

**Hearing in the Matter of California Department of Water Resources and United States
Bureau of Reclamation**

Request for Change in Point of Diversion for California WaterFix

Testimony of Arve Sjovold

On Behalf of C-WIN

I, Arve R. Sjovold, do hereby declare:

I. INTRODUCTION

I am a retired research scientist. I have Bachelor of Arts degree in Physics from the University of California (1956) and have 41 years of experience as a practicing research scientist in the fields of rocket engine development, systems engineering, systems analysis, operations research, cost analysis, cost estimation, model development and model application. I retired with position of Chief Cost Scientist from the company of my last employment. A copy of statement of qualifications has been submitted as Exhibit C-WIN-1. In my testimony I explain the methods and findings used in the preparation of C-WIN's document, "THE UNAFFORDABLE AND UNSTAINABLE TWIN TUNNELS, WHY THE SANTA BARBARA EXPERIENCE MATTERS", presented as Exhibit C-WIN-3.

II. OVERVIEW OF TESTIMONY

The objective of C-WIN's investigation was to examine the impacts of the proposed Twin Tunnels/California Water Fix project, both costs and benefits, on the water districts of the South Coast of Santa Barbara County in particular and Santa Barbara County in general.

The Santa Barbara County Flood Control and Water Conservation District (SBCFCWCD) is a contractor to the SWP and has assigned rights to receive State Water under its contract to

certain water districts in the County. Central Coast Water Association (CCWA), a joint powers agency of those districts administers the contract in behalf of the SBFCWCD. The South Coast water districts comprise the City of Santa Barbara, Montecito Water District (MWD), Carpinteria Water District (CWD), and Goleta Water District (GWD) and all are at the end of the line of the delivery aqueduct and thus experience the greatest relative cost burdens.

The analysis assumes that the Twin Tunnels/California Water Fix is pursued as an element of the current SWP contracts and that allocation of costs and benefits will adhere to the requirements of those contracts.

III. C-WIN's FINDINGS

As a basis for evaluating the impacts we first analyzed the impacts demonstrated to date by the County's participation in the SWP. The C-WIN analysis finds:

- The present cost burdens of water districts' participation in the SWP commands up to $\frac{1}{4}$ of current water budgets whereas the costs of purchased water supplies historically were around 6%.
- To meet revenue demands in order to balance budgets water districts have raised rates and service charges, so much so that customer water bills are many fold higher than they were prior to the late 80s/early 90s drought. The increases in bills have been met with commensurate decreases in demand. (Santa Barbara city's "normal demand" following the drought and hook-up to SWP is now at least 3000 acre-ft/yr lower than before the drought.) Economic demand for water at the consumer level is now very elastic (that is, increases in costs are met with decreases in demand) which will pose difficulties if further increases on water district budgets become necessary.
- Episodes of drought only exacerbate this response. Having less water to sale decreases revenues to the districts, while at the same time supplemental water has

to be purchased on the spot market at exorbitant prices thereby adding to the budgets.

- When the decision was made to hook-up to the SWP in 1991, the prevailing view is that SWP water was for a reliable supplemental supply, especially in times of drought. The present drought has demonstrated the failure in this respect as the SWP was only able to allocate 5% of contract amounts in 2014, perhaps the worst of the drought years. The SWP under current operations can no longer be considered a reliable supply for the South Coast districts.

C-WIN has also examined current operations of the SWP to ascertain why it is unable to supply the promised deliveries under the contracts. We have done so because to date the Twin Tunnels/California Water Fix program has offered no indication of any changes in fundamental SWP operations. C-WIN's analysis begins with a revisit of Sacramento River Hydrology, which shows:

- The Water Year Index from which Water Year Type is derived and is used to guide operational decisions of the project has no scientific merit and should be discarded.
- Dry years, whether singly or in drought sequences, constitute 56% of the 98 year runoff record; wet years constitute 44%. There is no meaningful average or "normal" runoff.
- C-WIN has found a good indicator for whether an ensuing water year will likely be dry or wet, but that determination cannot be made until the end of January at the latest, according to our preliminary analysis. Operations of the SWP up to the end of January must respect the likelihood that the ensuing year will be dry.
- For these reasons, the dry year statistics must be used as the basis for calculating delivery reliability.

C-WIN has also analyzed the impacts of the proposed Twin Tunnels/California Water Fix project, both for costs and benefits. The information on both costs and benefits is sketchy at best. Planning and engineering for the project are only about 10% complete. There is much work to be done, nonetheless we have attempted some estimates. Only the Twin Tunnels part of the project has any meaningful description and preliminary data; other facets of the project have not been defined.

C-WIN's estimates of cost to South Coast Santa Barbara water districts begin with estimates of total construction cost as presented in the "Bay Delta Conservation Plan", March 2012. Escalated to 2017 dollars, the presumed start of construction, the construction cost is estimated at \$20.3 billion. To provide a reasonable, high estimate for construction this amount was doubled. An amortization schedule and interest rate were assumed to derive an average annual amortized cost and allowances for Operations and Maintenance (O&M) and "mitigation measures" were added. The details of these estimates are presented in an Appendix, C-WIN- 3.

The average annual cost was then allocated to SWP contractors assuming first that the allocations would be based on proportionate shares of contracted amounts, and, second, assuming costs would be based on proportionate shares of existing SWP construction costs. The allocations to SBCFCWCD under these two assumptions are 1.1% and 3.4%. The SBCFCWCD allocations are then further allocated to SB County water districts based on proportionate shares of contracted amounts. One other consideration was included in the analysis, the relative participation rates in the project between the CVP and the SWP.

The results of these allocations provides varying impacts on the South Coast water districts.

- Based on the low construction cost estimate, the budgetary impacts range from an additional 6% share for Santa Barbara to 14% for MWD.
- Based on the high construction cost estimate combined with the higher statewide allocation the budgetary impacts range from 18% for Santa Barbara to 36% for MWD.

- Combined shares for SWP and Twin Tunnels range from 21% for Santa Barbara at low construction costs to 64% for MWD
- All of these impacts are if the split between SWP and CVP is 55%/45%. The case where the SWP assumes all the construction costs was deemed too extreme for further consideration

The impacts for the City of Santa Maria were also calculated because its large subscription of SWP water makes it particularly vulnerable to the allocations cited here. Impacts on Santa Maria range from 18% to 48% for the low and high cases respectively. The combined SWP/Twin Tunnels impacts range from 54% to 71%.

C-WIN also studied the likely benefits that might accrue to the Twin Tunnels/California Water Fix project. If, as indicated by C-WIN's analysis in Appendix B of C-WIN-3 and as stated above, SWP reliability is really dependent on the dry year delivery performances for the SWP alone. If the Twin Tunnels is specifically devoted to delivering excess runoff to the South Delta in wet years, it can do little to nothing to improve reliability. If wet years in Northern California are correlated with wet years in Santa Barbara County, wet year deliveries from SWP are not as interesting since local sources are abundant under those circumstances. It is difficult to see what if any benefits will accrue to Santa Barbara County from this project.

IV. CONCLUDING REMARKS

The Twin Tunnels/California Water Fix project does claim that it will be a necessary hedge when and if there should be an earthquake in the Delta region causing the collapse of levies, which are necessary to maintain the integrity of the cross Delta transport of CVP and SWP waters. That too may be a limited benefit since a levy failure in a dry year would reduce deliveries to zero, not much different than has been recently experienced. If the levy failure should occur during a wet

year, again the South Coast water districts rely heavily on local sources such that an SWP failure of the sort imagined in the Twin Tunnels/California Water Fix is also not critical.

C-WIN's analyses show that the proposed project presents real affordability difficulties for the South Coast water districts. They also indicate that there will likely be little to no benefit, either in increased deliveries or in reliability. Whether these same findings are applicable to other SWP contractors depends on each of their particular circumstances. We can confidently conclude that the potential to Santa Barbara County for harm is substantial; the prospect for gain is almost nil.

C-WIN has also shown in Appendix B of C-WIN 3 that the Water Year Index used to guide regulations in the Delta and SWP operations, has no scientific merit. Because the Water Year Index is the basis for the designation for Water Year Types, the use of those designations in the model, CALSIM II, invalidates any use of CALSIM II until better characterizations of Sacramento River hydrology can be developed and validated. In turn, because CALSIM II is required to provide boundary values for the exercise of DSM2, the DWR model used to analyze salinity variations in the Delta, its results are also invalid. Also, DSM2 model results cannot purport to provide objective evaluations as long as it depends on an uncalibrated CALSIM II model. In addition, because SWRCB regulations use Water Year Type to set flow standards throughout the Delta, they too cannot purport to provide objectively derived requirements for flows.

Executed on 29th of August, 2016 in Santa Barbara, California



Arve R. Sjovold