DOCKETED	
Docket Number:	09-AFC-05C
Project Title:	Abengoa Mojave Compliance
TN #:	257843
Document Title:	Mojave Solar Project Response to Data Request Set 2
Description:	N/A
Filer:	Deric Wittenborn
Organization:	Ellison Schneider Harris & Donlan LLP
Submitter Role:	Applicant Representative
Submission Date:	7/19/2024 12:26:08 PM
Docketed Date:	7/19/2024

Mojave Solar Project (09-AFC-05C)

MSP Two New Permanent Evaporation Ponds-Data Request, Set 2- Responses

WATER RESOURCES
Author: James Ackerman

BACKGROUND

Follow-up to Data Request, Set 1, Request No. 4: The statement in the Mojave Solar Project's (MSP) data request response "The top berm surface of the proposed evaporation ponds will be sloped at a minimum 1% away from the pond", indicates it was assumed that the request was referring to the berm profile. However, CEC's statement in the data request background (TN #256766, page 4) was referring to the longitudinal direction of the berm.

DR1. Please indicate whether the top of the berms of the proposed evaporation ponds will be designed with a slope in the longitudinal direction, or whether the top will be nearly level in the longitudinal direction. The explanation needs to address the entire perimeter of both ponds.

Response to DR1. Both of the proposed evaporation ponds have been designed with a constant rim elevation around the entire perimeter of the pond. The design intent is to create an approximate 5 acre pond with a balance of cut (excavation) and fill, as this is the most efficient in terms of construction. Similarly, the most efficient pond has a constant elevation. The Alpha A3 pond will be constructed to elevation 2046 ft-MSL, the Beta B3 pond will be constructed to elevation 2065 ft-MSL. Both ponds will be elevated above surrounding ground surface to allow direct precipitation on the berm to flow away from the pond and runoff from surrounding areas is prevented.

Mojave Solar Project (09-AFC-05C)

MSP Two New Permanent Evaporation Ponds-Data Request, Set 2- Responses

BACKGROUND

Follow-up to Data Request, set 1, Request No. 6 (TN #256766, p. 4): MSP staff did not adequately address the data request. To state that MSP has remained within the freshwater use limitations of the COCs does not answer the question of how much additional feed water has been used since the closed-circuit reverse osmosis (CCRO) system modification and why. Similarly, presenting data comparing water use versus megawatt hours does not answer the question regarding possible increased treatment plant water use.

Regarding the "Outflow" data presented in the tables on page 7 of the data request response, CEC staff had asked for data justifying why the CCRO-system modification was not the reason for an increase of discharge to the evaporation ponds. MSP did not provide this information. Moreover, analysis of the data provided in response to Data Request 6 indicates that discharge to the Alpha evaporation ponds increased by about 4.32 million gallons between 2019 (14.55 million gallons) and 2021 (18.87 million gallons). Regarding the presented operating pressures before and after the CCRO-system modification, there was no explanation why the range of reverse-osmosis vessel pressure ranges increased on the low end by 15 psi and on the high end by 345 psi. Also, no discussion was provided regarding what possible effect this may have had on other equipment.

DATA REQUESTS

DR2. Explain why the increase of feedwater to the water treatment plant was not the result of the CCRO system modification.

BACKGROUND- Mojave Solar Water Treatment Plant Modification Project (CCRO) Overview

With this response, MSP is providing additional information regarding the CCRO modification to assist CEC staff in a better understanding of the DR2, DR3, DR4 and DR5 responses.

The Water Treatment Plants (WTP) treat groundwater delivered to MSP from onsite wells, with two independent wells supplying each power block. Inflow data provided to the CEC is obtained from the flowmeters installed on each pump's discharge pipe, and these pumps are used to report well production to the Mojave Water Agency. After passing through the flowmeters, the water is directed to the WTPs.

The historical data regarding feedwater into the CCRO is not reliable due to SCADA outages or flowmeters malfunctions. The most reliable flowmeters for inflow data remains the well flowmeters, which are calibrated, available on PI at all times, and have data collected manually on a daily basis. Nevertheless, data regarding feedwater into the CCRO is being provided in Exhibit "A," which is comprised of confidential data and is being submitted along with a repeated application for confidential designation.

The WTP was designed to produce high-quality water for multiple onsite uses. The primary water end-uses include cooling tower make-up water, turbine/boiler feed water, water supply for mirror wash operations, and drinking water. Each WTP consists of Multimedia Filters, Primary Reverse Osmosis (RO),

MSP Two New Permanent Evaporation Ponds-Data Request, Set 2- Responses

Water Softening System, Ultra Filtration System, Concentrate RO, Mirror RO, Ion Exchange Mixed Bed Unit and Filter Press Unit.

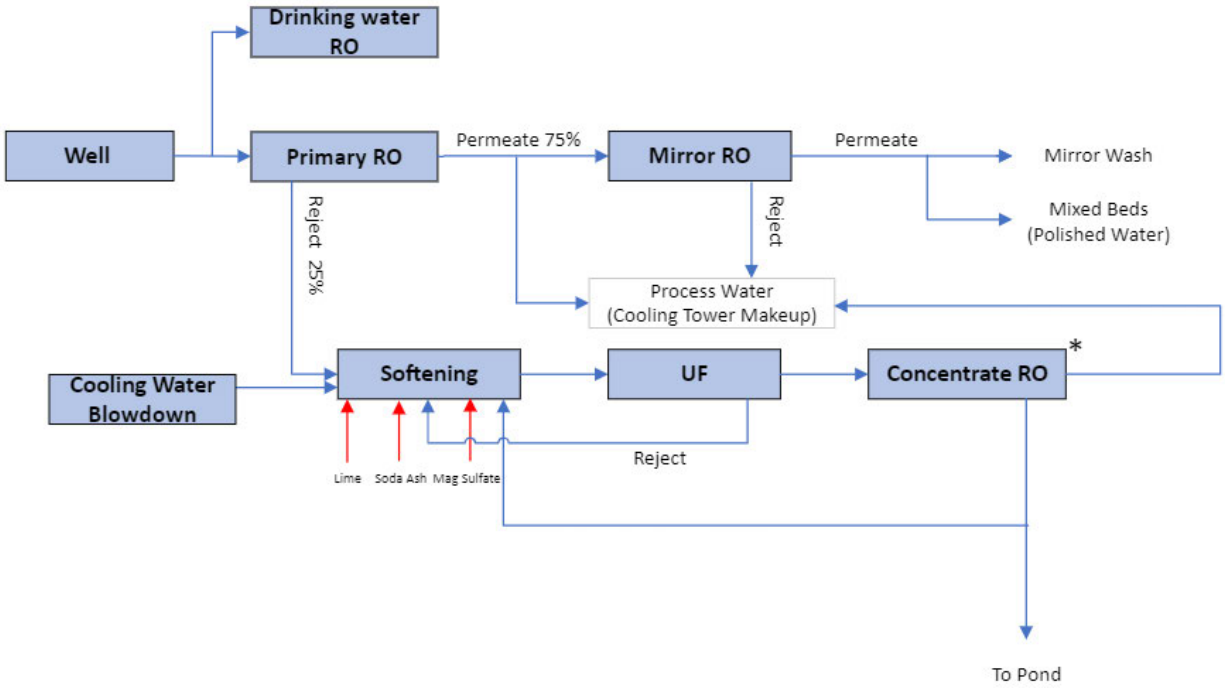
Starting in 2019, the Project Owner initiated improvements at the WTPs at both power blocks to achieve the following goals:

1) Minimize chemical usage by eliminating the use of magnesium sulfate and soda ash injection, and reducing the use of lime, which are chemicals used as water softeners in the water treatment process;

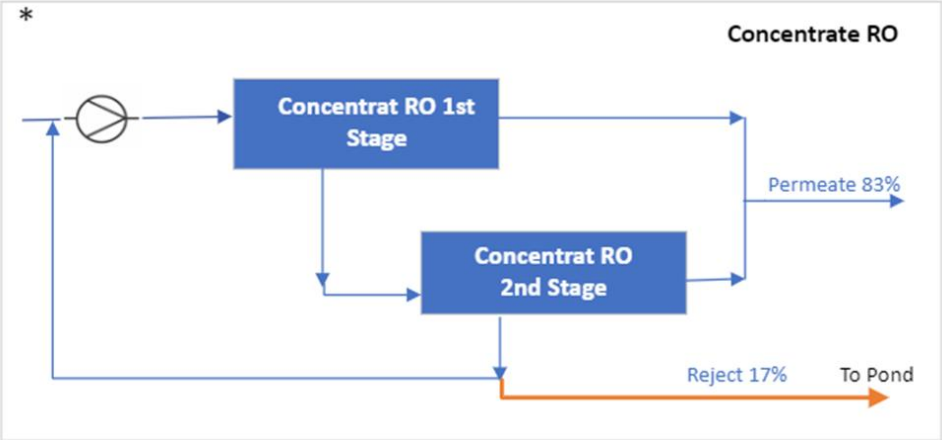
2) Reduce the generation of solid waste from the water treatment which is transported offsite for disposal;

3) To improve efficient use of water by improving the Concentrate RO system recovery by 5 to 10% from the original design.

Original Concentrate RO system- In the original Concentrate RO system, the feed water passes through the first stage of the RO membranes (Primary RO). The permeate water is sent to the process water tank. The first stage reject (Concentrate) then passes to the second RO stage (Mirror RO), where the permeate, water is again sent to the process water tank, and the reject is directed to the evaporation ponds. The system recovery rate was 80-83%.



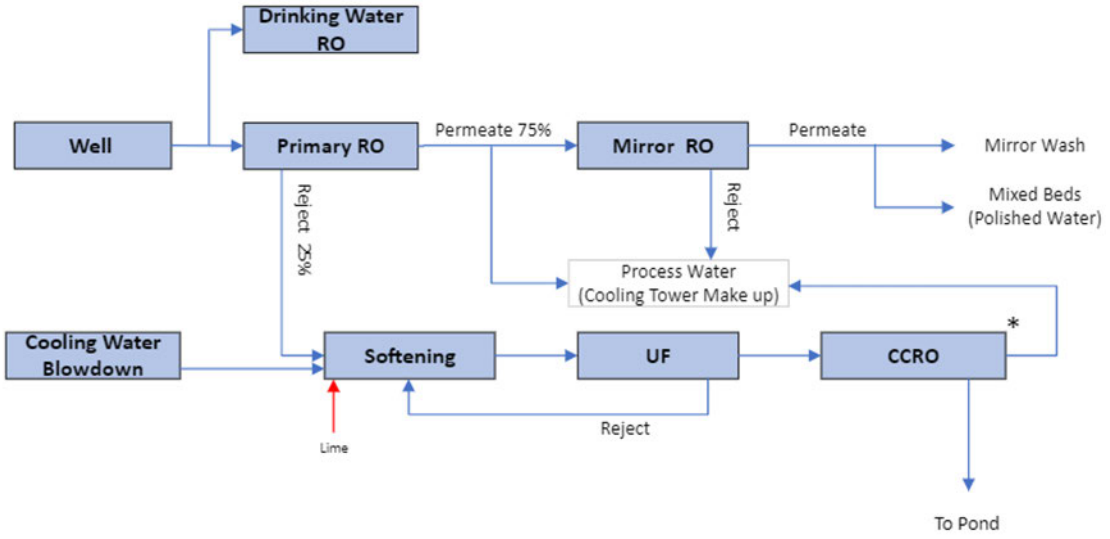
MSP Two New Permanent Evaporation Ponds-Data Request, Set 2- Responses

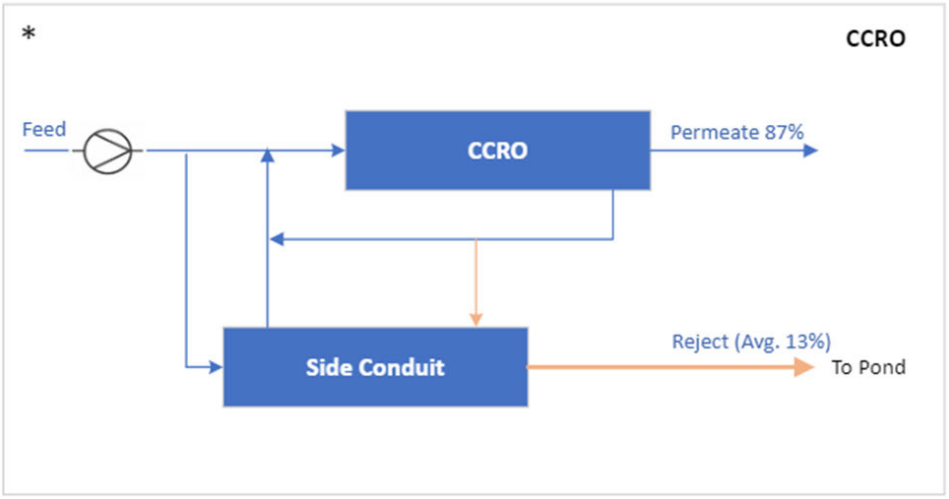


CCRO System design- The improvement affected two systems in WTP.

1. Concentrate RO: The Concentrate RO (CRO) skid was changed to Closed Circuit RO (CCRO) by installing:
    a. One additional RO vessel which contains 6 additional RO membranes inside;
    b. Five Side Conduits (empty vessels) to store fresh water for fast exchange of water at the end of each cycle;
    c. An additional Recirculation Pump in the Concentrate RO System.
2. Softening System: The groundwater supply serving MSP has a high total dissolved solids (TDS) concentration and is considered too brackish for uses at MSP without treatment. Prior to the WTP improvements, the "hardness" of the water was treated by injecting coagulant, lime, soda ash, magnesium sulfate, and polymer. Following the modifications, the injection of soda ash and magnesium sulfate has been eliminated and the use of lime has been reduced. No equipment modifications were made to the water softening system. The soda ash and magnesium sulfate skids were put out of service by manually closing the valves and disabling the equipment under Lockout-Tagout (LOTO) procedures.

MSP Two New Permanent Evaporation Ponds-Data Request, Set 2- Responses





The CCRO system works by recirculating pressurized feedwater until a desired recovery level is reached. Brine is replaced with fresh feed without stopping the flow of pressurized feed or permeate. During the Closed-Circuit stage, feed flow equals permeate flow and 100% of the concentrate is recycled back to the front of the membrane array. During this portion of the sequence, no concentrate is leaving the system.

Once one of the triggers (feed pressure) indicates to the system that target recovery has been reached, the brine flush valve opens, and all the concentrate is purged from the system without stopping permeate production. Once all the concentrate from the system is displaced with fresh feed, the brine flush valve closes, and the system goes back into the Closed-Circuit mode of the sequence. MSPs CCRO operation runs in 12-minute cycles.

Finally, MSP believes that data comparing water use to megawatt hours is relevant to the subject request. If MSP produces half of its anticipated energy, it will use approximately half the amount of groundwater. Indeed, a vast majority of the groundwater used at MSP is evaporated in the cooling tower based on power production and cooling needs.

Response to DR2. The CCRO system for the Beta power block began operating in July 2020, and the CCRO system for the Alpha power block began operating in March 2021. The inflow data, which was provided with the response to DR Set 1, does not show a correlation between operation of the CCRO systems and an increase in inflow to the WTPs. Since operation of the CCRO systems, fluctuations in inflow quantities are consistent with prior annual patterns, and the months post-CCRO system operation do not consistently show an increase of inflow quantities. The inflow data does not indicate that there has been an increase in inflow volumes correlated with or caused by operation of the CCRO systems. (See Confidential Exhibit "A.")

As indicated in the figures below, there is no perceptible or consistent increase in feedwater associated with the start of operations of the CCRO systems at either power block.

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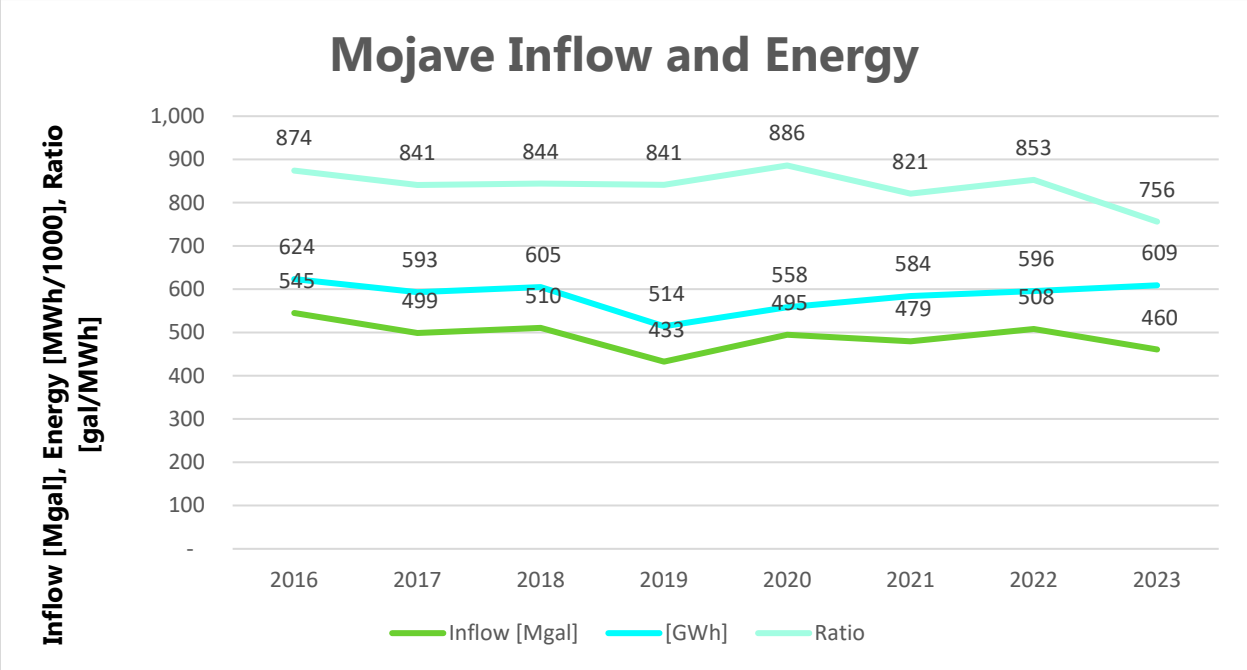
MSP Two New Permanent Evaporation Ponds-Data Request, Set 2- Responses

Instead, inflow quantities follow a pattern consistent with the MWh energy output of the plant. MSP acknowledges that since CCRO operation there have been some minor variations in the annual quantities of feedwater to the WTPs relative to annual MWh, with a slight average reduction in the inflow to MWh ratio, indicating a possible improved water efficiency. However, considering only two to three years of data are currently available to assess any potential trend, and further considering the multiple other

factors when it comes to the plant's water demand---such as temperature, it is too soon to draw a conclusion that operation of the CCRO systems have improved inflow volumes relative to energy output at this time.



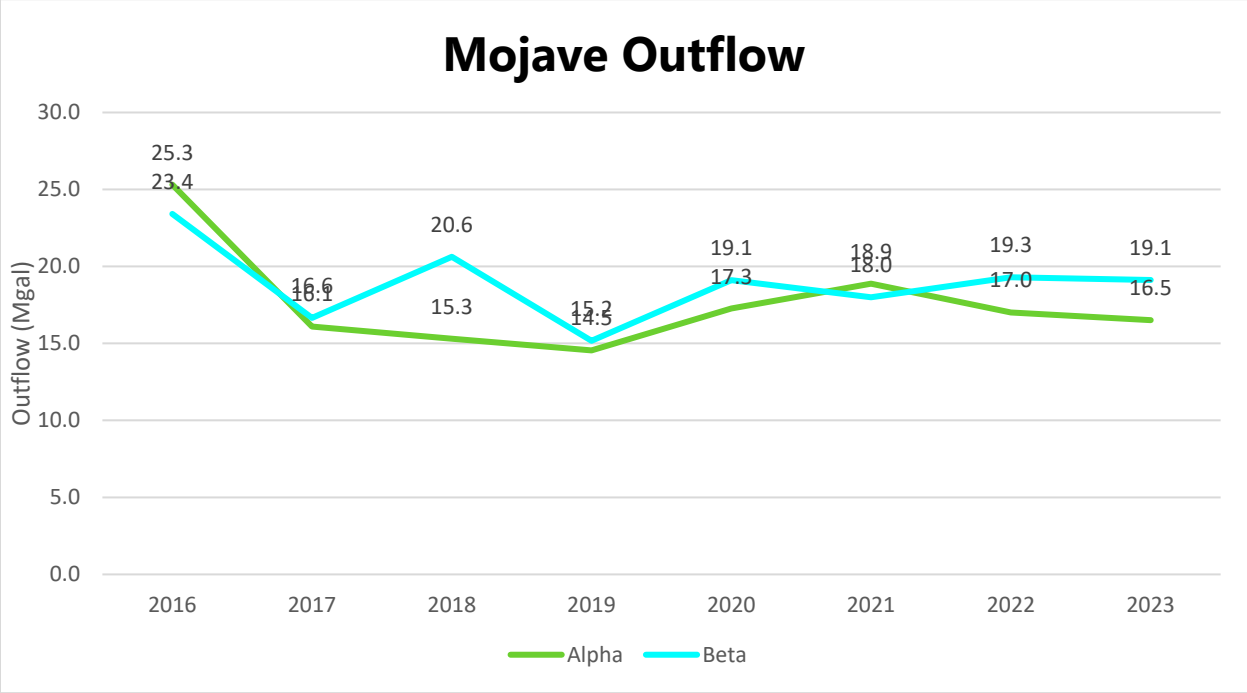
MSP has conducted an additional assessment of the data provided to staff in response to Data Request 1 which shows the 8-year water inflow average and MWh average for both plants. Before and after the CCRO, there were years when WTP inflow was lower than the 8-year average and some years when it was higher. (See analysis in Confidential Exhibit "A.") The data does not indicate that there has been an increase in inflow volumes correlated with or caused by operation of the CCRO systems. Furthermore, since installation of the CCRO systems the inflow of water to the treatment plant remains within the permit limit.

MSP Two New Permanent Evaporation Ponds-Data Request, Set 2- Responses

DR3. Provide data demonstrating that the CCRO system modification has not resulted in increased discharge to the evaporation ponds.

Response to DR3. This request presupposes that the CCRO system modification increased discharge to the evaporation ponds. MSP asserts that the data for outflow to the evaporation ponds (provided with MSP's responses to Data Request Set 1) does not show a pattern that confirms an increase in outflow to the evaporation ponds after CCRO operation.

MSP has further assessed the outflow data and provides the figure below to support the conclusion that outflow data is not correlated with CCRO operation. Because the outflow data since CCRO operation does not indicate a consistent trend at this time, MSP cannot conclude that changes in outflow are caused by the CCRO systems. In other words, there is insufficient evidence to infer that the CCRO system modification caused an increase in discharge to the evaporation ponds.



Mojave Solar Project (09-AFC-05C)

MSP Two New Permanent Evaporation Ponds-Data Request, Set 2- Responses

DR4. Explain why operating pressures increased after the CCRO system modification.

Response to DR4. The operating pressure has only increased in the CCRO skids, while the operating pressures out of the CCRO skids have remained the same.

- The CCRO system produces a higher permeate flow (137 gpm) compared to the original concentrate RO (100-115 gpm). Higher permeate production requires higher pressure.
- The CCRO system is designed for a higher recovery rate of 87% compared to the original recovery rate of 80%. Higher recovery requires higher pressure.

The system operates cyclically. In each cycle, the pressure starts at about 200 psi and could reach a maximum pressure of 570 psi. At this point, the system displaces the concentrated water inside the membranes with fresh water, then gets depressurized, and a new cycle starts.

DR5. Provide a discussion regarding possible effect the change in pressures may have on other equipment.

Response to DR5.

The operating pressure has only increased in the CCRO skids, while the operating pressures out of the CCRO skids have remained the same. We do not anticipate, nor have we observed pressure changes in other equipment.

Mojave Solar Project (09-AFC-05C)

MSP Two New Permanent Evaporation Ponds-Data Request, Set 2- Responses

LAHONTAN REGIONAL WATER QUALITY CONTROL BOARD

Author: Kerri O'Keefe

BACKGROUND

Lahontan Regional Water Quality Control Board (LRWQCB) staff provided the following questions to better understand the existing monitoring well network and the wells associated with the construction of the two new evaporation ponds. The direction of groundwater flow at the site is approximately N15°W. Therefore, the new wells should be installed in a northwesterly direction from the ponds.

DR6. Are there monitoring wells installed downgradient of the existing evaporation ponds? Would new wells be installed downgradient of the new evaporation ponds?

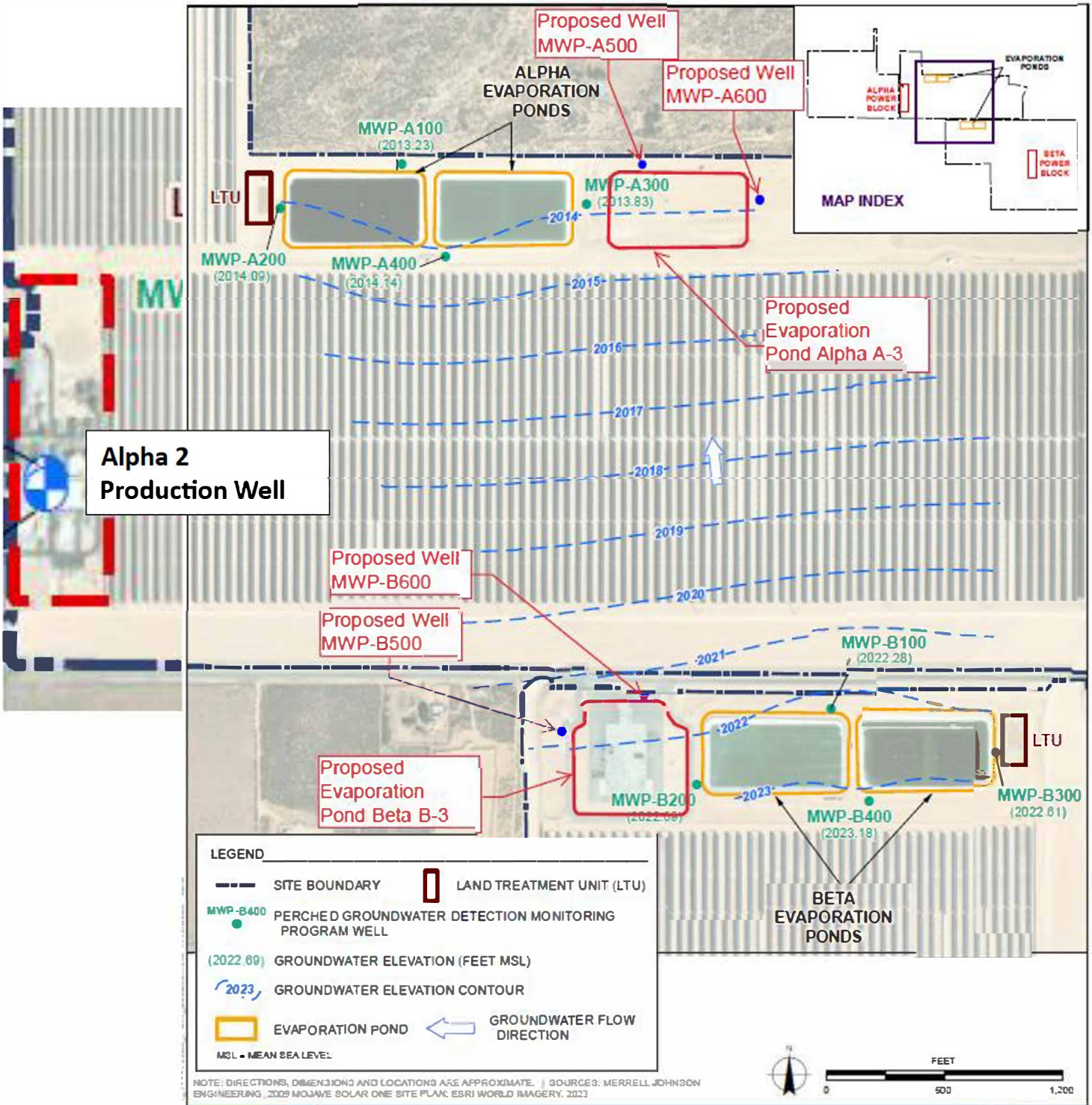
Response to DR6. Please see the attached Perched Groundwater Elevations figure for the existing and proposed evaporation ponds and monitoring wells.

For the existing Alpha Evaporation ponds MWP-A-100 is downgradient, MWP-A200 and MWP-A300 are lateral to the groundwater gradient and MWP-A400 provides upgradient monitoring for background. The existing monitoring wells are generally equally spaced around the existing ponds. Hence, the original design of the monitoring well network is in all directions to account for any changes to the gradient due to potential influence of MSP water use from the wells.

Proposed monitoring wells for the new A-3 evaporation pond include MWP-A500 which is down gradient and MWP-A600 which is trans-gradient providing a lateral monitoring point.

For the existing Beta Evaporation Ponds, the existing monitoring wells are generally located similar to the layout for the Alpha Ponds. MWP-B100 is downgradient of the existing ponds, MWP-B200 and MWP-B300 are located lateral to groundwater flow and MWP-B400 is located upgradient of the existing ponds. The proposed new Beta Evaporation Pond (B-3 pond) will be located west of the existing ponds. Two additional monitoring wells are proposed, and both are downgradient to the proposed pond.

According to MSP's design engineer, the proposed locations for the new monitoring wells are appropriate for detection monitoring and will provide adequate groundwater monitoring.


Proposed Well MWP-A500
Proposed Well MWP-A600
ALPHA EVAPORATION PONDS
MWP-A100 (2013.23)
MWP-A300 (2013.83)
LTU
MWP-A200 (2014.09)
MWP-A400 (2014.14)
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
MAP INDEX
EVAPORATION PONDS
ALPHA POWER BLOCK
BETA POWER BLOCK
Proposed Evaporation Pond Alpha A-3
Alpha 2 Production Well
Proposed Well MWP-B600
Proposed Well MWP-B500
MWP-B100 (2022.28)
Proposed Evaporation Pond Beta B-3
MWP-B200
MWP-B400 (2023.18)
MWP-B300 (2022.61)
LTU
BETA EVAPORATION PONDS
LEGEND
SITE BOUNDARY
LAND TREATMENT UNIT (LTU)
MWP-B400 PERCHED GROUNDWATER DETECTION MONITORING PROGRAM WELL
(2022.69) GROUNDWATER ELEVATION (FEET MSL)
2023 GROUNDWATER ELEVATION CONTOUR
EVAPORATION POND
GROUNDWATER FLOW DIRECTION
MSL = MEAN SEA LEVEL
NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE. | SOURCES: MERRELL JOHNSON ENGINEERING, 2009 MOJAVE SOLAR ONE SITE PLAN; ESRI WORLD IMAGERY, 2023
FEET
0
500
1,000
FIGURE 4
PERCHED GROUNDWATER ELEVATIONS - FEBRUARY 7 AND 8, 2023
MOJAVE SOLAR PROJECT
SAN BERNARDINO COUNTY, CALIFORNIA
105879028 | 7/23
Ninyo & Moore

Mojave Solar Project (09-AFC-05C)

Atlantica
Sustainable Infrastructure

MSP Two New Permanent Evaporation Ponds-Data Request, Set 2- Responses

BACKGROUND

Based on the existing wells design drawings, it appears that Alpha 2 is screened through the confining layer (basalt) between the upper and lower regional aquifers. If contamination reaches this well, it has the potential to pull the contamination through the upper aquifer down to the regional aquifer. The distance from the well to the ponds and treatment units exceeds 2000 feet, however, monitoring Alpha 2 for a release would be prudent. Alternatively, MSP could have this well sealed through the confining layer to prevent cross contamination.

DR7. Are the existing wells constructed in a manner that prevents vertical migration of contaminants through the confining layers to the drinking water aquifer?

Response to DR7. Yes, the existing wells are constructed in a manner consistent with the permit and are sealed with bentonite grout and other materials. Please find construction reports for the wells attached as Exhibit "B."

Alpha 1:

Casings									Annular Material			
Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)	Depth from Surface Feet	to Feet	Fill	Description
0	50	48	Conductor	Low Carbon Steel	.375	30			0	50	Cement	10.3 Sack
50	300	28	Blank		.375	18			50	280	Cement	10.3 Sack
300	380	28	Screen		.312	18	Shutter	0.060	280	290	Bentonite	
380	400	28	Blank		.375	18			290	640	Filter Pack	NSWG
400	620	28	Screen		.312	18	Shutter	0.060				
620	640	28	Blank		.375	18						

Alpha 2:

Casings									Annular Material			
Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)	Depth from Surface Feet	to Feet	Fill	Description
0	50	48	Conductor	Low Carbon Steel	.375	30			0	50	Cement	10.3 Sack
50	300	28	Blank		.375	18			50	280	Cement	10.3 Sack
300	380	28	Screen		.312	18	Shutter	0.060	280	290	Bentonite	
380	400	28	Blank		.375	18			290	640	Filter Pack	TACNA 6x16
400	620	28	Screen		.312	18	Shutter	0.060				
620	640	28	Blank		.375	18						

DR8. How would the new wells be constructed?

Response to DR8. The new wells are proposed to be constructed in a manner similar to the existing wells. Exploratory (pilot) borings would be initially drilled to confirm the geology and location of any confining layer (if any). If no confining layer is encountered, then the well would be installed to the design depth of 40 to 45 feet. The deeper depth is proposed since there is a general drop in the perched ground water elevation, thus the well will be installed within the perched groundwater table and have a screen length of approximately 15 feet. If a confining layer is identified, the monitoring wells would be installed to the top of the confining layer.

Mojave Solar Project (09-AFC-05C)

MSP Two New Permanent Evaporation Ponds-Data Request, Set 2- Responses

DR9. What actions would be taken to prevent vertical migration of contaminants?

Response to DR9. Any new monitoring wells would be constructed in a similar manner and would not penetrate the confining layer. If the confining layer is identified in the pilot borings, the pilot boring would be backfilled with bentonite grout and the monitoring well would be installed in a new boring and above the confining layer.

EXHIBIT A

CONFIDENTIAL

Mojave Solar Project
Water Treatment Plant Inflow, Outflow, and Energy Production Data

[Filed Separately from Responses to DR Set 2 With a Repeated Application for Confidential Designation]

EXHIBIT B

MSP Well Construction Reports

ALPHA WELL

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0163739

Page 1 of 1

Owner's Well Number ALPHA 1

Date Work Began 03/16/2012 Date Work Ended 4/10/2012

Local Permit Agency County of San Bernardino Dept. of Public Health

Permit Number 2012010027 Permit Date 1/10/12

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N W

Latitude Longitude

APN/TRS/Other

Geologic Log

Orientation ◉ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Reverse Circulation Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
50	60	Sandy , Clay
60	70	Clay
70	80	Clay, Sand
80	130	Clay
130	140	Sand, Clay
140	200	Sand, Small Gravel
200	220	Sand, Gravel, Clay
220	500	Sand, Gravel
500	510	Clay
510	520	Rock
520	530	Rock, Sand
530	550	Clay
550	620	Gravel, Sand
620	740	Gravel, Sand, Clay
740	750	Gravel, Sand
750	800	Gravel, Sand, Clay

Total Depth of Boring 660 Feet

Total Depth of Completed Well 640 Feet

Well Owner

Name Mojave Solar LLC

Mailing Address 11391 Park Ave, Suite 208

City Victorville State CA Zip 92392

Well Location

Address 42134 Harper Lake Rd

City Henkley County San Bernardino

Latitude 35 Deg 0 Min 49 Sec N Longitude 117 Deg 19 Min 46 Sec W

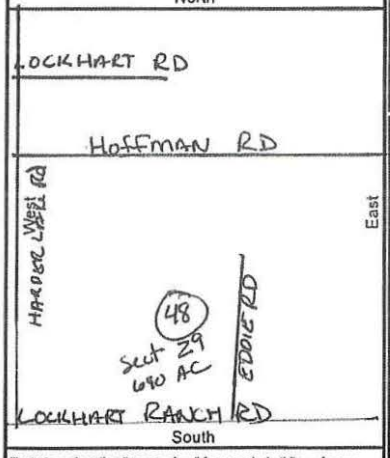
Datum Decimal Lat. Decimal Long.

APN Book 0490 Page 121 Parcel 48

Township 11N Range 4N Section 2.9

Location Sketch

(Sketch must be drawn by hand after form is printed.)



Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply ☐ Domestic ☐ Public ☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

○ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

◉ Other Com/PWS/City

Water Level and Yield of Completed Well

Depth to first water 140 (Feet below surface)

Depth to Static Water Level 140 (Feet) Date Measured 09/20/2012

Estimated Yield* 1,150 (GPM) Test Type Step-Drawndown

Test Length 12.0 (Hours) Total Drawdown 75 (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	50	48	Conductor	Low Carbon Steel	.375	30		
50	300	28	Blank		.375	18		
300	380	28	Screen		.312	18	Shutter	0.060
380	400	28	Blank		.375	18		
400	620	28	Screen		.312	18	Shutter	0.060
620	640	28	Blank		.375	18		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	50	Cement	10.3 Sack
50	280	Cement	10.3 Sack
280	290	Bentonite	
290	640	Filter Pack	NSWG

Attachments

☐ Geologic Log

☐ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☑ Other E-Log

Attach additional information, if it exists

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Layne Christensen Company (Person, Firm or Corporation)

1717 W Park Ave (Address) Redlands (City) CA (State) 92373 (Zip)

Signed (C-57 Licensed Water Well Contractor) 11/6/2012 (Date Signed) 510011 (C-57 License Number)

DWR 188 REV 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

Page 1 of 1

Owner's Well Number ALPHA #2

Date Work Began 05/07/2012 Date Work Ended 6/7/2012

Local Permit Agency County of San Bernardino Dept. of Public Health

Permit Number 2012010026 Permit Date 1/10/12

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0165068

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ◉ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Reverse Circulation Rotary Drilling Fluid Bentonite mud

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130	140	Sand, Clay
140	200	Sand, Small Gravel
200	220	Sand, Gravel, Clay
220	500	Sand, Gravel
500	510	Clay
510	520	Rock
520	530	Rock, Sand
530	550	Clay
550	620	Gravel, Sand
620	740	Gravel, Sand Clay
740	750	Gravel, Sand
750	800	Gravel, Sand, Clay

Total Depth of Boring 660 Feet

Total Depth of Completed Well 640 Feet

Well Owner

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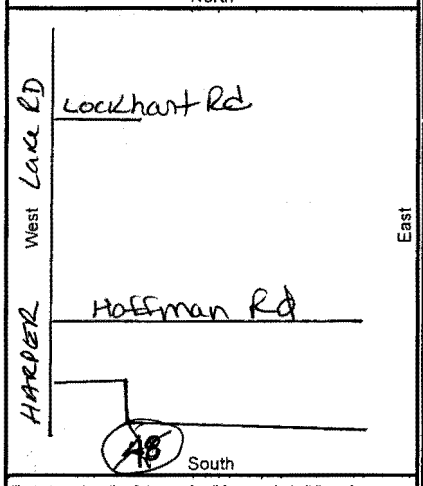
Datum Decimal Lat. Decimal Long.

APN Book 0490 Page 121 Parcel 48

Township 11N Range 4N Section 29

Location Sketch

(Sketch must be drawn by hand after form is printed.)



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Activity

◉ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
◉ Other Com/PWS/City

Water Level and Yield of Completed Well

Depth to first water 140 (Feet below surface)

Depth to Static Water Level 140 (Feet) Date Measured 09/20/2012

Estimated Yield * 1,150 (GPM) Test Type Constant Rate

Test Length 24.0 (Hours) Total Drawdown 75 (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	50	48	Conductor	Low Carbon Steel	.375	30		
50	300	28	Blank		.375	18		
300	380	28	Screen		.312	18	Shutter	0.060
380	400	28	Blank		.375	18		
400	620	28	Screen		.312	18	Shutter	0.060
620	640	28	Blank		.375	18		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	50	Cement	10.3 Sack
50	280	Cement	10.3 Sack
280	290	Bentonite	
290	640	Filter Pack	TACNA 6x16

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Layne Christensen Co
Person, Firm or Corporation

1717 W Park Ave Address Redlands City CA State 92373 Zip

Signed C-57 Licensed Water Well Contractor 11/29/30 Date Signed 510011 C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM