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July 19, 2022

Post 2026 Colorado River Operational
Strategies to: CRB-info@usbr.gov

Subject: Suggestions to help mitigate some of impact of the 20 year plus drought on the Colorado River.

One would hope that some of these suggestions could be instituted prior to 2026 and therefore reduce the hardship imposed on the users of the Lower Colorado River.

These documents include suggestions to adjustments in the accounting processes, and imposing some restriction on quantity of water being diverted. They also suggest construction of water projects to augment the supply, by using drainage & ground water.

Also including tables to outline the existing conditions & explain the results of the adjustments.

If any of the staff reviewing these documents have questions, please feel free to E-mail or call me, My E-mail address lomacloud@yahoo.com. My phone number is (970) 858-1592 in Colorado in the summer months (May to Dec.) or (928) 783-8637 in Yuma Arizona in the winter months.

Sincerely,

Curtis L. Cloud

Attachments: 13

Outline of Post 2026 Submittal to USBR

By Curtis L. Cloud July 18, 2022

Contents:

Summary: Estimated volume of water conserved or produced.

Item #1	200,000 AF
Item #2	100,000 AF
Item #3	45,000 AF
Item #4	165,000 AF
Item #5	120,000 AF
Item #6	105,000 AF
Item #5	120,000 AF
Item #7	70,000 AF
Item #8	600,000 AF
Item #9	620,000 AF
Totals	2,025,000 AF

Table #22

Measured Water discharged into Colorado River via PKP

9.25.21

Year	District IID	District Coachella	Comb	PKP Tab #2	New PKP Totals
2020	101,933	16,570	118,503	418,963	537,466
2019	56,888	10,314	67,202	527,593	594,795
2018	22,454	3,932	26386	703,484	729,870
2017	26,,653	4,209	30,862	591,888	622,750
2016	70,912	11,613	82,525	505,436	587,961
2015	89,019	13,913	102,932	479,611	581,943
2014	81,381	13,007	94,388	474,162	568,550
2013	71,941	10,067	82,008	440,517	522,525

Table #20

Un-measured 1989-2020 9.19.2021

Un-Meas Source : USBR Table #2

Year	CFS	A. F	PPM
1989	90	65,264	1461
1990	92	66,418	1678
1991	107	78,000	1271
1992	183	132,898	1428
1993	Gila River Flood		
1994	115	83,202	1157
1995	111	60,257	1858
1996	81	59,102	850
1997	325	235,414	959
1998	64	46,369	2071
1999	126	91,349	1427
2000	30	21,759	3819
2001	108	77,827	1394
2002	22	16,079	3905
2003	106	76,798	1346
2004	194	140,259	1005
2005	213	153,961	1002
2006	146	106,036	1167
2007	130	93,860	1143
2008	97	70,710	1666
2009	165	119,721	1369
2010	155	111,901	1437
2011	171	124,331	1529
2012	195	141,352	1373
2013	289	209,113	1086
2014	338	244,680	1233
2015	354	256,046	1167
2016	270	196,026	1243
2017	217	157,265	1280
2018	237	171,358	1260
2019	260	187,941	1422
2020	295	214,408	1213

Gila River Flow @ Yuma

Addition Unmeasured Return Via PKP	New Totals Unmeasured Ret @ NIB
82,008	127,105
94,388	150,292
102,932	153,114
82,525	113,501
30,862	125,403
26,385	144,973
67,202	120,739
118,503	95,905

Table #23

Excess Water to Mexico 2011 to 2020 8.13.21

By: Curtis L. Cloud Unit in Acre Feet

Year	AZ *	CA *	Combine Totals	Mexico #	Diff
2020	10544	30820	41364	52176	10312
2019	11672	22922	34594	39676	5082
2018	2913	10184	13397	7416	-5981
2017	6041	12789	18830	16688	-2142
2016	4165	10137	14382	9230	-5072
2015	4197	13288	17485	14829	-2656
2014	11816	26810	38626	32151	-6475
2013	28147	40159	68306	71970	3664
2012	26389	41152	67541	94830	27289
2011	19252	33457	52709	77954	25245
			Average	46300	

* Accounting report for each state

Accounting report for Mexico

Source: USBR accounting reports

Annaual water delivered into the All-American Canal Aug. 18,2021

Units in Acre Feet

Yuma Project ** Source:USBR Accounting Report

Reservation Division ## Source: USBR Table #2

	**	**	**	**	**	##	##	**	**	
	IIID	Indian Unit	Bard Unit	Comb Sum	Vall Div	CWW	PKP	Coachella	Others	Totals
2014	2,498,428	47,195	51080	98,275	357,773	217,197	474,182	366,799	1,808	4,014,462
2015	2,455,649	47,047	48,561	95,608	358.718	255,252	479,661	360,381	1,714	4,006,983
2016	2,461,562	44,781	47,709	92,490	348,431	293,371	505,436	372,371	1,629	4,075,290
2017	2,488,615	44,440	37,986	82,426	339,737	209,682	591,888	343,930	2,095	4,058,370
2018	2,515,215	42,639	42,952	85,591	343,495	99,638	703,484	346,367	1,012	4,094,770
2019	2,529,797	44,018	36,261	80,279	320,770	231,674	527,593	358,375	3,688	4,052,176
2020	2,487,376	46,380	35,843	82,223	344,336	180,465	428,963	371,588	3,464	3,898,415

LegendL

IID -Imperial Irrigation District
Indian Unit-Reservation of Yuma Project
Bard Unit-Reservation of Yuma Project
Vall Div-of Yuma Project
CWW-California Wasteway located on Yuma Main Canal
PKP- Pilot Knob Power Plant located on AAC some 20 miles d/s of Imperial Dam
Others- Ft. Yuma Indian & Cocpaha Indian

Table # 5D

Water Record between Parker & Imperial Dams 8.11.21 Units in Acre Feet

Year Source: USBR Accounting Report

2018 * Source from USBR table # 2 used for NIB

			Measured	Un-Meas	
AZ	User	Division	Returned	Return	CU
	CRIT	599,403	283,451	32,967	282,985
	Adj	396,000	118,850	0	277,150
	diff	103,403	164,601	32,967	6,834
CA	PVID	773,029	362,722	56,080	354,227
	Adj	496,000	148,800	0	347,200
	diff	277,029	213,922	56,080	7,027

		Old		New	
	Below Parker Dam	6,514,000		6,514,000	
	Comb Div	1,372,432		892,000	
	Diff	5,141,568		5,622,000	
	Comb RT	646,173		267,650	Gain
		5,787,741		5,889,650	101,909
	Imp Dam loss	5,376,952* 410,789			
Plus	Un-meas	105,930			
Total	Loss	516,719			

	Other Division	Other Meas Rt	Other Un-Meas	CU
AZ	47,606	230	15,838	31,538
Adj	47,606	230	0	47,376
diff	0	0	15,838	15,838
CA	2,637	0	1,145	1,582
Adj	2,637	0	0	2,637
diff	0	0	1,045	1,055

Old Totals				
CRIT	599,403	283,451	32,967	282,985
PVID	773,000	362,722	56,080	354,227
O AZ	47,606	230	15,838	31,538
O CA	2,637	0	1,045	1,582
Totals	142,675	646,403	105,930	670,332

New Totals				
CRIT	396,000	118,850	0	277,150
PVID	496,000	148,800	0	347,200
O AZ	47,606	230	0	47,376
O CA	2,637	0	0	2,637
Totals	942,243	646,403	0	674,263

Table 5C

Parker Dam to Imperial Dam

\# Units in acre feet

Year 2019 AZ	User	Division	Neasured Return	Un Measuews	CU
	CRIT	509,982	233,868	28,144	249,690
	Adj	350,000	105,000	0	245,000
	diff	159,982	128,686	0	3,690
CA	PVID	799,070	390,287	60,226	350,357
	Adj	490,500	147,150	0	343,350
	diff	308,570	243,137	0	7,007
	Old			New	
Below	Parker				
	Dam	6,258,300		6,258,300	
Comb	Divers	1,309,052		840,500	
	diff	4,949,248		5,417,800	
Comb	Return	624,155		252,150	Gain
	net	5,573,403		5,669,950	96,547
Above	Imperial	5,291,881			
	loss	341,522			
Plus	Un-meas	104,926			
Total	Loss	446,448			

Others AZ	Division	Measure Return	Un-Measure	CU
Others	47,126	289	15,651	31,186
CA	1400	0	556	844
Old Totals				
CRIT	509,982	233,868	28,144	249,690
PVID	799,070	390,287	60,226	350,357
O AZ	47,126	289	15,651	31,186
O CA	1,400	0	556	844
Totals	1,357,578	624,444	104,926	632,077
New Totals				
CRIT	350,000	105,000	0	245,000
PVID	490,500	147,150	0	343,350
O AZ	47,126	289	0	46,837
O CA	1,400	0	0	1,400
Totals	1,357,578	202,139	0	636,587

2020 Parker to Imperial Dam 7/1/2021 Units in Acre Feet

2020 AZ	User	Diverted	Measured Return	Un-Meas Return	CU	
	CRIT	459,026	231,317	25,245	202,463	
	adj	283,000	84,900	0	198,100	
	diff	173,950	146,417	25,245	3.363	
CA	PVID	792,060	386,109	61,772	346,085	407,857
	adj	484,400	145,320	0	339,080	
	diff	307,,660	240,789	61,772	6,905	

Beliw	Old Parker Dam	6,399,200		New 6,399,200	
Combine	Diverted	1,296,540		814,930	
	diff	5,102,660		5,584,270	
Combine	M Return	617,656		230,450	**Gain**
	Net	5,720,316		5,814,720	**94,404**
Above	Imp Dam	5,321,276		617,656	
	diff	399,040	65%	399,040	
				208,616	:Loss

Others AZ	Diverted	Measured Return	Un-Meas Return	CU	AZ Un-Meas	CA Un-Meas
Others	45,993	230	15,217	30,546	15,217	61,772
adj	45,993	230	0	45,763	25,245	613
diff	0	0	0	45,763	40,462	62,335
			15,217	15,217		
CA	1,537	0	613	924	Measured	Measured
adj	1,537	0	0	924	146,417	240,789
diff	0	0	0	1,537		

					Est
Old Totals					6,300,000
					815,000
CRIT	459,026	231,317	25,245	202,463	5,485,000
PVID	792,060	386,109	61,772	346,085	230,000
O AZ	45,993	230	15,217	30,546	5,715,000
O CA	1,537	0	613	924	5,300,000
Totals	1,296,540	617,656	102,847		

New Totals				
CRIT	283,000	84,900	0	198,100
PVID	484,400	145,320	0	339,080
O AZ	45,993	230	0	45,763
O CA	1,537	0	0	1,537
Totals	814,930	230,450	0	584,480

2020

Effect on water deliver to AZ & CA

AZ	Old	New	
Diverted	3,211,239	3,037,289	
Meas Rt	548,812	403,395	
Un-Meas	190,651	150,189	
CU	2,470,776	2,423,705	-47,071

CA	Old	New	
Diverted	4,578,857	4,271,197	
Meas Rt	570,812	329,723	
Un-Meas	86,367	24,032	
CU	4,019,911	3,917,442	-102,469

Table 5A

Parker Dam to Imperial Dam

7/16/2022 Units in acre feet

Year 2021 AZ	User	Division	Measured Return	Un-Measu Return	CU
	CRIT	489,547	237,095	26,925	225,527
	Adj	315,740	94,720	0	221,020
	diff	172,801	142,375	26,925	4,607
CA	PVID	808,850	380,630	61,772	368,779
	Adj	516,000	154,800	0	361,200
	diff	292,850	231,309	61,772	7,579

Below	Old Parker		New	
	Dam	6,344,900	6,344,900	
Comb	Div	1,298,397	831,740	
	diff	5,046,503	5,513,160	
Comb	Meas	617,725	249,520	Gain
	net	5,664,228	5,762,680	98,452
Above	Imp	5,260,000		
	loss	404,228		

Others AZ	Divert	Meas Return	Un Measu	CU
Others	49,278	236	16,409	32,133
Adj	49,276	236	0	49,043
diff	0	0	16,406	16,910
CA	1411	0	559	852
Adj	1411	0	0	1411
diff	0	0	559	559

Old Totals				
CRIT	489,547	237,095	26,925	225,527
PVID	808,850	380,630	61,772	368,779
O AZ	49,278	236	16,409	32,133
O CA	1,411	0	559	852
Totals	1,349,086	617,961	105,665	627,291

NewTotals				
CRIT	315,740	94,720	0	221,020
PVID	516,000	154,800	0	361,200
O AZ	49,278	236	0	49,042
O CA	1,411	0	0	1,411
Totals	882,430	298,798	0	632,673

Water savings operational adjustments

By Curtis L Cloud July 15, 2022

Post 2026 public comments to the Bureau of Reclamation

Suggestion #1:

Reduce division on CRIT & PVID: There are two large Irrigation Districts located below Parker Dam. They are Colorado River Indian Tribe CRIT & Palo Verde Irrigation District PVID. They divert 2 to 3 times more water than required to meet their demand within the respective districts. They will tell you that all the water not used was returned to the Colorado River. That's not true. The over diversion waste water because in the CRIT system they lose some 40,000 acre feet in conveyance & the PVID system lose some 60,000 acre feet in the same manner. As a matter of fact some 100,000 acre feet is lost each year using this method.

If the districts were required to reduce the diversion to 1.4% of the demand between the two districts they would save the 100,000 acre feet each year. It is well to know that all the other Irrigation Districts located within the Lower Colorado River that use open drainage system return 30 to 32 percent of the water they divert from the river. These two irrigation districts could also return the same percentage to the river.

In summary the 100,000 acre feet saved by reducing the division by two Districts in reality equal to 200,000 acre feet, because 100,000 acre feet less would be required at Imperial Dam . By adding the Un-Measured return flow a total of 300,000 acre feet could be SAVED.

All the above suggestions could be mandated by the Secretary of the Interior as the Boulder Canyon Act of 1928, the Act makes the Secretary the WATERMASTER of the water of the Lower Colorado River. Ref: Tables # 5A, 5B, 5C, 5D

Suggestion #2

Un-measured Return Flows: Within the section of the Colorado River between Parker & Imperial Dams some 100,000 Plus Acre Feet of Un-Measure Return Flow is given to all the users. That credit is not justified as none of that water arrives down to Imperial Dam. So why give credit for water that does not exist? A second question about the Un-measured return flow credits. Why is the PVID given 7.5 percent of the

division as return flow & the CRIT only given 5.5 percent of their division? Is the PVID given a bonus for diverting more water? Something is wrong with this picture!

Suggestion #3

Excess Water going to Mexico: The USBR should require all the Irrigation Districts below Parker Dam to produce documents outlining how they desiring the Bureau for ordering water needed downstream of Parker Dam. As it now exists the USBR office in Yuma, AZ makes the weekly orders. Between 2001 & 2010 the excess water delivered to Mexico ranged from 21,000 up to 200,000 acre feet per year, for an average of 109,000 acre feet. After the completion of the new Warren Brock Reservoir the excess water was reduced, ranging between 7,500 up to 94,000 acre feet per year 2011 to 2020, an average of 46,500 acre feet per year. With a major drought going on that's not good enough. The target should be less than 1,000 acre feet per year.

In other words the Irrigation Districts should take more responsibility. With Senator Wash Reservoir operating around 6,000 acre feet of storage capacity & the Brock Reservoir having 8,000 acre feet of storage capacity. If you have 6,000 acre feet in storage & have a demand of 500 CFS per day it would take 6 days to empty the 6,000 acre feet. Most of the increase demand for water is less than 500 CFS. One of the problems is the Bureau over orders and ends up wasting it. The travel time from Parker Dam to Imperial Dam is only 3 days.

One other issue that adds to this problem is it appears that the Imperial Irrigation District is discharging more water through the Pilot Knob Power Plant than is scheduled. Therefore some 100 to 150 thousand acre feet of water is showing up at the NIB as Un-measured return flow. This question show up on the Table #2 used by the USBR's in Yuma Area Office to track the Flow & Salinity between Imperial Dam & the NIB. See the Suggestion # 4 on All-American Canal:

If the districts were required to pay back the water they order & do not take delivery they would see fit to operate more efficiently. Or better yet if they were required to pay some $500 per each acre foot they order but don't take delivery the problem would go away. One other point with the excess water the amount charged to each state does not match the amount shown that is shown going to Mexico. Ref: Table # 23

Suggestion #4

All-American Canal Seepage Losses: Seepage loss credit given to the water users receiving water delivered through All-American Canal. The Bureau of Reclamation accounting reports are not showing the correct amount of water return to the Colorado River above the Northern International Boundary. They are using the

difference amount shown between Station 60+00 & Station 1117+00 on the AAC located about 1,200 feet below the Pilot Knob Check Structure. Station 60+00 is located downstream of the desilting basins at Imperial Dam.

A second factor is on the account report one month will show IID receiving 1500 acre feet of measured return. Then it goes up the following months & IID receiving 6,000 acre feet. The seepage losses each month are less than a 100 acre feet. It should match the amount of water making it back to the river at the NIB. The records show All-American Canal losses less than 48,000 acre feet each year. The Reservation Drain #4 collects drainage water from the Reservation Division of the Yuma Project east of the Yuma Main Canal & Seepage water from the AAC from branch drain located along the toe of the AAC that feed into this drain.

The Araz Drain #8 collects drainage water west of the Yuma Main Canal & is located south of the toe of the AAC. Both of these drains run very consistent flow. The two drains collect water seeping out of the AAC for some 12 miles, which equals about 60% of the canal length. This section of the drains collects some 2,000 acre feet per mile seeping out of AAC each year.

The Araz Drain #8 discharges into the Colorado River some 2.5 Miles upstream of the NIB. The section of the AAC below the outlet of Araz Drain to the NIB has no open drains or metering systems, therefore the accounting office estimates the seepage losses within that reach of the canal. They show it as `Measured Return. It's not measured. These seepage losses do not show up on the USBR table #2 the Yuma office on this table.

As information about the All-American Canal; the first 2,000 CFS delivered into the canal is water belonging to the Yuma Project. The two divisions of the Yuma Project are the Reservation Division about 14,000 acres located in California and the Valley Division about 48,000 acres located in Arizona, The two divisions divert the water off the AAC. A portion not taken by the two districts is conveyed down the Yuma Main Canal to the California Wasteway & returned to the Colorado River just north of Yuma. That portion is delivered to Mexico via the NIB Morelos Dam. During high flow demands by Mexico some of the Yuma Project water is transferred down the AAC to the Pilot Knob Hydro-power Plant. During high demand flows to Mexico water over & above the 2,000 CFS is also conveyed down the AAC to the Power Plant. The Yuma Project district's had transfer agreement with IID & receive compensation for that water. Also during high flow months water is delivered over the 2,000 CFS. We will call that water Overage Water.

During a normal year a little over a million acre feet of Yuma Project water is conveyed down the AAC. The two districts divert about 450,000 acre feet; The

remaining water about 550,000 acre feet goes to Mexico,. However the two districts only receive Measured Return flows for the portion they divert. The Account Report does not show credit for the seepage losses for the remaining 550,000 acre feet. The Accounting Reports should show a breakdown of how much each entity receives, except the Valley Division of the Yuma Project. Giving credit for seepage water not returning to the Colorado River is just adding to the drought condition. For California, they are allowed to divert water not returned to the river because the Accounting Office shows it happens.

Suggestion #5

Additional Water being discharged through the Pilot Knob Power Plant:

First, I will start with additional water being discharged through the Pilot Knob Power Plant located on the All-American Canal (AAC). The Pilot Knob Power Plant (PKP) is located a few hundred feet upstream of the Pilot Knob Check/Wasteway. The power plant & wasteway both discharge water from the AAC back into the Colorado River through the Old Rockwood Heading. The Rockwood Heading was the diversion structure used to convey the water into the old Alamo Canal that provided irrigation water to the Imperial Valley back in the early 1900's.

Following the completion of the Brock Reservoir (2010) the Un-measured return flows at the Northern International Boundary (NIB) jump up by more than 100,000 acre feet some years. That additional water can only come from one source. It's water coming from the AAC via the PKP. It appears that the water is used to increase the power production however; the IID only reports the water schedule for delivery to Mexico to the USBR Accounting office excluding the additional water.

The USGS & the IID meter the flow of water below the Pilot Knob Check Structure at Station 1117+00 Metering Station and submit the metering data to the USBR accounting office. The Account office uses the metering data to show seepage losses. With the water being run through the power plant it never makes it to the metering station. The IID in turn diverts additional water out of the Brock Reservoir to make up the difference. Note: IID operates Imperial Dam, the AAC & the Brock Reservoir.

Over the years I have noticed that the measured return flows given to the users of the AAC does not match the water returning to the river at the NIB. However, the drainage ditches that collect the water seeping out of the AAC run very consistent each year. It is noted from my research the AAC only loses some 48,000 acre feet of water each year within the 20 mile section between Imperial Dam & the metering station 1117+00. The measured water seeping out of the AAC between the mouth of the Araz Drain & the NIB is not measured it's an estimate from Un-measured flow made by the

USBR. A portion of that section of the AAC runs adjacent to the Pilot Knob Mountain therefore, the seepage is normally far less than the other portions of the canal.

To solve this issue I recommend that IID receive 30,000 acre feet as measured return flow & Coachella District receive 4,400 acre feet as measured return flow each year. That's more in line with the correct amount they should receive. The annual accounting report should outline in detail all the seepage losses from the AAC including the YCWUA in the Yuma valley.

By IID using this method they receive return flow credits for additional water not making it to the metering station. In the case of year 2020 they received credit for some102,000 acre feet of Measured Return over and above the 30,000 acre feet that should have been their portion of the seepage loss from the AAC. That water turned up at the NIB as Un-measured water. In addition the IID also used some16, 000 acre feet of water from the Coachella Water district.

Then IID discharges the normal amount into the Coachella Canal at Drop #1. Coachella also an additional 16,000 acre feet of measured return flow credit up because the IID operated the power plant in this manner. Coachella should only receive some 4,400 acre feet of measured return flow from the AAC.

Note of Interest: The All-American Canal seepage losses are far less than the Bureau report shows. For example, the Reservation Drain #4 & the Araz Drain #8 produces very consistent flow each year. As the records show these two drains collect some 12 mile section of the AAC & produces less than 2,400 acre feet of seepage water per mile each year. The section of the AAC between the metering Sta. 60+00 & the Reservation Main Canal turnout Sta. 308+00 (4.7miles) produces about the same losses as the above drainage ditches. The seepage losses along this section of the AAC are estimated as there is no metering drainage within this section.

The other sources of water returning to the Colorado River between Imperial Dam & Laguna Dam are as follows:

1. Water seeping out of the AAC upstream of Sta. 60+00.
2. Water seeping out of AAC between Sta. 60+00 & Laguna Dam.
3. Water seeping out of the Gila Gravity Main Canal between the Gila headwork's & tunnel #2.
4. Water from the Gila sluiceway below Imperial Dam.
5. The Mittry Lake Canal running from the Gila Headwork's into Mittry Lake.
6. The drainage ditch that collects water below the overflow weir @ Imperial Dam. Ref: Table #22

Suggestion #6

Operate the Yuma Desalting Plant @ 100% & use blend water from the South Gila Valley's DPOC channels:

If Mexico feels the wetlands down in Gulf of California is so important they should be willing to furnish some of the water. As it has turn out the USBR along with the Environmentalists having their way in continuing flow of the Wellton-Mohawk drainage canal over the last 30 years. It's time to fire up the plant as was intended by the Water Treaty Minutes 242. If the Wellton- Mohawk runs out of water, so will the drain. Then what?

This suggestion will produce some 105,000 acre feet of needed water to support the continued operations of all the users on the Lower Colorado River, including Mexico. This proposal calls for using some 75,000 acre feet of desalted water out of the plant & blending it with 30,000 acre feet of drainage water from the DPOC channels. The product water coming out of the plant runs at a salinity rate of less than 300 PPM. The drainage water coming out is 1700 PPM. The combined water will have a salinity rate of 700 PPM, near the same rate as the water arriving at Imperial Dam.

The reject water coming out of the plant runs some 35,000 acre feet will continue to be delivered down to the Wetlands. It could be combined with other drainage waters to support the Wetlands. It's not the end of the world! All the acre footage is based on a yearly production. A note of Interest: The DPOC channels located in the South Gila Valley can produce 100 CFS & deliver a total of some 72,000 acre feet each year.

Suggestion#7

Supply 20% of the diversion water to Yuma Valley:

Use the water from the 242 Well Field will be required to supply 20% of the diversion for the Yuma Valley. The existing Yuma-Mesa Conduit traverses north & crosses each of the Main canals in the valley. The conduit is a force pressure pipeline & should only require a turnout structure to convey the water into each canal. In order to support the volume of water needed to the additional 13 ground water wells authorized by the Salinity Control Act of 1974 will be required.

It is recommended that the USBR ask congress for funding to construct all 13 wells. In addition the increase wells will support delivering more water at the SIB if Mexico agrees. The canal system receiving the water from the Yuma valley's main drain & the 242 Well Field is large enough to handle up to some 230 CFS or 6.5 cubic meters.

The USBR should ask the International Boundary & Water Commission to include the increase in Minutes to the Water Treaty.

Suggestion #8

Recommend that the Secretary of Interior to hand down an order during the drought (when the level of Lake Mead being below a certain elevation) charge each State of the Lower Colorado River for their percentage of the conveyance losses, between Hoover Dam & the Northern International Boundary. Mexico should agree to take an equal cut of their percentage of the conveyance losses.

All the US Courts should support such an order as the Colorado River Compact should have included a clause to address these issues. Maybe in the future a clause can be added to the Colorado River Compact. The Secretary should have the authority to hand down such an order as Congress made the Water Master of the Lower Colorado River under the Boulder Canyon Act of 1928.

#9

Recently I mailed to the Metropolitan Water District of Southern California (see document enclosed).

This document recommends they look into constructing a Desalting Plant to help mitigate some of the impact of the ongoing drought on the Colorado River. The proposed desalting plant is designed to desalt drainage waters produced in the Imperial Valley. The estimated water volume produced by the plant & the added blend water should produce some 620,000 acre feet each year. They informed me they are doing a review of this proposal.

Desalting Drainage waters of the Imperial Valley

By: Curtis L. Cloud April 11, 2022

Here we are into a 20 year of continuing drought on the Colorado River. The time has come to start looking for other sources of water. Most of the people in the Imperial Valley want to save the Salton Sea, as it was before 2003. The main reason for trying to save the sea by drying up that area it covers. By the sea falling in elevation is causing exposure of the sea bed therefore air quality continues to degrade. However, some other method must be found to control this problem.

The drainage water flowing in the New & Alamo Rivers would be a good source of water to Desalt. Based on the records for the last 15 years the Imperial Valley & Mexico has discharged some 800,000 to 1,000,000 acre feet into the Salton Sea each year. Most of the drainage from Imperial Valley discharged into these two rivers. About 10% of drainage water from the Imperial Valley discharged directly into the sea.

According to Imperial Irrigation District records the salinity count of this drainage water ranges around 2,500 to 3,000 Parts per Million (PPM). That equal to around 4 tons per acre foot. That quality of water can be desalted using the Reverse Osmosis (RO) process & produce some 70% as desalted water. However, desalted water is mineral hungry & should be blended with some of treated drainage water. By blending useable treated drainage water with the desalted product the resulting will equal the same parameters as water coming from the Imperial Dam.

There are two issues that come up using this method. One is the 30% reject water produced by the process must be disposed of. In this case it is recommended that this water be discharged into the Salton Sea. The second issue is the sludge produced from the lime pre-treatment process required using the RO system. The existing lime in the drainage water must be removed from the feed water as it will plug up the RO membranes.

If the unused line sludge can be discharged into the Salton Sea it would be combined with the reject water for conveyance to that location. If the lime sludge can not be discharged into the Salton Sea then a disposable site will be required.

It is recommended that some 800 to 900 thousand acre feet be collected from near the mouth of the New Rivers and conveyed to the proposed Desalting Plant site. The drainage ditches & existing lateral canals spillways that parallel each of the drainage ditches that are located north of the proposed desalting site, should also be collected & conveyed to the desalting plant site. By constructing this collector system the point to which the diversion of the Alamo River should be located east of the mouth of the New River & near the Desalting Plant site.

At the site all this water should be processed through pretreatment of lime & possibly water filtering. After the water exits the SCR's that lime softening process acid is added. That

process changes the PH of the water. The blend water may require adjustment in the PH before combining with the desalted product water. That's a design question that must be addressed.

A total ranging between 700,000 & 800,000 acre feet would be desalted using RO. The proposed plant will produce some 490,000 to 520,000 acre feet of desalted water, having a salinity count of less than 300 PPM. Based on the water that is available it is recommended that the desalting plant have a feed water capacity of some 1,200 CFS.

The reject water from this process will range between 216,000 & 230,000 acre feet. The remaining 80,000 to 125,000 acre feet of processed water would be blended with the product water out of the plant making a total of 580,000 to 620,000 acre feet. Based on the blend water running around 2500 PPM, the salinity count of the blended water will be around 670 PPM. However, if the salinity of the blend water is higher or lower in salinity some adjustment in the volume may be required to meet the desired quality.

In a typical large operation a portion of the lime sludge is recycled. Recycling of the lime sludge will reduce the cost of the chemicals required. In most cases the lime sludge produced using the lime softening process produces some 3 times as was introduced. The remaining volume of lime by product can be sold to makers of sheet rock & other commercial products that use lime. If the surplus lime sludge can not be sold or used by other it might be well to combine it with the reject water and discharge it into the Salton Sea if that is permitted?

The recommended location of the Desalting Plant is east of the mouth of the New River & south of the town of Calipatria, CA. Most of the land located in that area is developed farms & will require the procurement of land large enough to construct & operate the proposed Desalting Plant plus all the needed water treatment process & equipment.

The division of the water from each of the rivers will require construction of diversion structures and pumping plants. Upstream of pump intake a desilting basin of some kind will be required along with a trash rack or traveling water screen. The silt & debris must be removed prior to pumping. From the pumping plants a pipeline will convey the water to the proposed desalting plant site.

A number of management structures will be needed to control & convey the water through the plant. One will be a plumbing system a (pipeline) to convey the reject water to the Desilting Basin/ Division structure located on the Alamo River. It is recommended that the Reject be used to flush the silt out of each of the basins & into the Salton Sea.

A conveyance system to deliver the blended/desalted water will require a pumping plant at the desalting plant along with a pressure pipeline. The pipeline would be constructed to an elevation on Imperial Valley's East Mesa a mile or two south of Siphon #1 on the Coachella Canal. The elevation of the termination shall be high enough to support the operation of the proposed flat bottom canal. The desalted/blended water will then discharge into a concrete lined canal running south for delivery into the existing East Highline Canal. It is recommended that this proposed canal have a flat bottom grade & sufficient size to carry all water needed in both directions.

If the desalting plant is down for some reason the new canal section will continue to deliver the water as the existing canal does. Also, using the new concrete lined canal will save an estimated of 5 to 10 thousand acre feet of water due to seepage losses from the old unlined canal each year.

This new proposed canal will replace the existing East Highline Canal between crossing of pressure pipeline & the south connection with the existing canal. The exact location will be determined by the designers. The new proposed canal will require construction of new turnouts for each the laterals feeding off the existing canal. It will also require a shot section of canal, along with a check/drop structure to connect the north bound water back to the existing Highline Canal continuing north.

To start with the volume of drainage water flowing in the Source Rivers is seasonal & varies with the irrigation demands. Therefore, the desalting plant will require operation to meet the water available based on the season. It is estimated the blend water will equal 25% of the desalted water produced by the plant.

An issue that must be addressed is the water coming out of Mexico via the New River. That water contains sewage effluent that does not meet the US standards. Therefore a study should be made to insure that water is fit for feed water for the desalting plant. Question is will that water require additional treatment prior to using it? If this water requires treatment it might be well to construct a treatment plant near Calexico, CA; or some other method of dealing with the issue may be needed?

One other consideration that is suggested, a desalting complex of this size & scope will require a very large source of electrical power. It is recommended that a 200 Megawatt Natural Gas fired steam generating plant be constructed at or near the proposed desalting plant site. The reject water produced by the desalting plant will supply the cooling water required for such a power unit. If the power is furnished off the open market it will require the supplier to build a unit of the same size. Also with the power demands varying with the seasonal demands, the power produced during the off season can be sold during that period. By constructing a power plant to furnish the desalting plant will also aid in the control of the energy cost.

A second consideration that would support the building of an electrical power plant is the waste heat produced by this plant could be used to re-calcite the line used in the recycling process.