GCID-21

California WaterFix Hearing
Exhibit No. ~~DOI - 32~~

DOI - 36 Exhibit No. revised by the hearing team on April 25, 2017

REBUTTAL TESTIMONY OF RON MILLIGAN

Citations of Protestant Testimony to be Rebutted

On operational philosophy and use of stored water

- Mr. Bourez states "And that is our primary concern, that that movement of that stored water in the wetter years … it makes sense to move that water in wetter years. But then when you get to those drier years – going into those drier years with less water, there's a potential effect to project operations and to water users." (Vol. 20, 75:8-16.)

- Mr. Bourez states "I believe our modeling assumptions result in a model mimicking ~~his~~ actual operations better than petitioners' model." (Vol. 21, 27:6-8.)

On use of JPOD capacity for CVP exports

- Mr. Bourez states "And we believe it's reasonable to assume that if the state is not using that export capacity, that the CVP can use it, whether it's North Delta or South Delta diversion. And this is the reason that, in our modeling, you see that July, August, and September, the increased use of joint point is much higher in our modeling because we remove that artificial limitation. So if there's enough storage upstream, the CVP would use unused capacity." (Vol. 20, 69:13-22.)

On minimum pumping for health and safety standards

- Mr. Bourez states "We made that change based on the pumping levels that occurred in 2014 and 2015. Historically, the model assumed 1500 CFS as public health and safety. And that was to run one unit at Jones and at Banks. And what's happened in the past two years is that public health and safety, those levels have gone below that. So we set it to the levels that we've seen in 2014/2015 operations". (Vol. 20 115:1-9.)

Key Points on Rebuttal

- Operational Philosophy and Water Supply Reliability
- Using Fall Exports to Increase Allocations South of the Delta
- Decision to Convey CVP Water in the Fall vs Store Water in Upstream CVP Reservoirs
- Moving Stored Water in the Fall
- Health and Safety Pumping Levels

Operational Philosophy and Water Supply Reliability

The CVP was developed, in part, to improve water supply reliability and subsequently drought relief. Through the use of reservoir storage and system conveyance, the CVP and SWP in unison use the wetter periods to store water and make reliable deliveries through dry periods and droughts. The CVP is (and always has been) operated to make full use of excess water during wet periods and use stored water to supplement releases and deliveries when adequate water is not otherwise available. The ability to control storage releases heightens the value of stored water and increases the priority of building and maintaining adequate upstream storage reserves. The use of the CWF would not change this operational philosophy to operate to maximize deliveries in wetter years to the detriment of very

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low or zero in the drought years. The entire system will continue to be balanced annually without the benefit of knowing what the following year's hydrology will look like.

This operational philosophy is further supported by the definition of CVP yield included in the Central Valley Project Improvement Act (CVPIA), Section 3406(b)(2):

> For the purpose of this section, the term "Central Valley Project yield" means the delivery capability of the Central Valley Project during the 1928-1934 drought period after fishery, water quality, and other flow and operational requirements imposed by terms and conditions existing in licenses, permits, and other agreements pertaining to the Central Valley Project under applicable State or Federal law existing at the time of enactment of this title have been met.

The CVP is operationally integrated and has water service and settlement contracts both north and south of the delta. To balance our various statutory requirements and contractual obligations, Reclamation will continue to prioritize upstream storage during dry periods to benefit all CVP contractors. Through system operations, Reclamation balances the obligations to Sacramento River Settlement Contractors, South of Delta settlement and San Joaquin River Exchange Contractors, various instream flow and Delta requirements and Level 2 Refuge deliveries. Reclamation also must balance deliveries for water service contractors both north and south of the Delta.

Water years 2014 and 2015 represented a set of extreme hydrologic conditions that resulted in the 0% allocations to many agricultural water service contractors and reduced deliveries to some settlement contractors. In addition, calendar year 2013 had the driest 12 month period on record. A primary factor in these years was the severely limited snowpack to provide a water source throughout the irrigation season. In these years, Reclamation chose not to drain the upstream CVP reservoirs to meet system demands due to heightened potential risk of the drought continuing. In addition, Reclamation requested modification of some D-1641 requirements, not to directly improve CVP water supplies, but to conserve upstream storage to the benefit of a number of uses.

Using Fall Exports to Increase Allocations South of the Delta

A factor we consider when developing allocations for water service contractors south of the Delta is the total expected storage that can be accumulated in the Federal share of San Luis Reservoir and the expected volume of CVP Delta diversions through the end of the irrigation season (typically by the end of August). When making allocations, we evaluate available supplies using a conservative hydrology forecast and conservative assumptions of operational constraints. As we move through the water year, these assumptions are adjusted and move closer to the actual observed hydrology, and Reclamation updates the allocations accordingly. By using conservative estimates, Reclamation attempts to avoid the possibility of decreasing allocations after agricultural operations have already begun, although this is not always possible in extremely dry hydrologic years.

When Reclamation makes the initial CVP allocations in late winter, we first estimate the total supplies we believe we can develop and deliver through the peak of the irrigation season (July and August). The spring allocation process places less emphasis on the total annual Delta diversions. Estimates of the Delta pumping volumes that may contribute to CVP supplies in the fall months are not the controlling factor in developing the spring allocations in that water year. We typically assume that if they can meet the peak demand in July and August then we will be able to meet the demands the remainder of the contract year. As a result, available Delta pumping in September through November is does not typically influence the allocation estimates made the previous spring. The water that is able to be conveyed in the fall is more often being used to support refuge level 2 deliveries and building for the supplies in the next contract year, and not used to meet CVP contract allocations in the current contract year.

Furthermore, conveyance of fall CVP supplies are reliant on the available capacity at the SWP's Banks Pumping Plant, which has a first priority to convey SWP supplies. The availability to convey CVP supplies is rarely known at the time Reclamation makes the South of Delta CVP allocations in the spring. Because of this, JPOD is not typically relied upon when estimating fall deliveries nor is it incorporated into the allocation process. We further expect this to be the case with the CWF.

Decision to Convey CVP Water in the Fall vs Store Water in Upstream CVP Reservoirs

Generally, CVP San Luis operations include filling the reservoir in the fall, winter and early spring, and taking water out of the reservoir (to the low point) through the end of the irrigation season. A set carryover of supply (above the minimum storage) is not an objective for the CVP share of San Luis reservoir since the main purpose of the reservoir is to store Delta diversions in wet periods, and then to meet demands throughout the irrigation season.

The contract year for most CVP water service contracts run from March-February, which aligns with the beginning of the irrigation season, and not the Delta pumping pattern.

If there is capacity to more CVP water in the fall (that is not needed for Level 2 refuge deliveries), then this water would generally be stored in San Luis reservoir to contribute to filling for the following water year rather than being delivered to contribute to current year allocations outside of the typical irrigation season. Because fall diversions are mostly used to build supplies for the next contract year (and not to meet allocations in the current year), Reclamation would not ordinarily take additional water out of upstream storage beyond what is needed to meet instream flow needs or to meet flood pool requirements. Instead, Reclamation would maintain storage in the upstream reservoirs to maintain operational flexibility in the event the next water year was dry.

Moving Stored Water in the Fall

In the latter part of the water year, Reclamation begins to consider the potential risk of an upcoming drought. The next water year hydrology is never known as we come to an end of a current water year. Given the possibility of an upcoming drought in any year, Reclamation's philosophy has always been to minimize releases in the fall and prioritize upstream storage for the following year. With the addition of the CWF, we assume there will be a greater ability to 1) capture un-stored excess Delta flows in wet periods, and 2) convey stored water throughout the year with less risk of not delivering allocated water due to through-delta restrictions. As a result, prioritizing upstream storage in the fall (over increased Delta diversions) would likely be further emphasized once the CWF is operational. Given this flexibility, it is unlikely Reclamation would choose to move additional stored water in the fall with the CWF in place at the expense of overall upstream CVP storage.

Health and Safety Pumping Levels

Combined CVP-SWP Pumping rates below 1,500 cfs are difficult for the Projects to sustain in the long term due to a combination of certain contractor demands and physical constraints of the CVP and SWP facilities. Reclamation must maintain flow in the Delta Mendota Canal (DMC) to allow the City of Tracy the ability to divert water directly from the DMC. Reclamation typically meets this demand by operating one small pumping unit at Jones Pumping Plant continuously. Jones Pumping Plant has six pumping units with up to five operating at any time. The pumping capacities of the units vary from about 850 cfs to about 1,050 cfs. The small pumping unit used for continuous operations has a minimum design standard of 850 cfs.

MBK's modeling assumes a minimum monthly average pumping rate of 300 cfs, and assumes that rate can be maintained across successive months during drought periods. This kind of operation would require Reclamation to cycle the smallest pump to start and stop every day for an extended period of time. The pumps were originally designed for long-term operations with minimal starts and stops. And, in accordance with this design intent, Reclamation does not cycle the pumps under normal operations. Excessive starting and stopping of the pumps from cycling the units would greatly degrade the motors and windings of the pump unit and would reduce the reliability of the pump units, and ultimately would lead to lengthy and costly repairs. While cycling a pump unit for a short-term emergency variance may occur, this should not be considered as an option for a sustained operation.

For many reasons, DWR and Reclamation believe that the minimum health and safety diversion level at any one time will be a range, and we believe 1,500 cfs is a reasonable cap on that range for a monthly average value. Actual health and safety diversion levels will depend on a number of factors and should take into account not only the need to deliver water directly for drinking water, sanitation, and fire suppression purposes, but also the need to store water for blending purposes later for health and safety water quality considerations in the event that, without blending, Delta diversions become unusable later in the year. In addition, there are facility operational constraints.

MBK's modeling that portrays reduced health and safety needs is inconsistent with the long understanding that the minimum health and safety level for Delta pumping is a combined 1,500 cfs, as the water pumped at those levels is needed to satisfy the pumps' physical constraints, and, importantly, periodic refuge supplies off the DMC and San Luis Canal. An operation that assumes a minimum pumping of 300 cfs from Jones Pumping Plant for an extended period is impractical and is not consistent with safe operation of the facilities. As such, Reclamation would not operate the CVP in a manner that would require the pumping levels depicted in MBK's modeling.

Figures

1. Operational and Allocation Philosophy

Figure 1.1 – The steep drop in MBK NAA CVP NOD Ag delivery at around the 60% exceedance mark and the very low delivery levels above 80% indicate an extreme distribution of allocations that CVO does not consider reasonable. Reclamation will make more conservative allocations in all but the wettest years in an effort to reserve water supply for more reliable delivery through drought periods. The flatter blue lines in this plot reflect this philosophy.

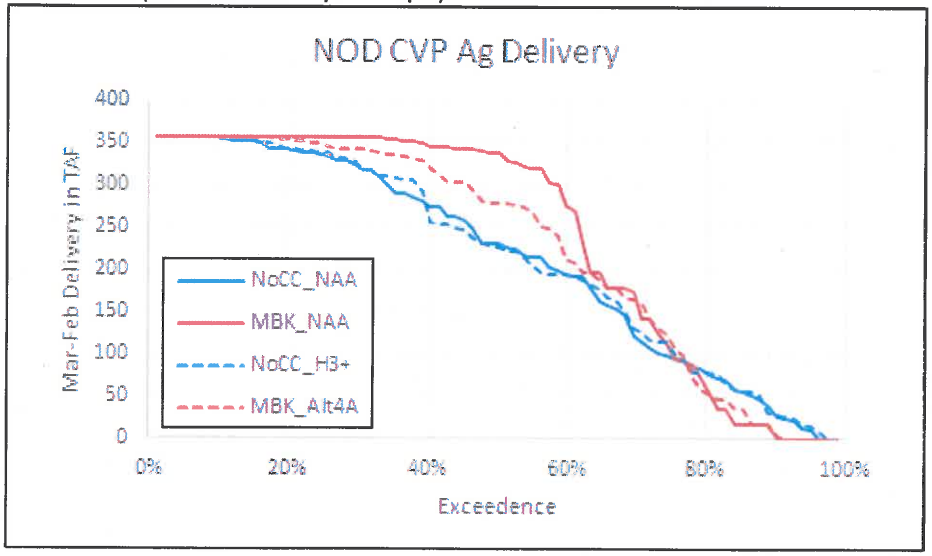
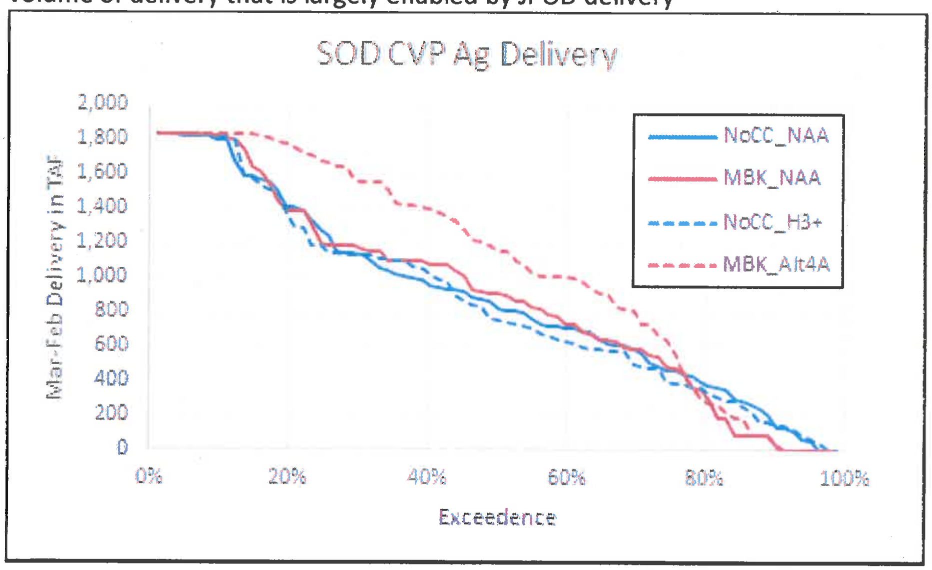


Figure 1.2 – The dramatic increase in SOD CVP Ag delivery with MBK's water fix scenario highlights the volume of delivery that is largely enabled by JPOD delivery



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Figures 1.3a and 1.3b offer additional perspectives on CVO and MBK's allocation decisions. These two scatter plots show final CVP SOD Allocation as a function of the system wide May 1 CVP storage condition and inflow forecasts. Both plots show that Petitioner modeling (blue dots) achieves at least limited delivery even under most of the driest conditions, and somewhat conservative allocations in wetter years when the system is recovering from past dry conditions or hedging against future need for stored water. Conversely, MBK modeling has numerous zero allocations in both studies and pushes WaterFix allocations aggressively in wetter years.

Figure 1.3a – No Action Alternative Results

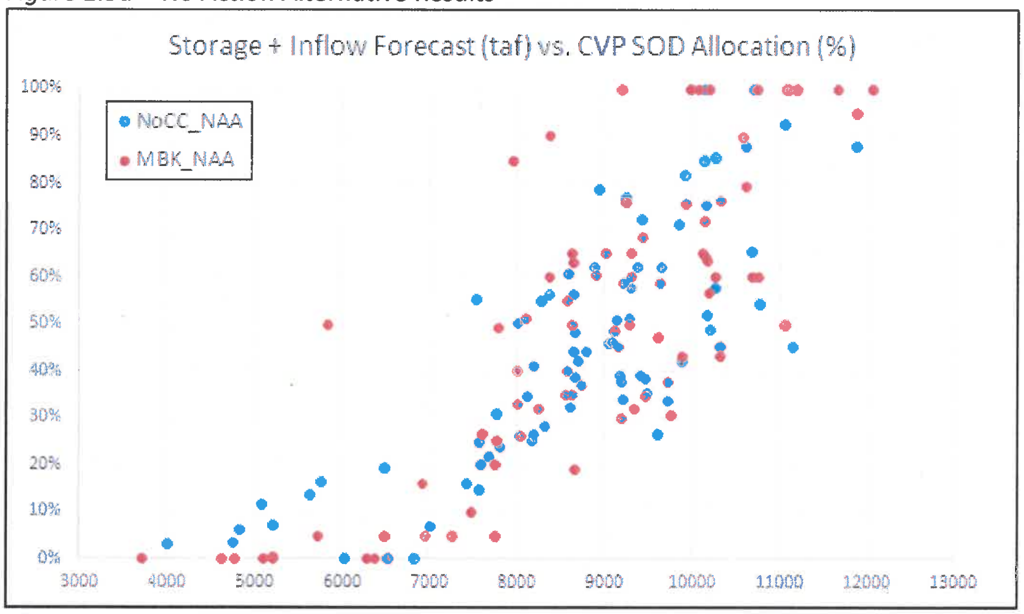
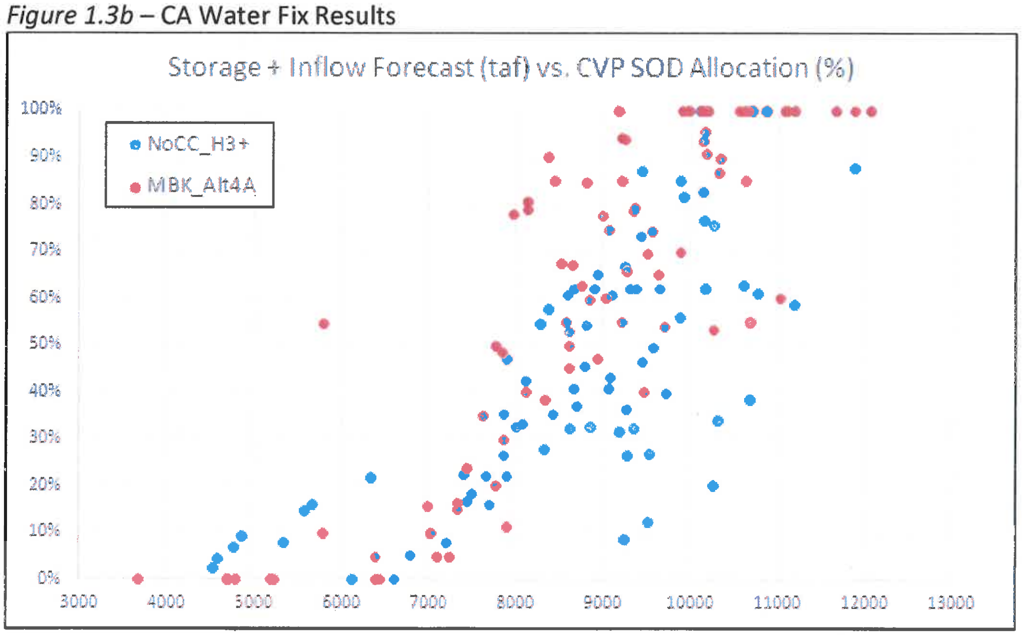
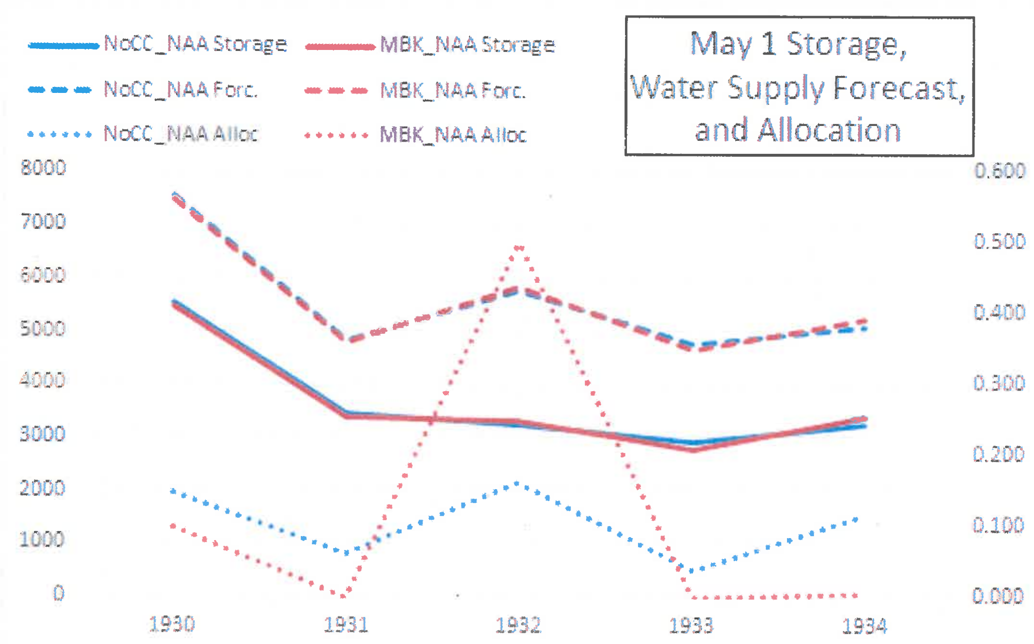


Figure 1.3b – CA Water Fix Results



Finally, a look at the sequence of 1931-1933 provides a good example of similar water supply conditions yielding inconsistent allocations in MBK modeling relative to Petitioners' modeling. Figure 1.4 illustrates that MBK's allocation has a jump in 1932 that is out of proportion to the slightly improved water supply forecast relative to the other years. This does not depict a consistent approach to allocation decisions. MBK was able to achieve this operation due to conditions that could not have been foreseen on May 1st through use of the iteratively trained export estimate time series.

Figure 1.4



2. Use of JPOD – Movement of Stored Water in the Fall

The plots in Figures 2.1a and 2.1b below show the extent to which MBK's water fix scenario relies on JPOD to achieve the operation they depict as more accurate. For an average increased Ag delivery of 185 taf/yr, 127 taf of that is increased JPOD export at Banks, of which 68 taf is direct delivery in July and August, which is not a reliable element of the CVP allocation process.

Figure 2.1a

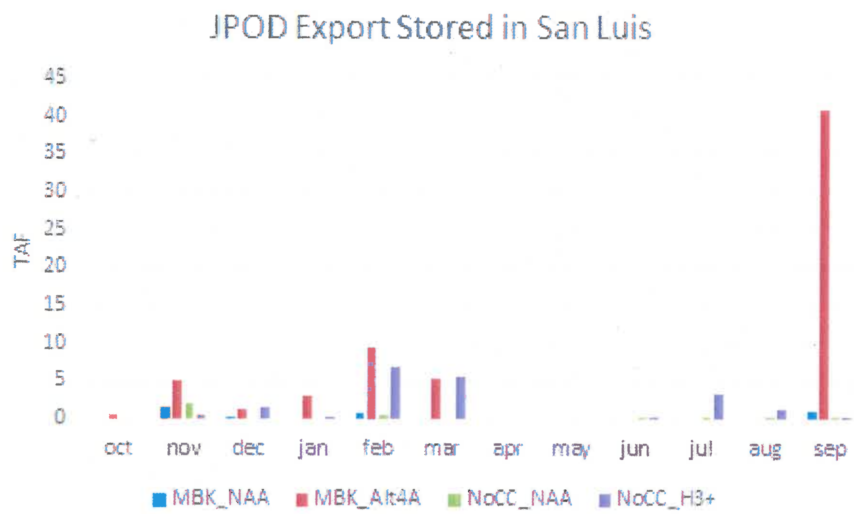
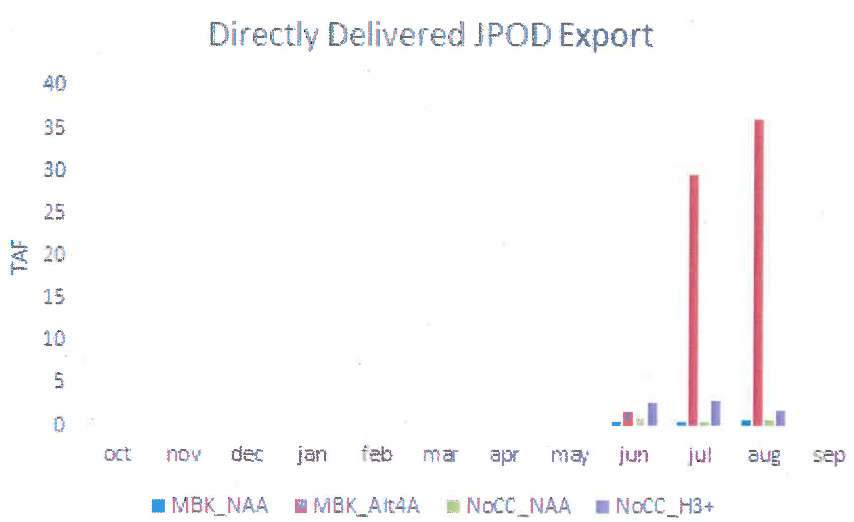


Figure 2.1b



3. Health and Safety Exports

Minimum pumping at Jones and Banks are implemented in petitioner's modeling as 800 cfs and 300 cfs respectively. This is not always possible under extreme conditions, so it is not a hard constraint in CalSim, and petitioner's modeling does have some instances with total exports less than 1100 cfs. MBK modeling set minimum exports at Jones to be 300 instead of 800 cfs, and results in more months below the 1100 cfs threshold.

Figure 3.1 – The blue lines in this plot demonstrate the effort which BA modeling makes to hold exports above 1100 cfs, while the red lines indicate the extent to which MBK's modeling relaxes export thresholds to achieve other means.

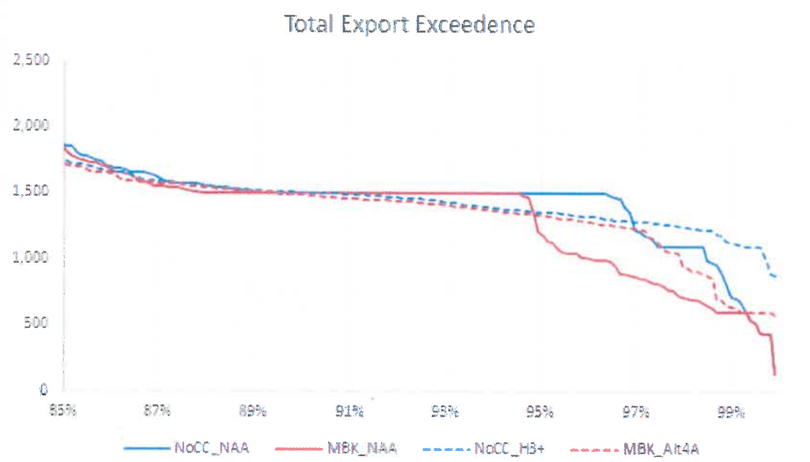


Figure 3.2 – While occasional instances of low exports are acceptable, repeated extended low export conditions are not. There were 12 years in the period of record with sequential months of total exports under 1100 cfs in MBK's no action alternative, and 6 years in MBK's water fix alternative. This operation does not comport with the long understanding of minimum health and safety export levels.

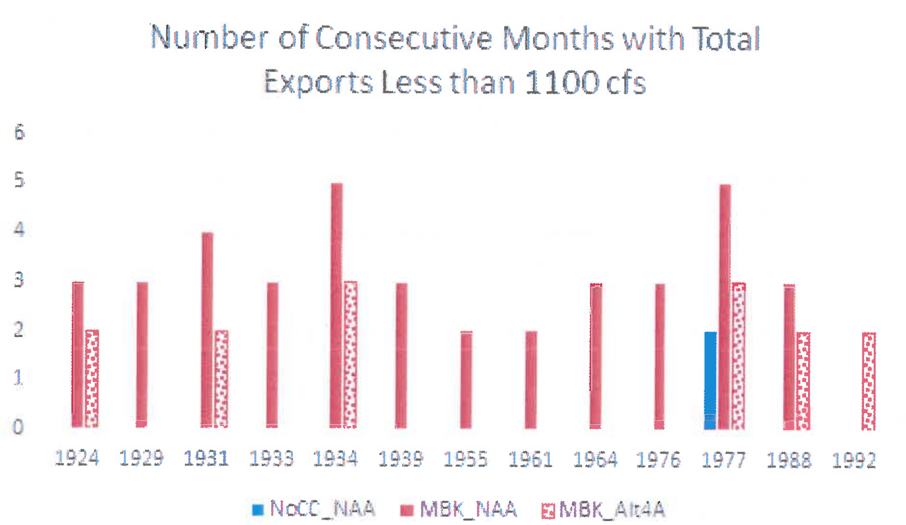


Figure 3.3 – This plot echoes Figure 3.1 but focuses on Jones Pumping alone. MBK modeling falls below 800 cfs with a greater frequency than in petitioner's modeling.

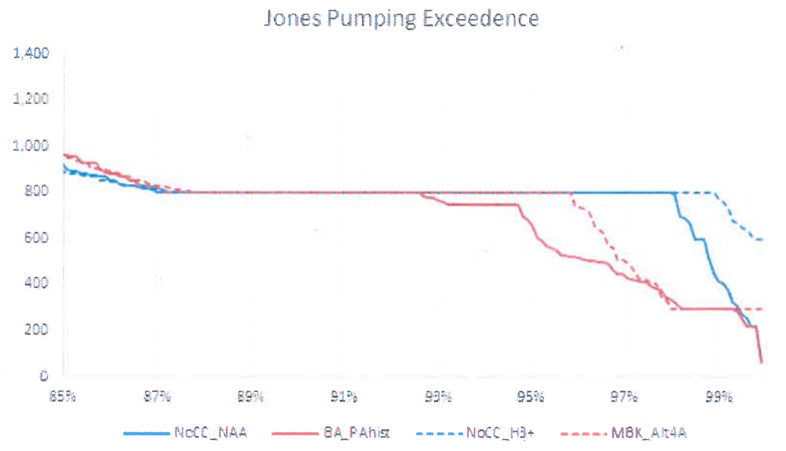


Figure 3.4 – This plot is similar to Figure 3.2, indicating years with multiple sequential months of Jones exports below 800 cfs. Years where successive April/May exports of exactly 750 cfs are not included in this count so as not to conflate the effects of pulse period and B2 constraints with minimum exports.

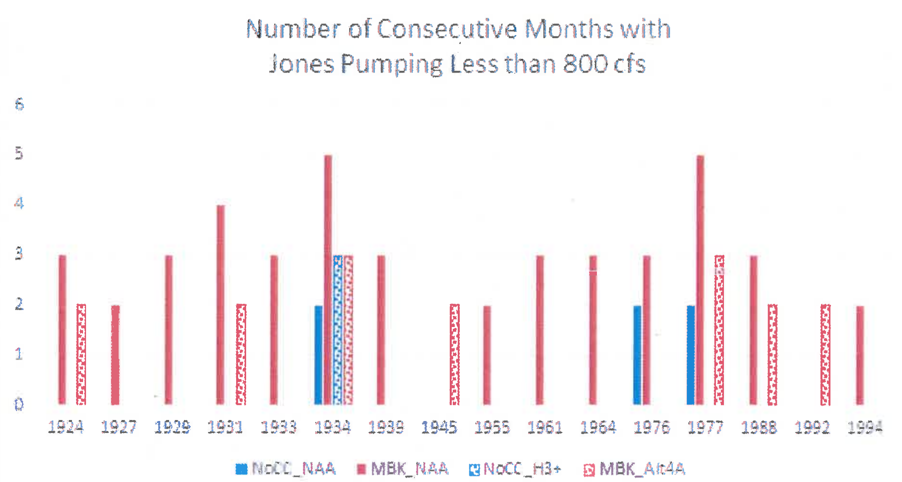


Table 3.1 – Summary of instances of low exports in MBK and Petitioner NoCC modeling

	# months with Total Export < 1100 cfs	# months with Jones Pumping < 800 cfs
NoCC_NAA	15	19
MBK_NAA	46	72
NoCC_H3+	3	10
MBK_Alt4A	24	42

MBK argues that recent historical operations do demonstrate extended low export levels.

> Mr. Bourez (Vol.20 115:1-9) "We made that change based on the pumping levels that occurred in 2014 and 2015. Historically, the model assumed 1500 CFS as public health and safety. And that was to run one unit at Jones and at Banks. And what's happened in the past two years is that public health and safety, those levels have gone below that. So we set it to the levels that we've seen in 2014/2015 operations."

As shown in Figure 5, actual exports did fall below 1500 cfs for 2 months in 2014 and 4 months in 2015, but the 1100 cfs threshold was only missed for a 3-month period in 2015. Given that 2015 had the lowest water supply on record and occurred following successive years of extreme drought, it is hard to justify extending this emergency operations to 12 other drier years in the historic period of record.

Figure 3.5 – water year 2014 and 2015 exports with health and safety thresholds