upgrades, this quotation includes the procurement of two (2) sets of spare PLC and Power Supply hardware. These spares consist of the following parts:

1. Two (2) Each - Allen Bradley 1769-L33ER PLC
2. Two (2) Each - Allen Bradley 1769-PB4 PLC Power Supply
3. Four (4) Each - Puls 24 Vdc, 10 Amp Power Supply
4. Two (2) Each – Puls 24 Vdc 20 Amp Redundancy Module

1. **Control Panel Hardware……………………………………………………………………..$81,030**

   Prime Systems Industrial Automation, Inc. will procure the Control Panel hardware necessary for the PLC and Power Supply upgrades at the nineteen (19) remote sites. Each set of Control Panel hardware consists of the following hardware:

   a. One (1) Each - Allen Bradley 1769-L33ER PLC
   b. One (1) Each - Allen Bradley 1769-PB4 PLC Power Supply
   c. Two (2) Each - Puls 24 Vdc, 10 Amp Power Supply
   d. One (1) Each – Puls 24 Vdc 20 Amp Redundancy Module
   e. One (1) Each – Miscellaneous Installation Hardware

2. **Spare Control Panel Hardware…..…………………………………………………………..$8,405**

   Prime Systems Industrial Automation, Inc. will procure two (2) sets of Spare Control Panel Hardware. The Spare Control Panel Hardware will be turned over to Mesa Water District for storage. The Spare Hardware will consist of the following hardware:

   a. Two (2) Each - Allen Bradley 1769-L33ER PLC
   b. Two (2) Each - Allen Bradley 1769-PB4 PLC Power Supply
   c. Four (4) Each - Puls 24 Vdc, 10 Amp Power Supply
   d. Two (2) Each – Puls 24 Vdc 20 Amp Redundancy Module

3. **Programming and Installation Labor…………..………………………………………..$28,600**

   Prime Systems Industrial Automation, Inc. will provide the required PLC Programming upgrade for each of the nineteen (19) remote Distribution Sites. In addition, this task includes the PLC, PLC Power Supply, Redundant 24 Vdc Power Supplies, and Redundancy Module installation and wiring. At the conclusion of the installation, the new Power Supply "OK" signal will be wired to an existing Discrete Input point. The Wonderware System Platform SCADA programming will be modified to add the new Power Supply Fault Alarm.

The project cost is quoted as a Fixed Fee: $118,035

All invoices are due and payable on net 30-day terms. Invoices will be generated monthly.

Prime Systems Industrial Automation, Inc. billing rates are as follows:

➢ In-office Labor	$184/hour
➢ Out-of-office Labor (4-hour minimum)	$184/hour
➢ Overtime/After-Hours/Saturday/Sundays/Holidays	1.5 Times Standard Rates
➢ Travel Time	Travel time is billed at the rates above
➢ Travel Mileage	Current IRS business mileage travel rate

Billing rates are based on Net 30 Day payment terms.

Terms and Conditions:

1. This quotation does not include Drawings and/or Drawing modification.
2. This quotation does not include any modifications and/or upgrades to the three (3) Data Concentrator Sites, Reservoir #1 (DC1), Reservoir #2 (DC2), and MWRF (DC3).
3. This quotation does not include any modifications to the Radios and/or Radio Systems.
4. This quotation consists of work specifically detailed in the Scope of Work above. Any work/tasks not specifically detailed in the Scope of Work above is not included in this quotation.
5. This quotation is based on payment of all invoices in full within the Net 30 Day payment terms. No payment retention is acceptable on these invoices. If alternate payment terms are required, a new quote will be provided.
6. This quotation assumes that all work will be done during normal work hours (no weekend, holidays, or after hours).
7. Any clarifications, modifications and/or additions to the Scope of Work as detailed in the above referenced documents will be evaluated for cost impact. Additional effort will be quoted separately and must be approved prior to *Prime Systems Industrial Automation, Inc.* commencing work.
8. *Prime Systems Industrial Automation, Inc.* standard work hours are Monday – Friday 8:00 AM – 5:00 PM. Any work outside these standard work hours is considered overtime/after-hours/weekend/holiday and is billed at the appropriate rate as identified above.

I hope this quotation is responsive to your needs and I look forward to demonstrating our reputation for quality work done in a timely manner. We appreciate the opportunity to work with you on this project and to support you in your automation and control system needs. If you have any questions, please don't hesitate to call me at our office, 951-656-7139.

Sincerely,

Marc Smith
President
Prime Systems Industrial Automation, Inc.

MesaWater DISTRICT®

Dedicated to Satisfying our Community's Water Needs

MEMORANDUM

TO: Board of Directors
FROM: Stacy Taylor, Water Policy Manager
DATE: December 17, 2020
SUBJECT: Legislative Platforms

RECOMMENDATION

Approve the proposed 2021 Legislative Platforms.

STRATEGIC PLAN

Goal #1: Provide a safe, abundant, and reliable water supply.
Goal #2: Practice perpetual infrastructure renewal and improvement.
Goal #3: Be financially responsible and transparent.
Goal #4: Increase public awareness about Mesa Water® and about water.
Goal #5: Attract and retain skilled employees.
Goal #6: Provide outstanding customer service.
Goal #7: Actively participate in regional water issues.

PRIOR BOARD ACTION/DISCUSSION

This item is updated annually by Mesa Water District's (Mesa Water®) Board of Directors (Board).

DISCUSSION

Mesa Water's legislative platforms establish a philosophical basis for policy principles and policy positions, agreed upon by the Board, to assist staff and advocacy consultants in monitoring, identifying, evaluating, and prioritizing legislation, administrative actions, and regulations that can impact Mesa Water and the interests of our constituents.

Mesa Water continues to engage with state legislative, administrative, regulatory and industry groups -- such as the Association of California Water Agencies, California Municipal Utilities Association, California Special Districts Association, State Water Resources Control Board, and others -- as well as with regional and local governmental organizations and industry associations, to develop opportunities for beneficially influencing water policy and related issues.

Mesa Water's proposed 2021 legislative platforms (see Attachment A) establish advocacy guidelines that allow timely response to certain types of legislative, administrative, and regulatory actions that are relevant to our operations including, but not necessarily limited to:

- water resources public policy;
- water quality and treatment mandates;
- local governance/transparency issues;
- infrastructure funding and fiscal policies;
- water rate structures and conservation/water use efficiency; and,
- water source development via desalination, potable reuse, recycled water, etc. to create new local water supplies.

Any policy issues with complex implications requiring further clarification will be presented to the Board for guidance. The legislative platforms relate to all seven of Mesa Water's strategic plan goals and can be updated on an as-needed basis and, minimally, annually.

FINANCIAL IMPACT

None.

ATTACHMENTS

Attachment A: Proposed Draft 2021 Legislative Platforms, Clean
Attachment B: Proposed Draft 2021 Legislative Platforms, Redline
Attachment C: Mesa Water Policy Positions (Updated May 14, 2020)

2021 Legislative Platforms

December 2020

Calendar Year 2021 marks the first year of California's two-year (2020 and 2021) legislative session, with the State legislature slated to reconvene on Monday, January 4, 2021. Due to the global Covid-19 pandemic, the 2021 session is expected to be conducted much like the 2020 legislative session which was historically unique with the implementation of new remote lawmaking processes that affected advocacy activities, limited policy hearings and public participation, and resulted in legislation focused on a few priority issues: homelessness and affordable housing; public and employee health (especially related to Covid-19), and wildfires. Also in 2020, the state was focused on addressing budget shortfalls caused by the pandemic.

For 2021, it is expected that some legislative proposals and ongoing policy discussions from 2019 and 2020 could return in 2021, including legislation and regulations that could significantly impact Mesa Water District (Mesa Water®). The State administration, legislature, and regulators explored several ongoing water issues in 2019 and 2020, including, but not limited to:

- water use efficiency/conservation regulations pertaining to data reporting, water loss performance standards, and other topics related to implementing SB 606 and AB 1668 (passed in 2018);
- water affordability related to California's Human Right to Water and the Safe and Affordable Drinking Water Fund (respectively, AB 685 and SB 200), Low-Income Water Rate Assistance also called "lifeline rates" or LiWRA programs (AB 401), and the state's No Water Shutoffs law (SB 998), as well as Governor's Executive Order N-42-20 prohibiting shutoffs during the Covid-19 emergency;
- water district consolidations;
- headwaters protection, forest management, and wildfires prevention;
- climate adaptation and resilience, and related issues (i.e., energy policies, public safety power shutoffs, etc.);
- water quality, PFAS, and other Constituents of Emerging Concern (CECs);
- recycled water and water reuse;
- affordable housing proposals to alleviate homelessness (i.e., ADUs, CEQA reform, housing development fees, surplus land, etc.); and,
- Delta Flows (e.g., Voluntary Settlement Agreements) and the Delta Conveyance Project (DCP).

As policy discussions continue in 2021, the above issues will be the primary areas of legislative and regulatory focus. Additionally, in 2020, Governor Newsom issued two climate-related Executive Orders to require: 1. by 2035, that all new cars and passenger trucks sold in CA are Zero-Emission Vehicles (N-79-20); and, 2. by 2030, the conservation of 30% of the state's land and coastal waters (N-82-20).

Lastly, Mesa Water engaged with various agencies and associations that the district is affiliated with (i.e., ACC-OC, ACWA, AWWA, CalDesal, CMUA, CSDA, CWSA, MWDOC/MWD, OCBC, OCWD, OC Tax, SCWC, WateReuse, etc.) to advocate on legislative/policy issues including, but not necessarily limited to: a potential "Split Roll" ballot initiative to amend Proposition 13; the Cortese-Knox-Hertzberg Act and LAFCO Protest Thresholds; and Covid-19 impacts on local government and water utilities.

Listed below, for the Board's consideration, are the proposed legislative and regulatory platforms regarding anticipated high-priority public policy issues in 2021 that could have major consequences for Mesa Water:

- **Water Rates –** Mesa Water supports local rate-setting control with rate structures, set by publicly-elected boards and councils, that best serve customers and comply with the law. Furthermore, Mesa Water supports cost-based water rates that:
  - represent the true, full cost of water services, including operational costs and infrastructure funding to ensure water system sustainability into perpetuity; and,
  - harmonize the concepts of conservation and legality, with rates that provide a strong price signal for ratepayers to conserve while also complying with legal mandates (i.e., Article X of the CA Constitution; SB 606 and AB 1668; and, Propositions 13, 26, and 218).

- **Proposition 13 –** Mesa Water supports Article XIII A of the California Constitution (Prop. 13) and the taxpayer protections it provides as passed in 1978; and, Mesa Water opposes a "Split Roll" that would remove some of the protections of Prop. 13 from nonresidential properties in order to raise taxes on them.

- **Proposition 218 –** Mesa Water supports Article XIII C and D of the California Constitution (Prop. 218) regarding government service assessments, fees, rates, and taxes, specifically:
  - the "2/3 vote" required from the legislature and voters for approval of new levies;
  - the "special benefit and proportionality requirements" provision which directly connects the special benefits received with reasonable proportionate costs, and ensures that assessments imposed for property-related (water) services must not exceed the proportional cost of the services attributable to the parcel; and
  - transparent rate-setting procedures that protect consumers from potential government overcharge by providing ample opportunities for consumer participation as well as the ability for consumers to protest illegal rates.

- **Water Rate Assistance Programs –** Mesa Water supports localized "lifeline rates" or LiWRA) programs that comply with Prop. 218 of the California Constitution and are funded either voluntarily or via non-restricted/non-water-rates revenues. Mesa Water opposes a state tax on local water customer bills.

- **Orange County Groundwater Basin –** Mesa Water opposes any potential streamlined process for adjudicating groundwater basins, including the Orange County groundwater basin which is currently managed by the Orange County Water District (OCWD).

- **Water Bonds Funding (Propositions 1 and 68) –** Mesa Water supports funding from the November 2014 and June 2018 water bonds for OCWD's priority projects.

- **Water Desalination –** Mesa Water supports CalDesal in its desalination advocacy efforts, as well as the local and regional development of cost-effective and environmentally-sensitive water desalination projects statewide -- including brackish and ocean water desalination and the proposed Huntington Beach and Dana Point projects -- to enhance the availability and reliability of local and regional water supply sources, and improve water supply reliability for Orange County, Southern California, and statewide.

- **Water Conservation/Water Use Efficiency –** Mesa Water supports accounting for water resource and supply investments -- such as desalination, potable reuse, and water recycling -- as part of any potential statewide effort to update urban water conservation goals. Mesa Water supports compliance flexibility and local control; maximum credit for drought-resilient supplies; and, regulatory water use and water loss target-setting that is based on valid data and includes a glide path for enforcement as well as a variance process for unique situations. Mesa Water also supports the streamlining of water reporting data as part of the implementation of, and compliance with, SB 606 and AB 1668.

- **Water Recycling –** Mesa Water supports OCWD and WateReuse in its efforts to advance potable reuse legislation and regulations. Mesa Water supports the "Beneficiaries Pay" principle for the development and implementation of new recycled water projects including storm water capture.

- **Water Quality and Economic Feasibility –** Mesa Water supports efforts by the Association of California Water Agencies (ACWA) and other water industry associations/organizations to protect public health by using the best available scientific data and cost/benefit analyses to inform the development of reasonable and fiscally-responsible water quality legislation and regulations -- for current and future constituents of concern (e.g., PFAS) -- which consider technical and economic feasibility of standards and treatments to ensure clean, safe drinking water.

- **Water Storage and Exchange Programs –** Mesa Water supports the "Beneficiaries Pay" principle for water storage and exchange/transfer programs provided that they are market-based, ensure full cost recovery at a minimum, and account for water loss.

- **Affordable Housing –** Mesa Water supports the advocacy efforts of California Special Districts Association (CSDA) and other industry associations/organizations on policies related to Accessory Dwelling Units (ADUs), CEQA reform/streamlining, development impact fees (i.e., capacity charges, connection fees, etc.), metering/sub-metering, surplus land, and other proposed affordable housing solutions provided that they support water utilities' ability to provide reliable residential water services that are appropriately priced and right-sized for public health and safety.

- **Local Government –** Mesa Water supports the efforts of CSDA and other industry associations/organizations to ensure local control and representation, efficient delivery of government services, and appropriate reserve funds levels.

- **Local Agency Formation Commission (LAFCO)** – Mesa Water supports the existing protest thresholds for LAFCO-initiated reorganizations, per the Cortese-Knox-Hertzberg (CKH) Act, and opposes changes that would make it more difficult for citizens to protest a LAFCO-initiated reorganization. Additionally, Mesa Water opposes any changes to the CKH Act that would weaken local control and representation and/or broaden the mission, powers, and scope of LAFCOs without providing any added public benefit.

- **Special Districts Voting Methods –** Mesa Water supports exempting special districts from Cumulative Voting and Ranked Choice Voting methods, and opposes attempts to make these methods an option or a mandate for special districts elections.

- **Delta Solutions –** Mesa Water supports the efforts of ACWA, Municipal Water District of Orange County (MWDOC), Metropolitan Water District of Southern California (MWD), and Southern California Water Committee (SCWC) to achieve a long-term solution for the Bay Delta that includes functional, unimpaired flows for optimal statewide water supply reliability, sustainability and quality, and Delta ecosystem health and restoration for the public benefit. Mesa Water supports the "Beneficiaries Pay" principle for Delta Solution funding.

- **CA Headwaters and Forest Management –** Mesa Water supports the efforts of ACWA and other water industry coalitions to promote policies that enhance the pace and scale of headwaters protection, forest management and wildfires prevention -- including improved planning, coordination and implementation -- and increase financing, research, and resources to: protect water supply and quality; bring management practices in line with modern challenges; and, provide multiple benefits to the State's water users.

- **Climate Adaptation/Resilience Bond –** Mesa Water supports the efforts of ACWA and other water industry associations/organizations in engaging with the Governor's Administration, lawmakers, and regulators on resource funding related to the Governor's Executive Orders on climate change and related issues including, but not necessarily limited to: energy solutions, water resilience, and public safety power shutoffs.

- **Essential Public Utilities –** Mesa Water supports the concept of carving out Essential Public Utilities -- such as water and wastewater service providers -- from future legislation, administrative actions, and regulations that add costs or time delays to a utility's work by mandating new, unfunded operational practices.

- **Federal Drought Legislation –** Mesa Water supports the efforts of ACWA and other water industry associations/organizations in collaborating with U.S. representatives to develop bicameral, bipartisan federal drought legislation.

- **Covid-19 Economic Relief –** Mesa Water supports the efforts of ACWA, CSDA, and other industry associations/organizations to advocate for State and Federal funding to help local governments overcome administrative, financial, and operational challenges caused by the global pandemic and related government actions.

~~2020~~ 2021 Legislative Platforms

December ~~2019~~2020

Calendar Year ~~2020~~ 2021 marks the ~~second~~ first year of California's two-year (~~2019~~ 2020 and ~~2020~~2021) legislative session, with the State legislature slated to reconvene ~~at noon~~ on Monday, January ~~6~~4, ~~2020~~2021. Due to the global Covid-19 pandemic, the 2021 session is expected to be conducted much like the 2020 legislative session which was historically unique with the implementation of new remote lawmaking processes that affected advocacy activities, limited policy hearings and public participation, and resulted in legislation focused on a few priority issues: homelessness and affordable housing; public and employee health (especially related to Covid-19), and wildfires. Also in 2020, the state was focused on addressing budget shortfalls caused by the pandemic.

~~Staff~~ For 2021, it is expected~~expects~~ that some legislative proposals and ongoing policy discussions from 2019 and 2020 ~~from the 2019 session will~~ could return in ~~2020~~2021, including ~~water~~ legislation and regulations that could significantly impact Mesa Water District (Mesa Water®). The State administration, ~~and~~ legislature, and regulators explored several ongoing water issues in ~~2019~~2019 and 2020, including, but not limited to:

- water use efficiency/conservation ~~"clean up" legislation~~regulations pertaining to data reporting ~~and streamlining~~, water loss performance standards, and other topics related to implementing SB 606 and AB 1668 (passed in 2018);
- ~~a statewide "public goods charge" (tax) on~~ water affordability related to ~~implement~~ California's Human Right to Water and the Safe and Affordable Drinking Water Fund (respectively, AB 685 and SB 200) ~~Law~~, Low-Income Water Rate Assistance also called "lifeline rates" or LiWRA programs (AB 401), and the state's No Water Shutoffs law (SB 998), as well as Governor's Executive Order N-42-20 prohibiting shutoffs during the Covid-19 emergency;
- water district consolidations;
- headwaters protection, ~~and~~ forest management, and wildfires prevention;
- climate ~~change, water~~adaptation and resilience, and related issues (i.e., energy ~~use~~policies~~, ,inverse condemnation,~~ public safety power shutoffs, etc.);
- ~~low income water rates assistance programs (aka "lifeline rates" or LiWRA programs);~~
- water quality, PFAS, and other Constituents of Emerging Concern (CECs);
- recycled water and water reuse;
- ~~California Environmental Quality Act (CEQA) reform (including~~ affordable housing proposals to alleviate homelessness (i.e., ADUs, CEQA reform, housing development fees, surplus land, etc.); and,
- Delta Flows (e.g., Voluntary Settlement Agreements) and the Delta Conveyance Project (DCP).

As policy discussions continue in ~~2020~~2021, the above issues will be the primary areas of legislative and regulatory focus. Additionally, in ~~2019~~2020, Governor Newsom issued two

~~water~~climate-related Executive Orders to require: 1. ~~California Water Resilience Portfolio~~by 2035, that all new cars and passenger trucks sold in CA are Zero-Emission Vehicles (N-79-20); and, 2. ~~Climate Change~~by 2030, the conservation of 30% of the state's land and coastal waters (N-82-20).

~~Furthermore, the Governor's Administration, as well as State legislative leadership, lawmakers, and regulators will continue work on implementing the water conservation bills -- SB 606 and AB 1668 -- that passed in 2018.~~

Lastly, Mesa Water engaged with various agencies and associations that the district is affiliated with (i.e., ACC-OC, ACWA, AWWA, CalDesal, CMUA, CSDA, CWSA, MWDOC/MWD, OCBC, OCWD, OC Tax, SCWC, WateReuse, etc.) to advocate on legislative/policy issues including, but not necessarily limited to: a potential "Split Roll" ballot initiative to amend Proposition 13; the Cortese-Knox-Hertzberg Act and LAFCO Protest Thresholds; and ~~Ranked Choice Voting~~Covid-19 impacts on local government and water utilities.

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  - transparent rate-setting procedures that protect consumers from potential government overcharge by providing ample opportunities for consumer participation as well as the ability for consumers to protest illegal rates.

- **Water Rate Assistance Programs ~~(“WRAP”)~~ –** Mesa Water supports localized ~~“WRAP” (aka~~ “lifeline rates” or LiWRA~~)~~ programs that comply with Prop. 218 of the California Constitution and are funded either voluntarily or via non-restricted/non-water-rates revenues. Mesa Water opposes a state tax on local water customer bills.

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- **~~CEQA Reforms~~Affordable Housing –** Mesa Water supports the advocacy efforts of ~~ACWA~~ California Special Districts Association (CSDA) and other ~~water~~ industry associations/organizations ~~to~~ on policies related to Accessory Dwelling Units (ADUs), CEQA reform/streamlining, development impact fees (i.e., capacity charges, connection fees, etc.), metering/sub-metering, surplus land, and other proposed affordable housing solutions provided that they support water utilities' ability to provide reliable residential water services that are appropriately priced and right-sized for public health and safety. ~~streamline CEQA to enhance efficiencies, reduce redundancies in the environmental review/permitting process, and eliminate unnecessary, costly, and time-consuming litigation and related delays.~~

- **Local Government –** Mesa Water supports the efforts of ~~California Special Districts Association (~~CSDA~~)~~ and other industry associations/organizations to ensure local control and representation, efficient delivery of government services, and appropriate reserve funds levels.

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- ~~**CA Water Resilience Portfolio and**~~ **Climate** ~~**Change**~~ **Adaptation/Resilience Bond –** ~~Mesa Water supports~~ Mesa Water supports the efforts of ACWA and other water industry associations/organizations in engaging with the Governor's Administration, lawmakers, and regulators on ~~policies~~ resource funding related to the Governor's Executive Orders ~~on Water Resilience Portfolio and Climate Change~~on climate change and related issues including, but not necessarily limited to: energy ~~use~~solutions, ~~inverse~~ water ~~condemnation~~resilience, and public safety power shutoffs.

- **Essential Public Utilities –** Mesa Water supports the concept of carving out Essential Public Utilities -- such as water and wastewater service providers -- from future legislation, administrative actions, and regulations that add costs or time delays to a utility's work by mandating new, unfunded operational practices.

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- **Covid-19 Economic Relief –** Mesa Water supports the efforts of ACWA, CSDA, and other industry associations/organizations to advocate for State and Federal funding to help local governments overcome administrative, financial, and operational challenges caused by the global pandemic and related government actions.

Policy Positions

Updated: May 14, 2020

Mesa Water District (Mesa Water®) supports:

1. Groundwater Quality Protection
    a. Support Orange County Water District's (OCWD) current groundwater quality protection programs
        i. Basin Equity Assessment (BEA) Exemption Program for Impaired Groundwater (including the Mesa Water Reliability Facility)
        ii. The MTBE, North Basin, and South Basin groundwater protection projects
        iii. The Tustin and Irvine desalters
    b. Encourage OCWD to protect the Basin from chlorides caused by seawater intrusion
        i. Encourage OCWD to set a goal of maintaining protective elevations along the coast
        ii. Encourage OCWD to hold semi-annual barrier meetings with Coastal Agencies (Huntington Beach, Mesa Water, and Seal Beach)
        iii. Encourage semi-annual reporting on the barrier
2. Policies that raise and stabilize the Basin Pumping Percentage (BPP)
    a. Support OCWD setting a target BPP that they intend to consistently meet
    b. Support new water supply projects that help achieve this goal
    c. Support OCWD adopting a water supply policy that sets a goal of developing water supply and recharge capabilities, including purchasing replenishment water, or other actions that result in a reliable and predictable source of groundwater at a BPP of not less than 80 percent. A goal of this policy is to accomplish this with a cost-neutral, or better, impact on producers when the avoided cost of purchasing imported water is considered
3. Policies that keep the Basin full
    a. Support OCWD adhering to the BPP-setting formula
    b. Support maximum production at the Groundwater Replenishment System (GWRS) to ensure a cost-effective, high-quality, environmentally-friendly and sustainable local water supply that benefits all OCWD producers and that increases the region's current and future water reliability
    c. Support maximum wastewater flows treatable by the GWRS to the Orange County Sanitation District (OCSD) -- and support OCSD/OCWD permanent acquisition of such wastewater flows -- to ensure source reliability for the GWRS
    d. Support storm water capture projects that are cost-effective (e.g., equivalent to or less than GWRS costs) and that contribute source water to the Basin Principal Aquifer
4. Basin Storage and Exchange/Transfer Programs that are market-based with the primary benefits accruing to OCWD, its Groundwater Producers, and the ratepayers they serve, with such Programs applying the "Beneficiaries Pay" principle and addressing issues including, and not limited to:
    a. Full cost recovery, at a minimum, of a proportional share of the historic and future capital investments as well as operations and maintenance costs incurred by OCWD to manage the Basin
    b. Full cost recovery, at a minimum, of the proportional value that entry into the Basin affords, including the value of reliability (and thus loss of reliability to the Groundwater Producers through the loss of available storage capacity) and the value of treatment

c. Accounting for water loss in a current or future year (both lost out of the Basin and lost due to inability to spread or extract)
d. Consideration that the above is merely a “break even” deal, and any program should bring significant benefits in excess of the above to OCWD and its Groundwater Producers
e. Deferring entering into any agreements until the *IRWD v. OCWD* lawsuit is resolved
f. Deferring entering into any agreements until the Metropolitan Water District of Southern California (MWD) Conjunctive Use Program has been terminated
g. Limiting any potential future storage agreements to storage programs that are compliant with OCWD Act Section 2.1.c
h. Maximizing the beneficial use of the Basin while maximizing Basin Pumping Percentage (BPP) for the Groundwater Producers overlying the Basin

5. Annexations
    a. Support financially neutral annexations into OCWD
6. A financially strong OCWD
    a. Support policies and practices that maintain OCWD current AAA credit rating from two of the three credit rating agencies
7. A potential merger of the Municipal Water District of Orange County (MWDOC) and OCWD if a merger:
    a. is mutually agreed upon by both MWDOC and OCWD, with any governance changes supported by the MWDOC and OCWD Boards of Directors;
    b. encourages MWDOC and OCWD exploring mutual areas of efficiency that results in economic savings for the members of both agencies;
    c. improves or, at a minimum, preserves the quality, reliability, and sustainability of wholesale water services to the members of both agencies;
    d. preserves the interests of groundwater producers currently existing within Orange County’s groundwater basin and protects those interests from diminished groundwater resources or supplies;
    e. supports the MWDOC current geographic boundaries, and preserves the existing boundaries of the Orange County groundwater basin for pumping and storage purposes;
    f. supports MWDOC current mission, and allows the Orange County groundwater basin to remain unadjudicated;
    g. respects the “one person one vote” principle, if the new Board of Directors is a wholly elected board;
    h. is facilitated openly and transparently; and,
    i. increases the effectiveness of Orange County’s representation at MWD, with a coordinated and unified voice representing Orange County
8. Increased influence at Metropolitan Water District of Southern California (MWD)
    a. Support increased allocations of MWDOC resources for engagement at MWD
    b. Support coordination of the entire Orange County MWD delegation
9. MWDOC priority initiatives at MWD
    a. Protect Mesa Water’s service area from any cost shifts resulting from San Diego County Water Authority lawsuits
    b. Encourage continued efforts in improving the Delta

c. Seek opportunities for MWD to provide assistance (or partnership) with MWDOC on developing desalination in Orange County
d. Continue to support MWD discounted replenishment water program

10. Close working relationships with MWDOC on local and regional issues and programs for which the organization is advocating at MWD
11. The current Mesa Water Strategic Plan, including the District's goals to:
    a. Provide a safe, abundant, and reliable water supply.
    b. Practice perpetual infrastructure renewal and improvement.
    c. Be financially responsible and transparent.
    d. Increase public awareness about Mesa Water and about water.
    e. Attract and retain skilled employees.
    f. Provide outstanding customer service.
    g. Actively participate in regional and statewide water issues.
12. The Orange County Local Agency Formation Commission (OC LAFCO) as more of a facilitator than an initiator of actions
13. Developing cost-effective and environmentally sensitive sources of water, including recycling, groundwater clean-up, conservation, and desalination
14. The potential Huntington Beach Ocean Desalter project as it can possibly provide a new, reliable and high-quality water supply that is appropriately priced
15. CalDesal's mission and its efforts to advocate for Climate Resilience/Water Bond funding of $250M for brackish and ocean water desalination
16. The co-equal goals of improved water supply reliability and Delta ecosystem health
17. Water rates, fees, and other service or use charges based on true costs in conformance with Prop. 218, and tax-free revenue
18. The "Expenditures Per Capita" metric as being a more accessible, equitable, simpler, and overall superior method compared to examining water rates alone -- for measuring the full, true cost and "affordability" of a public water agency's services to its community
19. Policies that encourage economical, practical, and healthful water use efficiency indoors, efficient and efficacious irrigation water use, and commercial and industrial water use, without stranding investments in potable reuse systems, including:
    a. Indoor water use efficiency at the level needed for community health and safety -- as substantiated by a recently-commissioned, validated, and peer-reviewed end-use study -- and that protects local investments in potable reuse systems
    b. Irrigation water use efficiency at the level necessary for productive crops and attractive landscapes
    c. Commercial and industrial water use efficiency at a level that sustains economic vitality
20. Fact-based water use efficiency policies and water use efficiency standards based on sound studies that are credible, replicable, and verifiable
21. Policies that establish regulatory and statutory parity for all types of recycled water, including purple pipe and potable reuse
22. Theft prevention of municipal metal infrastructure, such as fire hydrants, manhole covers, and backflow devices
23. The equitable treatment of OCWD -- and its programs and projects -- by the Santa Ana Watershed Project Authority (SAWPA) with respect to grants funding and related considerations as part of SAWPA Integrated Regional Water Management planning and One Water One Watershed program

Mesa Water opposes:

1. Encroachment Mesa Water easements, rights-of-way, and property without negotiation, agreed upon compensation, and advance approval at the sole discretion of the District
2. Administrative, legislative, and regulatory actions that mandate new, unfunded operational practices which add cost burdens or time delays to work conducted by essential public utilities

Mesa Water DISTRICT®

Dedicated to Satisfying our Community's Water Needs

MEMORANDUM

TO: Board of Directors
FROM: Phil Lauri, P.E., Assistant General Manager
DATE: December 17, 2020
SUBJECT: Water Supply, Energy, and Supply Chain Reliability Assessment

RECOMMENDATION

Recommend that the Board of Directors approve the proposed recommendations for the Water Supply, Energy, and Supply Chain Reliability Assessment as identified in the Executive Summary and Technical Memorandums 1, 2 and 3, and implement as part of the Capital Improvement Program Renewal.

STRATEGIC PLAN

Goal #1: Provide a safe, abundant, and reliable water supply.
Goal #2: Practice perpetual infrastructure renewal and improvement.
Goal #6: Provide outstanding customer service.

PRIOR BOARD ACTION/DISCUSSION

At its May 14, 2020 meeting, the Board of Directors (Board) awarded on-call professional design services contracts for the Capital Improvement Program Renewal.

BACKGROUND

Mesa Water District (Mesa Water®) owns and operates two reservoirs with a combined maximum storage capacity of approximately 30 million gallons and associated pump stations strategically located within its service area along with 5 clear wells with a total approximate capacity of 14 million gallons per day (MGD). The District also owns and operates two deep production wells that feed the 8.4 MGD Mesa Water Reliability Facility (MWRF) that treats amber-tinted water from the Orange County Groundwater Basin's (Basin) deep aquifer. These aforementioned production, storage, and treatment facilities allow Mesa Water to be the only Orange County water agency to provide 100% local water supply reliability.

Through the 2014 Capital Improvement Program (CIP) Master Plan Update (Master Plan) Mesa Water adopted a 115% water supply reliability requirement which provides for the District to ensure there is production capacity to meet 115% of all demands in any given season. This action resulted in Mesa Water purchasing two new commercial properties within the City of Santa Ana to initiate construction of two new wells and a connecting pipeline.

Mesa Water has taken great strides to provide robust diversification of both its energy and water supply reliability. Examples of this diversification are the construction of the MWRF, which allowed the District to obtain 100% local reliability, use of natural gas engines in both reservoirs and Well 5, and implementation of diesel back-up generators at a majority of the clear water well sites. While the efforts to date have provided a robust, cost-effective operational flexibility, a more systematic approach to the District's water, energy, and supply chain reliability is desired.

In 2017, the Reservoirs 1 & 2 Pumps, Controls, and Chemical System Assessment Project determined that much of the Reservoirs 1 and 2 chemical and mechanical equipment (e.g., pumps, engines, control system, chemical dosing systems, etc.) was at the end-of-life or soon approaching end-of-life. With the need to replace the mechanical equipment at Reservoirs 1 and 2, there is an opportunity to improve the distribution system. The District wanted to assess the state of its overall energy and water supply reliability from a readiness-to-serve perspective, long-term capital and operating cost approach, maintenance standardization, and regulatory permitting and compliance requirements to determine the best equipment for replacement of mechanical systems at Reservoirs 1 and 2. The idea of reliability expanded to assess the water supply, energy supply, and supply chain interruptions (e.g., materials, services, spare parts, energy supplies, chemicals, etc.) that could occur due to emergency events (e.g., earthquakes, floods, etc.). Knowing that the reservoirs, wells, and MWRF work together as one system, the District wanted to evaluate the entire system in determining the recommended replacements.

To achieve these goals, Mesa Water's staff developed the Water Supply, Energy, and Supply Chain Reliability Assessment. The objectives of this assessment are as follows:

1. Evaluate existing water supply capacities relative to meeting 115% of all demand seasons using local groundwater resources;
2. Evaluate existing Mesa Water energy supply capacities, types, and backup capabilities relative to ensuring reliable groundwater supplies can be pumped and distributed during normal and emergency operations;
3. Identify water supply and energy reliability gaps (from Objective Nos. 1 & 2) and provide recommended solutions;
4. Evaluate Mesa Water's Supply Chain system relative to emergency readiness; and
5. Identify Supply Chain system reliability gaps (from Objective No. 4) and provide recommended solutions.

This project resulted in three technical memorandums (TMs). The key project elements include:

TM-1 Water Supply Reliability: TM-1 analyzes Mesa Water's water supply program if emergency and operational scenarios caused certain water sources to be unavailable.

TM-1 focuses on the following Water Supply Reliability Assessment (WSRA) components:

- Evaluate Mesa Water's current and future water demands;
- Confirm Mesa Water's current and future water supply capacity against demands;
- Conduct GAP analysis applying various emergency and operational scenarios to Mesa Water's water sources; and
- Present cost-efficient solutions to address water supply deficiencies identified in the GAP analysis.

TM-2 Energy Supply Reliability: TM-2 assesses Mesa Water's energy supply reliability, evaluates regulatory and permitting compliance concerns associated with these supplies, forecasts future supply costs, and assesses and recommends the best available equipment technologies for replacement of end-of-life equipment.

TM-2 focuses on the following Energy Supply Reliability Assessment (ESRA) components:

- Evaluate Mesa Water's historic demands for energy usage at well sites and treatment facilities;
- Estimate Mesa Water's future energy demands and costs;
- Provide recommendations for pump drive technologies, considering life cycle costs; and
- Provide recommendations for backup power/fuel requirements.

TM-3 Energy Supply Chain Reliability and Disruption: The purpose of TM-3 is to perform an Emergency Supply Chain Reliability and Disruption Assessment (ESCRDA) to determine Mesa Water's ability to respond to a local or regional emergency event and to provide recommendations that support the reliable and safe delivery of water to its customers. For this purpose, TM-3 focuses on the following ESCRDA tasks:

- Perform Supply Chain Analysis (SCA) of typical materials and services used during routine operation;
- Perform Single Points of Failure Analysis (SPFA) for each core production facility;
- Conduct GAP analysis, with recommendations towards mitigation, for core production facilities after application of emergency scenarios;
- Evaluate suitability of storage at production facilities to accommodate the necessary equipment and parts needed during emergency scenarios; and
- Evaluate diesel fuel storage needed to supply backup power during emergency scenarios.

DISCUSSION

Findings, recommendations, and costs for each of the TMs are summarized below. More detailed information can be found in the Executive Summary (Attachment A) and TMs 1, 2, and 3 (Attachments B, C, and D).

TM-1 Water Supply Reliability

For the GAP analysis, water demands and production capacities are compared in three operational scenarios for both 2020 and 2040 cases. Scenario 1 represents normal operating conditions and establishes a baseline scenario for comparison. Scenario 2 consists of three different emergency situations in which several supply options are impaired or non-operational. Finally, Scenario 3 simulates the condition when several local supply options need critical repairs. Whenever a gap between water supply and demands are identified, various additional supply options are considered to address the deficiency based on the limitations and costs of each option. A summary of the TM-1 recommendations is provided in Table 1. below:

Table 1. Summary of Scenario Results								
Year	Scenario	Existing Operational Facilities			GAP with Existing Supplies (AF)(1)	Recommended Solution	Annual Cost Over Baseline	Lump Sum Capital Improvement Cost (30-Year Debt Cycle)
		Clear Wells	MWRF Capacity	MWD Import Available				
2020	1	7 of 7	100%	Yes	-	N/A	$-	$-
	2a	6 of 7	0%	No	720	Increased Restrictions	$(88,219)	$-
	2b	4 of 7	100%	No	640	Increased Restrictions	$(41,927)	$-
	2c	2 of 7	0%	Yes	1,661	Import from MWD	$2,147,681	$-
	3	4 of 7	50%	Yes	908	Import from MWD	$1,321,823	$-
2040	1	7 of 7	100%	Yes	-	N/A	$-	$-
	2a	6 of 7	0%	No	1,270	Additional Clear Wells	$1,914,009	$31,821,284
	2b	4 of 7	100%	No	1,189	Additional Clear Wells and MWRF Capacity	$2,348,122	$31,418,604
	2c	2 of 7	0%	Yes	2,211	Import from MWD	$2,828,399	$-
	3	4 of 7	50%	Yes	1,458	Import from MWD	$2,002,541	$-

1. *Monthly supply deficit based on max month demand conditions.*

Due to the high costs to maintain self-sufficiency on local water supplies during an emergency, it is ultimately recommended that Mesa Water purchase imported water in the event of a supply shortage, whenever available. In the event of a rare situational emergency such that Metropolitan Water District of Southern California (MWD) supplies are not available, Mesa Water may offset any supply shortages through the implementation of water usage restrictions if the emergency occurs in the near term (5-10 years). In the long-term, Mesa Water can expand its local production capabilities either by installing additional clear wells, expanding MWRF treatment capacity, or a combination of both.

TM-2 Energy Supply Reliability

The GAP analysis from TM-1 is further expanded by evaluating the availability and deficiencies of backup energy supplies in each of the scenarios. Overall, it is recommended that Mesa Water standardize its operations on electric motors, which offer a long useful life with relatively little maintenance required compared to reciprocating engines. When accounting for maintenance costs, electric motors provide an overall life-cycle cost savings of $2,050,000 for Reservoirs 1 and 2 pump and control systems versus engine driven pump systems. Also, using an electric driver provides flexibility in power sources, which will become more relevant in the shifting energy landscape. Planning level review of the Southern California Edison (SCE) infrastructure substations around both reservoirs indicates there is sufficient electrical capacity to service both reservoirs. Additionally, the cost to bring this enhanced service capacity to Mesa Water's site is SCE's costs. If all facilities used electric drivers, the backup power generation systems can be standardized around diesel fuel as well. The recommended improvements are outlined in Table 2. below:

Table 2. Summary of Recommended Improvements				
Site	Existing		Recommended	
	Primary	Backup	Primary	Backup
Reservoir 1 BPS	(3) 137 hp natural gas engines	(2) natural gas generators; (1) 1,200 gal propane tank	(3) 150 hp electric motors	(1) 1,000 kW diesel generator; (1) 2,000 gal diesel fuel tank
Reservoir 2 BPS	(4) 369 hp natural gas engines	(1) natural gas generator; (1) 1,200 gal propane tank	(4) 400 hp electric motors	(1) 2,000 kW diesel generator; (1) 3,000 gal diesel fuel tank
MWRF	(2) 400 hp well pumps; (3) 350 hp high lift pumps; (2) 250 hp feed pumps; (4) 100 kW CIP tank heaters; (3) 40 hp product transfer pumps; (2) 30 hp degasifier blowers; (3) 30 hp CO2 booster pumps	Onsite generator for shut- down only	No upgrades necessary	(1) 2,500 kW diesel generator; (1) 4,000 gal diesel fuel tank
Well 1	(1) 400 hp well pump	Connection for portable generator	No upgrades necessary	Truck-Mounted Portable Generator
Well 3	(1) 300 hp well pump	(1) 350 kW diesel generator; (1) 426 gal integral diesel storage tank	No upgrades necessary	No upgrades necessary
Well 5	(1) 450 hp natural gas engine	(1) 1,150 gal propane tank	(1) 450 hp electric motor (at end of useful life)	Diesel generation and fuel tank (at end of useful life)
Well 7	(1) 300 hp well pump	(1) 350 kW diesel generator; (1) 333 gal integral diesel storage tank	No upgrades necessary	No upgrades necessary
Well 9	(1) 300 hp well pump	(1) 350 kW diesel generator; (1) 426 gal integral diesel storage tank	No upgrades necessary	No upgrades necessary
Well 12 (Future)	(1) 600 hp well pump	(1) 600 kW diesel generator (1) 1,000 gal diesel storage tank	No upgrades necessary	No upgrades necessary
Well 14 (Future)	(1) 600 hp well pump	(1) 600 kW diesel generator (1) 1,000 gal diesel storage tank	No upgrades necessary	No upgrades necessary

Additionally, each onsite fuel storage tank is sized for 24 hours of operation. To improve reliability, Mesa Water can install a centralized bulk diesel fuel storage tank to replenish onsite fuel tanks during a prolonged emergency. It is recommended that two - 30,000 gallon tanks be installed at a location to be determined in order to provide 10 days of overall operational capacity. Since the wells and reservoirs work together to meet the various demand conditions, standardization of energy sources and back-up storage can provide a robust and self-reliant system.

TM-3 Energy Supply Chain Reliability and Disruption

For the SCA, Mesa Water's crucial material and service suppliers are categorized as a low, medium, or high risk for failure based on physical constraints, practices, and past history. From the results, it is recommended that Mesa Water identify back-up suppliers for carbon dioxide and water quality analyses. Also, temporary provisions such as diesel, aggregates, pipe repair materials, and street repair materials should be stored in the event of an emergency. For the

SPFA, systems and equipment at each facility are assigned a risk factor based on their ability to interrupt production and their available redundancy. Based on the findings, a number of recommendations are made to mitigate the quantity of single points of failure, ranging from mechanical, electrical, and instrumentation modifications. To further mitigate risks, it is also recommended that Mesa Water stock spare parts for crucial equipment, including but not limited to spare pumps, valves, and PLCs. As there is little additional space for storage at existing facilities, the parts recommended in TM-3 should be stored in a new centralized warehouse, which could be located at either of the proposed sites for new Wells 12 and 14 or at the centralized bulk fuel storage depot site.

Overall Recommendations

The overall recommendations across all technical memorandums are provided in Table 3. The recommendations are categorized as short-term (1 to 5 years) or long-term (greater than 5 years) and are ordered by priority. Prioritization is based on several factors, including criticality, ease of implementation, cost, and return on investment.

Table 3. Overall Recommendations

Priority	Recommendation	Estimated Cost
Short-Term Decisions (1-5 years)		
1	Minimize single points of failure with new equipment and instrumentation. Procure spare parts for critical equipment and instrumentation. Implement asset management system.	$1.1M[(1)]
	Construct new storage warehouse (Location TBD).	$0.2M
2	Replace pump motors at Reservoirs 1 and 2 with electric motors. Provide backup diesel generators and fuel storage.	$2.8M
3	Provide truck-mounted portable generator system for Well 1.	$0.5M
	Drill new well at Well 5 and provide electrical drives, backup power, and associated electrical improvements.	$1.5M
4	Construct centralized bulk diesel fuel storage tanks to replenish onsite fuel tanks during a prolonged emergency.	$3.5M
Long-Term Decisions (5+ years)		
5	Evaluate installation of additional clear wells or MWRF expansion.	Up to $32M
6	Provide backup power generation and fuel storage for the MWRF.	$1.0M

1. Costs derived from Table 8-1 in TM-3.

In the short term, making minor system improvements is the top priority, as it is simple to execute and can quickly eliminate several reliability risks. Additionally, storing spare parts allows these critical system components to remain available even during a supply chain emergency. A new warehouse can be considered to centralize and protect these critical spare parts as well. Replacing the pump drives and providing backup power at Reservoirs 1 and 2 is the next priority. The reservoirs are critical for meeting peak water demands, especially during an emergency. Installing electric motors and diesel powered generators is an improvement in reliability compared to the existing equipment and provides maintenance standardization across all of Mesa Water's sites. Providing backup generation at Well 1 and upgrading the propane back-up equipment at Well 5 is particularly important because the clear wells provide the bulk of water supplies during an emergency. Once all onsite backup power systems within the supply system are standardized around diesel powered generators, constructing a bulk diesel storage tank would provide an additional level of energy security during prolonged electrical and supply chain outages.

In the long term, Mesa Water can evaluate the feasibility of additional clear wells and MWRF treatment. Providing enough additional infrastructure to account for the worst-case scenarios examined where MWD water is unavailable will cost up to an estimated $32MM in capital improvements. However, this estimate should be viewed as an upper limit. The value and extent of the additional reliability insurance needed is open for discussion and should be examined closer in further assessment. Although much lower in cost, providing additional backup power at the MWRF is the lowest priority recommendation. The MWRF is less critical during an emergency due to its lower overall capacity in comparison to the capacity of the clear well supply system. In addition, the need for chemicals in the treatment process adds another layer of vulnerability to the MWRF during a disaster, which will not be mitigated with the addition of backup power.

The short-term recommendations from the Water Supply, Energy, and Supply Chain Reliability Assessment can be executed through the development of two CIPR projects:

1. **Reservoirs 1 & 2 Motor/Engine, Pump, and Control System Replacement** – End-of-life equipment will be replaced at Reservoirs 1 and 2. The existing natural gas engine-driven pumps and propane backup systems will be replaced using electrically driven motors and diesel backup generators.
2. **Mesa Water Emergency Preparedness Center** – The project would identify locations for and construct a centralized bulk diesel storage facility, procure critical spare parts, design and construct additional warehouse space, and design and procure a truck-mounted portable generator system for Well 1.

The long-term recommendations from the Water Supply, Energy, and Supply Chain Reliability Assessment will be further evaluated in a future assessment.

Overall, Mesa Water has taken great strides to reliably meet typical water demands using exclusively local supplies. With the aforementioned recommendations, Mesa Water can take its objectives to an elite level to remain reliable even during uncertain emergencies and natural disasters.

FINANCIAL IMPACT

Funds for the proposed recommendations are budgeted for Fiscal Year 2021 and are part of the Capital Improvement Program Renewal.

ATTACHMENTS

Attachment A: Executive Summary
Attachment B: TM-1 Water Supply Reliability Assessment
Attachment C: TM-2 Energy Supply Reliability
Attachment D: TM-3 Emergency Supply Chain Reliability and Disruption

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Prepared for: Mesa Water District

Project Title: Water Supply, Energy, and Supply Chain Reliability Assessment

Project No.: 155448

Executive Summary

Subject: Water Supply, Energy, and Supply Chain Reliability Assessment

Date: December 7, 2020

To: Phil Lauri, Mesa Water District Assistant General Manager

From: Adam Zacheis, Ph.D., P.E., Project Manager

Copy to: Andrew Wiesner, P.E., Principal Engineer

Prepared by: ___________________________________
Alan Mangosong

Reviewed by: ___________________________________
Adam Zacheis

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Abbreviations

BC	Brown and Caldwell
ESCRDA	Emergency Supply Chain Reliability and Disruption Assesment
ESRA	Energy Supply Reliability Assessment
Mesa Water	Mesa Water District
MWD	Metropolitan Water District of Southern California
MWDOC	Municipal Water District of Orange County
MWRF	Mesa Water Reliability Facility
PLC	programmable logic controller
SCA	Supply Chain Analysis
SPFA	Single Points of Failure Analysis
TM-1	Technical Memorandum No. 1
TM-2	Technical Memorandum No. 2
TM-3	Technical Memorandum No. 3
WSRA	Water Supply Reliability Assessment

Section 1: Executive Summary

Mesa Water District (Mesa Water) owns and operates a diverse water supply portfolio that has provided 100 percent local water supply reliability; the only Orange County water agency to accomplish this. Mesa Water's production and storage facilities include five (5) clear groundwater wells, two (2) deep production wells producing amber-tinted water that is subsequently treated at the Mesa Water Reliability Facility (MWRF), and two (2) reservoirs used for storage and handling of peak flows. Mesa Water also adopted a reliability requirement to ensure production can meet 115 percent of all demands in any given season. This action has resulted in Mesa Water pursuing the development of two (2) additional clear wells to further enhance their water reliability and resiliency. Although not a local water supply, Mesa Water also has the ability to import water from Metropolitan Water District (MWD) through the local wholesaler, the Municipal Water District of Orange County (MWDOC). For energy reliability, Mesa Water has implemented backup generation at the majority of its clear well sites and provided natural gas engines at both reservoirs. These actions have demonstrated how Mesa Water has established a robust and diverse water production system, but a systematic approach is desired to assess potential gaps in water, energy, and supply chain reliability, particularly during periods of emergency (e.g. earthquakes, floods, etc.). Mesa Water engaged Brown and Caldwell (BC) to conduct a Water Supply, Energy, and Supply Chain Reliability Assessment with the following objectives:

1. Evaluate existing water supply capacities relative to meeting 115 percent of all demand seasons using local groundwater resources;
2. Evaluate existing Mesa Water energy supply capacities, types, and backup capabilities to ensure groundwater supplies can be pumped and distributed during normal and emergency operations;
3. Identify water supply and energy reliability gaps (from Objectives Nos. 1 and 2) and provide recommended solutions;
4. Evaluate Mesa Water's Supply Chain system relative to emergency readiness; and
5. Identify Supply Chain system reliability gaps (from Objective No. 4) and provide recommended solutions.

To investigate these objectives, the assessment is divided into three Technical Memorandums (TM), each focusing on a separate aspect of reliability.

1.1 TM-1: Water Supply Reliability

Technical Memorandum No. 1 (TM-1) focuses on the following Water Supply Reliability Assessment (WSRA) components:

- Evaluate Mesa Water's current and future water demands;
- Confirm Mesa Water's current and future water supply capacity against demands;
- Conduct GAP analysis for various emergency and operational scenarios to water sources; and
- Present cost-efficient solutions to address water supply deficiencies identified in the GAP analysis.

For the GAP analysis, water demands, and production, capacities are compared in three operational scenarios for both 2020 and 2040 cases. Scenario 1 represents normal operating conditions and establishes a baseline scenario for comparison. Scenario 2 consists of three different emergency situations in which several supply options are impaired or non-operational. Finally, Scenario 3 simulates the condition when several local supply options need critical repairs. Whenever a gap between water supply and demands are identified, various additional supply options are considered to address the deficiency based on the limitations and costs of each option. A summary of the TM-1 recommendations is provided in Table ES-1.

Table ES-1. Summary of Scenario Results								
Year	Scenario	Existing Operational Facilities: Clear Wells	MWRF Capacity	MWD Import Available	GAP with Existing Supplies (AF)	Recommended Solution	Annual Cost Over Baseline	Lump Sum Capital Improvement Cost (30-Year Debt Cycle)
2020	1	7 of 7	100%	Yes	-	N/A	$-	$-
	2a	6 of 7	0%	No	720	Increased Restrictions	$(88,219)	$-
	2b	4 of 7	100%	No	640	Increased Restrictions	$(41,927)	$-
	2c	2 of 7	0%	Yes	1,661	Import from MWD	$2,147,681	$-
	3	4 of 7	50%	Yes	908	Import from MWD	$1,321,823	$-
2040	1	7 of 7	100%	Yes	-	N/A	$-	$-
	2a	6 of 7	0%	No	1,270	Additional Clear Wells	$1,914,009	$31,821,284
	2b	4 of 7	100%	No	1,189	Additional Clear Wells and MWRF Capacity	$2,348,122	$31,418,604
	2c	2 of 7	0%	Yes	2,211	Import from MWD	$2,828,399	$-
	3	4 of 7	50%	Yes	1,458	Import from MWD	$2,002,541	$-

Due to the high costs involved in maintaining self-sufficiency on local water supplies during an emergency, it is ultimately recommended that Mesa Water purchase imported water in the event of a supply shortage, whenever available. In the event of a rare situational emergency such that MWD supplies are not available, Mesa Water may offset any supply shortages through the implementation of water usage restrictions if the emergency occurs in the near term (5-10 years). In the long-term, Mesa Water can expand its local production capabilities either by installing additional clear wells, expanding MWRF treatment capacity, or a combination of both.

1.2 TM-2: Energy Supply Reliability

Technical Memorandum No. 2 (TM-2) focuses on the following Energy Supply Reliability Assessment (ESRA) components:

- Evaluate Mesa Water's historic demands for energy usage at well sites and treatment facilities;
- Estimate Mesa Water's future energy demands and costs;
- Provide recommendations for pump drive technologies, considering life cycle costs; and
- Provide recommendations for backup power and fuel requirements.

The GAP analysis from TM-1 is further expanded upon by evaluating the availability and deficiencies of backup energy supplies in each of the scenarios. Overall, it is recommended that Mesa Water standardize its operations on electric motors, which offer a long useful life with relatively little maintenance required compared to reciprocating engines. When accounting for maintenance costs, electric motors provide an overall capital savings in comparison. Also, using an electric driver provides flexibility in power sources, which may become more relevant in the shifting energy landscape. If all facilities used electric drivers, the backup power generation systems can be standardized around diesel fuel as well.

All existing clear wells are currently equipped with electric motors and backup generation, with the exception of Well 1 (which lacks a backup generator) and Well 5 (which is natural gas driven with a backup propane fuel tank). It is recommended that a truck-mounted portable generator be purchased for Well 1, and the drives at Well 5 be replaced with electric motors along with diesel backup generators once the existing equipment reaches the end of its useful life. The natural gas engines and generators at each reservoir should each be replaced with electric motors and diesel generators. The reservoirs are critical to meeting peak day demands, and considering that the natural gas engines are nearing the end of their useful life, replacing with electric motors is recommended. The pumps at the MWRF are currently electric and do not require upgrades, but it is recommended that a diesel generator and fuel tank be installed as a backup energy supply. However, backup power at the MWRF is a relatively low priority compared to the other recommendations. The recommended improvements are outlined in Table ES-2 below.

Table ES-2. Summary of Recommended Improvements

Site	Existing		Recommended	
	Primary	Backup	Primary	Backup
Reservoir 1 BPS	(3) 137 hp natural gas engines	(2) natural gas generators; (1) 1,200 gal propane tank	(3) 150 hp electric motors	(1) 1,000 kW diesel generator; (1) 2,000 gal diesel fuel tank
Reservoir 2 BPS	(4) 369 hp natural gas engines	(1) natural gas generator; (1) 1,200 gal propane tank	(4) 400 hp electric motors	(1) 2,000 kW diesel generator; (1) 3,000 gal diesel fuel tank
MWRF	(2) 400 hp well pumps; (3) 350 hp high lift pumps; (2) 250 hp feed pumps; (4) 100 kW CIP tank heaters; (3) 40 hp product transfer pumps; (2) 30 hp degasifier blowers; (3) 30 hp CO2 booster pumps	On-site generator for shutdown only	No upgrades necessary	(1) 2,500 kW diesel generator; (1) 4,000 gal diesel fuel tank

Since each on-site fuel storage tank is sized for 24 hours of operation, Mesa Water can also install a centralized bulk diesel fuel storage tank to replenish on-site fuel tanks during a prolonged emergency. It is recommended that two (2) 30,000 gallon tanks be installed at a location to be determined in order to provide 10 days of overall operational capacity.

1.3 TM-3: Emergency Supply Chain Reliability and Disruption

Technical Memorandum No. 3 (TM-3) focuses on the following Emergency Supply Chain Reliability and Disruption Assessment (ESCRDA) tasks:

- Perform Supply Chain Analysis (SCA) of typical materials and services used during routine operation;
- Perform Single Points of Failure Analysis (SPFA) for each core production facility;
- Conduct GAP analysis for core production facilities after application of emergency scenarios;
- Evaluate suitability of storage for necessary equipment/parts needed during emergency scenarios; and
- Evaluate diesel fuel storage needed to supply backup power during emergency scenarios.

For the SCA, Mesa Water's crucial material and service suppliers are categorized as a low, medium, or high risk for failure based on physical constraints, practices, and past history. From the results, it is recommended that Mesa Water identify backup suppliers for carbon dioxide and water quality analyses. Also, temporary provisions such as diesel, aggregates, pipe repair materials, and street repair materials should be stored in the event of an emergency. For the SPFA, systems and equipment at each facility are assigned a risk factor based on their ability to interrupt production and their available redundancy. Based on the findings, a number of recommendations are made to mitigate the quantity of single points of failure, ranging from mechanical, electrical, and instrumentation modifications. To further mitigate risks, it is also recommended that Mesa Water stock spare parts for crucial equipment, including but not limited to spare pumps, valves, and programmable logic controllers (PLCs). As there is little additional space for storage at existing facilities, the parts recommended in TM-3 should be stored in a new centralized warehouse, which could be located at either of the proposed sites for new Wells 12 and 14 or at the centralized bulk fuel storage depot site.

1.4 Overall Recommendations

The overall recommendations across all technical memorandums are provided in Table ES-3. The recommendations are categorized as short-term (one to five years) or long-term (greater than five years) and are ordered by priority. Prioritization is based on several factors, including criticality, ease of implementation, cost, and return on investment.

Table ES-3. Overall Recommendations

Priority	Recommendation	Estimated Cost
Short-Term Decisions (1-5 years)		
1	Minimize single points of failure with new equipment and instrumentation. Procure spare parts for critical equipment and instrumentation. Implement asset management system.	$1.1M(1)
	Construct new storage warehouse (Location TBD).	$0.2M
2	Replace pump motors at Reservoirs 1 and 2 with electric motors. Provide backup diesel generators and fuel storage.	$2.8M
3	Provide truck-mounted portable generator system for Well 1.	$0.5M
	Drill new well at Well 5 and provide electrical drives, backup power, and associated electrical improvements.	$1.5M
4	Construct centralized bulk diesel fuel storage tanks to replenish onsite fuel tanks during a prolonged emergency.	$3.5M
Long-Term Decisions (5+ years)		
5	Evaluate installation of additional clear wells or MWRF expansion.	Up to $32M
6	Provide backup power generation and fuel storage for the MWRF.	$1.0M

1. *Costs derived from Table 8-1 in TM-3.*

In the short term, making minor system improvements is the top priority, as it is simple to execute and can quickly eliminate several reliability risks. Additionally, storing spare parts allows these critical system components to remain available even during a supply chain emergency. A new warehouse can be considered to centralize and protect these critical spare parts as well. Replacing the pump drives and providing backup power at Reservoirs 1 and 2 is the next priority. Although costly, the reservoirs are critical for meeting peak water demands, especially during an emergency. Installing electric motors and diesel powered generators is an improvement in reliability compared to the existing equipment. Providing backup generation at Well 1 and upgrading the propane backup equipment at Well 5 is particularly important because the clear wells provide the bulk of water supplies during an emergency. Once all on-site backup power systems within the supply system are standardized around diesel powered generators, constructing a bulk diesel storage tank would provide an additional level of energy security during prolonged electrical and supply chain outages.

In the long term, Mesa Water can evaluate the feasibility of additional clear wells and MWRF treatment. Providing enough additional infrastructure to account for the worst-case scenarios examined where MWD water is unavailable will cost up to an estimated $32M in capital improvements. However, this estimate should be viewed as an upper limit. The value and extent of the additional insurance needed is open for discussion and should be examined closer in further studies. Although much lower in cost, providing additional backup power at the MWRF is the lowest priority recommendation. The MWRF is less critical during an emergency due to its lower overall capacity in comparison to the capacity of the clear well supply system. In addition, the need for chemicals in the treatment process adds another layer of vulnerability to the MWRF during a disaster, which will not be mitigated with the addition of backup power.

Overall, Mesa Water has taken great strides to reliably meet typical water demands using exclusively local supplies. With the aforementioned recommendations, Mesa Water can take its objectives a step further to remain reliable even during uncertain emergencies and natural disasters.

Technical Memorandum No. 1

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Prepared for: Mesa Water District

Project Title: Water Supply, Energy, and Supply Chain Reliability Assessment

Project No.: 155448.150

Technical Memorandum No. 1

Subject: Water Supply Reliability Assessment

Date: December 4, 2020

To: Phil Lauri, Mesa Water District Assistant General Manager

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List of Tables

Abbreviations

AF	acre-feet
AFY	acre-feet per year
Basin	Orange County Groundwater Basin
BC	Brown and Caldwell
BEA	Basin Equity Assessment
BPP	Basin Production Percentage
cfs	cubic feet per second
FYE	fiscal year ending
gpm	gallons per minute
GWRS	Groundwater Replenishment System
Mesa Water	Mesa Water District
MG	million gallons
MGD	million gallons per day
MWD	Metropolitan Water District of Southern California
MWDOC	Municipal Water District of Orange County
MWRF	Mesa Water Reliability Facility
OCWD	Orange County Water District
O&M	Operations and Maintenance
PSOP	Production Systems Operations Plan
RA	Replenishment Assessment
RTS	Readiness-to-Serve
TM-1	Technical Memorandum No. 1
UWMP	Urban Water Management Plan
WSRA	Water Supply Reliability Assessment
WSA	Water Supply Assessment
YTD	Year to date

Section 1: Introduction

Mesa Water District (Mesa Water) engaged Brown and Caldwell (BC) to conduct a Water Supply, Energy, and Supply Chain Reliability Assessment with the following objectives:

1. Evaluate existing water supply capacities relative to meeting 115 percent of all demand seasons using local groundwater resources;
2. Evaluate existing Mesa Water energy supply capacities, types, and backup capabilities relative to ensuring reliable groundwater supplies can be pumped and distributed during normal and emergency operations;
3. Identify water supply and energy reliability gaps (from Objectives Nos. 1 and 2) and provide recommended solutions;
4. Evaluate Mesa Water's Supply Chain system relative to emergency readiness; and
5. Identify Supply Chain system reliability gaps (from Objective No. 4) and provide recommended solutions.

1.1 Purpose

Technical Memorandum No. 1 (TM-1) is one of the components of Mesa Water's overall assessment of water supply, energy, and supply chain reliability. TM-1 focuses on the following Water Supply Reliability Assessment (WSRA) components:

- Evaluate Mesa Water's current and future water demands;
- Confirm Mesa Water's current and future water supply capacity against demands;
- Conduct GAP analysis applying various emergency and operational scenarios to Mesa Water's water sources; and
- Present cost-efficient solutions to address water supply deficiencies identified in the GAP analysis.

1.2 Background

Mesa Water is located within the County of Orange and serves approximately 17,00 acre-feet per year (AFY) to approximately 110,000 people throughout the City of Costa Mesa, a portion of the City of Newport Beach, and John Wayne Airport.

Mesa Water can supply its service area from a variety of sources including groundwater and imported water, when needed. Currently, Mesa Water owns and operates five (5) clear wells with an approximate capacity of 13 million gallons per day (MGD) from the Orange County Groundwater Basin (Basin). Two (2) additional aquifer-production wells are also available to pump and treat up to 8.6 MGD of deep aquifer amber-tinted (organic) groundwater through the Mesa Water Reliability Facility (MWRF).

In October 2019, Mesa Water performed a Water Supply Assessment (WSA) as part of a proposed high-density development project to be constructed in the City of Costa Mesa (One Metro West Project). The purpose of the WSA was to satisfy requirements under Senate Bill 610 (SB 610), Water Code Section 10910 et seq., and Senate Bill 221 (SB 221). Government Code Section 66473.7 requires that adequate water supplies be or will be available to meet the water demand associated with the One Metro West Project. Using projected demands identified in Mesa Water's *2015 Urban Water Management Plan* (UWMP), the WSA concluded that Mesa Water's water supply can adequately meet existing and future water demands. Mesa Water is the only water supplier in Orange County that is currently 100 percent reliable on local water supplies and has not needed to purchase imported water from outside resources (Metropolitan Water District of Southern California) in recent years.

However, the 2019 WSA did not consider any situations which would potentially affect or reduce Mesa Water's supplies for an extended period of time during an emergency situation. TM-1 further expands on the WSA by analyzing Mesa Water's water supply program if emergency and operational scenarios caused certain water sources to be unavailable. Three scenarios are evaluated in this memorandum. Scenario 1 presents a baseline for comparison in which all water supplies are available. Scenario 2 presents three separate disaster situations in which local supplies are either partially or completely unavailable and imported water may or may not be available as a back-up supply. In Scenario 2a, one clear well is not available, and the MWRF is unavailable. In Scenario 2b, several clear wells are unavailable, and the MWRF is available. In Scenario 2c, nearly all clear wells are unavailable, and the MWRF is unavailable, however, imported water is available as a back-up. Lastly, Scenario 3 simulates that local production is partially impaired due to extended maintenance while imported water supplies are still available. In the event any deficiencies are identified in Mesa Water's supply, various solutions are presented to increase the water supply to meet the necessary demands.

The following major documents were used to develop TM-1:

1. 2019 Water Supply Assessment
2. 2015 Urban Water Management Plan
3. 2014 Water Master Plan Update
4. 2019 Orange County Water District (OCWD) Engineer's Report
5. Mesa Water's Water Supply Reports for Fiscal Year Ending (FYE) 2019 and 2020
6. Production System Operations Plan (PSOP)

Section 2: Water Demands

Water usage demands are broken down into the following customer account use types: single family, multi-family, institutional, commercial, industrial, irrigation, and other. Irrigation demands will be examined further in Section 4, as Mesa Water has the option to call for restricted landscaping water usage during an emergency event as described in the water shortage contingency plan.

2.1 Annual Water Demands

TM-1 demand data was pulled from Mesa Water supply reports for the most recent two fiscal years (i.e. July 1, 2018 through June 30, 2020) as well as projections through 2040. Table 2-1 summarizes the annual demands in acre-feet (AF) for each FYE that will serve as the basis for the GAP analysis. Data was derived from the WSA, unless otherwise noted. The breakdown of percent volume by customer type was extracted from the WSA and applied to the 2019 and 2020 demands for consistency.

Table 2-1. Water Demands (AF)

Customer Type	2019	2020	2025	2030	2035	2040
Single Family	4,920	4,936	5,975	5,995	6,015	6,036
Multi-Family	4,876	4,892	5,922	5,942	5,962	5,982
Institutional	1,084	1,087	1,316	1,321	1,325	1,330
Commercial	3,092	3,102	3,755	3,767	3,780	3,793
Industrial	287	288	349	350	351	353
Irrigation	1,792	1,798	2,176	2,184	2,191	2,198
Other	14	14	17	17	17	17
Total	**16,065**	**16,118**(1)	**19,510**	**19,576**	**19,641**	**19,709**

1. *From the FY20 Water Supply Report.*

Currently, irrigation accounts for 11.2 percent of the total water demand within Mesa Water's service area and includes landscaping for public parks, businesses, and golf courses. However, as further described in TM-1, a call for no irrigation may include some or all of the customer types in order to reduce total demands by up to 25 percent. This percentage will be used throughout TM-1 to represent demand reductions associated from a call for no irrigation during an emergency condition.

2.2 115 Percent Maximum Demands

Using the demand data presented under Section 2.1, the 115 percent demands were calculated by applying a factor of 1.15 to each year's demand. From there, the relevant peaking factors can be applied to arrive at the maximum day and maximum hour demands, which can be calculated using the peaking factors outlined in Table 2-2.

Table 2-2. Peaking Factors

Demand	Factor	Applied To
Max Day Demand	1.5	Annual average day demand
Max Hour Demand	1.5	Max day demand

The 115 percent maximum demands, as well as maximum day and maximum hour demands, are summarized in Table 2-3 on an annual and seasonal basis. The winter months are assumed to be November through April when demands are lowest. Summer months are assumed to be May through October when demands are highest.

Table 2-3. 115% Demands (AF/day)

Demand	2020	2025	2030	2035	2040
Annual Overview					
115% Year Average	50.8	61.5	61.7	61.9	62.1
115% Max Day	76.2	92.2	92.5	92.8	93.1
115% Max Hour	114.3	138.3	138.8	139.2	139.7
Winter Season					
115% Winter Average	43.2	52.3	52.5	52.7	52.8
Summer Season					
115% Summer Average	58.3	70.6	70.9	71.1	71.3

The table above illustrates how water demand increases steadily in the future. It also shows how water demands on a seasonal, daily, and hourly scale can fluctuate significantly. Throughout the succeeding GAP analysis, 115 percent demands are used as a conservative representation of annual demand. For additional conservatism, demands during period of emergencies are calculated using maximum day (150 percent) peaking factors.

Section 3: Water Supplies

3.1 Basin Characteristics

As Mesa Water's most cost effective and reliable source of supply, the Basin underlies the northerly half of Orange County beneath broad lowlands. There are three major aquifer systems subdivided by the basin's managing agency, OCWD; the shallow aquifer system, the principal aquifer system, and the deep aquifer system with the majority of the groundwater production coming from wells screened through the principal aquifer system and only a minor amount pumped from the deep aquifer system. Mesa Water happens to be one of the few agencies that pump and treat from the deep aquifer as further described under Section 3.3.

3.2 Clear Groundwater Wells

Mesa Water currently operates five (5) clear wells (Well 1, Well 3, Well 5, Well 7, and Well 9) with the ability to pump from the principal aquifer system. All wells are operated with electric motors, apart from Well 5, which is natural gas driven. Mesa Water is also in the process of constructing two (2) additional clear wells (Well 12 and Well 14) that will further increase Mesa Water's local water supply portfolio and reliability. Note that Wells 12 and 14 are assumed as 'Active' under TM-1. A summary of the clear well capacities can be found in Table 3-1. Both active and future pumping capacities will be considered as available supply in the succeeding GAP analysis.

Table 3-1. Clear Groundwater Well Production Capacity

Well	Status	Capacity (gpm)	Capacity (MGD)	Capacity (AFY)
Well 1	Active	2,300	3.31	3,710
Well 3	Active	1,600	2.30	2,581
Well 5	Active	2,200	3.17	3,549
Well 7	Active	1,300	1.87	2,097
Well 9	Active	1,800	2.59	2,903
Well 12	Active	3,000	4.32	4,839
Well 14	Active	3,000	4.32	4,839
Total Active Pumping Capacity		**15,200**	**21.89**	**24,518**

The capacities above represent the most stable well production rates based on pump system capacities and optimal production to limit excessive sand production and/or well casing damage. The OC Basin is not adjudicated and, as such, pumping from the OC Basin is managed through a process that uses financial incentives to encourage groundwater producers to pump a sustainable amount of water. The framework for the financial incentives is based on establishing the Basin Production Percentage (BPP), the percentage of each producer's total water supply that comes from groundwater pumped from the Basin. Groundwater production at or below the BPP is assessed a Replenishment Assessment (RA). While there is no legal limit as to how much an agency can pump from the Basin, there is a financial disincentive to pump above the BPP. Agencies that pump above the BPP are charged the RA plus the Basin Equity Assessment (BEA), which is calculated so the cost of groundwater production becomes approximately equal to the cost of purchasing imported water. The BEA can also be increased to discourage further pumping production above the BPP. The BPP is set uniformly for all producers by OCWD on an annual basis.

The BPP is set based on groundwater conditions and Basin management objectives. The supplies available for recharge must be estimated for a given year. The supplies of recharge water that are estimated are: 1) Santa Ana River stormflow, 2) Natural incidental recharge, 3) Santa Ana River baseflow, 4) Groundwater Replenishment System (GWRS) supplies, and 5) other supplies such as imported water and recycled water purchased for the Alamitos Barrier. The BPP is a major factor in determining the cost of groundwater production from the Basin for that year. In the succeeding sections of TM-1, a BPP limit of 77 percent is assumed for current and future supplies. Because the cost of pumping above the BPP is the same as imported water, pumping above the BPP may not be cost effective under certain GAP analysis scenarios.

3.3 Amber-Tinted Groundwater Wells and the MWRF

In order to supplement the clear wells, Mesa Water currently owns two (2) amber-tinted water wells that pump from the deep aquifer system. Both amber wells are located on-site at the MWRF, along with a 1.25 MG reservoir, and remove the organic amber color using nanofiltration. Nanofiltration removes organic color molecules and is protected from sand and particle fouling using sand separators upstream of the nanofiltration cartridge filters. Wells 6 and 11 also contain trace amounts of methane and hydrogen sulfide, which are removed through the nanofiltration system degasifiers. Polysulfides, which result in taste and odor concerns, are removed through sodium bisulfite addition prior to final chloramination for final disinfection upstream of the water reservoir.

Table 3-2 below summarizes the production capacities of the amber-tinted wells, which were confirmed by Mesa Water.

Table 3-2. Amber-Tinted Groundwater Well Capacity

Well	Status	Capacity (gpm)	Capacity (MGD)	Capacity (AFY)
Well 6	Active	3,000	4.32	4,839
Well 11	Active	3,000	4.32	4,839
Total Active Pumping Capacity		6,000	8.64	9,678
Total Treatment Capacity		**6,000**	**8.64**	**9,678**

OCWD encourages treating and pumping groundwater that does not meet drinking water standards in order to protect water quality, such as pumping from the deep aquifer and treating it through a facility like the MWRF. This is achieved by using a financial incentive called the BEA Exemption. The BEA Exemption is used to clean up and contain the spread of less desirable groundwater. OCWD uses a partial or total exemption of the BEA to compensate a qualified participating agency or producer for the costs of treating lower quality groundwater. Once OCWD authorizes a BEA exemption for a project, it is obligated to provide the replenishment water for the production above the BPP and forgo the BEA revenue that OCWD would otherwise receive from the producer. As a result, any production from amber-tinted wells and the MWRF does not contribute to Mesa Water's BPP.

3.4 Imported Water Turnouts

Mesa Water can supplement its local groundwater production capabilities with imported water purchased from Metropolitan Water District (MWD) through the local wholesaler, the Municipal Water District of Orange County (MWDOC). Table 3-3 summarizes the capacity of all imported water connections.

Table 3-3. Imported Water Capacity

Pipeline/Turnout	Active Number of Turnouts	Turnout Capacity (cfs)	Turnout Capacity (AFY)	Max Delivery Capacity (MGD)
OC-44	3	67	48,506	43.3
OC-14	1	10	7,239	6.5
CM-2	1	15	10,859	9.7
CM-6	1	4	2,896	2.6
Total	**6**	**96**	**69,500**	**62.1**

3.5 Reservoirs

Mesa Water owns and operates two (2) reservoirs (Reservoirs 1 and 2) that provide storage capabilities within the distribution system. Table 3-4 summarizes the capacities of these reservoirs.

Table 3-4. Reservoir Capacities

Reservoir	Storage Capacity (MG)	Flow Capacity (gpm)
Reservoir 1	9.5	10,250
Reservoir 2	18.7	15,000
Total	**28.2**	**25,250**

As described in the PSOP, these reservoirs may be used in lead-lag operation to meet demands during peak hours as well as provide additional pumping capacity throughout peak day demands. The reservoirs are replenished overnight when water demands are minimal. For the purposes of TM-1, it is assumed the reservoirs are available at all times and used for flow equalization.

Section 4: GAP Analysis and Cost Estimate

Using the demand and supply data from the preceding sections, a GAP analysis was performed to identify local water supply disparities under several operational or emergency scenarios. Three types of scenarios are examined. Scenario 1 represents normal operating conditions and establishes a baseline scenario for comparison. Scenario 2 consists of three different emergency scenarios, in which several supply options are impaired or non-operational. Finally, Scenario 3 simulates that several local supply options need critical repairs. For each case, the most cost-effective solution to address the supply deficiency is proposed. The conditions evaluated under each are summarized in Table 4-1. For the GAP analysis, Wells 12 and 14 are assumed to be operational.

Table 4-1. Summary of Scenario Conditions

Scenario	Operational Clear Wells	MWRF Capacity	MWD Import Available
1	7 of 7	100%	Yes
2a	6 of 7	0%	No
2b	4 of 7	100%	No
2c	2 of 7	0%	Yes
3	4 of 7	50%	Yes

4.1 Additional Supply Options and Cost Basis

Wherever there were gaps between water supply and demand, BC evaluated various supply options to address the deficiency. The supply options considered are as follows:

1. **Call for No Irrigation Usage:** Mesa Water can turn off all irrigation customers during an emergency condition. This option can reduce demands by up to 25 percent with negligible costs to Mesa Water. In the event a 25 percent reduction is not sufficient, Mesa Water has the ability to reduce consumption by up to 50 percent as noted under Mesa Water's Ordinance No. 26. Enacting restrictions such as this to reduce demand is used only as a last resort in the event that demands cannot be met with the available existing supply and any of the additional supply options below.
2. **Install Additional Clear Water Wells:** If existing clear well capacity is reached, additional clear wells can be installed to increase production capabilities.
3. **Increase MWRF Treatment Capacity:** If existing MWRF capacity is reached, additional treatment capacity can be installed. Treatment capacity is assumed to be expanded by treatment train, and up to two (2) additional trains can be installed.
4. **Purchase Imported Water from MWDOC:** Lastly, water may be imported from MWD via MWDOC. However, Mesa Water takes great pride in being 100 percent locally reliable and not using imported water as a routine part of its normal operations.

The production cost of each supply option is summarized in Table 4-2. These costs are on a per AF basis and only apply when water is being supplied.

Table 4-2. Production Cost Basis ($/AF)			
Supply Option	**Cost**	**Limitations**	**Cost Assumptions**
Base Supply Options			
Clear Wells(1)	$568	Up to BPP limit	Includes RA, energy, and chemicals. Does not include capital and O&M.
MWRF(2)	$594	Up to MWRF max capacity	Includes RA, energy, and chemicals minus LRP. Does not include capital and O&M.
Additional Supply Options			
Call for No Irrigation	$-	Up to 25% of total demand	Negligible cost to implement.
Additional Clear Wells(1)	$568	Cannot implement short-term (2020)	Includes RA, energy, and chemicals. Does not include capital and O&M.
Increase MWRF Capacity(2)	$594	Cannot implement short-term (2020)	Includes RA, energy, and chemicals minus LRP. Does not include capital and O&M.
Import from MWD(3)	$1,104		Does not include fixed fees.

1. *From Production Well Costs (2019)*
2. *From Regional MWRF Usage (2016)*
3. *Tier 1 supply rate in 2021*

Annualized capital and operations and maintenance (O&M) costs for additional clear wells or additional MWRF treatment capacity are considered as fixed costs rather than production costs, as the capital and maintenance costs for new equipment are applied regardless if the equipment is operational or not. In all the scenarios examined, the additional investment for clear wells beyond Wells 12 and 14 or MWRF expansion is not needed under normal conditions and is only required during an emergency condition. Also, for each scenario, where a portion of the existing clear wells are non-operational, it is assumed that the same proportion of any additional clear wells are non-operational as well, with fixed costs scaled accordingly. O&M costs are included for all existing clear wells, however, only Wells 12 and 14 require capital debt servicing. All other clear wells were paid off at the time when they were constructed. It is assumed that remaining capital debt servicing for the existing MWRF will be completed by 2027, so capital costs are included only for 2020 GAP scenarios and not in 2040. O&M costs for the MWRF are applied for all scenarios in both 2020 and 2040.

Purchase of imported water from MWD through MWDOC also includes several fixed annual fees for their services, such as the Readiness-to-Serve Charge (RTS) based on an agency's four-year rolling average of purchases compared to other MWDOC member agencies. In order to compare each scenario more effectively, the costs in the subsequent years will be annualized and included in the cost for the current year evaluated. It is also assumed that an emergency condition will not be encountered for at least three subsequent years. The Capacity Charge is based on an agency's highest one-day flow experienced over the past three years. Similarly, the charges in the subsequent years will be annualized and included in the current year evaluated for comparison. MWDOC also collects revenue through a Retail Meter Charge based on the quantity of retail meters in service. This fee is omitted from the GAP analysis since it is charged regardless of use and will not differ between any of the scenarios examined. Annual fixed costs are summarized in Table 4-3.

Table 4-3. Annual Fixed Costs			
Supply Option	Cost	Unit Notes	Cost Assumptions
Capital Costs			
Existing Clear Wells	$1,104,589		Includes capital for Wells 12 and 14 and O&M for all existing wells, running or idle.
Existing MWRF	$2,732,200		2020 cost. Includes capital and O&M for the existing MWRF, running or idle.
	$232,200		2040 cost. Includes O&M for the existing MWRF, running or idle. Assumes capital debt servicing is completed by 2027.
Additional Clear Wells(1)	$85	Per AFY of additional production capacity needed	Includes capital and O&M. Assumes capital costs are scalable based on production capacity.
MWRF Expansion(2)	$728,053	For up to +3,000 gpm capacity	Includes capital. Based on expansion by one treatment train.
	$1,262,918	For up to +6,000 gpm capacity	Includes capital. Based on expansion by two treatment trains.
MWD & MWDOC Fixed Fees			
Readiness-to-Serve Charge (RTS)(3)	$113,546	Per percent of 4-year average of water share among all MWDOC customers	Assumes combined 4-year average volume among all other MWDOC customers is 206,178 AF. Cost based on 2020-2021 MWDOC RTS rate. Charged for subsequent years.
Capacity Charge(3)	$10,700	Per cfs of peak delivery from the past 3 years	2021 MWD capacity charge. Charged only if used and applied to subsequent years.

1. *From Production Well Costs (2019)*
2. *Rough order of magnitude*
3. *From MWDOC Water Rates and Charges - 2021 (2020)*

To compare between scenarios, total annual costs are calculated as follows:

$$[Total\ Costs] = [Production\ Costs] + [Fixed\ Costs]$$

$$[Production\ Costs] = [Clear\ Well\ Production] + [MWRF\ Production] + [MWD\ Imports]$$

$$[Fixed\ Costs] = [Clear\ Well] + [MWRF] + [RTS\ Charge] + [Capacity\ Charge]$$

An expanded description of the cost basis and calculations are provided in Attachment A.

4.2 Overall Assumptions

For each scenario, cases for both 2020 and 2040 are examined. Demands and supplies are compared on a monthly basis. To represent a worst-case scenario, the emergency conditions described in each scenario are applied to August, where demands are typically highest. Maximum day (150 percent) demands are used for the entire duration of August. For all other months, 115 percent demand is used, and supplies are available as described under the normal operating conditions of Scenario 1.

To represent typical operation in Scenario 1, the percentage of total supply from the MWRF will match the FY2020 MWRF usage. For Scenarios 2 and 3, MWRF usage in the months following the emergency in August is scaled such that clear well production is maximized and the year-to-date BPP is 77 percent. BPP is calculated as the percentage of total supply derived from clear well production from both existing and new clear wells.

When a supply deficiency is identified in a scenario, the available additional supply options are chosen to minimize total cost. For cases in 2020, it is assumed that additional clear wells and MWRF expansion are not viable options. These options require time and planning for engineering and construction and therefore cannot be implemented immediately. A call for no irrigation is used as the last resort to address a supply deficit. As a result of other additional supply options being available by 2040, a call for no irrigation is only assumed as a viable option under 2020 cases.

To ensure that peak hour demands can be fulfilled during an emergency condition, the maximum storage and flow capacities of Mesa Water's two reservoirs shall be used. It is assumed that none of the emergency conditions will affect the pumping rates of these reservoirs.

4.3 Scenario 1 – Normal Operating Conditions

The purpose of this scenario is to simulate normal operating conditions, as described in the PSOP and provide a baseline for the other scenarios. Under this scenario, the following conditions shall apply:

- All wells are operational with routine maintenance being performed. Downtime for Well 5 is four days per month and one day per month for all other clear water wells.
- The MWRF is operational and at full capacity.
- MWD supplies are available as a back-up supply.

The resulting available water supply is summarized in Table 4-4.

Table 4-4. Scenario 1 Available Supplies

Source	Baseline Capacity (AF/month)
Clear Wells	1,947
Well 1	299
Well 3	208
Well 5	257
Well 7	169
Well 9	234
Well 12	390
Well 14	390
MWRF	807
Local Subtotal	**2,754**
MWD Back-Up	5,792
Total	**8,545**

It should be noted that clear well production capacity to-date is 1,167 AF/month. However, the addition of new Wells 12 and 14 is in progress and will be available within the next couple years. For the purposes of TM-1, these new wells will be assumed available in 2020 scenarios in order to help meet increased water demands.

4.3.1 Scenario 1 – 2020

A GAP analysis was performed for Scenario 1 using 2020 demands. Tables 4-5 and 4-6 summarize the results.

Table 4-5. Scenario 1, 2020 GAP Analysis (AF)

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	YTD
115% Demand	1,847	1,892	1,784	1,747	1,488	1,182	1,316	1,370	1,290	1,242	1,626	1,752	**18,536**
Base Supply Options													
Clear Wells	1,369	1,408	1,335	1,396	1,232	1,182	1,316	1,095	1,060	777	917	982	**14,068**
MWRF(1)	479	484	449	352	255	-	-	275	230	465	709	770	**4,468**
115% GAP Deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-
Additional Supply Options													
Call for No Irrigation	-	-	-	-	-	-	-	-	-	-	-	-	-
Additional Clear Wells	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
Expand MWRF Capacity	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
Import from MWD	-	-	-	-	-	-	-	-	-	-	-	-	-
Remaining GAP Deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-

1. *Percentages of monthly supplies from the MWRF match FY2020 MWRF usage.*

Table 4-6. Scenario 1, 2020 Costs

Production Costs	$10,644,436
Fixed Costs	$3,836,789
Total Cost	**$14,481,225**
YTD BPP	75.9%

Under baseline conditions, Mesa Water currently has the supply capabilities to meet 115 percent demands, with the assumption that Wells 12 and 14 are operational. Peak hour demands can be met using reservoir pumping capacity. No additional actions or supply infrastructure are needed. The baseline production cost in 2020 is $14.5M annually.

4.3.2 Scenario 1 - 2040

A GAP analysis was performed for Scenario 1 using 2040 demands. Tables 4-7 and 4-8 summarize the results.

Table 4-7. Scenario 1, 2040 GAP Analysis (AF)

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	YTD
115% Demand	2,259	2,313	2,181	2,137	1,819	1,446	1,609	1,675	1,577	1,519	1,988	2,143	**22,665**
Base Supply Options													
Clear Wells	1,673	1,722	1,632	1,707	1,507	1,446	1,609	1,339	1,296	950	1,182	1,336	**17,398**
MWRF[(1)]	585	591	549	430	312	-	-	336	281	569	807	807	**5,267**
115% GAP Deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-
Additional Supply Options													
Call for No Irrigation	-	-	-	-	-	-	-	-	-	-	-	-	-
Additional Clear Wells	-	-	-	-	-	-	-	-	-	-	-	-	-
Expand MWRF Capacity	-	-	-	-	-	-	-	-	-	-	-	-	-
Import from MWD	-	-	-	-	-	-	-	-	-	-	-	-	-
Remaining GAP Deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-

1. *Percentages of monthly supplies from the MWRF match FY2020 MWRF usage.*

Table 4-8. Scenario 1, 2040 Costs

Production Costs	$13,010,870
Fixed Costs	$1,336,789
Total Cost	**$14,347,659**
YTD BPP	76.8%

Even with increased demands by 2040, Mesa Water's existing local supply infrastructure is equipped to meet 115 percent demands. In the absence of an emergency, no further improvements are needed. Reservoir pumping will ensure peak hour demands are met. The baseline cost in 2040 is $14.3M annually.

4.4 Scenario 2a – Emergency Condition 1

Scenario 2a simulates that a local or regional emergency has occurred (e.g., Earthquake, fires, flood, etc.) that will last for 30 calendar days. Most clear water wells are operational, but MWRF production and MWD supplies are unavailable. Under this scenario, the following conditions shall apply:

- Six of seven clear water wells (Well 5 not available) are operational with routine maintenance deferred.
- The MWRF is not available.
- MWD supplies are not available as a back-up supply.

The resulting available water supply is summarized in Table 4-9. After the 30-day emergency, the capacities of each well return to the baseline condition. Note that the capacities of each available well are higher during the emergency condition since routine maintenance is deferred.

Table 4-9. Scenario 2a Available Supplies

Source	Emergency Capacity (AF/month)	Baseline Capacity (AF/month)
Clear Wells	1,747	1,947
Well 1	309	299
Well 3	215	208
Well 5	-	257
Well 7	175	169
Well 9	242	234
Well 12	403	390
Well 14	403	390
MWRF	-	807
Local Subtotal	**1,747**	**2,754**
MWD Back-Up	-	5,792
Total	**1,747**	**8,545**

4.4.1 Scenario 2a – 2020

A GAP analysis was performed for Scenario 2a using 2020 demands. Tables 4-10 and 4-11 summarize the results.

Table 4-10. Scenario 2a, 2020 GAP Analysis (AF)

	Jul	Aug[(1)]	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	YTD
115% Demand	1,847	2,468	1,784	1,747	1,488	1,182	1,316	1,370	1,290	1,242	1,626	1,752	**19,111**
Base Supply Options													
Clear Wells	1,369	1,747	1,300	1,369	1,213	1,182	1,316	1,074	1,042	741	863	946	**14,161**
MWRF[(2)]	479	N/A	483	379	275	-	-	296	248	501	763	807	**4,230**
115% GAP Deficiency	-	720	-	-	-	-	-	-	-	-	-	-	**720**
Additional Supply Options													
Call for No Irrigation	-	617	-	-	-	-	-	-	-	-	-	-	**617**
Additional Clear Wells	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**-**
Expand MWRF Capacity	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**-**
Import from MWD	-	N/A	-	-	-	-	-	-	-	-	-	-	**-**
Level 2 Shortage	-	103	-	-	-	-	-	-	-	-	-	-	**103**
Remaining GAP Deficiency	-	-	-	-	-	-	-	-	-	-	-	-	**-**

1. *August demand shown reflects max day (150 percent) demand applied throughout the entire month. 30-day emergency analysis performed for August.*
2. *Percentages of monthly supplies from the MWRF match FY2020 MWRF usage prior to August emergency. After August, MWRF usage is adjusted to maximize clear well production while maintaining YTD BPP of 77 percent.*

Table 4-11. Scenario 2a, 2020 Costs

Production Costs	$10,556,217
Fixed Costs	$3,836,789
Total Cost	**$14,393,006**
YTD BPP	77.0%

Because MWD supplies are not available and expansion of clear wells or MWRF production cannot be implemented in the short-term, under this scenario Mesa Water would not be able to meet demands in August, even with a call for no irrigation. However, if desired, Mesa Water also has the ability to enact a Level 2 Water Supply Shortage, as described in Mesa Water's Ordinance No. 26. This action can decrease usage by up to 30 percent and reduce demand to within the available local supply. Conservation measures covered by a Level 2 action include, but are not limited to, designated watering days, obligation to fix leaks and malfunctions, and limits on filling ornamental water features. This case illustrates how, in the short-term, increased regulation can help mitigate an emergency supply deficit. In the long-term, Mesa Water has additional options at its disposal, as shown in the following case.

4.4.2 Scenario 2a – 2040

A GAP analysis was performed for Scenario 2a using 2040 demands. Tables 4-12 and 4-13 summarize the results.

Table 4-12. Scenario 2a, 2040 GAP Analysis (AF)

	Jul	Aug(1)	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	YTD
115% Demand	2,259	3,017	2,181	2,137	1,819	1,446	1,609	1,675	1,577	1,519	1,988	2,143	**23,369**
Base Supply Options													
Clear Wells	1,673	1,747	1,477	1,585	1,419	1,446	1,609	1,244	1,216	790	1,182	1,336	**16,724**
MWRF(2)	585	N/A	704	551	400	-	-	431	361	729	807	807	**5,375**
115% GAP Deficiency	-	1,270	-	-	-	-	-	-	-	-	-	-	**1,270**
Additional Supply Options													
Call for No Irrigation	-	-	-	-	-	-	-	-	-	-	-	-	-
Additional Clear Wells	-	1,270	-	-	-	-	-	-	-	-	-	-	**1,270**
Expand MWRF Capacity	-	N/A	-	-	-	-	-	-	-	-	-	-	-
Import from MWD	-	N/A	-	-	-	-	-	-	-	-	-	-	-
Remaining GAP Deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-

1. *August demand shown reflects max day (150 percent) demand applied throughout the entire month. 30-day emergency analysis performed for August.*
2. *Percentages of monthly supplies from the MWRF match FY2020 MWRF usage prior to August emergency. After August, MWRF usage is adjusted to maximize clear well production while maintaining YTD BPP of 77 percent.*

Table 4-13. Scenario 2a, 2040 Costs

Production Costs	$13,413,578
Fixed Costs	$2,848,091
Total Cost	**$16,261,668**
YTD BPP	77.0%

By 2040, capital improvements can be implemented to expand clear well production. Since the MWRF is unavailable in this case, expanding MWRF capacity is not a viable option. To meet demands under these supply conditions, additional clear wells will be needed to provide an additional 1,270 AF in one month. Assuming a portion of the new clear wells are non-operational like the existing clear wells, at least four (4) additional 3,000 gpm clear wells are needed along with the use of reservoir pumping to meet peak hour demands. MWRF usage will need to increase in the subsequent months to compensate for the increased clear well production in August and to stay below the YTD BPP. Annual costs would exceed baseline 2040 costs by $1.9M. Capital improvements would cost an estimated $31.8M over the life of a 30-year debt.

4.5 Scenario 2b – Emergency Condition 2

Scenario 2b simulates that a local or regional emergency has occurred (e.g., Earthquake, fires, flood, etc.) that will last for 30 calendar days. The MWRF and some clear water wells are operational, but MWD supplies are unavailable. Under this scenario, the following conditions shall apply:

- Four of seven clear water wells (Wells 3, 12, and 14 not available) are operational with routine maintenance deferred.
- The MWRF is available.
- MWD supplies are not available as a back-up supply.

The resulting available water supply is summarized in Table 4-14. After the 30-day emergency, the capacities of each well return to the baseline condition. Note that the capacities of each available well are higher during the emergency condition since routine maintenance is deferred.

Table 4-14. Scenario 2b Available Supplies

Source	Emergency Capacity (AF/month)	Baseline Capacity (AF/month)
Clear Wells	1,022	1,947
Well 1	309	299
Well 3	-	208
Well 5	296	257
Well 7	175	169
Well 9	242	234
Well 12	-	390
Well 14	-	390
MWRF	807	807
Local Subtotal	**1,828**	**2,754**
MWD Back-Up	-	5,792
Total	**1,828**	**8,545**

4.5.1 Scenario 2b – 2020

A GAP analysis was performed for Scenario 2b using 2020 demands. Tables 4-15 and 4-16 summarize the results.

Table 4-15. Scenario 2b, 2020 GAP Analysis (AF)

	Jul	Aug(1)	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	YTD
115% Demand	1,847	2,468	1,784	1,747	1,488	1,182	1,316	1,370	1,290	1,242	1,626	1,752	**19,111**
Base Supply Options													
Clear Wells	1,369	1,022	1,404	1,450	1,272	1,182	1,316	1,137	1,095	849	1,027	1,101	**14,223**
MWRF(2)	479	807	379	297	216	-	-	233	194	393	599	651	**4,249**
115% GAP Deficiency	-	640	-	-	-	-	-	-	-	-	-	-	**640**
Additional Supply Options													
Call for No Irrigation	-	617	-	-	-	-	-	-	-	-	-	-	**617**
Additional Clear Wells	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**-**
Expand MWRF Capacity	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**-**
Import from MWD	-	N/A	-	-	-	-	-	-	-	-	-	-	**-**
Level 2 Shortage	-	23	-	-	-	-	-	-	-	-	-	-	**23**
Remaining GAP Deficiency	-	-	-	-	-	-	-	-	-	-	-	-	**-**

1. *August demand shown reflects max day (150 percent) demand applied throughout the entire month. 30-day emergency analysis performed for August.*
2. *Percentages of monthly supplies from the MWRF match FY2020 MWRF usage prior to August emergency. After August, MWRF usage is adjusted to maximize clear well production while maintaining YTD BPP of 77 percent.*

Table 4-16. Scenario 2b, 2020 Costs

Production Costs	$10,602,509
Fixed Costs	$3,836,789
Total Cost	**$14,439,298**
YTD BPP	77.0%

In this scenario, water demands are nearly met with a 25 percent usage reduction from a call for no irrigation, showing that current MWRF production is not quite enough to provide the necessary capacity if several clear wells are non-operational and imported water cannot be used as a back-up supply. If a Level 2 Water Supply Shortage is enacted, the usage reduction can extend up to 30 percent, and all demands would be met with the available supply. As described in Scenario 2a, conservation measures covered under a Level 2 shortage include designated watering days, obligation to fix leaks and malfunctions, and limits on filling ornamental water fixtures. Similar to the 2020 case of Scenario 2a, additional regulation can mitigate a supply shortage in the short-term, but additional options are available in the long run given adequate time for infrastructure improvements.

4.5.2 Scenario 2b - 2040

A GAP analysis was performed for Scenario 2b using 2040 demands. Tables 4-17 and 4-18 summarize the results.

Table 4-17. Scenario 2b, 2040 GAP Analysis (AF)

	Jul	Aug(1)	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	YTD
115% Demand	2,259	3,017	2,181	2,137	1,819	1,446	1,609	1,675	1,577	1,519	1,988	2,143	**23,369**
Base Supply Options													
Clear Wells	1,673	1,022	1,774	1,818	1,588	1,446	1,609	1,426	1,369	1,097	1,346	1,445	**17,612**
MWRF(2)	585	807	407	319	231	-	-	249	208	421	642	698	**4,568**
115% GAP Deficiency	-	1,189	-	-	-	-	-	-	-	-	-	-	**1,189**
Additional Supply Options													
Call for No Irrigation	-	-	-	-	-	-	-	-	-	-	-	-	-
Additional Clear Wells	-	382	-	-	-	-	-	-	-	-	-	-	**382**
Expand MWRF Capacity	-	807	-	-	-	-	-	-	-	-	-	-	**807**
Import from MWD	-	N/A	-	-	-	-	-	-	-	-	-	-	-
Remaining GAP Deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-

1. *August demand shown reflects max day (150 percent) demand applied throughout the entire month. 30-day emergency analysis performed for August.*
2. *Percentages of monthly supplies from the MWRF match FY2020 MWRF usage prior to August emergency. After August, MWRF usage is adjusted to maximize clear well production while maintaining YTD BPP of 77 percent.*

Table 4-18. Scenario 2b, 2040 Costs

Production Costs	$13,413,577
Fixed Costs	$3,282,204
Total Cost	**$16,695,781**
YTD BPP	77.0%

Because it is assumed that a portion of any additional clear wells are non-operational, the scaled capital costs makes installing more clear wells a less desirable option to meet the supply deficit. To minimize costs, MWRF capacity is expanded as much as possible (two additional treatment trains), however, this alone is not enough to address the deficit. Then, additional clear wells would be installed to meet the remaining deficit of 382 AF. At least two (2) new 3,000 gpm wells would be needed, assuming some were affected by the emergency. Again, reservoir pumping will be needed to meet peak hour demands. With this proposed solution, annual costs would exceed baseline 2040 costs by $2.3M. Capital improvements would cost an estimated $31.4M over the life of a 30- year debt.

4.6 Scenario 2c – Emergency Condition 3

Scenario 2c simulates that a local or regional emergency has occurred (e.g., Earthquake, fires, flood, etc.) that will last for 30 calendar days. Few clear water wells are operational, and the MWRF is unavailable. However, MWD services are available for back-up supply. Under this scenario, the following conditions shall apply:

- Two of seven clear water wells are operational (Wells 1, 3, 5, 7, and 9 not available) with routine maintenance deferred.
- The MWRF is not available.
- MWD supplies are available as a back-up supply.

The resulting available water supply is summarized in Table 4-19. After the 30-day emergency, the capacities of each well return to the baseline condition. Note that the capacities of each available well are higher during the emergency condition since routine maintenance is deferred.

Table 4-19. Scenario 2c Available Supplies

Source	Emergency Capacity (AF/month)	Baseline Capacity (AF/month)
Clear Wells	807	1,947
Well 1	-	299
Well 3	-	208
Well 5	-	257
Well 7	-	169
Well 9	-	234
Well 12	403	390
Well 14	403	390
MWRF	-	807
Local Subtotal	**807**	**2,754**
MWD Back-Up	5,792	5,792
Total	**6,598**	**8,545**

4.6.1 Scenario 2c – 2020

A GAP analysis was performed for Scenario 2c using 2020 demands. Tables 4-20 and 4-21 summarize the results.

Table 4-20. Scenario 2c, 2020 GAP Analysis (AF)

	Jul	Aug[(1)]	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	YTD
115% Demand	1,847	2,468	1,784	1,747	1,488	1,182	1,316	1,370	1,290	1,242	1,626	1,752	**19,111**
Base Supply Options													
Clear Wells	1,369	807	1,495	1,521	1,323	1,182	1,316	1,193	1,142	943	1,170	1,256	**14,716**
MWRF[(2)]	479	N/A	289	226	164	-	-	177	148	299	456	496	**2,734**
115% GAP Deficiency	-	1,661	-	-	-	-	-	-	-	-	-	-	**1,661**
Additional Supply Options													
Call for No Irrigation	-	-	-	-	-	-	-	-	-	-	-	-	-
Additional Clear Wells	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
Expand MWRF Capacity	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
Import from MWD	-	1,661	-	-	-	-	-	-	-	-	-	-	**1,661**
Remaining GAP Deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-

1. *August demand shown reflects max day (150 percent) demand applied throughout the entire month. 30-day emergency analysis performed for August.*
2. *Percentages of monthly supplies from the MWRF match FY2020 MWRF usage prior to August emergency. After August, MWRF usage is adjusted to maximize clear well production while maintaining YTD BPP of 77 percent.*

Table 4-21. Scenario 2c, 2020 Costs

Production Costs	$11,816,794
Fixed Costs	$4,812,113
Total Cost	**$16,628,907**
YTD BPP	77.0%

MWD back-up supplies provide an immediate option to address the remaining supply deficit such that the overall gap deficiency is eliminated. Peak hour demands are still met by pumping from the reservoirs. As noted in Section 4.1, fixed costs would be incurred for using MWD supplies. By importing water, costs would exceed baseline 2020 costs by $2.1M.

4.6.2 Scenario 2c – 2040

A GAP analysis was performed for Scenario 2c using 2040 demands. Tables 4-22 and 4-23 summarize the results.

Table 4-22. Scenario 2c, 2040 GAP Analysis (AF)

	Jul	Aug(1)	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	YTD
115% Demand	2,259	3,017	2,181	2,137	1,819	1,446	1,609	1,675	1,577	1,519	1,988	2,143	**23,369**
Base Supply Options													
Clear Wells	1,673	807	1,851	1,878	1,631	1,446	1,609	1,473	1,408	1,177	1,467	1,576	**17,994**
MWRF(2)	585	N/A	330	259	188	-	-	202	169	342	521	567	**3,164**
115% GAP Deficiency	-	2,211	-	-	-	-	-	-	-	-	-	-	**2,211**
Additional Supply Options													
Call for No Irrigation	-	-	-	-	-	-	-	-	-	-	-	-	-
Additional Clear Wells	-	-	-	-	-	-	-	-	-	-	-	-	-
Expand MWRF Capacity	-	N/A	-	-	-	-	-	-	-	-	-	-	-
Import from MWD	-	2,211	-	-	-	-	-	-	-	-	-	-	**2,211**
Remaining GAP Deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-

1. *August demand shown reflects max day (150 percent) demand applied throughout the entire month. 30-day emergency analysis performed for August.*
2. *Percentages of monthly supplies from the MWRF match FY2020 MWRF usage prior to August emergency. After August, MWRF usage is adjusted to maximize clear well production while maintaining YTD BPP of 77%.*

Table 4-23. Scenario 2c, 2040 Costs

Production Costs	$14,541,148
Fixed Costs	$3,000,188
Total Cost	**$17,541,336**
YTD BPP	77.0%

Although the installation of new clear wells or expanded MWRF capacity is feasible by 2040, taking imported water during an emergency is still the most cost-effective and readily available supply option. Production costs for the local alternatives are less than the unit cost of imported water. However, the additional capital for new clear wells or MWRF capacity is not needed under baseline conditions, as shown in Scenario 1, and would only be used during an infrequent emergency. Therefore, the capital costs would need to be paid for even though the equipment is not typically used. Using imported water supplies presents an alternative that does not require stockpiling capital for exceptional circumstances. Any fixed fees would be incurred only during years with an emergency, in comparison to paying for capital costs over the lifespan of infrastructure and capacity that may or may not be needed. Refilling and pumping from reservoirs will still be needed to meet peak hour demands. With this proposed solution, annual costs would exceed baseline 2040 costs by $2.8M.

4.7 Scenario 3 – Extended Maintenance/Repair Condition

This scenario simulates that several supply units are undergoing extended maintenance or need critical repairs. Some clear water wells are operational, and half of MWRF capacity is available. MWD supplies are also available. Under this scenario, the following conditions shall apply:

- Four of seven clear water wells are operational (Wells 1, 7, and 12 not available) with routine maintenance deferred.
- 50 percent of MWRF capacity is available.
- MWD supplies are available as a back-up supply.

The resulting available water supply is summarized in Table 4-24. After the 30-day emergency, the capacities of each well return to the baseline condition. Note that the capacities of each available well are higher during the emergency condition since routine maintenance is deferred.

Table 4-24. Scenario 3 Available Supplies

Source	Emergency Capacity (AF/month)	Baseline Capacity (AF/month)
Clear Wells	1,156	1,947
Well 1	-	299
Well 3	215	208
Well 5	296	257
Well 7	-	169
Well 9	242	234
Well 12	-	390
Well 14	403	390
MWRF	403	807
Local Subtotal	**1,559**	**2,754**
MWD Back-Up	5,792	5,792
Total	**7,351**	**8,545**

4.7.1 Scenario 3 – 2020

A GAP analysis was performed for Scenario 3 using 2020 demands. Tables 4-25 and 4-26 summarize the results.

Table 4-25. Scenario 3, 2020 GAP Analysis (AF)

	Jul	Aug(1)	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	YTD
115% Demand	1,847	2,468	1,784	1,747	1,488	1,182	1,316	1,370	1,290	1,242	1,626	1,752	**19,111**
Base Supply Options													
Clear Wells	1,369	1,156	1,450	1,486	1,298	1,182	1,316	1,165	1,119	896	1,099	1,180	**14,716**
MWRF(2)	479	403	334	261	190	-	-	204	171	346	527	573	**3,487**
115% GAP Deficiency	-	908	-	-	-	-	-	-	-	-	-	-	**908**
Additional Supply Options													
Call for No Irrigation	-	-	-	-	-	-	-	-	-	-	-	-	-
Additional Clear Wells	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
Expand MWRF Capacity	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
Import from MWD (Optional: Level 3 Shortage)	-	908	-	-	-	-	-	-	-	-	-	-	**908**
Remaining GAP Deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-

1. *August demand shown reflects max day (150 percent) demand applied throughout the entire month. 30-day emergency analysis performed for August.*
2. *Percentages of monthly supplies from the MWRF match FY2020 MWRF usage prior to August emergency. After August, MWRF usage is adjusted to maximize clear well production while maintaining YTD BPP of 77 percent.*

Table 4-26. Scenario 3, 2020 Costs

Production Costs	$11,432,897
Fixed Costs	$4,370,151
Total Cost	**$15,803,048**
YTD BPP	77.0%

If extended maintenance were to occur today, taking imported water would be the only option to address the remaining supply shortage of 908 AF. To meet peak hour demands, Mesa Water would still need to pump from the reservoirs to equalize production flow. Costs would increase by $1.3M over the baseline 2020 condition.

Although not recommended, Mesa Water has the ability to enact up to a Level 3 Water Supply Shortage to reduce usage and offset a portion of the supply deficit.

4.7.2 Scenario 3 – 2040

A GAP analysis was performed for Scenario 3 using 2040 demands. Tables 4-27 and 4-28 summarize the results.

Table 4-27. Scenario 3, 2040 GAP Analysis (AF)

	Jul	Aug(1)	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	YTD
115% Demand	2,259	3,017	2,181	2,137	1,819	1,446	1,609	1,675	1,577	1,519	1,988	2,143	**23,369**
Base Supply Options													
Clear Wells	1,673	1,156	1,806	1,843	1,606	1,446	1,609	1,445	1,385	1,130	1,396	1,499	**17,994**
MWRF(2)	585	403	375	294	213	-	-	230	192	389	592	644	**3,917**
115% GAP Deficiency	-	1,458	-	-	-	-	-	-	-	-	-	-	**1,458**
Additional Supply Options													
Call for No Irrigation	-	-	-	-	-	-	-	-	-	-	-	-	-
Additional Clear Wells	-	-	-	-	-	-	-	-	-	-	-	-	-
Expand MWRF Capacity	-	-	-	-	-	-	-	-	-	-	-	-	-
Import from MWD (Optional: Level 2 Shortage)	-	1,458	-	-	-	-	-	-	-	-	-	-	**1,458**
Remaining GAP Deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-

1. *August demand shown reflects max day (150 percent) demand applied throughout the entire month. 30-day emergency analysis performed for August.*
2. *Percentages of monthly supplies from the MWRF match FY2020 MWRF usage prior to August emergency. After August, MWRF usage is adjusted to maximize clear well production while maintaining YTD BPP of 77 percent.*

Table 4-28. Scenario 3, 2040 Costs

Production Costs	$14,157,252
Fixed Costs	$2,192,948
Total Cost	**$16,350,200**
YTD BPP	77.0%

Similar to the 2040 case of Scenario 2c, importing from MWD is the more cost-effective option compared to expanding clear well or MWRF capacity. With this proposed solution, annual costs would exceed baseline 2040 costs by $2.0M. Similar to the 2020 case of Scenario 3, Mesa Water has the ability to instead choose to enact a Level 2 Water Supply Shortage rather than import water from MWD.

4.8 Summary of Scenario Results

A comparison of the scenario results is presented in Table 4-29. The supply deficiency with available existing supplies, the recommended solution to address the deficiency, and the change in costs from the baseline scenario are shown. Note that total costs decrease in the 2020 cases of Scenarios 2a and 2b because demands cannot be met, and less water is supplied.

Table 4-29. Summary of Scenario Results

Year	Scenario	GAP with Existing Supplies (AF)	Recommended Solution	Annual Cost Over Baseline	Lump Sum Capital Improvement Cost (30-Year Debt Cycle)
2020	1	-	N/A	$-	$-
	2a	720	Increased Restrictions	$(88,219)	$-
	2b	640	Increased Restrictions	$(41,927)	$-
	2c	1,661	Import from MWD	$2,147,681	$-
	3	908	Import from MWD	$1,321,823	$-
2040	1	-	N/A	$-	$-
	2a	1,270	Additional Clear Wells	$1,914,009	$31,821,284
	2b	1,189	Additional Clear Wells and MWRF Capacity	$2,348,122	$31,418,604
	2c	2,211	Import from MWD	$2,828,399	$-
	3	1,458	Import from MWD	$2,002,541	$-

For the short-term 2020 cases, where neither clear well or MWRF expansion are feasible, demands must be met using MWD imported water as illustrated in Scenarios 2c and 3. When importing is not an option, like in Scenarios 2a and 2b, Mesa Water's only alternative to bridge the gap between supply and demand is to further reduce usage through increased water usage restrictions. Expanded conservation efforts can also be used to offset a portion of water imports in Scenario 3.

For the long-term 2040 cases, importing water from MWD is the most cost-effective solution, whenever available. This is shown in Scenarios 2c and 3. Otherwise, the cost-effectiveness between installing additional clear wells or expanding MWRF treatment capacity depends on the type of emergency encountered. In the 2040 case under Scenario 3, additional water restrictions are an alternative to importing water during an extended maintenance condition, as shown in Scenario 3.

Section 5: Conclusion and Recommendations

5.1 Overall Findings

Under normal operating conditions including Wells 12 and 14, Mesa Water is currently well-equipped to supply water to accommodate 115 percent demands using existing infrastructure, even with projected demand increases over the next 20 years. This exemplifies Mesa Water's past and current success in continuing to be self-reliant upon their local water supplies.

However, being self-reliant can pose additional risk in the event of an emergency. If a portion of existing local supply infrastructure were to become unavailable, Mesa Water's supply system would need a significant amount of redundancy in their clear and amber wells to remain self-sufficient. Additional capital would not be required to meet demands under typical circumstances for the foreseeable future. If Mesa Water were to increase its number of wells and/or expand the MWRF, the redundant equipment would remain unused for much of its lifespan or at a minimum be cycled intermittently with the existing infrastructure.

5.2 Recommendations by Situation

5.2.1 Imported Water is Unavailable (Scenarios 2a and 2b)

Whenever available, imported water is the most cost-effective solution to increase supply during a temporary supply outage. However, it is recognized that importing water is not always an option. For example, a strong seismic event may affect MWD's imported water connections and/or infrastructure. Situations like this are illustrated under Scenarios 2a and 2b. Looking at current year (2020) cases of these scenarios, as shown in Tables 4-10 and 4-15, Mesa Water's only option to mitigate the gap is to employ regulatory action to curtail demand. When planning for future emergencies, there is additional insurance in owning redundant supplies, albeit at an additional capital and O&M cost. Providing enough clear well redundancy for a hypothetical deficit similar to the 2040 case of Scenario 2c, as shown in Table 4-22, would result in several millions in additional annual capital and O&M costs, even when Mesa Water does not encounter an emergency.

5.2.2 Unexpected and Extended Maintenance (Scenario 3)

While natural disasters can be unpredictable, some emergency condition effects can be mitigated. Scenario 3 simulates an outage due to several supply units requiring critical repairs. With careful maintenance protocols in place, it would be highly unlikely that almost half of the clear well and amber well supply capacity would be unavailable for an extended period. If preventive maintenance is staggered, the groundwater wells can be maintained without significant reductions in supply, allowing all demands to be met using existing infrastructure. Additional reliability improvements will be discussed in TM-3 as well.

5.2.3 Complete Self-Sufficiency

In the event Mesa Water decides to pursue self-sufficiency under all circumstances and scenarios, selecting between installing additional clear wells, expanding MWRF treatment production, or a combination of both would require additional in-depth analysis and further investigation. Various factors such as fixed costs, production costs, and operational flexibility within Mesa Water's system would also need to be further refined. The year 2040 cases under Scenarios 2a and 2b assume the most drastic situations examined in which imported water is not available. If these cases are used as an estimate of the extent of infrastructure improvements needed to become completely self-sufficient, lump sum capital costs could total up to $32M over the course of a 30-year debt cycle, as shown in Table 4-29. However, this capital cost is an upper limit;

the ultimate extent of improvements depends on the amount of risk Mesa Water is willing to take on. The overall long term value and resiliency gained from expanding supply infrastructure would need to be further investigated.

5.3 Final Recommendations

Because of the high costs to maintain self-sufficiency on local water supplies during an emergency, it is ultimately recommended that Mesa Water purchase imported water in the event of a supply shortage, as detailed on Table 4-28. In the event of a rare situational emergency such that MWD supplies are not available, Mesa Water may offset any supply shortages through the implementation of water usage restrictions if the emergency occurred in the near future. In the long-term, Mesa Water can expand its local production capabilities by installing additional clear wells or expanding MWRF treatment capacity. Additional feasibility and criticality studies would be needed in order to make a final determination as to which is the most cost-effective and reliable balance between the two local alternatives.

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Attachment A: Cost Basis and Calculations

Cost Basis

The production cost of each supply option, as outlined in Section 4.1, is summarized in Table A-1. These costs are on a per acre-foot basis and only apply when water is being supplied.

Table A-1. Production Cost Basis ($/AF)

Supply Option	Cost	Limitations	Cost Assumptions
Base Supply Options			
Clear Wells(1)	$568	Up to BPP limit	Includes RA, energy, and chemicals. Does not include capital and O&M.
MWRF(2)	$594	Up to MWRF max capacity	Includes RA, energy, and chemicals minus LRP. Does not include capital and O&M.
Additional Supply Options			
Call for No Irrigation	$-	Up to 25% of total demand	Negligible cost to implement.
Additional Clear Wells(1)	$568	Cannot implement short-term (2020)	Includes RA, energy, and chemicals. Does not include capital and O&M.
Increase MWRF Capacity(2)	$594	Cannot implement short-term (2020)	Includes RA, energy, and chemicals minus LRP. Does not include capital and O&M.
Import from MWD(3)	$1,104		Does not include fixed fees.

1. *From Production Well Costs (2019)*
2. *From Regional MWRF Usage (2016)*
3. *Tier 1 supply rate in 2021*

The annual fixed costs, which include both the annualized capital costs and O&M costs for equipment and the fixed fees imposed by MWD and MWDOC for importing water, are provided in Table A-2. Capital and O&M costs for equipment apply regardless if water is or is not supplied.

Table A-2. Annual Fixed Costs			
Supply Option	**Cost**	**Unit Notes**	**Cost Assumptions**
Capital Costs			
Existing Clear Wells	$1,104,589		Includes capital for Wells 12 and 14 and O&M for all existing wells, running or idle.
Existing MWRF	$2,732,200		2020 cost. Includes capital and O&M for the existing MWRF, running or idle.
	$232,200		2040 cost. Includes O&M for the existing MWRF, running or idle. Assumes capital debt servicing is completed by 2027.
Additional Clear Wells(1)	$85	Per AFY of additional production capacity needed	Includes capital and O&M. Assumes capital costs are scalable based on production capacity.
MWRF Expansion(2)	$728,053	For up to +3,000 gpm capacity	Includes capital. Based on expansion by one treatment train.
	$1,262,918	For up to +6,000 gpm capacity	Includes capital. Based on expansion by two treatment trains.
MWD & MWDOC Fixed Fees			
Readiness-to-Serve Charge (RTS)(3)	$113,546	Per percent of 4-year average of water share among all MWDOC customers	Assumes combined 4-year average volume among all other MWDOC customers is 206,178 AF. Cost based on 2020-2021 MWDOC RTS rate. Charged for subsequent years.
Capacity Charge(3)	$10,700	Per cfs of peak delivery from the past 3 years	2021 MWD capacity charge. Charged only if used and applied to subsequent years.

1. *From Production Well Costs (2019)*
2. *Rough order of magnitude*
3. *From MWDOC Water Rates and Charges - 2021 (2020)*

Cost Calculations

Total annual costs for each scenario are calculated as the sum of the total production and fixed costs:

$$[Total\ Costs] = [Production\ Costs] + [Fixed\ Costs]$$

Total annual production costs are calculated as follows:

$$[Production\ Costs] = [Clear\ Well\ Production] + [MWRF\ Production] + [MWD\ Imports]$$

The cost of each production component is based on the volume of water supplied or imported:

$$[Clear\ Well\ Production] = \left(\frac{\$568}{AF}\right)[Total\ clear\ well\ production\ in\ AF]$$

$$[MWRF\ Production] = \left(\frac{\$594}{AF}\right)[Total\ MWRF\ production\ in\ AF]$$

$$[MWD\ Imports] = \left(\frac{\$1{,}104}{AF}\right)[Total\ imports\ in\ AF]$$

Total annual fixed costs are calculated as follows:

$$[Fixed\ Costs] = [Clear\ Well] + [MWRF] + [RTS\ Charge] + [Capacity\ Charge]$$

Capital improvement costs for additional clear wells and expansion of the MWRF are based on additional production capacity needed to meet emergency demands. Costs are scaled based on the proportion of wells that are non-operational.

$$[Clear\ Well] = \$1{,}104{,}589 + \frac{\left(\frac{\$85}{AFY}\right)[Max\ production\ rate\ in\ AFY]}{[\%\ operational\ wells]}$$

$$[MWRF]_{2020} = \$2{,}732{,}200 + [MWRF\ expansion\ cost, depending\ on\ trains\ needed]$$

$$[MWRF]_{2040} = \$232{,}200 + [MWRF\ expansion\ cost, depending\ on\ trains\ needed]$$

The RTS Charge is based on the four-year rolling average of services. It is assumed that Mesa Water does not import water in the years prior and succeeding the period examined in each scenario. Therefore, the total costs over four years is equivalent to the cost of all MWD imported water paid in one year if imported water is used. To adequately estimate Mesa Water's future water purchases as part of the GAP analysis, it is assumed that imported water quantities for other member agencies is consistent with the information published by MWDOC for FY2018-2019.

$$[RTS\ Charge] = \left(\left(\frac{[Imported\ water\ in\ AF]}{206{,}178\ AF}\right) \times 100\%\right)\left(\frac{\$113{,}546}{\%\ share}\right)$$

The Capacity Charge is based on the maximum delivery rate over the past three years. Again, it is assumed that Mesa Water does not need imported water unless in an emergency. To calculate the Capacity Charge, the peak delivery rate is identified and applied for three years. For comparison, the charges over the 3-year period will be included in the fixed costs for the year when water is imported.

$$[Capacity\ Charge] = 3\left(\frac{\$10{,}700}{cfs}\right)[Max\ delivery\ rate\ in\ cfs]$$

Technical Memorandum

Prepared for: Mesa Water District

Project Title: Water Supply, Energy, and Supply Chain Reliability Assessment

Project No.: 155448.150

Technical Memorandum No. 2

Subject: Energy Supply Reliability

Date: December 4, 2020

To: Phil Lauri, Mesa Water District Assistant General Manager

From: Adam Zacheis, Ph.D., P.E., Project Manager

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Abbreviations

AF	acre feet
AWWA	American Water Works Association
BC	Brown and Caldwell
BPP	Basin Production Percentage
BPS	Booster Pump Station
Btu	British thermal units
Cal ISO	California Independent System Operator
Cal OES	California Office of Emergency Services
CEC	California Energy Commission
CMMS	computerized maintenance management system
CPUC	California Public Utilities Commission
EIA	U.S. Energy Information Administration
ESRA	Energy Supply Reliability Assessment
gph	gallons per hour
gpm	gallons per minute
hp	horsepower
kWh	kilowatt-hour
IEPR	Integrated Energy Policy Report
MAIFI	Momentary Average Interruption Frequency Index
MDD	maximum daily demand
MED	Major Event Day
Mesa Water	Mesa Water District
MMcfd	million cubic feet per day
MWD	Metropolitan Water District of Southern California
MWRF	Mesa Water Reliability Facility
NFPA	National Fire Protection Association
O&M	operations and maintenance
OPLAN	Southern California Catastrophic Earthquake Response Plan
PSPS	Public Safety Power Shutoff
RPS	Renewables Portfolio Standard
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SoCalGas	Southern California Gas Company
TM-2	Technical Memorandum No. 2
TOU	time of use
VFD	variable frequency drive

Section 1: Introduction

Mesa Water District (Mesa Water) engaged Brown and Caldwell (BC) to conduct a Water Supply, Energy, & Supply Chain Reliability Assessment with the following objectives:

1. Evaluate existing water supply capacities relative to meeting 115 percent of all demand seasons using local groundwater resources;
2. Evaluate existing Mesa Water energy supply capacities, types, and backup capabilities relative to ensuring reliable groundwater supplies can be pumped and distributed during normal and emergency operations;
3. Identify water supply and energy reliability gaps (from Objectives Nos. 1 & 2) and provide recommended solutions;
4. Evaluate Mesa Water's Supply Chain system relative to emergency readiness;
5. Identify Supply Chain system reliability gaps (from Objective No. 4) and provide recommended solutions.

1.1 Purpose

Technical Memorandum No. 2 (TM-2) is one of the components of Mesa Water's overall assessment of water supply, energy, and supply chain reliability. TM-2 focuses on the following Energy Supply Reliability Assessment (ESRA) components:

- Evaluate Mesa Water's historic demands for energy usage at well sites and treatment facilities;
- Estimate Mesa Water's future energy demands and costs;
- Provide recommendations for pump drive technologies, considering life cycle costs;
- Provide recommendations for backup power/fuel requirements.

Section 2: Background

Mesa Water's facilities are located in Orange County, California and receive electric power from Southern California Edison (SCE) and natural gas from Southern California Gas Company (SoCalGas). SCE is a private electric utility and its service area includes most of Orange County. SCE operates a regional electrical system consisting of high and medium voltage transmission and distribution lines, and low voltage distribution systems. SoCalGas is a private utility and its service area extends throughout Southern California. SoCalGas operates a regional natural gas system consisting of pipelines, compressor stations, and storage facilities. Propane is used as a backup fuel source at Mesa Water's facilities that utilize natural gas reciprocating engines as a primary driver. Propane is delivered by truck from local propane brokers.

Mesa Water's clear wells are all equipped with electric motor-operated pumps and diesel engine backup generators (either on site or have a connection for a portable generator) apart from Well 1 and Well 5. Well 1 has infrastructure in place to power the electric motor-operated pump by a portable generator and Well 5 is driven by a natural gas-powered engine that can use propane as a backup fuel source. The pumps at Mesa Water's two reservoirs are primarily powered by natural gas engines and are connected to a backup propane supply. Reservoir 1 Booster Pump Station (BPS) is also each equipped with two electric motor driven jockey pumps. Both reservoirs are also equipped with a natural gas engine generator which provides power to the control system and critical valves used to remove the facilities from being online in case of a system outage. The Mesa Water Reliability Facility (MWRF) is equipped with electric motor driven pumps and does not have provisions for backup power to operate the process, only a small standby generator for the building and operation of the nanofiltration air compressors and valves. Table 2-1 summarizes the existing equipment at the different facilities. Table 2-2 summarizes the reference information used throughout TM-2.

Table 2-1. Existing and Future Equipment

Site	Primary (Natural Gas Powered)	Primary (Electric Powered)	Backup Supplies
Reservoir 1 BPS	(3) 137 hp pumps at 2,500 gpm each	(2) 60 hp jockey pumps at 1,000 gpm each	(1) natural gas engine generator; (1) 1,150 gal horizontal propane storage tank
Reservoir 2 BPS	(4) 369 hp pumps at 4,200 gpm each	N/A	(1) natural gas engine generator; (1) 1,150 gal horizontal propane storage tank
Well 1	N/A	(1) 400 hp pump at 2,300 gpm	Connection for portable generator
Well 3	N/A	(1) 300 hp pump at 1,600 gpm	(1) 350 kW diesel generator; (1) 426 gal integral diesel storage tank
Well 5	(1) 450 hp pump at 2,200 gpm	N/A	(1) 1,150 gal horizontal propane storage tank
Well 7	N/A	(1) 300 hp pump at 1,300 gpm	(1) 350 kW diesel generator; (1) 333 gal integral diesel storage tank
Well 9	N/A	(1) 300 hp pump at 1,800 gpm	(1) 350 kW diesel generator; (1) 426 gal integral diesel storage tank
Well 12 (Future)	N/A	(1) 600 hp pump at 3,000 gpm	(1) 600 kW diesel generator (1) 1,000 gal diesel storage tank
Well 14 (Future)	N/A	(1) 600 hp pump at 3,000 gpm	(1) 600 kW diesel generator (1) 1,000 gal diesel storage tank
MWRF	N/A	(2) 400 hp well pumps; (3) 350 hp high lift pumps; (2) 250 hp nanofiltration feed pumps; (4) 100 kW CIP tank heaters; (3) 40 hp product transfer pumps; (2) 30 hp degasifier blowers; (3) 30 hp CO2 booster pumps	See Section 5

Notes:

1. *Pump and motor information for Reservoir BPSs are as reported in the 2017 Reservoir1&2 Pumps, Controls, and Chemical System Assessment Project.*
2. *Pump capacities for the clear wells are the maximum observed production, as provided by Mesa Water in TM-1. Motor information is per the design criteria specified in the Well Automation record drawings.*
3. *Capacity of backup supplies for future wells is estimated from pump motor size and assumes 24 hours of runtime at maximum fuel consumption.*
4. *Only major process equipment for the MWRF is listed. Equipment smaller than 30 hp is not shown.*

Table 2-2. Reference Information		
Reference No.	Reference	Description
1	TM-1 Water Supply Reliability Assessment	Assessment of Mesa Water's current water production in various operating or emergency scenarios.
2	2014 Water Master Plan Update	Report that includes pumping capacities for Mesa Water's groundwater extraction wells and fire flow analysis of the entire system, prepared by Carollo Engineers. Findings were further developed by the 2017 Reservoir 1&2 Pumps, Controls, and Chemical System Assessment Project.
3	2017 Reservoir 1&2 Pumps, Controls, and Chemical System Assessment Project	Report that includes the latest condition assessment of Reservoirs 1 and 2 and fire flow analysis of the entire system, prepared by Hazen and Sawyer.
4	SoCalGas Monthly Billing Statements	Monthly billing statements from July 2018 through July 2020 for Reservoirs 1 and 2 and Well 5 were provided. The statements include a breakdown of the billed amount.
5	SCE Monthly Billing Statements	Monthly billing statements from August 2018 through July 2020 for Wells 1, 3, 5, 7, and 9 were provided. The statements include a breakdown of the billed amount.
6	2019 Integrated Energy Policy Report	Annual assessment and forecast of California's natural gas and electricity sectors, prepared by the CEC.
7	2019 RPS Annual Report	Annual assessment of California's progress in complying with the Renewables Portfolio Standard program, prepared by the CPUC.
8	SoCalGas Historical Procurement Prices	SoCalGas's natural gas procurement prices from November 2009 to September 2020.
9	2013 Integrated Energy Policy Report	Annual assessment and forecast of California's natural gas and electricity sectors, prepared by the CEC.
10	U.S. EIA	Historical data for natural gas consumption, production, and net imports in the U.S. Provides conversion factors for various fuel sources.
11	SCE Historical Retail Rates	SCE's retail rates from 2009 to 2020.
12	FY19 Water Supply Report	Planned and actual water supply demand data for all of Mesa Water's facilities from July 2018 to June 2019.
13	FY20 Water Supply Report	Planned and actual water supply demand data for all of Mesa Water's facilities from July 2019 to June 2020.
14	SCE Annual System Reliability Report	Annual assessment of SCE system reliability and major outages.
15	Cal OES 2010 OPLAN	Provides a coordinated response to a catastrophic earthquake in Southern California.
16	SCAQMD Certified ICE-Emergency Generators	List of internal combustion engine emergency standby generators that are approved by the SCAQMD. List was updated July 31, 2020

Section 3: Energy Supply Consumption

Monthly billing statements and publicly available annual reports were reviewed to determine the historical energy usage and cost fluctuations over the last 10 years. The historical data was subsequently evaluated to establish a baseline usage pattern. As determined in TM-1, the water supply demand is highest in the summer (May through October), with the peak typically being in August, and the demand is lowest in the winter (November through April). Historical water supply demands were referenced from the FY19 and FY20 Water Supply Report. Annual reports published by the SoCalGas, SCE, the California Public Utilities Commission (CPUC), California Energy Commission (CEC), and U.S. Energy Information Administration (EIA) were reviewed to forecast energy supply and cost fluctuations for the next 1, 3, and 5 years. The forecasts were compared to the baseline usage pattern to estimate future energy supply reliability and cost impacts for Mesa Water.

It should be noted that the SoCalGas and SCE billing periods do not always coincide with the water supply demand periods, which begin and end on the 1st day of the month. Table 3-1 summarizes the average SoCalGas and SCE billing periods for each facility and will be referenced throughout this section. The date corresponding to the end of the period was used to graph the monthly water supply demand and energy usage for the figures in this section.

Table 3-1. SoCalGas and SCE Billing Periods

Site	SoCalGas[1]	SCE[1]
Reservoir 1 BPS	21st day of the month	28th day of the month
Reservoir 2 BPS	18th day of the month	N/A
Well 1	N/A	30th day of the month
Well 3	N/A	9th day of the month
Well 5	1st day of the month	N/A
Well 7	N/A	9th day of the month
Well 9	N/A	1st day of the month
MWRF	N/A	27th day of the month

1. *Listed day represents the average beginning and end of the billing period.*

3.1 Natural Gas

Mesa Water purchases natural gas from SoCalGas to power the engine-driven pumps at Reservoirs 1 and 2 and Well 5. Table 3-2 lists the assumptions made during analysis of Mesa Water's natural gas supplies.

Table 3-2. Natural Gas Supplies Assumptions

Assumption No.	Description
1	Since natural gas procurement prices are volatile and account for a significant portion of the billed amount, SoCalGas' historical procurement prices were used to estimate historical retail rates and forecast future retail rates.
2	The latest SCE, CPUC, and CEC annual reports are for 2018. It is assumed that the conclusions and recommendations from these reports are current.
3	Reservoirs 1 and 2 are not production facilities and do not have associated water supply demand values.
4	Pumping rates at Reservoirs 1 and 2 BPSs are not available.

3.1.1 Historical Usage

SoCalGas retail rates are primarily comprised of commodity and transportation fees. Commodity fees are affected by natural gas procurement prices, which refers to the cost that SoCalGas pays to acquire natural gas. The volume of natural gas used is measured in therms, which is equivalent to 100,000 British thermal units (Btu).

Billing statements for July 2018 through July 2020 were provided for Reservoirs 1 and 2 BPSs and Well 5. The historical data for Reservoirs 1 and 2 and Well 5 was analyzed to determine the average annual consumption, range of consumption, and peak seasons. A pattern was established to estimate an average cost per acre-foot (AF) of natural gas usage.

Reservoir 1 BPS is located at 1971 Placentia Avenue, Costa Mesa CA 92626. The site is equipped with 3 natural gas engine-driven pumps, a propane/natural gas engine standby generator which is not used for water delivery loads, and a propane storage tank. Each pump has a design capacity of 2,500 gallons per minute (gpm) and is powered by a 137 horsepower (hp) engine. The manufacturers and models are Ingersoll-Rand 16NKL 6 Stages (renamed to Flowserve 16EML) for the pumps and Waukesha Engines F1197G for the engines. The horizontal propane storage tank volume is 1,150 gallons. Table 3-3 presents the natural gas usage from July 2018 to July 2020. Reservoir 1 and Reservoir 1 BPS were not considered as contributing to production for the purpose of this evaluation. Historical pumping rates for the reservoir were not available.

Peak usage occurred in August 2018 and February 2019 at 1,864 therms and 1,801 therms, respectively. Minimum usage occurred in August 2019 at 783 therms. The average usage from July 2018 to July 2020 was 1,345 therms/month.

Table 3-3. Reservoir 1 Historical Usage – Natural Gas Supplies

Month	Usage (therms)	Month	Usage (therms)	Month	Usage (therms)
July 2018	1,431	April 2019	1,287	January 2020	1,594
August 2018	1,864	May 2019	1,171	February 2020	1,313
September 2018	1,524	June 2019	1,159	March 2020	1,361
October 2018	1,389	July 2019	1,028	April 2020	1,696
November 2018	1,182	August 2019	783	May 2020	946
December 2018	1,600	September 2019	1,209	June 2020	1,151
January 2019	1,488	October 2019	1,450	July 2020	1,357
February 2019	1,801	November 2019	1,128		
March 2019	1,565	December 2019	1,139		

Reservoir 2 BPS is located at 2340 Orange Avenue, Costa Mesa CA 92626. The site is equipped with 4 natural gas engine-driven pumps, a propane/natural gas engine standby generator which is not used for water delivery loads, and a propane storage tank. Each pump has a design capacity of 4,200 gpm and is powered by a 369 hp engine. The manufacturers and models are Floway 19FKM 4 Stages for the pumps and Waukesha Engines F2895G for the engines. The horizontal propane storage tank volume is 1,150 gallons. Table 3-4 presents the natural gas usage from July 2018 to July 2020. Reservoir 2 and Reservoir 2 BPS were not considered as contributing to production for the purpose of this evaluation. Historical pumping rates for the reservoir were not available.

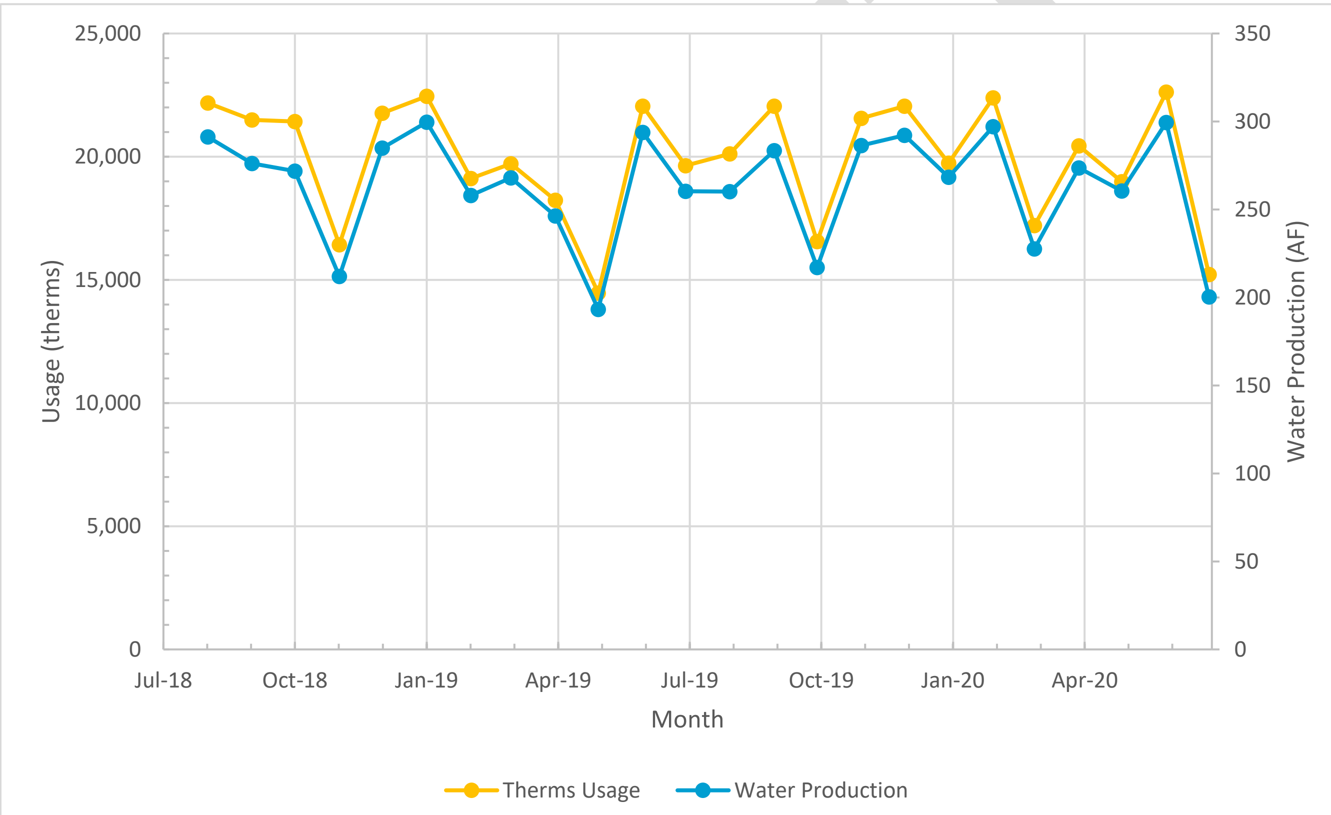
Peak usage occurred in December 2018 at 4,726 therms. Minimum usage occurred in October 2019 at 2,378 therms. The average usage from July 2018 to July 2020 was 3,460 therms/month.

Table 3-4. Reservoir 2 Historical Usage – Natural Gas Supplies

Month	Usage (therms)	Month	Usage (therms)	Month	Usage (therms)
July 2018	3,572	April 2019	2,598	January 2020	3,642
August 2018	3,357	May 2019	2,611	February 2020	3,202
September 2018	2,682	June 2019	3,517	March 2020	3,447
October 2018	3,502	July 2019	3,434	April 2020	3,377
November 2018	3,138	August 2019	3,238	May 2020	4,016
December 2018	4,726	September 2019	3,121	June 2020	3,173
January 2019	3,540	October 2019	2,378	July 2020	3,829
February 2019	4,433	November 2019	4,146		
March 2019	3,887	December 2019	3,932		

Well 5 is located at 3596 Cadillac Avenue, Costa Mesa CA 92626. The site is equipped with a natural gas engine-driven vertical turbine pump and a propane storage tank. The pump has a production capacity of 2,200 gpm and is powered by a 450 hp engine. The manufacturers and model(s) of the pump is National Pump Co. Q57228-3 and Waukesha for the engine. The horizontal propane tank volume is 1,150 gallons. Figure 3-1 presents the natural gas usage and actual water production from July 2018 to June 2020 and Table 3-5 summarizes the peak and minimum usage seasons. It should be noted that the Well 5 site and equipment was upgraded in 2018. As part of the upgrade project, the booster pump was removed from the site.

Well 5 was used to establish the baseline natural gas usage pattern since it is the only natural gas production facility. The average natural gas usage during the summer and winter months was 77 therms/AF and 75 therms/AF, respectively.



Note: Date graphed for therms usage and water production corresponds to the end of the billing/production period.

Figure 3-1. Well 5 Historical Usage – Natural Gas Supplies

Table 3-5. Well 5 Historical Usage – Natural Gas Supplies		
Parameter	Natural Gas Usage (therms/month)	Water Production (AF/month)
Peak Usage		
January 2020	22,450	300
June 2020	22,620	300
Minimum Usage		
April 2019	14,470	193
June 2020	15,230	200

3.1.2 Costs

SoCalGas' retail rates are primarily composed of commodity and transportation costs. Since SoCalGas procures its natural gas from external suppliers, retail rates are subject to market prices and are volatile. The CEC 2019 Integrated Energy Policy Report (IEPR) estimates that 85 to 90 percent of Southern California's gas supply is from out of state resources. These resources include the Western Canadian Sedimentary Basin (Alberta and British Columbia, Canada), Permian Basin (west Texas and southwestern New Mexico), San Juan Basin (northwestern New Mexico and southwestern Colorado), and Rocky Mountains (Wyoming).

The historical retail rates are not available online; however, natural gas procurement prices for the last 10 years are available. Figure 3-2 shows a downward trend in gas prices since 2009, despite price spikes. Improvements in technology and development of shale-deposited natural gas production were significant in recent natural gas price decreases. The 2019 IERP discusses the correlation between procurement prices and temperature, as well as system maintenance. Price increases in 2018 and 2019 coincided with major cold spells and heat waves. Additionally, the price increase in 2013 coincided with the sudden closure of the San Onofre Nuclear Generating Station. The 2013 IERP states that the closure abruptly increased the natural gas demand in California, since natural gas power plants were used to provide nearly all the energy production lost due to the closure.

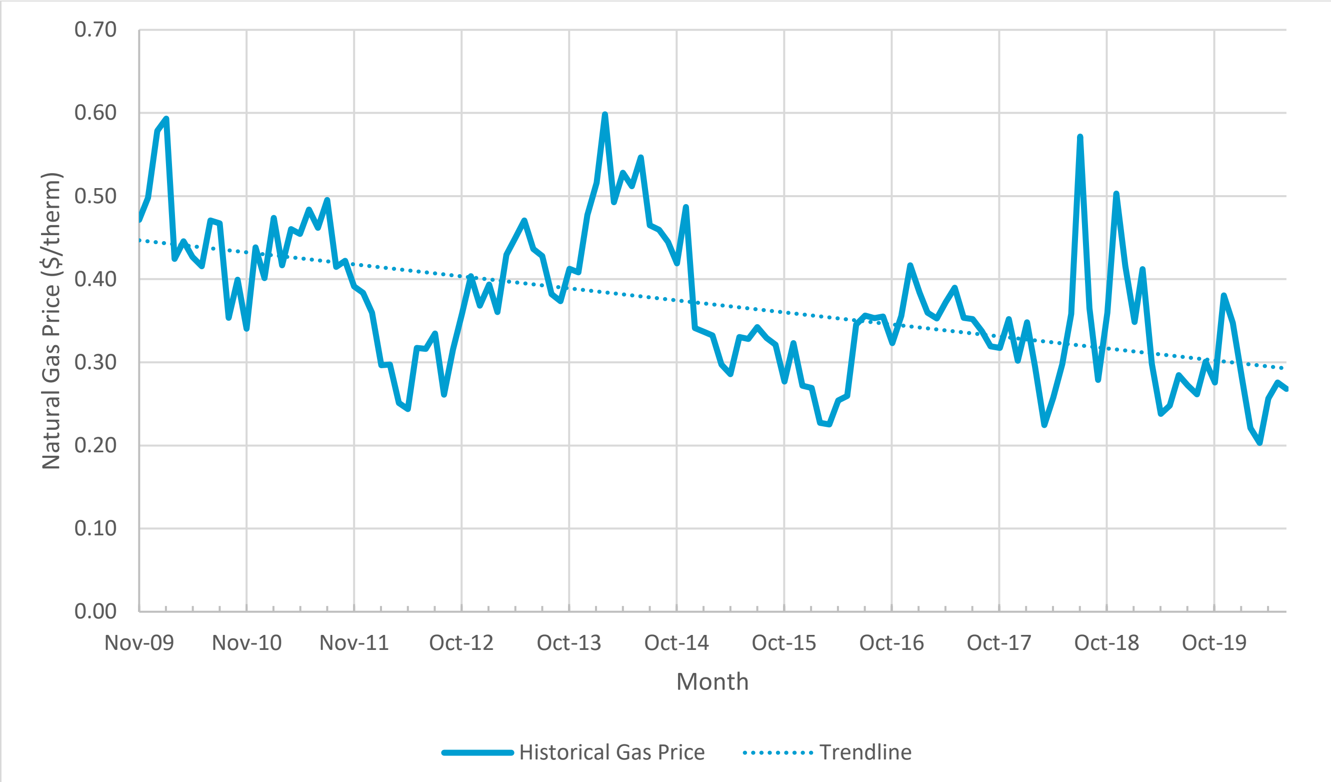


Figure 3-2. Historical Natural Gas Procurement Price

3.2 Electricity

Mesa Water purchases electricity from SCE to power the electric motor-driven pumps at Reservoir 1 BPS, the MWRF, and Wells 1, 3, 7, and 9. Electricity Table 3-6 lists the assumptions made during analysis of Mesa Water's electric supplies.

Table 3-6. Natural Gas Supplies Assumptions	
Assumption No.	**Description**
1	Clear well capacities are per TM-1 and represent the most stable well production rates.
2	Reservoirs 1 and 2 are not production facilities and do not have associated water supply demand values.
3	Pumping rates at Reservoirs 1 and 2 BPSs are not available.

3.2.1 Historical Usage

Billing statements for July 2018 to June 2020 were provided for Reservoir 1 BPS, the MWRF, and Wells 1, 3, 7, and 9. The historical data was analyzed to determine the average annual consumption, range of consumption, and peak seasons. A pattern was established to estimate an average cost of electricity per AF of production. The water production totals shown in the graphs of this section are for calendar months beginning on the first of each month. The electricity demand shown in the graphs of this section are for the SCE billing period which varies in duration and start date at each facility, therefore the electricity demand and water production rates on a month-by-month rarely are for exactly the same period.

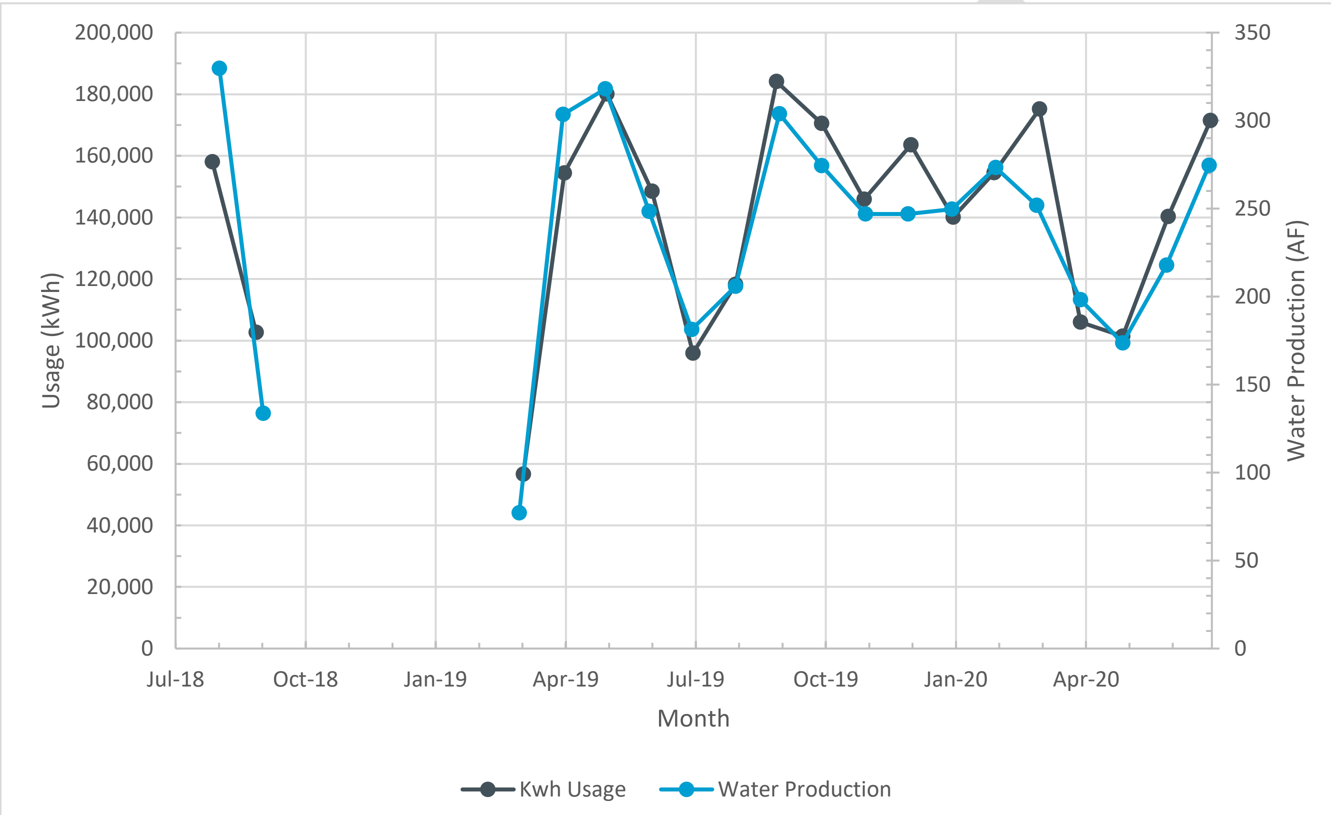
Reservoir 1 BPS is equipped with 2 electric motor-operated jockey pumps. Each pump has a design capacity of 1,000 gpm and is powered by a 60 hp motor. The manufacturers and models are Ingersoll-Rand 14KKH 7 Stages for the pump and General Electric 5KS404DP7005 for the motor. Table 3-7 presents the kWh usage from July 2018 to June 2020. Reservoir 1 and Reservoir 1 BPS operate as storage and do not contribute to production and thus, the water supply demand is not applicable. Historical pumping rates for the reservoir were not available.

Peak usage occurred in August 2019 at 6,044 kWh. Minimum usage occurred in April 2020 at 2,853 kWh. The average usage from July 2018 to July 2020 was 4,098 kWh/month.

Table 3-7. Reservoir 1 Historical Usage – Electric Supplies

Month	Usage (kWh)	Month	Usage (kWh)	Month	Usage (kWh)
July 2018	3,945	April 2019	4,833	January 2020	3,304
August 2018	4,540	May 2019	4,289	February 2020	3,127
September 2018	4,283	June 2019	3,645	March 2020	2,957
October 2018	3,998	July 2019	5,498	April 2020	2,853
November 2018	4,371	August 2019	6,044	May 2020	3,466
December 2018	3,031	September 2019	4,762	June 2020	3,131
January 2019	3,385	October 2019	4,822		
February 2019	3,654	November 2019	4,820		
March 2019	3,766	December 2019	5,831		

Well 1 is located at 1150 Sunflower Avenue, Costa Mesa CA 92626. The site is equipped with an electric motor-operated vertical turbine pump and a connection for a portable generator. The pump has a production capacity of 2,300 gpm and is powered by a 400 hp motor. The manufacturers and models are National Pump Co. Q-57228-1 for the pump and US Motors for the motor. Figure 3-3 presents the kWh usage and water production from July 2018 to June 2020 and Table 3-8 identifies the peak and minimum usage seasons. It should be noted that Well 1 was offline from September 2018 through January 2019 as part of Mesa Water's Well Automation Project.

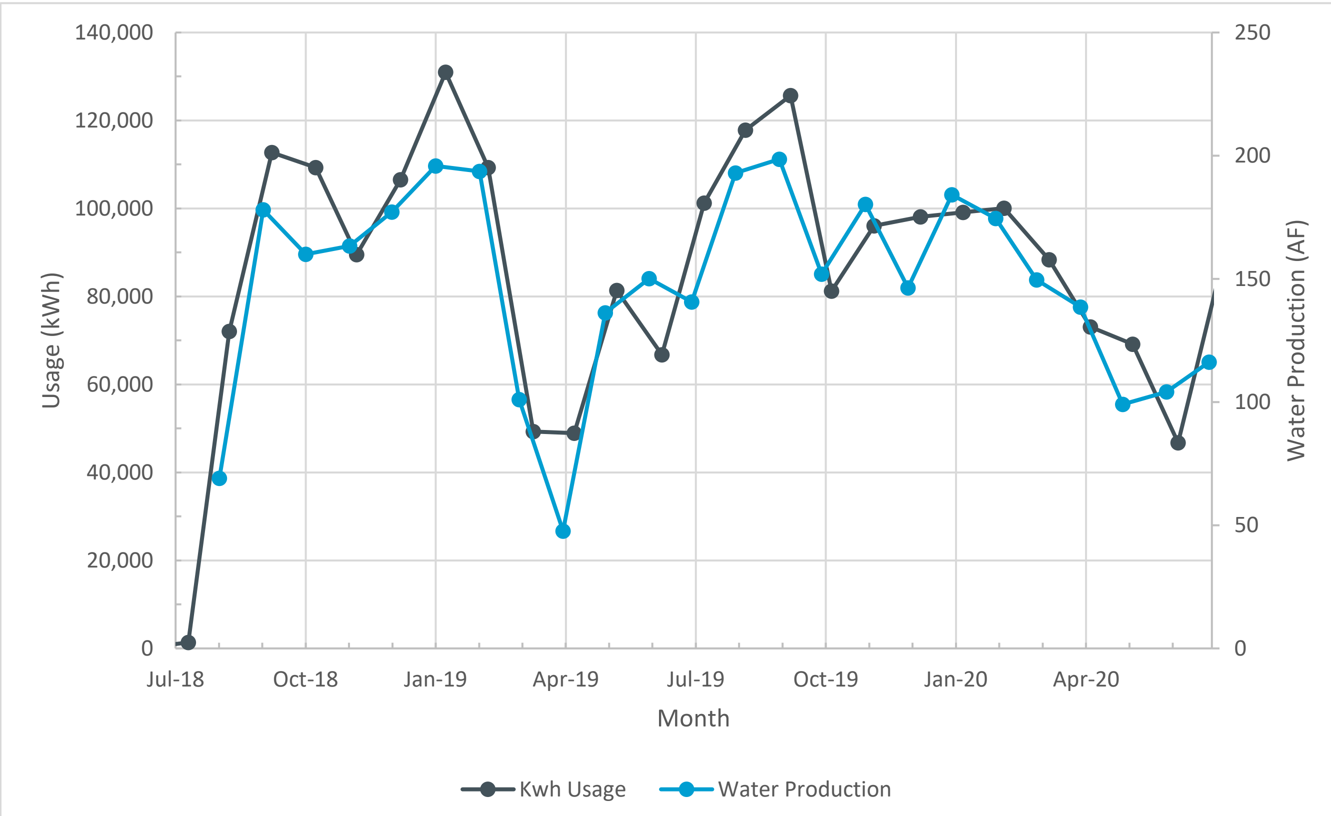


Note: Date graphed for kWh usage and water production corresponds to the end of the billing/production period.

Figure 3-3. Well 1 Historical Usage – Electric Supplies

Table 3-8. Well 1 Historical Usage – Electric Supplies		
Parameter	Electricity Usage (kWh/month)	Water Demand (AF/month)
Peak Usage		
April 2019	180,050	318
August 2019	184,100	304
Minimum Usage		
February 2019	56,600	77

Well 3 is located at 3581 Harbor Boulevard, Costa Mesa CA 92626. The site is equipped with an electric motor-driven vertical turbine pump and diesel engine driven standby generator. The pump has a production capacity of 1,600 gpm and is powered by a 300 hp motor. The manufacturers and models are National Pump Co. Q-57228-2 for the pump and US Motors for the motor. Figure 3-4 presents the kWh usage and water production from July 2018 to June 2020 and Table 3-9 identifies the peak and minimum usage seasons.

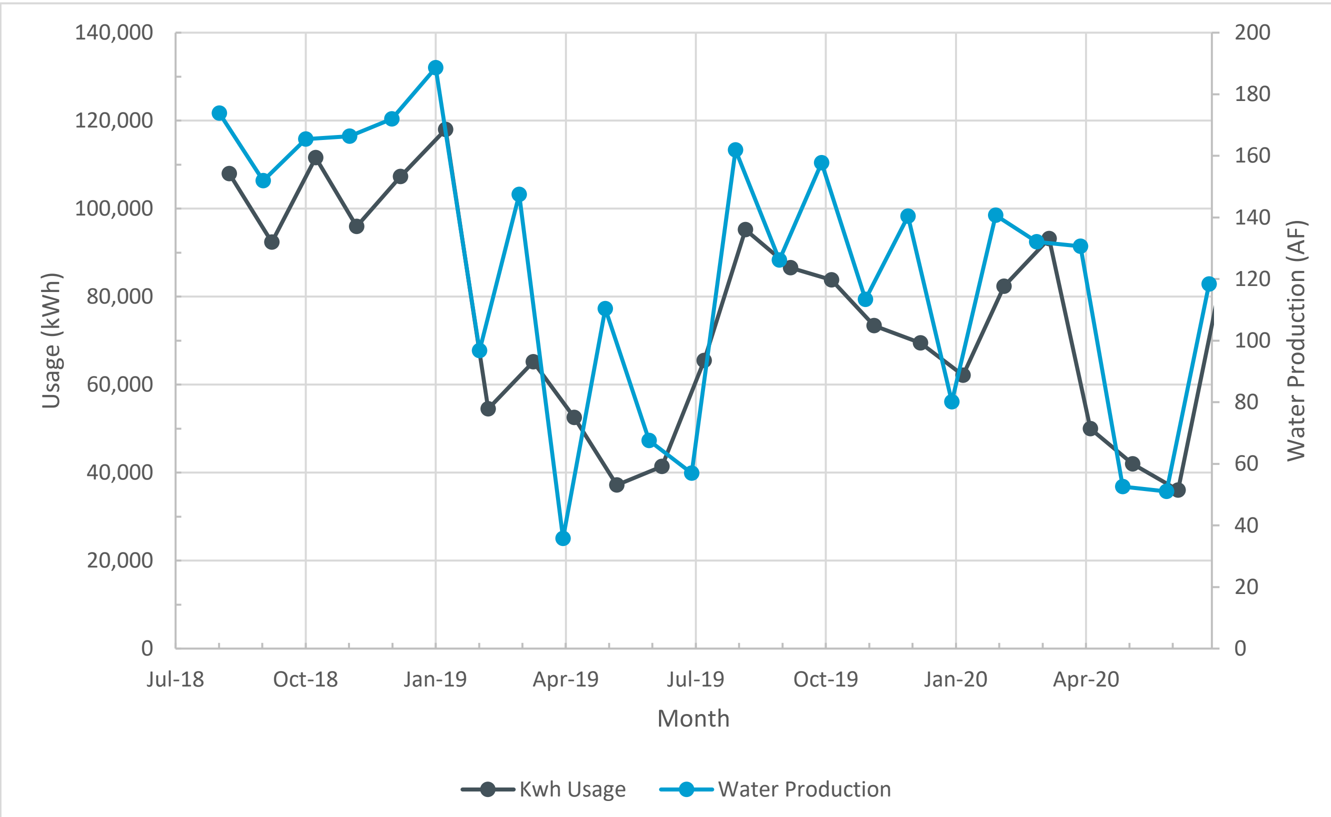


Note: Date graphed for kWh usage and water production corresponds to the end of the billing/production period.

Figure 3-4. Well 3 Historical Usage – Electric Supplies

Table 3-9. Well 3 Historical Usage – Electric Supplies		
Parameter	Electricity Usage (kWh/month)	Water Demand (AF/month)
Peak Usage		
December 2018	130,950	196
August 2019	125,700	199
Minimum Usage		
February 2019	49,350	101
March 2019	48,900	48
May 2020	46,750	104

Well 7 is located at 3325 Harbor Boulevard, Costa Mesa CA 92626. The site is equipped with an electric motor-driven vertical turbine pump and diesel engine driven standby generator. The pump has a production capacity of 1,300 gpm and is powered by a 200 hp motor. The manufacturers and models are National Pump Co. Q-57228-3 for the pump and US Motors for the motor. Figure 3-5 presents the kWh usage and water production from July 2018 to June 2020 and Table 3-10 identifies the peak and minimum usage seasons.



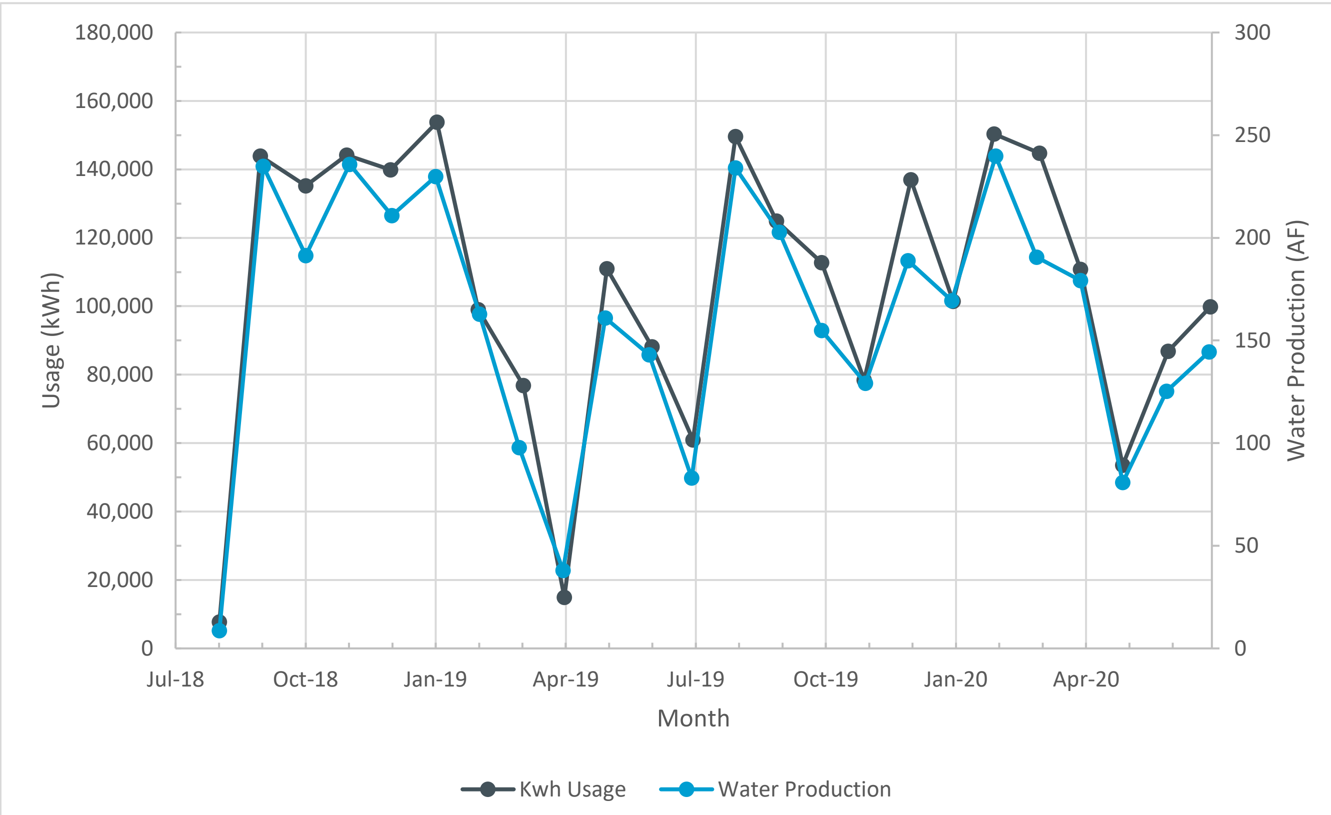
Note: Date graphed for kWh usage and water production corresponds to the end of the billing/production period.

Figure 3-5. Well 7 Historical Usage – Electric Supplies

Table 3-10. Well 7 Historical Usage – Electric Supplies

Parameter	Electricity Usage (kWh/month)	Water Demand (AF/month)
Peak Usage		
January 2020	118,000	189
Minimum Usage		
April 2019	37,200	110
May 2020	36,050	51

Well 9 is located at 1301 Sunflower Avenue, Costa Mesa CA 92626. The site is equipped with an electric motor-driven vertical turbine pump and diesel engine driven standby generator. The pump has a production capacity of 1,800 gpm and is powered by a 300 hp motor. The manufacturers are Goulds for the pump and US Motors for the motor. Figure 3-6 presents the kWh usage and water production from July 2018 to June 2020 and Table 3-11 identifies the peak and minimum usage seasons.

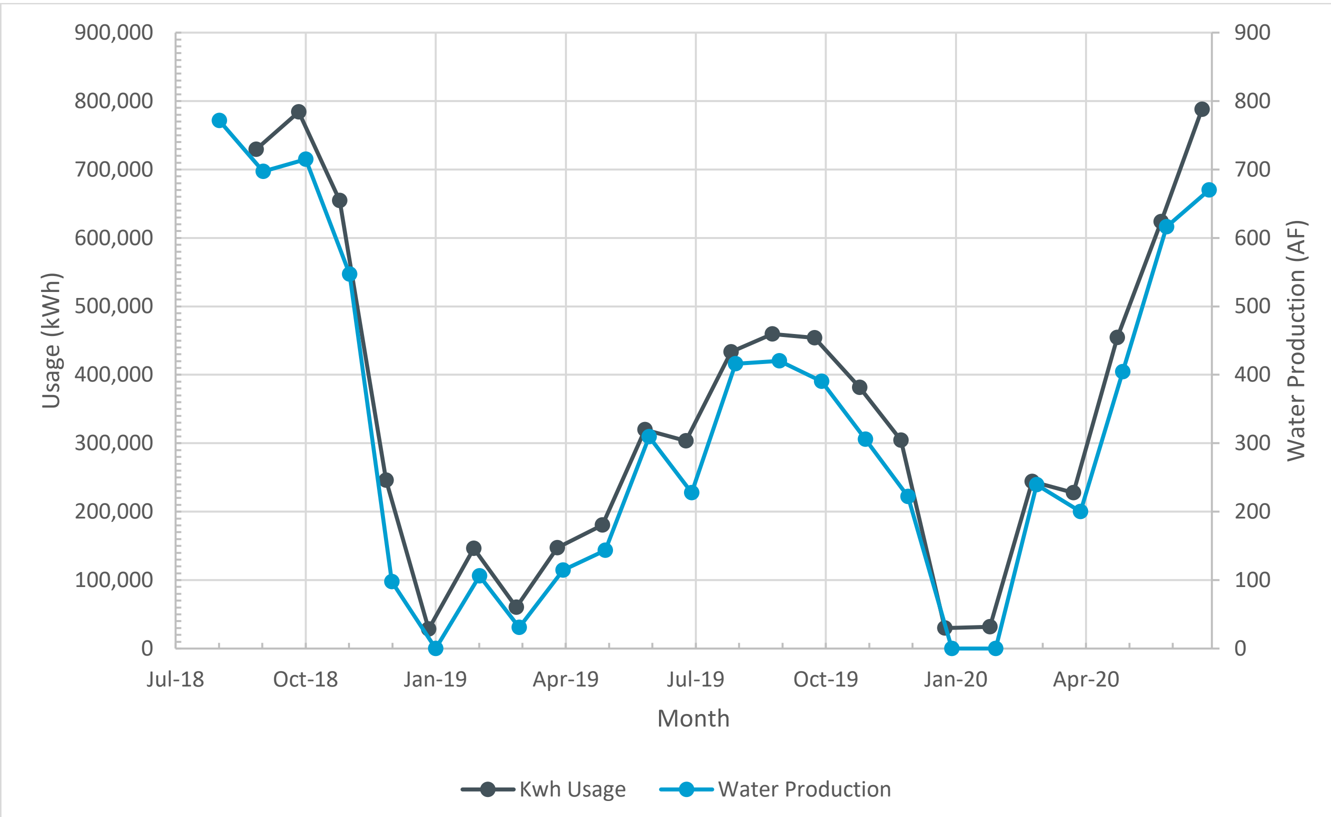


Note: Date graphed for kWh usage and water production corresponds to the end of the billing/production period.

Figure 3-6. Well 9 Historical Usage – Electric Supplies

Table 3-11. Well 9 Historical Usage – Electric Supplies		
Parameter	Electricity Usage (kWh/month)	Water Demand (AF/month)
Peak Usage		
December 2018	153,750	230
July 2019	149,650	234
January 2020	150,375	240
Minimum Usage		
March 2019	14,950	38

The MWRF is located at 1350 Gisler Ave, Costa Mesa 92626. The site is equipped with numerous electric driven pumps and equipment. The MWRF is equipped with a small standby generator for maintaining power to the control system and administrative loads but there is no standby power available for water production loads. Figure 3-7 presents the kWh usage and water production from July 2018 to June 2020 and Table 3-12 identifies the peak and minimum usage seasons.

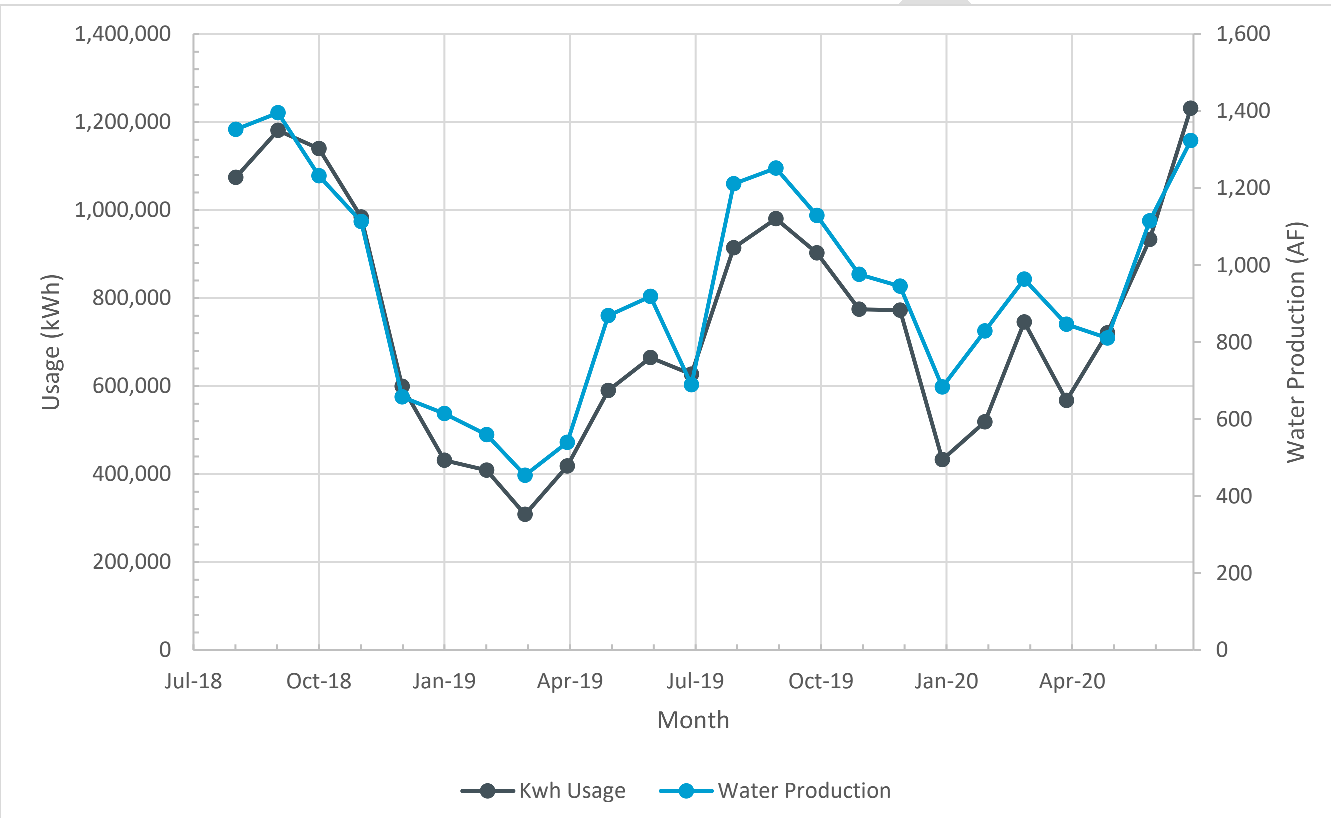


Note: Date graphed for kWh usage and water production corresponds to the end of the billing/production period.

Figure 3-7. MWRF Historical Usage – Electric Supplies

Table 3-12. MWRF Historical Usage – Electric Supplies		
Parameter	**Electricity Usage (kWh/month)**	**Water Demand (AF/month)**
Peak Usage		
September 2018	784,010	715
June 2020	788,085	670
Minimum Usage		
February 2019	60,240	31

Figure 3-8 presents the total electric usage and total water production for all of Mesa Water's electric powered production facilities discussed above. Table 3-13 identifies the corresponding peak and minimum usage seasons. The electric usage and water production include Wells 1, 3, 7, and 9 and the MWRF. It was determined that the average electric usage is 832 kWh/AF during summer months and 741 kWh/AF during winter months. Water production is higher in the summer months due to increases in the water supply demand. The higher electricity usage per AF produced by the clear wells and MWRF is likely due to the facilities and pumps operating at higher flow rates and thus incurring higher operating pressures due to increasing head loss in pipes and treatment systems. The electricity usage at the reservoirs is constant during the summer and winter months and accounts for a small percentage of the total usage.



Note: Date graphed for kWh usage and water production corresponds to the end of the billing/production period.

Figure 3-8. Overall Historical Usage – Electrical Supplies

Table 3-13. Overall Historical Usage – Electric Supplies		
Parameter	**Electricity Usage (kWh/month)**	**Water Demand (AF/month)**
Peak Usage		
August 2018	1,194,190	1,396
June 2020	1,239,840	1,323
Minimum Usage		
February 2019	315,560	454

3.2.2 Costs

Nearly 80 percent of SCE's retail rates are composed of generation and delivery costs, with generation costs being the majority. Rates vary by season (summer and winter) and demand periods (on peak, mid peak, off peak). Electric costs are the highest for summer on peak, and lowest for winter super-off peak. Historical retail rates for the last 10 years for all rate plans are available online. Mesa Water's facilities fall under the time of use (TOU) rate plans. This category is divided into subcategories by service type, such as PA2 (Agricultural and Pumping – Small to Medium) and PA3 (Agricultural and Pumping – Large). Wells 1, 3, and 9 fall under TOU-PA3; Reservoir 1 and Well 7 fall under TOU-PA2.

The highest rates for generation are summer on peak. The fluctuations for both generation rates are presented in Figure 3-9. Winter rates are relatively steady, but summer rates have varied. The price increase in 2013 and 2014 coincided with the sudden closure of the San Onofre Nuclear Generating Station. As previously mentioned, natural gas power plants were used to provide nearly all the energy production lost due to the closure. This caused a temporary spike in natural gas procurement prices and is reflected in SCE's generation costs. California's efforts to lower greenhouse gas emissions and increase reliance on renewable energy sources have contributed to increases in generation rates. Clean energy sources are more costly than other older technologies, such as ocean cooled natural gas power plants and coal-based power plants.

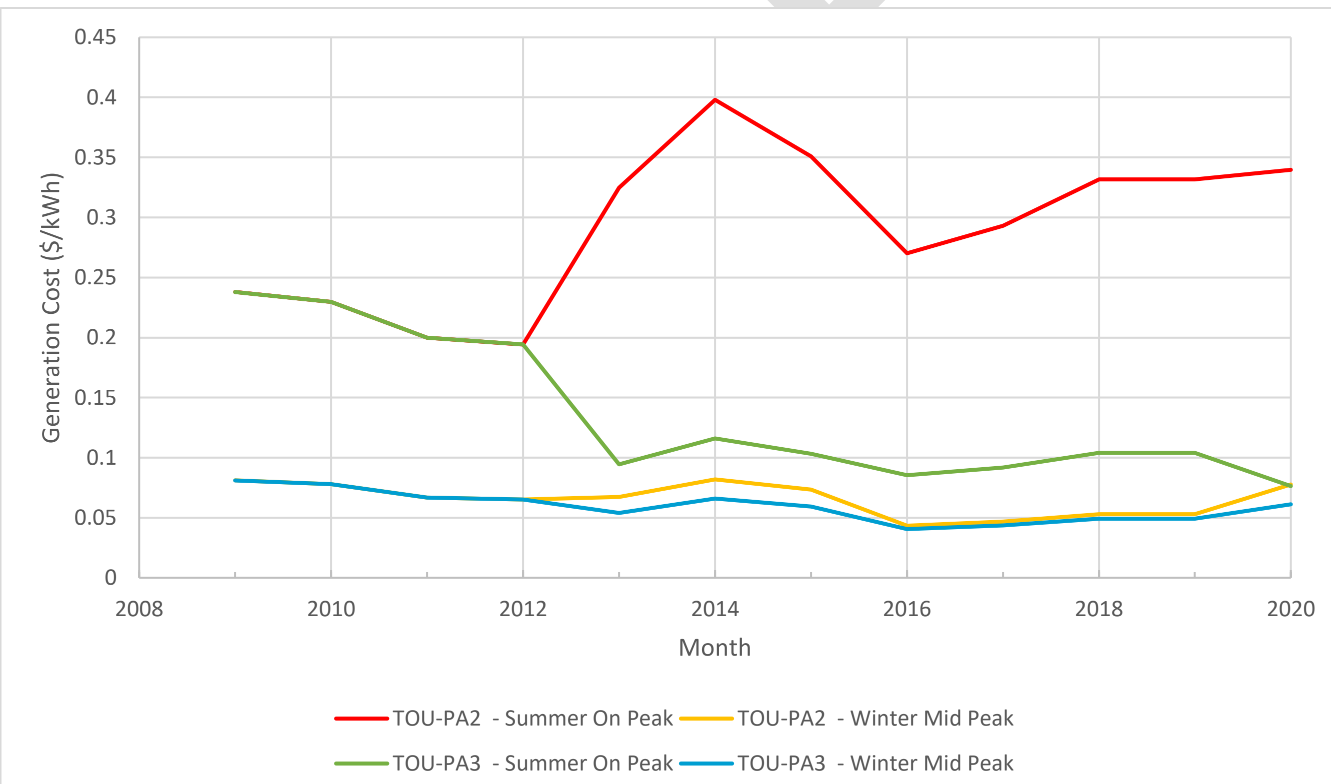


Figure 3-9. Historical Electric Generation Rates

Section 4: Energy Supply Forecasts

4.1 Natural Gas Supply Forecast

Within the next 1, 3, and 5 years, the natural gas demand in California is forecasted to steadily decrease. The California Renewables Portfolio Standard (RPS) program was established in 2002 to increase the use of carbon-free renewable energy. The program requires that by 2020, 33 percent of electricity sold by large Investor-Owned Utilities, such as SCE, is procured from renewable energy sources. By 2030, the requirement will increase to 60 percent and by 2045 the requirement will increase to 100 percent. The program is currently phasing out coal-fired power plants, of which there is only one operating within the state, and will target natural gas power plants next. Although the goal is to eliminate natural gas generation in California, it is currently a major source of energy. Renewable energy, such as wind and solar energy, require storage systems and planning to service peak demands. Approximately 75 percent of California's flexible energy capacity for peak events is provided by natural gas generation since the facilities can quickly adjust production levels.

Although the demand for natural gas is forecasted to decrease, the supply is expected to remain steady. Therefore, natural gas supply will be available to customers where it is necessary to be used as a fuel. It should be noted that projects installed in the future are less likely to receive regulatory approval if zero emission options are available.

As previously stated, 85 to 90 percent of California's natural gas supply is procured from Canada, Texas, New Mexico, Colorado, and Wyoming. Natural gas enters SoCalGas' system at 5 separate receipt points and is then boosted by compressor stations to transmission lines and storage fields. City gate stations, located in the Los Angeles region, are used to modulate the flow within the system. Natural gas leaves the system through the receipt point located at the California-Mexico border. Figure 4-1 presents a map of SoCalGas' system.

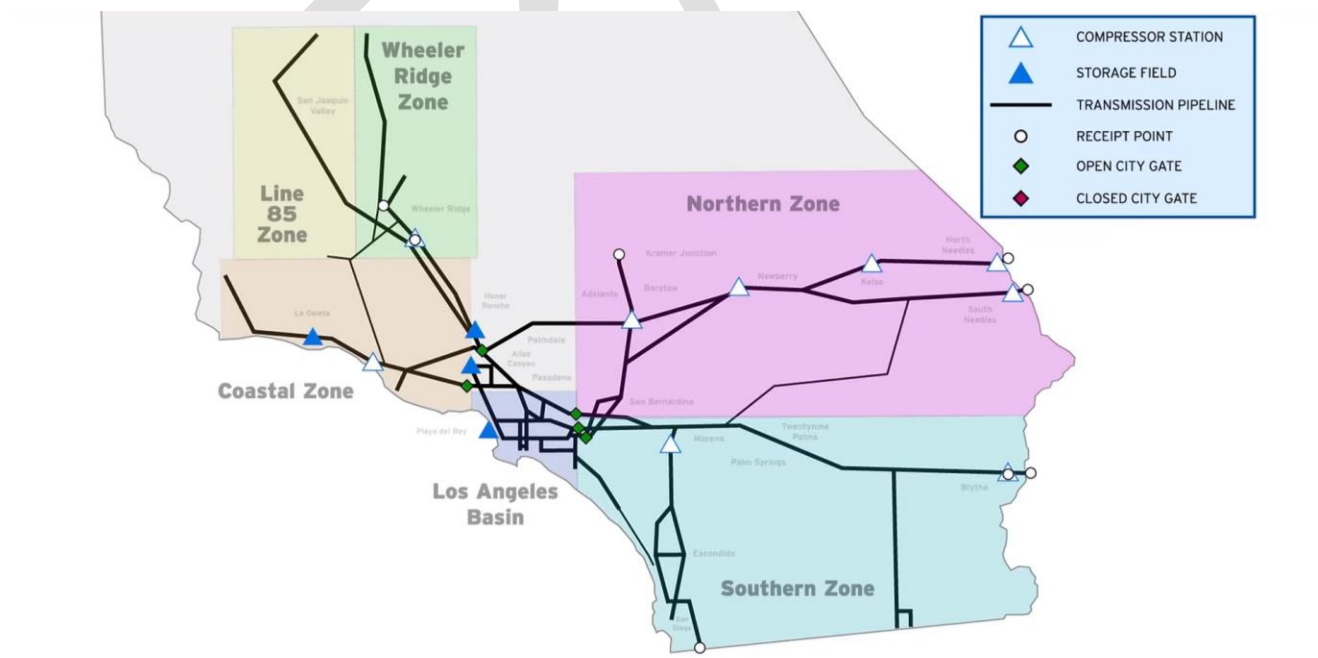


Figure 4-1. SoCalGas System Map

Figure from Southern California Gas Company

In 2018, California consumed approximately 4,930 million cubic feet per day (MMcfd) of natural gas. In the same year, the United States produced 83,400 MMcfd and exported 9,900 MMcfd, with 4,500 MMcfd being exported to Mexico. Additional natural gas export facilities are being constructed and the export volume increased to 12,800 MMcfd in 2019. Increases in export could result in cost or reliability repercussions for California. Figure 4-2 shows the natural gas consumption, production, and net imports for the U.S. in the last 10 years, per the U.S. EIA.

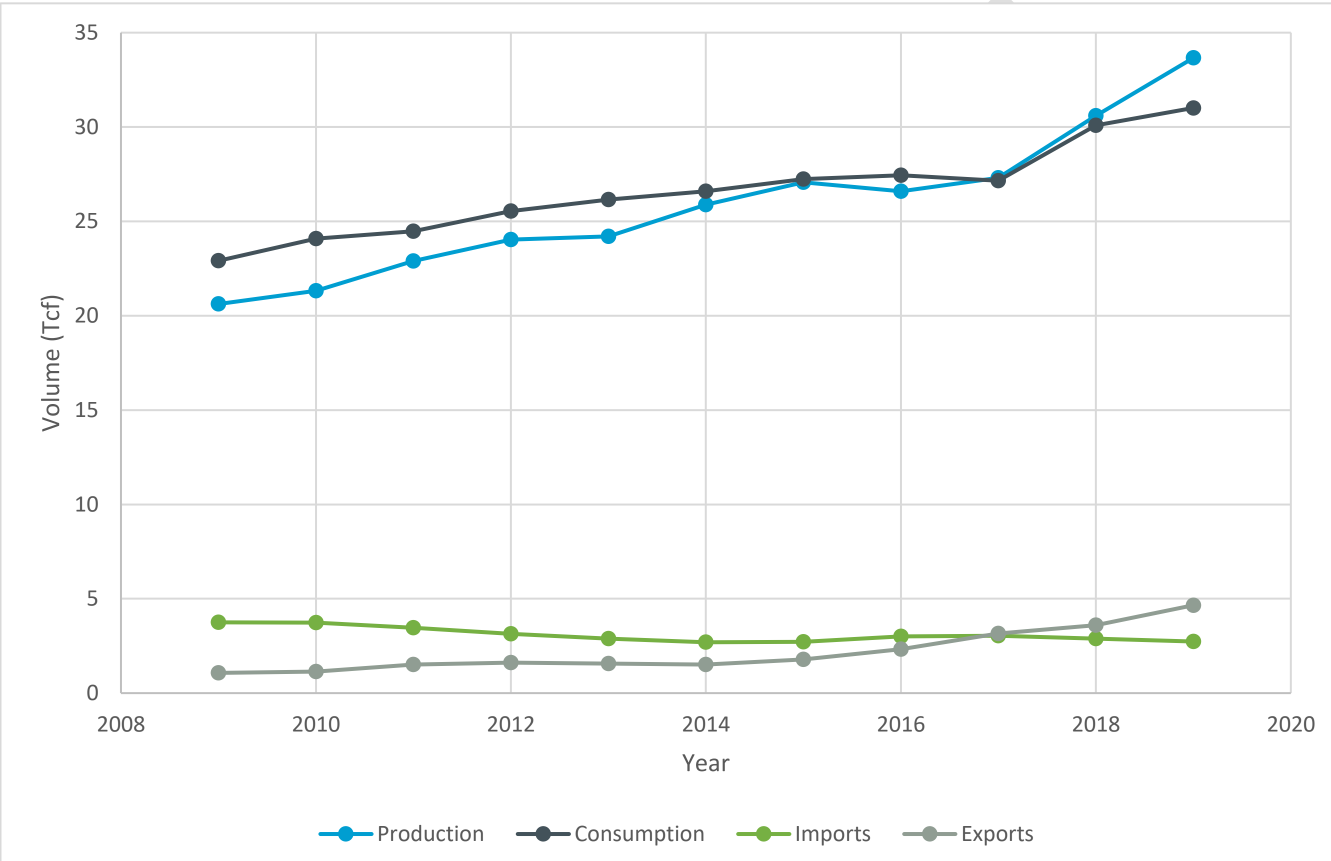


Figure 4-2. U.S. Natural Gas Consumption, Production, and Net Imports

Because of the RPS goal, there are no plans for expanding California's natural gas infrastructure and the existing infrastructure must be utilized. The 2015 leak at the Aliso Canyon natural gas storage field and recent pipeline outages have raised concerns regarding the existing infrastructure's reliability. In addition, the CPUC and CEC are currently investigating the feasibility of permanently closing the Aliso Canyon facility. The 2019 IERP states that pipeline outages were one of the causes of SoCalGas' natural gas price spikes. Approximately 20 percent of system capacity was lost during recent outages at Line 235-2, Line 4000, Line 3000, and Line 2000. SoCalGas plans to invest $6 billion over five years to improve pipeline safety, and the resulting pipeline outages can have direct effects on retail rates. The 2019 IERP estimates that natural gas prices will rise 2.37 percent per year between 2019 and 2030 because of supply, demand, and reliability issues. Figure 4-3 shows the forecasted natural gas procurement price for the next 1, 3, and 5 years.

Additional external factors, such as decreased petroleum demand due to COVID-19, will increase the volatility of natural gas procurement prices. Since hydraulic fracturing extracts both petroleum and natural gas, both commodities are similarly affected by market demands. The reduced demand for petroleum and natural gas results in decreased production, increased storage, and flaring of excess gas if storage facilities are at capacity.

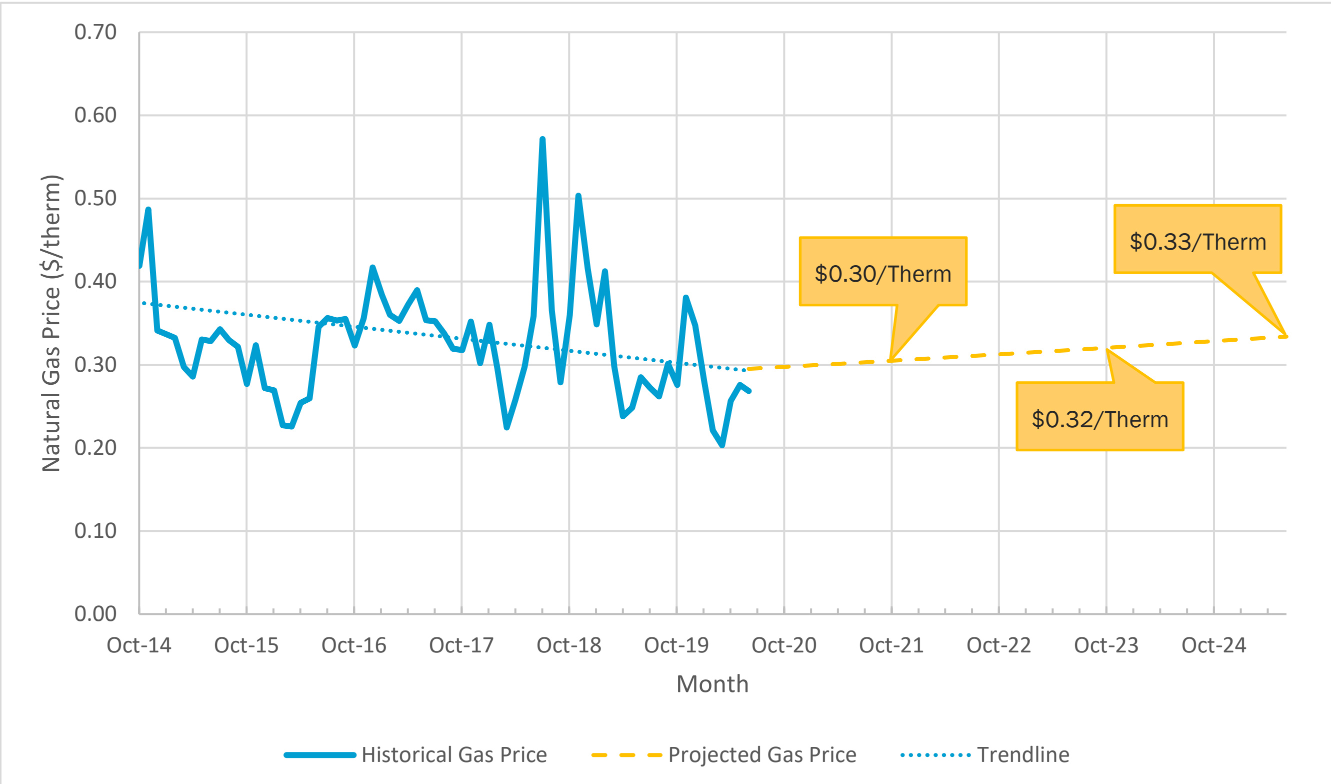


Figure 4-3. Forecasted Natural Gas Procurement Price

4.2 Electric Supply Forecast

California imports roughly one-third of its electricity from out of state. The remaining two-thirds are generated in-state using mostly renewable energy (34 percent) and natural gas (46 percent). California's renewable energy electric generation includes wind, solar thermal, solar photovoltaic, and hydropower. Electricity consumption in California has increased approximately 10 percent in the last 10 years. Within the next 1, 3, and 5 years, the electricity demand in California is forecasted to steadily increase. As previously stated, the RPS program requires that by 2020, 33 percent of electricity sold by large Investor-Owned Utilities, such as SCE, is procured from renewable energy sources. By 2030, the requirement will increase to 60 percent and by 2045 the requirement will increase to 100 percent.

To comply with the RPS program and meet peak demands, additional renewable energy and storage systems need to be integrated into the distribution grid. Wind and solar energy resources alone are not suitable to service peak demands since the production is dictated by weather conditions. Storage systems are needed to absorb excess energy during off-peak demands and supply energy during peak demands. The 2019 IERP estimates that during the next 1 to 3 years, California's electricity production is insufficient to meet peak demands. The shortfall is due to regulations on natural gas plants cooled by ocean water, a reduction on energy generated by coal and nuclear resources, and a shift in peak electricity demands. Natural gas plants cooled by ocean water account for a significant portion of natural gas plants in-state and will be entirely phased out by 2029. Imported coal generation and nuclear generation will be entirely phased out by 2025. Trends show that peak electricity demands are moving to early evening, which is when solar production is reduced or unavailable. Solutions, such as constructing generation and storage facilities, importing electricity, and upgrading the distribution grid, can potentially affect near term retail rates.

Due to California's electricity sector reliance on natural gas generation, natural gas procurement prices affect electricity prices. The high natural gas prices resulted in an increase of $0.014 per kWh effective 2019. Electricity is produced throughout the western United States and controlled regionally by system operators that manage production to match demand. Generation in California is primarily done at natural gas fired power plants and is distributed throughout the state on high voltage transmission lines at voltages above 135 kV. For the SCE system, the voltage is transmitted to substations before being fed to customers. The substations transform the voltages to either medium voltages (typically between 12 kV to 66 kV) or low voltages (typically between 120 V to 480 V).

SCE uses three standard indices to quantify reliability. The System Average Interruption Duration Index (SAIDI) represents the average time (in minutes) that a customer was without power in a year. The System Average Interruption Frequency Index (SAIFI) represents the average number of times that a customer was without power for over 5 minutes. The Momentary Average Interruption Frequency Index (MAIFI) represents the average number of times that a customer was without power for 5 minutes or less.

Mesa Water is within SCE's Huntington Beach District. Figure 4-4 depicts the historical SAIDI, SAIFI, and MAIFI for the district and overall SCE system. Note that the data presented includes both planned and unplanned outages. Indices corresponding to the Huntington Beach District are prefixed by the lowercase letter "d". The figure shows a downward trend in interruptions since 2016 and that the district generally has less interruptions than the entire SCE system. On average, in 2019 each SCE customer in the district was without power for approximately 2.5 hours, experienced 1.2 interruption greater than 5 minutes, and experienced 1.1 interruptions less than 5 minutes. This corresponds to a down-time of 0.03 percent annually.

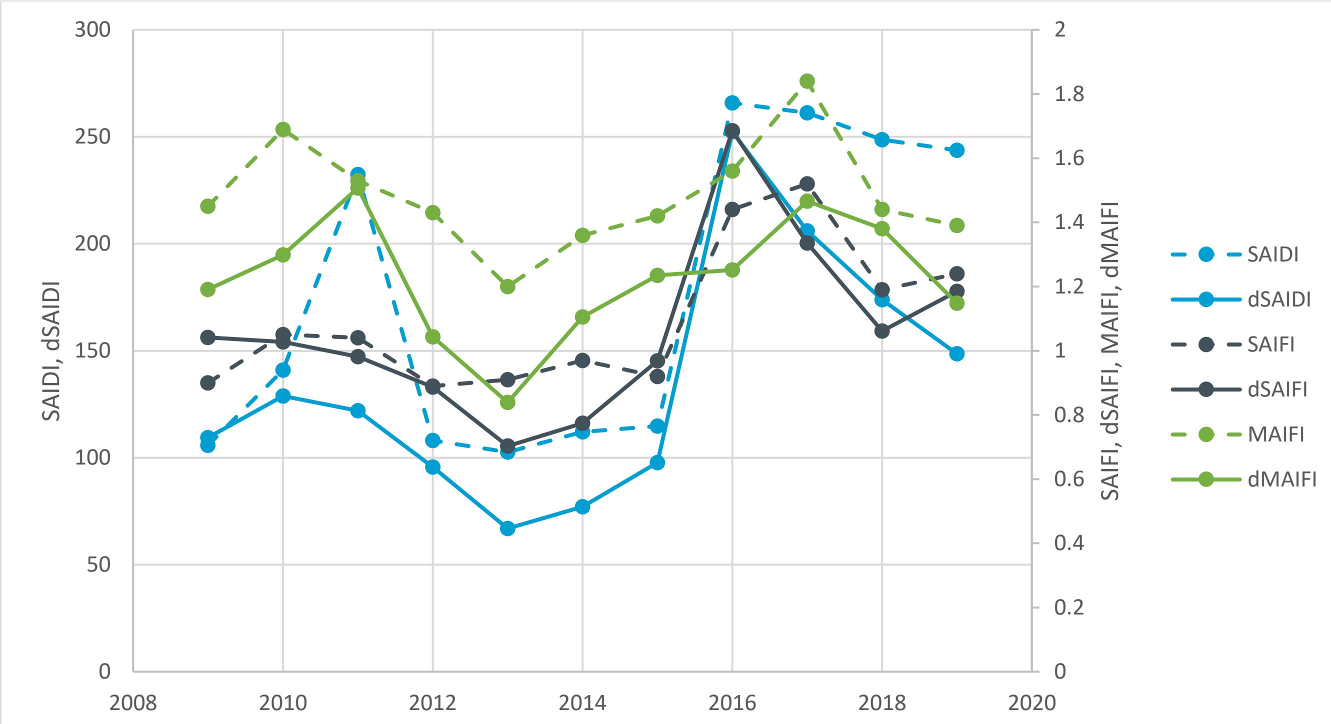


Figure 4-4. SCE Historical Reliability

In general, an electric utility with SAIDI and SAIFI values shown in Figure 4-4 would be considered extremely reliable. However, natural disasters such as regional wildfires and extreme heat events have reduced the perceived reliability of the electrical system that provides power to Mesa Water facilities. From a historic perspective, the SAIDI and SAIFI values have increased over the last five years which coincides with increased frequency and intensity of natural events. SCE classifies an outage as a Major Event Day (MED) if the daily SAIDI value exceeds a threshold value. Table 4-1 lists the total number and types of MEDs since 2016. Widespread natural disasters often affect multiple districts within SCE's service area. Not all events will affect the Huntington Beach District; however, the SAIFI and SAIDI values of the overall SCE system will be affected.

SCE started implementing the Public Safety Power Shutoff (PSPS) de-energization protocol towards the end of 2018 to minimize the threat of wildfires. Conditions that trigger a PSPS include high winds, low humidity, and dry vegetation. Additionally, SCE customers have experienced power outages due to extreme heat events where California Independent System Operator (Cal ISO), the state's electricity grid management agency, has implemented Stage 3 power emergencies which require utilities to implement rolling blackouts. These preventive measures negatively affect the SAIDI, SAIFI, and MAIFI. The increase in frequency, size, scope, and impact of wildfires raises concern over future electrical reliability and availability. Figure 4-5 and Table 4-2 show the forecasted electric generation rates for the next 1, 3, and 5 years.

Table 4-1. SCE Historical MEDs			
Year	Total Number of MEDs	MED Types	Total Number of Customers Affected
2016	7	Wind Storm, Fire, Lightning Storm	1,298,722
2017	9	Wind Storm, Fire, Vegetation Blown, Toppled Pole	3,768,753
2018	13	Wind Storm, Fire, Lightning Storm, Vegetation Blown, Landslide	1,668,621
2019	15	Wind Storm, PSPS	1,676,646

Note:

1. *Information referenced from SCE Annual System Reliability Reports.*

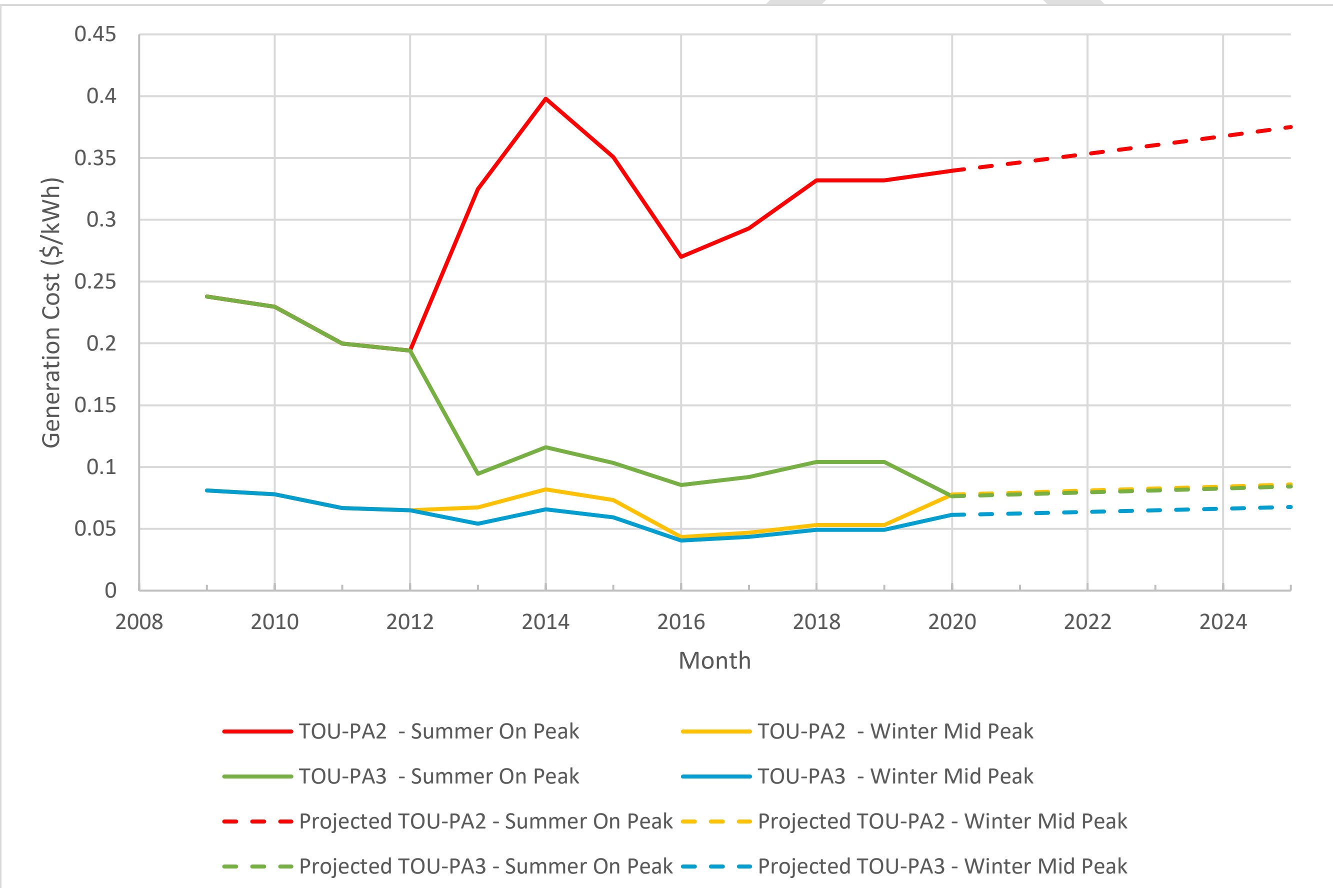


Figure 4-5. Forecasted Electric Generation Rates

Table 4-2. Forecasted Electric Generation Rates				
Rate Plan	Mesa Water Facilities	2021 ($/kWh)	2023 ($/kWh)	2025 ($/kWh)
TOU-PA2 – Summer On Peak	Reservoir 1 and Well 7	0.346	0.360	0.375
TOU-PA2 – Winter Mid Peak		0.079	0.083	0.086
TOU-PA3 – Summer On Peak	Wells 1, 3, and 9	0.078	0.081	0.084
TOU-PA3 – Winter Mid Peak		0.062	0.065	0.068

4.3 Infrastructure Risk

The movement of the Pacific Plate in relation to the North American Plate occurs at approximately 1” per year. A major earthquake on the San Andreas Fault, which is the boundary between the two plates, is expected to cause widespread destruction. The California Office of Emergency Services’ (Cal OES) Southern California Catastrophic Earthquake Response Plan (OPLAN), dated December 14, 2010, assumes a magnitude 7.8 earthquake on the San Andreas Fault and that natural gas and electricity supplies into Southern California are disrupted. Natural gas is primarily transported into and distributed throughout California using underground pipelines. These pipelines cross the San Andreas Fault 39 times and are subject to damage from a major seismic event. Electricity transmission lines cross the San Andreas Fault 141 times but are overhead. While the powerlines are at less risk as their overhead nature allows more movement separate from ground shaking, it is predicted severe ground shaking and resultant landslides will lead to failure of the towers that support these lines. Thus, a major earthquake would cause failures of the electricity transmission system.

The OPLAN prioritizes restoration of water, power, and communications infrastructure and has plans in place to assist utilities with restoration of said infrastructure. The OPLAN also outlines a strategy to implement emergency air operations, search and rescue operations, health and medical services, evacuations, and mass emergency shelters. For the purposes of TM-2, the following discussion will focus on the infrastructure response. The response plan is divided into three phases, as shown by Figure 4-6.

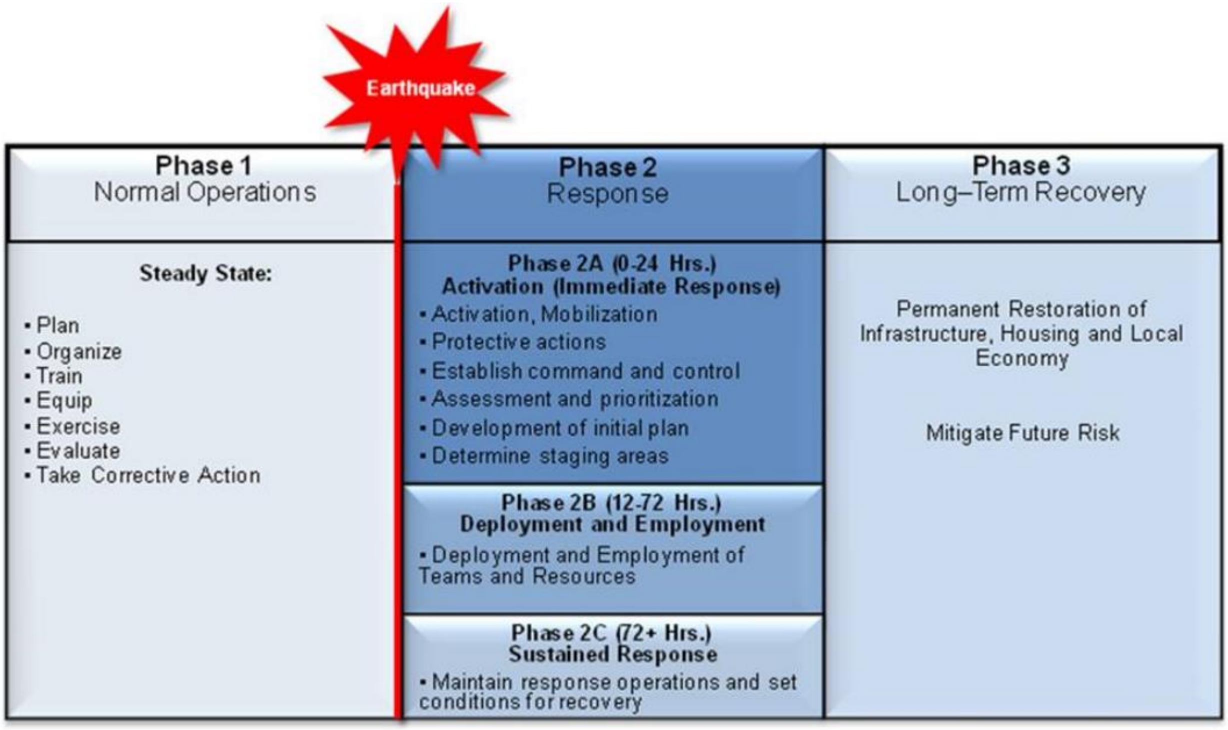


Figure 4-6. OPLAN Response Plan

Figure from Cal OES 2010 OPLAN

Phase 1 is comprised of planning, training, and preparations necessary for responding to the disaster. Phase 2 is divided into 3 subphases based on the time from the disaster. Phase 2A is the first 24 hours and consists of activation of task forces – ground transportation routes are established, airspace and airfields are coordinated, temporary sources of water, power, and fuel are acquired. This phase includes implementing mass distribution of bottled water and portable sanitation to affected communities, as well as coordinating federally provided equipment to produce potable water. It also includes coordinating repairs to water, power, and communications infrastructure. Phase 2B is within 12 to 72 hours after the disaster and consists of resource deployment – temporary sources of water and fuel are delivered from ground, sea, and air transport and alternate sources of water and power are rerouted to critical regions. Phase 2C is beyond 72 hours after the disaster and consists of sustaining emergency operations, such as temporarily repairing damaged infrastructure. Measures include temporary piping and temporary power generation infrastructure. Phase 3 consists of permanent measures to return to normal operations. The OPLAN estimates that 75 percent of normal electrical capacity in Orange County would be restored within 1 to 2 days. Up to 80 percent of normal electrical capacity in Los Angeles County could be restored using local generation, assuming the natural gas supply is available. No additional information regarding the expected capacities of natural gas or electricity from SoCalGas or SCE is available in the OPLAN.

Mesa Water can install a central natural gas or diesel fuel backup supply for additional reliability. This would ensure facilities remain operational during the beginning of an emergency, while regional power generation and distribution is restored. Further analysis is required to determine the capacity of the central backup supply. Local fuel delivery is expected eventually be available since the OPLAN also prioritizes road repairs.

Section 5: Available Backup Supplies

Mesa Water's clear wells and reservoir BPSs are equipped with backup fuel storage, except for Well 1. Wells 3, 7, and 9 have a diesel engine-driven generator on site, and Well 1 has a connection for a portable generator. Well 5, which is driven by a natural gas driven pump, has an onsite propane storage tank that provides fuel to the well pump and a propane engine-driven generator. The generator provides electricity to the well control system and critical valves.

Similar to Well 5, both Reservoir 1 and 2 BPSs are equipped with natural gas engine driven pumps that are connected to an onsite propane storage tank. Although Reservoir 1 and 2 BPSs and Well 5 are configured to operate using propane in the case of a natural gas outage, the systems are unreliable and not in use. Due to recent changes in maintenance and operating procedures, it was discovered that the backup propane systems need to be upgraded to provide for continues operation of the Reservoir and Well 5 as engines. At Well 5 Mesa Water has reported that the evaporator valves freeze after approximately 10 minutes of operation. Therefore, Well 5's pumping capacity is not available in the case of a natural gas outage. If production of other existing clear wells and MWRF can be increased, the loss of Well 5 would not impact Mesa Water's ability to meet demand.

The MWRF, which makes up 20 percent to 30 percent of locally produced water under normal demand conditions, is not equipped with standby generation for continuing production of water. In the event of a power outage, there is an onsite generator dedicated to the Administration Building and SCADA system for shutting down the plant. During peak demand seasons, water may need to be imported from Metropolitan Water District of Southern California (MWD) if the MWRF is without SCE power.

Table 5-1 summarizes backup fuel capacity and storage rating at each existing facility. The storage rating is estimated using the maximum fuel consumption rate. The 2017 Reservoir1&2 Pumps, Controls, and Chemical System Assessment Project performed field tests for the natural gas engines at the reservoirs. The results provided the fuel consumption at maximum flow in terms of therms/AF. The EIA states that 1 gallon of propane contains approximately 91,452 Btu, 1 gallon of diesel fuel contains 137,381 BTU, and 100,000 Btu is equal to 1 therm. Product data sheets for the generator at Well 7 were provided – since Wells 3 and 9 are equipped with generators of the same capacity, the same fuel consumption rate was assumed. Well 5's fuel consumption was estimated using a natural gas-powered engine with similar capacity.

Table 5-1. Available Backup Supplies		
Facility	**Backup Fuel Capacity**	**Storage Rating (hours)**
Reservoir 1 and BPS	1,150 gal horizontal propane storage tank	44[1,6]
Reservoir 2 and BPS	1,150 gal horizontal propane storage tank	32[2,6]
Well 1	N/A, connection for portable generator	N/A
Well 3	350 kW diesel generator; 426 gal subbase diesel storage tank	15[3]
Well 5	1,150 gal horizontal propane storage tank	25[4,6]
Well 7	350 kW diesel generator; 333 gal subbase diesel storage tank	12[3]
Well 9	350 kW diesel generator; 426 gal subbase diesel storage tank	15[3]
Well 12 (Future)	600 kW diesel generator; 1,000 gal diesel storage tank	24[5]
Well 14 (Future)	600 kW diesel generator; 1,000 gal diesel storage tank	24[5]

1. *Estimated maximum fuel consumption of 27 therms/AF at 2301 gpm (converts to 13 gal propane/hr) per pump. Assume two pumps in operation.*
2. *Estimated maximum fuel consumption of 27 therms/AF at 3352 gpm (converts to 18 gal propane/hr) per pump. Assume two pumps in operation.*
3. *Estimated maximum fuel consumption of 28.4 gal/hr. Referenced Caterpillar C-15.*
4. *Estimated maximum fuel consumption of 46 gal propane/hr. Referenced Cummins KTA19G.*
5. *Recommended that the minimum rating is 24 hours. Generator size is estimated from pump motor size. Diesel storage tank volume is estimated assuming a maximum fuel consumption of 43 gal/hr. Referenced Caterpillar C-18.*
6. *Existing propane backup system is not functional.*

Section 6: GAP Analysis

6.1 Emergency Conditions

The GAP analysis performed in TM-1 presented local water supply disparities under several operational or emergency scenarios. The three types of scenarios were as follows: Scenario 1 represented normal operating conditions, Scenario 2 consisted of three variations where several supply options are impaired or non-operational due to a local or regional emergency lasting 30 calendar days, and Scenario 3 represented several local supply options needing critical repairs. TM-1 verified that Mesa Water could meet water supply demands for 2020 and 2040 for all scenarios through various combinations of supply options, assuming that the power supply was not compromised. TM-2 builds upon the GAP analysis by evaluating the availability and deficiencies of backup energy supplies in each of the scenarios. Though the scenarios assume a duration of 30 days, backup energy supplies in this analysis are assumed to be needed for 10 days.

Scenario 1 assumed that the existing clear wells, future Wells 12 and 14, and the MWRF are available. Scenario 2a assumed that Well 5, the MWRF, and MWD supplies are not available. Scenario 2b assumed that Wells 3, 12, and 14 and MWD supplies are not available. Scenario 2c assumed that Wells 1, 3, 5, 7, and 9 and the MWRF are not available. Scenario 3 assumed that Wells 1, 7, and 12 and 50 percent of the MWRF are not available. Since Scenario 1 does not simulate an emergency condition, it will not be further evaluated in this GAP analysis. Scenario 2c demonstrates that Mesa Water can meet water supply demands if MWD supplies are utilized; since this GAP analysis focuses on backup power supplies, this scenario will also be removed from further consideration. While the scenarios do not consider the reason why some clear wells are unavailable, loss of utility power is likely a cause. Table 6-1 summarizes which facilities are in operation for each of the scenarios.

Table 6-1. Operational Facilities by GAP Analysis Scenario

Mesa Water Facility	Scenario 2a	Scenario 2b	Scenario 3
Well 1	✓	✓	
Well 3	✓		✓
Well 5		✓	✓
Well 7	✓	✓	
Well 9	✓	✓	✓
Well 12	✓		
Well 14	✓		✓
MWRF		✓	✓ (50% available)
Reservoir 1 and BPS	✓	✓	✓
Reservoir 2 and BPS	✓	✓	✓

Note:

1. *Refer to TM-1 for further information on which scenarios require importing water from MWD or expanding infrastructure.*

The GAP analysis scenarios are based on emergencies that last 30 calendar days before conditions return to normal. Typically, standby fuel storage is sized to provide 24 to 48 hours of supply at an engine's maximum fuel consumption. In practice, this results in the prime mover providing power for a longer duration since it will not continuously operate at maximum capacity. This often translates to fuel supplies having capacity to operate a facility for twice as long as they are rated for. The current capacities of onsite diesel fuel or propane storage at existing and future facilities is approximately 24 hours and is insufficient to provide power for the entire duration of a 30 day outage emergency. Assuming that SoCalGas and SCE are unavailable for only the first several days during a regional emergency, Mesa Water may still have to purchase water from MWD to meet demand. Optionally, Mesa Water can construct a centralized bulk fuel storage tank(s) in addition to the existing 24 hours of backup supplies at each facility. The capacity of the centralized tank depends on the desired degree of reliability. As discussed in Section 4.3, it is anticipated that local fuel delivery would be available within 72 hours of a regional emergency; however, the OPLAN's estimation of 72 hours may be optimistic and it is recommended that a longer duration for bulk fuel storage of 10 days be considered. Since onsite backup supplies provide approximately 24 hours of operation, the centralized backup supplies should be sized to provide for 9 days of operation. Thus, the combination of onsite and centralized backup supplies would accommodate 10 days of runtime during an outage emergency. Capacity beyond this duration may result in excessive maintenance costs since it would be more cost effective to utilize local fuel deliveries to replenish the bulk storage tanks. If this option is selected, it is recommended that Mesa Water's facilities standardize on diesel fuel for backup supplies so that only one type of fuel needs to be maintained.

As demonstrated in TM-1, peak day demands in August can be met in 2020 and 2040 if Wells 1, 3, 5, 7, 9, 12, & 14, the reservoirs, and the MWRF are online. The 150% demand for August 2020 is 2,468 AF and August 2040 is forecasted to be 3,017 AF. The analysis for sizing bulk fuel storage tanks assumes the following:

- Peak day demand is constant throughout a 30-day emergency;
- Backup generators are installed at the reservoirs and the MWRF;
- Well 5 has been replaced with a newly drilled well having a capacity of 3,000 gpm, is driven by a 600 hp motor and utilizes a 600 kW backup generator, similar to the other future wells.
- All of Mesa Water's facilities are operational during an emergency. If a facility is offline, it will not consume diesel fuel and water may need to be imported from MWD to meet water supply demands.
- The onsite diesel fuel storage at each facility offsets the bulk fuel storage volume.

Referencing the diurnal curve for August 30, 2013 in the 2014 Water Master Plan Update, the peak hours are approximately 4 am through 12 pm. It is assumed that the reservoirs are online and operating in lead lag during these hours to maintain pressure in the distribution system. For a 150% demand, 30-day emergency in 2020, the clear wells and the MWRF do not need to run continuously to meet demands; in 2040, the clear wells and the MWRF must run continuously to meet demands. To meet operation requirements for these conditions, the total centralized bulk diesel fuel storage tank volume must be 90,000 gallons and 100,000 gallons, respectively. Based on the conditions discussed in TM-1, the 2020 water supply demand was used as the basis for the bulk fuel storage tank capacity. The difference between the 2020 and 2040 demands is an additional 10,000 gallons of bulk storage. Due to the conservative nature of assuming peak day demands throughout the 30-day emergency, BC recommends that the backup supply capacities are further evaluated in the future when demand can be more closely determined. It is anticipated that the cost to increase storage by an additional 10,000 gallons in the future is relatively small compared to the present day capital cost, since majority of the cost is related to land acquisition and initial construction of the site. Using the 150% demand, three 30,000 gallon diesel fuel storage tanks would be recommended to meet the current year requirements. Fuel polishing is expected to cost approximately $12,000 annually with costs increasing with inflation.

A more cost-effective approach to the centralized bulk storage tank capacity is to assume 115% year average demands during a 30-day emergency in 2020 and 2040. To meet operation requirements for these conditions, the volume should be 60,000 gallons and 70,000 gallons, respectively. Using the 2020 demand water demands as the basis for diesel fuel storage capacity, two 30,000 gallon fuel tanks would need to be installed. The fuel polishing cost would be reduced to approximately $8,000 annually with costs increasing with inflation.

The reservoirs are necessary to meet peak hour demands in all scenarios and thus, it is recommended that backup supplies are provided at both. Scenarios 2a, 2b, and 3 show that combinations of the clear wells and the MWRF are sufficient to meet peak demands in August, the month with the highest demand. Following construction of two new clear wells, Mesa Water further improves system reliability in the event either of the existing water sources are unavailable during an emergency. The MWRF has a high production capacity and considerably exceeds the production capacity of any existing individual clear well. Mesa Water would be better able to meet water demands if backup supplies were provided at the MWRF when utility power is unavailable.

Though providing backup supplies at the MWRF has a significant initial cost, it may be advantageous to invest in backup supplies to strengthen overall system reliability and to provide redundancy. The Freeway Complex Fire in 2008 was the fourth largest wildfire to have occurred in Orange County, burning approximately 30,305 acres. During the event, one of Yorba Linda Water District's pump stations failed and fire flow was lost in the Hidden Hills area. This resulted in a lawsuit where the district was held responsible for millions of dollars in property damages. To mitigate similar environmental risks at Mesa Water facilities, installing standby generation at all facilities should be considered.

6.2 Fire Protection Supply

Per AWWA M31, the 2014 Master Plan Update states that the minimum service pressure for fire flow demands is 40 psi under normal operating conditions. The requirement is lowered to 20 psi during maximum daily demand (MDD). The MDD occurred during summer weekdays and was determined to be 25 MGD. Fire flow demand was assumed to be 1,500 gpm at all structures. The report concluded that, under these conditions, 98.5 percent of the distribution system by length can support National Fire Protection Association (NFPA) Class AA rated hydrants, with the remaining 1.0 percent and 0.5 percent supporting Class A and Class B hydrants, respectively. NFPA 291-2019 classifies hydrants based on their rated capacities, as summarized in Table 6-2.

Table 6-2. NFPA Hydrant Classification

NFPA Class	Rated Capacity (gpm)
Class AA	≥1,500
Class A	1,000-1,499
Class B	500-999
Class C	<500

The fire flow analysis considered under the Reservoir 1 & 2 Pump, Controls, and Chemical System Assessment Project built off of the 2014 Master Plan Update, and assumed that the MDD is 25 MGD and determined that fire flow demand is 5 hours at 5,000 gpm. The reservoirs are currently operated with a minimum capacity of 10 MG and the clear wells have a pumping capacity of approximately 9,200 gpm, assuming the most stable operation. The existing and recommended standby fuel sources are capable of providing pumping capacity for at least 24 hours. As long as at least one Reservoir has the ability to pump into the system, fire flow and normal demand can be met.

Section 7: Energy Supply Diversity Requirements

Each of the facilities operated by Mesa Water are critical to the operation of the system and are instrumental in delivering water to customers. Mesa Water's goal of remaining 100 percent reliant on local supplies, even during emergencies, requires a thoughtful approach to equipment needs to be sure that energy is available to continue water production. Therefore, backup supplies are necessary for any primary energy drive that is selected.

7.1 Existing Energy Supplies

Water production in AF will be used as the common metric for comparison. From July 2018 to June 2020, approximately 77 percent of water produced was from electric powered sites and the remaining 23 percent was produced by natural gas-powered sites. Wells 1, 3, 7, and 9 and the MWRF produce an average of 937 AF/month and Well 5 produces an average of 263 AF/month. Table 7-1 presents the natural gas and electricity usage patterns established in Section 3.1.1 and 3.2.1.

Table 7-1. Existing Energy Usage

Energy Supply Type	Usage Pattern
Natural Gas	
Summer	77 therms/AF
Winter	75 therms/AF
Electricity	
Summer	832 kWh/AF
Winter	741 kWh/AF

To compare the usage patterns, kWh will be used as the common metric as majority of Mesa Water's existing facilities utilize electricity as the primary energy drive. Well 5 is the only natural gas-powered production facility and will be compared to Well 1 because the production volumes are the most similar. In FY2020 Well 1 produced a total of 2,917 AF and used 1,770,992 kWh, while Well 5 produced a total of 3,166 AF and used 238,977 therms. The resulting conversion factor is 7.93 therms/kWh. The equivalent natural gas usage pattern is 610 kWh/AF in the summer and 595 kWh/AF in the winter. Production in FY2019 was not used since Well 1 was offline for several months as part of the Well Automation Project.

As discussed in Section 4.1 and 4.2, SoCalGas and SCE are both reliable sources of energy. In FY2019 and FY2020, Mesa Water's electric powered equipment were not removed from service for any major duration due to unforeseen circumstances. In the same period, multiple natural gas-driven engines at Reservoir 1 and 2 BPSs were removed from service for 6 months unplanned maintenance. Additionally, there have been 171 work orders for the natural gas-driven engines since 2017, totaling $97,050.

7.2 Energy Supply Diversity

Mesa Water has implemented policies and constructed facilities to increase reliability by diversifying its energy supply. As discussed in Section 4, California is moving towards carbon-free energy sources and does not intend to expand natural gas infrastructure. It is expected that regulations on natural gas will become more stringent such that renewable energy is favorable. Generally, private industry and utility agencies alike have standardized on electric motors to drive equipment because they are readily available, require minimal maintenance, and have long (30+ years) lifespans.

If natural gas-driven engines remained, the existing propane storage is suitable to provide backup fuel for the engines on-site. It should be noted that the propane storage system at both reservoirs would need to be fixed since they are currently out of operation and unable to provide fuel to the engines driven pumps. Conversely, if standardizing on electric motors for pumps, standby power needs to be provided. Diesel engine standby generators are typically selected for facilities due to the reliable nature of the engines and high energy density of diesel fuel. Permitting for the generators is simplified as the South Coast Air Quality Management District (SCAQMD) maintains a list of pre-approved standby generators. Diesel fuel is produced locally in California and is delivered to the site by truck. California's refining capacity for distillate, which includes diesel fuel, is approximately 13.7 MGD with sales of distillates averaging 10.8 MGD over the previous five years. The diesel fuel supply is forecasted to remain constant. Figure 7-1 shows the trend for historical distillate fuel deliveries.

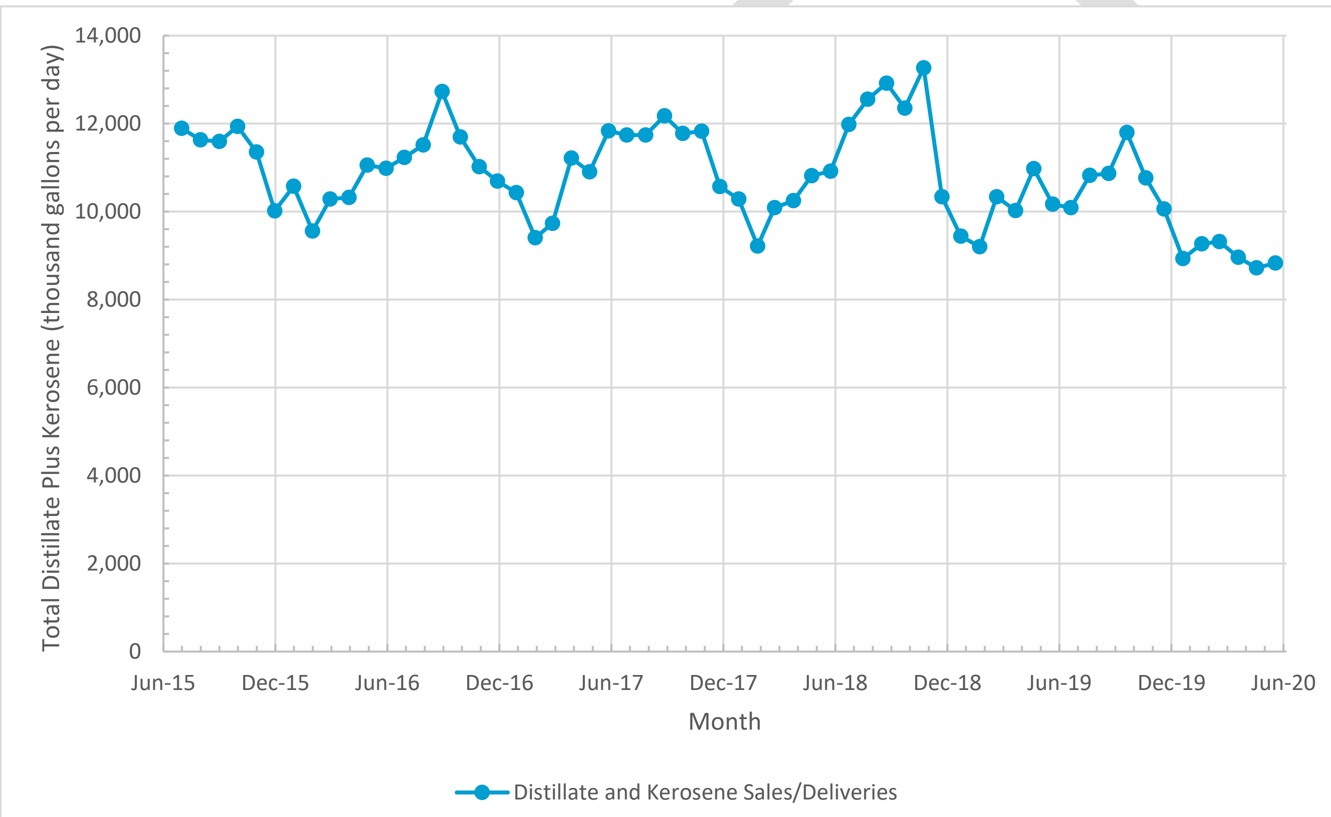


Figure 7-1. California Total Distillate Plus Kerosene Sales/Deliveries

An added benefit of utilizing electric motors for pump drives is the ease of deploying low emissions or zero emissions equipment into the energy portfolio to provide power to the pumps as a supplement to power from SCE or a diesel standby generator, or as a replacement to diesel engine standby generation. Solar generation coupled with battery storage can be operated in a number of modes:

- Solar panels can charge the batteries and offset utility demand during the day. The batteries can then be discharged during nighttime periods to offset electricity demand at night.

- Batteries can be charged overnight during off-peak periods and used to shave peak electrical demand during the day.
- Batteries can be charged using either solar panels or utility power and stored to be used exclusively during a power outage.

Coupling a battery storage system with solar panels would allow for operation of facilities, even if on a limited basis, when SCE cannot provide power for long durations because generation of solar power occurs locally. There is a limitation of solar generation due to the large area necessary to install solar panels. Generally, the more solar generation installed the more resilient a facility can be.

To best meet water delivery requirements Mesa Water should utilize electric motor driven equipment for water production and delivery at existing and future facilities. Coupling the high reliability and uptime of the SCE power grid with diesel engine driven standby generators, that will operate during the rare instances of an SCE outage, provides the best overall system reliability for Mesa Water facilities. Electricity should be selected as the primary power source for the following reasons:

- Electric motors are extremely reliable and require very little maintenance (fewer moving parts), especially when compared to natural gas driven engines which require numerous hours of annual maintenance and testing to keep in operation efficiently and are subject to extremely long outages in case of a parts failure. The maintenance costs for an electric motor throughout its life expectancy is estimated to be 8% of the maintenance costs for a gas burning reciprocating engine throughout its life expectancy. The life expectancy of an electric motor is expected to be nearly double the life expectancy of a reciprocating engine;
- Standardizing on electric motors for driven equipment simplifies operation and maintenance across assets. Motor maintenance is fairly typical across manufacturers and the routine maintenance required does not require specialized skills. This broadens the pool of people who can perform maintenance which keeps costs competitive whether it's performed by in-house staff or contracted out;
- Most of the electric motors in Mesa Water facilities are available in commodity sizing which means in the extremely rare occurrence of a premature motor failure, a new replacement motor can typically be procured and delivered within seven days and are available from numerous manufacturers and local vendors;
- While Variable Frequency Drives (VFDs) are likely to be used for speed control of electric motors, they do have life expectancies that are equal to reciprocating engines and need to be replaced at the end of their useful life. However, VFDs can be equipped with bypass contactors or could be completely bypassed with another drive or contact starter allowing the electric motors to operate in case of a drive failure. Operating in a bypass configuration could have an impact on efficiency but the equipment will still be able to operate;
- Using electricity as the primary power source allows flexibility for providing power, whether it be by the utility, stationary standby generators, mobile/portable standby generators, or other future technologies such as fuel cells;
- The liquid nature of diesel fuel is more stable, is easier to manage, store, deploy, and transfer, and provides more energy density than both natural gas and propane. The gaseous fuels are subject to loss to atmosphere as a result of leaks or faulty equipment without the chance of recovery;
- Much of the electricity distribution infrastructure is located above grade. Large seismic events could induce more damage on below grade infrastructure such as pipelines than above grade infrastructure which typically allows for more movement and may be more resilient to ground

movement. In the short term, while the majority of power generation is from natural gas, an interruption in natural gas supplies could impact the availability of electricity, but as California's energy portfolio transitions to renewable sources, the reliance on natural gas will decrease and the availability of electricity following a seismic event is likely to increase;

- As regulations throughout California work toward phasing out equipment that utilizes fossil fuels, transitioning equipment to electric powered reduces, or eliminates, the risk of high regulatory compliance costs in the future that may be required for equipment replacements or retrofits.

At present there is no advantage in deploying local generation, such as solar systems, to Mesa Water facilities. Existing facilities have insufficient real estate to install the large footprint battery and inverter systems as well as solar panels necessary to utilize solar for backup. The relative smaller size of diesel engine standby generator systems, energy density, and control of fuel make them a better option for providing standby power when needed.

Section 8: Reservoir Drive System Technology Solutions

The previously produced Reservoirs 1 & 2 Pumps, Controls, and Chemical System Assessment made recommendations for new control system upgrades to the Reservoir control systems. The recommendations made included upgrading the Murphy Engine Controllers to Allen Bradley PLCs to better integrate with the facility's existing control system and to eliminate the need for communications converters. This TM does not recommend any changes to control system topology previously proposed. The selection of electric motors in lieu of natural gas-driven engines will render engine controllers, or PLCs to replace those functions, unnecessary, thus further saving approximately $600,000 in procuring a new proprietary engine control system. The plant PLCs would send commands to the motor VFDs to adjust motor speed based on operational parameters such as pressure and flow requirements.

Section 9: Regulatory Permitting and Compliance Requirements

SCE is regulated in part by the CPUC. Legislation passed by the State of California (SB 901 and AB 1054) in recent years impacts how electric utilities operate their electrical systems and requires them to prioritize wildfire mitigation and system safety. As this legislation is new, its full impact cannot yet be assessed; however, electric utilities, including SCE, are shutting down transmission and distribution lines in high fire risk areas during high risk events. Shutting down these transmission lines could have an impact on power availability and capacity at local substations depending on overall system demand. As noted in Section 5, SCE has relatively high system reliability and uptime indexes and has operated the distribution system in the Orange County area at higher than their overall average. Therefore, it is difficult to predict with certainty what the impact of new operational modes will be on the system reliability and uptime. However, it is reasonable to predict wildfire mitigation efforts are likely to have a negative impact on those system indices.

SoCalGas is regulated in part by the CPUC. The CPUC is taking an active role in the decarbonization of California and reducing impacts on climate change. Coupled with the state's goal of moving to a carbon-free energy system is a goal to reduce methane emissions from the state's natural gas system. The CPUC is enforcing new rules and regulations that require operators of natural gas systems to improve the safety and reliability of natural gas storage and conveyance systems. To meet those goals, the natural gas utilities are expected to increase maintenance spending on infrastructure. As noted in Section 3.1.3, the capital that

SoCalGas plans to spend over the next five years on maintenance is expected to drive up the cost of natural gas for the foreseeable future. These maintenance projects are not expected to have an impact on the natural gas supply and availability.

At the local level, SCAQMD is responsible for managing air quality in the Southern California region. Under their purview they provide permits for emissions generating vehicles and stationary equipment, such as the natural gas engines that are drivers of some pumps at Mesa Water facilities. The regulatory landscape for engine emissions appears relatively stable for the next few years. However, the State of California has a goal of carbon neutrality in 2045, which will require a reduction of fossil fuel usage. The air quality districts are driven by state regulations to meet climate and emissions goals to tighten emissions standards and reduce fossil fuel usage. Air districts will require lower emission equipment and zero emission equipment as the technologies becomes available.

As California regulations reduce operation of fossil fuel burning equipment throughout the state Mesa Water's equipment would be at risk of being forced to be replaced or required to be retrofitted to meet more stringent emissions requirements if natural gas engines were retained. For utilities such as Mesa Water, forced obsolescence of operating equipment could also be a factor for this type of equipment. To avoid the risk and uncertainty of the future requirements associated with phasing out fossil fuel equipment Mesa Water should transition to electric motor driven equipment for existing and future production and distribution facilities.

There are no expected changes to regulatory rate structures for emergency generators since it is a widely implemented and proven technology. Permitting standards and rate structures between diesel-engine standby generators and continuous duty natural gas fired engines are similar and cost-competitive to one another, assuming an engine is selected from a SCAQMD pre-approved list of equipment. The time to permit an engine of either type, selected from the pre-approved list, is typically 3 to 6 months. Additionally, the permitting process for replacing engines in kind is accelerated if the technical specifications of the new equipment match the existing equipment. Permitting for generators that are not pre-certified or that have higher ratings than existing equipment is subject to longer timelines and may require health risk assessments.

Solar energy with battery storage and hydrogen fuel cell technology are potential new energy supply options. Solar energy with battery storage is an approved technology and would not require air permitting since the technology does not produce any emissions. Hydrogen fuel cell technology is still in development and there is no pending or recently approved legislation related to environmental permitting.

Section 10: Costs

10.1 Life Cycle Costs

The costs shown below in Tables 10-1 and 10-2 are Class 5 estimates to determine life cycle costs of replacing the existing pumps at Reservoir 1 and Reservoir 2 with new equipment. The estimate compares the options of replacing the existing natural gas engines with new natural gas engines or with electric motors. For electric motor replacements, upgrades to the existing electrical service infrastructure is necessary and is considered, as is the cost for new standby generators. Life cycle is assumed to be 20 years as diesel engines are expected to have reached the end of their expected life at that time. For the purposes of this analysis, the electric motors are assumed to be driven by VFDs. The electric motors are expected to have a life expectancy of 40 years while VFDs are expected to require replacement at 20 years. The depreciated value of assets is deducted from the electric motor life cycle cost to account for the differing life expectancy. Design and construction costs for new equipment are included in the capital costs.

The capital cost for natural gas-driven pumps includes the pump and engine, but does not include sound attenuation as it is assumed that existing will be reused. The operations and maintenance (O&M) costs for natural gas-driven pumps are based on a 20-year life cycle and based on computerized maintenance management system (CMMS) data for the existing engines. The annual increases in O&M costs is based on the current CMMS cost increases. Capital costs to replace the existing MurCal engine control system is included, as recommended in the 2017 Reservoir 1&2 Pumps, Controls, and Chemical System Assessment Project.

Capital costs for electric-motor operated pumps includes VFDs and ancillary electrical equipment. Upgrades to the electrical system are required if switching to electric motor-operated pumps since the existing service at both reservoirs is unable to support the higher electrical demand. Capital costs for electrical system upgrades includes a new service, transformer, and switchgear. O&M costs for the diesel generator is composed of routine operation and fuel polishing. Capital costs for required SCADA improvements are included.

Energy costs are based on the estimated water supply demands established in TM-1 and the forecasted increases described in Section 4 of this TM. Energy costs for natural gas-engine pumps assume that new engines will be more efficient than existing. Energy costs for electric motor-operated pumps were estimated using the conversion factor established in Section 7.1.

Table 10-1. Reservoir 1 – Upgrade Costs

Equipment	Capital Costs	O&M Costs	Energy Costs	Total
Natural Gas Engine-Driven Pumps	$1,090,000	$650,000	$260,000	**$2,731,000**
MurCal Engine Control System Replacement	$731,000	N/A	N/A	
Electric Motor-Operated Pumps	$190,000	$24,000	$540,000	**$1,514,000**
Electrical System Upgrades	$195,000	$30,000	N/A	
Diesel Generator	$500,000	$20,000	$15,000	
SCADA Improvements	$130,000	N/A	N/A	

Table 10-2. Reservoir 2 – Upgrade Costs				
Equipment	Capital Costs	O&M Costs	Energy Costs	Total
Natural Gas Engine-Driven Pumps	$1,560,000	$860,000	$650,000	**$3,750,000**
MurCal Engine Control System Replacement	$680,000	N/A	N/A	
Electric Motor-Operated Pumps	$750,000	$24,000	$1,100,000	**$2,919,000**
Electrical System Upgrades	$195,000	$30,000	N/A	
Diesel Generator	$650,000	$25,000	$15,000	
SCADA Improvements	$130,000	N/A	N/A	

10.2 Capital Costs

Class 5 capital cost estimates for the recommended upgrades at Mesa Water's facilities are shown in Table 10-3. It should be noted that the depreciated value of assets is no longer deducted from the capital costs for upgrades at the reservoirs. Capital costs for reliability upgrades at Well 1 and 5 are also included. Refer to TM-3 for discussion of purchasing a portable backup generator for Well 1 and semitruck for hauling. The capital cost for upgrades at Well 5 includes drilling a new well and installing an electric motor-operated pump, VFD, switchgear, and backup diesel generator. The centralized bulk diesel fuel storage tank capacity is designed for a total of 10 days of runtime during a 30-day regional emergency. Refer to Section 11.1 for sizing of the centralized bulk diesel fuel storage tanks and associated fuel polishing costs. Refer to TM-3 for breakdown of costs for the bulk diesel fuel storage tanks. TM-1 Scenario 1 established that Mesa Water's existing facilities can meet 2040 peak water supply demands and thus, the MWRF generator capacity is based on existing equipment. Design and construction costs for new equipment are included in the capital costs.

Table 10-3. Upgrades Cost	
Upgrade	Capital Cost
Reservoir 1 electric motor-operated pumps, backup diesel generator, and electrical upgrades	$1,045,000
Reservoir 2 electric motor-operated pumps, backup diesel generator, and electrical upgrades	$1,755,000
Well 1 portable backup generator and semitruck[1]	$500,000
Drill new well at Well 5 and install electrical equipment[2]	$1,500,000
Centralized (2) 30,000 gal bulk diesel fuel storage tanks[1]	$3,500,000
MWRF 2,500 kW diesel engine generator and 4,000 gal diesel fuel tank	$950,000

1. *Refer to TM-3 for further discussion.*
2. *Includes drilling new well and installing electric motor-operated pump, VFD, switchgear, and backup diesel generator.*

Section 11: Recommendations

It is recommended that Mesa Water standardizes on electric motors with backup diesel engine generators considering the life cycle cost benefits, ease of operation and maintenance, and forecasted regulatory atmosphere. Additionally, standardizing on energy supplies across all sites allows for greater flexibility when moving fuel supplies, portable generators, or providing additional power.

Based on the operating and failure scenarios discussed in TM-1, maintained operation at as many of the Mesa Water facilities as possible is necessary to meet current and future water demand. The scenarios, discussed in TM-1 vary slightly and peak summer demand can be met through efforts to reduce demand and/or purchases of water from MWD if necessary. Production of the MWRF and existing clear wells is sufficient to meet daily average demand through all seasons if all resources are available. By providing reliable pump drivers and standby power at each facility, including the MWRF and Wells 1 and 5, the need to purchase water from MWD is reduced in emergency scenarios. Adding new clear wells and equipping them with electric motor driven pumps and diesel engine standby generators, further decreases the need to purchase imported water, and increases Mesa Water's production capacities by installing facilities that are highly reliable from an energy drive standpoint and relatively easy to maintain.

Reliable operation of the reservoirs is necessary to meet peak daily demand. To enhance the reliability of the existing reservoir booster stations BC recommends replacing the end-of-life equipment, three natural gas engine driven pumps at Reservoir 1 and four natural gas engine driven pumps at Reservoir 2, with electric motor driven pumps. The electric jockey pumps at both Reservoirs 1 and 2 should also be replaced with electric motor driven pumps to provide the full range of operating flows from the facilities. To provide standby power, BC recommends the installation of diesel engine driven generators with the capacity to provide power to the entire reservoir from a single unit. Generators of the sizes necessary to accomplish this are standard and very reliable. With regular monthly operational testing and annual load testing, diesel engine driven standby generators are the best option for providing power in emergency conditions for critical facilities. Diesel fuel storage tanks should be installed at each facility with a diesel engine driven standby generation for short duration power outages. The generator sizes and capacities, along with the storage tank capacities, are shown in Table 11-1.

An important consideration for the selection of new equipment is the life span of the equipment selected. Electric motors very often have a useful life of 40 years with relatively little maintenance required when compared to reciprocating engines. Reciprocating engines require large maintenance budgets to remain operational as they age, as Mesa Water has experienced with the engines that are currently installed. The lifecycle costs of installing electric motors in place of the natural gas engine powered pumps shows a capital savings considering other electrical upgrades that are necessary to implement the recommendation after 20 years of operation. Additionally, the selection of electric drivers offers the flexibility of adding or supplementing utility or standby power with other sources in the future such as solar power and battery storage systems which would offer operational advantages such as on-site electricity generation which could be used during long duration power outages in case of a regional emergency as well as the ability to peak shave demand. While, neither of these technologies are recommended for deployment at this time due to footprint requirements or cost, the use of these technologies may be feasible in the future and the use of electricity would allow their installation. An important consideration is the life span of the equipment selected.

Several modifications are recommended at the clear wells to reduce the need to purchase water from MWD in emergency scenarios. Since Well 1 has a connection for a portable backup generator, it is recommended that Mesa Water considers purchasing a portable backup generator and semitruck. Well 5 has a natural gas engine-driven pump and backup propane tank installed and is nearing its end of useful life. Once Well 5 reaches the end of its useful life, it is recommended that the natural gas engine driven pump be replaced with an electric motor driven pump and backup diesel generator – allowing it to take advantage of the benefits previously listed as well as having a common equipment type across all of the clear well sites. Wells 3, 7, and 9 currently have electric motor-operated pumps and 350 kW backup diesel engine generators installed, and do not require any upgrades. Table 11-1 summarizes the recommended upgrades and estimated capital costs. Refer to TM-3 for further evaluation of the Well 1 portable backup generator and centralized diesel fuel storage.

Table 11-1. Recommended Upgrades

Site	Existing		Recommended		
	Primary	Backup	Primary	Backup	Capital Cost
Reservoir 1 BPS	(3) 137 hp natural gas engines	(2) natural gas engine generators; (1) 1,200 gal propane tank	(3) 150 hp electric motors with VFDs	(1) 1,000 kW diesel engine generator; (1) 2,000 gal diesel fuel tank[1,4]	$1,045,000
Reservoir 2 BPS	(4) 369 hp natural gas engines	(1) natural gas engine generator; (1) 1,200 gal propane tank	(4) 400 hp electric motors	(1) 2,000 kW diesel engine generator; (1) 3,000 gal diesel fuel tank[2,4]	$1,755,000
Well 1	(1) 400 hp electric motor	Connection for portable generator	No upgrades necessary	(1) Portable backup generator and semitruck	$500,000[5]
Well 5	(1) 450 hp natural gas engine	(1) 1,150 gal horizontal propane storage tank	(1) 600 hp electric motor	(1) 600 kW diesel engine generator; (1) 1,000 gal diesel fuel tank	$1,500,000[6]
Centralized Bulk Diesel Fuel Storage	N/A		(2) 30,000 gal bulk diesel fuel storage tanks		$3,500,000[5]
MWRF	(2) 400 hp well pumps; (3) 350 hp high lift pumps; (2) 250 hp nanofiltration feed pumps; (4) 100 kW CIP tank heaters; (3) 40 hp product transfer pumps; (2) 30 hp degasifier blowers; (3) 30 hp CO2 booster pumps	See Section 5	No upgrades necessary	(1) 2,500 kW diesel engine generator; (1) 4,000 gal diesel fuel tank[3,4]	$950,000

1. *Average estimated fuel consumption of 73 gal/hr. Referenced Caterpillar C-32 and Cummins QST30-G5. Fuel tank is rounded up to next standard size.*
2. *Average estimated fuel consumption of 138 gal/hr. Referenced Caterpillar 3516C DITA and Cummins QSK60-G6. Fuel tank is rounded up to next standard size.*
3. *Average estimated fuel consumption of 175 gal/hr. Referenced Caterpillar 3516C and Cummins QSK60-G19. Fuel tank is rounded up to next standard size.*
4. *Capacity is designed for 24 hours of runtime at maximum fuel consumption.*
5. *Refer to TM-3 for further discussion.*
6. *Includes drilling new well and installing electric motor-operated pump, VFD, switchgear, and backup diesel generator.*

Figure 11-1 shows the proposed location of the 1,000 kW backup diesel engine generator and 2,000 gal horizontal diesel fuel storage tank at Reservoir 1. The approximate dimensions are 6.5 ft by 5.5 ft for the generator and 64-inch diameter by 12 ft for the onsite storage tank.

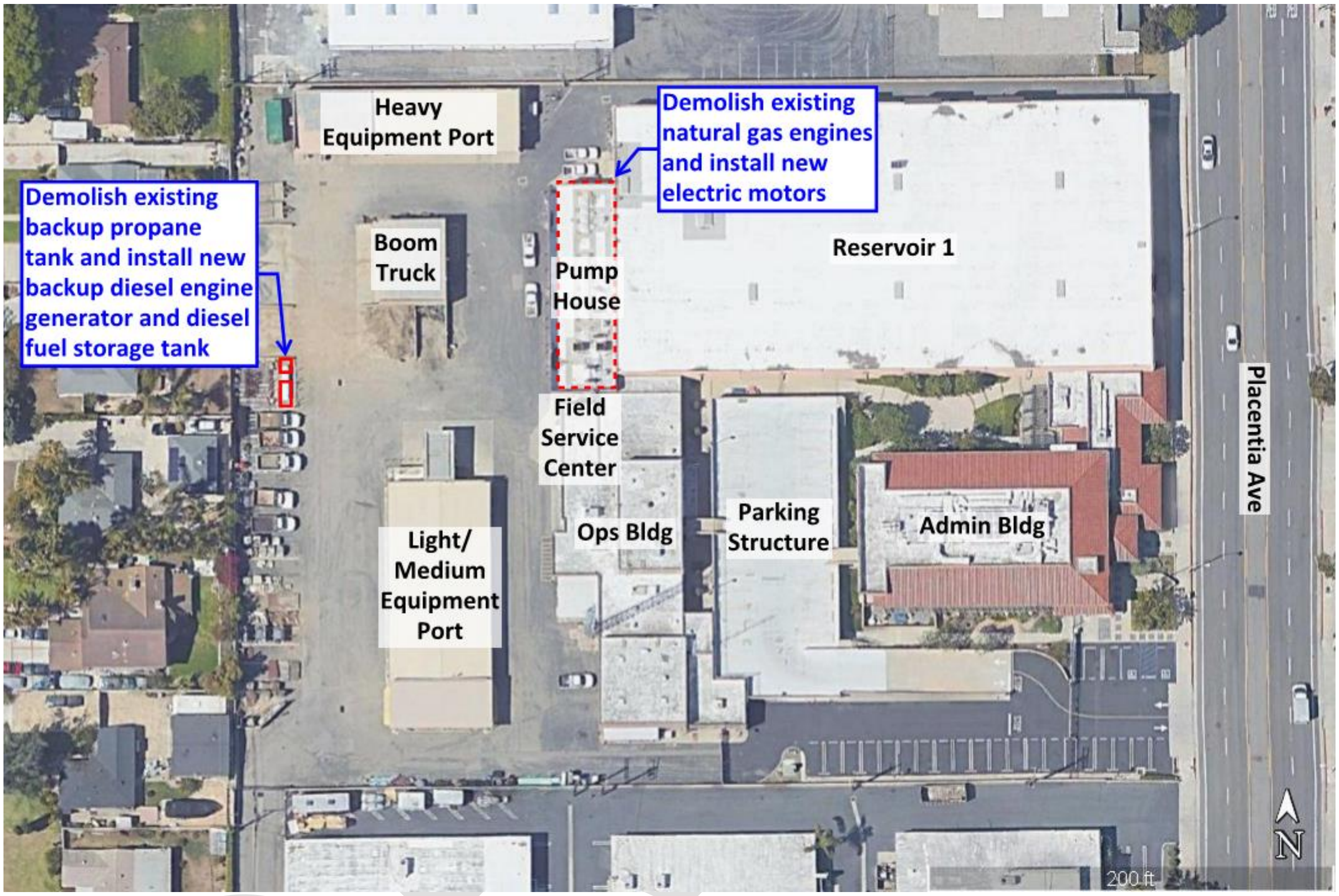


Figure 11-1. Reservoir 1 Proposed Diesel Fuel Supply

Figure 11-2 shows the proposed location of the 2,000 kW backup diesel engine generator and 3,000 gal horizontal diesel fuel storage tank at Reservoir 2. The approximate dimensions are 25 ft by 8.5 ft for the generator and 64-inch diameter by 18 ft for the onsite storage tank.

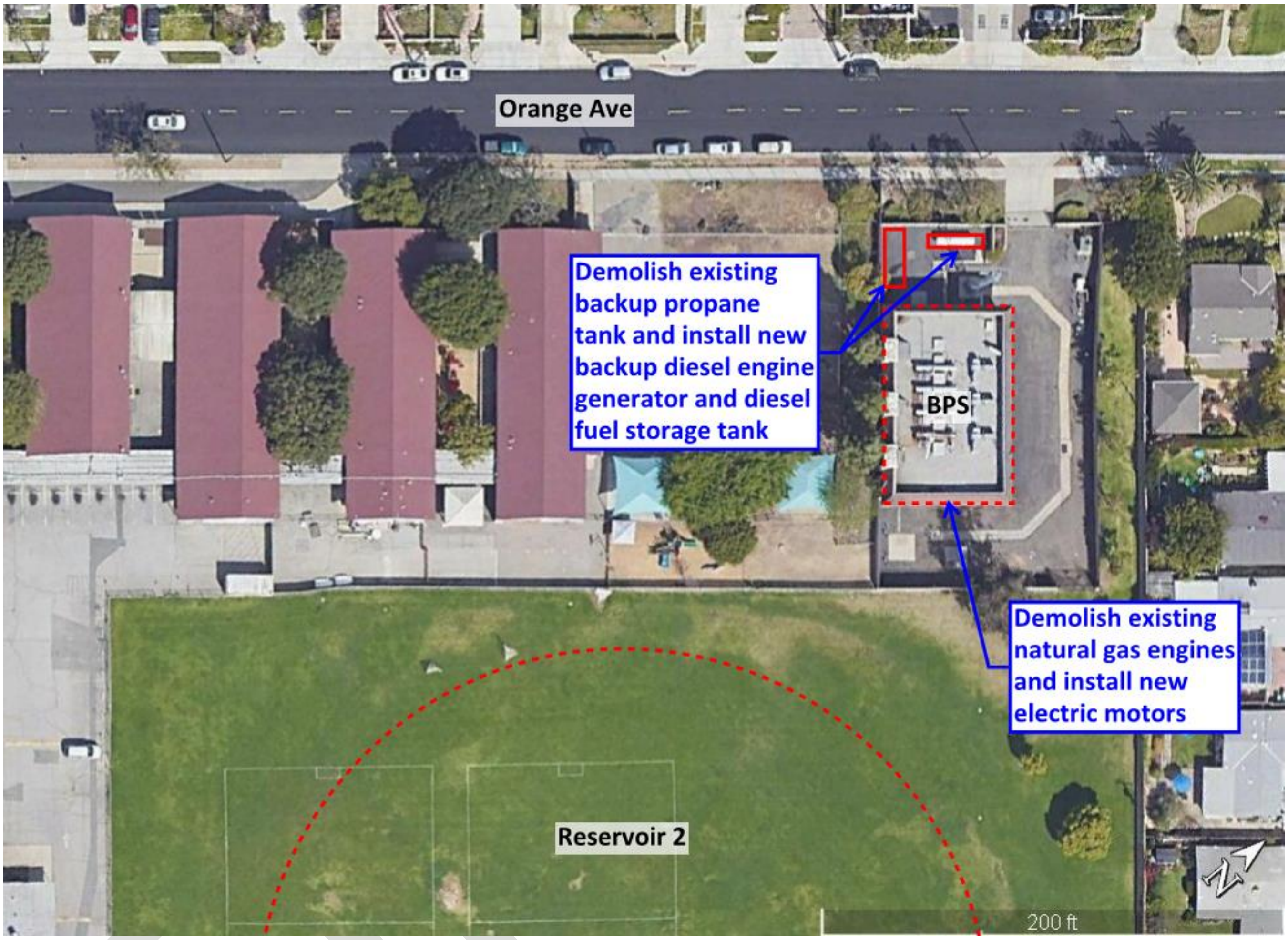


Figure 11-2. Reservoir 2 Proposed Diesel Fuel Supply

11.1 Bulk Fuel Storage

In addition to the fuel storage tanks installed at each Mesa Water facility with an operating standby generator, Mesa Water should install a centralized bulk diesel fuel storage tank. The bulk storage tank would allow Mesa Water to enhance the reliability and flexibility of backup supplies by providing the ability to transfer fuel to facilities facing longer outage durations in event of long emergencies without reliance of outside vendors or utilities. The flexibility afforded by bulk storing fuel is not possible utilizing natural gas driven engines since transportation of gaseous fuels is difficult by truck. Diesel fuel, in any storage system, should be tested twice per year and polished annually depending on the results of testing. BC recommends bulk diesel fuel storage that could sustain operations for 10 days, which should be sufficient to provide enough reserve to make it through major regional emergencies and would be available before most electricity generation and distribution is back online. To provide a total of 10 days of operational capacity, the volume should be 60,000 gallons and 70,000 gallons, respectively. BC recommends that the 2020 demands are used as the basis for diesel fuel storage capacity, and that two 30,000 gallon tanks be installed. The fuel polishing cost would be reduced to approximately $8,000 annually with costs increasing with inflation.

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Technical Memorandum No. 3

Prepared for: Mesa Water District

Project Title: Water Supply, Energy, and Supply Chain Reliability Assessment

Project No.: 155448.150

Technical Memorandum No. 3

Subject: Emergency Supply Chain Reliability and Disruption

Date: December 4, 2020

To: Phil Lauri, General Manager, Mesa Water District

From: Adam Zacheis, PhD., P.E., Project Manager, Brown and Caldwell

Copy to: Andrew Wiesner, P.E., Principal Engineer, Mesa Water District

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Abbreviations

ACP	asbestos cement pipe
AF	acre-feet
APSA	Aboveground Petroleum Storage Act
AST	abveground storage tank
BC	Brown and Caldwell
Cal OES	California Office of Emergency Services
CSWRCB	California State Water Resources Control Board
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
ESCRDA	Emergency Supply Chain Reliability and Disruption Assessment
gal	gallon
gpm	gallons per minute
HMI	human-machine interface
HP	horsepower
I/O	input/output
kW	kilowatt
Mesa Water	Mesa Water District
mgd	million gallons per day
MHz	Megahertz
MWD	Metropolitan Water District of Southern California
MWRF	Mesa Water Reliability Facility
OCHCA	Orange County Health Care Agency
OCWD	Orange County Water District
OPLAN	Southern California Catastrophic Earthquake Response Plan
P&ID	Process and Instrumentation Diagram
PLC	programmable logic controller
PVC	polyvinyl chloride
RTU	remote terminal unit
SCA	Supply Chain Analysis
SCADA	Supervisors Control and Data Acquisition
SLD	single line diagram
SPFA	Single Points of Failure Analysis
TM-3	Technical Memorandum No. 3
UPS	uninterruptible power supply
UST	underground storage tank
VDC	volts direct current

Section 1: Introduction

Mesa Water District (Mesa Water) engaged Brown and Caldwell (BC) to conduct a Water Supply, Energy, and Supply Chain Reliability Assessment with the following objectives:

1. Evaluate existing water supply capacities relative to meeting 115% of all demand seasons using local groundwater resources;
2. Evaluate existing Mesa Water energy supply capacities, types, and backup capabilities relative to ensuring reliable groundwater supplies can be pumped and distributed during normal and emergency operations;
3. Identify water supply and energy reliability gaps (from Objectives Nos. 1 and 2) and provide recommended solutions;
4. Evaluate Mesa Water's Supply Chain system relative to emergency readiness;
5. Identify Supply Chain system reliability gaps (from Objective No. 4) and provide recommended solutions.

1.1 Purpose

Technical Memorandum No. 3 (TM-3) is one of the components of Mesa Water's overall assessment of water supply, energy, and supply chain reliability. The purpose of TM-3 is to perform an Emergency Supply Chain Reliability and Disruption Assessment (ESCRDA) to determine Mesa Water's ability to respond to a local or regional emergency event and to provide recommendations that support the reliable and safe delivery of water to its customers. For this purpose, TM-3 focuses on the following ESCRDA tasks:

- Perform Supply Chain Analysis (SCA) of typical materials and services used during routine operation;
- Perform Single Points of Failure Analysis (SPFA) for each core production facility;
- Conduct GAP analysis, with recommendations towards mitigation, for core production facilities after application of emergency scenarios;
- Evaluate suitability of storage at production facilities to accommodate the necessary equipment and parts needed during emergency scenarios;
- Evaluate diesel fuel storage needed to supply backup power during emergency scenarios.

1.2 Related Memoranda

TM-3 relies, in part, on information included in the following TMs developed by BC as part of Mesa Water's overall assessment of water supply, energy, and supply chain reliability:

- TM-1 – Water Supply Reliability Assessment. Evaluates existing water supply capacities relative to meeting 115% of all demand seasons using local groundwater resources.
- TM-2 – Energy Supply Reliability. Assesses Mesa Water's energy supply (i.e., electric, natural gas, propane) reliability, evaluates regulatory and permitting compliance concerns associated with these supplies, forecasts future supply costs, and recommends best available equipment technologies for replacement of end-of-life equipment.

Section 2: Background

Mesa Water operates five (soon to be seven) groundwater clear wells, two reservoirs, an advanced nanomembrane treatment plant treating water from two amber-tinted groundwater deep wells, and turnout stations to deliver imported water from the Metropolitan Water District of Southern California (MWD). Mesa Water distributes produced groundwater or imported water through approximately 317 miles of pipeline varying in size from 4-inch to 42-inch diameter. Approximately 75% of Mesa Water's distribution system is asbestos cement pipe (ACP) and the larger transmission pipelines are steel pipelines.

2.1 Groundwater Wells

Mesa Water's five (5) clear water wells (Wells 1, 3, 5, 7 and 9) and two (2) deep wells (Wells 6 and 11) operate in conjunction with one another to supply water from the Orange County Groundwater Basin (Basin) to Mesa Water's service area. Each well site includes one extraction pump with a backup power source, as follows:

- Well 1 pump is driven by an electric motor and has a connection for a portable generator.
- Wells 3, 7 and 9 pumps are driven by electric motors and each have onsite diesel engine backup generators.
- Well 5 pump is driven by a natural gas engine and has an onsite 1,150-gallon liquefied petroleum gas (LPG) storage tank.
- Wells 6 and 11 pumps, located at the Mesa Water Reliability Facility are driven by electric motors but are not on back-up power.

All sites include chemical management systems that allow real-time chemical dosing and feedback control functionality. Disinfecting chemicals used onsite include 12.5% sodium hypochlorite and 19% aqueous ammonia. Mesa Water recently upgraded and modernized all of its well sites to include real-time connectivity, control, monitoring, and alarming via its Supervisory Control and Data Acquisition (SCADA) system.

In addition to the wells described above, Mesa Water is planning to construct two additional clear wells, Wells 12 and 14, that will each include a pump driven by an electric motor, an onsite diesel engine backup generator, and chemical management system.

2.2 Reservoirs

Mesa Water owns and operates two (2) reservoirs that provide pressure-sustaining control throughout the distribution system. Both reservoirs are primarily served by natural gas Waukesha engine-driven pumps. In addition, Reservoir 1 has two electric jockey pumps to address the lower flow ranges during normal diurnal low flow periods. Each reservoir includes an onsite 1,150-gallon liquefied petroleum gas (LPG) storage tank that provides backup power to the engine-driven pumps and to an onsite natural gas generator. The generators supply local power to the reservoir control systems and, at Reservoir 1, the Administration Building at Mesa Water's Main Headquarters.

2.3 Mesa Water Reliability Facility

Mesa Water owns and operates the Mesa Water Reliability Facility (MWRF), an 8.6 million gallon per day (mgd) advanced nanomembrane treatment plant that treats amber-tinted groundwater from the Basin's deep aquifer. The MWRF is highly automated and contains redundant instrumentation and control functionality throughout most of the plant. The MWRF only contains backup generation to power the MWRF Administration Building, along with the Supervisory Control and Data Acquisition (SCADA) system to allow plant shut-down in the event of a power failure, including the flushing of nanofiltration membranes.

2.4 Imported Metered Turnouts

Mesa Water owns three (3) metered turnouts (OC-44, CM-2, and OC-14) that feed imported water from MWD into the Mesa Water distribution system. The OC-44, comprised of three (3) sub-turnouts owned and operated by Mesa Water, is fed from the East Orange County Feeder No. 2, and is shared with the City of Huntington Beach.

2.5 Documentation Review

Table 2-1 summarizes the reference information provided by Mesa Water that was used to develop TM-3. Additional reference information is documented in footnotes within this document.

Table 2-1. Reference Information

Reference No.	Reference	Description
1	Emergency Operations Report to Board of Directors (May 2015)	Overview of Mesa Water's system water demands, water supply and storage capacities, and emergency back-up capabilities and protocols.
2	2017 Reservoir 1&2 Pumps, Controls, and Chemical System Assessment Project	Report that includes the latest condition assessment of Reservoirs 1 and 2, prepared by Hazen and Sawyer.
3	Production System Operations Plan (PSOP)	Plan that provides detailed guidance, monitoring and reporting requirements, and responsibilities for performing operational tasks related to Mesa Water's production and storage facilities.
4	Well Record Drawings	Record drawings for Wells 1, 3, 5, 7 and 9.
5	Well Automation Control Strategies	Control strategies (Section 17100) that provide typical control strategies for well sites.
6	Reservoir Record Drawings	Record drawings for Reservoirs 1 and 2.
7	MWRF Record Drawings	Record drawings for MWRF and Finished Water Systems.
8	Network Overview Drawings	Overview of SCADA and radio communication network.
9	Spare Parts Master Lists	Master Lists for 1) well sites and 2) water quality analyzers.
10	Emergency Interconnection Study	Report prepared by RBF Consulting to 1) inventory emergency interconnections between the distribution systems for the Irvine Ranch Water District, City of Newport Beach, City and Santa Ana, and Mesa Water; and 2) quantify the availability of water supply from each agency under various scenarios.
11	Water Atlas Book	Map book depicting Mesa Water's distribution system and schematic layout of OC-44 sub-Turnouts 2, 4 and 5.

Section 3: Supply Chain Analysis (SCA)

A supply chain is a network that manufactures and distributes a good or service that fulfills a demand. A key indicator of a healthy, functioning supply chain is its resilience or ability to continue fulfilling demand after a significant disruption. This section summarizes the approach and findings of an SCA performed for the typical materials and services used by Mesa Water during routine operations.

3.1 Approach

Mesa Water identified the materials and services considered critical to the routine operation of its core production facilities. The materials and services, along with the names of Mesa Water's suppliers and service providers, are summarized in Table 3-1.

To understand the reliability and potential disruptors to the supply chain for each manufacturer or service provider, three questionnaires were developed – each tailored to material suppliers, contractors or laboratories – and reviewed by Mesa Water. The questionnaires were shared with each of the suppliers and service providers listed in Table 3-1, and responses were either captured during a telephone conversation or in an email. Table 3-1 reflects those suppliers and service providers that responded to the questionnaires. The questionnaires and responses are included as Attachment A.

Table 3-1. Supply Chain Analysis – Materials and Services

Type	Product	Supplier	Response Received
Material			
Chemical	19% Aqueous Ammonia	Hill Brothers Chemical Company	Yes
Chemical	12.5% Sodium Hypochlorite	Northstar Chemical Company	Yes
Chemical	38% Sodium Bisulfite	Northstar Chemical Company	Yes
Chemical	25% Sodium Hydroxide	JCI Jones Chemicals, Inc.	Yes
Chemical	Carbon Dioxide	Linde (formerly Praxair)	Yes
Fuel	Diesel Fuel	Dion and Sons	No
Fuel	Propane (LPG)	Mutual Propane	No
Service			
Contractor	Pipeline	Paulus Engineering	No
Contractor	Pipeline	GCI Construction	Yes
Contractor	Pipeline	W.A. Rasic Construction Co., Inc.	Yes
Contractor	Electrical	Academy Electric	No
Contractor	Electrical	A.C. Pozos Electric Corp.	Yes
Contractor	Electrical	Leed Electric, Inc.	Yes
Contractor	Asphalt Paving	Ben's Asphalt	No
Contractor	Asphalt Paving	Copp Contracting	Yes
Laboratory	Water Quality Analyses	Weck Laboratories, Inc.	Yes
Laboratory	Water Quality Analyses	Truesdail Laboratories, Inc.	No
Laboratory	Water Quality Analyses	Orange County Water District	Yes

Based on the information received from the questionnaires, each manufacturer or service provider was assessed for exposure to risk – High, Medium or Low – based on the following factors:

- **Manufacturing Point of Origin.** Potential impacts to delivery based on distance, seasonal and geographical challenges (e.g., Rocky Mountains in winter), and political challenges (e.g., international trade disputes).
- **Emergency Manufacturing Capabilities During Emergencies.** Potential impacts to production capacity due to staffing or material shortages, inexperience in similar events, and lack of standard procedure.
- **Backup Delivery Protocols.** Potential impacts to delivery due to staffing shortages, accessibility challenges (e.g., roads closed, obstructions, damage), and priority assignments for essential service classifications.
- **Market Volatilities.** Impacts due to historical market volatility during emergency event.

The risk levels for each factor were defined as follows:

- High

  Probability of a failure in this category is likely given the physical constraints, practices or past history with the manufacturer or service provider.
- Medium

  Probability of a failure in this category is possible given the physical constraints, practices or past history with the manufacturer or service provider.
- Low

  Probability of a failure in this category is rare or unlikely given the physical constraints, practices or past history with the manufacturer or service provider.

Potential mitigation strategies for any factor designated with risk level of High or Medium are included in Section 3.3 – Recommendations.

3.2 Findings

Table 3-2 summarizes the risk levels assigned to each manufacturer or service provider, based on responses received from the questionnaires. In the cases of Dion and Sons (Diesel Fuel) and Mutual Propane (Propane), responses were not able to be obtained within the time allotted for the development of this TM. In these cases, a risk level of High was assumed until additional information can be obtained to downgrade this rating. Highlights from discussions with or responses from select and representative manufacturers or service providers are included below.

Type	Product	Supplier	Manufacturing Point of Origin	Manufacturing Capability During Emergencies	Backup Delivery Protocols	Market Volatilities
Material						
Chemical	19% Aqueous Ammonia	Hill Brothers Chemical Company	Low	Low	Low	Low
Chemical	12.5% Sodium Hypochlorite	Northstar Chemical Company	Low	Low	Low	Low
Chemical	25% Sodium Bisulfite	Northstar Chemical Company	Low	Low	Low	Low
Chemical	38% Sodium Hydroxide	JCI Jones Chemicals, Inc.	Low	Low	Low	Low
Chemical	Carbon Dioxide	Linde (formerly Praxair)	Low	High	Low	Medium
Fuel	Diesel Fuel	Dion and Sons	High	High	High	High
Fuel	Propane (LPG)	Mutual Propane	High	High	High	High
Service						
Contractor	Pipeline	W.A. Rasic Construction Co., Inc.	Low	Medium	Low	Medium
Contractor	Electrical	Leed Electric, Inc.	Medium	Medium	Medium	Medium
Contractor	Asphalt Paving	Copp Contracting, Inc.	Low	High	High	High
Laboratory	Water Quality Analyses	Weck Laboratories, Inc.	Medium	Low	Low	Medium
Laboratory	Water Quality Analyses	Orange County Water District	Medium	Medium	Medium	Medium

Table 3-2. Supply Chain Analysis – Risk Rankings

3.2.1 Hill Brothers Chemical Company

Hill Brothers Chemical Company (Hill Brothers) supplies Mesa Water with 19% aqueous ammonia from the City of Industry, CA. In its current purchasing contract, Hill Brothers acknowledges that Mesa Water is a top priority essential service provider and that all deliveries ordered pursuant to the contract shall be delivered within three business days of a given order.

3.2.1.1 Manufacturing Point of Origin

Anhydrous ammonia is purchased from Nutrien, a manufacturer in Canada, and railed in by California Ammonia Co. (CALAMCO), a large importer on the west coast. CALAMCO has the ability to store up to 70,000 tons of anhydrous ammonia at their Stockton, CA facility.

With multiple manufacturing points of origin, the risk level for this factor is designated as Low.

3.2.1.2 Emergency Manufacturing Capabilities During Emergencies

Hill Brothers owns and operates all of their equipment. While they can use third parties with whom they have long stemming relationships, it is preferred to use their own truck operators. They also own the rail cars that transport the anhydrous ammonia between the manufacturer and their two California facilities. In the event of a shortage/outage, Hill Brothers has maintained a commitment to prioritize utilities like Mesa Water.

Given the above, the risk level for this factor is designated as Low.

3.2.1.3 Backup Delivery Protocols

If the City of Industry facility struggles to meet demand in an emergency, Hill Brothers can send product from the San Jose facility to cover interruption and meet Mesa Water's needs. Historically, Hill Brothers has prioritized Mesa Water, understanding that their product is essential.

Given the above, the risk level for this factor is designated as Low.

3.2.1.4 Market Volatilities

Since the demand for ammonia is primarily driven in California by the agricultural industry, the market has historically been stable with slight to moderate growth. This was reinforced with stable production noted in the United States through Q4 2020.[1] This is confirmed by Hill Brothers anecdotal statements that they have never had a situation where they could not supply demand, even during the recent COVID-19 pandemic.

Given the above, the risk level for this factor is designated as Low.

3.2.2 Northstar Chemical

Northstar Chemical (Northstar) provides Mesa Water with sodium hypochlorite and sodium bisulfite from their chemical facility located in the City of Santa Fe Springs, CA. In its current purchasing contract, Northstar acknowledges that Mesa Water is a top priority essential service provider and that all deliveries ordered pursuant to the contract shall be delivered within three business days of a given order.

3.2.2.1 Manufacturing Point of Origin

Northstar sources sodium hypochlorite and sodium bisulfite from the following suppliers:

- Sodium Hypochlorite
  - Olin Chlor Alkali Products, Santa Fe Springs, CA
  - Hasa, Inc., Saugus, CA
  - JCI Jones Chemical, Inc., Torrance, CA
- Sodium Bisulfite
  - Thatcher Chemical, Stockton, CA
  - JCI Jones Chemical, Inc., Torrance, CA

Northstar also stores these chemicals in onsite bulk storage tanks at their Santa Fe Springs facility.

With multiple manufacturing points of origin, the risk level for this factor is designated as Low.

3.2.2.2 Emergency Manufacturing Capabilities During Emergencies

Northstar maintains a Business Continuity Plan that outlines its capabilities and operational guidelines during an emergency. In addition, Northstar conducts weekly Operations calls and monthly Supply Chain team meetings to discuss any issues that have risen or may arise.

Given the above, the risk level for this factor is designated as Low.

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[1] Mordor Intelligence, *Ammonia Market – Growth, Trends, and Forecast (2020-2025)*, https://www.mordorintelligence.com/industry-reports/ammonia-market.

3.2.2.3 Backup Delivery Protocols

If, for some reason, Northstar cannot receive chemicals from the sources listed above, there are backup Northstar distribution locations for both products in Modesto, CA, Sherwood, OR, and Tacoma, WA. There are also additional production facilities for these products in Northern California that serve as backups to the Southern California supply chain, if needed.

Given the above, the risk level for this factor is designated as Low.

3.2.2.4 Market Volatilities

Regarding sodium hypochlorite and sodium bisulfite, the market in the U.S. will continue to be driven by increasing demand from wastewater and water treatment facilities. This trend is likely to remain constant over the foreseeable future, thereby ensuring steady consumption for the product across North America. In light of the recent COVID-19 pandemic, one of the key sectors that reflected a large increase in sales was the sanitizer industry. Sodium hypochlorite is one of the key feedstocks consumed in formulating these hygiene and disinfectant products by companies globally.[2]

Given the above, the risk level for this factor is designated as Low.

3.2.3 JCI Jones Chemical, Inc.

JCI Jones Chemical, Inc. (JCI) supplies Mesa Water with sodium hydroxide from their facility in the City of Torrance, CA. Approximately 80% of JCI's chemical products, including sodium hydroxide, are transported by rail car.

3.2.3.1 Manufacturing Point of Origin

Industrially, sodium hydroxide is produced by electrolyzing brine or concentrated sodium chloride solution. JCI receives its supply of sodium hydroxide by rail from California, Texas, Oregon, and Canada. Additionally, JCI receives Japan-sourced sodium hydroxide through the Los Angeles Harbor.

With multiple manufacturing points of origin, the risk level for this factor is designated as Low.

3.2.3.2 Emergency Manufacturing Capabilities During Emergencies

To ensure day-to-day demand is met for Orange County, JCI is in constant communication with its rail service, ensuring "rail switches" occur as planned. JCI has a large fleet of delivery bulk tankers and strong ties with outside carriers to consistently provide deliveries on schedule.

Given the above, the risk level for this factor is designated as Low.

3.2.3.3 Backup Delivery Protocols

In case of a regional emergency, JCI has a plan in place that sources product from other JCI locations as well as working in conjunction with other suppliers. If for any reason, a catastrophic event caused rail service to halt, JCI's Torrance facility has the ability to supply sodium hydroxide through the Los Angeles and Long Beach Harbors.

Given the above, the risk level for this factor is designated as Low.

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[2] Grand View Research, *Sodium Hypochlorite Market Size, Share & Trends Analysis Report by Application (Cleaning & Disinfection, Bleaching, Chemical Manufacturing), By Region, and Segment Forecasts, 2020-2027,* June 2020, https://www.grandviewresearch.com/industry-analysis/sodium-hypochlorite-market.

3.2.3.4 Market Volatilities

U.S. supply of sodium hydroxide, also known as caustic soda, increased slightly during Q3 2020 as operating rates recovered from the sharp cutbacks during the COVID-19 pandemic response. Overall, production has recovered slowly, and the demand for water treatment purposes and for food preparation end-uses has held generally steady.[3]

Given the above, the risk level for this factor is designated as Low.

3.2.4 Linde (Formerly Praxair)

3.2.4.1 Manufacturing Point of Origin

Formerly Praxair, Linde supplies carbon dioxide to Mesa Water from either of two carbon dioxide plants owned and operated by Linde in the Cities of El Segundo and Long Beach, CA. The raw source comes from petroleum refining activities.

With multiple manufacturing points of origin, the risk level for this factor is designated as Low.

3.2.4.2 Emergency Manufacturing Capabilities During Emergencies

Currently, Linde does not have a plan for a regional emergency, but they will advise Mesa Water of any issues following such an emergency. A designation of High will be assigned until further information can be obtained to confirm or downgrade this rating.

3.2.4.3 Backup Delivery Protocols

In addition to the El Segundo and Long Beach facilities, Linde also owns plants in Benicia, CA and Price, UT. These plants are used from time to time to support Southern California with rail car and truck hauling.

Given the above, the risk level for this factor is designated as Low.

3.2.4.4 Market Volatilities

Historically, the demand for carbon dioxide has been consistently driven by beverage manufacturers and food producers. With the recent COVID-19 pandemic, demand for carbon dioxide has been volatile, with decreasing demand in large commercial operations being offset by a surging demand from smaller craft brewers.[4]

Given the above, the risk level for this factor is designated as Medium.

3.2.5 Pipeline (W.A. Rasic Construction)

To meet day-to-day demand for construction services, W.A. Rasic Construction (Rasic) maintains purchase agreements with various waterworks warehouses for supplies of materials. They are union signatory and are able to dispatch additional employees as required. Rasic owns the vast majority of their equipment which includes a fleet of more than 60 backhoes and is one of the largest privately-owned equipment fleets in Southern California.

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[3] Independent Commodity Intelligence Services (ICIS), *Caustic soda prices, markets & analysis*, Q3 2020, https://www.icis.com/explore/commodities/chemicals/caustic-soda.

[4] IBIS World, *Carbon Dioxide Production Industry in the US – Market Research Report*, October 26, 2020, https://www.ibisworld.com/united-states/market-research-reports/carbon-dioxide-production-industry.

To provide service during a regional emergency, Rasic maintain emergency after-hours on-call agreements with various water works warehouses for 24-hour ability to obtain pipe and fittings. Their local dispatch yard has a diesel fuel holding tank and pump that can fuel equipment in the event the system goes down to a certain extent. They stockpile some sand and aggregate to service small jobs in the event the quarries are shutdown. In the event of an emergency, customer needs are prioritized by proximity, ability to mobilize to location, and amount of revenue awarded to Rasic, as well as working history. Rasic predicts that Mesa Water can expect chaos during a regional emergency with contractors responding to those agencies they have worked with continually, serving the rest on a first-come, first-served basis. According to Rasic, there are not enough contractors in Southern California to repair every utility company's facilities simultaneously.

An area of concern for Rasic is the availability of pipe materials. Pipe materials are normally produced in Texas (plastic resin plants, ductile iron foundries, etc.) and there are no local manufacturers. The concern is that the collapse of freeway, rail, and other transportation could cut off access to these supplies. Rasic recommends that Mesa Water store diesel, aggregates, everyday pipe repair materials, and replacement pipe.

Given the above, the risk level for pipeline contractors is designated as Low and Medium across the identified factors.

3.2.6 Electrical (Leed Electric, Inc.)

To meet day-to-day demand for construction services, Leed Electric, Inc. (Leed) keeps tools updated, their fleet routinely maintained, and they keep qualified and responsive electricians on staff. Leed's line of business is specialty electrical construction in the water and wastewater market, and they have over 200 employees that are always available to serve in this market.

To provide service during a regional emergency, Leed has three layers of contacts that enable them to respond to customers accordingly. In addition, they always keep at least three electricians on standby from different areas (e.g., Los Angeles, Riverside, Orange County) to make sure someone will be able to respond to Mesa Water's emergency call. In addition, they own all of the equipment required for emergency calls.

An area of concern is when there are issues related to a sub-tier contractor or supplier to get additional services or material that may not be available during off hours. Examples include a variable frequency drive manufacturer to troubleshoot a high-level alarm, or if there is a need for a specialty replacement part, like a contactor.

To support Leed's work and ensure normal operation immediately following a regional emergency, Leed recommends that Mesa Water adhere to the following:

- Perform periodic maintenance on all equipment to ensure functionality.
- Store long lead time parts, in addition to general spare parts, for almost all equipment, regardless of lead time since most supply houses are closed after hours.
- Maintain a maintenance contract with at least two companies for each service to ensure guaranteed service.

Given the above, the risk level for electrical contractors is designated for all factors as Medium.

3.2.7 Asphalt/Paving (Copp Contracting, Inc.)

To meet day-to-day demand for construction services, Copp Contracting, Inc. (Copp) dedicates its forces to one project at a time. They own all their own equipment and are in close proximity to Mesa Water and its service area. In the event of an emergency, Copp will prioritize customers by "1st call, 1st served", with 100%

dedication until the project is complete. This means that Mesa Water cannot rely on Copp for asphalt/paving repairs during an emergency and has a general risk level designation of High.

As an alternative to retaining an asphalt/paving contractor to repair street surfaces with permanent asphalt during an emergency response, it is recommended that Mesa Water store those materials needed to temporarily repair street surfaces. These materials include cold mix and traffic plates, both of which can be installed by a pipeline contractor, who will generally be more available and prepared to respond in an emergency. Once the emergency has passed, permanent repair can be scheduled at the convenience of Mesa Water.

3.2.8 Water Quality Analysis

Mesa Water performs several hundred water quality samples and analyses each month for performance and regulatory compliance. Mesa Water has a small water quality lab to perform general physical water quality tests but uses a certified commercial lab for all other compliance analyses. Most of Mesa Water's production sites are equipped with real-time chemical analyzers (e.g., chlorine, ammonia, etc.) to monitor and control chemical dosing and assist in support of compliance reporting. In the event of an emergency, Mesa Water would need to ensure that water quality compliance sampling is conducted, and water quality standards are being met.

3.2.8.1 Weck Laboratories

Weck Laboratories (Weck) uses a third-party courier company to pick up samples from Mesa Water and deliver to Weck Laboratories, located approximately 40 miles north, in the City of Hacienda Heights, CA. They have numerous chemicals and supplies that are kept in stock at all times to perform water quality testing. Weck relies on water and power for testing, and they have backup generators to power necessary equipment as a short-term measure.

To meet testing demand, Weck projects forward in ordering supplies to ensure there are adequate supplies on hand for the months ahead. During a regional emergency, Mesa Water can expect Weck to complete basic water quality testing, including microbiological analyses.

As a backup to Weck Laboratories, Mesa Water employs a second water quality laboratory, Truesdail Laboratories, Inc.

3.2.8.2 Orange County Water District

The Orange County Water District (OCWD) is a California special district that manages the groundwater basin beneath central and northern Orange County, California. OCWD schedules and collects Title 22 drinking water samples for Mesa Water groundwater sources. OCWD then delivers the samples to OCWD's state-certified drinking water laboratory located in the City of Fountain Valley or to outside contract labs that are located in the Orange County or Los Angeles areas.

In the event of an emergency, OCWD's Emergency Operation Center and Emergency Response Plan will be activated. The OCWD laboratory currently has startup/shutdown procedures for all instrumentation in the case of power failure. OCWD Risk and Safety Department is currently looking into obtaining back-up power supplies for the lab. OCWD Lab does not have back-up power or a generator at this time. OCWD keeps necessary testing chemical and materials on-hand to last at least 3 to 6 months.

In the event of a regional emergency, OCWD laboratory and sample collection staff are required to report to work when safe to do so. If power supplies are operating, access roads are clear, and the laboratory building is deemed safe to inhabit, then drinking water compliance samples will be collected and analyzed as normal. OCWD recommends that Mesa Water be in close communication with the Division of Drinking Water (DDW) during and immediately following an emergency. Depending on the extent of emergency and damage to OCWD facilities, Mesa Water should consider having a back-up laboratory available to collect and test Title 22 drinking water samples, in case the OCWD lab cannot operate in an emergency.

3.3 Recommendations

In general, the chemical suppliers, contractors, and laboratories utilized by Mesa Water exhibit resilient supply chains. Recommendations to reinforce Mesa Water's supply chain resiliency are listed below, categorized by risk:

HIGH

- Diesel Fuel and Propane: In the cases of Dion and Sons (Diesel Fuel) and Mutual Propane (Propane), responses were not able to be obtained within the time allotted for the development of this TM. In these cases, a risk level of High was assumed until additional information can be obtained, and it is determined whether the rating can be downgraded, or a mitigation measure is required. Given the resilience of the other supply chains, it is recommended that Mesa Water continue to reach out to these suppliers and service providers to complete their individual supply chain profiles.
- Asphalt/Paving: It is recommended that Mesa Water store cold mix and steel plates to temporarily repair street surfaces in the event of an emergency pipe repair. Both of these materials can be installed by a pipeline contractor, precluding the need to retain an asphalt/paving contractor during an emergency. Once the emergency has passed, permanent repair can be scheduled at the convenience of Mesa Water.

MEDIUM

- Carbon Dioxide: Linde did not provide information about their manufacturing capabilities during emergencies. As with the above companies, it is recommended that Mesa Water continue to reach out to Linde to complete their individual supply chain profile. As a contingency measure, it is recommended that a second supplier of carbon dioxide be identified to supply the demand at the MWRF. Alternatively, if carbon dioxide were not available, temporary sulfuric acid injection, via totes and temporary pumps, could serve the same purpose until the Carbon Dioxide supply is restored. Based on a permeate flow rate of 8.6 mgd, the anticipated dosage of 93% sulfuric acid would be approximately 280 gallons per day, which is equivalent to one tote per day.
- Pipeline: It is recommended that Mesa Water continue its practice of storing diesel, aggregates, everyday pipe repair materials, and replacement polyvinyl chloride (PVC) pipe. PVC pipe should be covered to avoid direct sunlight, which degrades PVC material.
- Water Quality Laboratory: It is recommended that Mesa Water identify a back-up laboratory to collect and test Title 22 drinking water samples, in case the OCWD lab cannot operate in an emergency.

Section 4: Single Points of Failure Analysis (SPFA)

A single point of failure is any non-redundant part of a system that, if it were to malfunction, would cause the entire system to fail. While an SCA focuses on the logistics of fulfilling operational demands for materials and services, an SPFA focuses on the components in equipment or a system. This section summarizes the approach and findings of an SPFA performed for each of Mesa Water's core production facilities.

4.1 Approach

The core production facilities identified by Mesa Water for an SPFA include:

- Wells 1, 3, 5, 7 and 9
- Reservoirs 1 and 2
- MWRF and Finished Water Systems
- Turnouts OC-44 (sub-Turnouts 2, 4 and 5), CM-2, and OC-14

BC approached the SPFA for each of the above core production facilities at a component level, as opposed to a system level. This allowed BC staff to perform an in-depth assessment of each of Mesa Water's core production facilities. To perform this component-level analysis, BC relied on the following documents:

- Record drawings
- Electrical single line diagrams (SLD)
- Process and Instrumentation Diagrams (P&ID)
- Network Diagrams
- Control Strategies
- Photographs of equipment installations

Similar to the classification approach used in the SCA, SPFA findings were assigned a criticality rating to identify single points of failure. The criticality ratings were defined as follows:

- High

  Failure of this system/equipment substantially impacts production; no redundant system/ equipment available

- Medium

  Failure of this system/equipment does not impact production – redundant system/equipment exists and is assumed to operate as intended

- Low

  Failure if this system does not impact production – no redundant system/equipment available

As shown in Figure 4-1, this classification system was used to annotate the record drawing SLDs and P&IDs to highlight potential single points of failure. Annotations were reviewed with Mesa Water in two workshops, on September 14 and 21, 2020, to confirm BC's understanding of production facilities and Mesa Water's operational approach. In addition, a separate meeting was held on September 21, 2020 to discuss Mesa Water's SCADA network, control systems and communications architecture. Meeting minutes from these three meetings are included as Attachment B.

Once annotated and reviewed with Mesa Water, the criticality ratings were summarized in Criticality Summary tables, which identified preliminary mitigation measures that, when implemented, would allow the rating to be downgraded. Where appropriate, and as discussed with Mesa Water, recommendations to purchase spare parts stock to address components with no redundant system/equipment were allowed as an option to downgrade a criticality rating of High to Medium. These recommendations were captured on the Criticality Summary tables. An excerpt from a Criticality Summary table is shown in Figure 4-2.

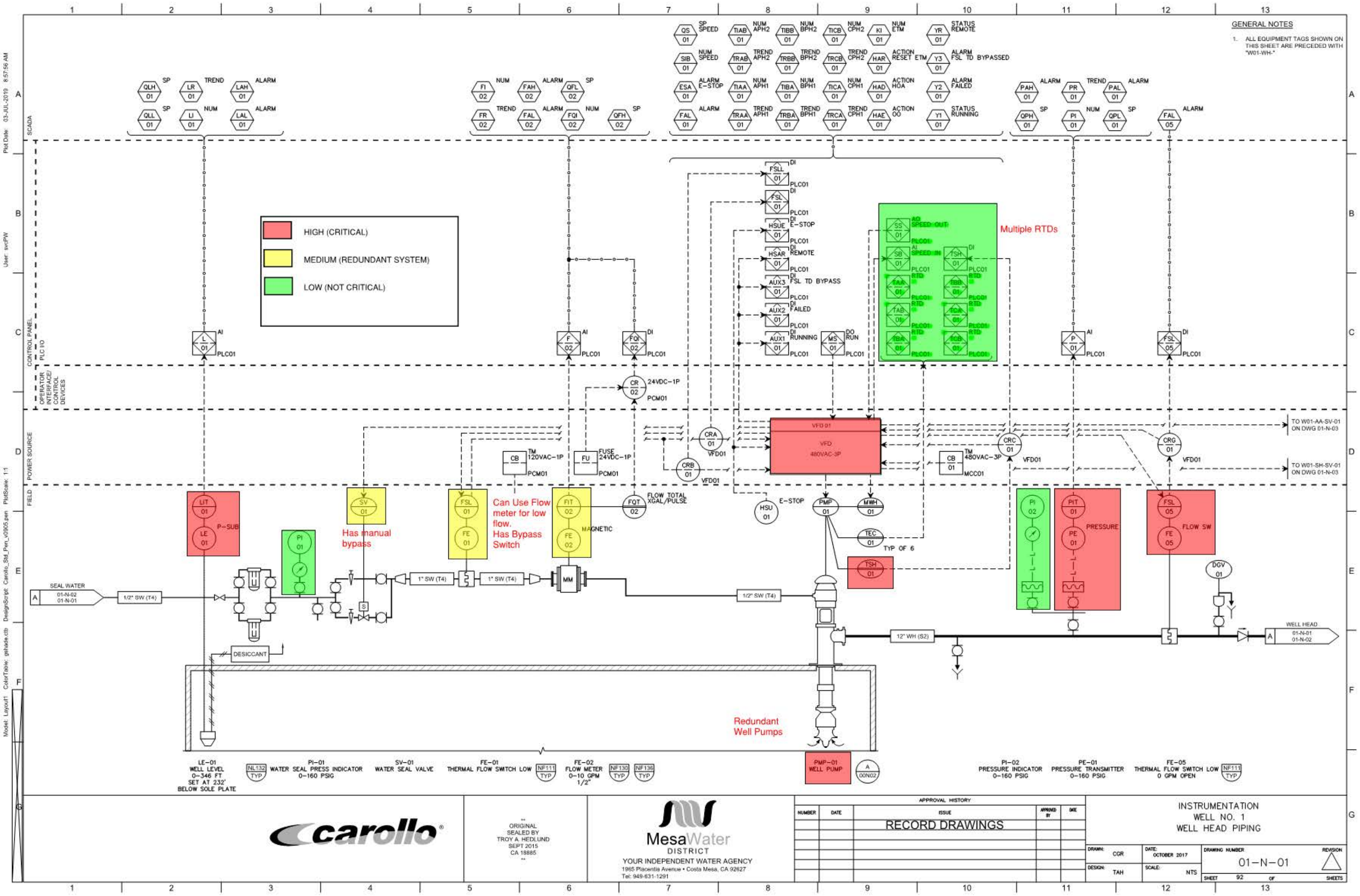

Figure 4-1. Example of Well 1 P&ID with Criticality Annotations

System	Equipment	Basis for SPF Rating	Criticality Score H	M	L	Recommended Spare Parts
Well Pump P&ID 01-N-01, 01-N-02						
[Electric]	PUMP, VERTICAL TURBINE					
	Motor, Electric	Pumping capacity from other Well Sites				
	Drive, Variable Frequency	Pumping capacity from other Well Sites				
	Level Transmitter	Indication Only				
	Seal Water Pressure Gauge	Indication Only				
	Seal Water Solenoid Valve	Manual bypass on Valve				
	Seal Water Flow Switch	Pump Shutdown				X
	Seal Water Flowmeter	Indication Only				
	Motor Temperature	Pump Shutdown				
	Discharge Pressure Gauge	Indication Only				
	Discharge Pressure Transmitter	Pump Shutdown				
	Discharge Flow Switch	Pump Shutdown				X
	Distribution Flowmeter	Use Pump Speed				
	Storm Drain Flowmeter	Use Pump Speed				
	Isolation Valve	Handwheel on valve				
	Chemical Injection Points	Warehouse Spares				X

Figure 4-2. Excerpt from Criticality Summary Table for Well 1.

4.2 Findings

SPFA findings for Mesa Water core production facilities are detailed in the following sections.

4.2.1 Wells

Mesa Water's five (5) groundwater clear wells operate in conjunction with one another to supply water from the Basin to Mesa Water's service area. Each well site includes one extraction pump with a backup power source, as summarized in Table 4-1. Table 4-1 also references the attachment where criticality summary tables and record drawing SLDs and P&IDs can be found. Due to the similarity in configurations, the Well 1 annotated SLDs and P&IDs serve as the basis for the SPFA for Wells 3, 7 and 9.

Table 4-1. Well Sites				
Site	Pump Type/Size	Rated Flow	Backup Power Source(s)	Reference Documents
Well 1	Vertical Turbine, 400 HP	2,300 gpm	Connection for portable generator (rental)	Attachment C
Well 3	Vertical Turbine, 300 HP	1,800 gpm	200 kW diesel generator; 426-gal subbase diesel storage tank	Attachment D
Well 5	Vertical Turbine, 450 HP	2,200 gpm	1,150-gal LPG storage tank	Attachment E
Well 7	Vertical Turbine, 300 HP	1,450 gpm	150 kW diesel generator; 333-gal subbase diesel storage tank	Attachment D
Well 9	Vertical Turbine, 300 HP	1,800 gpm	230 kW diesel generator; 426-gal subbase diesel storage tank	Attachment D

All sites include chemical management systems that allow real-time chemical dosing and feedback control functionality. Disinfecting chemicals used onsite include 12.5% sodium hypochlorite and 19% aqueous ammonia. Mesa Water recently upgraded its well sites to include real-time connectivity, control, monitoring, and alarming via its SCADA system. Section 4.2.5 includes an SPFA discussion of Mesa Water's network, controls and communications systems.

As indicated in the criticality summary tables, the following components were identified as single points of failure requiring mitigation:

- Chemical Storage Tank
  - o Location(s): All well sites
  - o System(s): Sodium Hypochlorite / Aqua Ammonia
  - o Description: Failure of tank shuts down both chemical metering pumps.
  - o Potential Mitigation: Install connection with valve for tote.
- Containment Level Switch
  - o Location(s): All well sites
  - o System(s): Sodium Hypochlorite / Aqua Ammonia
  - o Description: Failure of switch shuts down both chemical metering pumps and closes valve at chemical storage tank.
  - o Potential Mitigation: Install bypass switch at local control panel.
- Main Breaker
  - o Location(s): All well sites
  - o System(s): Electrical
  - o Description: Failure of main breaker prevents energization of motor control center (MCC) from either primary or backup power sources.
  - o Potential Mitigation: Install second feeder breaker with transfer switch.

In addition to the single points of failure identified above, the following items were identified as potential concerns during the SPFA:

1. Well 1 – Portable Generator: At Well 1, backup power during an emergency relies on the mobilization of a rental portable generator. While a rental generator may be available during local power outages, availability is less likely during a regional power outage or other event. It is recommended that a permanent backup power source be provided for Well 1, which is currently the largest production well for Mesa Water. It is recommended that a second electrical feeder, powered from a different substation than the one currently powering Well Site 1, be considered or Mesa Water proceed with the purchase of a truck-mounted portable generator system to mobilize the unit to the site. As an interim mitigation measure, a portable generator could be rented or leased until a decision is made and procurement is complete.
2. Solenoid Valves: The solenoid valves installed at the well sites do not appear to have manual overrides. Installation of solenoid valves with manual overrides would facilitate response to a failed solenoid valve by avoiding the need for an immediate response by an electrician. This would allow Mesa Water Operations staff to respond and then schedule an electrician to replace the solenoid valve on a non-emergency basis.
3. Instrumentation Switches: There were several instrumentation switches that could be bypassed at the local control panel by an Operator if override switches were added. This would facilitate response to a failed instrumentation switch by avoiding the need for an immediate response by an electrician. Instead, Mesa Water Operations staff could respond and then schedule an electrician to replace the switch on a non-emergency basis.

4.2.2 Reservoirs

Mesa Water owns and operates two (2) reservoirs that provide pressure-sustaining control and water supply throughout the distribution system. Both reservoirs are primarily served by natural gas Waukesha engine-driven pumps. In addition, Reservoir 1 has two electric jockey pumps available to address the lower flow ranges during normal diurnal low flow periods. Each reservoir includes an onsite 1,150-gallon LPG storage tank that provides backup power to the engine-driven pumps and to an onsite natural gas generator. The generators supply local power to the reservoir control systems and, at Reservoir 1, the Administration Building at Mesa Water's Main Headquarters. Section 4.2.5 includes an SPFA discussion of Mesa Water's network, controls and communications systems.

Mesa Water will be upgrading the pump and control system facilities at both Reservoirs 1 and 2. As such, a component-level SPFA was not considered to be necessary. It is anticipated that single points of failure will be evaluated and addressed during preliminary design of the proposed upgrades. However, during review of the Reservoir 1 facility, it was noted that the MCC that powers the two (2) 60-hp jockey pumps is served by a single main breaker. If this breaker were to fail, energization of the MCC by either primary or backup power would not be possible. It is recommended that Mesa Water incorporate a strategy that assigns pumps across multiple MCCs to mitigate against a single point of failure pre.

4.2.3 Mesa Water Reliability Facility

The MWRF is highly automated and contains redundant instrumentation and control functionality throughout most of the plant. The MWRF only contains backup generation to power the MWRF Administration Building. Section 4.2.5 includes an SPFA discussion of Mesa Water's network, controls and communications systems.

Annotated record drawing SLDs and P&IDs, along with a Criticality Summary table, are included as Attachment F. As indicated in the criticality summary tables, the following components were identified as single points of failure requiring mitigation:

- Well Pump, Vertical Turbine
  - System(s):
    - Raw Water Feed
  - Description: Failure of either Well 6 or 11 pump directly impacts MWRF production.
  - Potential Mitigation: Provide spare 400 HP motor for use at either well pump.
- Nanofiltration Feed Pump, Vertical Turbine
  - System(s):
    - Nanofiltration Feed
  - Description: Failure of single feed pump shuts down an entire process train.
  - Potential Mitigation: Provide spare parts pump.
- Pressure Switch
  - System(s):
    - Nanofiltration Feed
  - Description: Failure of pressure switch shuts down process train.
  - Potential Mitigation: Install bypass switch at local control panel.
- Flow Switch
  - System(s):
    - Nanofiltration Feed
  - Description: Failure of pressure switch shuts down process train.
  - Potential Mitigation: Install bypass switch at local control panel.
- Chemical Storage Tank
  - System(s):
    - Caustic Soda
    - Carbon Dioxide
    - Sodium Hypochlorite
    - Aqua Ammonia
    - Sodium Bisulfite
  - Description: Failure of tank shuts down critical process.
  - Potential Mitigation: Install direct connection with valve for tote or tank truck.
- Containment Level Switch
  - System(s):
    - Caustic Soda
    - Sodium Hypochlorite
    - Aqua Ammonia

        - Sodium Bisulfite
    - Description: Failure of switch shuts down both chemical metering pumps and closes valve at chemical storage tank.
    - Potential Mitigation: Install bypass switch at local control panel.
- Discharge Level Switch
    - System(s):
        - Caustic Soda
        - Sodium Hypochlorite
        - Aqua Ammonia
        - Sodium Bisulfite
    - Description: Failure of switch on double containment piping system shuts down chemical metering pumps.
    - Potential Mitigation: Install bypass switch at local control panel.
- Carbon Dioxide Heater
    - System(s): Carbon Dioxide
    - Description: Failure of heater reduces gaseous carbon dioxide flow, which will eventually shut down the decarbonator process.
    - Potential Mitigation: Install redundant heater.
- Product Transfer Pump, Vertical Turbine
    - System(s):
        - Product Water
    - Description: Existing 2+1 (standby + duty) configuration provides 50% redundancy. Per Mesa Water, this is a critical system with long lead time for replacement pumps.
    - Potential Mitigation: Provide spare parts pump.
- Main Breaker
    - System(s): MWRF Electrical Systems
    - Description: Failure of main breaker prevents energization of Switchboard SWBD-2 and MCC-3.
    - Potential Mitigation: Install second feeder breaker with transfer switch.

In addition to the single points of failure identified above, the following items were identified as potential concerns during the SPFA:

1. Add a supervisor override for the Scale Inhibitor Storage Tank to allow the MWRF to continue operation without scale inhibitor. The MWRF can operate for periods longer than 30 days without scale inhibitor, which makes this system non-critical from a single point of failure perspective.

4.2.4 Turnouts

Mesa Water owns three (3) metered turnouts (OC-44, CM-2, and OC-14) that feed imported water from MWD into the Mesa Water distribution system. The SPFAs performed for these turnouts are detailed below. Section 4.2.5 includes an SPFA discussion of Mesa Water's network, controls, and communications systems.

4.2.4.1 OC-44

OC-44, comprised of three (3) sub-turnouts owned and operated by Mesa Water, is fed from the East Orange County Feeder No. 2, and is shared with the City of Huntington Beach. The locations of these turnouts – referred to as Sub-Turnouts 2, 4 and 5 – are shown in the Water Atlas sheets included as Attachment G.

As there were no record drawings for the OC-44 turnouts, the SPFA for these turnouts was performed using schematics included in the Water Atlas and photographs of the OC-44 sub-turnout structures provided by Mesa Water.

Based on the schematics and photographs, each of the OC-44 sub-turnouts includes a fully redundant metering line with backpressure valves and associated instrumentation, isolation valves, and flow meters. No single points of failure can be observed at any of these turnouts. Schematics and photographs showing the OC-44 sub-turnouts are included in Figures 4-3 through 4-8.

4.2.4.2 CM-2 and OC-14

For the CM-2 and OC-14 turnouts, the SPFA was performed using a mechanical record drawing, Drawing CM-394-4, provided by Mesa Water.

Based on Drawing CM-394-4, both CM-2 and OC-14 turnouts include the following typical elements:

- Single pipeline within a vault structure
- One (1) disc check valve
- One (1) Venturi flow meter
- One (1) plug valve

Each of the above elements were determined to be a single point of failure. It is understood that Mesa Water is considering upgrades at each of these turnouts. It is recommended that the configurations used for the OC-44 turnouts be used as a model for providing redundancy and eliminating potential single points of failure.

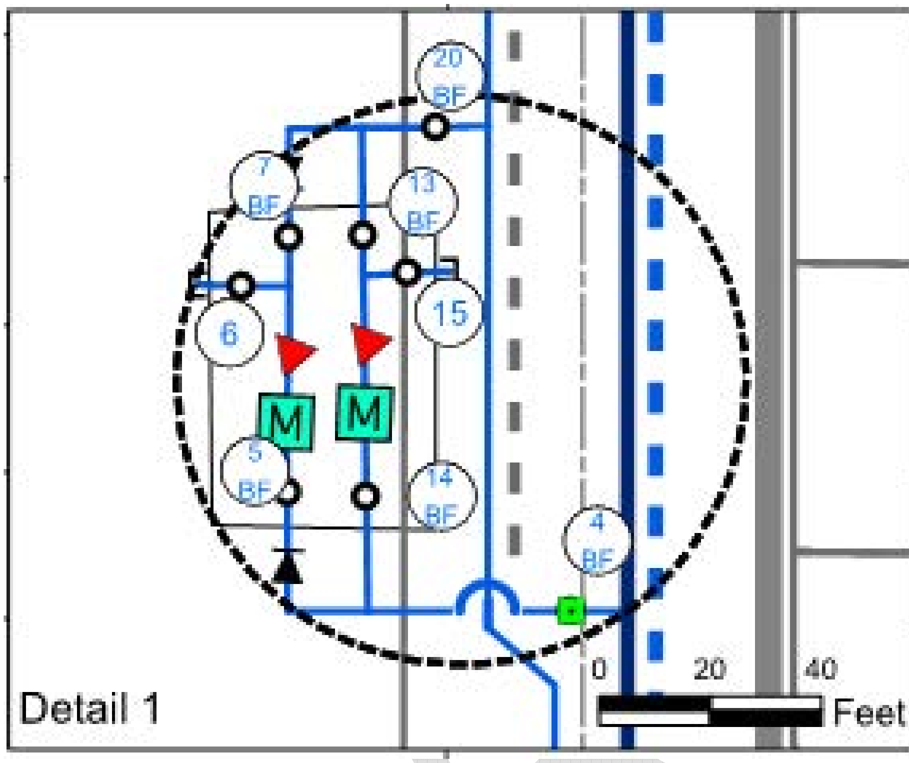

Figure 4-3. Water Atlas Schematic of OC-44, Sub-Turnout 2

Figure 4-4. Photograph of OC-44, Sub-Turnout 2

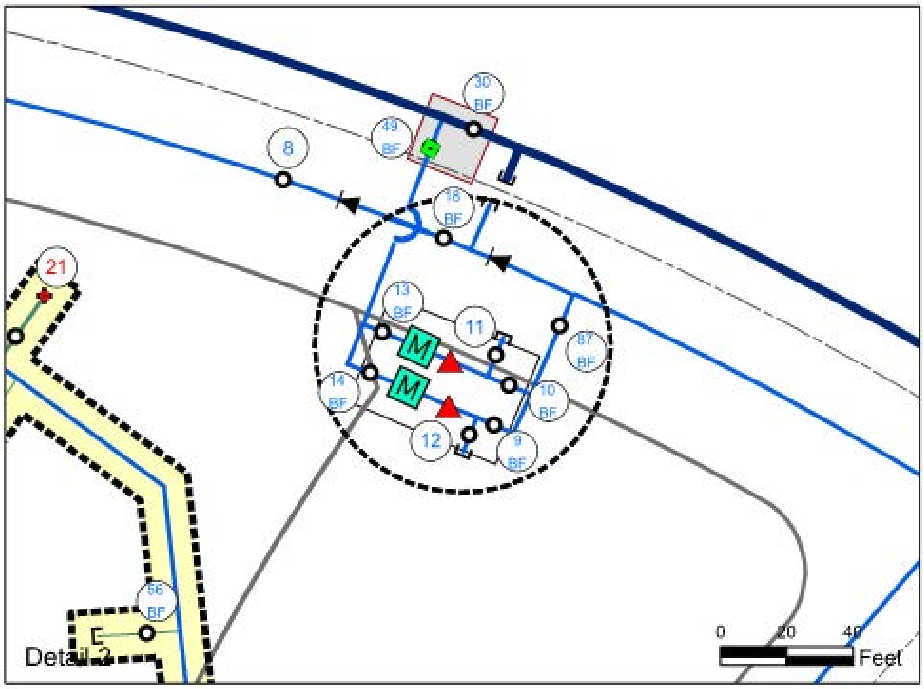

Figure 4-5. Water Atlas Schematic of OC-44, Sub-Turnout 4

Figure 4-6. Photograph of OC-44, Sub-Turnout 4

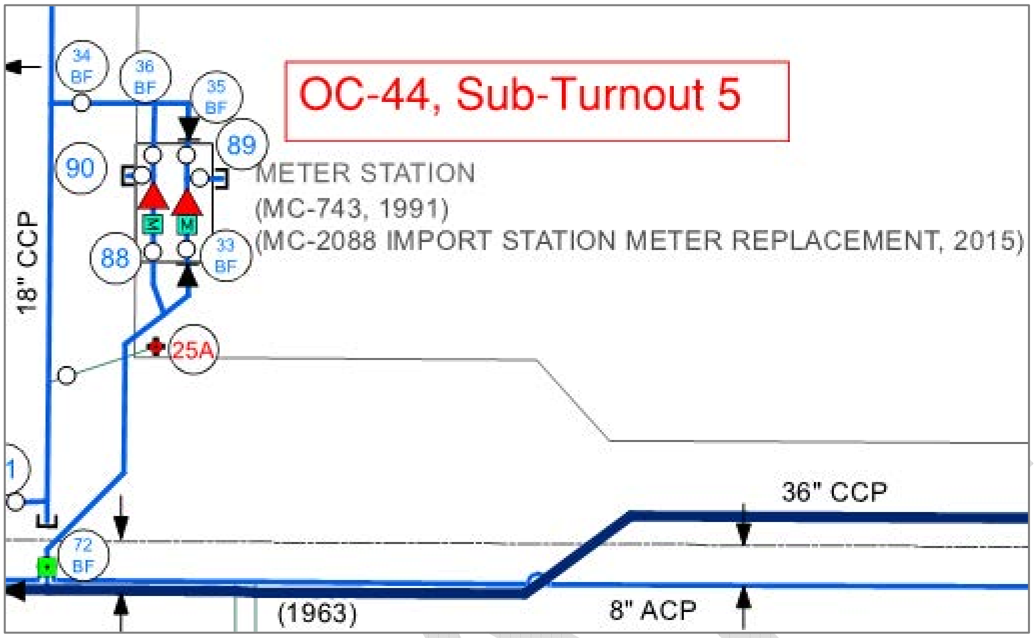

Figure 4-7. Water Atlas Schematic of OC-44, Sub-Turnout 5

Figure 4-8. Photograph of OC-44, Sub-Turnout 5

4.2.5 Network, Controls and Communications Systems

Due to the integrated nature of Mesa Water's network, controls and communications architecture, the SPFA findings have been consolidated for the core production facilities within this section.

4.2.5.1 Supervisory Control and Data Acquisition

As shown in the SCADA Network diagram, included as Attachment H, Mesa Water's SCADA system consists of 24 sites. Of these sites, 23 communicate via 900 or 450 MHz radios; the other, a Pressure Monitoring Station (Site 17), communicates via cellular modem due to radio signal reception challenges. The radio network includes radio towers at the Main Office, MWRF, and Reservoir 2 and uses redundant ring radio communication to transfer data between the Main Office, MWRF and Reservoir 2.

The well sites, import and export stations, pressure monitoring stations, and pressure reducing stations rely on line-of-sight communication with the Main Office, MWRF or Reservoir 2. In the event that radio communications between the radio towers and these sites is lost, Mesa Water loses its ability to remotely control and monitor these sites. Similarly, in the event that power or network communications are disrupted at Remote Terminal Units (RTU) 35A or 35B, located at the MWRF, or RTU 37, located at the Main Office, Mesa Water will lose remote control and monitoring capability.

There is a total of four Human-Machine Interface (HMI) terminals: one is located at the Main Office (EOC), two are at the Operations Center, and remaining HMI terminal is at MWRF. Operators also have laptops that allow SCADA access from an onsite network connection or from home.

Mesa Water utilizes Wonderware (Version 2014 R2) for their operating system. Both the MWRF and EOC operating systems are master operation systems. Each location has their own historian. As a matter of practice, programming changes are made first at MWRF and then the same change is made at EOC. The last command entered at either the MWRF or EOC HMI is the command that is implemented. Because the operators can control from the MWRF or EOC the operators must coordinate the starting and stopping of equipment. If the control at MWRF fails, the Main Office can control system wide operations. Both the Main Office and MWRF have redundant I/O servers. Historian functionality is duplicated at the Main Office and the MWRF terminals.

4.2.5.2 Programmable Logic Controllers

Mesa Water uses a mixture of programmable logic controllers (PLC) within their SCADA system as follows:

- Reservoirs 1 and 2 use two types of PLCs:
  - Allen-Bradley (A-B) CompactLogix PLCs are used for process data collection, control, and as RTUs.
  - Murphy 600 series PLCs are used for engine control and an additional Murphy 600 series PLC is used as a central controller and to communicate with the A-B CompactLogix PLCs.
- The MWRF uses Schneider Electric Modicon M-580 series for data collection and controls and A-B CompactLogix as an RTU.
- The well sites use A-B CompactLogix series for data collection, control and as RTUs.

The following are additional observations regarding Mesa Water's PLCs:

- Each PLC consists of a backplane, PLC controller, hardwired signal Input and Output (I/O) cards, communications card, and 24VDC power supply.
- All PLC controllers, I/O cards, communications cards, and 24VDC power supplies are considered to be single points of failure. Once a failure occurs, the affected process should be operated in manual until the component is replaced.
- Redundant/Hot Standby PLCs are not installed at any Mesa Water locations.

- Mesa Water is in the process of designing and constructing renovated Reservoir Facilities. The existing PLCs will be replaced under this project.
- Based on a review of I/O assignments on the record drawings for the Mesa Water Reliability Facility and Expansion Project, some I/O cards could be considered a single point of failure. I/O appears to be assigned by I/O description rather than equipment. This means that I/O assigned to duty and standby equipment may be on the same card. A failure of that I/O card would result in a failure of both duty and standby equipment.
- The Modicon M580 series will be supported for some time. Spares should be stocked to respond to PLC failures.
- The A-B PLCs are at the end of their service life. Mesa Water is planning to replace the A-B PLCs as part of the SCADA Metrics project.

Based on the above observations, the following recommendations relate to Mesa Water PLCs:

1. Modicon 580 series spare stock should be purchased.
2. For all sites that are scheduled for process upgrades, replace the A-B CompactLogix PLCs and I/O cards, communications cards and 24VDC power supplies. The existing A-B CompactLogix PLCs and I/O cards should be returned to Mesa Water to be refurbished and used as spares stock.
3. Assign duty and standby equipment to different I/O cards where possible.
4. Conduct a data communications radio study to select an operating and back up radio system.
5. As PLCs are replaced in the future, evaluate spare stock requirements and purchase spare parts as required.
6. Maintain an onsite copy, at either MWRF or EOC, of the latest PLC programs.

4.2.5.3 Uninterruptible Power Supply

The Uninterruptible Power Supply (UPS) installed at each site is used to power the PLCs and radio receivers. The Main Office (EOC) and MWRF each have a UPS (15-minute supply) and both sites have generators with automatic transfer switches to transition automatically to backup power.

All well sites, except for Well 1, have generators with automatic transfer switches. The well sites, import and export stations, pressure monitoring stations and pressure reducing stations each have 30-minute UPS power. All site PLCs and radio receivers are connected to the site UPS.

It is recommended that at least one spare UPS of each type should be available in the warehouse. When the UPS fails at a site, the warehouse spare should be installed and immediately replaced.

4.2.5.4 Communications Hardware

Radios used by Mesa Water are at the end of life and are no longer available from the manufacturer. Moving forward, Mesa Water has proposed that all new sites be provided a dual path radio system with both 900/450MHz radio receivers and 5G cellular or satellite communications.

As sites are upgraded with dual path radio systems, existing radios should be returned to Mesa Water and added to the warehouse spares. Spare dual path radios should be purchased.

4.3 Recommendations

Table 4-2 summarizes the recommendations generated from the above SPFA.

Table 4-2. Summary of SPFA Recommendations	
Site / System	**Recommendations**
Well Sites - All	
Chemical Storage Tanks – Sodium Hypochlorite, Aqua Ammonia	• Install connection with valve for tote.
Containment Level Switch – Sodium Hypochlorite, Aqua Ammonia	• Install bypass switch at local control panel.
Solenoid Valves (General)	• For new projects, Install solenoid valves with manual overrides.
Main Breaker	• Install second feeder breaker with transfer switch.
Well Site 1	
Portable Generator Connection	• Install second electrical feeder, powered from a different substation than the one currently powering Well Site 1, or proceed with the purchase of a portable generator system and truck to tow the unit to the site.
Reservoirs 1 and 2	
Main Breaker	• Incorporate into upcoming Reservoir Upgrades a strategy that assigns pumps across multiple MCCs to mitigate against a single point of failure.
MWRF	
Nanofiltration Feed	• Provide spare pump. • Pressure switch – Install bypass switch at local control panel. • Flow switch – Install bypass switch at local control panel.
Caustic Soda	• Storage tank – Install direct connection with valve for tote or tank truck. • Containment level switch – Install bypass switch at local control panel. • Discharge level switch – Install bypass switch at local control panel.
Carbon Dioxide	• Storage tank – Install direct connection with valve for tote or tank truck. • Heater – Install redundant heat exchanger.
Sodium Hypochlorite	• Storage tank – Install direct connection with valve for tote or tank truck. • Containment level switch – Install bypass switch at local control panel. • Discharge level switch – Install bypass switch at local control panel.
Aqua Ammonia	• Storage tank – Install direct connection with valve for tote or tank truck. • Containment level switch – Install bypass switch at local control panel. • Discharge level switch – Install bypass switch at local control panel.
Sodium Bisulfite	• Storage tank – Install direct connection with valve for tote or tank truck. • Containment level switch – Install bypass switch at local control panel. • Discharge level switch – Install bypass switch at local control panel.
Scale Inhibitor	• Add a supervisor override for the Scale Inhibitor Storage Tank to allow the MWRF to continue operation without scale inhibitor.
Main Breakers (SWBD-2, MCC-3)	• Install second feeder breaker with transfer switch.
Turnouts	
CM-2 and OC-14	• Incorporate redundancy into upcoming upgrades – use OC-44 turnout configurations as a model for providing redundancy and eliminating potential single points of failure.
Network, Controls and Communication Systems	
PLC – Programming	• Maintain an onsite copy, at either MWRF or EOC, of the latest PLC programs.
PLC – Spare Stock	• Modicon 580 series spare stock should be purchased.

Table 4-2. Summary of SPFA Recommendations	
Site / System	**Recommendations**
PLC – Spare Stock	• For all sites that are scheduled for process upgrades, replace the A-B CompactLogix PLCs and I/O cards, communications cards and 24VDC power supplies. The existing A-B CompactLogix PLCs and I/O cards should be returned to Mesa Water to be refurbished and used as spares stock.
PLC – I/O Allocation	• Assign duty and standby equipment to different I/O cards where possible.
UPS – Spare Stock	• Purchase one spare UPS of each type and stock in the warehouse. When the UPS fails at a site, the warehouse spare should be installed and immediately replaced.
Communications - Hardware	• As sites are upgraded with dual path radio systems, existing radios should be returned to Mesa Water and added to the warehouse spares. Spare dual path radios should be purchased. • Conduct a data communications radio study to select an operating and back up radio system.

Section 5: GAP Analysis (Routine Emergency Event)

5.1 Emergency Scenarios and Assumptions

In TM-1, three different emergency scenarios were evaluated as part of a GAP analysis. These scenarios contemplated a local or regional emergency event (e.g., earthquake, fires, flood, etc.) that lasted for 30 calendar days. The facilities operating in each of these emergency scenarios are summarized in Table 5-1.

Table 5-1. Operational Facilities by GAP Analysis Scenario			
Mesa Water Facility	**Scenario 2a – Emergency Condition 1**	**Scenario 2b – Emergency Condition 2**	**Scenario 2c – Emergency Condition 3**
Well 1	✓	✓	–
Well 3	✓	–	–
Well 5	–	✓	–
Well 7	✓	✓	–
Well 9	✓	✓	–
Well 12 (Future)	✓	–	✓
Well 14 (Future)	✓	–	✓
MWRF	–	✓	-
Reservoir 1	✓	✓	✓
Reservoir 2	✓	✓	✓
Metered Turnouts	–	–	–
GAP Deficiency	29%	26%	67%

Note:

1. *Refer to TM-1 for further information on which scenarios require regulatory action, importing water from MWD, or expanding infrastructure.*

The GAP analysis assumed that after the 30-day emergency, the capacities of each well returned to their baseline condition. The analysis also noted that the capacities of each available well were higher during the emergency condition than in the baseline condition since routine maintenance was assumed to be deferred.

To represent a worst-case scenario, the emergency conditions described in each scenario were applied to the month of August, when demands are typically highest. Maximum day (150%) demands were used for the entire duration of August. For all other months, 115% demand was used. In all three emergency scenarios, the gap between demand and supply in the month of August could not be met. This showed that current MWRF production is not enough to provide the necessary capacity if several clear wells are not operational and MWD imports are not available to supplement supply.

The above emergency scenarios were simulated under "ideal" conditions. That is, it was assumed that all equipment operated without failure and that sufficient consumables (i.e., fuel and chemicals) were available throughout the duration of the emergency event. Based on the Supply Chain and Single Points of Failure Analyses performed herein, the potential impacts of gaps between consumables supply and demand need to be considered.

5.2 Fuel Consumption

As previously described, with the exception of Well 1 and the MWRF, all Mesa Water core production facilities have onsite fuel storage to power onsite standby generators or directly supply onsite engine-driven pumps.

TM-2 recommends that backup power generation be provided by diesel engine-driven generators. Diesel fuel is supplied locally in California and delivered via truckloads. In the event of a natural disaster, the California Office of Emergency Services' (Cal OES) Southern California Catastrophic Earthquake Response Plan (OPLAN) states that roadways will be restored within 72 hours after a major event and that 75 percent of normal electrical capacity in Orange County would be restored within one to two days. For this GAP analysis, the OPLAN is considered optimistic and a "best-case" scenario. BC recommends using a more realistic period of 10 days when considering mitigation measures, such as a centralized diesel fuel storage tank.

Based on the above, a potential gap exists between the available runtime for equipment given onsite fuel storage and the anticipated 10-day period before roadways are restored after an emergency to allow fuel deliveries to resume. Table 5-2 summarizes the backup fuel capacity, estimated operating duration, and potential gap in operation at each existing facility over a 10-day period. Table 5-2 is based on information derived from an evaluation performed in TM-2.

Table 5-2. Available Backup Fuel Capacity

Facility	Backup Fuel Capacity	Estimated Operating Duration (hours)	Potential Gap in Operation (hours)[1]
Well 1	N/A (Connection for portable generator)	N/A	240
Well 3	200 kW diesel generator; 426-gal subbase diesel storage tank	15	225
Well 5	1,150-gal LPG storage tank	25	215
Well 7	150 kW diesel generator; 333-gal subbase diesel storage tank	12	228

Table 5-2. Available Backup Fuel Capacity			
Facility	Backup Fuel Capacity	Estimated Operating Duration (hours)	Potential Gap in Operation (hours)[1]
Well 9	230 kW diesel generator; 426-gal subbase diesel storage tank	15	225
Well 12 (Future)	600 kW diesel generator; 1,000-gal diesel storage tank	24	216
Well 14 (Future)	600 kW diesel generator; 1,000-gal diesel storage tank	24	216
Reservoir 1	1,150-gal LPG storage tank	44	196
Reservoir 2	1,150-gal LPG storage tank	32	208

[1] Calculated by subtracting estimated operating duration from 240 hours, the total available operating hours over a 10-day period. Assumes that fuel tanks are full at start of event. For Well 1, which relies on a portable rental generator, it is assumed that a generator would not be supplied until Day 11.

5.3 Chemical Consumption

As with fuel, a regional emergency has the potential to prevent truck deliveries of chemical for a 10-day period. Without certain chemicals, Mesa Water's core production facilities will be unable to reliably achieve water quality standards and will need to cease operation until chemical deliveries can resume. For each of these critical chemicals, Table 5-3 summarizes the onsite chemical tank volume, usable volume, estimated operating duration, and potential gap in operation at each existing facility. For this GAP analysis, it is optimistic to assume that the chemical tanks will be full at the time of the event. As such, it is recommended that the operating duration assume the tanks are one-third full.

Table 5-3. Available Chemical Capacity				
Chemical (Facility)	Tank Volume (gal)	Usable Volume @ 80% (gal)	Time Between Deliveries, Full (days)	Time Between Deliveries, ⅓ Full (days)
Well Sites – 1, 3, 5, 7, 9				
Sodium Hypochlorite	4,000	3,200	30	10
Aqua Ammonia	4,000	3,200	30+	10
Reservoirs 1 & 2				
Sodium Hypochlorite	350	280	30	10
MWRF				
Sodium Hypochlorite	6,570	5,256	6	2
Aqua Ammonia	2,000	1,600	8	2.7
Sodium Hydroxide (Caustic)	5,287	4,240	65	21.7
Carbon Dioxide	–	–	13.5	4.5

Source: Mesa Water District Production System Operations Plan

As indicated in Table 5-3, over a 10-day period there will be potential gaps in core production operation due to delays in deliveries of sodium hypochlorite, aqua ammonia and carbon dioxide. It should be noted that this analysis does not reflect the potential strength degradation of certain chemicals, like sodium hypochlorite, over a 10-day duration and with increases in storage temperature. As such, it is recommended that Mesa Water monitor the usage of these chemicals during an emergency.

Section 6: GAP Analysis (Identified Scenarios)

6.1 Emergency Scenarios and Assumptions

Using the demand and supply data identified in TM-1, a GAP analysis was performed to identify local water supply disparities under six regional emergency scenarios defined by Mesa Water. These scenarios have the following conditions in common:

1. Duration: 7, 14, and 30 calendar days as individual events.
2. Pipeline Breaks: 25 mainline breaks across associated small and large diameters
3. Natural gas supplies are unavailable
4. Electric supplies are unavailable
5. Reservoirs 1 and 2 are inoperable
6. MWRF is operable
7. MWD water (metered turnouts) is unavailable

For each of the durations identified in Item 1 above, the following sub-scenarios were evaluated:

1. Sub-Scenario A: Current condition of Mesa Water's back-up generation capacity and without having new Wells 12 and 14 constructed. Under this sub-scenario, the operating conditions of Mesa Water's core production facilities are as follows:
    a. Well 1 – Not available until rental portable generator mobilized.
    b. Wells 3, 5, 7 and 9 - Available on Day 1 and powered by onsite generators or LPG tanks.
    c. MWRF – Not available.
2. Sub-Scenario B: The recommendations from TM-2 have been implemented (filling in the back-up power capacity gaps) and new wells 12 and 14 have been constructed and are fully operational with back-up power capability. Under this sub-scenario, the operating conditions of Mesa Water's core production facilities are as follows:
    a. Well 1 – Portable generator mobilized and in operation on Day 2. The portable generator would be available for 24 hours before fuel depleted.
    b. Wells 3, 5, 7, 9, 12 and 14 - Available on Day 1 and powered by onsite generators.
    c. MWRF – Onsite generator would allow MWRF to operate on Day 1 and would be available for 24 hours before fuel depleted.
    d. Centralized Bulk Fuel Storage Depot and Fuel Tanker Truck – Provides sufficient fuel storage and means to refill onsite generator fuel tanks for up to 10 days.

The facilities operating in each of these emergency scenarios are summarized in Table 6-1.

Table 6-1. Operational Facilities by GAP Analysis Scenario						
Mesa Water Facility	Scenario 1A – 7 Days	Scenario 2A – 14 Days	Scenario 3A – 30 Days	Scenario 1B – 7 Days	Scenario 2B – 14 Days	Scenario 3B – 30 Days
Well 1	✓	✓	✓	✓	✓	✓
Well 3	✓	✓	✓	✓	✓	✓
Well 5	✓	✓	✓	✓	✓	✓
Well 7	✓	✓	✓	✓	✓	✓
Well 9	✓	✓	✓	✓	✓	✓
Well 12 (Future)	Not Available	Not Available	Not Available	✓	✓	✓
Well 14 (Future)	Not Available	Not Available	Not Available	✓	✓	✓
MWRF	Not Available	Not Available	Not Available	✓	✓	✓
Reservoirs 1 and 2	Not Available	Not Available	Not Available	✓	✓	✓
Metered Turnouts	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available

6.2 Water Supply

In TM-1, the available water supply over a 30-day period was determined for each Mesa Water facility. Since this GAP analysis evaluates events with durations less than 30 days, the water supply capacity has been expressed as a daily average. The available water supply for the various durations identified in this GAP analysis are summarized in Table 6-2. Note that the capacities of each available well are higher during the emergency condition since routine maintenance is deferred.

Table 6-2. Available Water Supplies					
Source	Baseline Capacity (AF/month)	Emergency Capacity (AF/month)	Emergency Capacity (AF/day)	Emergency Capacity (AF/7-day)	Emergency Capacity (AF/14-day)
Clear Wells					
Well 1	299	309	10.3	72.1	144.2
Well 3	208	215	7.2	50.4	100.8
Well 5	257	296	9.9	69.3	138.6
Well 7	169	175	5.8	40.6	81.2
Well 9	234	242	8.1	56.7	113.4
Well 12 (Future)	390	403	13.4	93.8	187.6
Well 14 (Future)	390	403	13.4	93.8	187.6
MWRF	807	807	26.9	188.3	376.6
Totals	**2,754**	**2,850**	**95.0**	**665.0**	**1,330.0**

To account for the potential gaps in available onsite fuel and chemical storage and the 10-day lag in delivery due to roadway closures, the resulting available production for each clear well and the MWRF, identified in Table 5-2, needs to be used to determine the available water supplies over 7-, 14- and 30-day periods.

6.2.1 Well 1

Well 1 has an emergency production capacity of 10.3 acre-feet per day (AF/day), on average. After losing power during a regional emergency, Well 1 is assumed to operate as follows:

- Sub-Scenario A:
  - Rental portable generator is required to be mobilized to allow operation. It is assumed that procuring and mobilizing a rental generator will not be feasible until Day 11 of the emergency response.
  - On Day 11, fuel and chemical deliveries will resume, and Well 1 will produce 10.3 AF/day.
- Sub-Scenario B:
  - Portable generator, owned by Mesa Water, will be mobilized to allow operation beginning on Day 2 of the emergency response. On Day 2, Well 1 will produce 10.3 AF/day.
  - The onsite chemical inventory at the time of the emergency, with tanks at one-third full, will support operation for up to 10 days.
  - On Day 11, fuel and chemical deliveries will return to pre-emergency conditions.

When the above conditions are applied to 7-, 14- and 30-day periods after a regional emergency, the available water supply is as shown in Table 6-3. GAP deficiencies, in terms of percent less than potential emergency production, are also included.

Table 6-3. Available Water Supplies, Well 1

Source	Emergency Capacity (AF/day)	Availability (days/10-day)	Emergency Capacity (AF/7-day)	Emergency Capacity (AF/14-day)	Emergency Capacity (AF/30-day)
Well 1 (Baseline)	10.3	10	72.1	144.2	309
Well 1 (Sub-Scenario A)	10.3	0	0	41.4	206
Well 1 (Sub-Scenario B)	10.3	9	61.8	133.9	298.7
GAP Deficiencies (A/B)	-0-	100% / 10%	100% / 14%	71.5% / 7.1%	33.3% / 3.3%

6.2.2 Well 3

Well 3 has an emergency production capacity of 7.2 AF/day, on average. After losing power during a regional emergency, Well 3 is assumed to operate as follows:

- Sub-Scenario A:
  - Onsite generator has fuel capacity to allow operation for approximately 15 hours (0.63 days).
  - Onsite chemical inventory at the time of the emergency, with tanks at one-third full, will support operation for up to 10 days.
  - Over first 10 days, Well 3 will be limited by existing fuel inventory and available to produce only 4.5 AF, or 7.2 AF/day multiplied by 0.63 days.
  - On Day 11, fuel and chemical deliveries will return to pre-emergency conditions, and Well 3 will produce 7.2 AF/day.
- Sub-Scenario B:

- o Onsite generator will remain in operation through first 10 days, with fuel deliveries from Mesa Water's Centralized Bulk Fuel Storage Depot.
  - o The onsite chemical inventory at the time of the emergency, with tanks at one-third full, will support operation for up to 10 days.
  - o On Day 11, fuel and chemical deliveries will return to pre-emergency conditions.
  - o Well 3 will produce 7.2 AF/day for 7-, 14- and 30-day scenarios.

When the above conditions are applied to 7-, 14- and 30-day periods after a regional emergency, the available water supply is as shown in Table 6-4. GAP deficiencies, in terms of percent less than potential emergency production, are also included.

Table 6-4. Available Water Supplies, Well 3

Source	Emergency Capacity (AF/day)	Availability (days/10-day)	Emergency Capacity (AF/7-day)	Emergency Capacity (AF/14-day)	Emergency Capacity (AF/30-day)
Well 3 (Baseline)	7.2	10	50.4	100.8	215
Well 3 (Sub-Scenario A)	7.2	0.63	4.5	33.3	148.5
Well 3 (Sub-Scenario B)	7.2	10	50.4	100.8	215
GAP Deficiencies (A/B)	-0-	99.1% / 0%	91.1% / 0%	67.0% / 0%	30.9% / 0%

6.2.3 Well 5

Well 5 has an emergency production capacity of 9.9 AF/day, on average. After losing power during a regional emergency, Well 5 is assumed to operate as follows:

- Sub-Scenario A:
  - o Onsite LPG tank has fuel capacity to allow operation for approximately 25 hours (1.04 days).
  - o Onsite chemical inventory at the time of the emergency, with tanks at one-third full, will support operation for up to 10 days.
  - o Over first 10 days, Well 5 will be limited by existing fuel inventory and available to produce only 10.3 AF, or 9.9 AF/day multiplied by 1.04 days.
  - o On Day 11, fuel and chemical deliveries will return to pre-emergency conditions, and Well 5 will produce 9.9 AF/day.
- Sub-Scenario B:
  - o Onsite generator will remain in operation through first 10 days, with fuel deliveries from Mesa Water's Centralized Bulk Fuel Storage Depot.
  - o The onsite chemical inventory at the time of the emergency, with tanks at one-third full, will support operation for up to 10 days.
  - o On Day 11, fuel and chemical deliveries will return to pre-emergency conditions.
  - o Well 5 will produce 9.9 AF/day for 7-, 14- and 30-day scenarios.

When the above conditions are applied to 7-, 14- and 30-day periods after a regional emergency, the available water supply is as shown in Table 6-5. GAP deficiencies, in terms of percent less than potential emergency production, are also included.

Table 6-5. Available Water Supplies, Well 5

Source	Emergency Capacity (AF/day)	Availability (days/10-day)	Emergency Capacity (AF/7-day)	Emergency Capacity (AF/14-day)	Emergency Capacity (AF/30-day)
Well 5 (Baseline)	9.9	10	69.3	138.6	296
Well 5 (Sub-Scenario A)	9.9	1.04	10.3	49.9	208.3
Well 5 (Sub-Scenario B)	9.9	10	69.3	138.6	296
GAP Deficiencies (A/B)	-0-	98.9% / 0%	85.1% / 0%	64.0% / 0%	29.6% / 0%

6.2.4 Well 7

Well 7 has an emergency production capacity of 5.8 AF/day, on average. After losing power during a regional emergency, Well 7 is assumed to operate as follows:

- Sub-Scenario A:
  - Onsite generator has fuel capacity to allow operation for approximately 12 hours (0.5 days).
  - Onsite chemical inventory at the time of the emergency, with tanks at one-third full, will support operation for up to 10 days.
  - Over first 10 days, Well 7 will be limited by existing fuel inventory and available to produce only 2.9 AF, or 5.8 AF/day multiplied by 0.5 days.
  - On Day 11, fuel and chemical deliveries will return to pre-emergency conditions, and Well 7 will produce 5.8 AF/day.
- Sub-Scenario B:
  - Onsite generator will remain in operation through first 10 days, with fuel deliveries from Mesa Water's Centralized Bulk Fuel Storage Depot.
  - The onsite chemical inventory at the time of the emergency, with tanks at one-third full, will support operation for up to 10 days.
  - On Day 11, fuel and chemical deliveries will return to pre-emergency conditions.
  - Well 7 will produce 5.8 AF/day for 7-, 14- and 30-day scenarios.

When the above conditions are applied to 7-, 14- and 30-day periods after a regional emergency, the available water supply is as shown in Table 6-6. GAP deficiencies, in terms of percent less than potential emergency production, are also included.

Table 6-6. Available Water Supplies, Well 7					
Source	Emergency Capacity (AF/day)	Availability (days/10-day)	Emergency Capacity (AF/7-day)	Emergency Capacity (AF/14-day)	Emergency Capacity (AF/30-day)
Well 7 (Baseline)	5.8	10	40.6	81.2	175
Well 7 (Sub-Scenario A)	5.8	0.5	2.9	26.1	118.9
Well 7 (Sub-Scenario B)	5.8	10	40.6	81.2	175
GAP Deficiencies (A/B)	-0-	99.1% / 0%	92.9% / 0%	67.9% / 0%	32.0% / 0%

6.2.5 Well 9

Well 9 has an emergency production capacity of 8.1 AF/day, on average. After losing power during a regional emergency, Well 9 is assumed to operate as follows:

- Sub-Scenario A:
  - o Onsite generator has fuel capacity to allow operation for approximately 15 hours (0.63 days).
  - o Onsite chemical inventory at the time of the emergency, with tanks at one-third full, will support operation for up to 10 days.
  - o Over first 10 days, Well 9 will be limited by existing fuel inventory and available to produce only 5.1 AF, or 8.1 AF/day multiplied by 0.63 days.
  - o On Day 11, fuel and chemical deliveries will return to pre-emergency conditions, and Well 9 will produce 8.1 AF/day.
- Sub-Scenario B:
  - o Onsite generator will remain in operation through first 10 days, with fuel deliveries from Mesa Water's Centralized Bulk Fuel Storage Depot.
  - o The onsite chemical inventory at the time of the emergency, with tanks at one-third full, will support operation for up to 10 days.
  - o On Day 11, fuel and chemical deliveries will return to pre-emergency conditions.
  - o Well 7 will produce 8.1 AF/day for 7-, 14- and 30-day scenarios.

When the above conditions are applied to 7-, 14- and 30-day periods after a regional emergency, the available water supply is as shown in Table 6-7. GAP deficiencies, in terms of percent less than potential emergency production, are also included.

Table 6-7. Available Water Supplies, Well 9					
Source	Emergency Capacity (AF/day)	Availability (days/10-day)	Emergency Capacity (AF/7-day)	Emergency Capacity (AF/14-day)	Emergency Capacity (AF/30-day)
Well 9 (Baseline)	8.1	10	56.7	113.4	242
Well 9 (Sub-Scenario A)	8.1	0.63	5.1	37.5	167.1
Well 9 (Sub-Scenario B)	8.1	10	56.7	113.4	242
GAP Deficiencies (A/B)	-0-	99.2% / 0%	91.0% / 0%	66.9% / 0%	31.0% / 0%

6.2.6 Wells 12 and 14 (Future)

Wells 12 and 14 each have an anticipated emergency production capacity of 13.4 AF/day, on average. After losing power during a regional emergency, Wells 12 and 14 are each assumed to operate as follows:

- Sub-Scenario A:
  - As indicated in Section 6.1, Wells 12 and 14 are to be considered not available for this scenario.
- Sub-Scenario B:
  - Onsite generator will remain in operation through first 10 days, with fuel deliveries from Mesa Water's Centralized Bulk Fuel Storage Depot.
  - The onsite chemical inventory at the time of the emergency, with tanks at one-third full, will support operation for up to 10 days.
  - On Day 11, fuel and chemical deliveries will return to pre-emergency conditions.
  - Wells 12 and 14 will each produce 13.4 AF/day for 7-, 14- and 30-day scenarios.

When the above conditions are applied to 7-, 14- and 30-day periods after a regional emergency, the available water supply is as shown in Table 6-8. GAP deficiencies, in terms of percent less than potential emergency production, are also included.

Table 6-8. Available Water Supplies, Wells 12 and 14

Source	Emergency Capacity (AF/day)	Availability (days/10-day)	Emergency Capacity (AF/7-day)	Emergency Capacity (AF/14-day)	Emergency Capacity (AF/30-day)
Wells 12/14 (Baseline)	13.4	10	93.8	187.6	403
Well 12/14 (Sub-Scenario A)	-0-	-0-	-0-	-0-	-0-
Well 12/14 (Sub-Scenario B)	13.4	10	93.8	187.6	403
GAP Deficiencies (A/B)	100% / 0%	100% / 0%	100% / 0%	100% / 0%	100% / 0%

6.2.7 MWRF

The MWRF has an emergency production capacity of 26.9 AF/day, on average. After losing power during a regional emergency, the MWRF is assumed to operate as follows:

- Sub-Scenario A:
  - As indicated in Section 6.1, the MWRF is to be considered not available for this scenario.
- Sub-Scenario B:
  - Onsite generator will remain in operation through first 10 days, with fuel deliveries from Mesa Water's Centralized Bulk Fuel Storage Depot.
  - The onsite chemical inventory at the time of the emergency, with tanks at one-third full, will support operation for up to 48 hours (2.0 days). After this, the MWRF would deplete its onsite storage of sodium hypochlorite, followed by aqueous ammonia.
  - Over first 10 days, the MWRF will be limited by existing chemical inventory and available to produce only 53.8 AF, or 26.9 AF/day multiplied by 2.0 days.

- Due to chemical inventory limitations, the MWRF will not be available from Day 3 through Day 10.
- On Day 11, fuel and chemical deliveries will return to pre-emergency conditions, and the MWRF will produce 26.9 AF/day.

When the above conditions are applied to 7-, 14- and 30-day periods after a regional emergency, the available water supply is as shown in Table 6-9. GAP deficiencies, in terms of percent less than potential emergency production, are also included.

Table 6-9. Available Water Supplies, MWRF

Source	Emergency Capacity (AF/day)	Availability (days/10-day)	Emergency Capacity (AF/7-day)	Emergency Capacity (AF/14-day)	Emergency Capacity (AF/30-day)
MWRF (Baseline)	26.9	10	188.3	376.6	807
MWRF (Sub-Scenario A)	-0-	-0-	-0-	-0-	-0-
MWRF (Sub-Scenario B)	26.9	2	53.8	161.4	591.8
GAP Deficiencies (A/B)	100% / 0%	100% / 80%	100% / 71.4%	100% / 57.1%	100% / 26.7%

6.3 Water Demand

As indicated in Section 5.1, to represent a worst-case scenario, the emergency conditions described in each scenario were applied to the month of August, when demands are typically highest. Maximum day (150%) demands were used for the entire duration of August. For 2020 flows, this results in a demand of 2,468 AF/month or 82.3 AF/day.

6.4 Results

Table 6-10 summarizes the results of the GAP analysis performed for all six scenarios, described in Table 6-1, using 2020 demands and the adjusted water supply for each facility identified in Section 6.2.

Table 6-10. GAP Analysis

	Scenario 1A	Scenario 2A	Scenario 3A	Scenario 1B	Scenario 2B	Scenario 3B
Scenario Duration (days)	7	14	30	7	14	30
Demand (AF/period) (1)	**576**	**1,152**	**2,468**	**576**	**1,152**	**2,468**
Emergency Capacity						
Clear Wells						
Well 1	0	41.4	206	61.8	133.9	298.7
Well 3	4.5	33.3	148.5	50.4	100.8	215
Well 5	10.3	49.9	208.3	69.3	138.6	296
Well 7	2.9	26.1	118.9	40.6	81.2	175
Well 9	5.1	37.5	167.1	56.7	113.4	242
Well 12 (Future)	-	-	-	93.8	187.6	403

Well 14 (Future)	-	-	-	93.8	187.6	403
MWRF	-	-	-	53.8	161.4	591.8
Totals (AF/period)	22.8	188.2	848.8	520.2	1,104.5	2,624.5
GAP Deficiency (AF/period)	*553.2*	*963.8*	*1,619.2*	*55.8*	*47.5*	*(157)*
GAP Deficiency (%)	*96.0%*	*83.7%*	*65.6%*	*9.7%*	*4.1%*	*0%*

1. August demand shown reflects max day (150%) demand applied throughout the entire month. 30-day emergency analysis performed for August.

As reflected in Table 6-10, there is a substantial deficiency in meeting the worst-case demand with only the clear wells in operation during an emergency (Scenarios 1A, 2A and 3A). This is clearly exacerbated by the gap in operation that occurs after individual well sites deplete their onsite fuel storage capacity and wait for the first deliveries following the reopening of roadways. In these scenarios, at the end of 30 days following a regional emergency, Mesa Water will have met approximately 35 percent of their peak demand.

However, as reflected in Scenarios 1B, 2B and 3B, with the implementation of the recommendations included in TM-2 (includes procurement of portable generator for Well 1 and construction of Centralized Bulk Fuel Storage Depot), additional capacity from future Wells 12 and 14, and operation of the MWRF, the gap between demand and available supply drops dramatically. In these scenarios, the gap is approximately 10% at the end of 10 days following a regional emergency, and continues to drop to approximately 4% after 14 days and is 0% at the end of 30 days,

Based on the above GAP analysis, the following observations can be made:

- The recommendation included in TM-2 to construct a Centralized Bulk Fuel Storage Depot and procure a Fuel Tanker Truck is critical in addressing a substantial portion of the demand during a regional emergency. Implementing this recommendation allows Mesa Water to refuel onsite generators for up to 10 days following a regional emergency, which further shores their supply chain by reducing their reliance on third parties.
- The recommendation included in TM-2 to construct back-up power facilities at MWRF has only a limited benefit. Following a regional emergency, the available chemical inventory at the MWRF becomes a limiting factor for MWRF operation. Regardless of onsite back-up power availability, the MWRF will not be available after the onsite inventory of sodium hypochlorite is depleted. Considering the capital costs to construct onsite back-up power facilities and additional chemical storage facilities sufficient for 10 days, it would be more cost effective to construct one or two new clear wells to address the potential gap deficiency during an emergency.

Section 7: Storage and Spare Parts

7.1 Material Storage

As a result of the SCA and SPFA, a number of recommendations have been made to purchase spare parts stock to 1) mitigate potential risks to supply chains and 2) mitigate single points of failure by procuring components with no redundant system/equipment. These recommendations are summarized, with recommended quantities, in Table 7-1.

Table 7-1. Summary of Spare Parts Stock Recommendations			
Description	Quantity	Notes	Storage Location (Warehouse)
Distribution System			
Pipe, PVC	15	• C900 (DR25), 20-ft joints, varies from 4”-42”	Pipe Racks
Pipe, Copper	15	• 10-ft lengths, small diameter	Pipe Racks
Repair Couplings	30	• Varies from 4”-42”, two (2) for each size PVC Pipe	Pallet Racks
Repair Clamps, ACP	20	• Varies from 4”-16”	Pallet Racks
Repair Clamps, Steel	10	• Varies from 4”-24”	Pallet Racks
Steel Plates	8	• For emergency street repairs	Outdoor Rack
Cold Mix	10	• 50-lb bags	Pallet Racks
Well Sites			
Bypass switch	10		Electrical Storage
Solenoid valve	6	• Includes manual bypass	Electrical Storage
MWRF			
Bypass switch	8		Electrical Storage
Solenoid valve	4	• Includes manual bypass	Electrical Storage
Vertical Turbine Pump, Nanofiltration Feed	1	• 3330 gpm @ 217’ TDH • 250 HP motor • Storage dimensions: 4’ x 4’ x 20’	Pallet, Floor
Vertical Turbine Pump, Product Transfer	1	• 4,000 gpm @ 22’ TDH • 40 HP motor • Storage dimensions: 4’ x 4’ x 25’	Pallet, Floor
Motor, Well 6/11	1	• 400 HP • Storage dimensions: 4’ x 4’ x 10’	Pallet, Floor
Electrical, Instrumentation and Control			
PLC, Modicon 580	2		Electrical Storage
PLC, Allen-Bradley CompactLogix	2		Electrical Storage
UPS	4	• At least one of each type	Electrical Storage
Dual path radios	4		Electrical Storage
Miscellaneous			
Forklift	1		Warehouse Floor
Pallet Jacks	2		Warehouse Floor

As noted by Mesa Water staff, there is little additional space for storage at existing facilities. Current spare parts stock is stored across facilities to enhance accessibility during an emergency. Since a number of spare parts require protection from direct sunlight (e.g., PVC pipe) or dry conditions with accessibility to power for space heaters (e.g., pumps, motors) or low dust environments (e.g., electronics, electrical equipment), it is recommended that a warehouse be constructed, sized at a minimum for the items identified in Table 7-1. As reflected in Figure 7-1, the recommended dimensions of the warehouse would be 80 feet by 80 feet, or approximately 6,400 square feet. This layout is conceptual and should be further evaluated to accommodate additional spare parts stock, as appropriate.

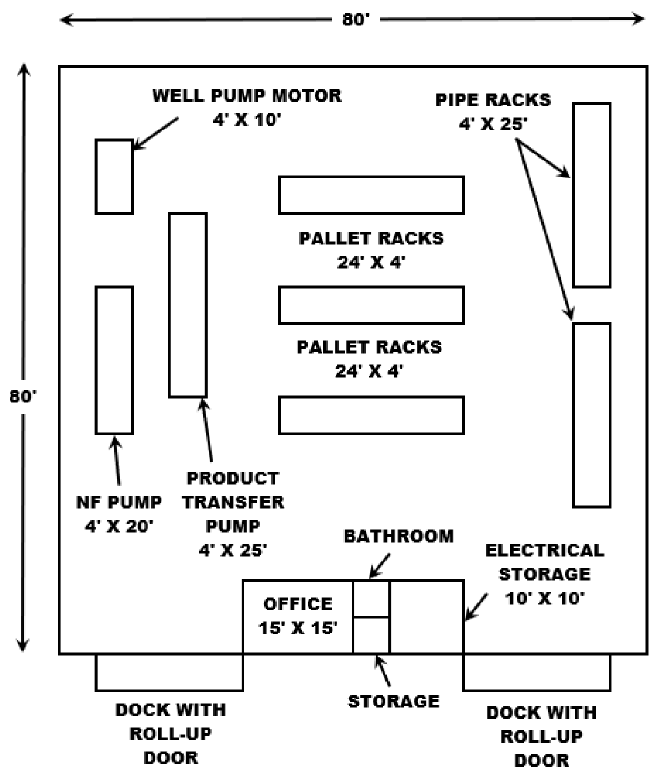

Figure 7-1. Conceptual Layout for Storage Facility

As previously indicated, there is little additional space for storage at existing facilities. If the above layout cannot be accommodated at an existing facility, then it could be located at either proposed Well Site 12 or 14. Additionally, it could be co-located with the diesel fuel tank storage, which was identified in TM-2 and is further discussed in Section 7.2.

In addition to constructing a warehouse for the spare parts stock recommended in this TM, it is recommended that Mesa Water consider investing in an inventory or asset management system that would be connected to purchasing functions, to facilitate replacement of parts as they are used and ensure critical spare parts remain in stock. Ultimately, the inventory system should be focused on consumables required for preventative maintenance and for spare parts needed to address critical equipment and instruments. This would allow Mesa Water to identify any excess inventory supply and better manage required storage space.

7.2 Diesel Fuel Storage

7.2.1 Storage Capacity

TM-2 recommends that backup power generation be provided by diesel engine-driven generators. Diesel fuel is supplied locally in California and delivered via truckloads. In the event of a natural disaster, the California Office of Emergency Services' (Cal OES) Southern California Catastrophic Earthquake Response Plan (OPLAN) states that roadways will be restored within 72 hours after a major event and that 75 percent of normal electrical capacity in Orange County would be restored within one to two days. BC recommends providing a centralized diesel storage tank with an operational capacity of 10 days, as the OPLAN may optimistic and a more practical period should be anticipated in the event of an emergency. Although greater storage capacity would provide additional reliability, greater fuel polishing costs would be incurred.

As summarized in Section 5.2, the clear wells are not currently equipped to provide 10 days (240 hours) of runtime at maximum fuel consumption. Reservoirs 1 and 2 are currently designed to provide 32 and 44 hours of runtime, respectively, at maximum fuel consumption, and the MWRF is not equipped with any backup supplies. If Mesa Water elects to provide back-up power at the MWRF, as is recommended in TM-2, additional storage capacity would be required. Per the discussion in TM-2, to achieve a total operational capacity of 10 days of runtime at all of Mesa Water's facilities, approximately two 30,000-gallon centralized diesel fuel storage tanks would need to be installed.

7.2.2 Regulatory and Operational Considerations

There are two types of storage tanks for diesel fuel: aboveground storage tanks (ASTs) and underground storage tanks (USTs). ASTs are simpler and less expensive to construct compared to USTs, which require excavation. If groundwater is encountered, then dewatering and thicker footings to counteract buoyant forces will significantly increase construction costs. ASTs have greater accessibility and allow for visual leak detection. USTs are advantageous for sites where there are space limitations.

Both types of storage tanks are regulated by federal and state-specific regulations. However, regulations are more stringent for USTs as they are one of the greatest sources of groundwater contamination. ASTs are primarily regulated by the Office of the State Fire Marshal under the Aboveground Petroleum Storage Act (APSA). The APSA applies to ASTs with storage capacities exceeding 1,320 gallons of petroleum, or tanks in underground areas with storage capacities less than 1,320 gallons. Federal regulations by the Environmental Protection Agency (EPA) under the Spill Prevention, Control, and Countermeasure (40 CFR Part 112) may also apply. USTs are regulated by the EPA under the 2015 Technical Standards and Correction Action Requirements for Owners and Operators of USTs (40 CFR Part 280) and the California State Water Resources Control Board (CSWRCB) under the UST Program. Regulations for both USTs and ASTs include material selection, containment requirements, and leak detection. USTs have an extensive permitting process, require regular inspections, and in some cases, require groundwater monitoring.

Diesel fuel is susceptible to microbial contamination if it is not regularly maintained. Microbial growth occurs on the fuel surface and results in the formation of biofilm. Microbial contamination is more likely to occur in humid or warm climates. Normal operation of diesel fuel storage tanks can also result in water or solids entering the storage tank and contaminating the fuel. Fuel polishing is typically performed on an annual basis, though the frequency will vary with environmental conditions. Failure to maintain the fuel will result in equipment operating at a reduced capacity, or potentially clogging. Fuel polishing is commonly performed as a service by third party vendors.

Because of state-specific diesel fuel specifications regulated by the California Air Resources Board, a majority of California's diesel fuel supply is refined locally. As discussed in TM-2, California's refining capacity for distillate has exceeded the sales of distillates for the last five years. Thus, availability of local diesel fuel supply is not a concern. Diesel fuel is delivered to storage sites by truck, with the loads ranging from 6 to 12 thousand gallons. Deliveries can potentially be compromised if a natural disaster prompts road closure.

Property acquisition will be necessary for the centralized diesel storage tank as future projects are planned to utilize the available space at Reservoir 1 and the MWRF. Each of the 30,000-gallon diesel fuel storage tanks are horizontal cylindrical type and have an outside diameter of approximately 11 feet and outside length of approximately 52 feet. Considering property and building line setbacks of 25 feet and access for a fuel truck and other maintenance vehicles, a minimum lot size of 85 feet by 120 feet, approximately 10,000 square feet, is anticipated to be required for the new fuel storage facility. If the site were to include a warehouse, as described in Section 7.1, then it is recommended to increase the lot size to a minimum of 165 feet by 120 feet, or approximately 20,000 square feet. Similar to Mesa Water District and Reservoir 1, the new facility would be zoned as General Industrial, which applies to drinking water infrastructure and backup supplies related to this usage.

New ASTs that are regulated by the APSA require a California Fire Code permit, which is obtained from the Orange County Fire Authority through a plan check process. The process includes an initial inspection by the Orange County Health Care Agency (OCHCA). In addition to enforcing the APSA, the OCHCA conducts routine inspections and collects annual fees for ASTs. The APSA also requires that a SPCC plan is prepared and implemented.

New USTs are regulated by the CSWRCB UST Program and require an operating permit, which is obtained from the CSWRCB through an application process. Required documents include as-built drawings, proposed monitoring program, and operator certifications. The monitoring program must include a non-visual monitoring method. If the highest anticipated groundwater level is less than 10 feet below the bottom of the tank, then groundwater monitoring must be implemented. Otherwise, the vadose zone can be monitored. As part of the permit conditions, the owner must maintain various monitoring and maintenance records. Like ASTs, the OCHCA enforces the UST Program and conducts routine inspections.

7.2.3 Costs

Based on a recent project that installed an above grade diesel fuel storage tank, the unit cost for a diesel fuel storage tank ranges from $28/gal to $35/gal. This range of unit costs is based on the following constructed elements and excludes soft costs (i.e., design, permitting, etc.) and a permanent fuel polishing system:

- Structure
  - Reinforced concrete pad with containment berms
  - Transfer pump pads (2 total)
  - Stair landing pad and elevated platform
  - Canopy
- Equipment
  - Transfer pumps (2 total)
  - Diesel fuel storage tank, double wall, carbon steel
  - Remote fill station
  - Leak detection and other appurtenances
- Mechanical
  - Process piping
- Electrical and instrumentation
- Ancillary Equipment
  - Diesel fuel tractor-trailer

At a unit cost of $30/gal, the estimated construction cost for two 30,000-gallon ASTs is approximately $1.8 million. This excludes soft costs (i.e., design, permitting, etc.) and the cost to acquire property. The cost for a diesel fuel tractor-trailer with approximately 8,000-gallon capacity is estimated to be $200,000.

Section 8: Recommendations

Table 8-1 summarizes the recommendations that mitigate or reduce the findings of this Emergency Supply Chain Reliability and Disruption Analysis and includes an associated cost for each item. Costs are in 2020 U.S. dollars and do not include escalation.

Table 8-1. Summary of Recommendations and Associated Costs

Site / System	Recommendations	Quantity	Estimated Cost	Extended Cost
Well Sites - All				
Chemical Storage Tanks – Sodium Hypochlorite, Aqua Ammonia	• Install connection with valve for tote.	10	$15,000 (each connection)	$150,000
Containment Level Switch – Sodium Hypochlorite, Aqua Ammonia	• Install bypass switch at local control panel.	10	$3,000 (each switch)	$30,000
Solenoid Valves (General)	• For new Well 12 and 14 projects, install solenoid valves with manual overrides.	6	$2,000 (each valve)	$12,000
Main Breaker	• Install second feeder breaker with transfer switch.	1	$150,000	$150,000
Well Site 1				
Portable Generator Connection	• Procure truck-mounted portable generator system.	1	$500,000	$500,000
Reservoirs 1 and 2				
Centralized Diesel Fuel Tank with Diesel Fuel Tractor-Trailer	• Install two 30,000-gallon diesel fuel tank at new property to be acquired by Mesa Water (cost does not include property acquisition) • Diesel fuel tractor-trailer (8,000-gallon capacity) • Warehouse ($30/sf @ 6,400 sf) • Property Acquisition ($1.5 million)	1	$3,700,000	$3,700,000
MWRF				
Nanofiltration Feed	• Provide spare pump. • Pressure switch – Install bypass switch at control panel. • Flow switch – Install bypass switch at control panel.	1	$40,000 (total)	$40,000
Caustic Soda	• Storage tank – Install direct connection for with valve for tote or tank truck. • Containment level switch – Install bypass switch at control panel. • Discharge level switch – Install bypass switch at control panel.	1	$20,000 (total)	$20,000

Table 8-1. Summary of Recommendations and Associated Costs				
Site / System	Recommendations	Quantity	Estimated Cost	Extended Cost
Carbon Dioxide	• Storage tank – Install direct connection for with valve for tote or tank truck. • Heater – Install redundant heat exchanger.	1	$35,000 (total)	$35,000
Sodium Hypochlorite	• Storage tank – Install direct connection for with valve for tote or tank truck. • Containment level switch – Install bypass switch at control panel. • Discharge level switch – Install bypass switch at control panel.	1	$20,000 (total)	$20,000
Aqua Ammonia	• Storage tank – Install direct connection for with valve for tote or tank truck. • Containment level switch – Install bypass switch at control panel. • Discharge level switch – Install bypass switch at control panel.	1	$20,000 (total)	$20,000
Sodium Bisulfite	• Storage tank – Install direct connection for with valve for tote or tank truck. • Containment level switch – Install bypass switch at control panel. • Discharge level switch – Install bypass switch at control panel.	1	$20,000 (total)	$20,000
Scale Inhibitor	• Add a supervisor override for the Scale Inhibitor Storage Tank to allow the MWRF to continue operation without scale inhibitor.	1	$3,000	$3,000
Main Breaker	• Install second feeder breaker with transfer switch at SWBD-2 and MCC-3.	2	$250,000	$500,000
Network, Controls and Communication Systems				
PLC – Spare Stock	• Modicon 580 series spare stock should be purchased.	2	$20,000 (each PLC)	$40,000
PLC – Spare Stock	• A-B CompactLogix spare stock should be purchased.	2	$5,000	$10,000
PLC – I/O Allocation	• Assign duty and standby equipment to different I/O cards where possible.	N/A	N/A	N/A
UPS – Spare Stock	• Purchase one spare UPS of each type and stock in the warehouse. When the UPS fails at a site, the warehouse spare should be installed and immediately replaced.	4	$1,000 (each UPS)	$4,000
Communications - Hardware	• As sites are upgraded with dual path radio systems, existing radios should be returned to Mesa Water and added to the warehouse spares. Spare dual path radios should be purchased.	8	$1,500 (each dual path radio)	$12,000
			Total Cost:	$5,266,000
			Total Cost (Rounded):	$5,300,000

Attachment A: SCA – Questionnaires and Responses

- A1: Questionnaire - Supplier
- A2: Questionnaire - Contractor
- A3: Questionnaire - Laboratory
- A4: Phone Conversation Record – Hill Brothers Chemical Company
- A5: Email Response – Northstar Chemical
- A6: Email Response – JCI Jones Chemicals, Inc.
- A7: Email Response - Linde
- A8: Email Response – W.A. Rasic Construction Co., Inc.
- A9: Email Response – GCI Construction
- A10: Email Response – Leed Electric, Inc.
- A11: Email Response – A C Pozos Electric Corporation
- A12: Email Response – Copp Contracting, Inc.
- A13: Email Response – Weck Laboratories
- A14: Email Response – Orange County Water District

Brown AND Caldwell

18500 Von Karman Avenue, Suite 1100
Irvine, CA 92612

T: 714.730.7600

Phone Conversation Record

Date: [Month] [Day], 2020 **Time:** [00:00 a.m./p.m.] **Project No.:** 155448.400
Project Title: Water Supply, Energy, & Supply Chain Reliability Assessment
Prepared by: [First Name Last Name, Title]

Subject

Conversation with [SUPPLIER NAME] to understand the reliability and potential disruptions to their supply chain for [PRODUCT].

Attendees

Name, Organization	000.000.0000
Name, Organization	000.000.0000
Name, Organization	000.000.0000

Conversation Summary

1. Have you mapped out your supply chain from origin/raw material through delivery to the Orange County area?
   -
2. What does your supply chain look like? Are you able to provide a figure, written description or other product literature?
   -
3. Have you performed a supply chain reliability analysis? If so, what were determined to be the areas of concern? Are you able to provide a copy of the report or summary of findings (non-disclosure affidavit)?
   -
4. If you have not performed a supply chain reliability analysis, in your experience what have been the areas of concern for reliably meeting demand?
   -
5. How do you ensure that you meet day-to-day demand for Orange County and/or Southern California?
   -
6. What measures are in place to ensure that you can meet current demand immediately following a regional emergency such as earthquake, power outages, tsunami, etc.?
   -

7. In terms of service, what can Mesa Water District reasonably expected during a regional emergency?
    -
8. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, with respect to your product, to ensure normal operation immediately following a regional emergency? This could be onsite storage, preferred service contracts, or other measures observed at other agencies.
    -

Action Required

The following are a list of actions required as a result of the meeting discussion:

1. Enter action item here. **Assigned Person(s):** Name; **Response Required:** Date
2. Enter action item here. **Assigned Person(s):** Name; **Response Required:** Date

cc: Name, Organization
Name, Organization

18500 Von Karman Avenue, Suite 1100
Irvine, CA 92612

T: 714.730.7600

Phone Conversation Record

Date: [Month] [Day], 2020 **Time:** [00:00 a.m./p.m.] **Project No.:** 155448.400
Project Title: Water Supply, Energy, & Supply Chain Reliability Assessment
Prepared by: [First Name Last Name, Title]

Subject

Conversation with [CONTRACTOR NAME] to understand the reliability and potential disruptions to their response during a regional emergency (i.e., supply chain).

Attendees

Name, Organization	000.000.0000
Name, Organization	000.000.0000
Name, Organization	000.000.0000

Conversation Summary

1. Have you performed a readiness analysis for your response during a regional emergency (i.e., supply chain reliability analysis)? If so, what did you determine were the areas of concern?
   -
2. If you have not performed this type of analysis, in your experience, where are the points of concern?
   -
3. How do you ensure your ability to meet day-to-day demand for construction services?
   -
4. You are currently listed on Mesa Water District's emergency on-call list. How do you ensure that you can provide required services during a regional emergency such as earthquake, power outage, tsunami, etc.?
   -
5. How do you determine priority during an emergency when multiple customers may require service?
   -
6. In terms of service, what can Mesa Water District reasonably expect during a regional emergency?
   -

7. Do you rely on rental equipment or do you own your own equipment?
   -
8. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, to best support your work, to ensure normal operation immediately following a regional emergency? This could be onsite storage of long-lead items, preferred service contracts, or other measures observed at other agencies.
   -

Action Required

The following are a list of actions required as a result of the meeting discussion:

1. Enter action item here. **Assigned Person(s):** Name; **Response Required:** Date
2. Enter action item here. **Assigned Person(s):** Name; **Response Required:** Date

cc: Name, Organization
Name, Organization

Brown AND Caldwell

18500 Von Karman Avenue, Suite 1100
Irvine, CA 92612

T: 714.730.7600

Phone Conversation Record

Date: [Month] [Day], 2020 **Time:** [00:00 a.m./p.m.] **Project No.:** 155448.400

Project Title: Water Supply, Energy, & Supply Chain Reliability Assessment

Prepared by: [First Name Last Name, Title]

Subject

Conversation with [LABORATORY NAME] to understand the reliability and potential disruptions to their response during a regional emergency (i.e., supply chain).

Attendees

Name, Organization	000.000.0000
Name, Organization	000.000.0000
Name, Organization	000.000.0000

Conversation Summary

1. Please describe the process of how Mesa Water District samples arrive to your facility. Are they delivered by Mesa Water District, by your staff or a third-party service?
   -
2. What does your supply chain look like? For example, what chemicals or other supplies do you rely on to complete water quality testing? What utilities do you rely on to perform testing and do you have any backup services (e.g., power, natural gas, etc.)? Are you able to provide a figure, written description or other literature?
   -
3. Have you performed a supply chain reliability analysis? If so, what were determined to be the areas of concern? Are you able to provide a copy of the report or summary of findings (non-disclosure affidavit)?
   -
4. If you have not performed a supply chain reliability analysis, in your experience, what have been the areas of concern for reliably meeting testing demand?
   -
5. How do you ensure your ability meet day-to-day testing demand?
   -

6. What measures are in place to ensure that you can continue performing water quality testing immediately following a regional emergency such as earthquake, power outage, tsunami, etc.?
    -
7. In terms of service, what can Mesa Water District reasonably expected during a regional emergency?
    -
8. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, with respect to sampling and testing, to ensure normal operation immediately following a regional emergency? This could be preferred service contracts or other measures observed at other agencies.
    -

Action Required

The following are a list of actions required as a result of the meeting discussion:

1. Enter action item here. **Assigned Person(s):** Name; **Response Required:** Date
2. Enter action item here. **Assigned Person(s):** Name; **Response Required:** Date

cc: Name, Organization
Name, Organization

Brown AND Caldwell

18500 Von Karman Avenue, Suite 1100
Irvine, CA 92612

T: 714.730.7600

Phone Conversation Record

Date: August 18, 2020 **Time:** 09:30 a.m. **Project No.:** 155448.400
Project Title: Water Supply, Energy, & Supply Chain Reliability Assessment
Prepared by: Nadia Boutros, Project Engineer

Subject

Conversation with Hill Brothers to understand the reliability and potential disruptions to their supply chain for 19% Aqueous Ammonia.

Attendees

Nadia Boutros, Brown and Caldwell	714.689.4838
Jon Ganz, Brown and Caldwell	213.271.2223
Dustin Burnside, Mesa Water District	949.207.5466
Frank Alari, Hill Brothers Chemical	714.579.3333

Conversation Summary

1. Have you mapped out your supply chain from origin/raw material through delivery to the Orange County area?
    - Not in writing, it's been a monthly discussion. Re-evaluate on a regular basis. anhydrous ammonia bought from Nutrien, manufacturer in Canada, CALAMCO importer on west coast. In city of industry, rail in anhydrous ammonia (can also use trucks), 2 rail cars (each manufacturers 70,000 aq. Ammonia.) if one facility struggles, they can ship from either facility to cover interruption (can send truck from San Jose to meet customer's needs). Run through HEX with DI water. (power, DI water, anhydrous ammonia) service cleans up city water (made on site)
    - In any type of shortage/outage, we always supply contract customers first (never had to do), 100% supply by Hill brothers, spot buyers
2. What does your supply chain look like? Are you able to provide a figure, written description or other product literature?
    - See previous question. No figure or literature available.
3. Have you performed a supply chain reliability analysis? If so, what were determined to be the areas of concern? Are you able to provide a copy of the report or summary of findings (non-disclosure affidavit)?
    - No report available
4. If you have not performed a supply chain reliability analysis, in your experience what have been the areas of concern for reliably meeting demand?

- None

5. How do you ensure that you meet day-to-day demand for Orange County and/or Southern California?
   - Storage, logistics, manage their own deliveries, 100 years of experience
   - Own and operate all equipment, do use third parties (long stemming relationships) but prefer to use their own truckers. Purchase everything (not leased). Own rail cars.
6. What measures are in place to ensure that you can meet current demand immediately following a regional emergency such as earthquake, power outages, tsunami, etc.?
   - Facilities are interchangeable in terms of dispatch. Because of nature of material, 2 people on site to load to ensure safety (drivers can load as well). Manufacturing is pretty automated. Load truck from storage tank (can load from manufacturing facility). Put procedures in place after pandemic, understand their product is essential.
7. In terms of service, what can Mesa Water District reasonably expected during a regional emergency?
   - Aqueous ammonia doesn't have a shelf life. Requires 2 people to unload at Mesa.
8. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, with respect to your product, to ensure normal operation immediately following a regional emergency? This could be onsite storage, preferred service contracts, or other measures observed at other agencies.
   - Possibly larger tank for onsite storage (Ed Gunderson) for main facility. Hill Brothers has jumped through hoops to get product to Mesa

Action Required

The following are a list of actions required as a result of the meeting discussion:

1. Enter action item here. **Assigned Person(s):** Name; **Response Required:** Date
2. Enter action item here. **Assigned Person(s):** Name; **Response Required:** Date

cc: Name, Organization
Name, Organization

Jon Ganz

From:	Clare Walker <CWalker@northstarchemical.com>
Sent:	Tuesday, August 18, 2020 11:34 AM
To:	Nadia Boutros
Cc:	Jon Ganz; Dustin Burnside; Ken Poston; Clare Walker
Subject:	FW: Mesa WD - Sodium Hypochlorite/Bisulfite Supply Chain
Attachments:	Process Flow Diagram (bleach) 2020.pdf; SFS Northstar Chemical Ordering Process.docx; P-1050 Business Continuity Plan for Northstar Santa Fe Springs CA.pdf

HI Nadia:
I will type out the answers as best I can here and then if we need to do a conference call, perhaps we can setup for next week some time?
I am on vacation starting tomorrow through the end of the week.

We have a Supply Chain Team at Northstar Chemical. We review past demand, updated forecasted demand and purchasing plans for each product.
We meet monthly to review our current supply chain for each product we distribute and talk through any issues or strategies that need to be addressed.

The attached flowchart for Sodium Hypochlorite would be the same for Sodium Bisulfite and is a good representation of the supply chain process for delivery of these 2 products to Mesa Water from Northstar Chemi9cal's facility located in Santa Fe Springs, where we store both of these products in Bulk storage tanks.

I have also attached our Business Continuity Plan for our Santa Fe Springs CA facility which services Mesa Water with these two products.

Our sources for both of these products are produced locally in Southern Cal:

Sodium Hypochlorite Sources:
Olin, Santa Fe Springs CA
Hasa, Saugus CA
Jones, Torrance CA
Northstar Chemical tank, Santa Fe Springs CA

SBS Sources:
Jones, Torrance CA
Thatcher Chemical, Stockton CA
Northstar Chemical tank, Santa Fe Springs CA

We also have backup Northstar Chemical distribution locations for both of these products in Modesto CA, Sherwood OR and Tacoma WA.
There are also additional production facilities for these products in Northern CA that are backups to the Southern Cal supply chain, if needed.

Please see below answers to your questions.

Stay Safe and Healthy!

Clare Walker
Cell: 925-787-5864

From: Nadia Boutros <Nboutros@BrwnCald.com>
Sent: Tuesday, August 18, 2020 10:14 AM
To: Ken Poston <kposton@northstarchemical.com>
Cc: Jon Ganz <JGanz@BrwnCald.com>; dustinb@mesawater.org
Subject: Mesa WD - Sodium Hypochlorite/Bisulfite Supply Chain

Good morning Ken,

Below is our list of questions regarding the supply chain for 12.5% Sodium Hypochlorite and Sodium Bisulfite. Feel free to type out your answers below and send back to me. If you prefer to set up a 30 minute call to discuss over the phone, we can make that happen, just let me know.

1. Have you mapped out your supply chain from origin/raw material through delivery to the Orange County area?
    - Yes see attached and above
2. What does your supply chain look like? Are you able to provide a figure, written description or other product literature?
    - Yes see attached flowchart
3. Have you performed a supply chain reliability analysis? If so, what were determined to be the areas of concern? Are you able to provide a copy of the report or summary of findings (non-disclosure affidavit)?
    - No, but conduct weekly Operations conference calls and monthly Supply Chain team meetings as mentioned above to discuss any issues. We also have a weekly Friday operations conference call where supply chain issues would be addressed if topics are needed to be discussed before the monthly supply chain meeting.
4. If you have not performed a supply chain reliability analysis, in your experience what have been the areas of concern for reliably meeting demand?
    - Northstar Chemical has a robust supply chain and we do not have any areas of concern with our reliability meeting our demand.
5. How do you ensure that you meet day-to-day demand for Orange County and/or Southern California?
    - Weekly operations conference call, and monthly supply chain meetings.
6. What measures are in place to ensure that you can meet current demand immediately following a regional emergency such as earthquake, power outages, tsunami, etc.?
    - Our supply network described above. Local product sources as well as our network of distribution facilities as a back up for each individual distribution facility, should there be any disruptions in a particular geography.
7. In terms of service, what can Mesa Water District reasonably expected during a regional emergency?
    - You can expect business as usual from Northstar Chemical. We can provide the products from other locations, with our network of various source locations and own delivery equipment.
8. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, with respect to your product, to ensure normal operation immediately following a regional emergency? This could be onsite storage, preferred service contracts, or other measures observed at other agencies.
    - Communication is key as it has been through this COVID pandemic. Northstar Chemical has a robust supply and logistics chain to help insure that we provide Mesa Water with the Sodium Hypochlorite

and Sodium Bisulfite as needed even in emergency. Please see the attached Business Continuity Plan and Emergency Contact info.

Thanks, we appreciate your time and input!

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

Jon Ganz

From: Tim Ross <tross@jcichem.com>
Sent: Friday, November 20, 2020 6:41 AM
To: Nadia Boutros; Cris Blomgren
Cc: Jon Ganz
Subject: RE: Website Contact Form Submission

Categories: Mesa Water

Nadis,

As you can see we have multiple location we are supplied from.

Five sources….
Japan – JCI picks up from Los Angeles Harbor
Canada – Rail to JCI
Oregon – Rail to JCI
Texas – Rail to JCI
California – Rail to JCI

Massive Earthquake would cause issues of supply.

Stay Well,
TROSS

Tim Ross; V.P. West Coast, JCI JONES CHEMICALS INC. Torrance CA. 310-523-1629,

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From: Nadia Boutros <Nboutros@BrwnCald.com>
Sent: Thursday, November 19, 2020 11:29 PM
To: Tim Ross <tross@jcichem.com>; Cris Blomgren <cblomgren@jcichem.com>
Cc: Jon Ganz <JGanz@BrwnCald.com>
Subject: RE: Website Contact Form Submission

Tim,

Thanks for answering our questions. As a follow-up, can you please elaborate on the following:

- Manufacturing point of origin(s) for Sodium Hydroxide
  - o
- Is there any type of emergency that would cause a cut-off to the supply?
  - o

Feel free to give me a call you prefer, we appreciate your time.

Thanks!

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com

T 714.689.4838

Brown and Caldwell stands with and embraces all people.

From: Tim Ross <tross@jcichem.com>
Sent: Thursday, August 20, 2020 11:11 AM
To: Cris Blomgren <cblomgren@jcichem.com>; Nadia Boutros <Nboutros@BrwnCald.com>
Subject: RE: Website Contact Form Submission

Nidia,

See below.
Let me know if further information is needed.

Stay Well,
TROSS

Tim Ross; V.P. West Coast, JCI JONES CHEMICALS INC. Torrance CA. 310-523-1629,

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From: Cris Blomgren <cblomgren@jcichem.com>
Sent: Thursday, August 20, 2020 9:52 AM
To: Tim Ross <tross@jcichem.com>
Cc: Doug Perry <dperry@jcichem.com>
Subject: RE: Website Contact Form Submission

Just got off the phone with Nadia. Their company is doing a supply chain reliability analysis for Mesa Water District. She just needs the questions answered by early next week. If she needs additional information, she will e-mail or call us.

From: Doug Perry <dperry@jcichem.com>
Sent: Thursday, August 20, 2020 6:08 AM
To: Cris Blomgren <cblomgren@jcichem.com>; Tim Ross <tross@jcichem.com>
Subject: Fw: Website Contact Form Submission

Tim and Cris,

If we don't want to talk to them, you could email her and answer her questions, but a phone call is probably best. Typically, we would not do this, but my understanding is that they are working for one of our customers, so we probably want to accommodate.

================================

Doug Perry

Director of Information Technology

JCI Jones Chemicals, Inc.

1765 Ringling Blvd. | Sarasota, Florida | 34236

941-330-1537 ext 120

dperry@jcichem.com

From: Nadia Boutros <Nboutros@BrwnCald.com>
Sent: Wednesday, August 19, 2020 2:35 PM
To: Doug Perry <dperry@jcichem.com>
Subject: RE: Website Contact Form Submission

The questions are below:

1. Have you mapped out your supply chain from origin/raw material through delivery to the Orange County area?
    - YES
2. What does your supply chain look like? Are you able to provide a figure, written description or other product literature?
    - JCI Jones Chemicals Inc. Torrance CA. supplies 3 basic products in various weights and formulations.
    - Sodium Hydroxide, 25% - 30% - 50% solutions
    - Chlorine Liquefied Gas, 2,000lb containers &150# cylinders
    - Sulfur Dioxide Liquefied, Gas 2,000lb containers & 150# cylinders

    Sodium Hydroxide is added to Chlorine to produce Sodium Hypochlorite (+/- 28,000,000 gallons produced per year - last ten years)

    Sodium Hydroxide is added to Sulfur Dioxide to produce Sodium Bisulfite (+/- 2,000,000 gallons produced per year – last three years)

3. Have you performed a supply chain reliability analysis? If so, what were determined to be the areas of concern? Are you able to provide a copy of the report or summary of findings (non-disclosure affidavit)?
    - We have not run a “Supply Reliability analysis.
    - 80% of these 3 products is supplied by Rail Car.
    - Being a key provider of Chlorine in California JCI is considered “Essential Services” therefore we have top priority with ALL RAIL SERVICE.
4. If you have not performed a supply chain reliability analysis, in your experience what have been the areas of concern for reliably meeting demand?
    - Only concern is failure “catastrophic” failure of Rail Service…act of god. JCI Torrance also has supply of Sodium Hydroxide from LA & Long Beach Harbors.
5. How do you ensure that you meet day-to-day demand for Orange County and/or Southern California?
    - Constant communication with Rail service ensuring “Rail Switches” occur as planned. JCI has large fleet of Delivery Bulk Tankers and strong ties with Outside Carriers to provide constant scheduled deliveries.

6. What measures are in place to ensure that you can meet current demand immediately following a regional emergency such as earthquake, power outages, tsunami, etc.?
    - We do have plan in which we ship product from JCI other locations or work in conjunction with other suppliers.
7. In terms of service, what can Mesa Water District reasonably expected during a regional emergency?
    - A immediate response from Mesa Water of what they believe requirements of product would be....following a emergency, so production and logistics can be established to fulfill Mesa's requirements.
8. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, with respect to your product, to ensure normal operation immediately following a regional emergency? This could be onsite storage, preferred service contracts, or other measures observed at other agencies.
    - To determine what needs would be required immediately following emergency. By getting a forecast/needs immediately following emergency. So as production – logistics and or supply from others could be put into action.

Thanks,

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

From: Doug Perry <dperry@jcichem.com>
Sent: Wednesday, August 19, 2020 11:32 AM
To: Nadia Boutros <Nboutros@BrwnCald.com>
Subject: Re: Website Contact Form Submission

You can send the questionnaire to me and I'll foward it. They may call you or just fill it out and send it to you directly.

Thanks,

================================

Doug Perry

Director of Information Technology

JCI Jones Chemicals, Inc.

1765 Ringling Blvd. | Sarasota, Florida | 34236

dperry@jcichem.com

From: Nadia Boutros <Nboutros@BrwnCald.com>
Sent: Wednesday, August 19, 2020 2:28 PM
To: Doug Perry <dperry@jcichem.com>
Subject: RE: Website Contact Form Submission

Thanks Doug, if you prefer to fill out the questions and send back to me, that is fine as well.

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

Brown AND Caldwell

From: Doug Perry <dperry@jcichem.com>
Sent: Wednesday, August 19, 2020 11:28 AM
To: Nadia Boutros <Nboutros@BrwnCald.com>
Subject: Re: Website Contact Form Submission

Nadia,

We are working on getting someone to reach out to you.

Thank you,

-Doug

================================

Doug Perry

Director of Information Technology

JCI Jones Chemicals, Inc.

1765 Ringling Blvd. | Sarasota, Florida | 34236

dperry@jcichem.com

From: Nadia Boutros <Nboutros@BrwnCald.com>
Sent: Sunday, August 16, 2020 10:13 PM
To: Doug Perry <dperry@jcichem.com>
Subject: RE: Website Contact Form Submission

Hi Doug,

Ideally we'd like to set up a quick 20-30 minute call between us and Mesa sometime this week. Let me know if this works for you.

I have included the questions below in case you'd like to look them over before we talk:

1. Have you mapped out your supply chain from origin/raw material through delivery to the Orange County area?
2. What does your supply chain look like? Are you able to provide a figure, written description or other product literature?
3. Have you performed a supply chain reliability analysis? If so, what were determined to be the areas of concern? Are you able to provide a copy of the report or summary of findings (non-disclosure affidavit)?
4. If you have not performed a supply chain reliability analysis, in your experience what have been the areas of concern for reliably meeting demand?
5. How do you ensure that you meet day-to-day demand for Orange County and/or Southern California?
6. What measures are in place to ensure that you can meet current demand immediately following a regional emergency such as earthquake, power outages, tsunami, etc.?
7. In terms of service, what can Mesa Water District reasonably expected during a regional emergency?
8. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, with respect to your product, to ensure normal operation immediately following a regional emergency? This could be onsite storage, preferred service contracts, or other measures observed at other agencies.

Thanks,

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

From: Doug Perry <dperry@jcichem.com>
Sent: Saturday, August 15, 2020 2:17 PM
To: Nadia Boutros <Nboutros@BrwnCald.com>
Subject: Re: Website Contact Form Submission

Please provide a phone number.

Thank you.

Doug Perry

Sent from a mobile device....

From: noreply@jcichem.com <noreply@jcichem.com>
Sent: Saturday, August 15, 2020, 3:05 PM
Subject: Website Contact Form Submission

Nadia Boutros

nboutros@brwncald.com

Hi, I reached out last week about getting in contact with someone to discuss the supply chain from JCI to Mesa Water District in Orange County, California. I'd appreciate the info on a contact, thanks!

IP: 137.83.223.202

Jon Ganz

From:	JP Carjuzaa <jp.carjuzaa@linde.com>
Sent:	Monday, October 5, 2020 5:40 PM
To:	Nadia Boutros
Cc:	Jon Ganz; Dustin Burnside
Subject:	RE: Mesa Water District - Carbon Dioxide Supply Chain
Importance:	High

Hello Nadia,
Please see below and advise if you have any questions.
Regards,

Jean-Pierre Carjuzaa
Sales Manager
Linde
Mobile: 707-892-3253
jp.carjuzaa@linde.com

In case of an emergency with a supply system, please dial 1-800-772-9247. For Linde Logistics and/or product deliveries, please dial 1-800-621-7100.

Reminder: Now you can get invoice copies and proofs of delivery at the Linde Express site. https://bulkexpress.praxair.com/express/Home/Login.aspx New users, register now!

From: Nadia Boutros <Nboutros@BrwnCald.com>
Sent: Monday, October 5, 2020 3:51 PM
To: JP Carjuzaa <jp.carjuzaa@linde.com>
Cc: Jon Ganz <JGanz@BrwnCald.com>; Dustin Burnside <dustinb@mesawater.org>
Subject: Mesa Water District - Carbon Dioxide Supply Chain

Hello JP,

It was nice talking with you. As we discussed on the phone, Brown and Caldwell is performing a Supply Chain Analysis for Mesa Water District and we'd appreciate your input on the questions below regarding the supply chain for Carbon Dioxide. Feel free to type out your answers below and send back to me. I understand your shorthanded, so I appreciate you taking some time to get us this information!

1. Have you mapped out your supply chain from origin/raw material through delivery to the Orange County area?

The majority of our Carbon Dioxide to supply Mesa Water comes from El Segundo and/or Long Beach where Linde owns and operates the CO2 plants. The raw source comes from Petroleum refining activities.

2. What does your supply chain look like? Are you able to provide a figure, written description or other product literature?

Linde has plenty of capacity to support Mesa from our 2 CO2 plants in So Cal. Linde owns and operates as well a CO2 plant in Benicia, CA, and Price UT, used from time to time to back up So Cal with rail car and truck hauling. The product description to support Mesa Water is part of our agreement with Mesa Water.

3. Have you performed a supply chain reliability analysis? If so, what were determined to be the areas of concern? Are you able to provide a copy of the report or summary of findings (non-disclosure affidavit)?

We have not performed a supply chain reliability analysis for So Cal, however, we are by far the most reliable supplier in CA. There are no areas of concern at this time.

4. If you have not performed a supply chain reliability analysis, in your experience what have been the areas of concern for reliably meeting demand?

None at this time.

5. How do you ensure that you meet day-to-day demand for Orange County and/or Southern California?

We are only obligated to support contracted customers and have no issues meeting the demand at this time.

6. What measures are in place to ensure that you can meet current demand immediately following a regional emergency such as earthquake, power outages, tsunami, etc.?

Linde will advise Mesa Water with any issues following any regional emergencies.

7. In terms of service, what can Mesa Water District reasonably expected during a regional emergency?

Linde will regroup internally and inform what Mesa Water should expect during a regional emergency as it is virtually impossible to come up with a plan until we understand the nature of the issue following the emergency.

8. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, with respect to your product, to ensure normal operation immediately following a regional emergency? This could be onsite storage, preferred service contracts, or other measures observed at other agencies.

Mesa could envision an additional storage tank as the current tank is 54 tons in capacity for an average usage of ~82 tons per month. Linde delivers full loads of ~20 tons every 5 to 6 days. That stated, the tank is adequate for the usage in our view. There is already a preferred service contract in place with Mesa Water.

Thanks, we appreciate your time and input!

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

Jon Ganz

From: Shane Sato <ssato@WARasic.com>
Sent: Tuesday, October 20, 2020 4:36 PM
To: Nadia Boutros
Subject: RE: Mesa WD - W.A. Rasic Construction Supply Chain/Emergency Services

Nadia,
Our responses are below in red.

Shane K. Sato | Division Manager
W.A. Rasic Construction Co., Inc. | www.warasic.com
Tel: (562) 928-6111x2311 | Fax: (562) 928-7339
4150 Long Beach Blvd., Long Beach, CA 90807
Cell: (310) 864-0278 | Email: ssato@warasic.com

From: Nadia Boutros [mailto:Nboutros@BrwnCald.com]
Sent: Monday, October 19, 2020 4:23 PM
To: Wes Brodeur
Cc: Jon Ganz
Subject: RE: Mesa WD - W.A. Rasic Construction Supply Chain/Emergency Services

Hi Wes,

I'm following up again in hopes you may have some time to fill out our questionnaire below for the Supply Chain Analysis we're doing for Mesa Water District. We appreciate your time!

1. Have you performed a readiness analysis for your response during a regional emergency (i.e., supply chain reliability analysis)? If so, what did you determine were the areas of concern?
    - Not a formal analysis but informal with known industry conditions.
2. If you have not performed this type of analysis, in your experience, where are the points of concern?
    - Concern would be availability of pipe materials. There are no local manufacturers. Pipe materials are normally produced in Texas (plastic resin plants, ductile iron foundries, etc.) Concern is that collapse of freeway, rail, and other transportation would cut off access to these supplies.
3. How do you ensure your ability to meet day-to-day demand for construction services?
    - W.A. Rasic maintains purchase agreements with various waterworks warehouses for supplies of materials. We are union signatory and are able to dispatch additional employees as required. We have one of the largest privately owned equipment fleets in southern California.
4. You are currently listed on Mesa Water District's emergency on-call list. How do you ensure that you can provide required services during a regional emergency such as earthquake, power outage, tsunami, etc.?
    - We maintain emergency after-hours on-call agreements with various water works warehouses for 24-hour ability to obtain pipe and fittings. Our local dispatch yard has a diesel fuel holding tank and pump that we can fuel equipment in the event the system goes down to a certain extent. We stockpile some sand and aggregate to service small jobs in the event the quarries are shutdown.
5. How do you determine priority during an emergency when multiple customers may require service?

- This is determined by proximity, ability to mobilize to location, and amount of revenue awarded to Rasic as well as history. We have some clients that have utilized us near exclusively for decades, these of course would be prioritized.

6. In terms of service, what can Mesa Water District reasonably expect during a regional emergency?
    - Chaos. I would expect contractors would respond to those agencies they have worked with continually and the rest will be first-come first-served basis. There are not enough contractors in southern California to repair every utility company's facilities simultaneously.
7. Do you rely on rental equipment or do you own your own equipment?
    - We own the vast majority of our equipment which includes a 60+ backhoe fleet.
8. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, to best support your work, to ensure normal operation immediately following a regional emergency? This could be onsite storage of long-lead items, preferred service contracts, or other measures observed at other agencies.
    - Storage of diesel, aggregates, and everyday pipe repair materials and sticks of ductile iron pipe (doesn't degrade as fast as PVC). Casitas buried pipe in the ground on their property in case of major disaster, they would have pipe available for themselves protected from the elements.

Thanks,

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

From: Nadia Boutros
Sent: Monday, September 7, 2020 10:17 PM
To: 'wbrodeur@warasic.com' <wbrodeur@warasic.com>
Cc: Jon Ganz <JGanz@BrwnCald.com>
Subject: RE: Mesa WD - W.A. Rasic Construction Supply Chain/Emergency Services

Hi Wes,

I'm following up to see if you might have some time to answer the questions below? We'd very much appreciate it.

Thanks!

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

From: Nadia Boutros
Sent: Tuesday, August 18, 2020 12:56 PM
To: wbrodeur@warasic.com
Cc: Jon Ganz <JGanz@BrwnCald.com>
Subject: Mesa WD - W.A. Rasic Construction Supply Chain/Emergency Services

Good afternoon Wes,

Brown and Caldwell is performing a Supply Chain Analysis for Mesa Water District and we'd appreciate your input on the questions below regarding the supply chain/emergency services for W.A. Rasic Construction. Feel free to type out your answers below and send back to me. If you prefer to set up a 30 minute call to discuss over the phone, we can make that happen, just let me know.

1. Have you performed a readiness analysis for your response during a regional emergency (i.e., supply chain reliability analysis)? If so, what did you determine were the areas of concern?
   -
2. If you have not performed this type of analysis, in your experience, where are the points of concern?
   -
3. How do you ensure your ability to meet day-to-day demand for construction services?
   -
4. You are currently listed on Mesa Water District's emergency on-call list. How do you ensure that you can provide required services during a regional emergency such as earthquake, power outage, tsunami, etc.?
   -
5. How do you determine priority during an emergency when multiple customers may require service?
   -
6. In terms of service, what can Mesa Water District reasonably expect during a regional emergency?
   -
7. Do you rely on rental equipment or do you own your own equipment?
   -
8. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, to best support your work, to ensure normal operation immediately following a regional emergency? This could be onsite storage of long-lead items, preferred service contracts, or other measures observed at other agencies.
   -

Thanks, we appreciate your time and input!

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

Nadia Boutros

From: Alan Aristondo <alan@gciconstruction.com>
Sent: Thursday, August 27, 2020 10:02 AM
To: Nadia Boutros
Subject: RE: Contact Info - Supply Chain

I'll just reply to your email below in red

GCI Construction
Alan Aristondo, EIT
1031 Calle Recodo Suite D
San Clemente, CA 92673

From: Nadia Boutros <Nboutros@BrwnCald.com>
Sent: Wednesday, August 26, 2020 11:11 PM
To: Alan Aristondo <alan@gciconstruction.com>
Subject: RE: Contact Info - Supply Chain

Hi Alan,

I sincerely apologize for the late response. Would you be able to respond to the questions below and send them back to me? We'd very much appreciate it. If you prefer to set up a call between us (Brown and Caldwell) and Mesa WD, let me know and I can arrange that.

Thanks!

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

From: Alan Aristondo <alan@gciconstruction.com>
Sent: Monday, August 17, 2020 9:26 AM
To: Nadia Boutros <Nboutros@BrwnCald.com>
Subject: RE: Contact Info - Supply Chain

Nadia,

I am free today, tomorrow and Friday.
So, correct me if I am wrong, but I will be answering those questions while on a call with you and Mesa?

GCI Construction
Alan Aristondo, EIT
1031 Calle Recodo Suite D
San Clemente, CA 92673

From: Nadia Boutros <Nboutros@BrwnCald.com>
Sent: Monday, August 17, 2020 9:23 AM
To: Alan Aristondo <alan@gciconstruction.com>
Subject: RE: Contact Info - Supply Chain

Hi Alan,

For our study, we will be analyzing the supply chain/readiness of each contractor (as well as suppliers and laboratories) that might work with Mesa during a regional emergency. Ideally we'd like to set up a quick 20-30 minute call between us and Mesa sometime this week. Please let me know who I should invite to this call.

I have included the questions below:

1. Have you performed a readiness analysis for your response during a regional emergency (i.e., supply chain reliability analysis)? If so, what did you determine were the areas of concern?

   Yes. We are concerned with Pipe and Concrete suppliers. They are integral to our work and we would have a hard time performing our work with out them

2. If you have not performed this type of analysis, in your experience, where are the points of concern?
3. How do you ensure your ability to meet day-to-day demand for construction services?

   By planning ahead and looking forward two weeks in advance.

4. You are currently listed on Mesa Water District's emergency on-call list. How do you ensure that you can provide required services during a regional emergency such as earthquake, power outage, tsunami, etc.?

   We would stop all contracts and move to help MWD at any moment.

5. How do you determine priority during an emergency when multiple customers may require service?

   We help customers with emergencies that affect life and livelihoods first.

6. In terms of service, what can Mesa Water District reasonably expect during a regional emergency?

   GCI will always provide 24/7 service and be ready to work and resolve problems.

7. Do you rely on rental equipment or do you own your own equipment?

   We own 95% of our own equipment. We rent specialized equipment such as dewatering and shoring. We have 24/7 relationships with those suppliers and subcontractors.

8. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, to best support your work, to ensure normal operation immediately following a regional emergency? This could be onsite storage of long-lead items, preferred service contracts, or other measures observed at other agencies.

   Stock long lead items. Stock various sizes and types of valves and fittings.

Thanks,

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com

T 714.689.4838

From: Alan Aristondo <alan@gciconstruction.com>
Sent: Monday, August 17, 2020 7:31 AM
To: Nadia Boutros <Nboutros@BrwnCald.com>
Subject: RE: Contact Info - Supply Chain

Hi Nadia,

What does your study entail?

GCI Construction
Alan Aristondo, EIT
1031 Calle Recodo Suite D
San Clemente, CA 92673

From: Nadia Boutros <Nboutros@BrwnCald.com>
Sent: Saturday, August 15, 2020 12:32 PM
To: Alan Aristondo <alan@gciconstruction.com>
Subject: FW: Contact Info - Supply Chain

Hi Alan, I found your email on the GCI website and thought I'd pass my request your way in case you could help.

Thanks,

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

From: Nadia Boutros
Sent: Saturday, August 15, 2020 12:19 PM
To: 'info@gcigc.com' <info@gcigc.com>
Subject: RE: Contact Info - Supply Chain

Hello, just following up on this request for contact info. Looking forward to your response!

Thanks,

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

From: Nadia Boutros
Sent: Tuesday, August 11, 2020 11:49 AM
To: info@gcigc.com
Subject: Contact Info - Supply Chain

Hi, I'm working on a supply chain reliability study for a mutual client - Mesa Water District in Orange County, CA. I'm looking for contact information for whomever I can ask some questions regarding emergency services for Mesa.

Thanks,

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

Jon Ganz

From: Seth Jamali-Dinan <sjamali@leedelectric.com>
Sent: Thursday, October 1, 2020 7:28 PM
To: Nadia Boutros; Anthony Santoro; Edgar Saldivar
Cc: Jon Ganz; 'dustinb@mesawater.org'
Subject: RE: Contact Info - Supply Chain

Phi Nadia:

Please see below

Seth A. Jamali Dinan
LEED ELECTRIC, INC
13138 Arctic Circle I Santa Fe Springs I CA 90670
Contractor License #379096
p. 562.270.9500 f. 562.863.5723 m. 213.216.8088
sjamali@leedelectric.com
www.leedelectric.com

From: Nadia Boutros <Nboutros@BrwnCald.com>
Sent: Thursday, October 1, 2020 2:58 PM
To: Seth Jamali-Dinan <sjamali@leedelectric.com>; Anthony Santoro <asantoro@leedelectric.com>; Edgar Saldivar <esaldivar@leedelectric.com>
Cc: Jon Ganz <JGanz@BrwnCald.com>; 'dustinb@mesawater.org' <dustinb@mesawater.org>
Subject: RE: Contact Info - Supply Chain

Hello all,

Checking in again to see if we could get the questions below answered.

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

From: Nadia Boutros
Sent: Monday, September 7, 2020 10:19 PM
To: 'Seth Jamali-Dinan' <sjamali@leedelectric.com>; 'Anthony Santoro' <asantoro@leedelectric.com>; 'Edgar Saldivar' <esaldivar@leedelectric.com>
Cc: Jon Ganz <JGanz@BrwnCald.com>; 'dustinb@mesawater.org' <dustinb@mesawater.org>
Subject: RE: Contact Info - Supply Chain

Hi Seth, Edgar, & Anthony,

I'm following up to see if one of you might have some time to answer the questions below? We'd very much appreciate it.

Thanks!

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

From: Nadia Boutros
Sent: Wednesday, August 26, 2020 11:17 PM
To: Seth Jamali-Dinan <sjamali@leedelectric.com>
Cc: Edgar Saldivar <esaldivar@leedelectric.com>; Anthony Santoro <asantoro@leedelectric.com>
Subject: RE: Contact Info - Supply Chain

Hi Seth,

I sincerely apologize for the late response. Would you be able to respond to the questions below and send them back to me? We'd very much appreciate it. If you prefer to set up a call between us (Brown and Caldwell) and Mesa WD, let me know and I can arrange that.

1. Have you performed a readiness analysis for your response during a regional emergency (i.e., supply chain reliability analysis)? If so, what did you determine were the areas of concern?
   - NO
2. If you have not performed this type of analysis, in your experience, where are the points of concern?
   - LEED has three layers of contact during emergency calls which enabled us to respond to our customers accordingly. The areas of concerns is when there are issues related to a subtier or supplier to get additional services or material that may not be available during off hours. Examples are if you need a VFD manufacturer rep to troubleshoot a high level alarm, or if you need specialty replacement part like a contactor.
3. How do you ensure your ability to meet day-to-day demand for construction services?
   - Keeping our tools updated, our fleet periodical maintenance and keep qualified and responsive electricians in our staff.
4. You are currently listed on Mesa Water District's emergency on-call list. How do you ensure that you can provide required services during a regional emergency such as earthquake, power outage, tsunami, etc.?
   - We always keep at least three electricians on standby at all time and we always select them from different areas of resident (LA, Riverside. OC) to make sure someone will respond to Mesa's emergency call.
5. How do you determine priority during an emergency when multiple customers may require service?
   - LEED line of business is specialty electrical construction is water and wastewater market and we have over 200 employees that always available to serve in this market. Our emergency service calls are normally related to issues with pump stations and treatment plants and we keep sufficient staff and own several equipment on standby so we can service them. We also provide to other emergency response like issues with Motor Controls Centers, Switchboards and medium voltage transformers.
6. In terms of service, what can Mesa Water District reasonably expect during a regional emergency?
   - On time response to their enquiries based on the terms of our contract.

7. Do you rely on rental equipment or do you own your own equipment?
    - We own all the equipment that related to emergency calls.
8. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, to best support your work, to ensure normal operation immediately following a regional emergency? This could be onsite storage of long-lead items, preferred service contracts, or other measures observed at other agencies. First plan of action is to perform periodical maintenance on all equipment to ensure functionality. Second would be storage of long lead and in general spare part for almost all equipment regardless of long lead because most supply houses are closed after hours. Third would be maintenance contract with at least two companies to ensure guaranteed service.
    -

Thanks!

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

From: Seth Jamali-Dinan <sjamali@leedelectric.com>
Sent: Tuesday, August 11, 2020 2:24 PM
To: Nadia Boutros <Nboutros@BrwnCald.com>
Cc: Edgar Saldivar <esaldivar@leedelectric.com>; Anthony Santoro <asantoro@leedelectric.com>
Subject: RE: Contact Info - Supply Chain

Hi Nadia:

Thank you for your email. Anthony Santoro and myself are handling the project management and Edgar Saldivar (562-409-4214) is handling the field operation for Mesa WD. Let me know how we can be of any assistant.

Seth

Seth A. Jamali Dinan
LEED ELECTRIC, INC
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Contractor License #379096
p. 562.270.9500 f. 562.863.5723 m. 213.216.8088
sjamali@leedelectric.com
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From: Nadia Boutros <Nboutros@BrwnCald.com>
Sent: Tuesday, August 11, 2020 12:00 PM
To: Info LEED Electric <info@leedelectric.com>
Subject: Contact Info - Supply Chain

Hi, I'm working on a supply chain reliability study for a mutual client - Mesa Water District in Orange County, CA. I'm looking for contact information for whomever I can ask some questions regarding emergency services for Mesa.

Thanks,

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

Brown AND Caldwell

Jon Ganz

From: Anthony Pozos <apozos58@gmail.com>
Sent: Thursday, August 27, 2020 8:22 AM
To: Nadia Boutros
Subject: Re: From A C Pozos Electric Corporation

1. Have you performed a readiness analysis for your response during a regional emergency (i.e., supply chain reliability analysis)? If so, what did you determine were the areas of concern?
   - We have not performed a readiness analysis. Our intent to be available for emergencies was only intended to be available for after hours and weekend emergencies where we have access to the supplies we need.
   - In the case of a local disaster our suppliers are out of the area hopefully to receive supplies from.
2. If you have not performed this type of analysis, in your experience, where are the points of concern?
   - Local suppliers will be down in the same situation as a contractor
3. How do you ensure your ability to meet day-to-day demand for construction services?
   - We have a number of suppliers that we deal with to create a more diversified chain of supply.
4. You are currently listed on Mesa Water District's emergency on-call list. How do you ensure that you can provide required services during a regional emergency such as earthquake, power outage, tsunami, etc.?
   - We cannot ensure that we would be available. While our vehicles and storage areas are in well protected areas they too would be impacted by earthquakes and a power outage. We are located well beyond tsunami range in our present location.
5. How do you determine priority during an emergency when multiple customers may require service?
   - The largest customers that consistently pay on time are our first priority.
6. In terms of service, what can Mesa Water District reasonably expect during a regional emergency?
   - We would like to get them up and running to basic functionality
7. Do you rely on rental equipment or do you own your own equipment?
   - Most equipment we own. But large equipment like generators, etc would be rented.
8. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, to best support your work, to ensure normal operation immediately following a regional emergency? This could be onsite storage of long-lead items, preferred service contracts, or other measures observed at other agencies. I would encourage emergency generators that would be tested on a regular basis. Solar based technologies is another area that they could explore. Battery backed up technologies are adequate for the immediate need. Emergency fuel supplies is another area that could be considered for vehicles, etc. A contract with a large emergency generator company is another possibility

On Wed, Aug 26, 2020 at 11:19 PM Nadia Boutros <Nboutros@brwncald.com> wrote:

> Hi Anthony,
>
> I sincerely apologize for the late response. Would you be able to respond to the questions below and send them back to me? We'd very much appreciate it. If you prefer to set up a call between us (Brown and Caldwell) and Mesa WD, let me know and I can arrange that.

1. Have you performed a readiness analysis for your response during a regional emergency (i.e., supply chain reliability analysis)? If so, what did you determine were the areas of concern?
   -
2. If you have not performed this type of analysis, in your experience, where are the points of concern?
   -
3. How do you ensure your ability to meet day-to-day demand for construction services?
   -
4. You are currently listed on Mesa Water District's emergency on-call list. How do you ensure that you can provide required services during a regional emergency such as earthquake, power outage, tsunami, etc.?
   -
5. How do you determine priority during an emergency when multiple customers may require service?
   -
6. In terms of service, what can Mesa Water District reasonably expect during a regional emergency?
   -
7. Do you rely on rental equipment or do you own your own equipment?
   -
8. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, to best support your work, to ensure normal operation immediately following a regional emergency? This could be onsite storage of long-lead items, preferred service contracts, or other measures observed at other agencies.
   -

Thanks!

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

From: Anthony Pozos <apozos58@gmail.com>
Sent: Friday, August 14, 2020 7:20 PM
To: Nadia Boutros <Nboutros@BrwnCald.com>
Subject: From A C Pozos Electric Corporation

I contacted the Mesa Water District due to the fact that I had never heard of your company. The District assured us that you were legitimate and were on board with your contact.

Please set up a date that will work for your company. In addition please if you are going to call please let me know the number you will be calling from since we receive unwanted calls on a regular basis.

Anthony Pozos

A C Pozos Electric Corporation

949 254 6017 mobile

714 546 0366 answering service

Nadia Boutros

From: cc@coppcontracting.com
Sent: Thursday, November 19, 2020 9:44 AM
To: Nadia Boutros
Cc: Jon Ganz; scotts@mesawater.org; andreww@mesawater.org
Subject: RE: reply

Answers are highlighted in red.

Have a good day,

Yolie Copp
COPP CONTRACTING, INC
6751 Stanton Ave.
Buena Park, CA 90621
PH. 714.522.7754
FX. 714.522.2074

--------- Original Message ---------
Subject: RE: reply
From: "Nadia Boutros" <Nboutros@BrwnCald.com>
Date: 10/19/20 4:20 pm
To: "cc@coppcontracting.com" <cc@coppcontracting.com>
Cc: "Jon Ganz" <JGanz@BrwnCald.com>, "scotts@mesawater.org" <scotts@mesawater.org>, "andreww@mesawater.org" <andreww@mesawater.org>

Hi Yolie,

Thanks for confirming you hadn’t received my emails. Glad we sorted that out!

We are working on a Supply Chain Reliability Analysis and are hoping to get some questions answered for our mutual client, Mesa Water District. We’d really appreciate if someone could answer the questions below, preferably in the next few days. We appreciate your time!

1. Have you performed a readiness analysis for your response during a regional emergency (i.e., supply chain reliability analysis)? If so, what did you determine were the areas of concern?
   - No
2. If you have not performed this type of analysis, in your experience, where are the points of concern?
   - N/A
3. How do you ensure your ability to meet day-to-day demand for construction services?
   - Copp Contracting, Inc. dedicates to one project at a time.
4. You are currently listed on Mesa Water District’s emergency on-call list. How do you ensure that you can provide required services during a regional emergency such as earthquake, power outage, tsunami, etc.?

- Copp Contracting, Inc. is located in close proximity to Mesa Water District's region and we have all equipment on site.

5. How do you determine priority during an emergency when multiple customers may require service?
   - 1st call, 1st served
6. In terms of service, what can Mesa Water District reasonably expect during a regional emergency?
   - 100% dedication until project is complete
7. Do you rely on rental equipment or do you own your own equipment?
   - Own
8. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, to best support your work, to ensure normal operation immediately following a regional emergency? This could be onsite storage of long-lead items, preferred service contracts, or other measures observed at other agencies.
   - N/A

Thanks,

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

Brown AND Caldwell

From: cc@coppcontracting.com <cc@coppcontracting.com>
Sent: Monday, October 19, 2020 4:13 PM
To: Nadia Boutros <Nboutros@BrwnCald.com>
Subject: reply

Yolie Copp

COPP CONTRACTING, INC

6751 Stanton Ave.

Buena Park, CA 90621

PH. 714.522.7754

FX. 714.522.2074

Jon Ganz

From: Kim G. Tu <Kim.Tu@wecklabs.com>
Sent: Tuesday, August 18, 2020 4:02 PM
To: Nadia Boutros
Cc: Jon Ganz; kayingl@mesawater.org
Subject: RE: Mesa WD - Weck Laboratories Testing Supply Chain

1. Please describe the process of how Mesa Water District samples arrive to your facility. Are they delivered by Mesa Water District, by your staff or a third-party service?
    - We use a third party courier company to pick up samples from Mesa Water and delivery to Weck.

1. What does your supply chain look like? For example, what chemicals or other supplies do you rely on to complete water quality testing? What utilities do you rely on to perform testing and do you have any backup services (e.g., power, natural gas, etc.)? Are you able to provide a figure, written description or other literature?
    - We have numerous chemicals and supplies that we keep in stock at all times use to do water quality testing. The utilities we rely on are water and power, and we have short term back ups for them. What figure are you looking for?
2. Have you performed a supply chain reliability analysis? If so, what were determined to be the areas of concern? Are you able to provide a copy of the report or summary of findings (non-disclosure affidavit)?
    - No
3. If you have not performed a supply chain reliability analysis, in your experience, what have been the areas of concern for reliably meeting testing demand?
    - To meet testing demand we have always projected forward in ordering supplies to make sure that we always have adequate supplies on hand for the months ahead.
4. How do you ensure your ability meet day-to-day testing demand?
    - We keep stocked supply in hand and have chemists trained and cross trained to get the analyses completed
5. What measures are in place to ensure that you can continue performing water quality testing immediately following a regional emergency such as earthquake, power outage, tsunami, etc.?
    - We have short term measures such as generators to power equipment as needed.
6. In terms of service, what can Mesa Water District reasonably expected during a regional emergency?
    - Mesa can expect us to be able to still complete basic water quality testing which includes microbiological analyses.
7. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, with respect to sampling and testing, to ensure normal operation immediately following a regional emergency? This could be preferred service contracts or other measures observed at other agencies.
    - Make sure they have at least a month's worth of supplies on hand as well as backup power.

Thank You.
-Kim Tu

From: Nadia Boutros <Nboutros@BrwnCald.com>
Sent: Tuesday, August 18, 2020 10:36 AM
To: Kim G. Tu <Kim.Tu@wecklabs.com>
Cc: Jon Ganz <JGanz@BrwnCald.com>; kayingl@mesawater.org
Subject: Mesa WD - Weck Laboratories Testing Supply Chain

Good morning Kim,

Brown and Caldwell is performing a Supply Chain Analysis for Mesa Water District and we'd appreciate your input on the questions below regarding the supply chain for Weck Laboratories. Feel free to type out your answers below and send back to me. If you prefer to set up a 30 minute call to discuss over the phone, we can make that happen, just let me know.

1. Please describe the process of how Mesa Water District samples arrive to your facility. Are they delivered by Mesa Water District, by your staff or a third-party service?
   -
2. What does your supply chain look like? For example, what chemicals or other supplies do you rely on to complete water quality testing? What utilities do you rely on to perform testing and do you have any backup services (e.g., power, natural gas, etc.)? Are you able to provide a figure, written description or other literature?
   -
3. Have you performed a supply chain reliability analysis? If so, what were determined to be the areas of concern? Are you able to provide a copy of the report or summary of findings (non-disclosure affidavit)?
   -
4. If you have not performed a supply chain reliability analysis, in your experience, what have been the areas of concern for reliably meeting testing demand?
   -
5. How do you ensure your ability meet day-to-day testing demand?
   -
6. What measures are in place to ensure that you can continue performing water quality testing immediately following a regional emergency such as earthquake, power outage, tsunami, etc.?
   -
7. In terms of service, what can Mesa Water District reasonably expected during a regional emergency?
   -
8. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, with respect to sampling and testing, to ensure normal operation immediately following a regional emergency? This could be preferred service contracts or other measures observed at other agencies.
   -

Thanks, we appreciate your time and input!

Nadia Boutros
Brown and Caldwell | Irvine, CA
NBoutros@brwncald.com
T 714.689.4838

Jon Ganz

From: Boyd, Michelle <mboyd@ocwd.com>
Sent: Tuesday, September 22, 2020 4:02 PM
To: Nadia Boutros
Cc: Versluis, Patrick
Subject: RE: Mesa WD - OCWD Lab Testing Supply Chain Survey

Nadia,

Below you will find input on your Testing Supply Chain survey for OCWD. Input was collected from and reviewed by our Laboratory Supervisors and Director as well as our Risk and Safety Officer (hence the delayed response).

Let me know if you need any other information.

Thank you.

Michelle

Subject: RE: Mesa WD - OCWD Testing Supply Chain

1. Please describe the process of how Mesa Water District samples arrive to your facility. Are they delivered by Mesa Water District, by your staff or a third-party service?
   - OCWD schedules and collects Title 22 drinking water samples for MESA groundwater sources. OCWD then delivers the samples to OCWD's state-certified drinking water laboratory located in the city of Fountain Valley or to outside contract labs that are located in the Orange County or Los Angeles areas.
2. What does your supply chain look like? For example, what chemicals or other supplies do you rely on to complete water quality testing? What utilities do you rely on to perform testing and do you have any backup services (e.g., power, natural gas, etc.)? Are you able to provide a figure, written description or other literature?
   - Each laboratory analysis method requires different chemicals and supplies. We keep stock on-hand to last at least 3-6 months.
   - OCWD Lab does not have back-up power or a generator at this time.
3. Have you performed a supply chain reliability analysis? If so, what were determined to be the areas of concern? Are you able to provide a copy of the report or summary of findings (non-disclosure affidavit)?
   - No
4. If you have not performed a supply chain reliability analysis, in your experience, what have been the areas of concern for reliably meeting testing demand?
   - Back-up power source/supply
5. How do you ensure your ability meet day-to-day testing demand?

- OCWD maintains appropriate staffing and resources to meet testing demand for OCWD Producer water systems. Several departments communicate and coordinate sample loads and staffing on a weekly basis. In addition, many staff are cross trained to handle any needs.

6. What measures are in place to ensure that you can continue performing water quality testing immediately following a regional emergency such as earthquake, power outage, tsunami, etc.?
    - The Emergency Operation Center (EOC) and the Emergency Response Plan will be activated in an event of an emergency.
    - The OCWD laboratory currently has startup/shutdown procedures for all instrumentation in the case of power failure.
    - OCWD Risk and Safety Department is currently looking into obtaining back-up power supplies for the lab.
7. In terms of service, what can Mesa Water District reasonably expected during a regional emergency?
    - OCWD laboratory and sample collection staff are required to report to work when safe to do so. If power supplies are operating, access roads are clear, and lab building is deemed safe to inhabit, then drinking water compliance samples will be collected and analyzed as normal. If not, then MESA will need to have another plan in place for sample analysis with another laboratory.
8. Based on your experience, what measures would you recommend that an agency, like Mesa Water District, implement, with respect to sampling and testing, to ensure normal operation immediately following a regional emergency? This could be preferred service contracts or other measures observed at other agencies.
    - MESA should ensure close communication with DDW during and immediately following an emergency. Depending on extent of emergency and damage to OCWD facilities, MESA should consider having 2 or 3 back-up labs available for service in case OCWD Lab cannot operate in an emergency.

Michelle Boyd
Supervising Environmental Specialist

Orange County Water District
18700 Ward Street, Fountain Valley, CA 92708
tel: (714) 378-3224
fax: (714) 378-3259
email: mboyd@ocwd.com

Attachment B: SPFA – Meeting Minutes

- B1: SPFA Workshop 1 – September 14, 2020
- B2: SPFA Workshop 2 – September 21, 2020
- B3: SCADA Workshop 1 – September 21, 2020

Meeting Minutes

18500 Von Karman Avenue, Suite 1100
Irvine, CA 92612

T: 714.730.7600

Prepared for: Mesa Water District (Mesa Water)
Project Title: Water Supply, Energy, and Supply Chain Reliability Assessment
Project No.: 155448

Purpose of Meeting: Single Point of Failure – Workshop 1 **Date:** September 14, 2020
Meeting Location: Virtual via Microsoft Teams **Time:** 1:00 p.m.
Minutes Prepared by: Jon Ganz, Brown and Caldwell

Attendees:

Phil Lauri, Mesa Water	Jon Ganz, Brown and Caldwell
Andrew Wiesner, Mesa Water	Adam Zacheis, Brown and Caldwell
Tracy Manning, Mesa Water	Richard Birdsell, Brown and Caldwell
Marc Smith, Mesa Water	Lance Salerno, Brown and Caldwell
Paul Shoenberger, Mesa Water	Windsor Lee, Brown and Caldwell
Dustin Burnside, Mesa Water	
Scott Sullivan, Mesa Water	

Summary

Agenda:

Workshop to review BC's approach and preliminary findings for the following typical core production facilities:

- Well No. 1 (electric-driven well pump)
- Well No. 5 (gas-driven well pump)
- Reservoir No. 1

General SPFA Discussion:

- **Decision:** Add the turnouts and imported water to the SPFA, as they are considered core production facilities. Assume that the system/equipment is the same for each.
- Mesa Water confirmed that their facilities can be operated manually. **Decision:** Remote-operated valves with handwheels as redundancy shall be classified as Medium criticality. Manual valves and similar items shall be classified as Low criticality. **Action Item:** Verify the motor operated valves have handwheels.
- **Decision:** The Supply Chain Analysis shall follow the same scoring system as the SPFA.

- Mesa Water stocks spare parts for most of their production wells, such as motors. In lieu of recommending redundant wells or pumps, BC will consider stocking spare parts as a mitigation measure.
- Mesa Water has a radio system in addition to SCADA. A backup radio system and necessary spare parts is an option for redundancy.
- In the event of pump failure or a power outage, the production well pump is programmed to be out of service for 30 minutes before being permitted to start up again. This allows the seal water system to flush seals before initiating the pump start sequence. Action Item: BC shall evaluate if there are instances where it is safe to manually override these types of operational interlocks.
- Mesa Water confirmed that their staff is readily available to perform certain repairs for their production wells. Thus, they have varying levels of redundancy within their system – some equipment will only require spare parts and not standby equipment.
- Mesa Water confirmed that their Consolidated Maintenance Management System (CMMS) does not have fields for spare parts and criticality.
- Action Item: Although the single line diagrams and P&IDs are the primary source for determining which systems require spare parts, Mesa Water requested BC to review the Control Logic algorithms.
- Action Item: Mesa Water shall provide standard spare parts forms that they receive from manufacturers.

Well 1 SPFA Discussion:

- Mesa Water stated that in the event of a power outage, staff has access to flashlights and light stands. If the site is equipped with a backup generator, then lighting will be powered by it during an outage.
- Mesa Water stated that they do not own a portable generator. During an outage at Well 1, a generator would need to be rented. It should be noted that Well 1 is the largest production well and has a significant electric load. The size of the generator was the primary reason why Mesa Water never purchased its own generator for Well 1.
    - Mesa Water is open to the idea of buying and storing a generator, but the feasibility of this depends on SCAQMD regulations.
    - Mesa Water has previously rented a generator for Well 1 from Baker Rentals. Since they have an open PO for the generator and other equipment, Mesa Water is likely guaranteed a generator in the event of a local power outage.
    - Mesa Water is currently evaluating the feasibility of providing a second utility feed from a different substation at Well 1, and other facilities, because of the recent increase in brownouts. Many of the production wells are powered by the same substation but other substations are available.
- Mesa Water confirmed that they do not have redundancy for the MCC or breakers. Action Item: BC shall provide a list of recommendations for electrical redundancy. This list will be used as reference for Mesa Water's current well construction projects.
- Level indicators for the well level are for indication only.

- Action Item: BC shall verify if installing solenoids with built in manual bypasses for the seal water system is a cost-effective solution.
- The valve on the seal water line controls the flow pressure and can shut down the well. It is not operated as a bypass system. If the solenoid valve is out of operation, the needle valves can be manually opened but might not provide enough flow.
- There is a bypass switch used to override the seal water low flow switch that will allow the flow meter to be used as a backup to determine low flow.
- Mesa Water does not have their own electrician and relies on on-call electric services. Solutions with manual bypasses that do not require an electrician are preferred (such as a function built into the SCADA).
- Bypass switches are requested for equipment that shutdown a process and not required for processes used for status indication.
- The bypass switch would also have status indication monitored by the SCADA system.
- The VFD does not have a bypass contactor because of space limitations at the site. The intention of the design was for the pump to operate only with the VFD, such that pump longevity is promoted. Operating a pump “across the line” at 100 percent would require coordination with the other operating wells.
- The pressure switch, along with most other instruments, are for alarm only and can potentially be bypassed at the SCADA.
- Mesa Water stocks spare parts for the chemical injection system, such as injection quills. Second injection points are not necessary as they are able to quickly get onsite to make any repairs.
- During start up, flow is discharged to the storm drain. There is a Cla-Val to regulate when flow is sent to the storm drain and is normally open. It should be noted that flow cannot be sent through both the production and storm drain lines simultaneously.
- Mesa Water stocks spare parts for the analyzer instruments, such as probes or transmitters.
- The flow switches at the emergency showers are for indication only. The emergency showers and fire extinguishers are maintained monthly.
- Although there are redundant analyzers, Mesa Water is open to implementing a manual bypass or override for the chemical injection system. The metering pumps have hand controls that allow for manual pacing, as well as local control for starting and stopping operation.
- The fill valve position indicator for the sodium hypochlorite is for indication only.
- The sodium hypochlorite tank has a local level indicator and a level transmitter as redundant indication.
- The sodium hypochlorite discharge valve controlled by SCADA should have a local hand wheel.
- The level float for the sodium hypochlorite containment sump shuts down the wells. A redundant float is not required, but a control panel bypass switch is a potential solution.
- Since the sodium hypochlorite tank is 4,000 gallons, a tote is a potential solution for leaks. It should be noted that Mesa Water previously operated with totes that were filled weekly. At Well 9, it may be challenging to find space for a tote to bypass the aqueous ammonia station. Action Item: BC to investigate and recommend if the piping should be modified to add a tote.

- A bypass for the metering pump pressure switch can be added to the pump control panel.
- The metering pump flowmeter has a bypass, where the pump speed is used to determine the flow rate.
- The operating philosophy for the aqueous ammonia system is the same as the sodium hypochlorite system.
- The production well pump will stop if the ammonia analyzer fails. However, Mesa Water does not consider the analyzer to be High criticality. They have sufficient spare parts and can change out parts quickly. This can be designated as Medium criticality.
- Mesa Water confirmed that each well production site has an onsite UPS. Since there are backup generators at each site, the UPS requirement is minimal at approximately 15 to 30 minutes.
- There is no redundancy for the 24 VDC power supplies on the I/O rack, which is used to power the fail-safe alarms. A spare power supply could be installed but would require the instruments to be rewired. Optionally, separate redundant power supply could be installed and designed to communicate a 24 VDC power supply failure with the PLC.
- Mesa Water confirmed they have copies of the vendor programming for the PLCs. The distribution side is equipped with Allen Bradley PLCs and the MWRF is equipped with Schneider PLCs. Reservoirs 1 and 2 and MWRF are L43, and everything else is L35E.

Well 5 SPFA Discussion:

- The well pump is driven by natural gas and is backed up by an onsite LPG tank. The remaining equipment and auxiliary systems at Well 5 are operated electrically and are backed up by an onsite generator.
- The flow meter for natural gas is for indication only.
- There is a 1,500 gallon LPG tank at Well 5, so it is not necessary to have a second natural gas supply line. However, while connected to the LPG tank, the gas-driven pump is not able to operate with LNG. As such, there is no redundant fuel system for the well pump. There are issues with the heat exchanger that have not yet been addressed. It should be noted that the valves on the existing piping for the propane tank are manual, so in the event of an outage, an operator would need to manually convert from natural gas to LPG.
- The sand separator has a manual bypass that allows for bypass to the distribution system.
- Since there are no obstructions to the eye wash station at Well 5, it is not necessary to have a redundant eye wash station.
- Well 5 operates similarly to Well 1, and many of the previous comments will apply.
- The backup generators at each site are maintained quarterly.

Reservoir 1 Discussion:

- Scheduled for Monday, September 21, 2020.

Action Required

The following are a list of actions required as a result of the meeting discussion:

1. Verify if the motor operated valves have handwheels. **Assigned Person(s):** Mesa Water; **Response Required:** 9/28/20
2. Evaluate if there are instances where it is safe to manually override the operational sequences for the seal water system. **Assigned Person(s):** BC; **Response Required:** 9/28/20
3. Review the Control Logic algorithms. **Assigned Person(s):** BC; **Response Required:** 9/28/20
4. Provide standard spare parts forms that are received from manufacturers. **Assigned Person(s):** Mesa Water; **Response Required:** 9/21/20
5. Provide a list of recommendations for electrical redundancy. This list will be used as reference for Mesa Water's current well construction projects. **Assigned Person(s):** BC; **Response Required:** 9/21/20
6. Verify if installing solenoids with built in bypasses for the seal water system is a cost-effective solution. **Assigned Person(s):** BC; **Response Required:** 9/28/20
7. Investigate and recommend if the chemical injection system piping should be modified to add a tote. **Assigned Person(s):** BC; **Response Required:** 9/28/20

Attachments

- Well No. 1 and 5 markups

Brown AND Caldwell

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Irvine, CA 92612

T: 714.730.7600

Meeting Minutes

Prepared for: Mesa Water District (Mesa Water)
Project Title: Water Supply, Energy, and Supply Chain Reliability Assessment
Project No.: 155448

Purpose of Meeting: Single Point of Failure – Workshop 2 **Date:** September 21, 2020
Meeting Location: Virtual via Microsoft Teams **Time:** 2:00 p.m.
Minutes Prepared by: Jon Ganz, Brown and Caldwell

Attendees: Phil Lauri, Mesa Water
Andrew Wiesner, Mesa Water
Tracy Manning, Mesa Water
Jon Ganz, Brown and Caldwell
Adam Zacheis, Brown and Caldwell
Richard Birdsell, Brown and Caldwell
Lance Salerno, Brown and Caldwell
Windsor Lee, Brown and Caldwell

Summary

Agenda:

Workshop to review BC's approach and preliminary findings for the following core production facilities:

- Mesa Water Reliability Facility (MWRF)
- Reservoir 1

MWRF Discussion:

- During normal operation, one of the two MWRF treatment trains and one of the two amber-tinted wells are in service. Both treatment trains and wells experience similar run time as service is routinely rotated.
- Mesa Water confirmed that all chemical metering pumps are a 1+1 configuration. Pressure switches for the pumps are indication only.
- The flowmeter upstream of the sand separators is used to calculate the scale inhibitor dose. The well speed can be used to determine the dose if the flowmeter is out of service.
- The level indicators on the scale inhibitor storage tank are to prevent overfilling. Operators can determine the tank level without instruments.
- If the scale inhibitor tank is empty, the MWRF can operate for a preset duration before shutting down. It was noted that the MWRF can operate without scale inhibitor for periods longer than 30 days, which makes this system non-critical from a single point of failure perspective.

Action Item: Mesa Water requested that a supervisor override is added, such that the MWRF will continue operation without scale inhibitor. [JG1]

- The floats in all the chemical containment areas (where the metering pumps are installed) are programmed to close the chemical valve downstream of the tank and shut down the MWRF. Since rain can accumulate in these areas and trigger false alarms, a solution could be to install an additional float that would signal a pre-alarm before a plant shut down occurs.
- Mesa Water clarified that “shut down” refers to a shutdown sequence, and not an instantaneous shutdown.
- Pressure switches for the metering pumps are for indication only.
- All analyzers can be manually calibrated (overridden in SCADA) if instruments or equipment need to be taken offline for maintenance. All analyzers are stocked in spare parts.
- Flowmeters are critical to operation and shall be High criticality.
- The differential pressure sensor on the cartridge filter is currently programmed to shut down the plant. This should be changed to indication only as it is redundant with other operations. Note that there is redundancy between cartridge filters.
- Mesa Water does not stock spare nanofiltration feed pump. Action Item: BC shall make a recommendation on stocking a spare pump vs. installing a standby pump. The recommendation shall include an evaluation of shelf life and feasibility of installation.
- The level sensor in the nanofiltration trench is Low criticality and has software switches.
- Mesa Water confirmed that the MWRF is able to operate without the secondary nanofiltration system. The secondary nanofiltration system shall be shown as Low criticality.
- Mesa Water confirmed that the anti-foam system is in operation, but that failure of the system would not result in shut down. The anti-foam system shall be shown as Low criticality.
- The CIP system is for maintenance work and would not be in operation during an emergency.
- The CO2 system is critical and there is concern regarding the heat exchanger’s reliability. A redundant heat exchanger should be considered, but a second CO2 storage tank may not be necessary. Since CO2 consumption is low, Mesa Water could consider direct feeding CO2 from a tanker truck or cylinders in the event of a local or regional outage. Action Item: BC shall approach Praxair and discuss ways to increase reliability. The submersible pumps for the lift station shown on N-11 are a 1+1 configuration.
- The post treatment pumps operate in a 1+2 configuration at half capacity, and a 2+1 configuration at full capacity. The flowmeter and pressure indicator on the waste line to the sewer and air gap are critical, as they are required for permitting.
- There is no redundancy between the degasifiers, as there is one degasifier per treatment train. The level switches are Low to Medium criticality. Action Item: BC shall review the control strategy before finalizing the criticality score for the degasifiers.
- Mesa Water confirmed that failure of the scrubber system would not result in a shut down. The scrubber system shall be shown as Low criticality.
- The CO2 system is not used on the back end of the product transfer pumps. The product transfer pumps are controlled on level. The product transfer pump system shall be shown as Low criticality because analyzers are stocked in spare parts.

- The purpose of the sump pump for the post treatment chemical vault is for leaks. The level indicator for the vault will not cause a shutdown.
- The high lift pump station configuration is 2+1. The analyzers for permit compliance are critical but can be offline since permit requirements can be satisfied through sampling. Control points are critical.

Reservoir 1 Discussion:

- Since Reservoir 2 is similarly configured, notes on Reservoir 1 will be extended to Reservoir 2.
- The available P&IDs are outdated. There is a backup generator installed, and the reservoir can remain in operation with it.
- Mesa Water does not staff any electricians, so solutions must be accessible to operations staff.
- Similar to Well 5, the natural gas engine-driven pumps are unable to run off of the existing backup propane supply. The pumps are unable to automatically switch over to LPG.
- Despite new equipment, Well 5 is near the end of its remaining useful life. The new well would be an electric motor-operated pump with a VFD.
- The clear wells are the backup for the distribution system, as they are able to maintain the required pressure in the system. The reservoirs are bypassed during normal operation and boost demand during peak water supply demands. Given the capacity of the reservoirs, they provide only several hours of supply during an outage.
- The electric jockey pumps at Reservoir 2 are out of service.
- Mesa Water does not have a master spare parts list. **Action Item:** Mesa Water shall compile and provide available information on stocked spare parts. BC shall schedule a meeting to discuss.

Action Required

The following are a list of actions required as a result of the meeting discussion:

1. Add a supervisor override to the scale inhibitor storage tank, such that the MWRF will continue operation without scale inhibitor. **Assigned Person(s):** BC; **Response Required:** To be included as recommendation in TM 3.
2. Provide a recommendation on stocking a spare pump vs. installing a standby pump for the nanofiltration feed pumps. **Assigned Person(s):** BC; **Response Required:** To be included as recommendation in TM 3
3. Contact Praxair and discuss ways to increase reliability of the CO2 system heat exchanger. **Assigned Person(s):** BC; **Response Required:** 10/9/20
4. Review the control strategy before finalizing the criticality score for the degasifiers. **Assigned Person(s):** BC; **Response Required:** To be included in TM 3
5. Mesa Water shall compile and provide available information on stocked spare parts. BC shall schedule a meeting to discuss. **Assigned Person(s):** Mesa Water and BC; **Response Required:** 10/5/20

Attachments

- MWRF and Reservoir 1 markups

Brown AND Caldwell

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Meeting Minutes

Prepared for: Mesa Water District (Mesa Water)
Project Title: Water Supply, Energy, and Supply Chain Reliability Assessment
Project No.: 155448

Purpose of Meeting: Single Point of Failure – SCADA Workshop 1 **Date:** September 21, 2020
Meeting Location: Virtual via Microsoft Teams **Time:** 11:30 a.m.
Minutes Prepared by: Jon Ganz, Brown and Caldwell

Attendees: Marc Smith, Mesa Water
Andrew Wiesner, Mesa Water
Jon Ganz, Brown and Caldwell
Adam Zacheis, Brown and Caldwell
Richard Birdsell, Brown and Caldwell

Summary

Agenda:

Workshop to discuss Mesa Water's PLC, SCADA, and UPS systems to identify any Single Point of Failure for the following systems:

- PLC
- SCADA
- UPS
- Open Discussion

PLC Discussion:

- **Decision:** The SCADA system I/O assignments will be discussed in the next meeting.
- Mesa Water confirmed that the Mesa Water facilities do not have redundant PLCs and PLC location only has a single 24 VDC power supplies.
- Reservoir 1 and 2 PLCs consists of three (3) Murphy Series 600 engine controllers which communicate to a Murphy Series 600 Master controller, which communicate to the Allen Bradly PLC/RTU. The RTU communicates to the SCADA network over 900 MHz spread spectrum radio.
- Mesa Water stated it is difficult obtaining Murphy support for the controllers and it is difficult to make changes to the existing programs.
- Mesa Water confirmed all sites and PLC/Controllers were included on the Network Diagram.

SCADA Discussion:

- Mesa Water confirmed the SCADA system operates on Wonderware software version 2014 R2.
- BC asked where the I/O server, Backup Server and Historian were located. Mesa Water replied EOC and MWRF had redundant I/O servers, 2 stand-alone Servers at EOC and MWRF and the Historians were duplicated at EOC and MWRF. Both servers have Win alarm 911. MWRF has the active Win alarm, EOC watches. If the MWRF fails, the Win alarm at EOC can be turned on. The Mesa Water system does not have a “Master” between EOC and MWRF. The last command entered at either EOC or MWRF wins.
- The location of the HMIs was discussed. Mesa Water stated that HMIs are located at EOC and MWRF. EOC has 4 total HMIs, 2 thin clients at the OOC, 1 in Tracy’s office and 1 in Dustin’s office. MWRF has 3 thin clients. Operators have laptops which allows access from an onsite network connection or from home. Programming changes can be made remotely. Typically, changes are made starting at MWFR and then the change is made at EOC.
- SCADA radio communications was the next topic. Mesa Water confirmed that there is a redundant ring radio communicating between EOC, MWRF and Reservoir 2. The other well, import, export, pressure reducing sites communicate via radio and one site via Cellular modem. Some sites have dual radios. Based on the radio NET ID the well, import, export, pressure reducing sites communicate to EOC, MWRF or Reservoir 2. The radio paths are indicated on the Network Diagram. If the radio communications between the main towers and the well, import, export, pressure reducing sites is out of service data could be lost.
- Mesa Water stated the existing radios are at the end of life and are no longer available from the manufacturer. Mesa Water does not have spare radios. Radios proposed for new sites will have redundant path both 900 MHz and satellite communications.
- The communications between site 17 and Reservoir 1 is via a Cellular modem because it is difficult to communicate over a reliable radio path. The cellular modem works fine, but it has a monthly charge. BC asked if Mesa Water would consider using Cellular modems for communications between well, import, export, pressure reducing sites to EOC, MWRF or Reservoir 2. Mesa Water stated they would rather not relay on a third party for support or have a continuous charge forever.
- The next topic of discussion was the Ethernet communications. Mesa Water uses non redundant Ethernet highways both fiber and copper for communications at EOC and MWRF. MWRF has 2 networks that are bridged. EOC has a similar ethernet configuration. The SCADA Local Area Network (LAN) and Office LAN are not connected.
- Mesa Water does not have network diagrams for EOC or MWFR.
- Mesa Water stated that if RTU 35A or RTU 35B located at MWRF lost power or network communications SCADA data would be lost. If RTU 37 located at EOC lost power or network communications SCADA data would also be lost.

UPS Discussion:

- The Uninterruptible Power Supplied (UPS) were discussed. Mesa Water confirmed each site has a UPS while EOC and MWRF has two UPSs. EOC and MWRF have generators with automatic transfer switches. These sites probably need UPS power for 15-minute. Well sites except for one have generators with automatic transfer switches. The well, import, export, pressure reducing sites should have 30-minute UPS power. The PLC and Radios at each site are on UPS.

Action Item: BC to investigate if Automatic transfer switches have an external manual bypass switch built into the faceplate.

Open Discussion:

- BC asked if the 24VDC power supply used for the PLC was redundant. Mesa Water responded no.
- BC asked if Mesa Water had spare PLC processors. Mesa Water responded no and the end of life for the PLC processor is December 2020. Mesa Water is using a new version of the PLC processor for the new sites. The existing PLC program must be converted to be loaded on the new PLC processors.
- BC noticed the I/O assigned to individual I/O cards was not assigned with Single Point of Failure in mind. BC will make a recommendation the I/O will be so redundant equipment does not share the same I/O card.

  Action Item: BC to recommend redundant equipment does not share the same I/O card.

The following are a list of actions required as a result of the meeting discussion:

1. Investigate if Automatic transfer switches have an external manual bypass switch built into the faceplate. **Assigned Person(s):** BC; **Response Required:** 9/30/20
2. Recommend redundant equipment does not share the same I/O card. **Assigned Person(s):** BC; **Response Required:** TM 3

Attachments

- Network Diagram

Attachment C: SPFA – Well Site 1

MESA WATER DISTRICT
Single Points of Failure Analysis
Criticality Summary - Well 1

High – Failure of this system/equipment substantially impacts production; no redundant system/equipment available
Medium – Failure of this system/equipment does not impact production; redundant system/equipment exists and is assumed to operate
Low – Failure of this system/equipment does not impact production; no redundant system/equipment available

Core Production Area	System	Equipment	Basis for SPF Rating	Criticality Score H	Criticality Score M	Criticality Score L	Recommended Spare Parts	Notes
	Well Pump P&ID 01-N-01, 01-N-02							
	[Electric]	PUMP, VERTICAL TURBINE						
		Motor, Electric	Pumping capacity from other Well Sites					
		Drive, Variable Frequency	Pumping capacity from other Well Sites					
		Level Transmitter	Indication Only					
		Seal Water Pressure Gauge	Indication Only					
		Seal Water Solenoid Valve	Manual bypass on Valve					
		Seal Water Flow Switch	Pump Shutdown				X	
		Seal Water Flowmeter	Indication Only					
		Motor Temperature	Pump Shutdown					
		Discharge Pressure Gauge	Indication Only					
		Discharge Pressure Transmitter	Pump Shutdown					
		Discharge Flow Switch	Pump Shutdown				X	
		Distribution Flowmeter	Use Pump Speed					
		Storm Drain Flowmeter	Use Pump Speed					
		Isolation Valve	Handwheel on valve					
		Chemical Injection Points	Warehouse Spares				X	
	Sample Panel P&ID 01-N-03							
		Sodium Hypochlorite Sample Panel						
		Solenoid Valve	Manual Override on Valve					
		Flow Indicator	Indication Only					
		CL2 Analyzer	Warehouse Spare				X	
		CL2 Analyzer	Warehouse Spare				X	
		Aqua Ammonia Sample Panel						
		Solenoid Valve	Manual Override on Valve					
		Flow Indicator	Indication Only					
		NH2CL Analyzer	Warehouse Spare				X	
	Safety Showers P&ID 01-N-03							
		Flow Switch	Monthly Maintenance					
		Flow Switch	Monthly Maintenance					
	Sodium Hypochlorite Storage Tank P&ID 01-N-04							
		Sodium Hypochlorite Storage Tank						Potential Mitigation: Add Tote Connection
		Fill Valve	Indication Only					
		Level Transmitter	Indication Only					
		Containment Level Switch	Shuts Valve				X	Potential Mitigation: Software Bypass Switch, Valve has handwheel
		Solium Hypochlorite Tank Block Valve	Handwheel on Valve					
		Sodium Hypochlorite Fill Panel	Indication Only					
Well 1	**Sodium Hydrochloride Metering Pumps** P&ID 01-N-05, 01-N-06							
	Metering Pump No. 1	PUMP, METERING	Redundant Pump					
		Pressure Indicator	Indication Only					
		Pressure Switch	Pump Shutdown but redundant pump				X	
	Metering Pump No. 2	PUMP, METERING	Redundant Pump					
		Pressure Indicator	Indication Only					
		Pressure Switch	Pump Shutdown but redundant pump				X	
		Containment Level Switch	Both pumps shutdown					Potential Mitigation: Bypass switch on panel, Valve has handwheel
		Discharge Flowmeter	Use Pump Speed					
	Aqua Ammonia Storage Tank P&ID 01-N-07							
		Aqua Ammonia Storage Tank						Potential Mitigation: Add Tote Connection
		Fill Valve	Handwheel on valve					
		Level Transmitter	Indication Only					
		Containment Level Switch	Shuts Valve				X	Potential Mitigation: Software Bypass Switch, Valve has handwheel
		Aqua Ammonia Tank Block Valve	Handwheel on Valve					
		Aqua Ammonia Fill Panel	Indication Only					
	Aqua Ammonia Metering Pumps P&ID 01-N-08, 01-N-09							
	Metering Pump No. 1	PUMP, METERING	Redundant Pump					
		Pressure Indicator	Indication Only					
		Pressure Switch	Pump Shutdown but redundant pump				X	
	Metering Pump No. 2	PUMP, METERING	Redundant Pump					
		Pressure Indicator	Indication Only					
		Pressure Switch	Pump Shutdown but redundant pump				X	
		Containment Level Switch	Both pumps shutdown					Potential Mitigation: Bypass switch on panel, Valve has handwheel
		Discharge Flowmeter	Use Pump Speed					

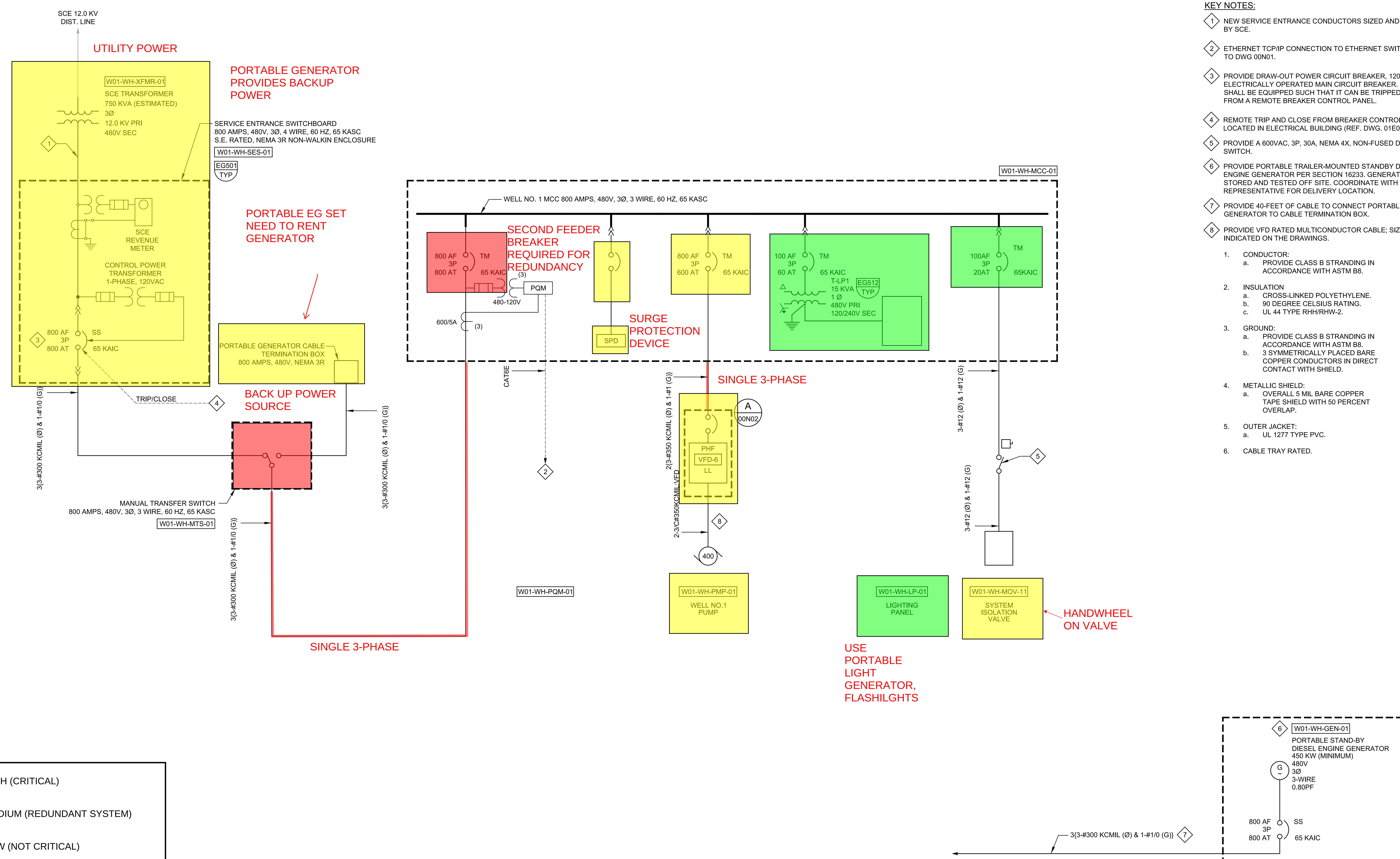
MESA WATER DISTRICT
Single Points of Failure Analysis
Criticality Summary - Well 1

High – Failure of this system/equipment substantially impacts production; no redundant system/equipment available

Medium – Failure of this system/equipment does not impact production; redundant system/equipment exists and is assumed to operate

Low – Failure of this system/equipment does not impact production; no redundant system/equipment available

Core Production Area	System	Equipment	Basis for SPF Rating	Criticality Score H	M	L	Recommended Spare Parts	Notes
	Electrical Dwg 01E01							
		Utility Power Feed	Back Up Generator					
		Manual Transfer Switch	Pumping capacity from other Well Sites					
		Portable Generator (Rented by Agency - not owned)	Back up, Normally feed from Utility Power					
		Main Breaker						Potential Mitigation: Add second Main Breaker with Manual Transfer Switch
		Well Feeder Breaker	Use another Well/Wells					
		Well VFD	Use another Well/Wells					
		Surge Protection Device	Can Operate without in Emergency					
		Surge Protection Device Breaker	Can Operate without in Emergency					
		Lighting Transformer/Panel Feeder Breaker	Portable Power Pack and Flashlights					
		Lighting Transformer	Portable Power Pack and Flashlights					
		Lighting Panel	Portable Power Pack and Flashlights					
		System Isolation Valve Breaker	Valve has Handwheel					



KEY NOTES:

1. NEW SERVICE ENTRANCE CONDUCTORS SIZED AND PROVIDED BY SCE.
2. ETHERNET TCP/IP CONNECTION TO ETHERNET SWITCH. REFER TO DWG 00N01.
3. PROVIDE DRAW-OUT POWER CIRCUIT BREAKER, 120VAC ELECTRICALLY OPERATED MAIN CIRCUIT BREAKER. BREAKER SHALL BE EQUIPPED SUCH THAT IT CAN BE TRIPPED AND CLOSED FROM A REMOTE BREAKER CONTROL PANEL.
4. REMOTE TRIP AND CLOSE FROM BREAKER CONTROL PANEL LOCATED IN ELECTRICAL BUILDING (REF. DWG. 01E05).
5. PROVIDE A 600VAC, 3P, 30A, NEMA 4X, NON-FUSED DISCONNECT SWITCH.
6. PROVIDE PORTABLE TRAILER-MOUNTED STANDBY DIESEL ENGINE GENERATOR PER SECTION 16233. GENERATOR SHALL BE STORED AND TESTED OFF SITE. COORDINATE WITH OWNER'S REPRESENTATIVE FOR DELIVERY LOCATION.
7. PROVIDE 40-FEET OF CABLE TO CONNECT PORTABLE GENERATOR TO CABLE TERMINATION BOX.
8. PROVIDE VFD RATED MULTICONDUCTOR CABLE; SIZE AS INDICATED ON THE DRAWINGS.
   1. CONDUCTOR:
      a. PROVIDE CLASS B STRANDING IN ACCORDANCE WITH ASTM B8.
   2. INSULATION
      a. CROSS-LINKED POLYETHYLENE.
      b. 90 DEGREE CELSIUS RATING.
      c. UL 44 TYPE RHH/RHW-2.
   3. GROUND:
      a. PROVIDE CLASS B STRANDING IN ACCORDANCE WITH ASTM B8.
      b. 3 SYMMETRICALLY PLACED BARE COPPER CONDUCTORS IN DIRECT CONTACT WITH SHIELD.
   4. METALLIC SHIELD:
      a. OVERALL 5 MIL BARE COPPER TAPE SHIELD WITH 50 PERCENT OVERLAP.
   5. OUTER JACKET:
      a. UL 1277 TYPE PVC.
   6. CABLE TRAY RATED.

(red)	HIGH (CRITICAL)
(yellow)	MEDIUM (REDUNDANT SYSTEM)
(green)	LOW (NOT CRITICAL)

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MesaWater DISTRICT
YOUR INDEPENDENT WATER AGENCY
1965 Placentia Avenue • Costa Mesa, CA 92627
Tel: 949-631-1291

APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

ELECTRICAL
WELL NO.1
ONE-LINE DIAGRAM

DRAWN: AD	DATE: OCTOBER 2017	DRAWING NUMBER 01E01	REVISION
DESIGN: TAH	SCALE: NOT TO SCALE	SHEET 51 OF SHEETS	

Plot Date: 03-JUL-2019 8:57:56 AM

User: svcPW

PlotScale: 1:1

DesignScript: Carollo_Std_Pen_v0805.pen

ColorTable: gshade.ctb

Model: Layout1

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Tel: 949-631-1291

APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

INSTRUMENTATION
WELL NO. 1
WELL HEAD PIPING

DRAWN: CGR
DESIGN: TAH
DATE: OCTOBER 2017
SCALE: NTS
DRAWING NUMBER 01-N-01
REVISION
SHEET 92 OF SHEETS

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APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

INSTRUMENTATION
WELL NO. 1
WELL HEAD PIPING CONTINUED

DRAWN: CGR	DATE: OCTOBER 2017	DRAWING NUMBER 01–N–02	REVISION
DESIGN: TAH	SCALE: NTS	SHEET 93 OF SHEETS	

GENERAL NOTES

1. UNLESS OTHERWISE NOTED, ALL EQUIPMENT TAGS SHOWN ON THIS SHEET ARE PRECEDED WITH "W01-WH-"

KEY NOTES

1. ALL TAGS ASSOCIATED WITH THIS EQUIPMENT ARE PRECEDED WITH "W01-AA-".
2. ALL TAGS ASSOCIATED WITH THIS EQUIPMENT ARE PRECEDED WITH "W01-SH-".

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APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

INSTRUMENTATION
WELL NO. 1
SAMPLE PANEL

DRAWN: CGR | DATE: OCTOBER 2017 | DRAWING NUMBER 01-N-03
DESIGN: TAH | SCALE: NTS | SHEET 94 OF SHEETS

Model: Layout1 ColorTable: gshade.ctb DesignScript: Carollo_Std_Pen_v0905.pen PlotScale: 1:1 User: svcPW Plot Date: 03-JUL-2019 7:24:33 AM

GENERAL NOTES

1. ALL EQUIPMENT TAGS SHOWN ON THIS SHEET ARE PRECEDED WITH "W01-SH-"

HIGH (CRITICAL)	
MEDIUM (REDUNDANT SYSTEM)	
LOW (NOT CRITICAL)	

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APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

INSTRUMENTATION
WELL NO. 1 – SODIUM HYPOCHLORITE STORAGE TANK

DRAWN: CGR
DESIGN: TAH
DATE: OCTOBER 2017
SCALE: NTS
DRAWING NUMBER 01-N-04
REVISION
SHEET 95 OF SHEETS

Model: Layout1 ColorTable: gshade.ctb DesignScript: Carollo_Std_Pen_v0805.pen PlotScale: 1:1 User: svcPW Plot Date: 03-JUL-2019 7:24:39 AM

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APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

INSTRUMENTATION
WELL NO. 1 –SODIUM HYPOCHLORITE
METERING PUMP 1

DRAWN: CGR | DATE: OCTOBER 2017 | DRAWING NUMBER 01–N–05 | REVISION
DESIGN: TAH | SCALE: NTS | SHEET 96 OF SHEETS

Plot Date: 03-JUL-2019 7:24:37 AM User: svcPW PlotScale: 1:1 DesignScript: Carollo_Std_Pen_v0905.pen ColorTable: gshade.ctb Model: Layout1

GENERAL NOTES

1. ALL EQUIPMENT TAGS SHOWN ON THIS SHEET ARE PRECEDED WITH "W01-SH-"

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APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

INSTRUMENTATION
WELL NO. 1 – SODIUM HYPOCHLORITE
METERING PUMP 2

DRAWN: CGR	DATE: OCTOBER 2017	DRAWING NUMBER 01–N–06	REVISION
DESIGN: TAH	SCALE: NTS	SHEET 97 OF SHEETS	

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MesaWater DISTRICT
YOUR INDEPENDENT WATER AGENCY
1965 Placentia Avenue • Costa Mesa, CA 92627
Tel: 949-631-1291

APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

INSTRUMENTATION
WELL NO. 1 – AQUA AMMONIA STORAGE TANK

DRAWN: CGR
DESIGN: TAH
DATE: OCTOBER 2017
SCALE: NTS
DRAWING NUMBER 01–N–07
REVISION
SHEET 98 OF SHEETS

ORIGINAL SEALED BY TROY A. HEDLUND SEPT 2015 CA 18885

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		RECORD DRAWINGS		

INSTRUMENTATION
WELL NO. 1 – AQUA AMMONIA
METERING PUMP 1

DRAWN: CGR
DESIGN: TAH
DATE: OCTOBER 2017
SCALE: NTS
DRAWING NUMBER 01-N-08
SHEET 99 OF SHEETS

GENERAL NOTES

1. ALL EQUIPMENT TAGS SHOWN ON THIS SHEET ARE PRECEDED WITH "W01-AA-"

Plot Date: 03-JUL-2019 7:24:43 AM User: svcPW PlotScale: 1:1 DesignScript: Carollo_Std_Pen_v0805.pen ColorTable: gshade.ctb Model: Layout1

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NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

INSTRUMENTATION
WELL NO. 1 – AQUA AMMONIA
METERING PUMP 2

DRAWN: CGR
DESIGN: TAH
DATE: OCTOBER 2017
SCALE: NTS
DRAWING NUMBER: 01–N–09
REVISION
SHEET 100 OF SHEETS

GENERAL NOTES

1. ALL EQUIPMENT TAGS SHOWN ON THIS SHEET ARE PRECEDED WITH "W01_WH_"
2. EVERYTHING ASSOCIATED WITH THE RTU/PLC CONTROL PANEL MONITORING SHOWN ON THIS SHEET IS EXISTING.

(red)	HIGH (CRITICAL)
(yellow)	MEDIUM (REDUNDANT SYSTEM)
(green)	LOW (NOT CRITICAL)

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APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

INSTRUMENTATION
WELL NO. 1
MCC AND RTU MONITORING

DRAWN: ESW | DATE: OCTOBER 2017 | DRAWING NUMBER 01–N–10 | REVISION
DESIGN: TAH | SCALE: NTS | SHEET 101 OF SHEETS

Model: Layout1 ColorTable: gshade.ctb DesignScript: Carollo_Std_Pen_v0805.pen PlotScale: 1:1 User: svcPW Plot Date: 03-JUL-2019 7:24:48 AM

Attachment D: SPFA – Well Sites 3, 7 and 9

MESA WATER DISTRICT
Single Points of Failure Analysis
Criticality Summary - Wells 3, 7 and 9

High – Failure of this system/equipment substantially impacts production; no redundant system/equipment available
Medium – Failure of this system/equipment does not impact production; redundant system/equipment exists and is assumed to operate
Low – Failure of this system/equipment does not impact production; no redundant system/equipment available

Core Production Area	System	Equipment	Basis for SPF Rating	Criticality Score H	M	L	Recommended Spare Parts	Notes
	Well Pump P&ID 01-N-01, 01-N-02							
	[Electric]	PUMP, VERTICAL TURBINE						
		Motor, Electric	Pumping capacity from other Well Sites					
		Drive, Variable Frequency	Pumping capacity from other Well Sites					
		Level Transmitter	Indication Only					
		Seal Water Pressure Gauge	Indication Only					
		Seal Water Solenoid Valve	Manual bypass on Valve					
		Seal Water Flow Switch	Pump Shutdown				X	
		Seal Water Flowmeter	Indication Only					
		Motor Temperature	Pump Shutdown					
		Discharge Pressure Gauge	Indication Only					
		Discharge Pressure Transmitter	Pump Shutdown					
		Discharge Flow Switch	Pump Shutdown				X	
		Distribution Flowmeter	Use Pump Speed					
		Storm Drain Flowmeter	Use Pump Speed					
		Isolation Valve	Handwheel on valve					
		Chemical Injection Points	Warehouse Spares				X	
	Sample Panel P&ID 01-N-03							
		Sodium Hypochlorite Sample Panel						
		Solenoid Valve	Manual Override on Valve					
		Flow Indicator	Indication Only					
		CL2 Analyzer	Warehouse Spare				X	
		CL2 Analyzer	Warehouse Spare				X	
		Aqua Ammonia Sample Panel						
		Solenoid Valve	Manual Override on Valve					
		Flow Indicator	Indication Only					
		NH2CL Analyzer	Warehouse Spare				X	
	Safety Showers P&ID 01-N-03							
		Flow Switch	Monthly Maintenance					
		Flow Switch	Monthly Maintenance					
	Sodium Hypochlorite Storage Tank P&ID 01-N-04							
		Sodium Hypochlorite Storage Tank						Potential Mitigation: Add Tote Connection
		Fill Valve	Indication Only					
		Level Transmitter	Indication Only					
		Containment Level Switch	Shuts Valve				X	Potential Mitigation: Software Bypass Switch, Valve has handwheel
		Solium Hypochlorite Tank Block Valve	Handwheel on Valve					
		Sodium Hypochlorite Fill Panel	Indication Only					
<u>Wells 3/7/9</u>	**Sodium Hydrochloride Metering Pumps** P&ID 01-N-05, 01-N-06							
	Metering Pump No. 1	PUMP, METERING	Redundant Pump					
		Pressure Indicator	Indication Only					
		Pressure Switch	Pump Shutdown but redundant pump				X	
	Metering Pump No. 2	PUMP, METERING	Redundant Pump					
		Pressure Indicator	Indication Only					
		Pressure Switch	Pump Shutdown but redundant pump				X	
		Containment Level Switch	Both pumps shutdown					Potential Mitigation: Bypass switch on panel, Valve has handwheel
		Discharge Flowmeter	Use Pump Speed					
	Aqua Ammonia Storage Tank P&ID 01-N-07							
		Aqua Ammonia Storage Tank						Potential Mitigation: Add Tote Connection
		Fill Valve	Handwheel on valve					
		Level Transmitter	Indication Only					
		Containment Level Switch	Shuts Valve				X	Potential Mitigation: Software Bypass Switch, Valve has handwheel
		Aqua Ammonia Tank Block Valve	Handwheel on Valve					
		Aqua Ammonia Fill Panel	Indication Only					
	Aqua Ammonia Metering Pumps P&ID 01-N-08, 01-N-09							
	Metering Pump No. 1	PUMP, METERING	Redundant Pump					
		Pressure Indicator	Indication Only					
		Pressure Switch	Pump Shutdown but redundant pump				X	
	Metering Pump No. 2	PUMP, METERING	Redundant Pump					
		Pressure Indicator	Indication Only					
		Pressure Switch	Pump Shutdown but redundant pump				X	
		Containment Level Switch	Both pumps shutdown					Potential Mitigation: Bypass switch on panel, Valve has handwheel
		Discharge Flowmeter	Use Pump Speed					

MESA WATER DISTRICT
Single Points of Failure Analysis
Criticality Summary - Wells 3, 7 and 9

High – Failure of this system/equipment substantially impacts production; no redundant system/equipment available
Medium – Failure of this system/equipment does not impact production; redundant system/equipment exists and is assumed to operate
Low – Failure of this system/equipment does not impact production; no redundant system/equipment available

Core Production Area	System	Equipment	Basis for SPF Rating	Criticality Score			Recommended Spare Parts	Notes
				H	M	L		
	Electrical Dwg 01E01							
		Utility Power Feed	Back Up Generator					
		Manual Transfer Switch	Pumping capacity from other Well Sites					
		Generator, Onsite	Back up, Normally feed from Utility Power					
		Main Breaker						Potential Mitigation: Add second Main Breaker with Manual Transfer Switch
		Well Feeder Breaker	Use another Well/Wells					
		Well VFD	Use another Well/Wells					
		Surge Protection Device	Can Operate without in Emergency					
		Surge Protection Device Breaker	Can Operate without in Emergency					
		Lighting Transformer/Panel Feeder Breaker	Portable Power Pack and Flashlights					
		Lighting Transformer	Portable Power Pack and Flashlights					
		Lighting Panel	Portable Power Pack and Flashlights					
		System Isolation Valve Breaker	Valve has Handwheel					

Attachment E: SPFA – Well Site 5

MESA WATER DISTRICT
Single Points of Failure Analysis
Criticality Summary - Well 1

High – Failure of this system/equipment substantially impacts production; no redundant system/equipment available
Medium – Failure of this system/equipment does not impact production; redundant system/equipment exists and is assumed to operate
Low – Failure of this system/equipment does not impact production; no redundant system/equipment available

Core Production Area	System	Equipment	Basis for SPF Rating	Criticality Score H	M	L	Recommended Spare Parts	Notes
	Well Pump P&ID 01-N-01, 01-N-02							
	[Electric]	PUMP, VERTICAL TURBINE						
		Motor, Electric	Pumping capacity from other Well Sites					
		Drive, Variable Frequency	Pumping capacity from other Well Sites					
		Level Transmitter	Indication Only					
		Seal Water Pressure Gauge	Indication Only					
		Seal Water Solenoid Valve	Manual bypass on Valve					
		Seal Water Flow Switch	Pump Shutdown				X	
		Seal Water Flowmeter	Indication Only					
		Motor Temperature	Pump Shutdown					
		Discharge Pressure Gauge	Indication Only					
		Discharge Pressure Transmitter	Pump Shutdown					
		Discharge Flow Switch	Pump Shutdown				X	
		Distribution Flowmeter	Use Pump Speed					
		Storm Drain Flowmeter	Use Pump Speed					
		Isolation Valve	Handwheel on valve					
		Chemical Injection Points	Warehouse Spares				X	
	Sample Panel P&ID 01-N-03							
		Sodium Hypochlorite Sample Panel						
		Solenoid Valve	Manual Override on Valve					
		Flow Indicator	Indication Only					
		CL2 Analyzer	Warehouse Spare				X	
		CL2 Analyzer	Warehouse Spare				X	
		Aqua Ammonia Sample Panel						
		Solenoid Valve	Manual Override on Valve					
		Flow Indicator	Indication Only					
		NH2CL Analyzer	Warehouse Spare				X	
	Safety Showers P&ID 01-N-03							
		Flow Switch	Monthly Maintenance					
		Flow Switch	Monthly Maintenance					
	Sodium Hypochlorite Storage Tank P&ID 01-N-04							
		Sodium Hypochlorite Storage Tank						Potential Mitigation: Add Tote Connection
		Fill Valve	Indication Only					
		Level Transmitter	Indication Only					
		Containment Level Switch	Shuts Valve				X	Potential Mitigation: Software Bypass Switch, Valve has handwheel
		Solium Hypochlorite Tank Block Valve	Handwheel on Valve					
		Sodium Hypochlorite Fill Panel	Indication Only					
Well 1	**Sodium Hydrochloride Metering Pumps** P&ID 01-N-05, 01-N-06							
	Metering Pump No. 1	PUMP, METERING	Redundant Pump					
		Pressure Indicator	Indication Only					
		Pressure Switch	Pump Shutdown but redundant pump				X	
	Metering Pump No. 2	PUMP, METERING	Redundant Pump					
		Pressure Indicator	Indication Only					
		Pressure Switch	Pump Shutdown but redundant pump				X	
		Containment Level Switch	Both pumps shutdown					Potential Mitigation: Bypass switch on panel, Valve has handwheel
		Discharge Flowmeter	Use Pump Speed					
	Aqua Ammonia Storage Tank P&ID 01-N-07							
		Aqua Ammonia Storage Tank						Potential Mitigation: Add Tote Connection
		Fill Valve	Handwheel on valve					
		Level Transmitter	Indication Only					
		Containment Level Switch	Shuts Valve				X	Potential Mitigation: Software Bypass Switch, Valve has handwheel
		Aqua Ammonia Tank Block Valve	Handwheel on Valve					
		Aqua Ammonia Fill Panel	Indication Only					
	Aqua Ammonia Metering Pumps P&ID 01-N-08, 01-N-09							
	Metering Pump No. 1	PUMP, METERING	Redundant Pump					
		Pressure Indicator	Indication Only					
		Pressure Switch	Pump Shutdown but redundant pump				X	
	Metering Pump No. 2	PUMP, METERING	Redundant Pump					
		Pressure Indicator	Indication Only					
		Pressure Switch	Pump Shutdown but redundant pump				X	
		Containment Level Switch	Both pumps shutdown					Potential Mitigation: Bypass switch on panel, Valve has handwheel
		Discharge Flowmeter	Use Pump Speed					

MESA WATER DISTRICT
Single Points of Failure Analysis
Criticality Summary - Well 1

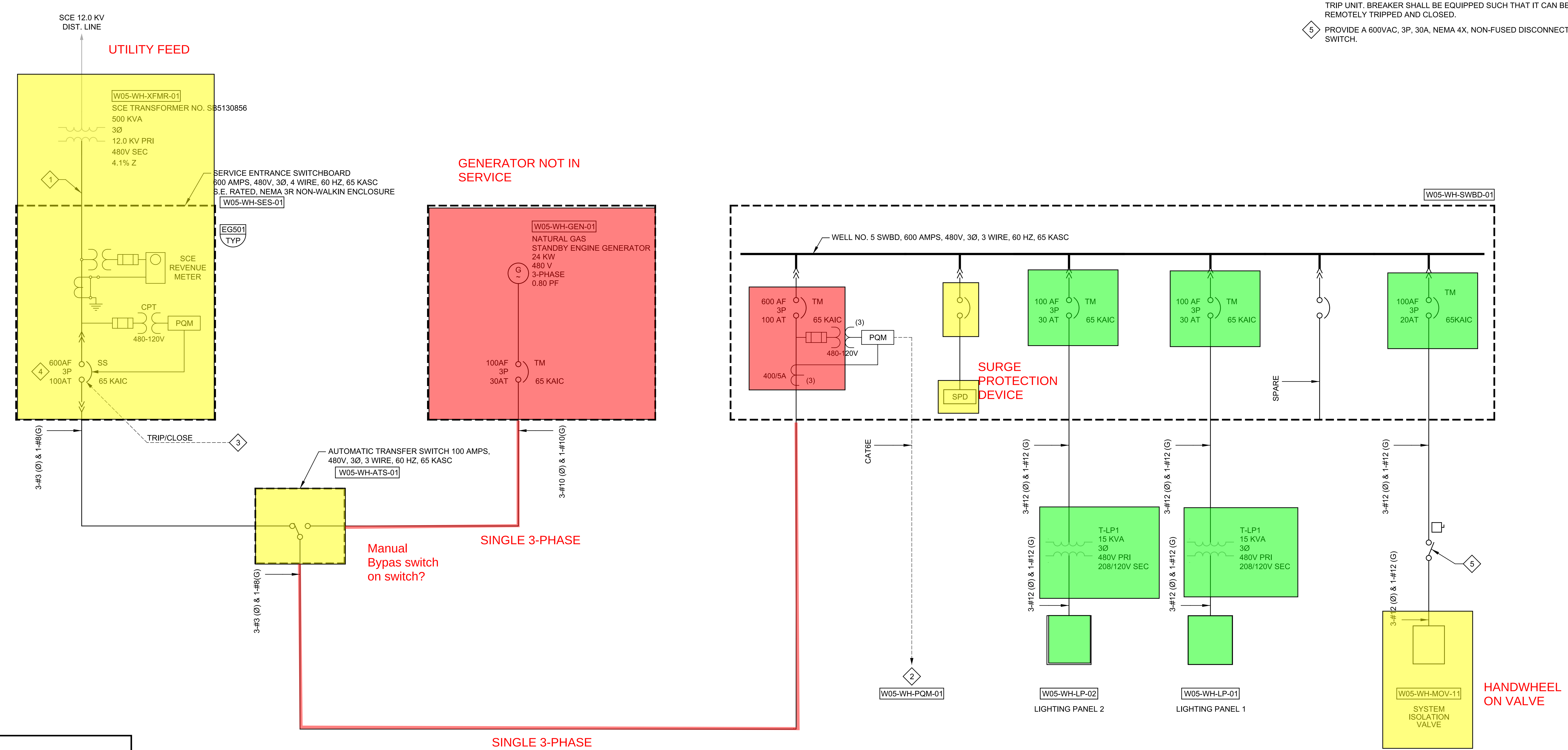
High – Failure of this system/equipment substantially impacts production; no redundant system/equipment available
Medium – Failure of this system/equipment does not impact production; redundant system/equipment exists and is assumed to operate
Low – Failure of this system/equipment does not impact production; no redundant system/equipment available

Core Production Area	System	Equipment	Basis for SPF Rating	Criticality Score H	M	L	Recommended Spare Parts	Notes
	Electrical Dwg 01E01							
		Utility Power Feed	Back Up Generator					
		Manual Transfer Switch	Pumping capacity from other Well Sites					
		Portable Generator (Rented by Agency - not owned)	Back up, Normally feed from Utility Power					
		Main Breaker						Potential Mitigation: Add second Main Breaker with Manual Transfer Switch
		Well Feeder Breaker	Use another Well/Wells					
		Well VFD	Use another Well/Wells					
		Surge Protection Device	Can Operate without in Emergency					
		Surge Protection Device Breaker	Can Operate without in Emergency					
		Lighting Transformer/Panel Feeder Breaker	Portable Power Pack and Flashlights					
		Lighting Transformer	Portable Power Pack and Flashlights					
		Lighting Panel	Portable Power Pack and Flashlights					
		System Isolation Valve Breaker	Valve has Handwheel					

AT WELL 5, ELECTRICAL LARGELY FEEDS LIGHTING/AUXILIARY - THOUGH NOT CONSIDERED CRITICAL (WATER PRODUCTION NOT IMPACTED), EVALUATED FOR CRITICALITY.

KEY NOTES:

1. NEW SERVICE ENTERANCE CONDUCTED SIZED AND PROVIDED BY SIZE.
2. ETHERNET TCP/IP CONNECTION TO ETHERNET SWITCH. REFER TO DWG 00N01.
3. REMOTE BREAKER TRIP AND CLOSE FROM NEW CIRCUIT BREAKER CONTROL PANEL LOCATED IN ELECTRICAL ROOM (REF. DWG. 05E04)
4. PROVIDE DRAW-OUT POWER CIRCUIT BREAKER, 120VAC ELECTRICALLY OPERATED POWER BREAKER WITH SOLID-STATE TRIP UNIT. BREAKER SHALL BE EQUIPPED SUCH THAT IT CAN BE REMOTELY TRIPPED AND CLOSED.
5. PROVIDE A 600VAC, 3P, 30A, NEMA 4X, NON-FUSED DISCONNECT SWITCH.



(red)	HIGH (CRITICAL)
(yellow)	MEDIUM (REDUNDANT SYSTEM)
(green)	LOW (NOT CRITICAL)

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APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		Jan 2018

ELECTRICAL
WELL NO.5
ONE-LINE DIAGRAM

DRAWN: VYJ
DESIGN: TAH
DATE: OCTOBER 2017
SCALE: NOT TO SCALE
DRAWING NUMBER 05E01
REVISION
SHEET 30 OF 77 SHEETS

Plot Date: 26-DEC-2017 8:40:44 AM User: tdavidson PlotScale: 12.000001:1 PlotScale: Carollo_Std_Pen_v0905.pen DesignScript: gshade.ctb ColorTable: Layout1 Model:

Red	HIGH (CRITICAL)
Yellow	MEDIUM (REDUNDANT SYSTEM)
Green	LOW (NOT CRITICAL)

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APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		Jan 2018

INSTRUMENTATION
WELL NO. 5
WELL HEAD PIPING

DRAWN: DKI DATE: OCTOBER 2017
DESIGN: TAH SCALE: NTS
DRAWING NUMBER 05–N–01 REVISION
SHEET 45 OF 77 SHEETS

GENERAL NOTES:

1. ALL EQUIPMENT TAGS SHOWN ON THIS SHEET ARE PRECEDED WITH "W05-WH-"

KEY NOTES:

1. VENDOR CONTROL PANEL SHALL BE PROVIDED WITH AN ALLEN-BRADLEY COMPACTLOGIX PLC PER SECTION 17720.

HIGH (CRITICAL)

MEDIUM (REDUNDANT SYSTEM)

LOW (NOT CRITICAL)

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NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		Jan 2018

INSTRUMENTATION
WELL NO. 5
WELL HEAD PIPING CONTINUED

DRAWN: CGR | DESIGN: TAH | DATE: OCTOBER 2017 | SCALE: NTS | DRAWING NUMBER 05-N-02 | SHEET 46 OF 77 SHEETS

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NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		Jan 2018

INSTRUMENTATION
WELL NO. 5
SAMPLE PANEL

DRAWN: CGR	DATE: OCTOBER 2017	DRAWING NUMBER 05–N–03	REVISION
DESIGN: TAH	SCALE: NTS	SHEET 47 OF 77 SHEETS	

Model: Layout1 ColorTable: gshade.ctb DesignScript: Carollo_Std_Pen_v0805.pen PlotScale: 12.000001:1 User: ldavidson Plot Date: 26-DEC-2017 8:45:33 AM

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APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		Jan 2018

INSTRUMENTATION
WELL NO. 5 – SODIUM HYPOCHLORITE STORAGE TANK

DRAWN: CGR	DATE: OCTOBER 2017	DRAWING NUMBER 05–N–04	REVISION
DESIGN: TAH	SCALE: NTS	SHEET 48 OF 77 SHEETS	

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NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		Jan 2018

INSTRUMENTATION
WELL NO. 5 –SODIUM HYPOCHLORITE
METERING PUMP 1

DRAWN: CGR	DATE: OCTOBER 2017	DRAWING NUMBER 05–N–05	REVISION
DESIGN: TAH	SCALE: NTS	SHEET 49 OF 77 SHEETS	

Model: Layout1 ColorTable: gshade.ctb DesignScript: Carollo_Std_Pen_v0805.pen PlotScale: 12.000001:1 User: tdavidson Plot Date: 26-DEC-2017 8:46:03 AM

GENERAL NOTES

1. ALL EQUIPMENT TAGS SHOWN ON THIS SHEET ARE PRECEDED WITH "W05-SH-"

	HIGH (CRITICAL)
	MEDIUM (REDUNDANT SYSTEM)
	LOW (NOT CRITICAL)

PMP–12 SH METERING PUMP (B 00-N-03)

PI–12 PRESSURE INDICATOR 0–200 PSIG

PE–12 PRESSURE SWITCH HIGH 110 PSIG (NP501 TYP)

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APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		Jan 2018

INSTRUMENTATION
WELL NO. 5 – SODIUM HYPOCHLORITE
METERING PUMP 2

DRAWN: CGR | DATE: OCTOBER 2017 | DRAWING NUMBER 05–N–06 | REVISION
DESIGN: TAH | SCALE: NTS | SHEET 50 OF 77 SHEETS

Model: Layout1 ColorTable: gshade.ctb DesignScript: Carollo_Std_Pen_v0805.pen PlotScale: 12.000001:1 User: ldavidson Plot Date: 26-DEC-2017 8:46:18 AM

Plot Date: 26-DEC-2017 8:46:33 AM
User: tdavidson
PlotScale: 12.000001:1
DesignScript: Carollo_Std_Pen_v0905.pen
ColorTable: gshade.ctb
Model: Layout1

GENERAL NOTES

1. ALL EQUIPMENT TAGS SHOWN ON THIS SHEET ARE PRECEDED WITH "W05-AA-"

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NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		Jan 2018

INSTRUMENTATION
WELL NO. 5 – AQUA AMMONIA
STORAGE TANK

DRAWN: CGR	DATE: OCTOBER 2017	DRAWING NUMBER 05–N–07	REVISION
DESIGN: TAH	SCALE: NTS	SHEET 51 OF 77 SHEETS	

GENERAL NOTES

1. ALL EQUIPMENT TAGS SHOWN ON THIS SHEET ARE PRECEDED WITH "W05-AA-"

KEY NOTES

1. INSTALL CORIOLIS FLOW METER PER MANUFACTURER RECOMMENDATION.

(red)	HIGH (CRITICAL)
(yellow)	MEDIUM (REDUNDANT SYSTEM)
(green)	LOW (NOT CRITICAL)

Plot Date: 26-DEC-2017 8:46:48 AM
User: tdavidson
PlotScale: 12.000001:1
DesignScript: Carollo_Std_Pen_v0905.pen
ColorTable: gshade.ctb
Model: Layout1

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APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		Jan 2018

INSTRUMENTATION
WELL NO. 5 – AQUA AMMONIA METERING PUMP 1

DRAWN: CGR | DATE: OCTOBER 2017 | DRAWING NUMBER 05-N-08 | REVISION
DESIGN: TAH | SCALE: NTS | SHEET 52 OF 77 SHEETS

Plot Date: 26-DEC-2017 8:47:04 AM
User: ldavidson
PlotScale: 12.000001:1
DesignScript: Carollo_Std_Pen_v0805.pen
ColorTable: gshade.ctb
Model: Layout1

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NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		Jan 2018

INSTRUMENTATION
WELL NO. 5 – AQUA AMMONIA
METERING PUMP 2

DRAWN: CGR
DESIGN: TAH
DATE: OCTOBER 2017
SCALE: NTS
DRAWING NUMBER 05-N-09
REVISION
SHEET 53 OF 77 SHEETS

GENERAL NOTES

1. ALL EQUIPMENT TAGS SHOWN ON THIS SHEET ARE PRECEDED WITH "W05_WH_"
2. EVERYTHING ASSOCIATED WITH THE RTU/PLC CONTROL PANEL MONITORING AND DOOR INTRUSION SWITCH SHOWN ON THIS SHEET ARE EXISTING.

Plot Date: 26-DEC-2017 8:47:19 AM User: ldavidson PlotScale: 12.000001:1 DesignScript: Carollo_Std_Pen_v0805.pen ColorTable: gshade.ctb Model: Layout1

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NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		Jan 2018

INSTRUMENTATION
WELL NO. 5
SWITCHBOARD AND RTU MONITORING

DRAWN: ESW	DATE: OCTOBER 2017	DRAWING NUMBER 05-N-10	REVISION
DESIGN: TAH	SCALE: NTS	SHEET 54 OF 77 SHEETS	

Attachment F: SPFA – MWRF and Finished Water System

MESA WATER DISTRICT
Single Points of Failure Analysis
Criticality Summary Table - MWRF and Finished Water Facilities

High – Failure of this system/equipment substantially impacts production; no redundant system/equipment available
Medium – Failure of this system/equipment does not impact production; redundant system/equipment exists and is assumed to operate
Low – Failure of this system/equipment does not impact production; no redundant system/equipment available

Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score H	M	L	Recommended Spare Parts	Notes
	P&ID N-2								
	Wells								
	Extraction Well No. 6								
	[Electric]	PUMP	Vertical Turbine Pump						
		Motor	400 HP - Electric	Redundant Pump					
		Drive	Variable Frequency Drive	Redundant Pump					
		Level Transmitter		Indication Only					
		Seal Water Solenoid Valve		Manual bypass on Valve					
		Motor Temperature		Indication Only					
		Flow Switch		Pump Shutdown but redundant pump				X	
		Pressure Transmitter		Indication Only					
		Flowmeter		Indication Only					
	Extraction Well No. 11								
	[Electric]	PUMP	Vertical Turbine Pump						
		Motor	400 HP - Electric	Redundant Pump					
		Drive	Variable Frequency Drive	Redundant Pump					
		Level Transmitter		Indication Only					
		Seal Water Solenoid Valve		Manual bypass on Valve					
		Motor Temperature		Indication Only					
		Flow Switch		Pump Shutdown but redundant pump				X	
Sand Separator		Pressure Transmitter		Indication Only					
		Flowmeter		Indication Only					
	Separators								
	Sand Separator No. 1								
		Sand Separator		Redundant Separator					
		Inlet Valve	Pneumatic Valve Quantity = 2	Handwheel on Valve					
		Differential Pressure Indicator		Indication Only					
		Drain Valve	Pneumatic Valve	Handwheel on Valve					
	Sand Separator No. 2								
		Sand Separator		Redundant Separator					
		Inlet Valve	Pneumatic Valve Quantity = 2	Handwheel on Valve					
		Differential Pressure Indicator		Indication Only					
		Drain Valve	Pneumatic Valve	Handwheel on Valve					
	Sand Separator No. 3								
		Sand Separator		Redundant Separator					
		Inlet Valve (2)	Pneumatic Valve	Handwheel on Valve					
		Differential Pressure Indicator		Indication Only					
		Drain Valve	Pneumatic Valve	Handwheel on Valve					
		Discharge Flowmeter		Indication Only					

MESA WATER DISTRICT
Single Points of Failure Analysis
Criticality Summary Table - MWRF and Finished Water Facilities

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Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score			Recommended Spare Parts	Notes
					H	M	L		
	P&ID N-3								
	Storage								
		Drum/Tote Transfer Pump							
		Scale Inhibitor Storage Tank							
		Level Switch	Pump Control	Plug Pump Into Power Outlet/bypass switch					
		Level Transmitter	Indication Only						
	Metering Pumps								
	Metering Pump No. 1	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Pump Shutdown but redundant pump				X	
	Metering Pump No. 2	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Pump Shutdown but redundant pump				X	
		Flowmeter	Common Pipe for pumps No. 1&2	Indication Only, Use Pump Speed					
		Level Switch	Double Containment Piping Pipe	Pump Shutdown				X	
Scale Inhibitor									
	Metering Pump No. 3	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Pump Shutdown but redundant pump				X	
	Metering Pump No. 4	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Pump Shutdown but redundant pump				X	
		Flowmeter	Common Pipe for pumps No. 3&4	Indication Only Use Pump Speed					
		Level Switch	Double Containment Piping Pipe	Pump Shutdown				X	
	Pump Containment Area								
		Level Switch	Containment Area	Pump Shutdown				X	
	Injection System								
		Injection System		Warehouse Spares				X	

MESA WATER DISTRICT
Single Points of Failure Analysis
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Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score H	M	L	Recommended Spare Parts	Notes
	P&ID N-4								
	Raw Water Sample Panel								
		Differential Pressure Transmitter	Indication Only Quantity =2						
		Pressure Transmitter	Indication Only Quantity =2						
		Rotometer	Indication Only Quantity =3	Plug Pump Into Power Outlet/bypass switch					
		Pressure Gauge	Indication Only						
		Temperature Transmitter	Indication Only						
		PH Analyzer		Warehouse Spare				X	
		Conductivity Analyzer		Warehouse Spare				X	
		Turbidity Analyzer		Redundant Trrbidity Analyzers, Warehouse Spare				X	
		Turbidity Analyzer		Redundant Trrbidity Analyzers, Warehouse Spare				X	
		Solenoid Valves	Quantity =2	Manual bypass on Valve					
	Cartridge Filters								
Cartridge Filters	Cartridge Filter No. 1								
		Cartridge Filter		Redundant Cartridge Filter					
		Pressure Indcator		Indication Only					
	Cartridge Filter No. 3	PUMP	Metering Pump	Redundant Cartridge Filter					
		Pressure Indcator		Indication Only					
	Cartridge Filter No. 5	PUMP	Metering Pump	Redundant Cartridge Filter					
		Pressure Differential Indcator		Indication Only					

MESA WATER DISTRICT
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Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score			Recommended Spare Parts	Notes
					H	M	L		
	P&ID N-5								
	NF Pump No. 1								
	[Electric]	PUMP	Vertical Turbine Pump	One Per Train				X	Recommend one spare pump
		Motor							
		Drive	Variable Frequency Drive						
		Motor Temperature		Indication Only					
		Inlet Valve	Pneumatic Valve Quantity = 2	Handwheel on Valve					
		Pressure Indicator	Quantity=2	Indication Only					
		Pressure Switch	Suction	Shutdown				X	Potential Mitigation: Bypass switch on panel
		Flow Switch	Discharge	Shutdown				X	Potential Mitigation: Bypass switch on panel
	NF Pump No. 2								
	[Electric]	PUMP	Vertical Turbine Pump	One Per Train				X	Recommend one spare pump
		Motor							
		Drive	Variable Frequency Drive						
		Motor Temperature		Indication Only					
		Inlet Valve	Pneumatic Valve Quantity = 2	Handwheel on Valve					
		Pressure Indicator	Quantity=2	Indication Only					
		Pressure Switch	Suction	Shutdown				X	Potential Mitigation: Bypass switch on panel
		Flow Switch	Discharge	Shutdown				X	Potential Mitigation: Bypass switch on panel
Nanofiltration Feed	Sand Separator No. 1								
		Sand Separator		Redundant Separator					
		Inlet Valve	Pneumatic Valve Quantity = 2	Handwheel on Valve					
		Differential Pressure Indicator		Indication Only					
		Drain Valve	Pneumatic Valve	Handwheel on Valve					
	Sand Separator No. 2								
		Sand Separator		Redundant Separator					
		Inlet Valve	Pneumatic Valve Quantity = 2	Handwheel on Valve					
		Differential Pressure Indicator		Indication Only					
		Drain Valve	Pneumatic Valve	Handwheel on Valve					
	Sand Separator No. 3								
		Sand Separator		Redundant Separator					
		Inlet Valve (2)	Pneumatic Valve	Handwheel on Valve					
		Differential Pressure Indicator		Indication Only					
		Drain Valve	Pneumatic Valve	Handwheel on Valve					
		Discharge Flowmeter		Indication Only					

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Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score H	M	L	Recommended Spare Parts	Notes
	P&ID N-6								
	Primary NF System Train 1								
		Inlet Pressure Transmitter		Indication, Used for Differential Pressure , Alarm				X	
		Inlet Temperature Transmitter		Indication Only					
		Inlet Conductivity Analyzer		Warehouse Spare				X	
		Membrane		Second Train					
		Membrane		Second Train					
		Membrane		Second Train					
		1st Stage Permeate Conductivity Analyzer		Warehouse Spare				X	
		1st Stage Permeate Pressure Transmitter		Indication, Used for Differential Pressure , Alarm				X	
		1st Stage Permeate Pressure Switch		Shutdown, Second Train				X	
		1st Stage Permeate Flowmeter Element		Flow Control					
		1st Stage Permeate Flowmeter Transmitter		Flow Control				X	
		1st Stage Permeate Control Valve		Handwheel on Valve					
		Drain Discharge Pressure Transmitter		Indication, Used for Differential Pressure , Alarm				X	
	P&ID N-7								
	Primary NF System Train 1								
		Membrane							
		2nd Stage Permeate Conductivity Analyzer		Warehouse Spare				X	
		2nd Stage Permeate Pressure Transmitter		Indication, Used for Differential Pressure , Alarm				X	
		2nd Stage Permeate Pressure Switch		Shutdown, Second Train				X	
		2nd Stage Permeate Flowmeter Element		Flow Control					
		2nd Stage Permeate Flowmeter Transmitter		Flow Control				X	
		Combined Permeate Conductivity Analyzer		Warehouse Spare				X	
		Combined Permeate Discharge Isolation Valve		Indication Only, Handwheel on Valve					
		NF System Combined Concentrate Pressure Transmitter		Indication, Used for Differential Pressure , Alarm				X	
		NF System Combined Concentrate Pressure Switch		Shutdown, Second Train				X	
		NF System Combined Concentrate Conductivity Analyzer		Warehouse Spare				X	
		NF System Combined Concentrate Flowmeter Element		Flow Control					
		NF System Combined Concentrate Flowmeter Tranmitter		Flow Control				X	
		NF System Combined ConcentrateNF Feed Control Valve		Handwheel on Valve					
		Primary Concentrate Recycle Flowmeter Element		Flow Control					
		Primary Concentrate Recycle Flowmeter Tranmitter		Flow Control				X	
		Primary Concentrate Recycle Control Valve		Handwheel on Valve					
	P&ID-6								
	Primary NF System Train 2								
		Inlet Pressure Transmitter		Indication, Used for Differential Pressure , Alarm				X	
		Inlet Temperature Transmitter		Indication Only					
		Inlet Conductivity Analyzer		Warehouse Spare				X	
		Membrane		Second Train					
		Membrane		Second Train					
		Membrane		Second Train					
		1st Stage Permeate Conductivity Analyzer		Warehouse Spare				X	
		1st Stage Permeate Pressure Transmitter		Indication, Used for Differential Pressure , Alarm				X	
		1st Stage Permeate Pressure Switch		Shutdown, Second Train				X	
		1st Stage Permeate Flowmeter Element		Flow Control					
		1st Stage Permeate Flowmeter Transmitter		Flow Control				X	
		1st Stage Permeate Control Valve		Handwheel on Valve					
		Drain Discharge Pressure Transmitter		Indication, Used for Differential Pressure , Alarm				X	
	P&ID N-7								
	Primary NF System Train 2								
Primary NF System		Membrane							
		2nd Stage Permeate Conductivity Analyzer		Warehouse Spare				X	
		2nd Stage Permeate Pressure Transmitter		Indication, Used for Differential Pressure , Alarm				X	
		2nd Stage Permeate Pressure Switch		Shutdown, Second Train				X	
		2nd Stage Permeate Flowmeter Element		Flow Control					
		2nd Stage Permeate Flowmeter Transmitter		Flow Control				X	
		Combined Permeate Conductivity Analyzer		Warehouse Spare				X	
		Combined Permeate Discharge Isolation Valve		Indication Only, Handwheel on Valve					
		NF System Combined Concentrate Pressure Transmitter		Indication, Used for Differential Pressure , Alarm				X	
		NF System Combined Concentrate Pressure Switch		Shutdown, Second Train				X	
		NF System Combined Concentrate Conductivity Analyzer		Warehouse Spare				X	
		NF System Combined Concentrate Flowmeter Element		Flow Control					
		NF System Combined Concentrate Flowmeter Tranmitter		Flow Control				X	
		NF System Combined ConcentrateNF Feed Control Valve		Handwheel on Valve					
		Primary Concentrate Recycle Flowmeter Element		Flow Control					
		Primary Concentrate Recycle Flowmeter Tranmitter		Flow Control				X	
		Primary Concentrate Recycle Control Valve		Handwheel on Valve					
	P&ID -7								
	Nanofiltration Trench								
		Level Switch		Alarm Only					

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Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score H	Criticality Score M	Criticality Score L	Recommended Spare Parts	Notes
		Primary Conc Recycle Flowmeter							
		Primary Conc Recycle Isolation Valve							

MESA WATER DISTRICT
Single Points of Failure Analysis
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Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score H	M	L	Recommended Spare Parts	Notes
	P&ID N-8								
	Secondary NF System Train								
		Train No. 2 selection Valve		Handwheel on Valve					
		Train No. 1 selection Valve		Handwheel on Valve					
		Secondary NF Isolation Valve (NF)		Handwheel on Valve					
		Secondary NF Control Valve (Soft/Dechlor)		Handwheel on Valve					
	Secondary NF Feed Pump No. 1								
		Secondary NF Feed Pump Suction Pressure Transmitter		Indication, Calculate Differential Pressure, Alarm					
		Secondary NF Feed Pump Suction Pressure Indicator		Indication Only					
		Secondary NF Feed Pump Suction Pressure Switch		Shutdown Pump				X	
		Secondary NF Feed Pump No. 1							
		Motor		Can Operate without system					
		Drive	VFD	Can Operate without system					
		Secondary NF Feed Pump Discharge Pressure Indicator		Indication Only					
		Secondary NF Feed Pump Discharge Flow Switch		Shutdown Pump				X	
		Secondary NF Feed Pump Discharge Temperatute		Indication Only					
		Secondary NF Feed Pump Discharge Conductivity Analyzer		Warehouse Spare				X	
		Secondary NF Feed Pump Discharge Pressure Transmitter		Indication, Calculate Differential Pressure, Alarm					
	Secondary Membrane								
		Bank 2 Isolation Valve		Handwheel on Valve					
		Bank 2 Flushing Control Valve		Handwheel on Valve					
		Secondary Membrane Train 1	Membrane	Second Train					
Secondary NF System		Secondary Train Valve Bypass Control Isolation Valve		Handwheel on Valve					
		Permeate Conductivity Analyzer		Warehouse Spare				X	
		Permeate Pressure Transmitter		Indication, Alarm					
		Permeate Pressure Switch		Shutdown System				X	
		Permeate Flowmeter		Indication Only					
		Permeate Control Valve		Handwheel on Valve					
		Consentrate Conductivity Analyzer		Warehouse Spare				X	
		Concentrate Pressure Transmitter		Indication Only					
		Concentrate Treatment Discharge Pressure Switch		Shutdown System				X	
		Concentrate Treatment Discharge Flowmeter		Indication Only					

MESA WATER DISTRICT
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Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score H	M	L	Recommended Spare Parts	Notes
	P&ID N-9								
	Storage								
								X	Warehouse Spare
		Caustic Soda Storage Tank							Potential Mitigation: Add a Tote Connection
		Level Indicator		Indication Only					
		Level Transmitter		Indication Only					
		Containment Level Switch		Shuts Isolation Valves				X	Potential Mitigation: Software Bypass Switch
		Caustic Soda Tank Discharge Isolation Valve		Handwheel on Valve					
	Scrubber Metering Pumps								
	Metering Pump No. 1	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Pump Shutdown but redundant pump				X	
	Metering Pump No. 2	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Pump Shutdown but redundant pump				X	
		Discharge Level Switch	Double Containment Piping Pipe	Pump Shutdown				X	Potential Mitigation: Bypass switch on panel
Caustic Soda	**Chemical Injection Metering Pumps**								
	Metering Pump No. 3	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Pump Shutdown but redundant pump				X	
	Metering Pump No. 4	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Pump Shutdown but redundant pump				X	
		Flowmeter	Common Pipe for pumps No. 3 & 4	Use Pump Speed					
		Level Switch	Double Containment Piping Pipe	Pump Shutdown				X	Potential Mitigation: Bypass switch on panel
	Containment Area								
		Level Switch		Shuts Isolation Valve				X	Potential Mitigation: Software Bypass Switch
		Caustic Soda Feed Isolation Valve		Handwheel on Valve					
	Injection System								
		Injection System		Warehouse Spares				X	

MESA WATER DISTRICT
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Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score H	M	L	Recommended Spare Parts	Notes
	P&ID N-10								
CIP System	**Transfer Pump**								
	Caustic Soda CIP Transfer Pump	PUMP	Metering Pump	System not critical to emergency operation					
		Pressure Indcator		Indication Only					
		Pressure Switch		Shutdown; System not critical to emergency operation				X	
	CIP Make-up Water Softener System								
		CIP Make-up Water Softener System	Vendor System						Redundant Control Panels, Manual Bypass valve for the system
	CIP Mixing Tank								
		CIP Tank No. 1		Redundant System					
		CIP Tank No. 1 Mixing Tank Mixer		Redundant System					
		CIP Tank No. 1 Heater		Redundant System					
		CIP Tank No. 1 Level Transmitter		Redundant System					
		CIP Tank No. 1 Inlet Valve		Redundant System					
		CIP Tank No. 1 Discharge Valve		Redundant System					
		CIP Tank No. 2		Redundant System					
		CIP Tank No. 2 Mixing Tank Mixer		Redundant System					
		CIP Tank No. 2 Heater		Redundant System					
		CIP Tank No. 2 Level Transmitter		Redundant System					
		CIP Tank No. 2 Inlet Valve		Redundant System					
		CIP Tank No. 2 Discharge Valve		Redundant System					
	CIP Batching Tank								
		CIP Batching Tank						X	
	Batch Transfer Pump								
		Batch Transfer Pump		System not critical to emergency operation					
		Batch Transfer Pump Inlet Valve		Handwheel on Valve					
		Batch Transfer Pump Discharge Valve		Handwheel on Valve					
	CIP Pump								
		CIP PUMP		System not critical to emergency operation					
		Pressure Indicator	Quantity=2	Indication Only					
		Suction Pressure Switch		Shutdown; System not critical to emergency operation				X	
		Discharge Flow Switch		Shutdown; System not critical to emergency operation				X	
	Cartridge Filter								
		Cartridge Filter		Plant will Operater without Cartridge Filter					
		Differential Pressure Indicator		Indication Only					
	Discharge Flowmeter								
		Discharge Flowmeter		Indication Only					

MESA WATER DISTRICT
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Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score H	M	L	Recommended Spare Parts	Notes
	P&ID N-11								
	Sump								
	Lift Pump No. 1	PUMP		Redundant Pump					
		Motor Leak		Redundant Pump					
		Stator Leak		Redundant Pump					
		Oil Leak		Redundant Pump					
		Stator Temperature		Redundant Pump					
		Lower Bearing Temperature		Redundant Pump					
	Lift Pump No. 2	PUMP		Redundant Pump					
		Motor Leak		Redundant Pump					
		Stator Leak		Redundant Pump					
		Oil Leak		Redundant Pump					
		Stator Temperature		Redundant Pump					
		Lower Bearing Temperature		Redundant Pump					
CO2 Storage									
		Level Switch Low Low		Manual Control on Control Panel				X	
		Level Switch Low		Manual Control on Control Panel					
		Level Switch		Manual Control on Control Panel					
		Level Switch High		Manual Control on Control Panel					
		Level Switch High High		Manual Control on Control Panel					
	Carbon Dioxide Storage Tank								
		Carbon Dioxide Storage Tank No. 1		Critical System					Potential mitigation: Install direct connection for tanker truck.
		Carbon Dioxide Vapor Heater		Critical System					Potential mitigation: Redundant heat exchanger.

MESA WATER DISTRICT
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Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score H	M	L	Recommended Spare Parts	Notes
	P&ID N-12								
Anti-Foam	**Storage**								
		Drum/Tote Transfer Pump		System is not critical to emergency operation					
		Anti-Foam Storage Tank							
		Level Switch	Pump Control	Pump Shutdown					
		Level Transmitter	Indication Only						
		Level Indicator	Indication Only						
	Metering Pumps								
	Metering Pump No. 1	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Pump Shutdown but redundant pump				X	
	Metering Pump No. 2	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Pump Shutdown but redundant pump				X	
		Level Switch	Common Pipe for pumps No. 1&2	Alarm Only					
	Metering Pump No. 3	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Pump Shutdown but redundant pump				X	
	Metering Pump No. 4	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Pump Shutdown but redundant pump				X	
		Level Switch	Double Containment Piping Pipe	Pump Shutdown				X	
	Pump Containment Area								
		Level Switch	Containment Area	Pump Shutdown				X	
	Injection System								
		Injection System		Warehouse Spares				X	

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Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score H	M	L	Recommended Spare Parts	Notes
	P&ID N-13								
	Post Treatment								
		Inlet valve from Secondary NF		Indication Only					
		Post Treatment Pressure		Indication Only					
		Post Treatment Flow		Indication Only					
		Carbon Dioxide Solution Panel No. 1		Redundant Panel					
		Carbon Dioxide Solution Panel No. 2		Redundant Panel					
		CO2 Booster Pump No. 1		Redundant Pumps					
		Suction Pressure Switch		Redundant Pumps					
		Discharge Pressure Switch		Redundant Pumps					
		CO2 Booster Pump No. 2		Redundant Pumps					
		Suction Pressure Switch		Redundant Pumps					
		Discharge Pressure Switch		Redundant Pumps					
Post Treatment		CO2 Booster Pump No. 3		Redundant Pumps					
		Suction Pressure Switch		Redundant Pumps					
		Discharge Pressure Switch		Redundant Pumps					
		pH Analyzer		Warehouse Spare				X	
		pH Analyzer Flow Indicator		Indication Only					
		Anti-Foam and secondary NF Feed Flowmeter		Indication Only					
		Anti-Foam and secondary NF Feed Pressure Transmitter		Indication Only					
		Safety Shower Flow Switch		Monthly Maintenance				X	

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Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score H	Criticality Score M	Criticality Score L	Recommended Spare Parts	Notes
	P&ID N-14								
	Storage								
		Soduim Hypochlorite Storage Tank							Potential Mitigation: Add a Tote Connection
		Level Transmitter		Indication Only					
		Containment Level Switch	Shuts Valves						Potential Mitigation: Software Bypass Switch
		Sodium Hypochlorite Tank Block Valve		Handwheel on Valve					
	Scrubber Metering Pumps								
	Metering Pump No. 1	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Shutdown, Redundant Pump				X	
		Discharge Level Switch	Double Containment Piping Pipe	Pump Shutdown				X	Potential Mitigation: Bypass switch on panel
	Metering Pump No. 2	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Shutdown, Redundant Pump				X	
		Discharge Level Switch	Double Containment Piping Pipe	Pump Shutdown				X	Potential Mitigation: Bypass switch on panel
	FW P&ID N-04								
	Metering Pump No. 3	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Shutdown, Redundant Pump				X	
	P&ID N-14								
	Chemical Injection Metering Pumps								
Sodium Hypochlorite	Metering Pump No. 4	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Shutdown, Redundant Pump				X	
	Metering Pump No. 5	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Shutdown, Redundant Pump				X	
		Flow Meter	Common Pipe for pumps No. 3 & 4	Indication Only					
		Level Switch	Common Pipe for pumps No. 3&4	Alarm Only					
	FW P&ID N-04								
	Metering Pump No. 6	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Shutdown, Redundant Pump				X	
		Discharge Level Switch	Double Containment Piping Pipe	Pump Shutdown				X	Potential Mitigation: Bypass switch on panel
	P&ID N-14								
	Containment Area								
		Level Switch		Shuts Isolation Valve				X	Potential Mitigation: Software Bypass Switch
	Injection System								
		Injection System		Warehouse Spares				X	

MESA WATER DISTRICT
Single Points of Failure Analysis
Criticality Summary Table - MWRF and Finished Water Facilities

High – Failure of this system/equipment substantially impacts production; no redundant system/equipment available
Medium – Failure of this system/equipment does not impact production; redundant system/equipment exists and is assumed to operate
Low – Failure of this system/equipment does not impact production; no redundant system/equipment available

Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score			Recommended Spare Parts	Notes
					H	M	L		
	P&ID N-15, N-02.1								
Degasifier System	**Degasifier**								
		Degasifier Blower No. 1		Redundant Train					
		Degasifier Blower No. 2		Redundant Train					
		Degasifier No. 1		Redundant Train					
		Level Switch Low		Redundant Train					
		Level Switch High		Redundant Train					
		Degasifier No. 2		Redundant Train					
		Level Switch Low		Redundant Train					
		Level Switch High		Redundant Train					
	CIP								
		Flow Indicator		Indication Only					
		Isolation Valve		Handwheel on Valve					
		Inlet Valve		Handwheel on Valve					
		Inlet Valve		Handwheel on Valve					
		Discharge Valve		Handwheel on Valve					
		Drain Valve		Handwheel on Valve					
		ORP Analyzer		Warehouse Spare				X	
		Suction Pressure Switch		System not critical to emergency operation				X	
		CIP Recirculation Pump No. 1		System not critical to emergency operation					
		Discharge Pressure Switch		System not critical to emergency operation				X	

MESA WATER DISTRICT
Single Points of Failure Analysis
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Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score			Recommended Spare Parts	Notes
					H	M	L		
	P&ID N-16								
	Scrubber								
		Scrubber		One Scrubber ; System is not critical to emergency operation					
		Level Switch Low Low	Recirculation Fan Shutdown	Used For Pump Control, Operate pump in Hand				X	
		Level Switch Low	Opens Solenoid Valve	Manual Overide on Solenoid Valve				X	
		Level Switch High	Closes Solenoid	Manual Overide on Solenoid Valve				X	
		Level Switch High High	Alarm	Alarm Only					
		Soften Water Flow Indicator		Indication Only					
Scrubber System		Soften Water Flow Transmitter		Indication Only					
		pH analyzer		Warehouse Spares				X	
		OPR Analyzer		Warehouse Spares				X	
	Scrubber Pump								
		Scrubber Recirculation Pump No. 1		Redundant Pump					
		Scrubber Recirculation Pump No. 2		Redundant Pump					

MESA WATER DISTRICT
Single Points of Failure Analysis
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Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score			Recommended Spare Parts	Notes
					H	M	L		
	P&ID N-17								
	Storage								
		Aqua Ammonia Soda Storage Tank							Potential Mitigation: Add a Tote Connection
		Level Indicator		Indication Only					
		Level Transmitter		Indication Only					
		Containment Level Switch		Shuts Isolation Valves					Potential Mitigation: Software Bypass Switch
		Aqua Ammonia Discharge Isolation Valve		Handwheel on Valve					
	Scrubber Metering Pumps								
	Metering Pump No. 1	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Shutdown, Redundant Pump				X	
	Metering Pump No. 2	PUMP	Metering Pump	Redundant Pump					
Aqua Ammonia		Pressure Indcator		Indication Only					
		Pressure Switch		Shutdown, Redundant Pump				X	
		Flowmeter	Aquia Ammonia to Transfer Pumps	Use Pump Speed					
		Discharge Level Switch	Double Containment Piping Pipe	Pump Shutdown				X	Potential Mitigation: Bypass switch on panel
	Containment Area								
		Level Switch		Shuts Isolation Valve				X	Software Bypass Switch
		Aqua Amonia Caustic Soda Feed Isolation Valve		Handwheel on Valve					
	Safety Showers	Chemical Building Interior Flow Switch						X	Monthly Maintenance
		Chemical Building West Flow Switch						X	Monthly Maintenance
		Chemical Building South Flow Switch						X	Monthly Maintenance

MESA WATER DISTRICT
Single Points of Failure Analysis
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Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score H	Criticality Score M	Criticality Score L	Recommended Spare Parts	Notes
	P&ID N-18, N-19								
Product Transfer Pumps	**CO2 System**								
		Carbon Dioxide Solution Panel No. 3		Redundant Panel					
		CO2 Booster Pump No. 4		Redundant Pump					
		Suction Pressure Switch		Redundant Pump				X	
		Discharge Pressure Switch		Redundant Pump				X	
		CO2 Booster Pump No. 5		Redundant Pump					
		Suction Pressure Switch		Redundant Pump				X	
		Discharge Pressure Switch		Redundant Pump				X	
		Flow Indicator		Indication Only					
	Analyzer	Flow Indicator		Indication Only					
		pH Analyzer		Warehouse Spare				X	
	Sump								
		Sump Pump		Not Critical				X	
		Level Switch High		Alarm Only					
	Transfer Pump Sump (Clearwell)								
		Level Transmitter		Indication Only					
		Level switch Low		Alarm Only					
		Level Switch High		Alarm Only					
	Product Transfer Pumps								
		Product Transfer Pump No. 1							
		Motor		Redundant Pump					
		Drive		Redundant Pump					
		Pressure Gauge		Indication Only					
		Motor Temperature		Indication Only					
		Motor Temperature		Indication Only					
		Pressure Switch		Pump Shutdown but redundant pump				X	
		Product Transfer Pump No. 2							
		Motor		Redundant Pump					
		Drive		Redundant Pump					
		Pressure Gauge		Indication Only					
		Motor Temperature		Indication Only					
		Pressure Switch		Pump Shutdown but redundant pump				X	
		Product Transfer Pump No. 3							
		Motor		Redundant Pump					
		Drive		Redundant Pump					
		Pressure Gauge		Indication Only					
		Motor Temperature		Indication Only					
		Pressure Switch		Pump Shutdown but redundant pump				X	
	Common Header								
		Pressure Indicator		Indication Only					
		Pressure Transmitter		Indication Only					
		Flowmeter		Use Pump Speed/Level Control					
		Analyzer Flow Indicator		Indication Only					
		CL2 Analyzer		Redundant amnalyzers, Warehouse Spares				X	
		CL2 Analyzer		Redundant amnalyzers, Warehouse Spares				X	
		Sample Pump							
		Turbidy Analyzer		Warehouse Spare				X	
		Flow Indicator		Indication Only					
		NHCL2 Analyzer		Warehouse Spare				X	
		pH Analyzer		Warehouse Spare				X	
		Conductivity Analyzer		Warehouse Spare				X	

MESA WATER DISTRICT
Single Points of Failure Analysis
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Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score			Recommended Spare Parts	Notes
					H	M	L		
	P&ID N-20, N-21								
High Lift Station	**Storage**								
		Treated Water Tank Inlet Valve							
		Treated Water Tank Bypass Valve							
		Treated Water Tank							
		Level Transmitter							
		Discharge Isolation Valve							
	High Lift Pumps								
		Level Transmitter		Indication Only					
		Level switch Low		Alarm Only					
		Level Switch High		Alarm Only					
	High Lift Pumps								
		High Lift Pump No. 1							
		Motor		Redundant Pump					
		Drive		Redundant Pump					
		Pressure Gauge		Indication Only					
		Motor Temperature		Indication Only					
		Flow switch		Pump Shutdown but redundant pump				X	
		Inlet Valve		Handwheel on Valve					
		Discharge Valve		Handwheel on Valve					
		High Lift Pump No. 2							
		Motor		Redundant Pump					
		Drive		Redundant Pump					
		Pressure Gauge		Indication Only					
		Motor Temperature		Indication Only					
		Flow switch		Pump Shutdown but redundant pump				X	
		Inlet Valve		Handwheel on Valve					
		Discharge Valve		Handwheel on Valve					
		High Lift Pump No. 3							
		Motor		Redundant Pump					
		Drive		Redundant Pump					
		Pressure Gauge		Indication Only					
		Motor Temperature		Indication Only					
		Flow switch		Pump Shutdown but redundant pump				X	
		Inlet Valve		Handwheel on Valve					
		Discharge Valve		Handwheel on Valve					
	Discharge Header								
		Pressure Gauge		Indication Only					
		Pressure Transmitter		Indication Only					
		Analyzer Flowmeter		Indication Only					
		CL2 Analyzer		Warehouse Spare				X	
		pH Analyzer		Warehouse Spare				X	
		Flowmeter		Use Pump Speed					
	Sample Line								
		Sample Line CL2 Analyzer		Warehouse Spare				X	

MESA WATER DISTRICT
Single Points of Failure Analysis
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Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score H	M	L	Recommended Spare Parts	Notes
	P&ID N-03								
Sodium Bisulfite	**Storage**								
		Sodium Bisulfite Storage Tank							Potential Mitigation: Add a Tote Connection
		Level Transmitter		Indication Only					
		Containment Level Switch		Shuts Isolation Valves				X	Potential Mitigation: Software Bypass Switch
		Sodium Bisulfite Tank Discharge Isolation Valve		Handwheel on Valve					
	Scrubber Metering Pumps								
	Metering Pump No. 1	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Pump Shutdown but redundant pump				X	
	Metering Pump No. 2	PUMP	Metering Pump	Redundant Pump					
		Pressure Indcator		Indication Only					
		Pressure Switch		Pump Shutdown but redundant pump				X	
	Discharge Line								
		Flow meter		Indication Only					
		Discharge Level Switch	Double Containment Piping Pipe	Pump Shutdown				X	Potential Mitigation: Bypass switch on panel
	Injection System								
		Injection System		Warehouse Spares				X	

MESA WATER DISTRICT
Single Points of Failure Analysis
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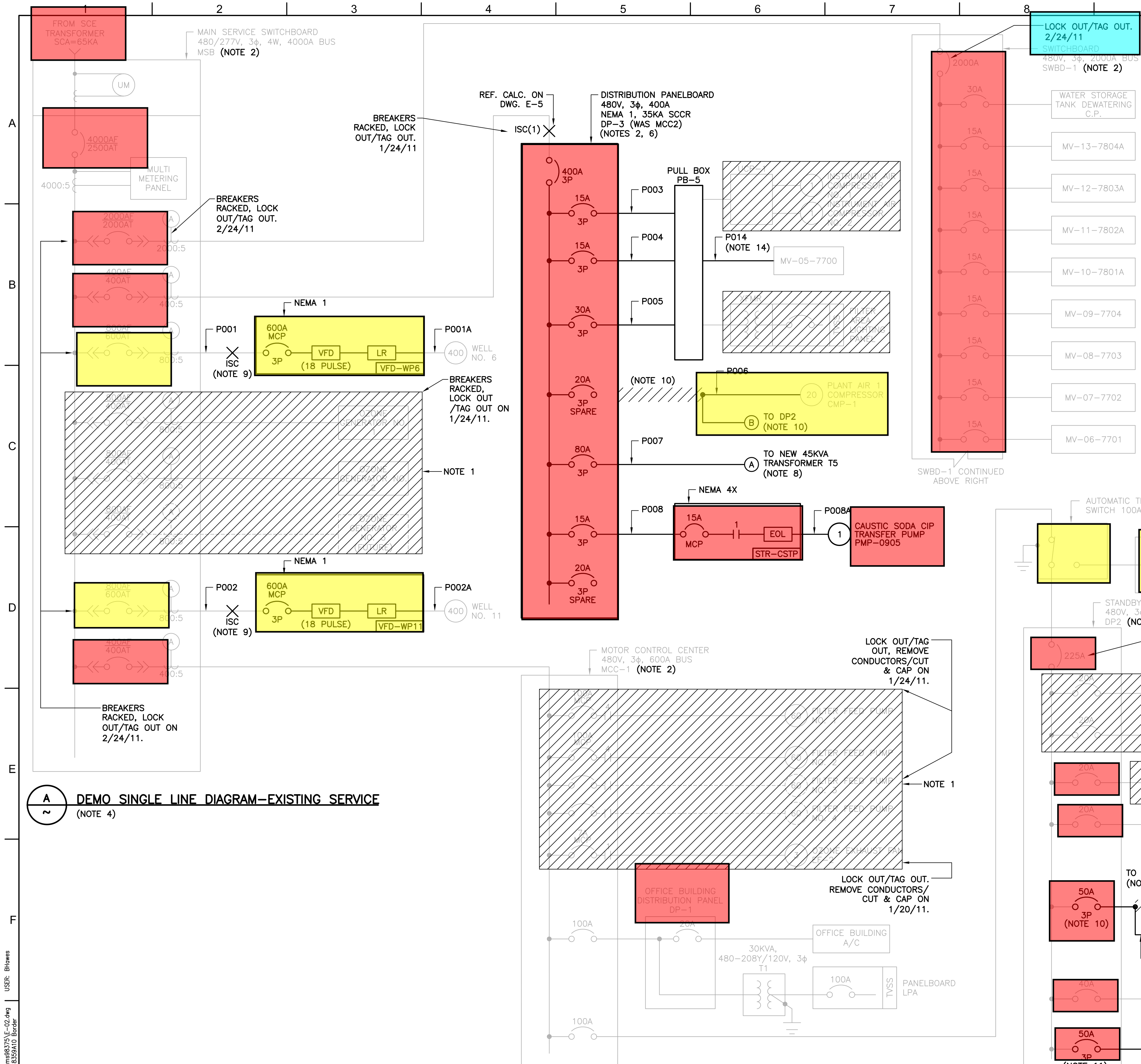
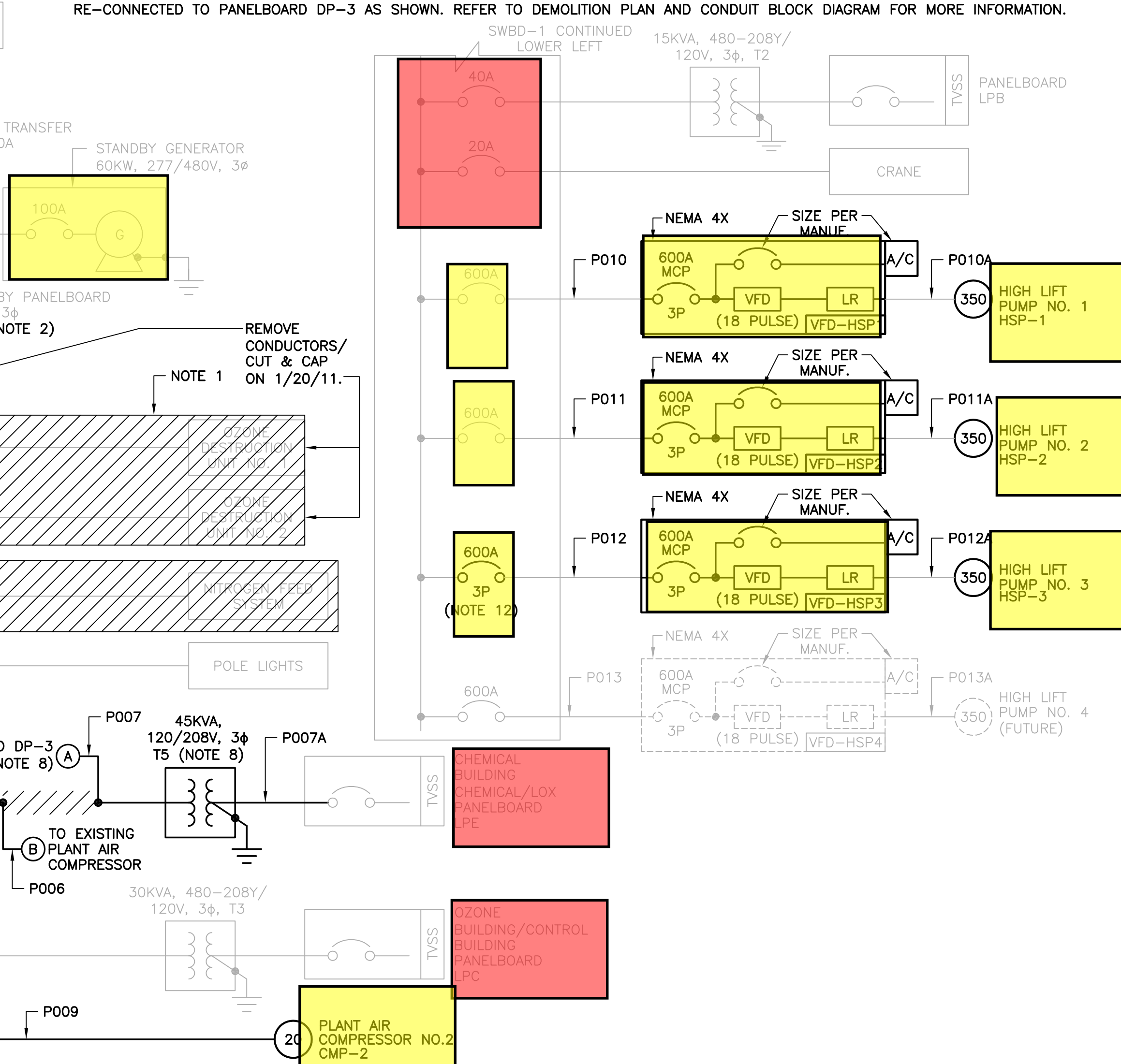
Core Production Area	System	Equipment	Description	Basis for SPF Rating	Criticality Score			Recommended Spare Parts	Notes
					H	M	L		
	Electrical Dwg E2								
MWRF ELECTRICAL	Utility Feed		From SCE Transformer						
	MSB								
		Main Breaker							
		Breaker to SWBD-1							Locked Out
		Breaker to DP-3							
		Breaker to Well No. 6							
		VFD well No. 6							
		Breaker to Well No. 11							
		VFD Well No. 11							
		Breaker to MCC-1							
	DP-3								
		Main Breaker							
		Spare Breaker							
		Breaker to MV-05-7700							
		Spare Breaker							
		Breaker to Chemical Building Chemical/LOX Panelboard LPE							
		Breaker to Caustic Soda CIP Pump							
		Starter for Caustic Soda CIP Pump							
		Spare Breaker							
	MCC-1								
		Main Breaker							
		Breaker to Office Building A/C, Panel Board LPA							
		Breaker to Automatic Transfer Switch							
	Automatic Transfer Switch			Manual Switch on Automatic Transfer Switch					
	Standby Generator			Backup Power					
	Standby Panel Board								
	DP2								
		Main Breaker							
		Spare Breaker							
		Breaker to Pole Light Breaker							
		Breaker to Plant Air Compressor No. 1							
		Breaker to Ozone Building/Control Building Panelboard							
		Breaker to Plant Air Compressor No. 2							
	Dwg E-3								
	Utility Feed	From Utility							
	SWBD-2	Main Breaker							
		SPD Breaker							
		Breaker to MCC-3							
		Breaker to Primary NF Feed Pump No. 1							
		Breaker to Primary NF Feed Pump No. 2							
		Spare Breaker							
		Spare Breaker							
		Breaker to CIP Pump No. 1							
		Breaker to CIP Tank Heater Control Panel No. 1							
		Breaker to CIP Tank Heater Control Panel No. 2							
	Dwg E-4								
	MCC-3								
		Breaker to Lighting Panel and Lighting Panel							
		Breaker to Production Transfer Pump No. 1		Process Spares					
		Breaker to Production Transfer Pump No. 2		Process Spares					
		Breaker to Production Transfer Pump No. 3		Process Spares					
		Spare Breaker		Spare Breaker					
		Breaker to Degasifier Blower No. 1		Process Spares					
		Breaker to Degasifier Blower No. 2		Process Spares					
		Spare Breaker		Spare Breaker					
		Spare Breaker		Spare Breaker					
		Breaker to NF Feed Pump No. 1							
		Breaker to CIP Mixer No. 1		Process Spares					
		Breaker to CIP Mixer No. 2		Process Spares					
		Breaker to CIP Mixer No. 3		Process Spares					
		Breaker to Batch Transfer Pump No. 1							
		Scrubber Recirculation Pump No. 1		Process Spares					
		Scrubber Recirculation Pump No. 2		Process Spares					
		Spare Breaker		Spare Breaker					
		Breaker to CO2 Booster Pump No. 1		Process Spares					
		Breaker to CO2 Booster Pump No. 2		Process Spares					
		Breaker to CO2 Booster Pump No. 3		Process Spares					
		Breaker to CO2 Booster Pump No. 4		Process Spares					
		Breaker to CO2 Booster Pump No. 5		Process Spares					
		Breaker to Air Conditioning Unit		Not Critical					
		Breaker to Lift Station Duplex Control Panel							
		Breaker to Sand Separator Control Panel							
		Breaker to Carbon Dioxide Condensing Unit							
		Breaker to Carbon Dioxide Pressure Builder							
		Breaker to Lighting TranstomerXMR-2 and Lighting panel LP-2 and LP-3							
	UPS								
		UPS		Used as backup					



NOTES:

1. ALL ITEMS SHOWN HATCHED ON THIS DRAWING ARE TO BE DEMOLISHED. DEMOLISHMENT EFFORTS ARE TO CONSIST OF THE FOLLOWING: REMOVAL OF ASSOCIATED FEED BREAKERS AND STARTERS, INSTALLING MANUFACTURER RECOMMENDED COVERS ON SECTIONS WHERE BREAKERS WERE REMOVED (TO BE LABELED 'SPACE'), REMOVAL OF ASSOCIATED WIRING AND CAPPING OF ASSOCIATED FIELD CONDUITS. ALL REMOVED EQUIPMENT/HARDWARE IS TO BE GIVEN TO OWNER FOR PROPER STORAGE/DISPOSAL.
2. LOAD CALCULATIONS FOR 'MSB', 'SWBD-1', 'DP-3', 'DP2', AND 'MCC-1' ARE REFLECTED ON DRAWING E-5.
3. 'FUTURE' LOADS DEPICTED IN LOAD CALCULATIONS AS 'TO BE REMOVED' DO NOT PERTAIN TO ACTUAL EQUIPMENT REQUIRING REMOVAL AS THEY ARE 'FUTURE'. THIS ONLY INDICATES THAT THE ASSOCIATED LOAD VALUE THAT WOULD HAVE BEEN ACCOUNTED FOR IN ORIGINAL PLANT DESIGN LOAD CALCULATIONS IS NOT BEING ACCOUNTED FOR IN THE TOTAL LOAD CALCULATION(S) AS IT PERTAINS TO THIS DESIGN.
4. INFORMATION REFLECTED ON THIS DRAWING IS BASED ON INFORMATION TAKEN FROM ORIGINAL PLANT SINGLE LINE DRAWINGS DATED 2/16/00 AND FROM INFORMATION GATHERED DURING A SITE VISIT CONDUCTED ON 10/8/09.
5. 'LOAD TO BE REMOVED' VALUE FOR 'MSB' (E-5 LOAD CALCULATIONS) INCLUDES REMOVED LOAD VALUES FROM ALL ASSOCIATED SUB-FED PANELS ('MCC-2', AND 'MCC-1').
6. EXISTING MCC (MCC-2) IN CHEMICAL BUILDING IS TO BE REPLACED WITH NEW PANELBOARD (DP-3) AS SHOWN.
7. THE SINGLE LINE DIAGRAM CALLOUT SCHEDULE IS LOCATED ON DRAWING E-5.
8. DEMOLISH EXISTING POWER CONDUCTORS AND ASSOCIATED CONDUIT FEEDING EXISTING TRANSFORMER T5 FROM EXISTING PANELBOARD DP2. REPLACE EXISTING 15KVA TRANSFORMER T5 WITH NEW 45KVA TRANSFORMER. PROVIDE POWER TO NEW TRANSFORMER T5 FROM NEW PANELBOARD DP-3.
9. ALL SHORT CIRCUIT INTERRUPTING AND PROTECTING DEVICES SHALL HAVE A SHORT CIRCUIT INTERRUPTING RATING EQUAL TO OR GREATER THAN THE AVAILABLE SHORT CIRCUIT ON THE BUS. AVAILABLE SHORT CIRCUIT CURRENT AT VFD'S TO BE ASSUMED AT 65KA.
10. DEMOLISH EXISTING POWER CONDUCTORS FEEDING THE EXISTING PLANT AIR COMPRESSOR (CMP-1) FROM EXISTING MCC-2. INSTALL NEW POWER CONDUCTORS AND REPLACE EXISTING 30A BREAKER WITH NEW 50A BREAKER IN EXISTING STANDBY PANELBOARD DP2 TO PROVIDE POWER TO EXISTING PLANT AIR COMPRESSOR.
11. INSTALL NEW 50A BREAKER IN SPACE ASSOCIATED WITH DEMOLISHED OZONE DESTRUCTION UNIT NO.1 FEEDER BREAKER IN EXISTING STANDBY PANELBOARD DP-2. UTILIZE NEW 50A BREAKER TO PROVIDE POWER TO NEW PLANT AIR COMPRESSOR NO.2 (CMP-2).
12. INSTALL NEW 600A FEEDER BREAKER IN SPACE WITHIN EXISTING SWITCHBOARD SWBD-1 TO PROVIDE POWER TO HIGH SERVICE PUMP NO.3.
13. EXISTING HIGH LIFT PUMP NO.1 AND NO.2 SHALL BE REFURBISHED ACCORDING TO MOTOR REFURBISHMENT SPECIFICATION.
14. THE EXISTING DUCTBANK ASSOCIATED WITH MV-05 IS BEING DEMOLISHED. ASSOCIATED POWER CONDUCTORS WILL BE REPLACED AND RE-CONNECTED TO PANELBOARD DP-3 AS SHOWN. REFER TO DEMOLITION PLAN AND CONDUIT BLOCK DIAGRAM FOR MORE INFORMATION.



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carollo

**
ORIGINAL
SEALED BY
BRIAN D. DOWNING
10/09
E17607
**

MesaWater
DISTRICT
YOUR INDEPENDENT WATER AGENCY
1965 Placentia Avenue • Costa Mesa, CA 92627
Tel: 949-631-1291

APPROVAL HISTORY

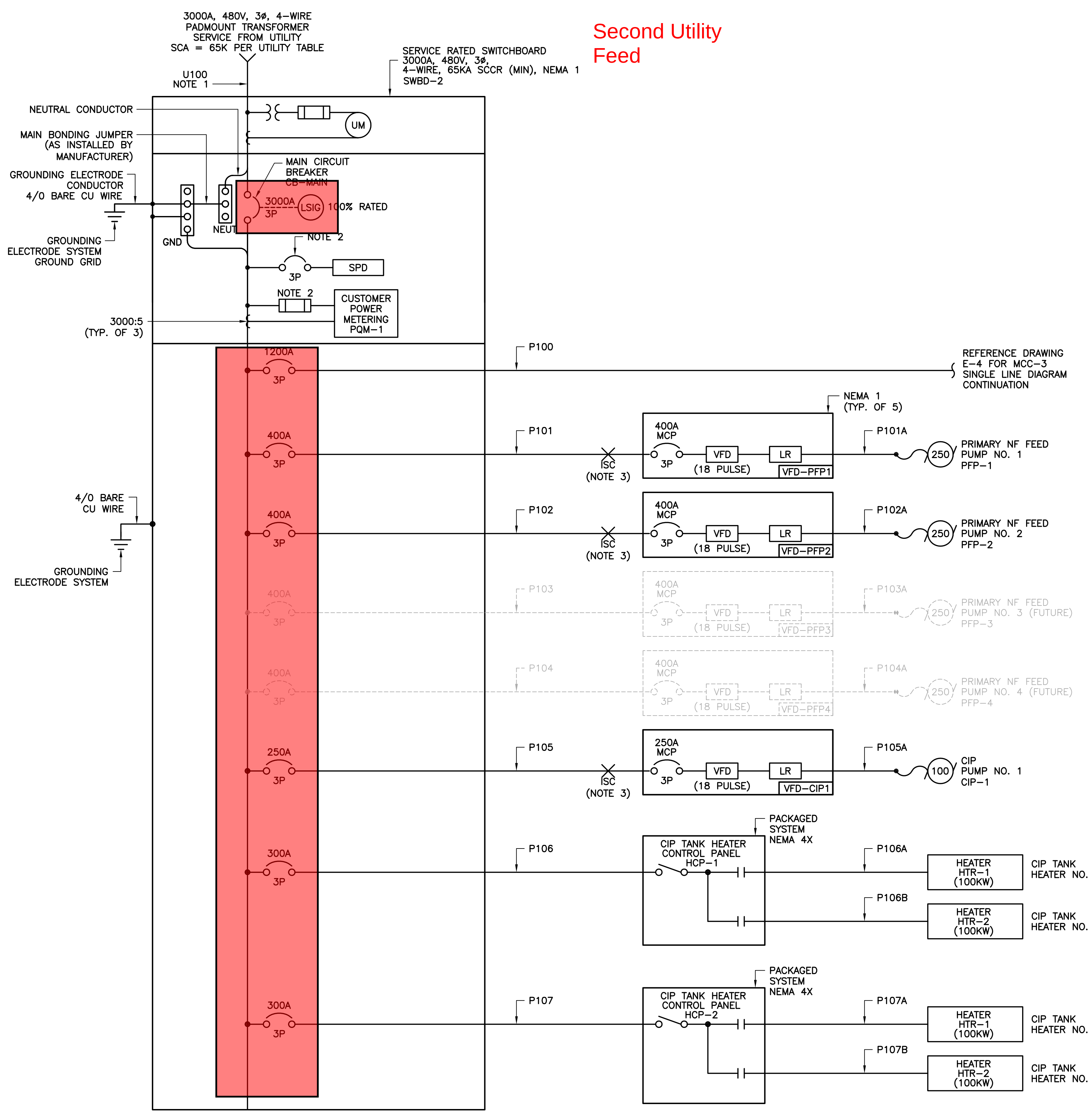
NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

ELECTRICAL
EXISTING SERVICE DEMOLITION/ADDITIONS
SINGLE LINE DIAGRAM

DRAWN: TJB | DATE: 10/2010 | DESIGN: SKL | SCALE: AS NOTED

DRAWING NUMBER E-2 | REVISION

SHEET 112 OF 188 SHEETS



A ~ SINGLE LINE DIAGRAM SWBD-2

NOTE 4

NOTES:

1. CONDUIT, TRENCHING, AND BACKFILL ASSOCIATED WITH POWER FEED RUNNING BETWEEN UTILITY SERVICE POINT(S) AND SERVICE ENTRANCE IS TO BE PER UTILITY REQUIREMENTS.
2. CIRCUIT BREAKERS AND FUSES SHOWN WITHOUT SIZES ARE TO BE SIZED PER ASSOCIATED EQUIPMENT MANUFACTURER'S RECOMMENDATIONS.
3. ALL SHORT CIRCUIT INTERRUPTING AND PROTECTING DEVICES SHALL HAVE A SHORT CIRCUIT INTERRUPTING RATING EQUAL TO OR GREATER THAN THE AVAILABLE SHORT CIRCUIT AT THE BUS. AVAILABLE SHORT CIRCUIT CURRENT AT VFD'S TO BE ASSUMED AT 65KA.
4. THE SINGLE LINE DIAGRAM CALLOUT SCHEDULE IS LOCATED ON DRAWING E-5.
5. ALL CONDUIT SHOWN FOR FUTURE EQUIPMENT IS TO BE INSTALLED AS PART OF THIS DESIGN.

CIRCUIT/DESCRIPTION	KVA	HP	FLA
SWBD-2 Service Rated Switchboard			
MOTOR LOADS			
Primary NF Feed Pump No. 1		250.0	302.0
Primary NF Feed Pump No. 2		250.0	302.0
CIP Pump No. 1		100.0	124.0
FUTURE MOTOR LOADS			
Primary NF Feed Pump No. 3 (Future)		250.0	302.0
Primary NF Feed Pump No. 4 (Future)		250.0	302.0
NON-MOTOR LOADS			
CIP Tank Heater No. 1	100.0		120.3
CIP Tank Heater No. 2	100.0		120.3
CIP Tank Heater No. 3	100.0		120.3
CIP Tank Heater No. 4	100.0		120.3
MCC-3			996.6
SUBTOTAL			2809.7
+ 25% OF LARGEST MOTOR			75.5
TOTAL AMPS @ 480V/3PHASE			2885.2
SERVICE SIZE (AMPS)			3000.0

B ~ LOAD CALCULATIONS (SWBD-2)

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APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

ELECTRICAL
SINGLE LINE DIAGRAM SWBD-2

DRAWN: TJB
DATE: 10/2010
DESIGN: SKL
SCALE: AS NOTED
DRAWING NUMBER: E-3
REVISION
SHEET 113 OF 188 SHEETS

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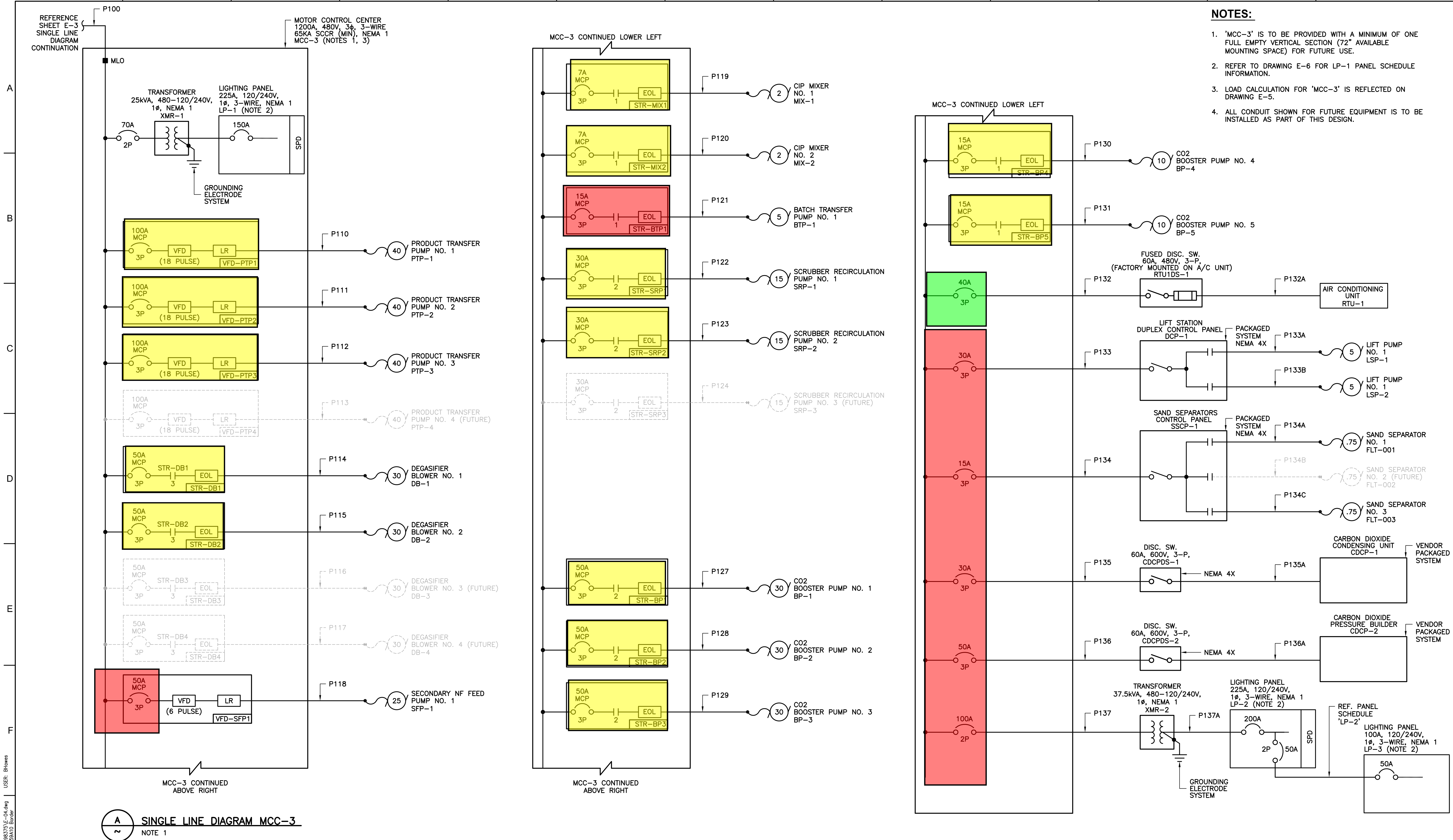
USER: bhowes



A SINGLE LINE DIAGRAM MCC-3
NOTE 1

NOTES:

1. 'MCC-3' IS TO BE PROVIDED WITH A MINIMUM OF ONE FULL EMPTY VERTICAL SECTION (72" AVAILABLE MOUNTING SPACE) FOR FUTURE USE.
2. REFER TO DRAWING E-6 FOR LP-1 PANEL SCHEDULE INFORMATION.
3. LOAD CALCULATION FOR 'MCC-3' IS REFLECTED ON DRAWING E-5.
4. ALL CONDUIT SHOWN FOR FUTURE EQUIPMENT IS TO BE INSTALLED AS PART OF THIS DESIGN.

DLT&V SYSTEMS ENGINEERING
16 TECHNOLOGY, SUITE 100
IRVINE, CA 92618 (949) 273-8773

carollo

**
ORIGINAL
SEALED BY
BRIAN D. DOWNING
10/09
E17607
**

Mesa Water DISTRICT
YOUR INDEPENDENT WATER AGENCY
1965 Placentia Avenue • Costa Mesa, CA 92627
Tel: 949-631-1291

APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

ELECTRICAL
SINGLE LINE DIAGRAM MCC-3

DRAWN: TJB	DATE: 10/2010	DRAWING NUMBER: E-4	REVISION
DESIGN: SKL	SCALE: AS NOTED	SHEET 114 OF 188 SHEETS	

DWG: C:\pw_working\projectwise\bhowes\dms88375\E-04.dwg XREFS: 8359A10 Border
DATE: Apr 10, 2013 9:26am USER: BHowes

NOTES:

1. 'FUTURE' LOADS DEPICTED IN LOAD CALCULATIONS AS 'TO BE REMOVED' DO NOT PERTAIN TO ACTUAL EQUIPMENT REQUIRING REMOVAL AS THEY ARE 'FUTURE'. THIS ONLY INDICATES THAT THE ASSOCIATED LOAD VALUE THAT WOULD HAVE BEEN ACCOUNTED FOR IN ORIGINAL PLANT DESIGN LOAD CALCULATIONS IS BEING REMOVED FROM THE TOTAL LOAD CALCULATION(S) AS IT PERTAINS TO THIS DESIGN.
2. 'LOAD TO BE REMOVED' VALUE FOR 'MCC-1' INCLUDES REMOVED LOAD VALUES FROM ASSOCIATED SUB-FED PANEL 'DP-2'.
3. 'LOAD TO BE REMOVED' VALUE FOR 'MSB' INCLUDES REMOVED LOAD VALUES FROM ASSOCIATED SUB-FED PANELS 'SWBD-2', 'MCC-2', AND 'MCC-1'.

CALLOUT NO.	NO. SETS	CONDUIT SIZE	CIRCUIT CONDUCTORS	CIRCUIT NO.'s
U100	PER UTILITY	PER UTILITY	PROVIDED BY UTILITY	SWBD2-P1
P001	2	3" EXISTING	3 - 350 MCM, #1/0 GND	VFDWP6-P1
P001A	2	3" EXISTING	3 - 350 MCM, #1/0 GND	WELL6-P1
P002	2	3" EXISTING	3 - 350 MCM, #1/0 GND	VFDWP11-P1
P002A	2	3" EXISTING	3 - 350 MCM, #1/0 GND	WELL11-P1
P004	1	1"	3 - #12, #12 GND	PB5-P2
P006	1	1"	3 - #8, #8 GND	CMP-P1
P007	1	1"	3 - #4, #8 GND	T5-P1
P007A	1	1 1/2"	4 - #2/0, #4 GND	LPE-P1
P008	1	1"	3 - #12, #12 GND	STRCSTP-P1
P008A	1	1"	3 - #12, #12 GND	PMP0905-P1
P009	1	3" EXISTING	3 - #8, #8 GND	CMP2-P1
P010	2	3" EXISTING	3 - 350 MCM, #1/0 GND	VFDHSP1-P1
P010A	2	3" EXISTING	3 - 350 MCM, #1/0 GND	HSP1-P1
P011	2	3" EXISTING	3 - 350 MCM, #1/0 GND	VFDHSP2-P1
P011A	2	3" EXISTING	3 - 350 MCM, #1/0 GND	HSP2-P1
P012	2	3" EXISTING	3 - 350 MCM, #1/0 GND	VFDHSP3-P1
P012A	2	3" EXISTING	3 - 350 MCM, #1/0 GND	HSP3-P1
P013	2	3" EXISTING	FUTURE CONDUCTORS	VFDHSP4-P1
P013A	2	3"	FUTURE CONDUCTORS	HSP4-P1
P014	1	1"	3 - #12, #12 GND	MV05-P1
P100	4	3"	3 - 350 MCM, #4/0 GND	MCC3-P1
P101	1	3"	3 - 500 MCM, #2 GND	VFDPFP1-P1
P101A	1	3"	3 - 500 MCM, #2 GND	PFP1-P1
P102	1	3"	3 - 500 MCM, #2 GND	VFDPFP2-P1
P102A	1	3"	3 - 500 MCM, #2 GND	PFP2-P1
P103	1	3"	FUTURE CONDUCTORS	VFDPFP3-P1
P103A	1	3"	FUTURE CONDUCTORS	PFP3-P1
P104	1	3"	FUTURE CONDUCTORS	VFDPFP4-P1
P104A	1	3"	FUTURE CONDUCTORS	PFP4-P1
P105	1	2"	3 - #2/0, #4 GND	VFDCIP1-P1
P105A	1	2"	3 - #2/0, #4 GND	CIP1-P1
P106	1	3"	3 - 350 MCM, #4 GND	HCP1-P1
P106A	1	2"	9 - #6, #4 GND	HTR1-P1
P106B	1	2"	9 - #6, #4 GND	HTR2-P1
P107	1	3"	9 - 350 MCM, #4 GND	HCP2-P1
P107A	1	2"	9 - #6, #4 GND	HTR3-P1
P107B	1	2"	9 - #6, #4 GND	HTR4-P1
P110	1	1 1/2"	3 - #4, #8 GND	PTP1-P1
P111	1	1 1/2"	3 - #4, #8 GND	PTP2-P1
P112	1	1 1/2"	3 - #4, #8 GND	PTP3-P1
P113	1	1 1/2"	FUTURE CONDUCTORS	PTP4-P1
P114	1	1"	3 - #6, #10 GND	DB1-P1
P115	1	1"	3 - #6, #10 GND	DB2-P1
P116	1	1"	FUTURE CONDUCTORS	DB3-P1
P117	1	1"	FUTURE CONDUCTORS	DB4-P1
P118	1	1"	3 - #6, #10 GND	SFP1-P1
P119	1	1"	3 - #12, #12 GND	MIX1-P1
P120	1	1"	3 - #12, #12 GND	MIX2-P1
P121	1	1"	3 - #12, #12 GND	BTP1-P1
P122	1	1"	3 - #10, #10 GND	SRP1-P1
P123	1	1"	3 - #10, #10 GND	SRP2-P1
P124	1	1"	FUTURE CONDUCTORS	SRP3-P1
P125	1	1"	FUTURE CONDUCTORS	SRP4-P1
P126	1	1"	FUTURE CONDUCTORS	SRP5-P1
P127	1	1"	3 - #6, #10 GND	BP1-P1
P128	1	1"	3 - #6, #10 GND	BP2-P1
P129	1	1"	3 - #6, #10 GND	BP3-P1
P130	1	1"	3 - #12, #12 GND	BP4-P1
P131	1	1"	3 - #12, #12 GND	BP5-P1
P132	1	1"	3 - #8, #10 GND	RTU1DS1-P1
P132A	1	1"	3 - #8, #10 GND	RTU1-P1
P133	1	1"	3 - #10, #10 GND	DCP1-P1
P133A	1	1"	3 - #12, #12 GND	LSP1-P1
P133B	1	1"	3 - #12, #12 GND	LSP2-P1
P134	1	1"	3 - #12, #12 GND	SSCP1-P1
P134A	1	1"	3 - #12, #12 GND	FLT001-P1
P134B	1	1"	FUTURE CONDUCTORS	FLT002-P1
P134C	1	1"	3 - #12, #12 GND	FLT003-P1
P135	1	1"	3 - #10, #10 GND	CDCPDS1-P1
P135A	1	1"	3 - #10, #10 GND	CDCP1-P1
P136	1	1"	3 - #6, #8 GND	CDCPDS2-P1
P136A	1	1"	3 - #6, #8 GND	CDCP2-P1
P137	1	1 1/2"	2 - #1, #8 GND	XMR2-P1
P137A	1	1 1/2"	2 - #2/0, #2/0 NEUT, #6 GND	LP2-P1

A ~ CALLOUT SCHEDULE

CIRCUIT/DESCRIPTION	KVA	HP	FLA
MSB Main Service Switchboard			
MOTOR LOADS			
Well No. 6		400.0	477.0
Well No. 11		400.0	477.0
**Well No. 12 (Future)		400.0	477.0
NON-MOTOR LOADS			
SWBD-1			967.8
DP-3			133.5
MCC-1			581.0
*Ozone Generator No. 1			280.0
*Ozone Generator No. 2			280.0
*Ozone Generator No. 3 (Future)			280.0
SUBTOTAL			3476.3
+ 25% OF LARGEST MOTOR			119.3
TOTAL AMPS @ 480V/3PHASE (ORIGINAL)			3595.6
(NOTE 5) LOAD TO BE REMOVED			1269.4
ADJUSTED LOAD			2326.1
SERVICE SIZE (AMPS)			4000.0

* DENOTES LOAD TO BE REMOVED. (NOTE 3)
** DENOTES WHAT WILL BE CONSIDERED TO BE A NON-COINCIDENTAL LOAD AND IS THEREFORE NOT ACCOUNTED FOR IN THE TOTAL LOAD CALCULATION.

B ~ LOAD CALCULATIONS (MSB)

CIRCUIT/DESCRIPTION	KVA	HP	FLA
SWBD-1 High Lift Pump Station			
MOTOR LOADS			
High Lift Pump No. 1		350.0	414.0
High Lift Pump No. 2		350.0	414.0
**High Lift Pump No. 3		350.0	414.0
**High Lift Pump No. 4 (Future)		350.0	414.0
Crane	1.5		1.8
*MV-06-7701	1.5		1.8
MV-07-7702	1.5		1.8
MV-08-7703	1.5		1.8
MV-09-7704	1.5		1.8
MV-10-7801A	1.5		1.8
MV-11-7802A	1.5		1.8
MV-12-7803A	1.5		1.8
MV-13-7804A	1.5		1.8
Water Storage Tank Dewatering C.P.			2.0
NON-MOTOR LOADS			
THREE PHASE TRANSFORMER T2	15.0		18.0
SUBTOTAL			864.3
+ 25% OF LARGEST MOTOR			103.5
TOTAL AMPS @ 480V/3PHASE (ORIGINAL)			967.8
EQUIPMENT BUS RATING (AMPS)			2000.0

* DENOTES LOAD TO BE REMOVED. (NOTE 3)
** DENOTES WHAT WILL BE CONSIDERED TO BE A NON-COINCIDENTAL LOAD AND IS THEREFORE NOT ACCOUNTED FOR IN THE TOTAL LOAD CALCULATION.

C ~ LOAD CALCULATIONS (SWBD-1)

CIRCUIT/DESCRIPTION	KVA	HP	FLA
DP-3 Chemical Building			
MOTOR LOADS			
Instrument Air Compressor No. 1		1.0	2.1
Instrument Air Compressor No. 2		1.0	2.1
*Airwash Blower No. 1		20.0	27.0
*Airwash Blower No. 2		20.0	27.0
*Washwater Recovery Pump No. 1		1.0	2.1
*Washwater Recovery Pump No. 2		1.0	2.1
*Washwater Recovery Pump No. 3 (Future)		1.0	2.1
*Washwater Return Pump No. 1		1.0	2.1
*Washwater Return Pump No. 2		1.0	2.1
*Washwater Return Pump No. 3 (Future)		1.0	2.1
MV-05-7700			16.0
MV-06-7701	1.5		1.8
Caustic Soda CIP Transfer Pump (PMP-0905)		1.0	2.1
NON-MOTOR LOADS			
THREE PHASE TRANSFORMER XFMER	15.0		18.0
THREE PHASE TRANSFORMER T5	15.0		18.0
SUBTOTAL			126.8
+ 25% OF LARGEST MOTOR			6.8
TOTAL AMPS @ 480V/3PHASE (ORIGINAL)			133.5
LOAD TO BE REMOVED			66.6
ADJUSTED LOAD			66.9
EQUIPMENT BUS RATING (AMPS)			600.0

* DENOTES LOAD TO BE REMOVED. (NOTE 1)

D ~ LOAD CALCULATIONS (DP-3)

CIRCUIT/DESCRIPTION	KVA	HP	FLA
MCC-1 Office/Ozone/Elect. Building			
MOTOR LOADS			
*Filter Feed Pump No. 1		60.0	77.0
*Filter Feed Pump No. 2		60.0	77.0
*Filter Feed Pump No. 3 (Future)		60.0	77.0
*Filter Feed Pump No. 4 (Future)		60.0	77.0
*Ozone Exhaust Fan EF-3		3.0	4.8
Office Building A/C			16.0
NON-MOTOR LOADS			
THREE PHASE TRANSFORMER T1	30.0		36.1
DP2			196.9
SUBTOTAL			561.8
+ 25% OF LARGEST MOTOR			19.3
TOTAL AMPS @ 480V/3PHASE (ORIGINAL)			581.0
(NOTE 2) LOAD TO BE REMOVED			362.8
ADJUSTED LOAD			218.2

* DENOTES LOAD TO BE REMOVED. (NOTE 2)

E ~ LOAD CALCULATIONS (MCC-1)

CIRCUIT/DESCRIPTION	KVA	HP	FLA
DP2 Standby Panelboard			
MOTOR LOADS			
*Ozone Destruction Unit No. 1			16.0
*Ozone Destruction Unit No. 2			16.0
Nitrogen Feed System			16.0
Plant Air Compressor 1		20.0	27.0
Plant Air Compressor 2		20.0	27.0
NON-MOTOR LOADS			
*THREE PHASE TRANSFORMER T5	15.0		18.0
THREE PHASE TRANSFORMER T3	30.0		36.1
POLE LIGHTS			16.0
NITROGEN FEED SYSTEM			18.0
* EXISTING LOAD TO BE REMOVED			
SUBTOTAL			190.1
+ 25% OF LARGEST MOTOR			6.8
TOTAL AMPS @ 480V/3PHASE			196.9
LOAD TO BE REMOVED			50.0
ADJUSTED LOAD			146.8

* DENOTES LOAD TO BE REMOVED. (NOTE 1)

F ~ LOAD CALCULATIONS (DP2)

CIRCUIT/DESCRIPTION	KVA	HP	FLA
MCC-3 Motor Control Center			
MOTOR LOADS			
Product Transfer Pump No. 1		40.0	52.0
Product Transfer Pump No. 2		40.0	52.0
Product Transfer Pump No. 3		40.0	52.0
Degasifier Blower No. 1		30.0	40.0
Degasifier Blower No. 2		30.0	40.0
Secondary NF Feed Pump No. 1		25.0	34.0
Permeate Flush Pump		25.0	34.0
CIP Mixer No. 1		2.0	3.4
CIP Mixer No. 2		2.0	3.4
Batch Transfer Pump No. 1		5.0	7.6
Scrubber Recirculation Pump No. 1		15.0	21.0
Scrubber Recirculation Pump No. 2		15.0	21.0
CO2 Booster Pump No. 1		30.0	34.0
CO2 Booster Pump No. 2		30.0	34.0
CO2 Booster Pump No. 3		30.0	34.0
CO2 Booster Pump No. 4		10.0	11.0
CO2 Booster Pump No. 5		10.0	11.0
Air Conditioning Unit, RTU-1			32.0
Lift Pump No. 1		5.0	7.6
Lift Pump No. 2		5.0	7.6
Sand Separator No. 1		0.75	1.6
Sand Separator No. 3		0.75	1.6
CO2 Control Panel CDCP-1			60.0
CO2 Pressure Builder CDCP-2			60.0
FUTURE MOTOR LOADS			
Product Transfer Pump No. 4 (Future)		40.0	52.0
Degasifier Blower No. 3 (Future)		30.0	40.0
Degasifier Blower No. 4 (Future)		30.0	40.0
Scrubber Recirculation Pump No. 3 (Future)		15.0	21.0
Scrubber Recirculation Pump No. 4 (Future)		15.0	21.0
Scrubber Recirculation Pump No. 5 (Future)		15.0	21.0
Sand Separator No. 2 (Future)		0.75	1.6
NON-MOTOR LOADS			
SINGLE PHASE TRANSFORMER, XMR-1	25.0		52.1
SINGLE PHASE TRANSFORMER, XMR-2	37.5		78.1
SUBTOTAL			981.6
+ 25% OF LARGEST MOTOR			15.0
TOTAL AMPS @ 480V/3PHASE			996.6
EQUIPMENT BUS RATING (AMPS)			1200.0

G ~ LOAD CALCULATIONS (MCC-3)

PANEL TAG No.	LP-4	NEMA TYPE/MOUNTING	NEMA 4X/SURFACE
LOCATION	CHEMICAL BUILDING	MAIN DEVICE	100A MCB
BUS AMPACITY	100A	AIC RATING	10K
VOLTS, PHASE, WIRE	240 V/1-PHASE/3-WIRE	FED FROM	LP-E
REMARKS		ACCESSORIES	

LOAD VA PHASE A	LOAD VA PHASE B	LOAD DESCRIPTION	WIRE SIZE	DEMAND	BKR	BKR. NO.	BKR. NO.	BKR	DEMAND	WIRE SIZE	LOAD DESCRIPTION	LOAD VA PHASE A	LOAD VA PHASE B
1176		CAUSTIC SODA METERING PUMP NO. 1	#12	1.25	20/1	1	2	20/1	1.25	#12	SODIUM HYPOCHLORITE METERING PUMP NO. 1	1176	
	1176	CAUSTIC SODA METERING PUMP NO. 2	#12	1.25	20/1	3	4	20/1	1.25	#12	SODIUM HYPOCHLORITE METERING PUMP NO. 2		1176
1176		CAUSTIC SODA METERING PUMP NO. 3 (F)	#12	1.25	20/1	5	6	20/1	1.25	#12	SODIUM HYPOCHLORITE METERING PUMP NO. 3 (F)	1176	
	1176	CAUSTIC SODA METERING PUMP NO. 4	#12	1.25	20/1	7	8	20/1	1.25	#12	SODIUM HYPOCHLORITE METERING PUMP NO. 4		1176
1176		CAUSTIC SODA METERING PUMP NO. 5	#12	1.25	20/1	9	10	20/1	1.25	#12	SODIUM HYPOCHLORITE METERING PUMP NO. 5	1176	
	1176	AQUA AMMONIA METERING PUMP NO. 1	#12	1.25	20/1	11	12	20/1			SPARE		0
1176		AQUA AMMONIA METERING PUMP NO. 2	#12	1.25	20/1	13	14				SPACE	0	
	0	SPARE			20/1	15	16				SPACE		0
0		SPACE				17	18				SPACE	0	
4704	3528	CONNECTED VA									CONNECTED VA	3528	2352
5880	4410	DEMAND VA									DEMAND VA	4410	2940

* - Each branch circuit shall have an equipment grounding conductor sized per N.E.C. Article 250.

(F) depicts a Future Load

	VA	AMPS
TOTAL PANEL CONNECTED LOAD	14112	58.80
TOTAL PANEL DEMAND LOAD	17640	73.50
PANEL DEMAND FACTOR	125%	

TOTAL CONNECTED VA - PER PHASE	8232	5880
TOTAL DEMAND VA - PER PHASE	10290	7350
TOTAL DEMAND PHASE AMPS	85.8	61.3

J ~ LIGHTING PANEL SCHEDULE LP-4

SHORT CIRCUIT CALCULATIONS

DEFINITIONS		FORMULAS
ISC =	SHORT CIRCUIT CURRENT (AMPS)	3 PH: $f = \frac{1.732 \times L \times Isc}{N \times C \times V_{L-L}}$
N =	NUMBER OF CONDUCTORS/PHASE	
L =	LENGTH OF CONDUCTOR (FEET)	
C =	CONSTANT FROM TABLE OF "C"	1 PH: $f = \frac{2 \times L \times Isc}{N \times C \times V_{L-L}}$
Isc =	AVAILABLE SHORT-CIRCUIT AMPS	
V_{L-L} =	LINE TO LINE VOLTAGE (VOLTS)	
V_P =	PRIMARY VOLTAGE	1 PH XFMR: $f = \frac{Iscx\ V_P \times \%Z}{100{,}000 \times KVA}$
V_s =	SECONDARY VOLTAGE	
% Z =	TRANSFORMER % IMPEDANCE	

ISC(1)

$$f1 = \frac{1.732 \times 110 \times 65{,}000}{1 \times 26706 \times 480} = 0.9661$$

$$M = \frac{1}{1 + 0.9661} = 0.5086$$

ISC(1) = 65,000 x 0.5086 = 33,059 A

H ~ SHORT CIRCUIT CALCULATION

REF. DWG. E-2

DLT&V SYSTEMS ENGINEERING
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carollo

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APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

ELECTRICAL
LOAD CALCULATIONS AND CALLOUT SCHEDULE

DRAWN: TJB	DATE: 10/2010	DRAWING NUMBER E-5	REVISION
DESIGN: SKL	SCALE: AS NOTED	SHEET 115 OF 188 SHEETS	

DWG: C:\pw_working\projectwise\bhawes\dms98375\E-05.dwg USER: BHawes XREFS: 8359A10 Border
DATE: Apr 10, 2013 10:04am

NOTES:

1. EXISTING MCB IN PANEL 'LP-E' IS TO BE REPLACED WITH NEW 150A BREAKER AS INDICATED.
2. REFERENCE DRAWING E-5 FOR PANEL SCHEDULE ASSOCIATED WITH PANEL 'LP-4'.

* DENOTES A NEW LOAD BEING ADDED IN PLACE OF AN EXISTING LOAD THAT IS BEING REMOVED/DEMOLISHED. REPLACE EXISTING 20A BREAKER WITH NEW BREAKER SIZED AS SHOWN.

** DENOTES A LOAD THAT IS TO BE REMOVED/DISCONNECTED AS PART OF THE SCOPE OF THIS PROJECT; ASSOCIATED BREAKER IS TO BE LEFT AS SPARE.

PANEL TAG No. LP-1
LOCATION MCC-3
BUS AMPACITY 225A
VOLTS, PHASE, WIRE 240 V/1-PHASE/3-WIRE
REMARKS
NEMA TYPE/MOUNTING 1/INTEGRAL TO MCC-3
MAIN DEVICE 150A MCB
AIC RATING 10K
FED FROM XMR-1
ACCESSORIES SURGE PROTECTION DEVICE (SPD)

LOAD VA PHASE A	LOAD VA PHASE B	LOAD DESCRIPTION	WIRE SIZE	DEMAND	BKR	BKR. NO.	BKR. NO.	BKR	DEMAND	WIRE SIZE	LOAD DESCRIPTION	LOAD VA PHASE A	LOAD VA PHASE B
896		ELECTRICAL ROOM LIGHTS (E-15)	#12	1.25	20/1	1	2	20/1	1.00	#12	ELECT. ROOM & CO2 SYS. ROOM CONV. RECEPS. (E-15)	720	
	525	CO2 SYSTEM ROOM LIGHTS (E-15)	#12	1.25	20/1	3	4	20/1	1.00	#12	CIP/NF SYS., FILTERS, SAND SEP. AREA CONV. RECEPS. (E-17, E-19)		1080
1050		NF FEED PUMP AREA LIGHTS (E-19)	#12	1.25	20/1	5	6	20/1	1.00	#12	NF FEED PUMP AND TRANSFER P.S. AREA CONV. RECEPS. (E-19, E-20)	720	
	1575	PRODUCT TRANSFER PUMP STATION LIGHTS (E-20)	#12	1.25	20/1	7	8	20/1	1.00	#12	EXTERIOR AREA CONV. RECEPS.		900
1190		LIGHTING CONTROL PANEL (LCP-1)	#12	1.25	20/1	9	10	20/1			SPARE	0	
	500	PLC-7	#12	1.25	20/1	11	12	20/1			SPARE		0
630		NF BUILDING OUTSIDE WALLPACK LIGHTS	#12	1.25	20/1	13	14	20/1			SPARE	0	
	1400	CIP/NF SYS., FILTERS, SAND SEP. AREA LIGHTS 1 (E-17, E-19)	#12	1.25	20/1	15	16	20/1			SPARE		0
1400		CIP/NF SYS., FILTERS, SAND SEP. AREA LIGHTS 2 (E-17, E-19)	#12	1.25	20/1	17	18	20/1	1.25	#12	FIT-1033	40	
	1400	CIP/NF SYS., FILTERS, SAND SEP. AREA LIGHTS 3 (E-17, E-19)	#12	1.25	20/1	19	20	20/1	1.25	#12	FIT-1318		40
1575		CIP/NF SYS., FILTERS, SAND SEP. AREA LIGHTS 4 (E-17, E-19)	#12	1.25	20/1	21	22	20/1			SPARE	0	
	40	FIT-0204	#12	1.25	20/1	23	24	20/1			SPARE		0
0		SPARE			20/1	25	26	20/1			SPARE	0	
	0	SPARE			20/1	27	28	20/1	1.25	#12	FIT-1906		40
480		NF TRAIN 1	#12	1.25	20/1	29	30	20/1			SPARE	0	
	480	NF TRAIN 2	#12	1.25	20/1	31	32	20/1	1.25	#12	FIT-1602 (F)		40
160		SECONDARY NF	#12	1.25	20/1	33	34	20/1	1.25	#12	FIT-7800 (F)	40	
	0	SPARE			20/1	35	36	20/1			SPARE		0
0		SPARE			20/1	37	38	20/1			SPARE	0	
	0	SPARE			20/1	39	40	20/1			SPARE		0
0		SPARE			20/1	41	42	20/1			SPARE	0	
7381	5920	CONNECTED VA									CONNECTED VA	1520	2100
9226	7400	DEMAND VA									DEMAND VA	1540	2130

* - Each branch circuit shall have an equipment grounding conductor sized per N.E.C. Article 250.

(F) depicts a Future Load

	VA	AMPS
TOTAL PANEL CONNECTED LOAD	16921	70.50
TOTAL PANEL DEMAND LOAD	20296	84.60
PANEL DEMAND FACTOR	120%	

TOTAL CONNECTED VA - PER PHASE	8901	8020
TOTAL DEMAND VA - PER PHASE	10766	9530
TOTAL DEMAND PHASE AMPS	89.7	79.4

A ~ LIGHTING PANEL SCHEDULE LP-1

PANEL TAG No. LP-E (EXISTING)
LOCATION CHEMICAL BUILDING
BUS AMPACITY 225A
VOLTS 208
PHASE/WIRE CONFIG. 3-PHASE/4-WIRE
REMARKS
NEMA TYPE/MOUNTING 3R/SURFACE
MAIN DEVICE 150A (NOTE 1)
AIC RATING
FED FROM T5
ACCESSORIES

LOAD VA PHASE A	LOAD VA PHASE B	LOAD VA PHASE C	LOAD DESCRIPTION	WIRE SIZE*	DEMAND	BKR	BKR. NO.	BKR. NO.	BKR	DEMAND	WIRE SIZE*	LOAD DESCRIPTION	LOAD VA PHASE A	LOAD VA PHASE B	LOAD VA PHASE C
1440			INTERIOR LIGHTING	#12	1.25	20/1	1	2	20/1	1.25	#12	INTERIOR RECEPTACLES	540		
	500		CHEM. BLDG. EXTERIOR LIGHTS	#12	1.25	20/1	3	4	20/1	1.25	#12	EXTERIOR RECEPTACLES		540	
		2352	*CP-AFMP1	#10	1.25	30/1	5	6	20/1			SPARE			0
2352			*CP-AFMP2	#10	1.25	30/1	7	8	20/1	1.25	#12	*SECURITY CONTROL PANEL SCP-5	100		
	2352		*CP-SIMP1	#10	1.25	30/1	9	10	20/1			SPARE		0	
		2352	*CP-SIMP2	#10	1.25	30/1	11	12	20/1	1.25	#12	*CARBON FILTER & SOFTENER CONTROLLERS			25
40			*FIT-0900	#12	1.25	20/1	13	14	20/1			SPARE	0		
	1656		*STR-0310	#12	1.25	20/1	15	16	20/1			SPARE		0	
		1656	*STR-1210	#12	1.25	20/1	17	18	20/1			SPARE			0
0			SPARE			20/1	19	20	20/1			SPARE	0		
	10290		LIGHTING PANEL (LP-4, NOTE 2)	#1	1.00	100/1	21	22	20/1	1.25	#12	*FIT-1700		40	
		7350	LIGHTING PANEL (LP-4, NOTE 2)	#1	1.00		23	24	20/1			SPARE			0
180			FIRE BELL	#12	1.00	20/1	25	26	20/1	1.25	#12	*FIT-1400	40		
	0		SPARE			20/1	27	28	20/1			SPARE		0	
		0	SPARE			20/1	29	30	20/1			SPARE			0
180			BACK DOOR EXIT SIGN	#12	1.00	20/1	31	32	20/1	1.25	#12	*FIT-0300, FIT-0301	50		
	180		FRONT DOOR EXIT SIGN	#12	1.00	20/1	33	34	20/1			SPARE		0	
		500	PLC-05 (CHEM. BLDG.)	#12	1.25	20/1	35	36	20/1	1.25	#12	*LIT-0300, LIT-1200			50
65			EXHAUST FAN	#12	1.25	20/1	37	38	20/1			SPARE	0		
	65		EXHAUST FAN	#12	1.25	20/1	39	40	20/1			SPARE		0	
		65	EXHAUST FAN	#12	1.25	20/1	41	42	20/1	1.00	#12	DEGASIFIER AREA RECEPTACLE			180
4257	15043	14275	CONNECTED VA									CONNECTED VA	730	580	255
5231	16186	16006	DEMAND VA									DEMAND VA	913	725	274

* - Each branch circuit shall have an equipment grounding conductor sized per N.E.C. Article 250

	VA	AMPS
TOTAL PANEL CONNECTED LOAD	35140	97.60
TOTAL PANEL DEMAND LOAD	39335	109.30
PANEL DEMAND FACTOR	112%	

TOTAL CONNECTED VA - PER PHASE	4987	15623	14530
TOTAL DEMAND VA - PER PHASE	6144	16911	16280
TOTAL DEMAND PHASE AMPS	51.2	140.9	135.7

B ~ EXISTING LIGHTING PANEL SCHEDULE LP-E

NOTE 1

PANEL TAG No. LP-2
LOCATION INSIDE NF BLDG. ELECTRICAL ROOM
BUS AMPACITY 225A
VOLTS, PHASE, WIRE 240 V/1-PHASE/3-WIRE
REMARKS
NEMA TYPE/MOUNTING NEMA 1/SURFACE
MAIN DEVICE 200A MCB
AIC RATING 10K
FED FROM XMR-2
ACCESSORIES SURGE PROTECTION DEVICE (SPD)

LOAD VA PHASE A	LOAD VA PHASE B	LOAD DESCRIPTION	WIRE SIZE	DEMAND	BKR	BKR. NO.	BKR. NO.	BKR	DEMAND	WIRE SIZE	LOAD DESCRIPTION	LOAD VA PHASE A	LOAD VA PHASE B
4800		WATER HEATER (HTR-0200)	#8	1.25	50/2	1	2	20/1	1.00	#12	POST TREATMENT CHEMICAL VAULT CONV. RECEP.	180	
	4800	WATER HEATER (HTR-0200)	#8	1.25		3	4	20/1	1.25	#12	POST TREATMENT CHEMICAL VAULT SUMP PUMP (SP-1)		1920
250		CO2 SOLUTION FEED PANEL NO. 1 (SFCP-1)	#12	1.25	20/1	5	6	20/1	1.25	#12	POST TREATMENT CHEMICAL VAULT LIGHT	70	
	250	CO2 SOLUTION FEED PANEL NO. 2 (SFCP-2)	#12	1.25	20/1	7	8	20/1	1.25	#12	POST TREATMENT CHEMICAL VAULT EXHAUST FAN		250
250		CO2 SOLUTION FEED PANEL NO. 3 (SFCP-3)	#12	1.25	20/1	9	10	20/1	1.25	#12	AIT-1800	40	
	600	IRRIGATION CONTROLLER	#12	1.25	20/1	11	12	20/1	1.25	#12	OIT PANEL		80
1250		IRRIGATION PUMP	#6	1.25	30/2	13	14	15/1	1.00	#12	CO2 SYSTEM TRACKER	50	
	1250	IRRIGATION PUMP		1.25		15	16	20/1	1.00	#12	ROLLUP DOOR NO. 1		1176
0		SPARE			20/1	17	18	20/1	1.00	#12	ROLLUP DOOR NO. 2	1176	
	100	SECURITY CONTROL PANEL (SCP-7)	#12	1.25	20/1	19	20	20/1	1.00	#12	ROLLUP DOOR NO. 3		1176
785		LIGHTING PANEL (LP-3)	#6	1.00	50/2	21	22	20/1	1.00	#12	ROLLUP DOOR NO. 4	1176	
	680	LIGHTING PANEL (LP-3)		1.00		23	24	20/1	1.00	#12	ROLLUP DOOR NO. 5		1176
0		SPARE			20/1	25	26	20/1	1.00	#12	ROLLUP DOOR NO. 6	1176	
	700	EXHAUST FAN (EF-1)	#12	1.25	20/1	27	28	20/1	1.25	#12	CO2 CONTROL PANEL (CO21)		250
700		EXHAUST FAN (EF-2)	#12	1.25	20/1	29	30	20/1	1.25	#12	CO2 CONTROL PANEL (CO22)	250	
	1200	EXHAUST FAN (EF-3)	#12	1.25	20/1	31	32	20/1			SPARE		0
0		SPARE			20/1	33	34	20/1			SPARE	0	
	1176	EXHAUST FAN (EF-4)	#12	1.25	20/1	35	36	20/1			SPARE		0
1176		EXHAUST FAN (EF-5)	#12	1.25	20/1	37	38	20/1			SPARE	0	
	180	FINISHED SAMPLE PANEL RECEP	#12	1.00	20/1	39	40	20/1			SPARE		0
180		FINISHED SAMPLE PANEL RECEP	#12	1.00	20/1	41	42	20/1			SPARE	0	
9391	10936	CONNECTED VA									CONNECTED VA	4118	6028
11498	13455	DEMAND VA									DEMAND VA	4208	6653

* - Each branch circuit shall have an equipment grounding conductor sized per N.E.C. Article 250.

(F) depicts a Future Load

	VA	AMPS
TOTAL PANEL CONNECTED LOAD	30473	127.00
TOTAL PANEL DEMAND LOAD	35814	149.20
PANEL DEMAND FACTOR	117%	

TOTAL CONNECTED VA - PER PHASE	13509	16964
TOTAL DEMAND VA - PER PHASE	15706	20108
TOTAL DEMAND PHASE AMPS	130.8	167.6

C ~ INSTRUMENTATION LIGHTING PANEL SCHEDULE LP-2

PANEL TAG No. LP-3
LOCATION INSIDE NF BLDG. ELECTRICAL ROOM
BUS AMPACITY 100A
VOLTS, PHASE, WIRE 240 V/1-PHASE/3-WIRE
REMARKS
NEMA TYPE/MOUNTING NEMA 1/SURFACE
MAIN DEVICE 50A MCB
AIC RATING 10K
FED FROM LP-2
ACCESSORIES

LOAD VA PHASE A	LOAD VA PHASE B	LOAD DESCRIPTION	WIRE SIZE	DEMAND	BKR	BKR. NO.	BKR. NO.	BKR	DEMAND	WIRE SIZE	LOAD DESCRIPTION	LOAD VA PHASE A	LOAD VA PHASE B
0		SPARE			20/1	1	2	20/1	1.25	#12	AIT-1313	40	
	0	SPARE			20/1	3	4	20/1			SPARE		0
0		SPARE			20/1	5	6	20/1			SPARE	0	
	0	SPARE			20/1	7	8	20/1			SPARE		0
0		SPARE			20/1	9	10	20/1			SPARE	0	
	0	SPARE			20/1	11	12	20/1	1.25	#12	AIT-1904		40
0		SPARE			20/1	13	14	20/1	1.25	#12	AIT-1907	40	
	40	LIT-1804	#12	1.25	20/1	15	16	20/1	1.25	#12	AIT-1908		40
40		AIT-0413	#12	1.25	20/1	17	18	20/1	1.25	#12	AIT-1909	40	
	40	AIT-0414	#12	1.25	20/1	19	20	20/1	1.25	#12	AIT-1910		40
40		AIT-0415	#12	1.25	20/1	21	22	20/1	1.25	#12	AIT-7800(F)	40	
	40	AIT-0416	#12	1.25	20/1	23	24	20/1	1.25	#12	AIT-7803(F)		40
0		SPARE			20/1	25	26	20/1	1.25	#12	AIT-7804(F)	40	
	0	SPARE			20/1	27	28	20/1			SPARE		0
0		SPARE			20/1	29	30	20/1			SPARE	0	
	0	SPARE			20/1	31	32	20/1	1.25	#12	AIT-1911		40
0		SPARE			20/1	33	34	20/1	1.25	#12	AIT-0417	40	
	0	SPARE			20/1	35	36	20/1			SPARE		0
0		SPARE			20/1	37	38				SPARE	0	
	0	SPARE			20/1	39	40				SPARE		0
40		AIT-1031	#12	1.25	20/1	41	42	20/1	1.25	#12	POWER QUALITY METER	25	
120	120	CONNECTED VA									CONNECTED VA	265	200
150	150	DEMAND VA									DEMAND VA	331	250

* - Each branch circuit shall have an equipment grounding conductor sized per N.E.C. Article 250.

(F) depicts a Future Load

	VA	AMPS
TOTAL PANEL CONNECTED LOAD	705	2.90
TOTAL PANEL DEMAND LOAD	881	3.70
PANEL DEMAND FACTOR	125%	

TOTAL CONNECTED VA - PER PHASE	385	320
TOTAL DEMAND VA - PER PHASE	481	400
TOTAL DEMAND PHASE AMPS	4.0	3.3

D ~ LIGHTING PANEL SCHEDULE LP-3

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carollo

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SEALED BY
BRIAN D. DOWNING
10/09
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MesaWater DISTRICT
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APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

ELECTRICAL CIRCUIT/CONDUIT, LIGHTING AND PANEL SCHEDULES

DRAWN: TJB
DATE: 10/2010
DESIGN: SKL
SCALE: AS NOTED
DRAWING NUMBER E-6
REVISION
SHEET 116 OF 188 SHEETS

DWG: C:\pw_working\projectwise\bhowes\dms98375\E-06.dwg
DATE: Apr 10, 2013 10:16am
XREFS: 8359A10 Border
USER: BHowes

ISA INSTRUMENT IDENTIFICATION TABLE

	FIRST LETTERS		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYZER		ALARM		AUTO
B	BURNER, COMBUSTION				
C	CONDUCTIVITY			CONTROL	CLOSED
D	DENSITY	DIFFERENTIAL			
E	VOLTAGE		ELEMENT		
F	FLOW	RATIO			
G	GAUGE		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHED.	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MOTION				MIDDLE
N	INTRUSION				NORMAL
O	TORQUE		ORIFICE, RESTRICTION		OPEN
P	PRESSURE		POINT CONNECTION		STOP
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD, OR PRINT		RUN OR REMOTE
S	SPEED, FREQUENCY	SAFETY		SWITCH	START
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION			VALVE, LOUVER	
W	WEIGHT		WELL		
X	MOTOR	X–AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE, OR PRESENCE	Y–AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION	Z–AXIS		DRIVER, ACTUATOR, FINAL CONTROL ELEMENT	

P&ID VALVE SYMBOLS

- GATE OR GENERIC VALVE
- 3–WAY VALVE
- 4–WAY VALVE
- ANGLE VALVE
- BUTTERFLY VALVE
- PLUG VALVE
- ECCENTRIC PLUG VALVE
- BALL VALVE
- CHECK VALVE
- SWING CHECK VALVE
- STOP CHECK VALVE
- BALL CHECK VALVE
- PINCH VALVE
- DIAPHRAGM VALVE
- DIAPHRAGM VALVE (ALTERNATE)
- GLOBE VALVE
- HAND VALVE
- KNIFE VALVE
- M — MOTORIZED VALVE ACTUATOR
- S — SOLENOID VALVE 2–WAY
- S — SOLENOID VALVE 3–WAY
- S — PUMP CONTROL VALVE
- S S — FLOW CONTROL VALVE
- PRESSURE RELIEF VALVE
- VACUUM RELIEF VALVE
- PRESSURE REGULATOR WITH REMOTE PROCESS CONNECTION
- PRESSURE REGULATOR SELF CONTAINED
- AIR RELEASE VALVE
- REDUCED PRESSURE PRINCIPLE DEVICE (RPP)

P&ID ABBREVIATIONS

A	AMPERE
AFD	ADJUSTABLE FREQUENCY DRIVE
AI	ANALOG INPUT
AIC	AMPS INTERRUPTING CAPACITY
ARV	AIR RELIEF VALVE
AO	ANALOG OUTPUT
AS	AIR SUPPLY
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
CB	CIRCUIT BREAKER
CL2	CHLORINE
CON	CONTACTOR
CU	COPPER
CV	CONTROL VALVE
DCS	DISTRIBUTED CONTROL SYSTEM
DI	DISCRETE INPUT
DO	DISSOLVED OXYGEN, DISCRETE OUTPUT
DP	DIFFERENTIAL PRESSURE
DWG	DRAWING
EGO	EMERGENCY GAS OFF
ETM	ELAPSED TIME METER
ETMf	ELAPSED TIME METER (FAST SPEED)
ETMs	ELAPSED TIME METER (SLOW SPEED)
EOL	ELECTRONIC OVERLOAD
EXIST	EXISTING
FA	FOUL AIR
FC	FAIL CLOSED
FE	FINAL EFFLUENT
FR	FORWARD–REVERSE
FS	FLOAT SWITCH
FVNR	FULL VOLTAGE NON–REVERSING
FW	FINISHED WATER
GND	GROUND
GAL	GALLONS
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
H, HI	HIGH
H2S	HYDROGEN SULFIDE
HMI	HUMAN MACHINE INTERFACE
HOA	HAND–OFF–AUTO
I	CURRENT
IO	INPUT/OUTPUT
IOE	INTERNAL–OFF–EXTERNAL
JB	JUNCTION BOX
L, LO	LOW
LAN	LOCAL AREA NETWORK
LC	LOOP CONTROLLER
LCP	LOCAL CONTROL PANEL
LOS	LOCK–OFF–STOP
LR	LOCAL/REMOTE
LS	LEVEL (i.e.. FLOAT) SWITCH
M	MOTOR
MA	MANUAL/AUTO
mA	MILLIAMP
MC	MANUFACTURE CABLE
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MFR(S)	MANUFACTURER(S)
MGD	MILLION GALLONS PER DAY
MGL	MILLIGRAMS PER LITER
MH	MANHOLE
MLR	MIXED LIQUOR RETURN
MO	MOISTURE
MOD	MODULATED
MTU	MASTER TELEMETRY UNIT
NPW	NON–POTABLE WATER
NS	NITROGEN SUPPLY
NTU	TURBIDITY
O/C	OPEN / CLOSE
OCA	OPEN–CLOSE–AUTO
OCR	OPEN–CLOSE–REMOTE
OIT	OPERATOR INTERFACE TERMINAL
OL	OVERLOAD
OO	ON/OFF (MAINTAINED)
OOA	ON–OFF–AUTO
OOR	ON–OFF–REMOTE
OSC	OPEN–STOP–CLOSE
PAH	PRESSURE ALARM HIGH
PER	PERMISSIVE
PLC	PROGRAMMABLE LOGIC CONTROLLER
PNL	PANEL
PO	PULSE OUTPUT
POS	POSITION
POT	POTENTIOMETER
PPG	POUNDS PER GALLON
PPH	POUNDS PER HOUR
PPM	PARTS PER MILLION
PR	PAIR
PRES	PRESSURE
PS	PRESSURE SWITCH
PSI	POUNDS PER SQUARE INCH
PV	PROCESS VARIABLE
RAS	RETURN ACTIVATED SLUDGE
RAW	RAW WATER
REM	REMOTE
RF	RADIO FREQUENCY
RIO	REMOTE INPUT OUTPUT
RS	RAW SEWAGE
RSP	RAW SEWAGE PUMP
RST	RESET
RTD	RESISTANCE TEMPERATURE DETECTOR
RTU	REMOTE TELEMETRY UNIT
RUNf	RUN (FAST SPEED)
RUNs	RUN (SLOW SPEED)
SB	SLUDGE BLANKET
SEQ	SERVICE ENTRANCE EQUIPMENT
SES	SERVICE ENTRANCE SECTION
SLC	SINGLE LOOP CONTROLLER
SLOS	START–LOCK–OFF–STOP
SO2	SULFUR DIOXIDE
SOV	SOLENOID OPERATED VALVE
SP	SET POINT
SPD	SPEED
SPR	SPARE
SS	START/STOP (MAINTAINED)
SSS	SOLID STATE STARTER (SOFT START)
STR	MOTOR STARTER
TAH	TEMPERATURE ALARM HIGH
T/M	TEMPERATURE AND/OR MOISTURE
TEMP	TEMPERATURE
TS	TEMPERATURE SWITCH
TSS	TOTAL SUSPENDED SOLIDS
UG	UNDERGROUND
USD	UP/STOP/DOWN
V	VOLT
VFD	VARIABLE FREQUENCY DRIVE
W	WATER
WAS	WASTE ACTIVATED SLUDGE
WW	WASTEWATER
XMTR	TRANSMITTER
ZS	POSITION (i.e. LIMIT) SWITCH

P&ID EQUIPMENT AND PROCESS SYMBOLS

- METERING PUMP WITH MANUAL STROKE CONTROL
- ROTARY LUBE PUMP
- M — SUBMERSIBLE MIXER
- AERATOR
- S — SUBMERSIBLE PUMP
- DIESEL GENERATOR
- CENTRIFUGAL PUMP
- BLOWER
- LIFT PUMP
- M — MOTOR OR MOTOR ACTUATOR
- P — PNEUMATIC ACTUATOR
- S — SOLENOID
- M — VERTICAL TURBINE PUMP
- CL2 — CHLORINE TANK
- WEIGHT SCALE
- AIR COMPRESSOR
- SLUICE GATE
- SAMPLER
- PROPELLER FLOWMETER ELEMENT
- M — MAGNETIC FLOWMETER ELEMENT
- CORIOLIS FLOWMETER
- FIT 6 MASS — INSERTION TYPE MASS FLOW METER
- FIT 6 MASS — MASS FLOW METER ANNUBAR TYPE
- DRAIN
- OUTLET SILENCER
- INLET SILENCER
- ROTAMETER
- AIR FILTER
- EJECTOR
- DIAPHRAGM SEAL
- DIFFUSER
- DIAPHRAGM
- Y–TYPE STRAINER
- IPS CORPORATION STOP
- PVC DIFFUSER WITH IPS CORPORATION STOP

TAG NUMBERS AND DESIGNATIONS

TRL
XXX

- FIRST LETTER
- SUCCEEDING LETTER(S)
- LOOP DESIGNATION NUMBER
- pH — ADDITIONAL IDENTIFICATION SEE ABBREVIATIONS AND HAND SWITCH DESIGNATIONS

HAND SWITCH DESIGNATIONS

ES	EMERGENCY STOP
HOA	HAND–OFF–AUTO
HOR	HAND–OFF–REMOTE
HORA	HAND–OFF–REMOTE–AUTO
JOA	JOG–OFF–AUTO
LOR	LOCAL–OFF–REMOTE
LR	LOCAL–REMOTE
OC	OPEN–CLOSE
OO	ON–OFF
S/S	START STOP PUSH BUTTONS

SENSING, INDICATION, AND CONTROL SYMBOLS

- LE — ULTRASONIC LEVEL TRANSDUCER
- LS — FLOAT SWITCH
- R BEACON — BEACON R=RED, A=AMBER, B=BLUE, G=GREEN
- YL G STOP — INDICATING LIGHT
- HS HOA — HAND SWITCH
- AIT ORP — ORP ANALYZER
- AIT pH — pH ANALYZER
- AE — ANALYZER ELEMENT
- AE DO — DO SENSOR
- AE ORP — ORP SENSOR
- AE pH — pH SENSOR
- AIT DO — DO ANALYZER
- AE CL2 — RESIDUAL CL2 CHLORINE SENSOR
- AIT CL2 — RESIDUAL CL2 CHLORINE ANALYZER

LINE SYMBOLS

- MAJOR PROCESS PIPING OR FLOW CHANNEL
- EXISTING PROCESS PIPING
- SECONDARY PROCESS PIPING
- EXISTING SECONDARY PROCESS PIPING
- FUTURE PIPING AND EQUIPMENT
- ELECTRICAL SIGNAL
- HYDRAULIC SIGNAL
- PNEUMATIC SIGNAL
- ELECTRICAL DIRECTION ARROW
- SIGNAL CONNECTION POINT
- FLOW ARROW FOR PROCESS PIPING
- I–3 /A — PROCESS OR SIGNAL LINE GOING TO ANOTHER SHEET (MATCH LETTERS)
- I–2 /A — PROCESS OR SIGNAL LINE FROM ANOTHER SHEET (MATCH LETTERS)
- PROCESS LINES CROSSING (NOT CONNECTED)
- INTERNAL SYSTEM SIGNAL LINK (SOFTWARE OR DATA LINK)

P&ID INTERFACE SYMBOLS

- BBB X AAA — PILOT LIGHT X= LENS COLOR, R=RED, G=GREEN, A=AMBER B=BLUE
- BBB CCC AAA — FIELD DEVICE
- BBB CCC AAA — PANEL DEVICE
- BBB CCC AAA — DEVICE MOUNTED IN SUBPANEL
- BBB CCC — REMOTE I/O TERMINAL
- BBB CCC — HMI OR OIT FUNCTION
- I X — INTERLOCK DEVICE OR RELAY X=NOTE REF.
- I/I — DUAL CHANNEL CURRENT ISOLATOR
- DISCRETE INPUT
- DISCRETE OUTPUT
- ANALOG INPUT
- ANALOG OUTPUT
- PULSE INPUT

NOTE:

REFER TO ISA INSTRUMENT IDENTIFICATION TABLE FOR DEFINITION OF LETTERS BBB INSIDE THE BUBBLES. CCC REPRESENTS LOOP ID (IF USED). SEE ABBREVIATIONS LIST FOR SUPERSCRIPT AAA.

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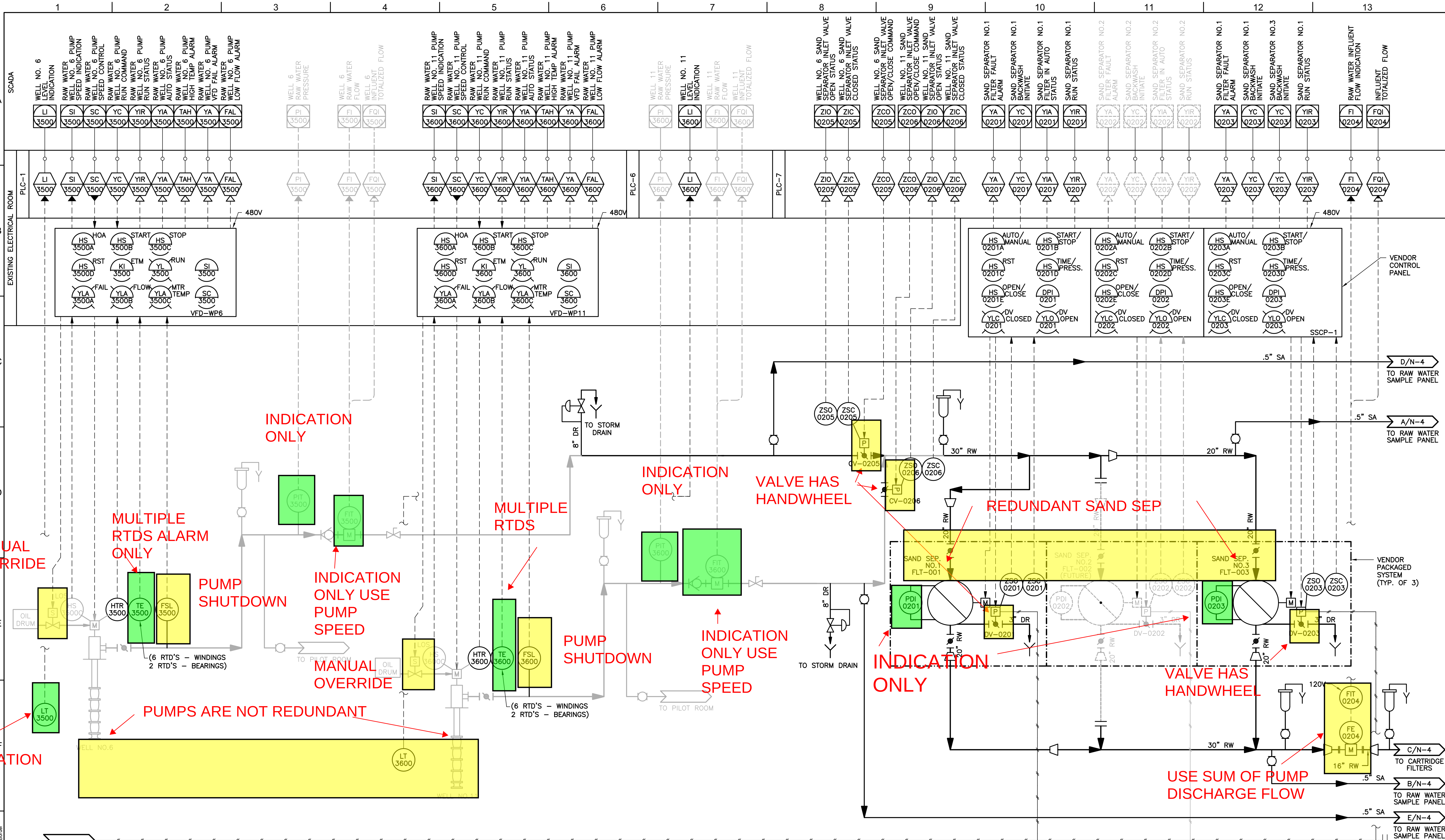
APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

INSTRUMENTATION
NOTES, SYMBOLS, AND LEGENDS

DRAWN: TJB	DATE: 10/2010	DRAWING NUMBER N–1	REVISION
DESIGN: SKL	SCALE: AS NOTED	SHEET 167 OF 188 SHEETS	

DWG: C:\pw_working\projectwise\bhawes\dms98376\N–01.dwg USER: bhawes
DATE: Apr 11, 2013 9:40am XREFS: 8359A10 Border



	HIGH (CRITICAL)
	MEDIUM (REDUNDANT SYSTEM)
	LOW (NOT CRITICAL)

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INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
SAND SEPARATORS

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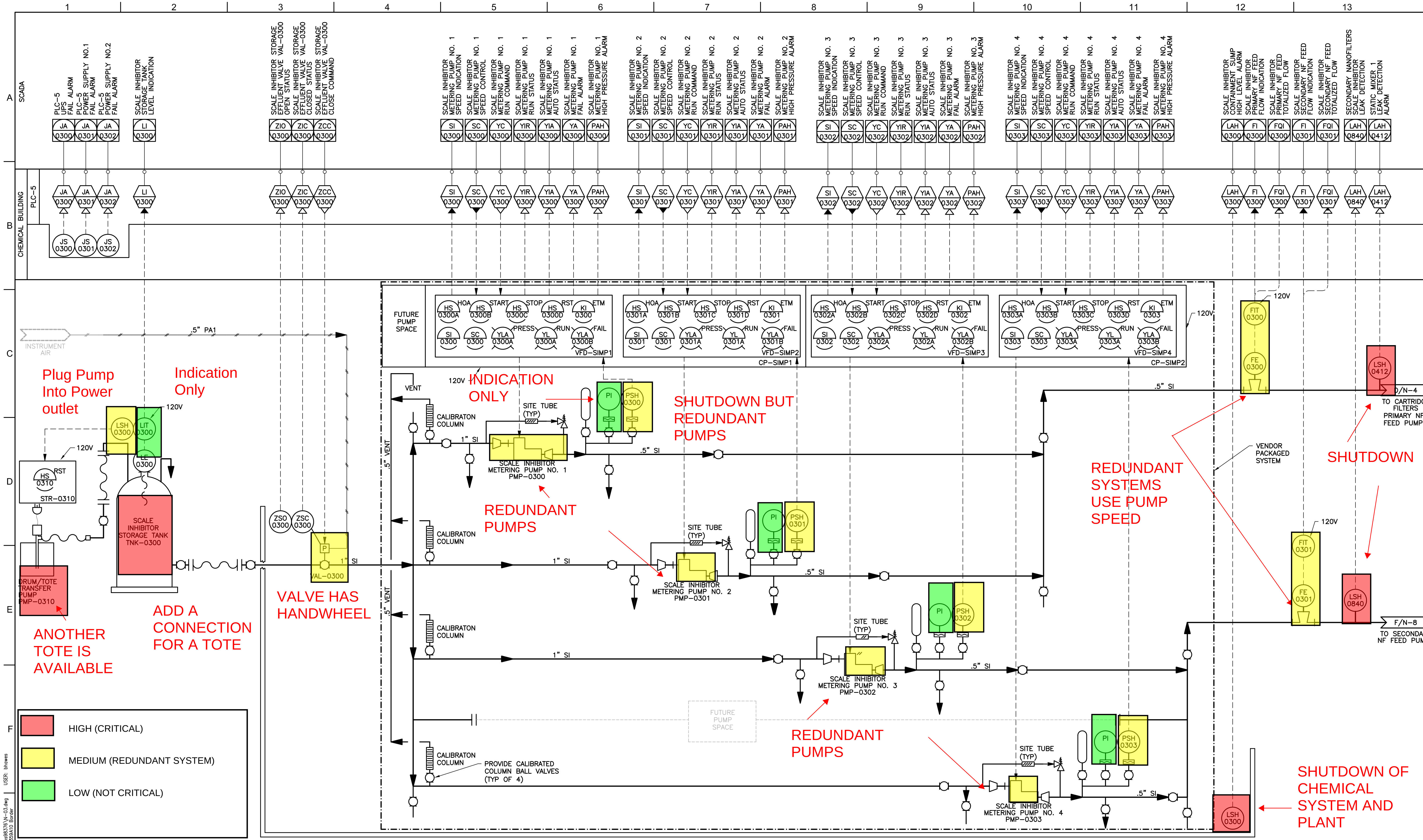
DESIGN: SKL · SCALE: AS NOTED
SHEET 168 OF 188 SHEETS



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INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
SCALE INHIBITOR STORAGE AND FEED

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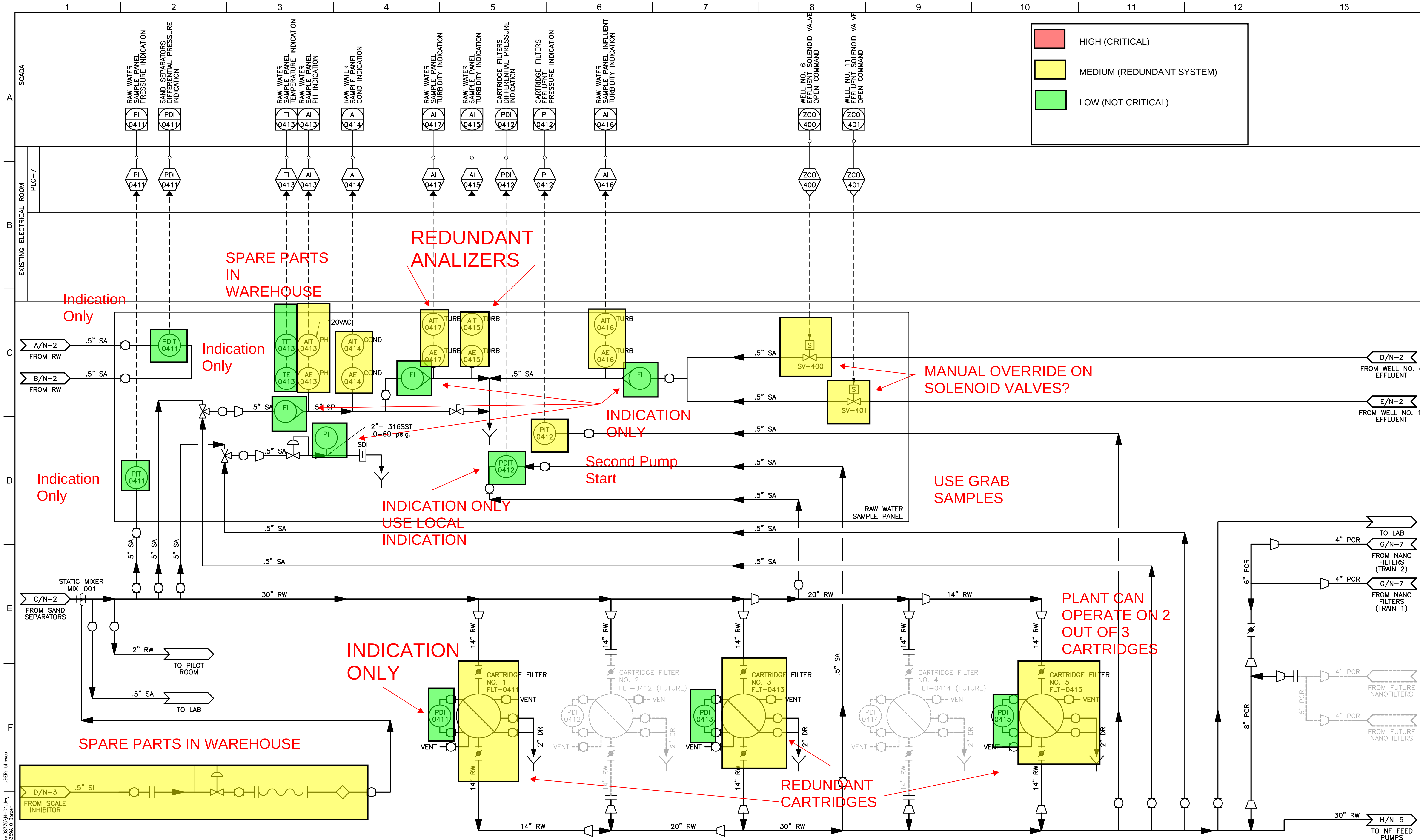
DESIGN: SKL — SCALE: AS NOTED
SHEET 169 OF 188 SHEETS



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PROCESS AND INSTRUMENTATION DIAGRAM
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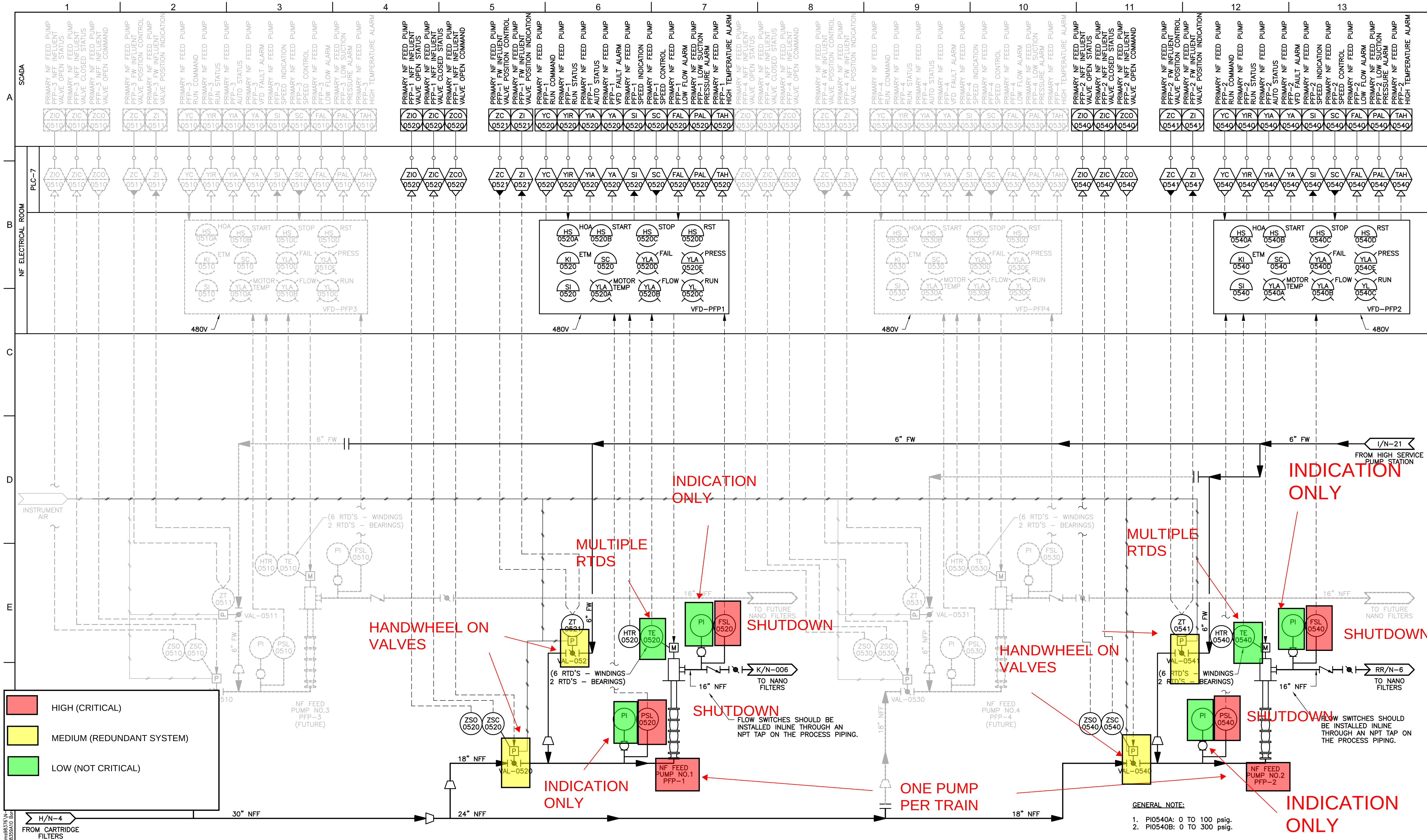
DRAWING NUMBER N-4

SHEET 170 OF 188 SHEETS



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INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
NANOFILTRATION FEED PUMPS

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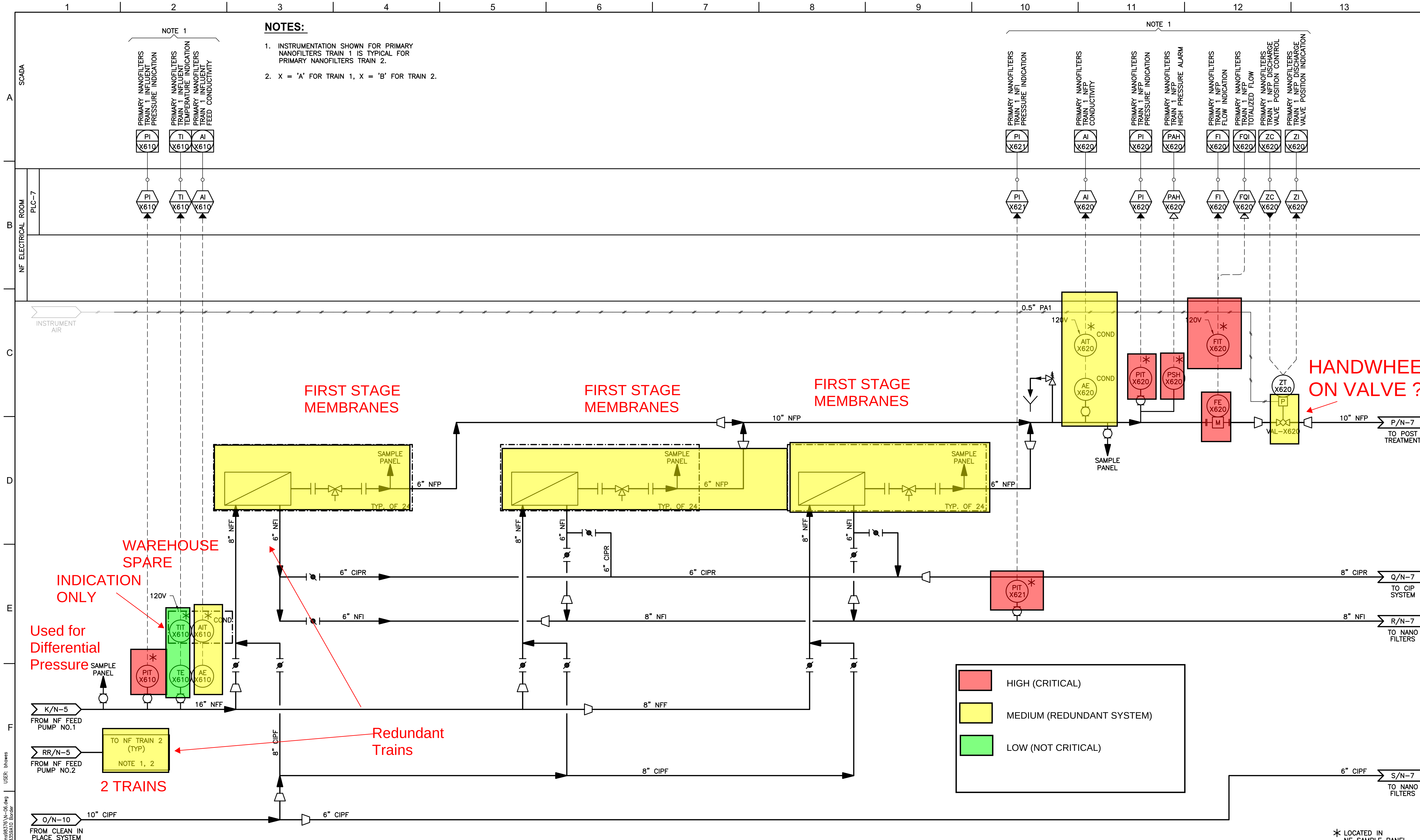
DATE: 10/2010
DESIGN: SKL
SCALE: AS NOTED
DRAWING NUMBER: N-5
SHEET 171 OF 188 SHEETS



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INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
PRIMARY NF SYSTEM, SHEET 1

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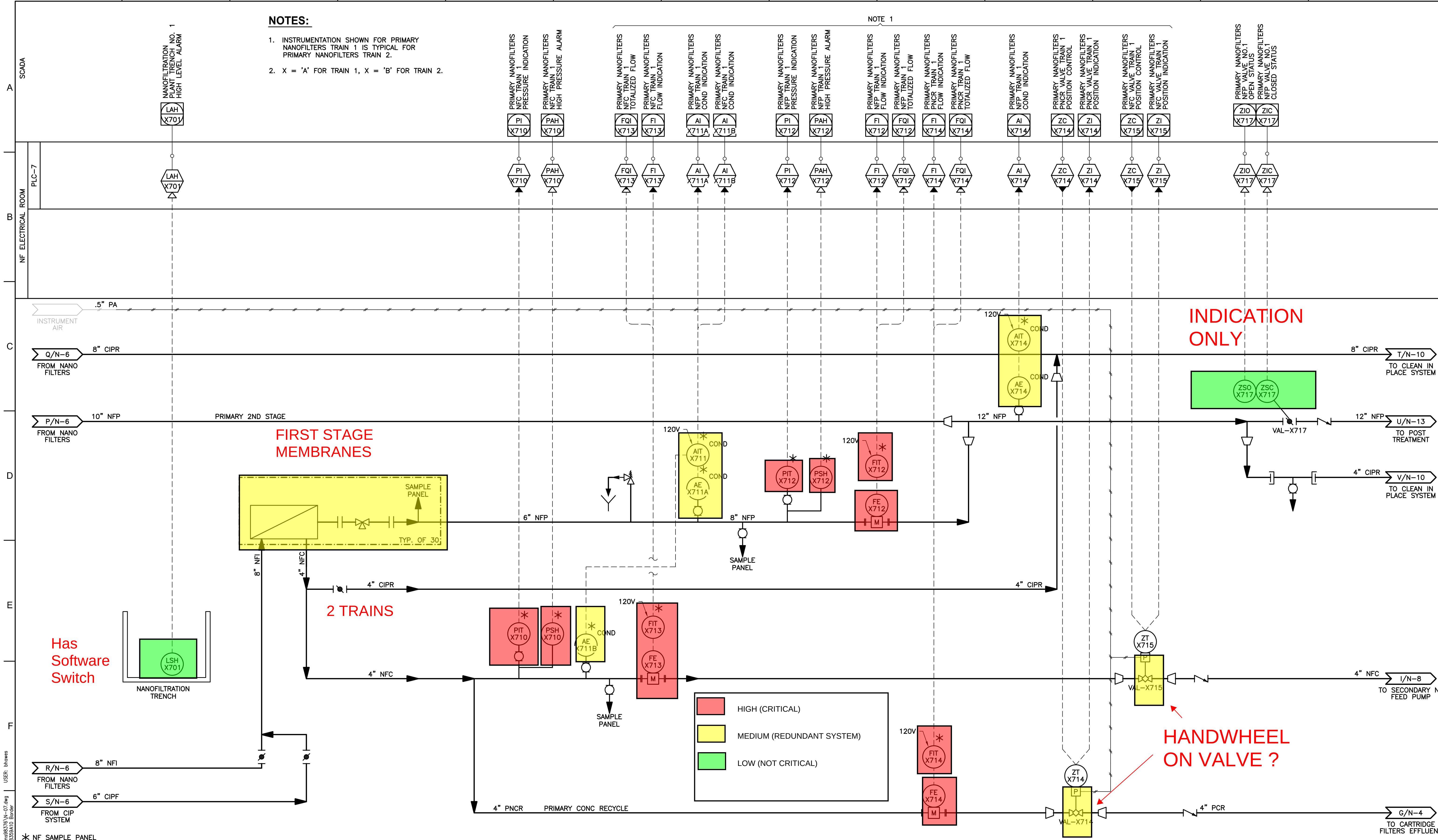
DESIGN: SKL
SCALE: AS NOTED
DRAWING NUMBER: N-6
SHEET 172 OF 188 SHEETS

NOTES:

1. INSTRUMENTATION SHOWN FOR PRIMARY NANOFILTERS TRAIN 1 IS TYPICAL FOR PRIMARY NANOFILTERS TRAIN 2.
2. X = 'A' FOR TRAIN 1, X = 'B' FOR TRAIN 2.



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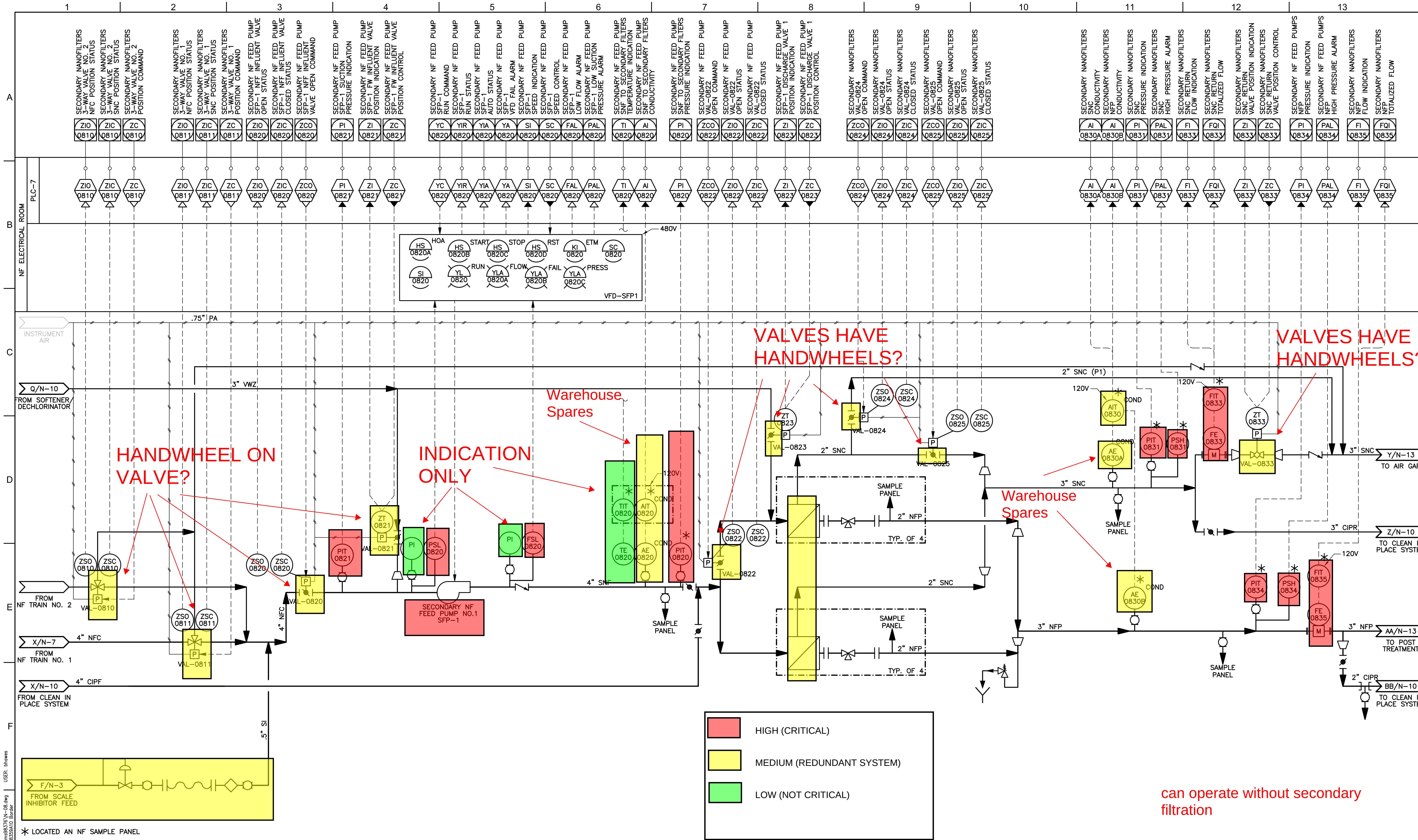
INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
PRIMARY NF SYSTEM, SHEET 2

DRAWN: TJB	DATE: 10/2010	DRAWING NUMBER N-7	REVISION
DESIGN: SKL	SCALE: AS NOTED	SHEET 173 OF 188 SHEETS	



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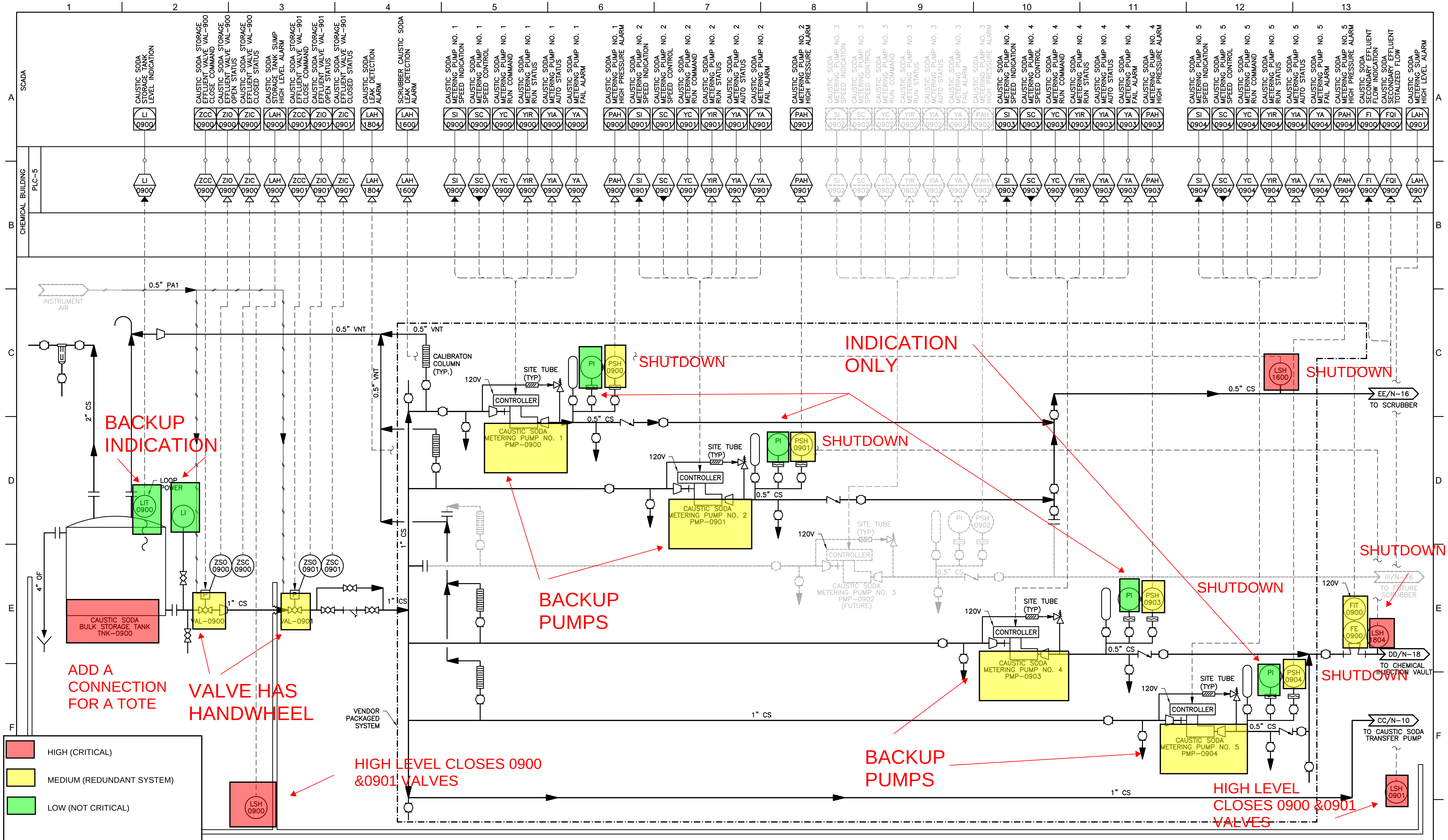
INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
SECONDARY NF SYSTEM

DRAWN: TJB | DATE: 10/2010 | DESIGN: SKL | SCALE: AS NOTED

DRAWING NUMBER N-8

SHEET 174 OF 188 SHEETS



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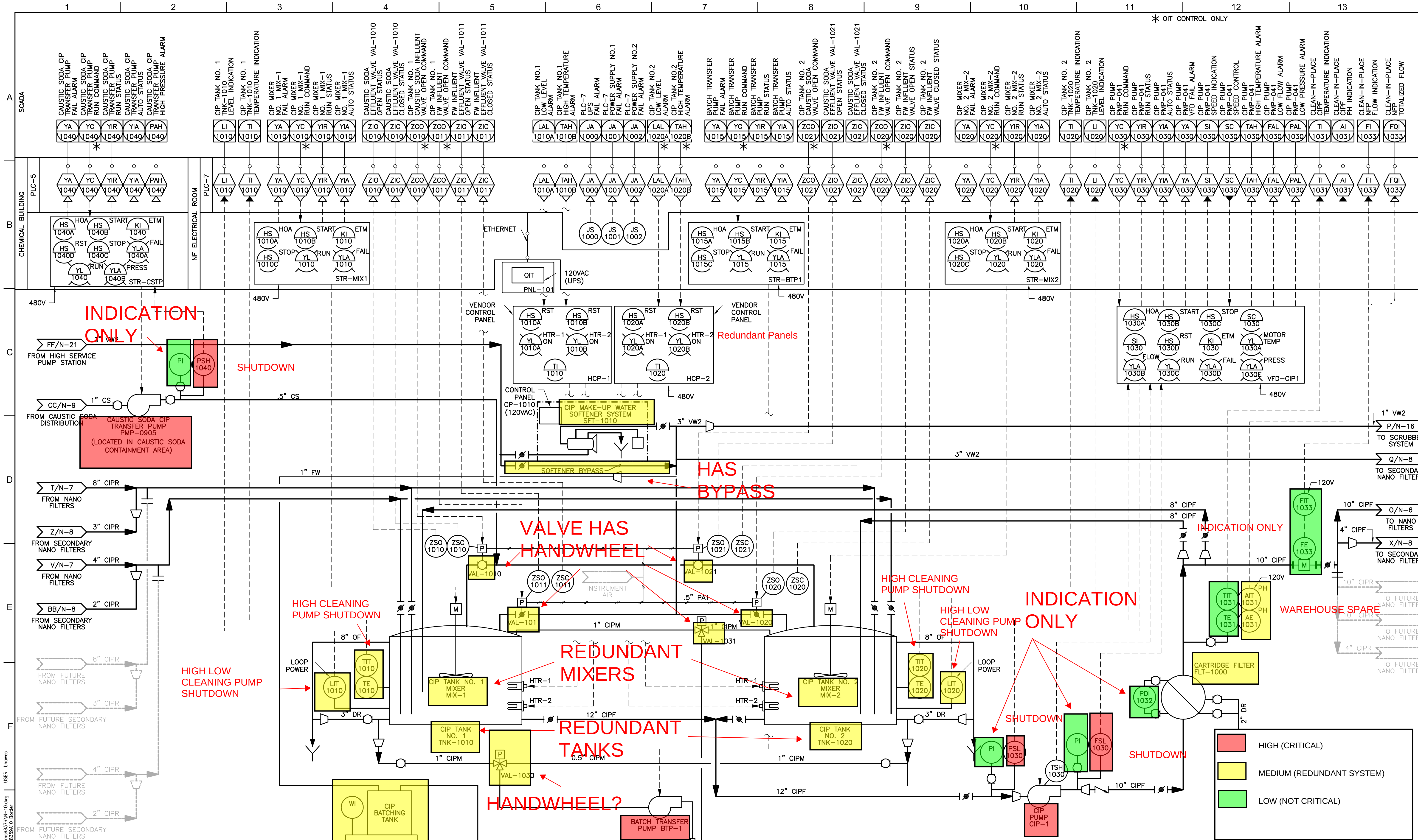
INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
CAUSTIC SODA STORAGE AND FEED

DRAWN: TJB
DATE: 10/2010
DESIGN: SKL
SCALE: AS NOTED
DRAWING NUMBER N-9
REVISION
SHEET 175 OF 188 SHEETS



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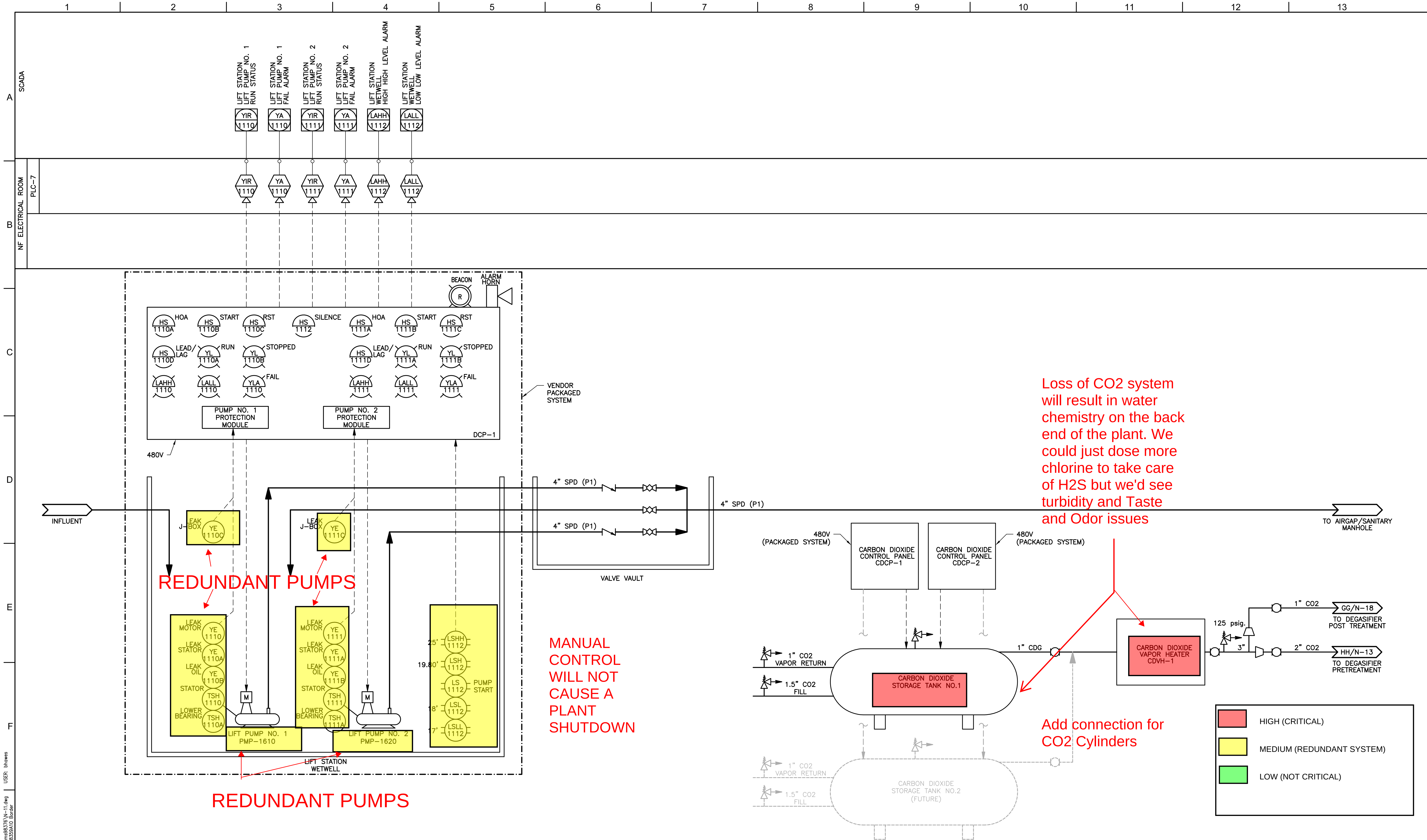
INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
CIP SYSTEM

DRAWN: TJB
DATE: 10/2010
DESIGN: SKL
SCALE: AS NOTED
DRAWING NUMBER N-10
REVISION
SHEET 176 OF 188 SHEETS



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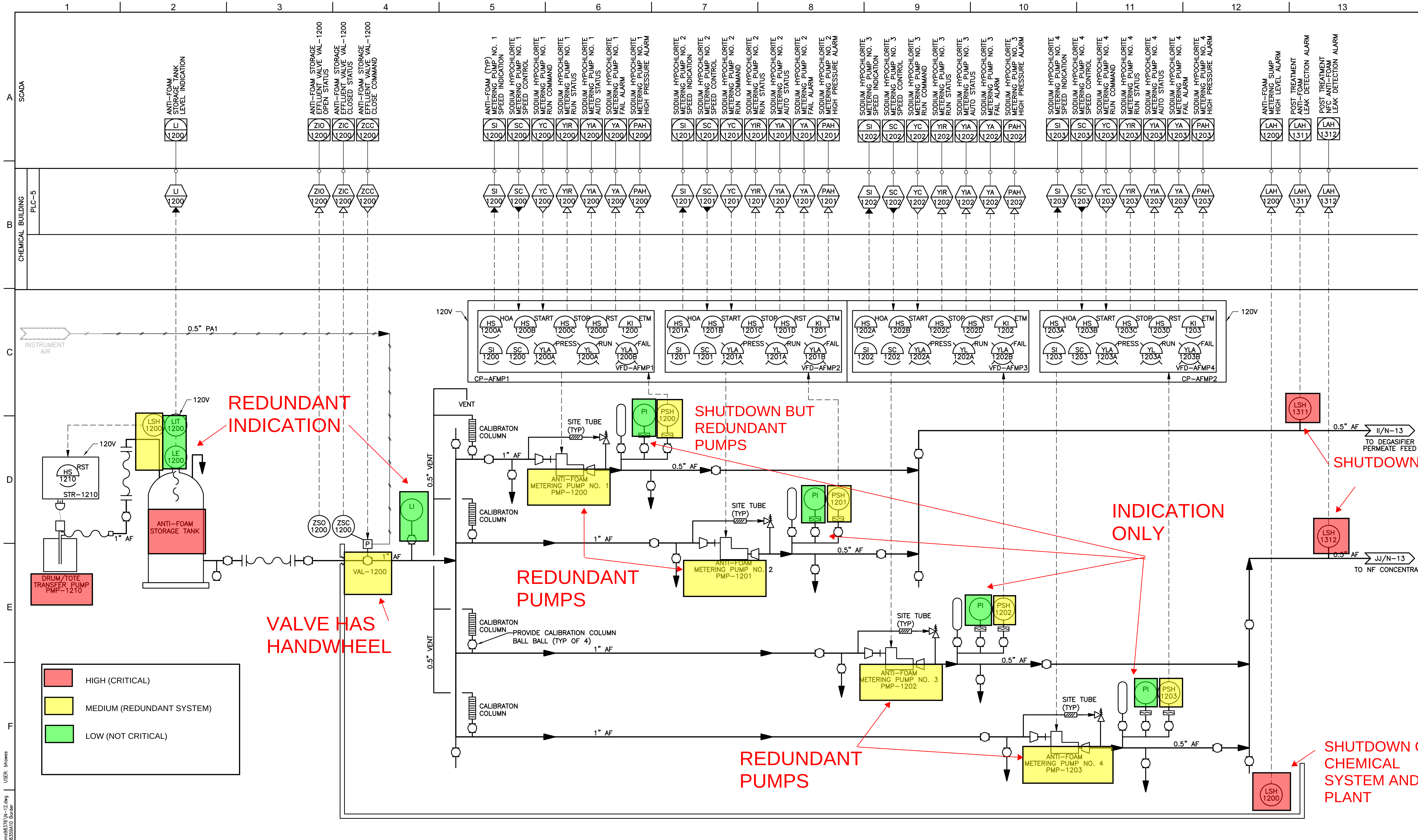
INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
CO2 STORAGE

DRAWN: TJB | DATE: 10/2010 | DRAWING NUMBER: N-11
DESIGN: SKL | SCALE: AS NOTED
SHEET 177 OF 188 SHEETS



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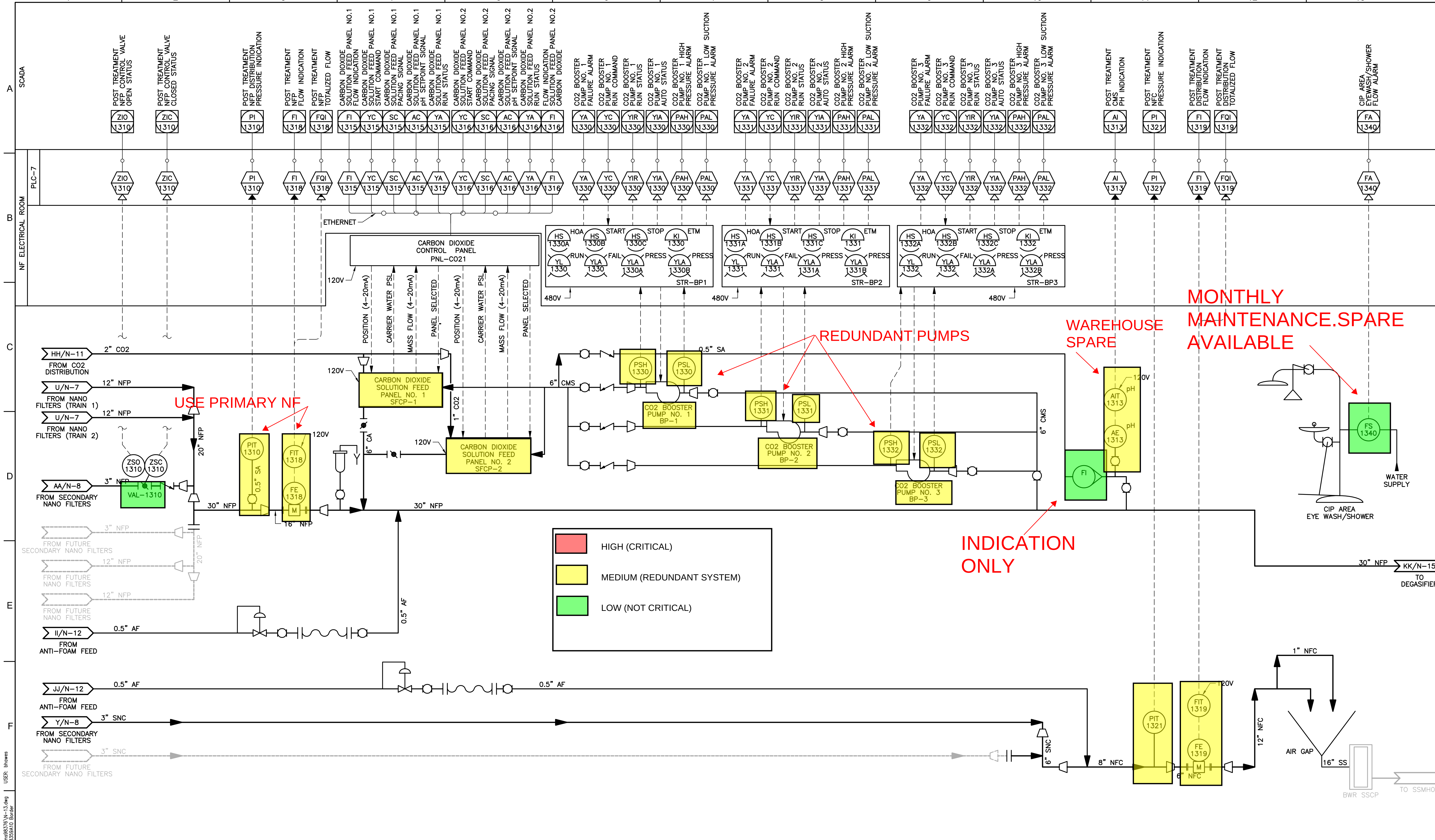
INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
ANTI-FOAM STORAGE AND FEED

DRAWN: TJB
DATE: 10/2010
DESIGN: SKL
SCALE: AS NOTED
DRAWING NUMBER: N-12
SHEET 178 OF 188 SHEETS



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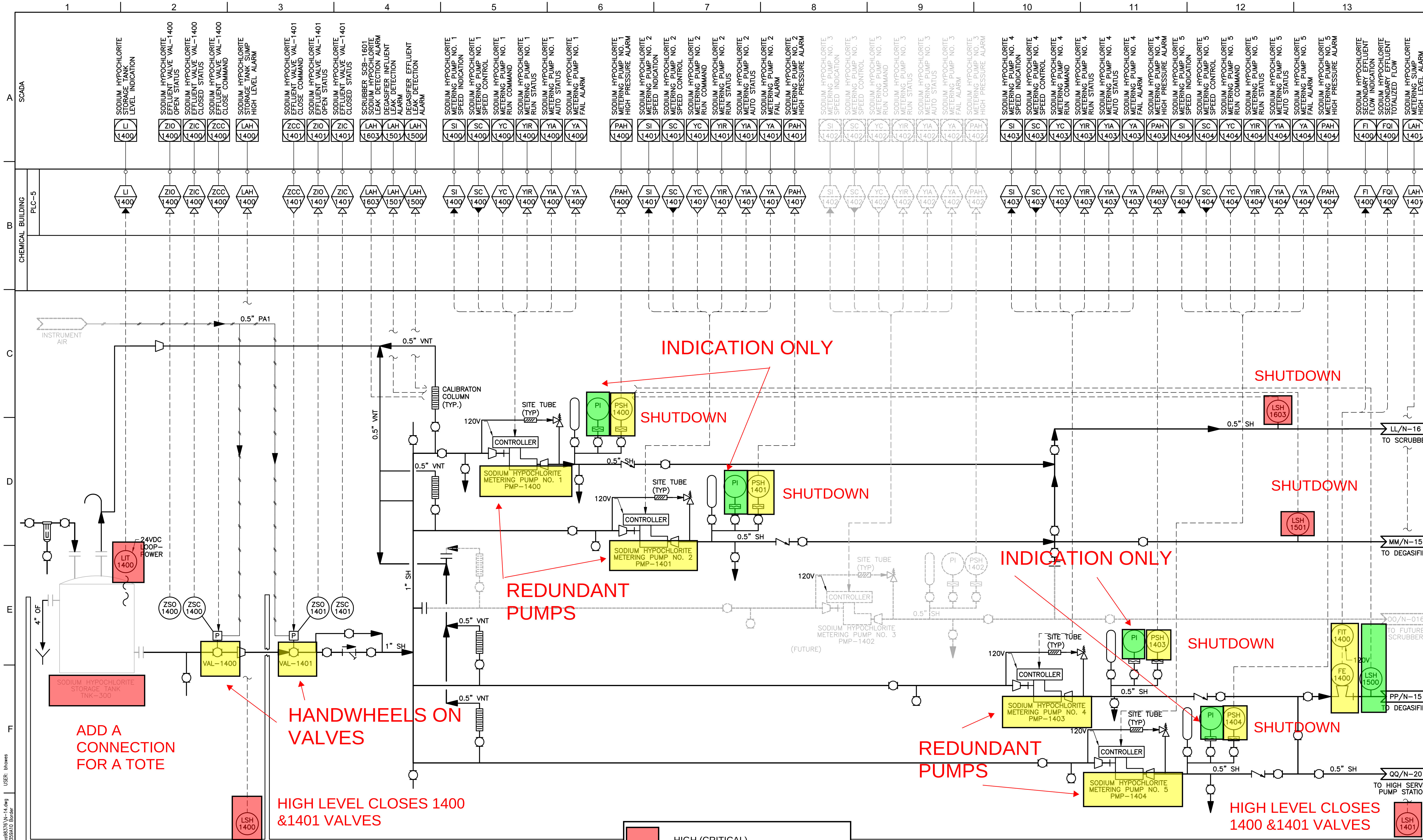
INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
POST TREATMENT SYSTEM

DRAWN: TJB
DATE: 10/2010
DESIGN: SKL
SCALE: AS NOTED
DRAWING NUMBER N-13
SHEET 179 OF 188 SHEETS



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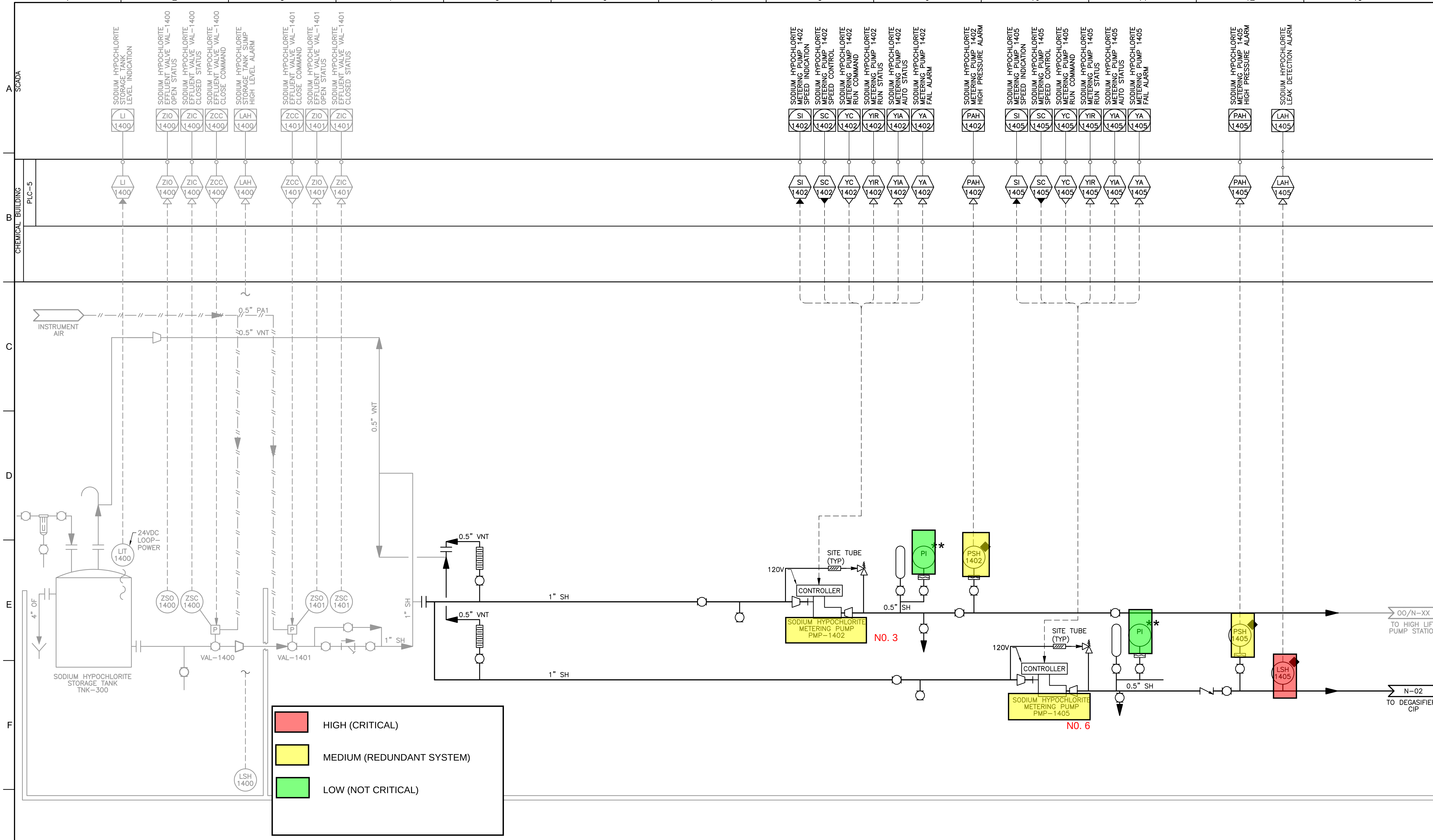
INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
SODIUM HYPOCHLORITE STORAGE AND FEED

DRAWN: TJB — DATE: 10/2010 — DRAWING NUMBER: N-14 — REVISION
DESIGN: SKL — SCALE: AS NOTED — SHEET 180 OF 188 SHEETS



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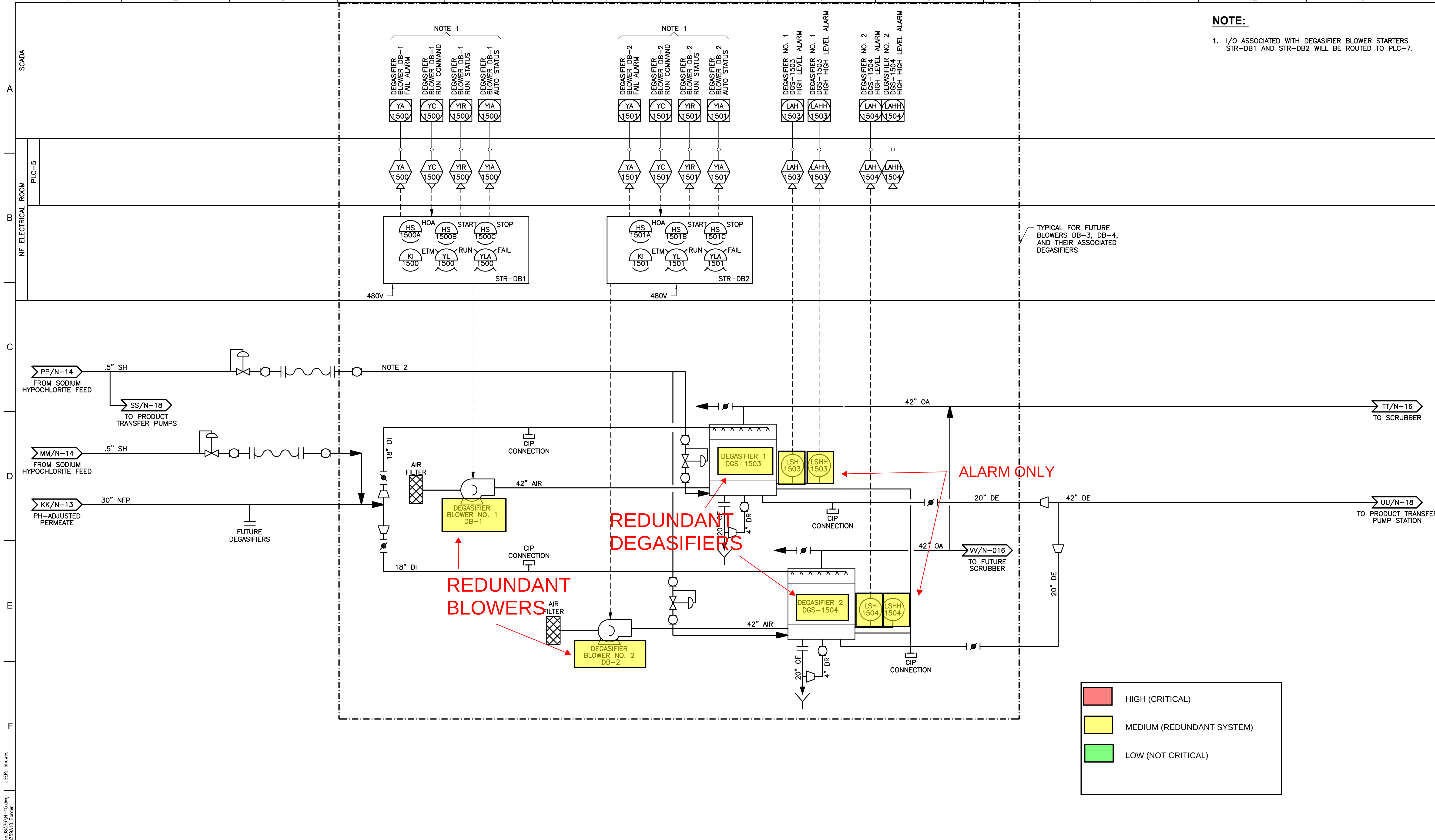
PROCESS AND INSTRUMENTATION DIAGRAM HYPOCHLORITE STORAGE AND FEED

DRAWN: ADS	DATE: MARCH 2016	DRAWING NUMBER N-04	REVISION
DESIGN: ADS	SCALE:	SHEET 42 OF 48 SHEETS	



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PROCESS AND INSTRUMENTATION DIAGRAM
DEGASIFIER SYSTEM

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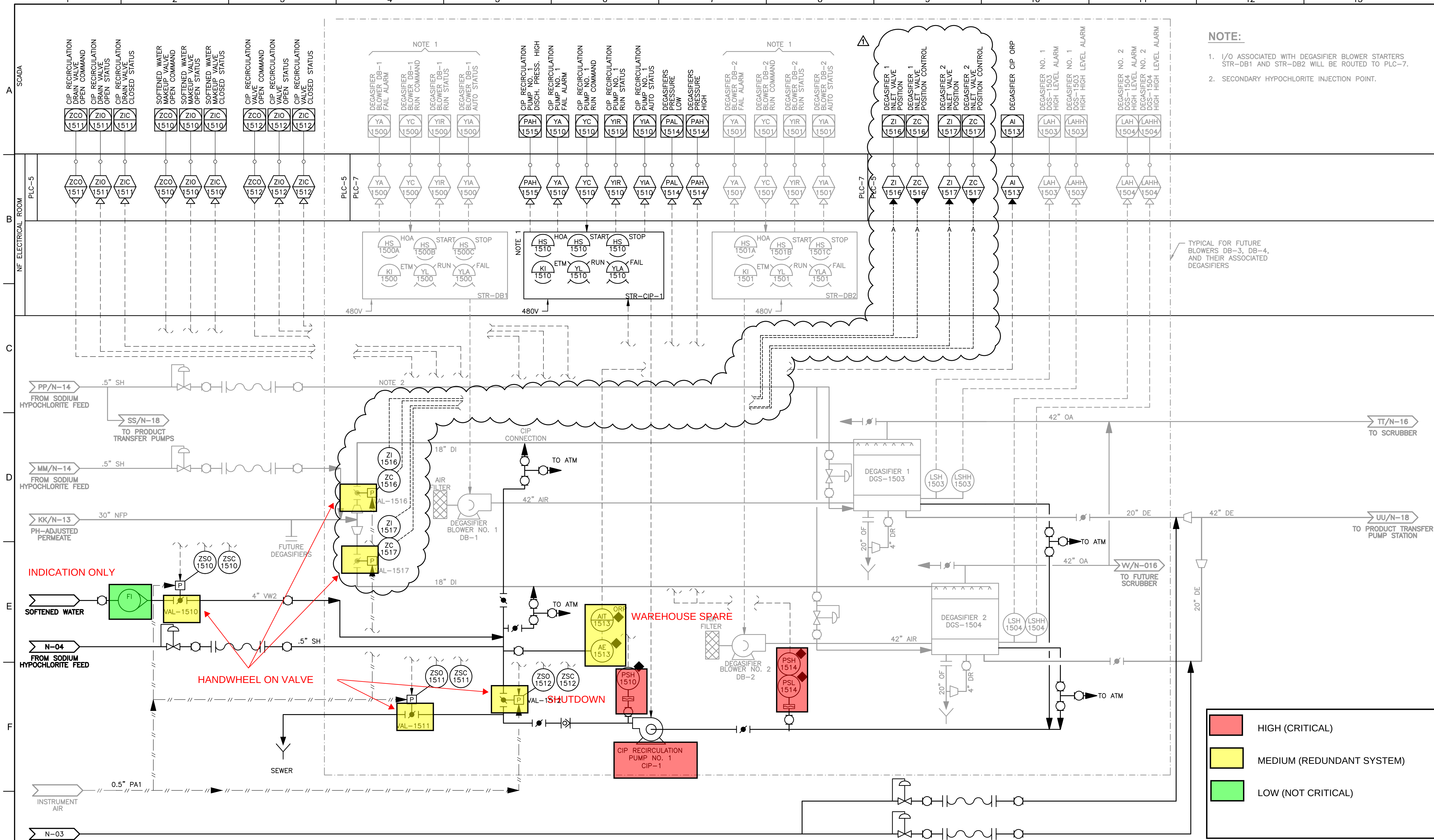
DESIGN: SKL | SCALE: AS NOTED
SHEET 181 OF 188 SHEETS



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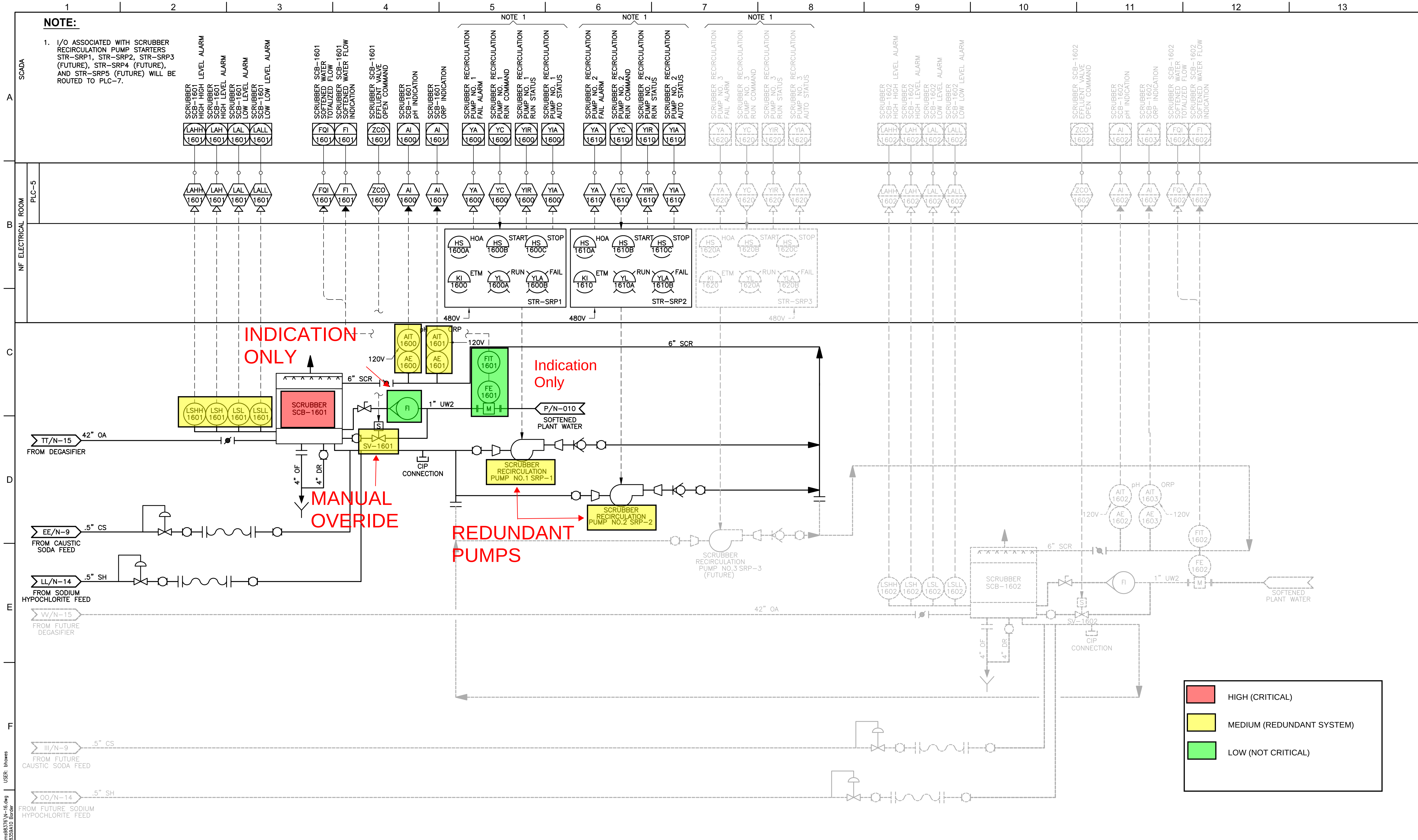
INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
DEGASIFIER SYSTEM

DRAWN: ADS
DATE: MARCH 2016
DESIGN: ADS
SCALE:
DRAWING NUMBER: N-02.1
REVISION: 1
SHEET 40 OF 48 SHEETS



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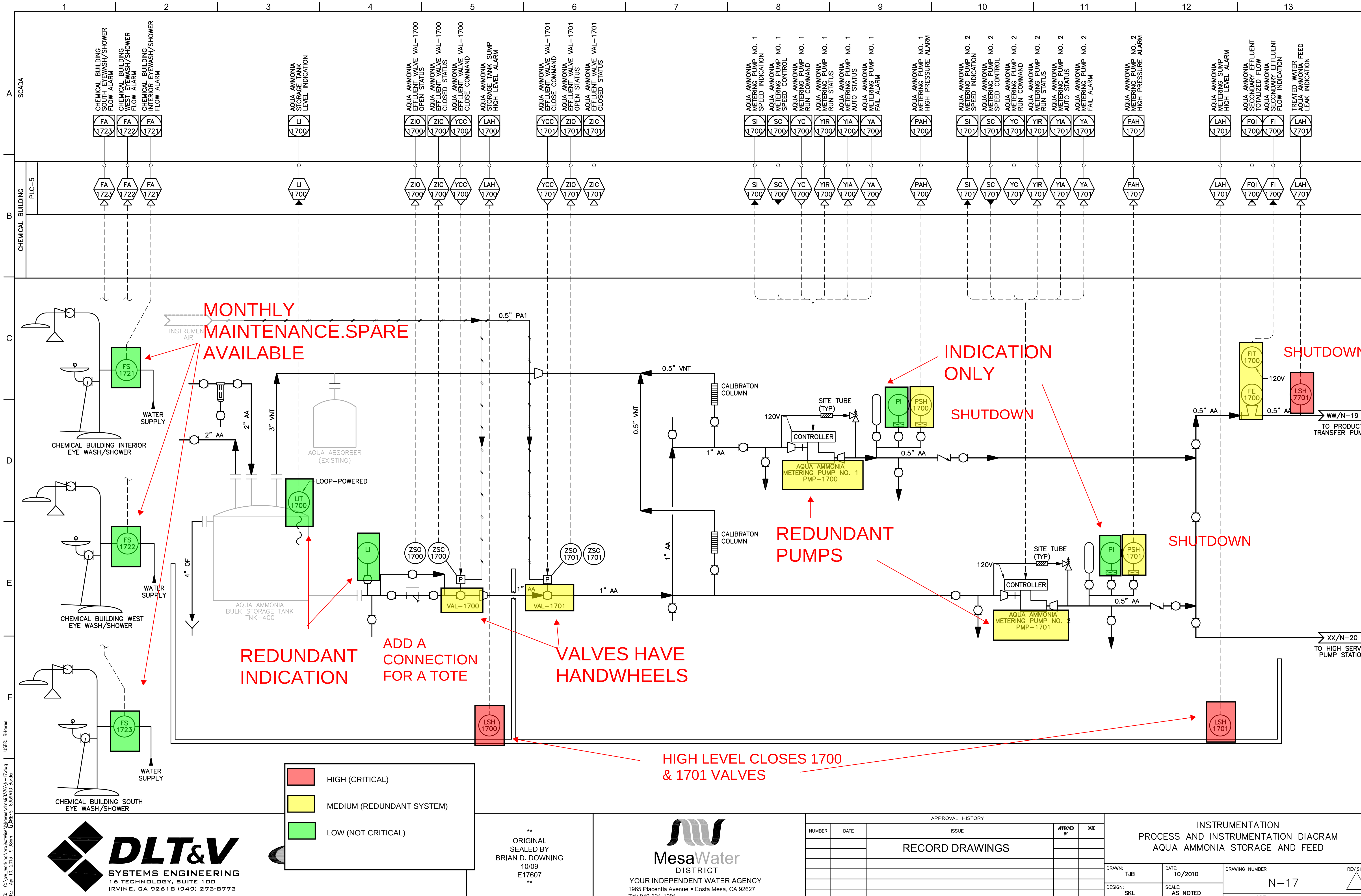
INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
SCRUBBER SYSTEM

DRAWN: TJB
DATE: 10/2010
DESIGN: SKL
SCALE: AS NOTED
DRAWING NUMBER N-16
REVISION
SHEET 182 OF 188 SHEETS



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PLC-5
MONTHLY MAINTENANCE.SPARE AVAILABLE
INSTRUMENT AIR
0.5" PA1
0.5" VNT
CALIBRATON COLUMN
INDICATION ONLY
SHUTDOWN
SHUTDOWN
SHUTDOWN
WATER SUPPLY
CHEMICAL BUILDING INTERIOR EYE WASH/SHOWER
CHEMICAL BUILDING WEST EYE WASH/SHOWER
CHEMICAL BUILDING SOUTH EYE WASH/SHOWER
2" AA
3" VNT
AQUA ABSORBER (EXISTING)
LOOP-POWERED
AQUA AMMONIA BULK STORAGE TANK TNK-400
4" OF
VAL-1700
VAL-1701
1" AA
SITE TUBE (TYP)
120V
CONTROLLER
AQUA AMMONIA METERING PUMP NO. 1 PMP-1700
AQUA AMMONIA METERING PUMP NO. 2 PMP-1701
0.5" AA
REDUNDANT PUMPS
REDUNDANT INDICATION
ADD A CONNECTION FOR A TOTE
VALVES HAVE HANDWHEELS
HIGH LEVEL CLOSES 1700 & 1701 VALVES
WW/N-19
TO PRODUCT TRANSFER PUMPS
XX/N-20
TO HIGH SERVICE PUMP STATION
HIGH (CRITICAL)
MEDIUM (REDUNDANT SYSTEM)
LOW (NOT CRITICAL)
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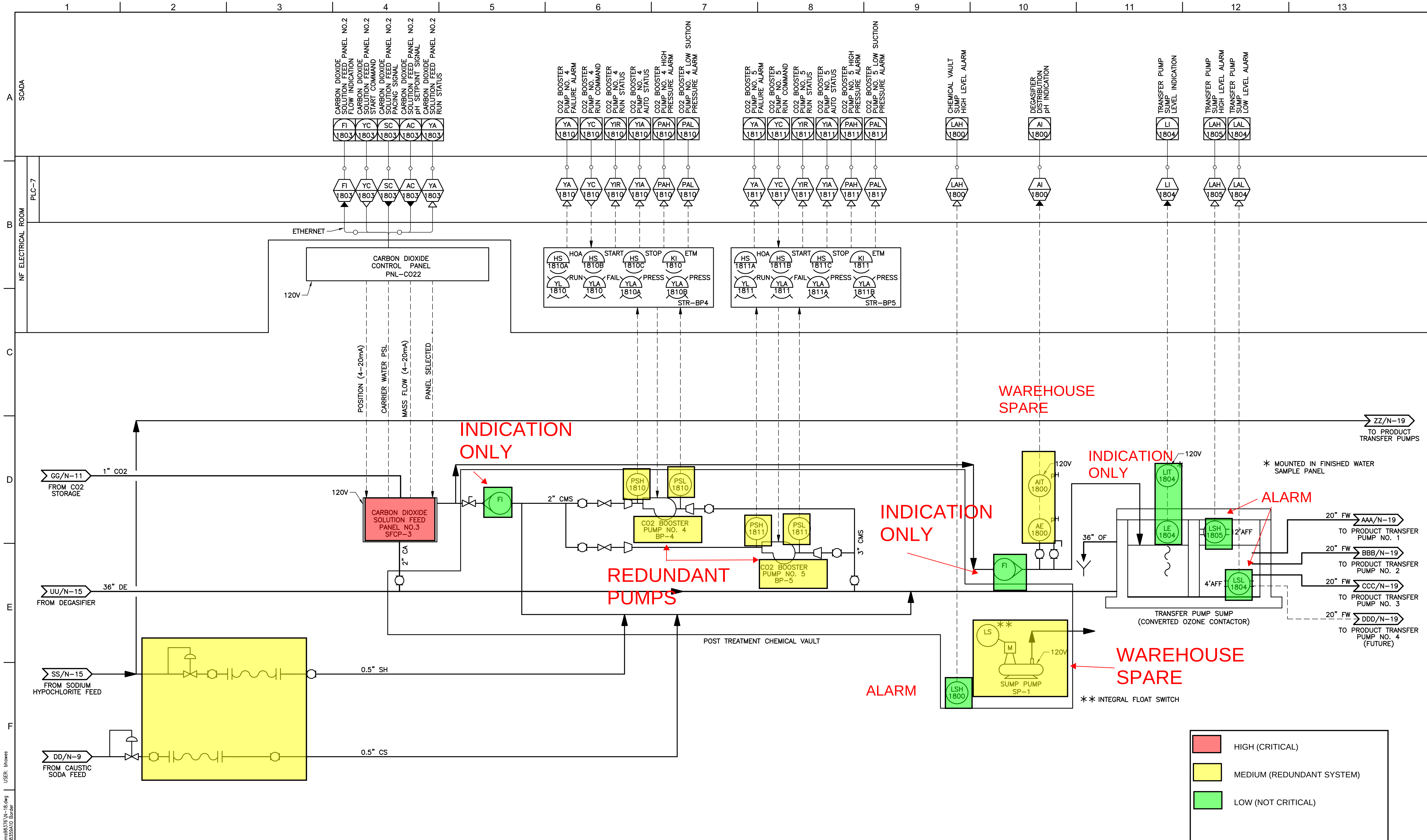
INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
AQUA AMMONIA STORAGE AND FEED
DRAWN: TJB
DATE: 10/2010
DESIGN: SKL
SCALE: AS NOTED
DRAWING NUMBER N-17
SHEET 183 OF 188 SHEETS



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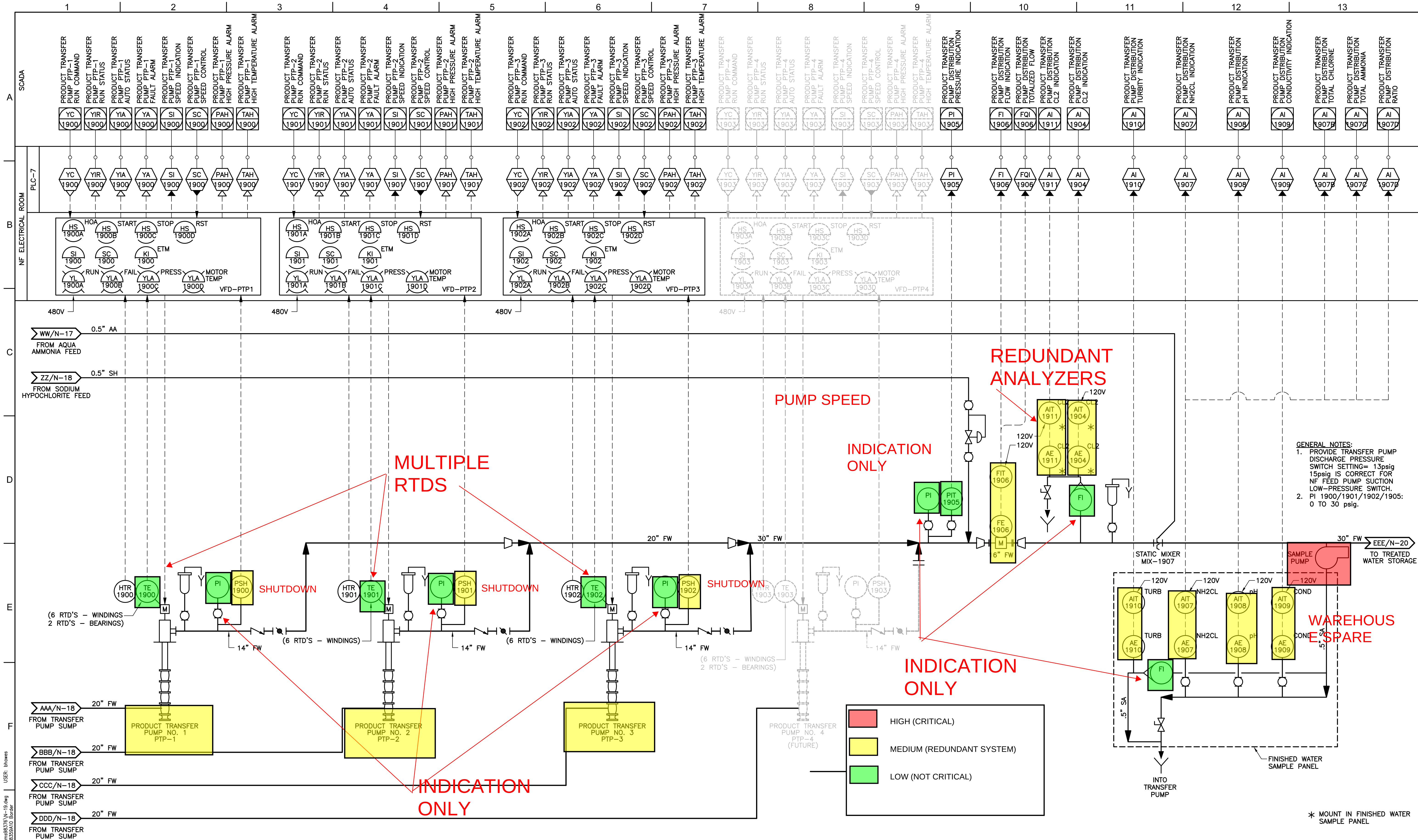
INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
PRODUCT TRANSFER PUMPS, SHEET 1

DRAWN: TJB | DATE: 10/2010 | DRAWING NUMBER N-18
DESIGN: SKL | SCALE: AS NOTED
SHEET 184 OF 188 SHEETS



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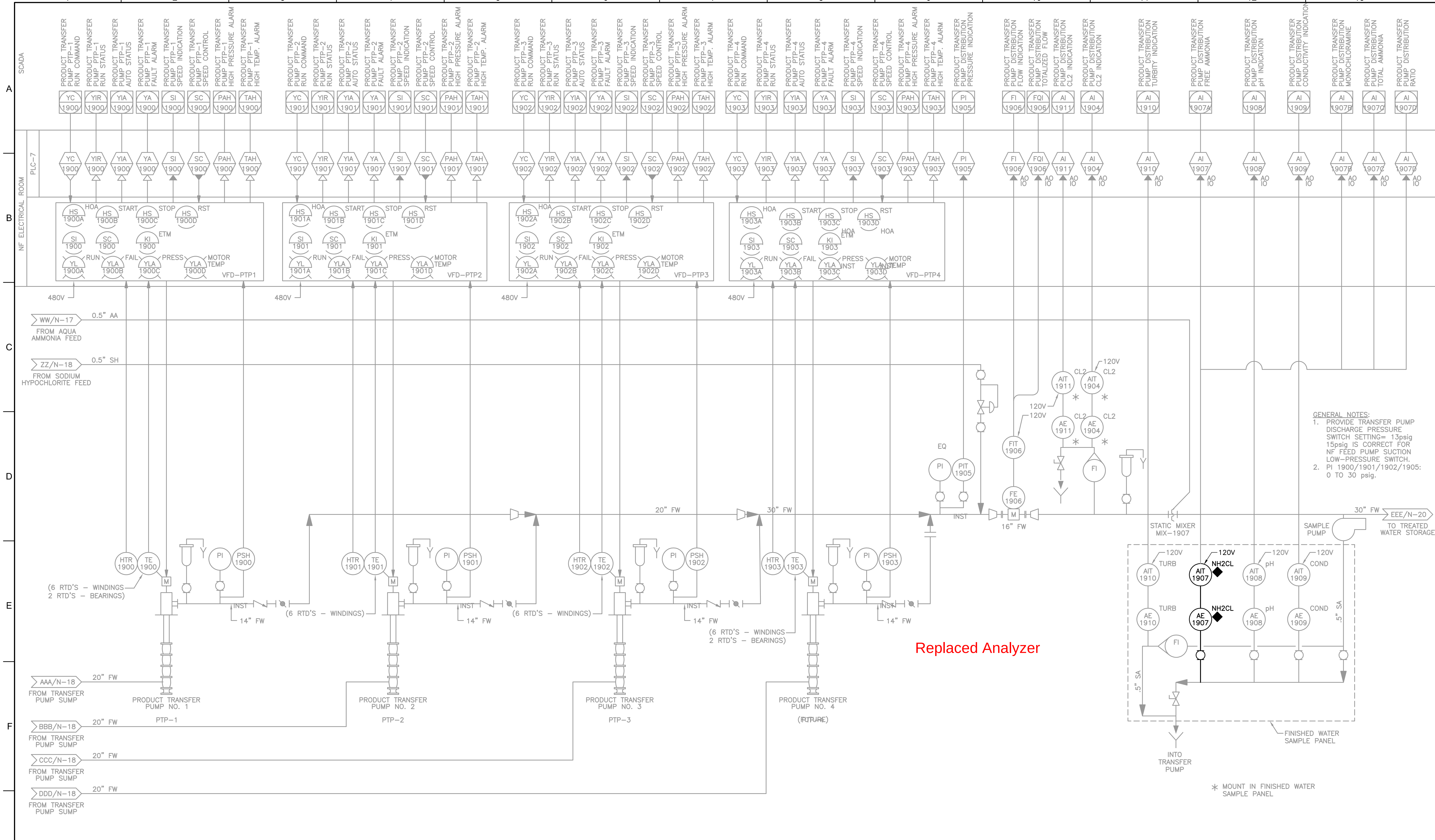
INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
PRODUCT TRANSFER PUMPS, SHEET 2

DRAWN: TJB
DATE: 10/2010
DESIGN: SKL
SCALE: AS NOTED
DRAWING NUMBER N-19
SHEET 185 OF 188 SHEETS



ADS Engineering 4701 N FEDERAL HWY, SUITE 390 POMPANO BEACH, FL 33064	carollo®	REGISTERED PROFESSIONAL ENGINEER No. E18857 ELECTRICAL STATE OF CALIFORNIA 9/30/17	MesaWater DISTRICT YOUR INDEPENDENT WATER AGENCY 1965 Placentia Avenue • Costa Mesa, CA 92627 Tel: 949-631-1291	INSTRUMENTATION PROCESS AND INSTRUMENTATION DIAGRAM PRODUCT TRANSFER PUMPS, SHEET 2

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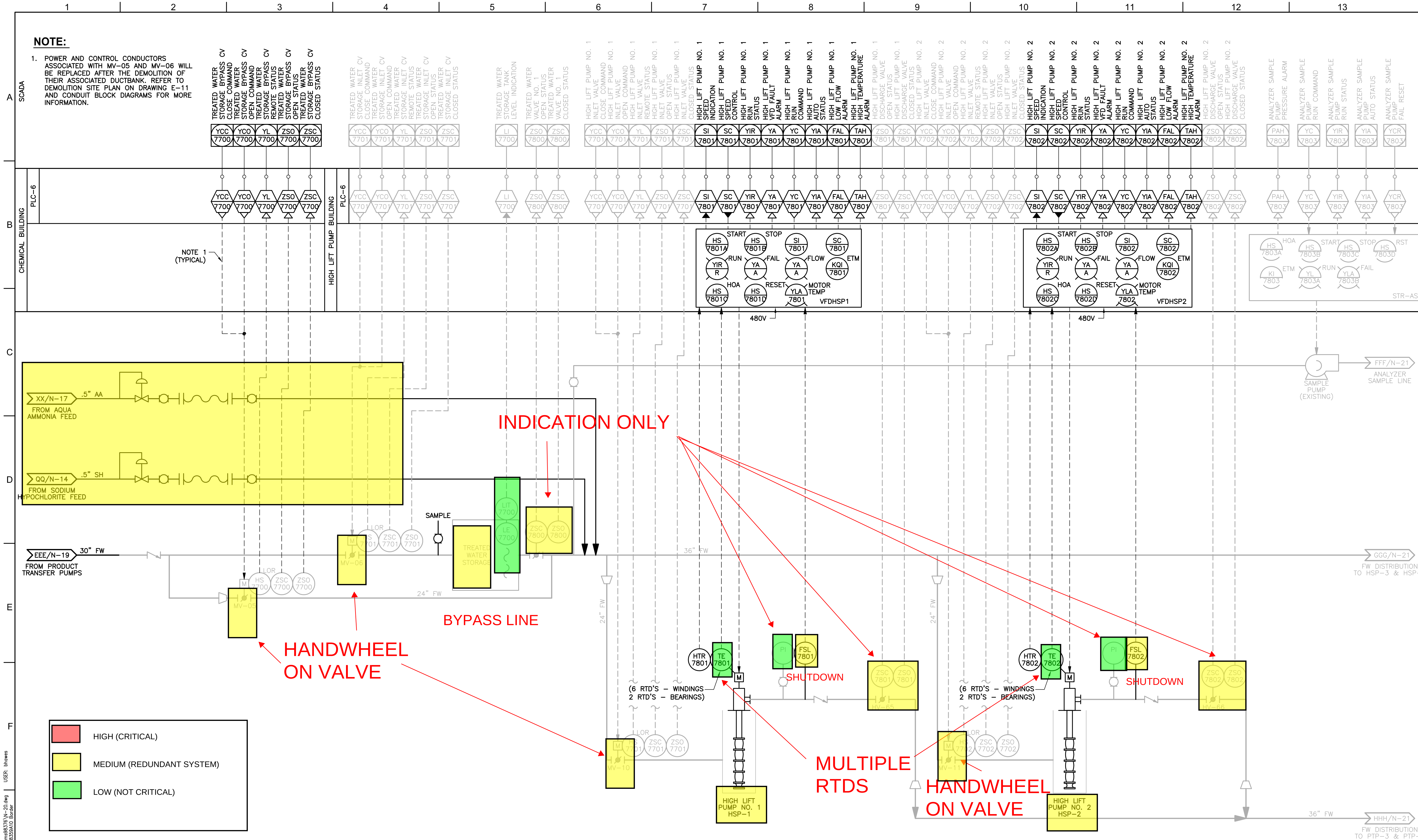
NUMBER	DATE	ISSUE	APPROVED BY	DATE

DRAWN: ADS	DATE: MARCH 2016	DRAWING NUMBER: N-05	REVISION
DESIGN: ADS	SCALE:	SHEET 43 OF 48 SHEETS	



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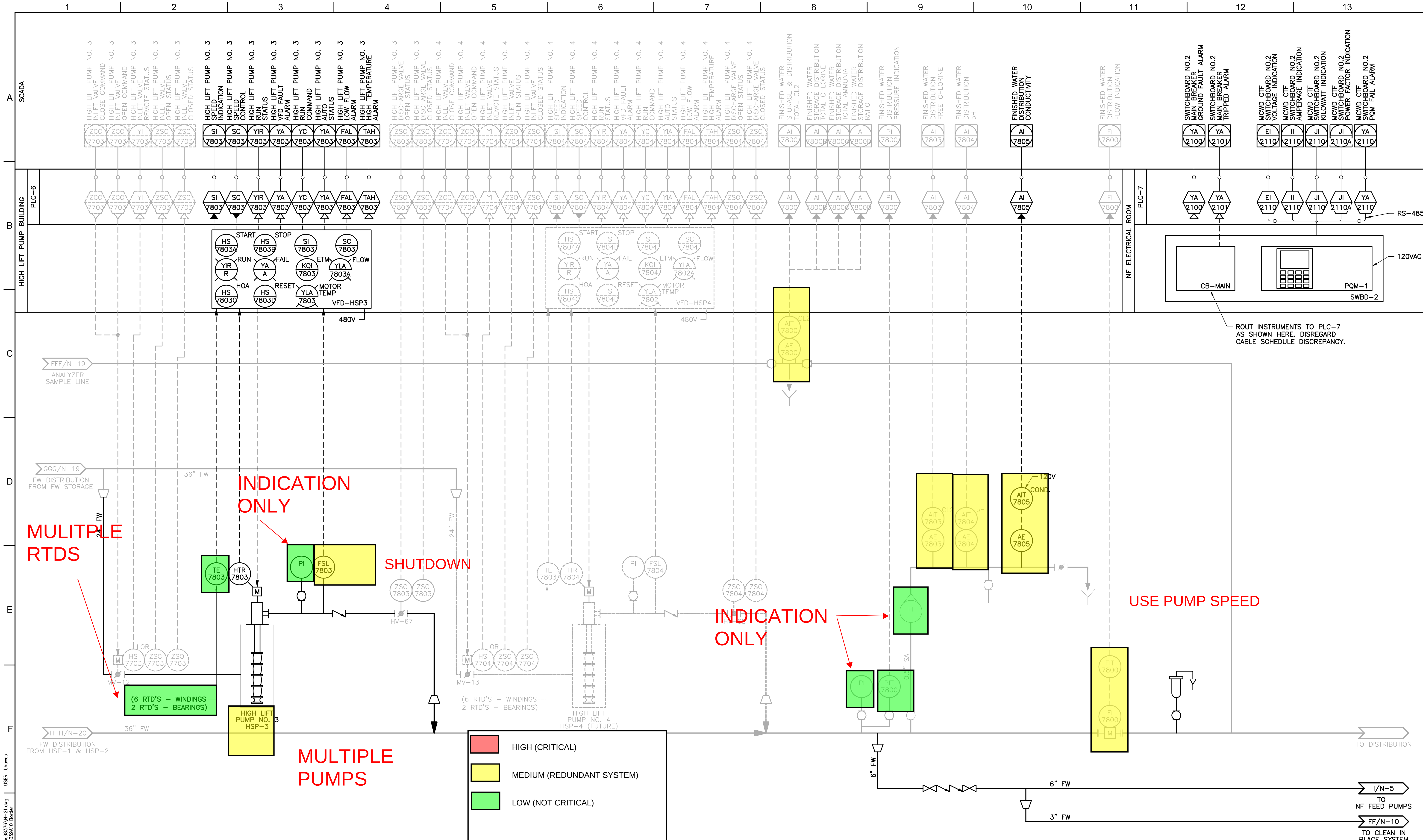
INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
HIGH LIFT PUMP STATION, SHEET 1

DRAWN: TJB
DATE: 10/2010
DESIGN: SKL
SCALE: AS NOTED
DRAWING NUMBER N–20
REVISION
SHEET 186 OF 188 SHEETS



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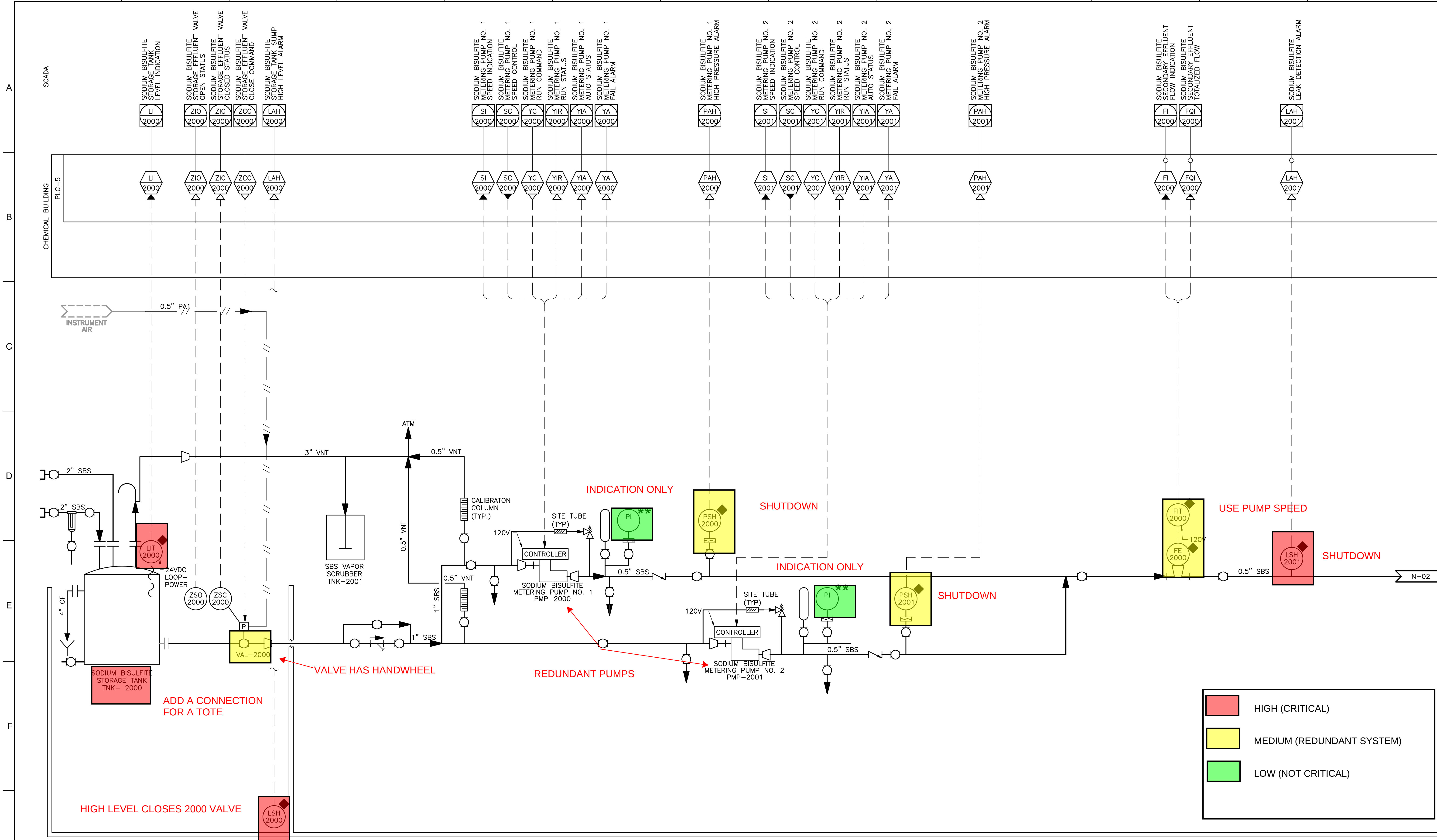
Tel: 949-631-1291

APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

INSTRUMENTATION
PROCESS AND INSTRUMENTATION DIAGRAM
HIGH LIFT PUMP STATION, SHEET 2

DRAWN: TJB
DATE: 10/2010
DESIGN: SKL
SCALE: AS NOTED
DRAWING NUMBER: N-21
SHEET 187 OF 188 SHEETS



ADS Engineering
4701 N FEDERAL HWY, SUITE 390
POMPANO BEACH, FL 33064

carollo®

REGISTERED PROFESSIONAL ENGINEER
ALEXANDAR D. STOJANOVIC
No. E18857
ELECTRICAL
STATE OF CALIFORNIA
9/30/17

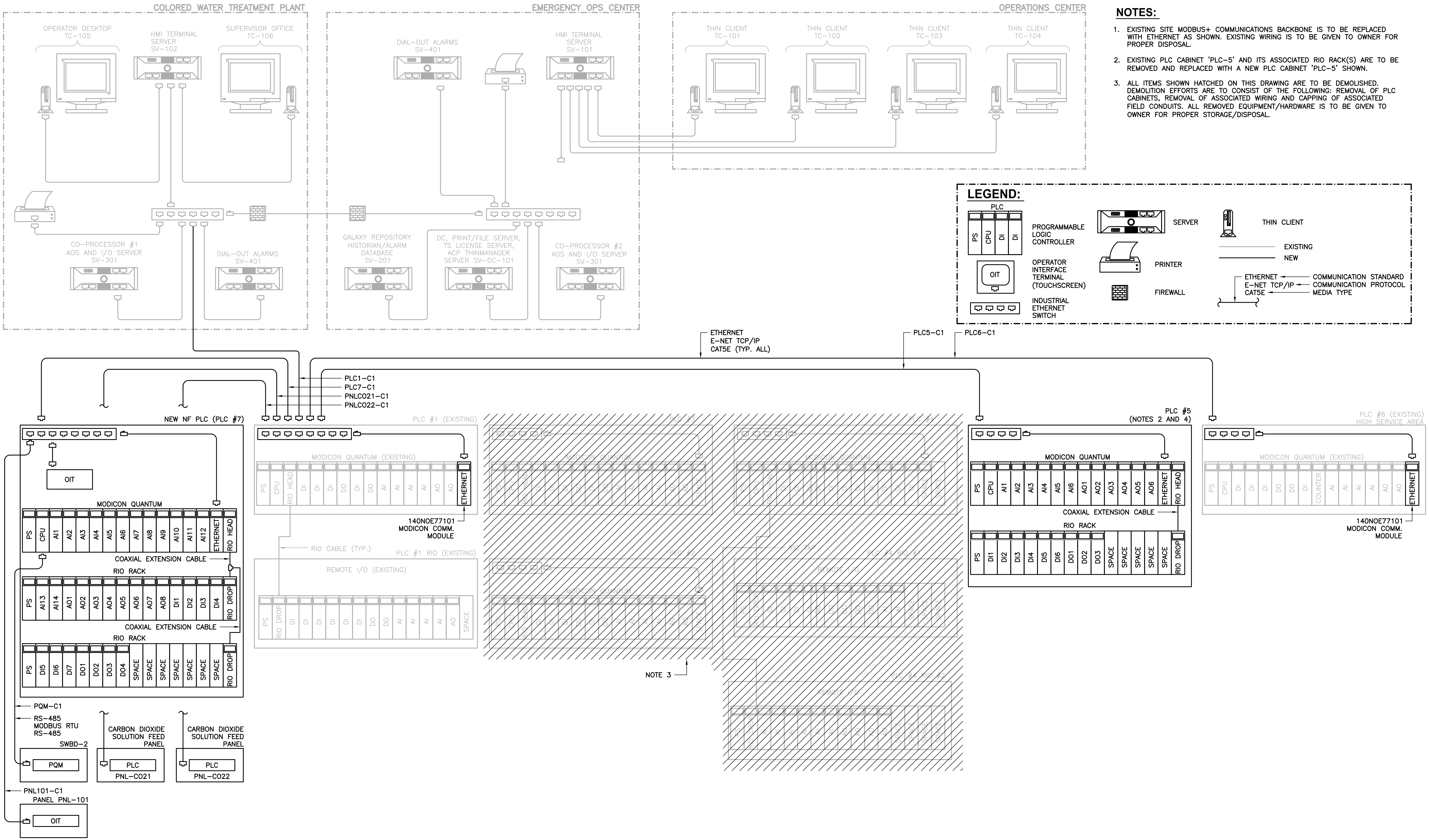
MesaWater DISTRICT
YOUR INDEPENDENT WATER AGENCY
1965 Placentia Avenue • Costa Mesa, CA 92627
Tel: 949-631-1291

APPROVAL HISTORY

NUMBER	DATE	ISSUE	APPROVED BY	DATE

INSTRUMENTATION
SODIUM BISULFITE
FEED AND STORAGE

DRAWN: ADS
DESIGN: ADS
DATE: MARCH 2016
SCALE:
DRAWING NUMBER N-03
REVISION
SHEET 41 OF 48 SHEETS



NOTES:

1. EXISTING SITE MODBUS+ COMMUNICATIONS BACKBONE IS TO BE REPLACED WITH ETHERNET AS SHOWN. EXISTING WIRING IS TO BE GIVEN TO OWNER FOR PROPER DISPOSAL.
2. EXISTING PLC CABINET 'PLC-5' AND ITS ASSOCIATED RIO RACK(S) ARE TO BE REMOVED AND REPLACED WITH A NEW PLC CABINET 'PLC-5' SHOWN.
3. ALL ITEMS SHOWN HATCHED ON THIS DRAWING ARE TO BE DEMOLISHED. DEMOLITION EFFORTS ARE TO CONSIST OF THE FOLLOWING: REMOVAL OF PLC CABINETS, REMOVAL OF ASSOCIATED WIRING AND CAPPING OF ASSOCIATED FIELD CONDUITS. ALL REMOVED EQUIPMENT/HARDWARE IS TO BE GIVEN TO OWNER FOR PROPER STORAGE/DISPOSAL.

DLT&V SYSTEMS ENGINEERING
16 TECHNOLOGY, SUITE 100
IRVINE, CA 92618 (949) 273-8773

carollo

**
ORIGINAL
SEALED BY
BRIAN D. DOWNING
10/09
E17607
**

Mesa Water DISTRICT
YOUR INDEPENDENT WATER AGENCY
1965 Placentia Avenue • Costa Mesa, CA 92627
Tel: 949-631-1291

APPROVAL HISTORY

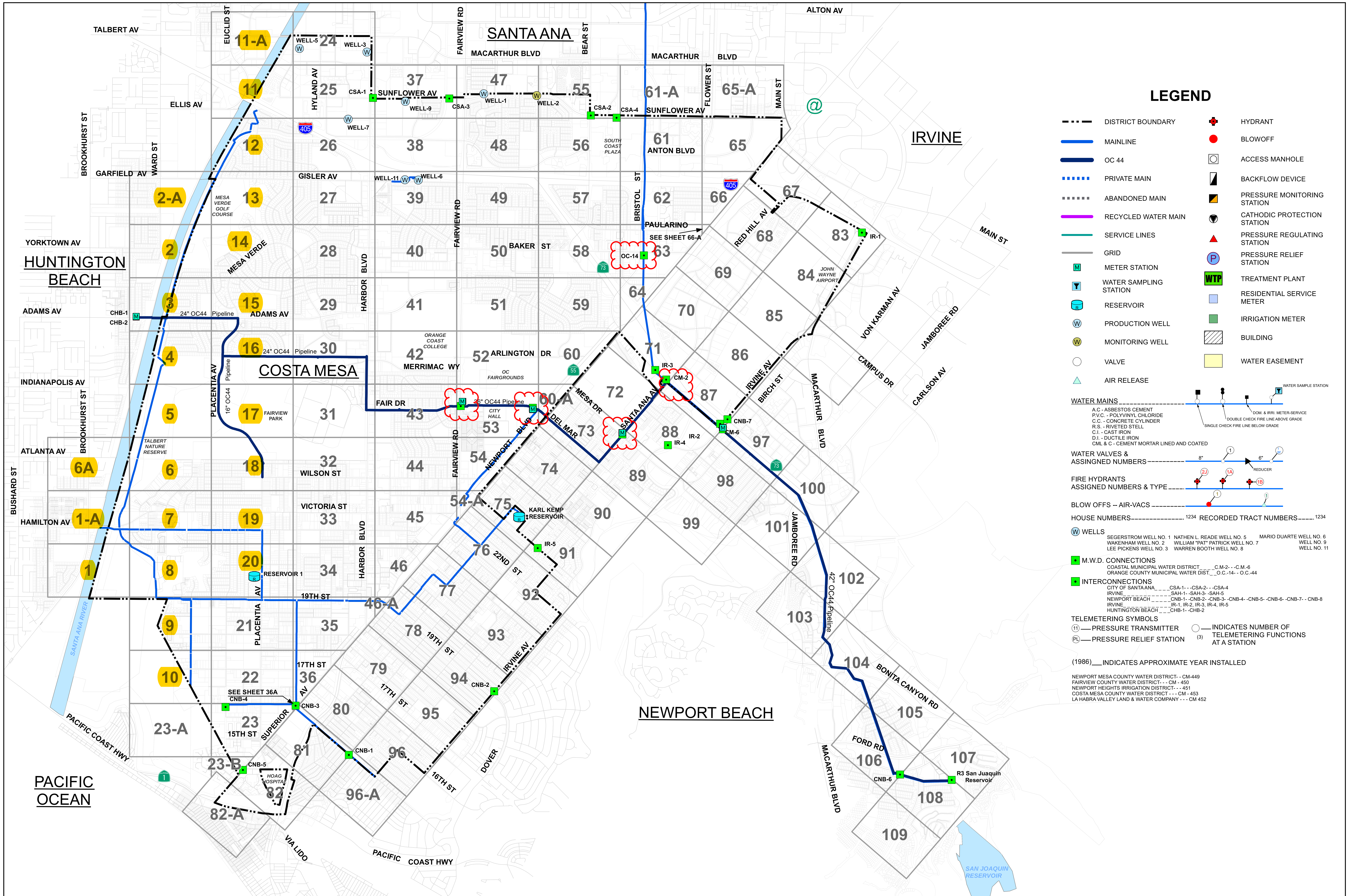
NUMBER	DATE	ISSUE	APPROVED BY	DATE
		RECORD DRAWINGS		

INSTRUMENTATION
NETWORK COMMUNICATION DIAGRAM

DRAWN: TJB	DATE: 10/2010	DRAWING NUMBER N-22	REVISION
DESIGN: SKL	SCALE: AS NOTED	SHEET 188 OF 188 SHEETS	

DWG: C:\pw_working\projectwise\bhowes\dms98376\N-22.dwg
DATE: Apr 11, 2013 9:54am
XREFS: 8359A10 Border
USER: bhowes

Attachment G: SPFA – Metered Turnouts



MesaWater DISTRICT

Michael Baker INTERNATIONAL

WATER ATLAS BOOK

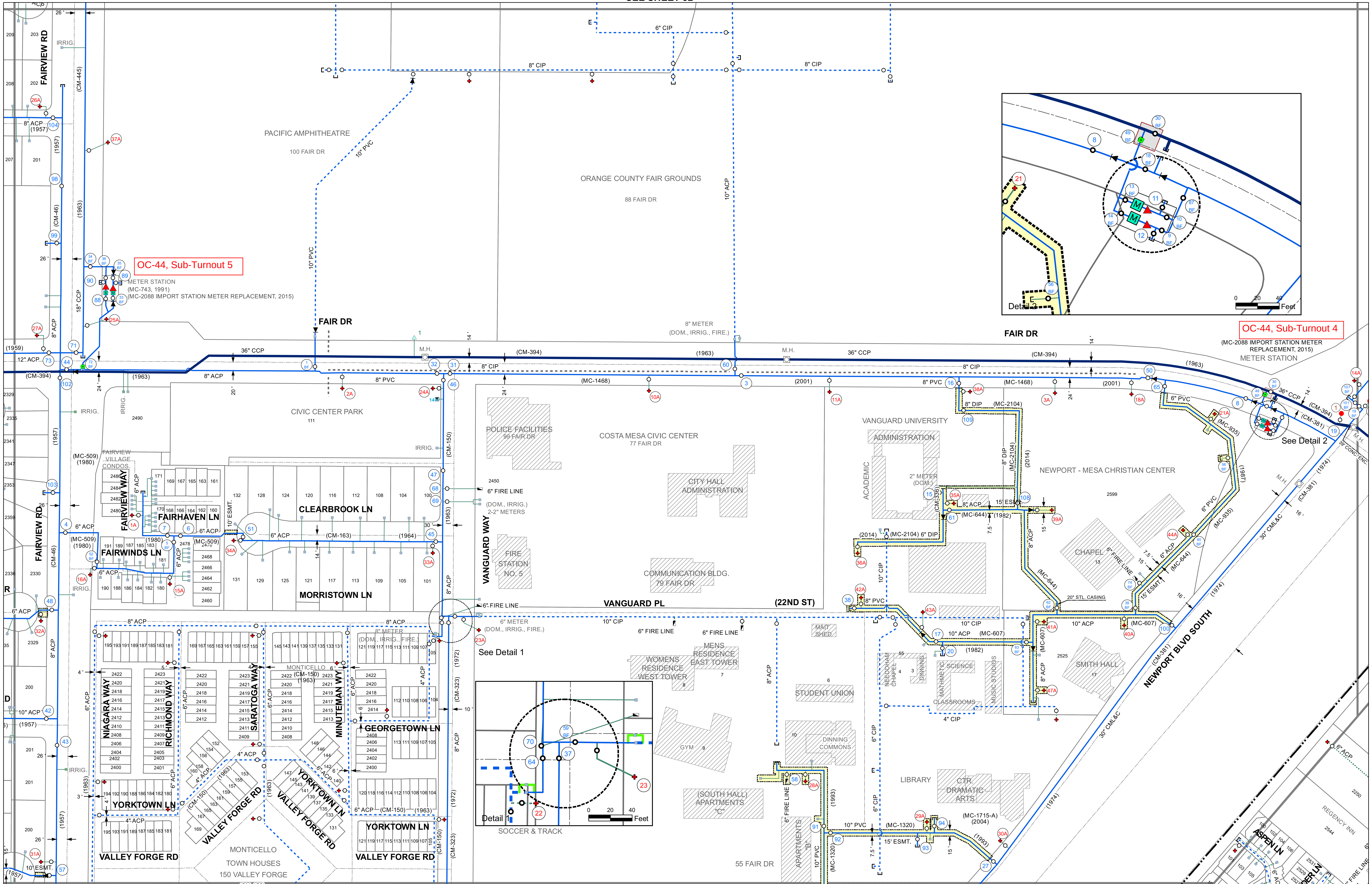
0 0.25 0.5 Miles

NOT FOR CONSTRUCTION USE

REVISION:
July 25, 2019

DISCLAIMER:
This map represents a visual aid intended to assist Public Utility Department personnel with the management of Water System facilities. Data provided hereon is not a guarantee of actual field conditions nor a substitute for record drawings and field verification.

INDEX



![Mesa Water District logo]

Michael Baker INTERNATIONAL

WATER ATLAS BOOK

0 50 100 200 300 Feet

NOT FOR CONSTRUCTION USE

REVISION: July 25, 2019

SEE SHEET 54

DISCLAIMER:
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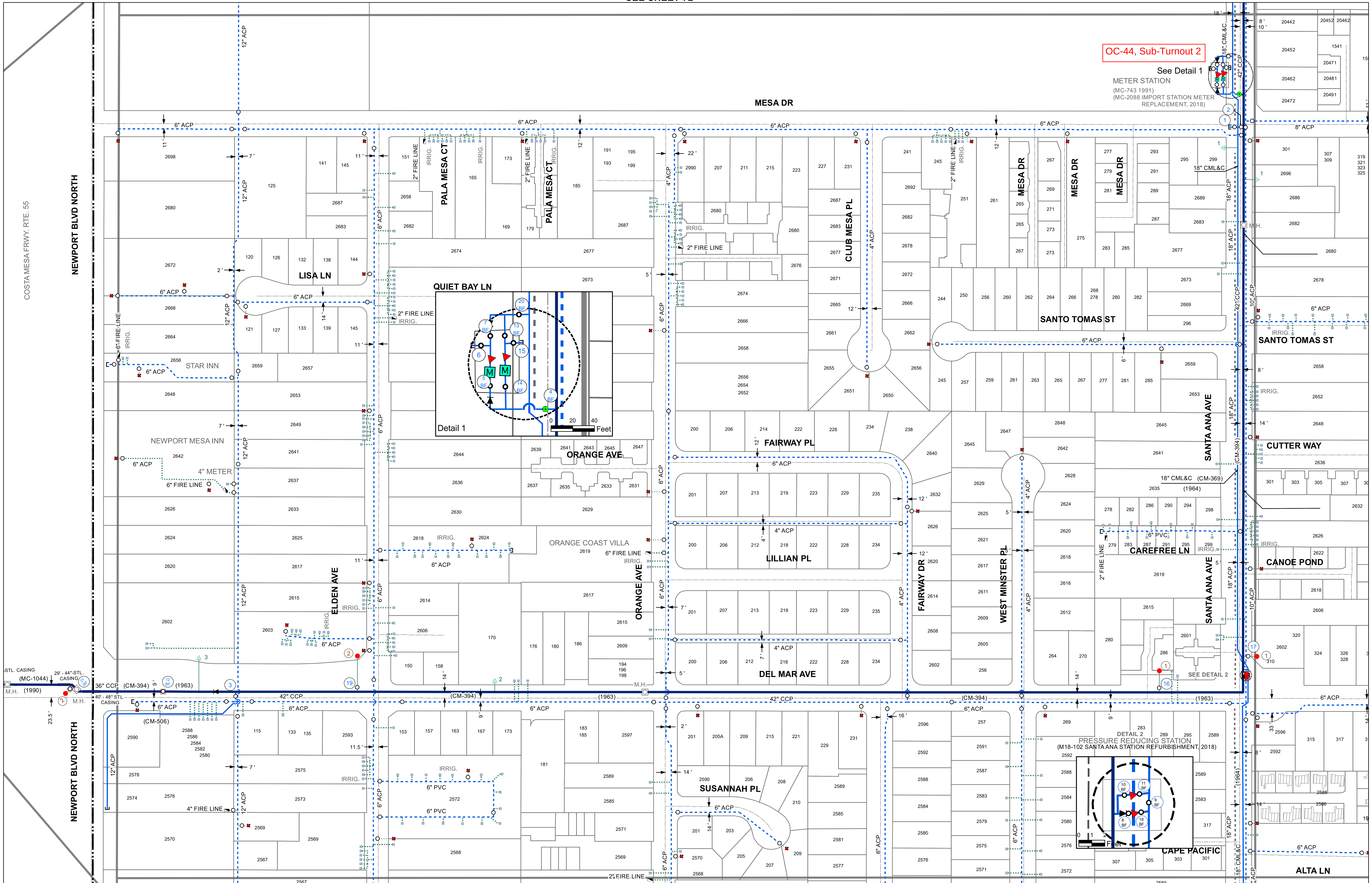
42	52	60
43	53	73
44	54	74



Mesa Water DISTRICT

Michael Baker INTERNATIONAL

WATER ATLAS BOOK

0 50 100 200 300 Feet

NOT FOR CONSTRUCTION USE

REVISION: July 25, 2019

SEE SHEET 74

DISCLAIMER:
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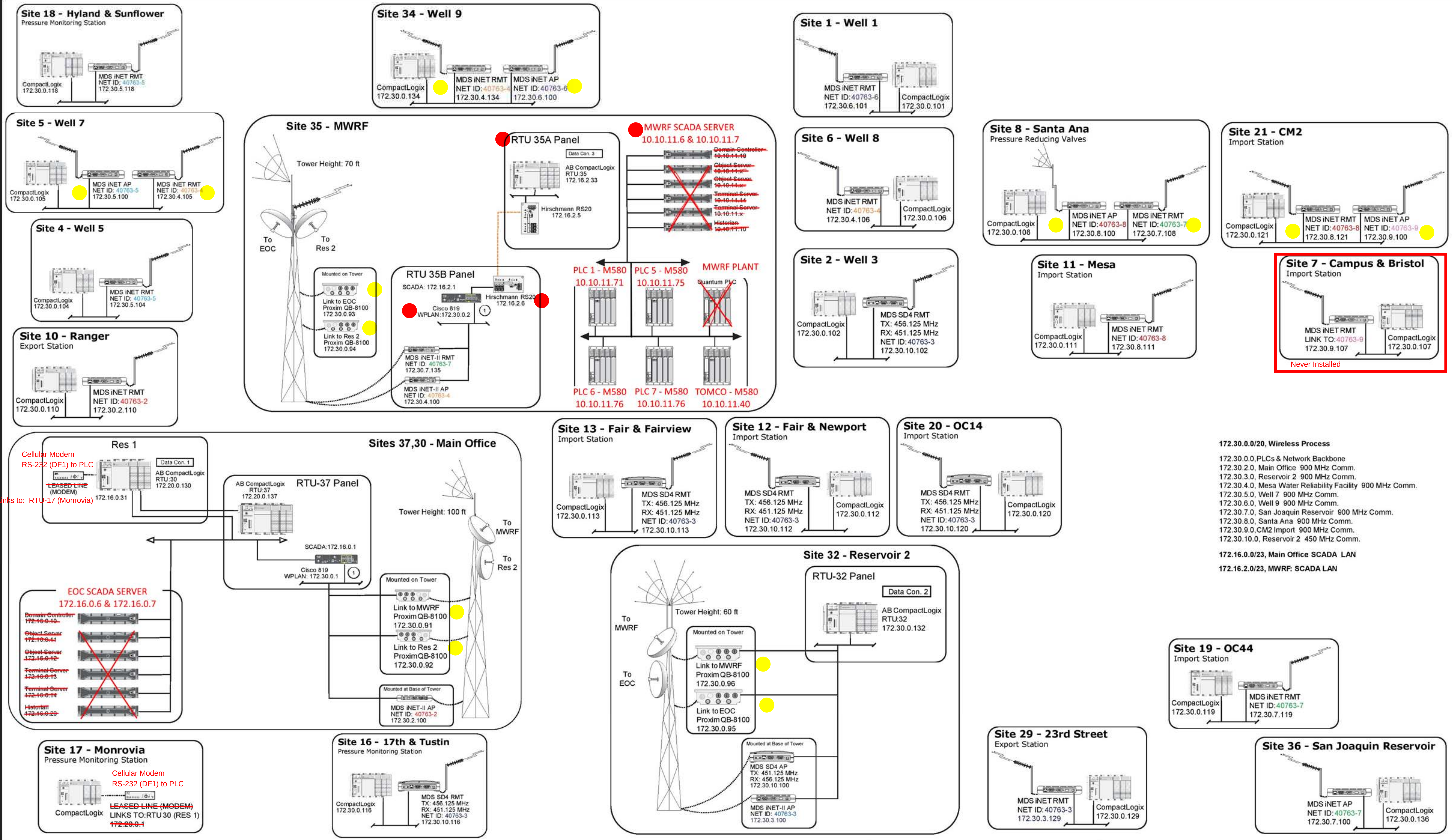
52	60	72	88
		73	89
53		74	90

SHEET 73

Attachment H: SCADA Network



TESCO CONTROLS, INC.
An Employee-Owned Company

NOTES

Fiber (MM/SM)
Cat-5e / Cat-6
Coax
Serial
Hardwire I/O

LEGEND

RF

Switch
Switched Network Small
Switched Network Large

SCADA Network

Mesa Consolidated Water District
MC-1864 SCADA System Radio Communication Project

DRAFTED	DESIGNED	DATE	REV. DATE	JOB NO.	DRAWING
SS	BS	03/27/2012	03/07/2013	T-40763	00b

Mesa Water DISTRICT®

Dedicated to Satisfying our Community's Water Needs

MEMORANDUM

TO: Board of Directors
FROM: Stacy Taylor, Water Policy Manager
DATE: December 17, 2020
SUBJECT: Assembly Bill 992

RECOMMENDATION

Receive the presentation.

STRATEGIC PLAN

Goal #4: Increase public awareness about Mesa Water® and about water.
Goal #7: Actively participate in regional water issues.

PRIOR BOARD ACTION/DISCUSSION

None.

DISCUSSION

A representative from Mesa Water District's (Mesa Water®) General Legal Counsel - Atkinson, Andelson, Loya, Ruud & Romo (AALRR) - will provide a presentation on Assembly Bill (AB) 992 to the Board at the December 17, 2020 meeting.

FINANCIAL IMPACT

None.

ATTACHMENTS

Attachment A: AALRR Legislative Alert on AB 992

AB 992 Clarifies Permissible Communications via Social Media Platforms

10.08.2020

On September 18, 2020, Governor Newsom signed Assembly Bill 992 ("AB 992"), which clarifies how public officials may communicate on internet-based social media platforms through a new exception to the Brown Act's prohibition against "serial meetings."

Background

The Brown Act generally requires meetings of legislative bodies to be open and public. Outside of properly noticed public meetings, the Brown Act prohibits "serial meetings" between a majority of a legislative body's members. Serial meetings are defined as <u>any</u> type of communication, direct or through intermediaries, that allows the majority of the legislative body's members to "discuss, deliberate or take action" on a matter "within the subject matter of the legislative body." This prohibition does not apply to individual communications between members of a legislative body and employees/staff of the public agency, provided that the employees/staff do not communicate the comments or position of any other members of the legislative body. The Brown Act also does not prohibit communications involving a total of less than a quorum of the legislative body.

While communications on internet-based social media platforms may be public and allow members of the public to comment/react, such communications do not meet the general open meeting requirements of the Brown Act, including compliance with the usual notice, agenda and accessibility requirements. AB 992 attempts to clarify how members of a legislative body may permissibly use social media platforms to address matters within the subject matter jurisdiction of their legislative body by amending the Brown Act in two notable ways.

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AB 992 Clarifies Permissible Communications via Social Media Platforms

Communications on Internet-Based Social Media Platforms

AB 992 amends Government Code section 54952.2 to clarify that certain communications involving a legislative body's members on an internet-based social media platform do not constitute meetings under the Brown Act. As such, a legislative body's members may engage in separate communications on an internet-based social media platform to "answer questions," "provide information to the public," and/or solicit public input on matters within the body's jurisdiction. However, a majority of the legislative body may not "discuss among themselves" "business of a specific nature" within the body's jurisdiction. As defined by AB 992, "discuss among themselves" includes "comments or use of digital icons that express reactions to communications," as well as any communications posted or shared on a social media platform between members of the legislative body Accordingly, a majority of the members of a legislative body may not respond to the same communication on an internet-based social media platform, whether accessing the internet-based social media by computer, phone, iPad, or other device, including the use of emojis, the "like" button on Facebook or Instagram, and/or retweeting on Twitter.

Additionally, AB 992 now limits direct communications via social media between individual members of a legislative body regarding a matter within a legislative body's subject matter jurisdiction. Specifically, members may not directly respond to a social media communication made, posted, or shared by any other member of the same legislative body. Previously, the Brown Act did not prohibit such communications, as long as they did not involve a majority of the members of a legislative body. This change is significant considering the increase in social media usage by members of legislative bodies in recent years, and especially during the COVID-19 pandemic, in order to connect to and communicate with their constituents.

AB 992 applies to any communication on an internet-based social media platform that is "open and accessible to the public." This means social media platforms which members of the public may access and participate in free of charge and without prior approval, and from which they cannot be blocked, except for violations of the platform's protocols or rules (as determined by the platform). This includes any forum or chatroom on a social media platform.

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AB 992 Clarifies Permissible Communications via Social Media Platforms

As written, this new provision sunsets on January 1, 2026, and then Section 54952.2 reverts to the prior language. However, given the proliferation in the use of social media by and among members of legislative bodies and the public, it is critical for members of legislative bodies to be aware of and adhere to these new requirements and restrictions. This is especially true considering the potential for both criminal and civil penalties, as well as public criticism, for violations of the Brown Act.

REPORTS:

16. REPORT OF THE GENERAL MANAGER

REPORTS:

17. DIRECTORS' REPORTS AND COMMENTS

There are no support materials for this item.