

RECLAMATION

Managing Water in the West

Yuma Desalting Plant Pilot Run

Project Monthly Report #7, May 2010



Photograph: Water sampling in the Colorado River. Discharge of YDP product water from MODE 2 in the background. Sampling device is a DH95 Isokinetic Sampler from the U.S. Geological Survey

**U.S. Department of the Interior
Bureau of Reclamation
Yuma Area Office**

1.0 Background – Project Information

For the Pilot Run the Yuma Desalting Plant (YDP) is planned to be operated at up to one-third capacity for 365 days within a 12 to 18 month period. The run was developed to assist in considering potential long term, sustained operation of the plant as a means to extend water supplies on the Colorado River in the midst of an unprecedented drought. Such consideration requires: 1) collecting performance and cost data; 2) identifying any remaining equipment improvements that are needed; and 3) testing changes that have already been made to the plant. Over the course of the Pilot Run, approximately 29,000 acre-feet of water (recovered bypass flow) may be discharged into the River and included in water deliveries to Mexico preserving a like amount of water in system storage for use by the Metropolitan Water District of Southern California, Central Arizona Water Conservation District, and Southern Nevada Water Authority (Municipal Utilities). The estimated \$23 million cost is being shared by Reclamation and the Municipal Utilities.

This report has been developed for the Funding Committee Representatives of the Municipal Utilities in accordance with the Pilot Run funding agreement (Agreement No. 09-XX-30-W0541) and as a means to regularly provide the Municipal Utilities with information concerning the status of the run. Reclamation will use the report as a means to request capital contributions through the Funding Committee Representatives. In accordance with the agreement, Reclamation requests that the Funding Committee Representatives utilize the monthly status report and conference call discussion forum as a means to notify Reclamation for any reason that future funding will not be provided. The Municipal Utilities have designated the following Representatives to Reclamation for the Funding Committee:

- Mr. Bill Hasencamp for the Metropolitan Water District of Southern California (MWD)
- Mr. Chuck Cullom for the Central Arizona Water Conservation District (CAWCD)
- Ms. Colby Pellegrino for the Southern Nevada Water Authority (SNWA)

2.0 Project Status Snapshot

Start date of final preparation phase	12/1/09
Days elapsed in final preparation phase	152
Days remaining in final preparation phase <i>Preparation concluded 5/2/10</i>	0
Start date for Pilot Run	5/3/10
Days elapsed in the Pilot Run	29
Days remaining in 18 month max duration <i>Run must conclude by 11/3/11</i>	577

Total water recovered to date (acre-feet)	2,372
Balance remaining (acre-feet)	26,628

The final preparation phase for the YDP Pilot Run began on December 1, 2009 and concluded as scheduled on May 2, 2010. The Pilot Run commenced as scheduled on May 3, 2010 and during May the run recovered 2,372 acre-feet of water.

The most noteworthy accomplishment during May was the successful commencement of the Pilot Run on May 3rd. On May 5th the coffer dam was removed from MODE 2 and the discharge of YDP product water to the River commenced. One-third capacity operation of the plant was also achieved on May 5th.

The Pilot Run original schedule called for up to 4 weeks of pretreatment stabilization and then up to an additional 4 weeks for ramp up of reverse osmosis (RO) water production to one-third capacity operation. Pretreatment stabilization was largely accomplished during shakedown testing in April. RO equipment also performed well during shakedown testing. The combined result was achieving one-third capacity plant operation ahead of schedule.

On May 10th a leak occurred on the A22 pipeline which transports calcium carbonate slurry from the plant to the evaporative and disposal cells. The YDP remained on-line and 24 hour a day trucking and hauling of the slurry being produced by the plant continued until pipeline repairs and testing were completed on May 13th.

Also during May an electrical short occurred underneath solids contact reactor (SCR) #2 which was in service at the time. Temporary repairs were successfully completed without disruption to the Pilot Run. On May 27th we successfully transitioned from SCR #2 to SCR #3. This allows for permanent repairs to SCR #2, which are in progress.

Presently our focus is on checking instrumentation calibration in order to ensure the integrity of performance data being gathered during the Pilot Run. This work is being performed systematically from RO back to pretreatment and then intake.

Project risks and concerns remain unchanged. Based on the results of the three month demonstration run of the YDP in 2007 and the current condition of plant equipment, we anticipate a successful Pilot Run. Two plant components however, create small but actual risk that the run might be stopped prior to the recovery of 29,000 acre-feet of water or 18 months of operation.

Piping: Risk mitigation measures for the plant's aluminum bronze piping were developed and implemented prior to commencing the Pilot Run. As was the case during the demonstration run of 2007, piping leaks will occur during the Pilot Run. This did not prevent successful completion of the demonstration run; the same outcome is expected for the Pilot Run. If leaks become major and costly to repair, this could require consideration of the costs and benefits associated with making major repairs and continuing with the Pilot Run. During May the YDP did not experience any aluminum bronze pipe leaks.

Membranes: The reverse osmosis membranes being used for the Pilot Run are unused and have been in cold storage for nearly 20 years. Periodically some membranes are removed from storage and are performance tested. They continue to perform at or near original specifications.

We expect the membranes to perform adequately throughout the duration of the Pilot Run. Nevertheless, using 20 year old membranes does present some risk and it is possible (but unlikely) these membranes may stop performing. Acquiring new membranes, which are custom made, would require several million dollars and approximately 12 months. During May the membranes performed at or near original specifications with a 95% average salt rejection.

3.0 Financial – Budgeted vs. Expended

The Pilot Run of the YDP is divided into two phases, preparation for the Pilot Run and conducting the run. Reclamation began incurring costs associated with preparing for a potential Pilot Run in fiscal year 2008. To date, total expenditures associated with the Pilot Run are \$7,542,299 (values in blue font). All values indicated below are as of May 31, 2010.

Activity	Total Budget ¹	May-10	Total-to-Date Expended ²	Undelivered Orders ³	Balance ⁴	Percent Expended ⁵
Plant Preparation						
Reclamation						
One Time Construction Projects	2,605,000	74,629	2,456,458	12,030	136,511	94%
Reclamation Labor	2,751,853	204,329	2,131,778	0	620,075	77%
Reclamation Other ⁶	0	(2,430)	101,939	0	(101,939)	
Reclamation Total	\$5,356,853	\$276,528	\$4,690,174	\$12,030	\$654,649	88%
Municipal Utilities						
Contract Labor & Services ⁷	1,144,584	33,606	1,048,131	108,610	(12,158)	92%
Environmental		(26)	334,610	0		
Membrane Transportation		0	35,368	0		
Operation & Maintenance		33,019	522,288	0		
Technical Support		0	138,829	108,610		
Other		613	17,036	0		
Materials/Supplies	130,500	68,989	102,987	14,342	13,171	79%
Municipal Utilities Total	\$1,275,084	\$102,596	\$1,151,119	\$122,952	\$1,013	90%
MWD Total	866,067	82,076	766,895	98,362	810	89%
CAWCD Total	204,508	10,260	192,112	12,295	101	94%
SNWA Total	204,508	10,260	192,112	12,295	101	94%
Total Plant Preparation	\$6,631,937	\$379,123	\$5,841,293	\$134,983	\$655,662	88%
Conducting Pilot Run						
Reclamation						
Reclamation Labor	3,411,492	33,280	33,280	0	3,378,212	1%
Management Reserve (contingency)	414,500	1,360	403,816	2,920	7,764	97%
Reclamation Total	\$3,825,992	\$34,640	\$437,096	\$2,920	\$3,385,976	11%
Municipal Utilities						
Contract Labor & Services	2,662,752	42,745	42,745	729,740	1,890,267	2%
Environmental		0	0	59,353		
Membrane Transportation		0	0	3,930		
Operation & Maintenance		0	0	660,252		
Technical Support		36,953	36,953	0		
Other		5,792	5,792	6,205		
Power	3,304,516	9,691	14,295	328,376	2,961,845	0%
Chemicals	6,415,610	75,830	1,206,870	256,624	4,952,116	19%
Materials/Supplies	349,200	0	0	0	349,200	0%
Municipal Utilities Total	\$12,732,078	\$128,266	\$1,263,910	\$1,314,740	\$10,153,429	10%
MWD	10,185,662	102,613	1,011,128	1,051,792	8,122,743	10%
CAWCD	1,273,208	12,827	126,391	131,474	1,015,343	10%
SNWA	1,273,208	12,827	126,391	131,474	1,015,343	10%
Total Conducting Pilot Run	\$16,558,070	\$162,906	\$1,701,006	\$1,317,660	\$13,539,404	10%
Reclamation Total	9,182,845	311,168	5,127,270	14,950	4,040,625	56%
MU Total	14,007,162	230,861	2,415,029	1,437,692	10,154,441	17%
Grand Total	\$23,190,007	\$542,029	\$7,542,299	\$1,452,642	\$14,195,066	33%

Notes

¹ Total Budget represents the Estimated Cost for the Plant Preparation and the Operation, Maintenance, Repair & Replacement (OMR&R) as outlined in Exhibit A of the Agreement.

² Total-to-Date Expended represents total expenditures from Fiscal Year 2008 to present. Total-to-Date Expended for the Preparation Phase includes \$330,000 payment associated with the Environmental Compliance Funding Agreement.

³ Undelivered Orders represent the order for goods/services which have not been delivered or performed.

⁴ Balance is the difference between Total Budget and Total-to-Date Expended and Undelivered Orders.

⁵ Percent Expended is the Total-to-Date Expended divided by Total Budget. Percent Expended for the Preparation Phase includes \$330,000 payment associated with the Environmental Compliance Funding Agreement.

⁶ Costs incurred by Reclamation not identified in Exhibit A. Include miscellaneous expenses such as travel, transportation, IBWC payment.

⁷ Includes \$330,000 payment associated with the Environmental Compliance Funding Agreement. This payment was provided in equal \$110,000 increments. The budget in the Preparation Phase for Contract Labor & Services per Exhibit A is \$814,584.

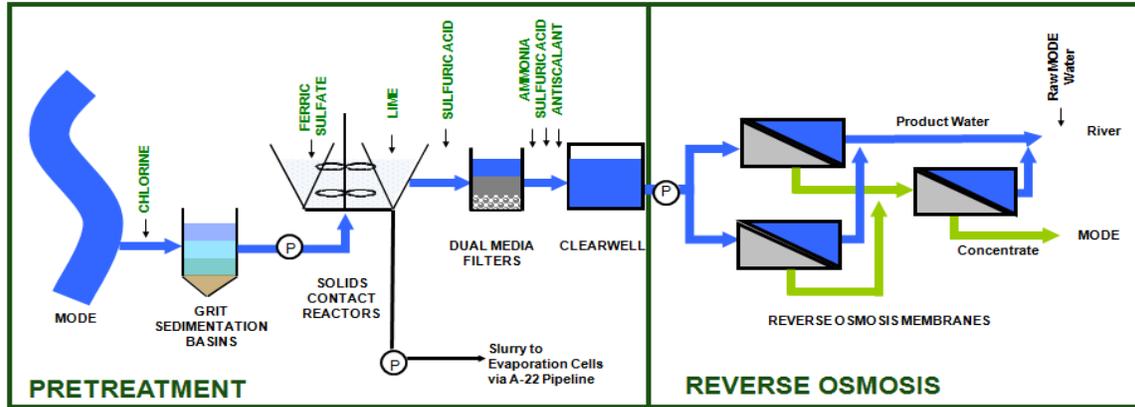
Total project expenditures incurred for the month of May 2010 were \$542,029. Reclamation expenditures of \$311,168 were primarily for Reclamation labor associated with the first 29 days of Pilot Run operation. Municipal Utilities expenditures of \$230,861 during May were primarily for contract labor and services, chemicals and power also associated with the first 29 days of plant operation.

As of May 2010, capital contributions received are \$7,641,122. Expenditures for the Municipal Utilities to date total \$2,415,029 and Undelivered Orders total \$1,437,692 leaving a balance of \$3,788,401.

The preparation phase for the Pilot Run was completed on May 2, 2010. All invoices associated with that phase have not been received and are anticipated within two to three months. Final preparation phase costs will be provided as soon as all costs are known and have been validated.

4.0 Plant Performance

The following is a summary level schematic of the water treatment processes of the YDP based on how the plant is configured and being operated during the Pilot Run.



The following is YDP plant performance information for May, 2010. This is summary level information and at the request of the Municipal Utilities more detailed performance information is being prepared. That will be published separately and on a recurring basis beginning in late June, 2010.

Overall Production (acre-feet)	May	Run to date
Product water produced	1,614	1,614
Untreated MODE flow to the River	758	758
Total water recovered	2,372	2,372

Total water recovered represents the sum of YDP product water discharged to the River plus untreated bypass flow diverted to the River at the MODE 1 diversion facility. During the period May 3 through 31, 2010 a total of 2,372 acre-feet of water was recovered by the Pilot Run and included in water deliveries to Mexico. This includes 1,614 acre-feet of YDP product water and 758 acre-feet of untreated bypass flow diverted to the River at the MODE 1 diversion facility. Intentionally Created Surplus credits are accounted for and administered by the Lower Colorado Region Water Accounting and Conservation Group.

On-stream Factors (%)	May	Run to date
Pretreatment	100%	100%
Reverse Osmosis	100%	100%
Total	100%	100%

The on-stream factor is the ratio of actual operating hours over a given period of time to a hypothetical maximum. For example, if a plant operated for 10 months over a 12 month period of time that plant's on-stream factor would be 83% (8,760 hours ÷ 7,297 hours).

During May both the pretreatment and reverse osmosis portions of the YDP operated continuously without any planned or forced outages.

Key Pretreatment Parameters	May	Run to date
MODE water at intake (Nephelometric turbidity units)	7.17	7.17
RO feed water at Clearwell (silt density index units)	2.20	2.20

Turbidity is a measurement of the amount of suspended particulate in water. The silt density index (SDI) is a measurement of the fouling potential to membranes of suspended particulate in water.

At the YDP water pretreatment equipment (grit sedimentation basins, solids contact reactors, dual media gravity filters) is designed to significantly reduce the level of suspended particulate in water in order to reduce potential fouling for the RO membranes. Pretreated, but saline water is stored in the clearwell and pumped to the reverse osmosis membranes for desalination.

For May turbidity of bypass flow water at intake averaged 7.17 NTU and SDI averaged 2.20. We consider an SDI of less than 4.3 acceptable for YDP operations.

Key RO Parameters	May	Run to date
Intake water at the MODE (total dissolved solids in ppm ¹)	2,808	2,808
Clearwell and RO feed water (total dissolved solids in ppm ¹)	2,404	2,404
Product Water (total dissolved solids in ppm ¹)	203	203
Recovery (%)	69.7	69.7
Salt Rejection (%)	94.9	94.9

As noted earlier pretreatment at the YDP is designed to make the water reaching the RO membranes as particulate free as possible. Pretreatment however, has relatively little impact on salinity of bypass flow water. During May bypass flow water at intake averaged 2,808 ppm. Pretreatment removed an average of 404 ppm resulting in water at the clearwell to feed the RO pumps of 2,404 ppm. Product water from RO and discharged to the River averaged 203 ppm.

¹ Values based on Sum of Constituents methodology.

Salt rejection of the RO membranes averaged about 95% for the month. During May the membranes functioned at or near the manufacturer’s specifications and there are no signs of membrane degradation.

During May RO feed water pressure varied between 220 and 300 psi. We consider this range acceptable. No leaks to the plant’s high pressure aluminum bronze piping occurred during May.

Other Effluent Data	April	May	Run to date
Bypass Drain volume at SIB (acre-feet ²)	11,619	-	-
Bypass Drain salinity at SIB (ppm ³)	2,667	-	-
Slurry to A22 (tons)	1,715	2,550	2,550

For April, 2010 bypass flow volume at the SIB totaled an estimated 11,619 acre-feet with an average salinity of 2,667 ppm. These values include Mexican arranged water which Reclamation conveyed to the Bypass Drain on behalf of Mexico. Reclamation’s bypass flow data becomes available for dissemination 4 to 6 weeks after completion of a calendar month; data for May will be included in next month’s Pilot Run report.

During May a total of 2,550 tons of calcium carbonate slurry were transported via pipeline to A22 evaporative and disposal cells. This total does not include slurry that was transported to the cells via truck while the pipeline was out of service.

On May 10th a leak occurred on the A22 pipeline which transports calcium carbonate slurry from the plant to the evaporative and disposal cells. 24 hour a day trucking and hauling of the slurry continued until pipeline repairs and testing were completed on May 13th. While the pipeline was out of service an estimated 1,027 tons of slurry were trucked to the evaporative and disposal cells (56 tanker truck loads totaling 224,000 gallons). At the location of the leak the soil that was exposed to the slurry was removed (an estimated 240 tons of soil).

² This is a provisional value. Final data for the volume of the bypass flow is provided by the IBWC.

³ Estimated value based on Sum of Constituents (SOC) methodology. Actual values were based on Corrected Residual on Evaporation (ROE) methodology (2,485 ppm) and converted to SOC based historic average difference between SOC and Corrected ROE (+182 ppm) for bypass flow water at the Southerly International Boundary. The historic average difference of 182 ppm is for the 14 year period, 1995 through 2008.

Consumption	March & April	May	Run to date
Power (kWh)	438,151	3,217,424	3,217,424
Ammonia (tons)	2.2	12.1	12.1
Antiscalant (tons)	0	11.9	11.9
Chlorine (tons)	9.9	22.0	22.0
Ferric Sulfate (tons)	81.2	85.7	85.7
Lime (tons)	1,545.0	1,253.0	1,253.0
Sodium Bisulfite (tons)	0	19.5	19.5
Sulfuric Acid (tons)	47.2	206.0	206.0
RO cleaning chemicals (gallons)	0	0	0
Other	0	0	0

During May the YDP's power consumption was 3,217,424 kWh. The average price of power during May was \$31.86 per mWh. This is based on preliminary information from WAPA which had not completed the power bill for the YAO for May. .

An additional 438,151 kWh of power was utilized in March and April during pre-run preparation . The average price of power during March was \$30.98/mWh and during April was \$33.47 per mWh.

Chemical consumption during preparation and May is as reflected in the table above.

5.0 Joint Cooperative Actions

In accordance with the Joint Report of the Principal Engineers⁴, Reclamation began moving arranged water to the Bypass Drain in late October, 2009. The Joint Report states, “The United States, Mexico, and a partnership of non-governmental organizations (NGO) intend to each arrange for 10,000 acre-feet (12.3 mcm) of water, for a total of 30,000 acre-feet (37 mcm), in connection with the reduction in flow to the Santa Clara Wetland and the increase in salinity that would occur during the proposed YDP Pilot Run in the absence of the Joint Cooperative Actions identified in this agreement. The volumes shall be conveyed during the YDP Pilot Run period, however each party may initiate conveyance of their respective volumes starting on the date a decision is made by the appropriate U.S. agency to proceed with the proposed YDP Pilot Run until the conclusion of the proposed YDP Pilot Run.” Reclamation decided to proceed with the YDP Pilot Run on October 29, 2009 and formally informed the U.S. Section of the International Boundary and Water Commission (IBWC) of that decision on that date. On October 30, 2009 Reclamation initiated the movement of U.S. arranged water to the Santa Clara Wetland.

⁴ “Joint Report of the Principal Engineers Concerning U.S.-Mexico Joint Cooperative Actions Related to the Yuma Desalting Plant (YDP) and the Santa Clara Wetland” International Boundary and Water Commission, July 17, 2009

The following table describes the status of arranged water as of May 31, 2010:

Arranged Water			
Acre-feet of water			
Month	United States ¹	Mexico ²	Non-Governmental Organizations
Oct-09	149	-	-
Nov-09	4,363	-	-
Dec-09	1,785	-	-
Jan-10	1,778	-	-
Feb-10	194	-	-
Mar-10	2,016	-	-
Apr-10	-	1,840	-
May-10	-	1,096	-
Totals	10,286 ³	2,936 ⁴	0
¹ Values for the U.S. represent final values as reported by the IBWC			
² Values for Mexico are provisional and as reported by the IBWC			
³ Additional one acre-feet is the result of rounding			
⁴ Column has been totaled for convenience; a provisional total has not actually been reported by the IBWC			

U.S. Arranged Water: The IBWC has confirmed that Reclamation has successfully conveyed its full 10,000 acre-feet of arranged water to the Cienega. Mexico has formally accepted 8,075 acre-feet of arranged water from the U.S. which was conveyed between October 30, 2009 and January 31, 2010. According to the IBWC Mexico is reviewing and considering the IBWC's data for arranged water conveyed by the U.S. since January 31st.

Mexican and NGO Arranged Water: In April the IBWC informed Reclamation that any Mexican or NGO water conveyed to the Bypass Drain on the U.S. side of the border will be fulfilled from Mexico's 1.5 million acre-foot annual Treaty allotment. During April and May 2010 the U.S. conveyed on behalf of Mexico 1,840 and 1,096 acre-feet of water, respectively to the Bypass Drain. These are provisional values and once final data is received from the IBWC, the actual quantities will be accounted for against Mexico's 1.5 million acre-foot annual allotment. To date the U.S. has not conveyed any arranged water on behalf of the NGOs.

6.0 Major Historical Milestones

Milestone	Date
Publish press release for Public Scoping Meeting	9/25/08
Conduct Public Scoping Meeting	10/8/08
Initiate voluntary Cienega study based on scoping meeting and other comments	11/1/08
Conduct initial consultation meeting with IBWC	11/14/08
Conduct second consultation meeting with IBWC	2/12/09
Submit ADEQ applications	3/2/09
Conduct third consultation meeting with IBWC (re: Cienega Literature Review)	4/8/09
Compliance Funding Agreement Routed for signature	4/22/09
Release draft Environmental Assessment (EA) with Cienega Literature Review attached for public comment for 30 days	5/1/09
Close of public comment period	6/1/09
Sign YDP Environmental Compliance Funding Agreement (<i>Begin finalization of Risk Management Plan after signing</i>)	6/10/09
Pilot Run Agreements complete & circulating for review by Boards: Funding Agreement, Delivery Agreement, Forbearance Agreement, Monitoring Plan Agreement (<i>Begin finalization of Risk Management Plan after signing</i>)	8/2/09
Release final EA with all comments addressed (<i>Dependency – complete agreement with IBWC and Section 8 consultation</i>)	8/26/09
Release draft Finding of No Significant Impact (FONSI) out for public review for 30 days	8/26/09
Close of public review period	9/28/09
Release final FONSI	9/30/09
All parties sign YDP pilot run Funding Agreement (<i>Dependency – agreement cannot be executed prior to final FONSI</i>)	10/29/09
Notification to International Boundary and Water Commission: Reclamation intends to conduct the Pilot Run of the YDP	10/29/09
Reclamation initiated movement of arranged water to the Santa Clara Wetland	10/30/09
Receipt of 1 st installment payments from Municipal Utilities	12/1/09
Final preparation phase for the Pilot Run begins	12/1/09
Meeting at annual Colorado River Water Users Association conference – initial planning for the celebratory event	12/9/09
Discharge permit received for the YDP and WQIC	1/8/10
Receipt of 2nd installment payments from Municipal Utilities	4/16/10
Minute 316 to the 1944 Water Treaty signed	4/16/10
Reclamation makes \$100K payment to Mexico for extraordinary Bypass Drain maintenance	4/16/10
Aquifer protection permit received for the YDP and WQIC	4/28/10
Celebration Event for the YDP Pilot Run and Drop 2 Reservoir	4/28/10
Completion of the final preparation phase of the Pilot Run	5/2/10
Commencement of the Pilot Run (as scheduled)	5/3/10
Coffer dam removed in MODE 2 and discharge of YDP product water to the River commences	5/5/10