Brown AND Caldwell

Mesa Water District– Project No. M21-210B

Water Supply, Energy, and Supply Chain Reliability Assessment

MesaWater DISTRICT®

December 17, 2020

Agenda

- Background and Objectives
- TM-1: Water Supply Reliability
- TM-2: Energy Supply Reliability
- TM-3: Supply Chain Reliability
- Overall Recommendations

Brown AND Caldwell

Background and Objectives

Brown AND Caldwell

Background and Objectives

Existing Infrastructure


Clear Wells


MWRF


MWDOC Turnouts


Reservoirs/BPS

Assessment Objectives

1. Evaluate existing local water supplies for meeting 115% demand
2. Evaluate energy supplies and backup power during normal and emergency operation
3. Identify water/energy supply gaps and provide recommended solutions
4. Evaluate existing supply chain for emergency readiness
5. Identify supply chain reliability gaps and provide recommended solutions

TM-1: Water Supply Reliability

Brown AND Caldwell

Scenarios Examined

Scenario	Situation	Operational Clear Wells	MWRF Capacity	MWDOC Import Available
1	Normal Operation (Baseline)	7 of 7	100%	Yes
2a	Emergency Situation	6 of 7	0%	No
2b	Emergency Situation	4 of 7	100%	No
2c	Emergency Situation	2 of 7	0%	Yes
3	Widespread Maintenance	4 of 7	50%	Yes

Earthquake

Wildfire

Power Outage

Additional Supply Options

Additional Clear Wells

Increase MWRF Capacity

Import from MWDOC

Emergency Water Restrictions

Scenario Results and Recommendations

Year	Scenario	GAP (AF)	Recommended Solution
2020	1	-	N/A
	2a	720	Emergency Restrictions
	2b	640	Emergency Restrictions
	2c	1,661	Import from MWD
	3	908	Import from MWD
2040	1	-	N/A
	2a	1,270	Additional Clear Wells
	2b	1,189	Additional Clear Wells and MWRF Capacity
	2c	2,211	Import from MWD
	3	1,458	Import from MWD

Short-Term Solutions

1. Import from MWD whenever possible
2. Water restrictions for exceptional emergencies

Long-Term Solutions

1. Evaluate expanding local production supplies for 100% local reliability

Note: Reservoirs are assumed to be functional and are critical for meeting peak demands

TM-2: Energy Supply Reliability

Brown AND Caldwell

Energy Supply Markets

Natural Gas

- Natural gas generation in CA forecasted to decrease due to changing regulations
- Prices are volatile and affected by overall market and system reliability

Electricity

- Expanding infrastructure due to shift to renewable energy sources
- Extremely reliable despite increasing frequency of natural disasters

Natural Gas vs Electric Driven Equipment

Factors in Favor of Electric Driven:

- Decreased capital/O&M costs
- Forecasted regulatory atmosphere favors carbon-free energy systems
- Less maintenance required
- Widely available spare parts
- Easier to store/transport diesel than propane

Electric Motor
Used at Wells 1, 3, 7, 9 and the MWRF

Reciprocating NG Engine
Used at Well 5 and the Reservoirs

Recommended Improvements

Standardize on Electric Motors (Especially at Reservoirs)

Diesel Generators and Onsite Fuel Storage

Centralized Bulk Diesel Storage Tanks

TM-3: Emergency Supply Chain Reliability and Disruption

Brown AND Caldwell

Supply Chain Analysis

Suppliers were contacted with questionnaires to better understand their operations and potential disrupters

Risk Level	
HIGH	Probability of a failure in this category is likely given the physical constraints, practices, or past history with the manufacturer or service provider. NOTE: Unresponsive suppliers are assigned a default risk of HIGH
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.

Supply Chain Analysis

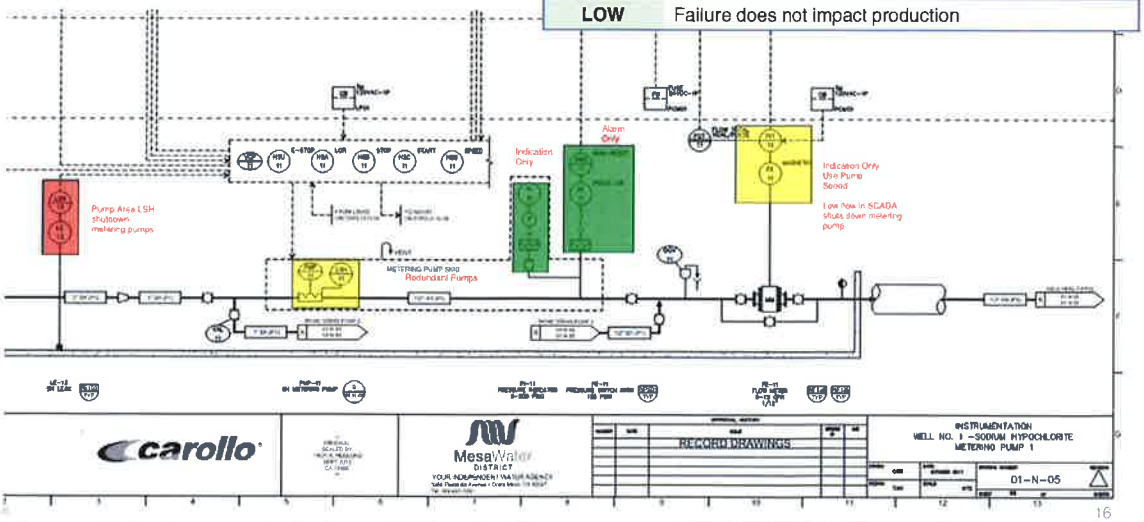
Risk Level	
HIGH	Probability of a failure in this category is likely
MEDIUM	Probability of a failure in this category is possible
LOW	Probability of a failure in this category is rare or unlikely

Type	Product	Supplier	Point of Origin	Emergency Manufacturing	Backup Delivery Protocols	Market Volatility
Chemical	19% NH_4OH	Hill Brothers Chemical	Low	Low	Low	Low
Chemical	12.5% NaClO	Northstar Chemical	Low	Low	Low	Low
Chemical	25% $NaHSO_3$	Northstar Chemical	Low	Low	Low	Low
Chemical	38% NaOH	JCI Jones Chemicals	Low	Low	Low	Low
Chemical	CO_2	Linde (formerly Praxair)	Low	High	Low	Medium
Fuel	Diesel Fuel	Dion and Sons	N/A	N/A	N/A	N/A
Fuel	Propane (LPG)	Mutual Propane	N/A	N/A	N/A	N/A
Contractor	Pipeline	W.A. Rasic Construction	Low	Medium	Low	Medium
Contractor	Electrical	Leed Electric	Medium	Medium	Medium	Medium
Contractor	Asphalt Paving	Copp Contracting	Low	High	High	High
Laboratory	WQ Analyses	Weck Laboratories	Medium	Low	Low	Medium
Laboratory	WQ Analyses	OCWD	Medium	Medium	Medium	Medium

15

Single Points of Failure Analysis

Risk Level	
HIGH	Failure impacts production; No redundancy available
MEDIUM	Failure impacts production; Redundancy is available
LOW	Failure does not impact production



16

Recommended Improvements

Mitigate Single Points of Failure

Store Parts for Remaining Single Points of Failure

Construct Warehouse for Critical Spare Parts

Overall Recommendations

Brown AND Caldwell

Reliability Assessment Recommendations

Priority	Recommendation	Estimated Cost[1]
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 (Parts only)
	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[2]
6	Provide backup power generation and fuel storage for the MWRF.	$1.0M

1. All costs are in 2020 dollars and are Class 5 estimates. Additional studies will be needed to confirm project components and refine project cost.
2. Cost shown represents two additional 3,000 gpm clear wells and 8.6 MGD MWRF expansion.

19

Recommendation to the Board:

Receive comments on the Water Supply, Energy, and Supply Chain Reliability Assessment and direct staff to bring back to a future Committee meeting for further discussion.

20

Questions?

Brown AND Caldwell