MEMO

To: Stein Buer
Other CALFED Staff

From: David Fullerton

Subject: Status Reports on Technical Studies for the Storage and Conveyance Refinement Process

Date: March 25, 1997

I have a few comments to make on the system modeling chapter (DWRSIM runs on the dual facility). I may have additional comments to make on other sections as well, but haven't had a chance to review in detail yet.

I found the chapter very interesting and useful. However, I did have a few concerns which I would hope could be addressed in future status reports.

I. Balance

I am concerned about the choices that were made about what runs to make and what information to present. To be blunt, the chapter could be read as be read as showing a bias toward traditional DWR perspectives, rather than presenting the balanced approach symbolized by CALFED. This is not a major problem. But it does mean that there is a need for: (1) more explanatory language; (2) presentation of additional outputs; and (3) presentation of additional DWRSIM runs which make different operational assumptions. My alarm bells went off several times:

o The inclusion of South Delta Improvements (SDI) in most of the DWRSIM runs (including IF = 15 kcfs) requires explanation. As the size of the IF grows from 5 kcfs to 15 kcfs, it becomes less and less obvious that SDI provides additional benefits. I suspect that many people will be asking why it keeps appearing. We discussed this and you made three good points: (1) SDI provides for additional system flexibility for times when the IF might be closed for environmental purposes; (2) The SDI and be implemented much more quickly than the IF and could provide water supply and environmental benefits during the interim period at very low cost; and (3) you are trying to push the edge of the planning envelope here, not to look at a lot of intermediate points.

Still, I don't think that this answer will not satisfy everyone: (1) While SDI does provide for additional diversion flexibility, *that benefit will not show up in the modeling*. In order to see any benefit in the model, the operational rules and standards would need to be significantly altered. (2) The utility of SDI for an interim period is not relevant when we are modeling and IF. Rather the benefits of an SDI for the interim period would show up in model runs that *do not* include an IF. (3) If SDI does not have an impact on model results, how does its inclusion push the envelope?

I would recommend that SDI be taken out of the IF runs entirely. We can add it in later, if needed to provide for flexibility or for interim improvements. If it is too much trouble to go back, then runs for the 15 kcfs, 10 kcfs, and perhaps the 5 kcfs IF should be provided which do not include the SDI. Otherwise, this just looks like DWR is trying to promote its own project.

- The operational rules for the south Delta intakes were designed entirely around the desire for: (1) maximal drinking water quality benefits and (2) meeting South Delta water quality standards for agriculture. Thus, during the April/May period so critical for downmigrating San Joaquin salmon smolts, pumping in the south Delta would be at least 3 kcfs in order to protect South Delta water quality. But 3 kcfs is a high level of pumping for April/May, even now. The WQCP, the AFRP, and the biological opinions are all pushing Delta pumping below 3 kcfs in many years. Given the construction of new export and storage infrastructure, it is highly unlikely that people will stand for backsliding on these April/May conditions in the south Delta.

  Extending the 1 kcfs minimum requirement through May for at least some of the runs might help. Better yet, look at changing the April-May export requirement so that it is limited to 25% or 50% of Vernalis inflows.

- The DWRSIM assumption that SWP export demand is 4.2 MAF appears to promote the idea that CALFED is designed around meeting SWP contracts. This is not the case. If it is not the case, then the analysis should avoid giving a mistaken impression.

- Are we really estimating 2020 demand at 8 MAF (sum of SWP and CVP demands)? That implies an average pumping rate of 11 kcfs into the export canals. Such high levels will be very difficult to sustain for both alternatives 1 and 2. Given that pumping must be reduced for at least 30 days in April and May to protect San Joaquin salmon, we are looking at average pumping levels of at least 12 kcfs for all other periods just to meet demand. Alternatives 1 and 2 clearly cannot sustain this level of diversion without degrading environmental conditions. As I discuss in the next paragraph, I view supply and demand as linked. If we go with alternative 1 or 2, then demands of 8 maf will never develop. Rather, the demand management the enviros have been looking for will deal with the difference between supply and demand by default. Exporters will conserve, recycle, and reallocate what supplies they do have access to and the shortages projected by DWRSIM will be phantoms. This may or may not be the best overall solution. But the shortages which an 8 MAF demand level implies will never materialize. The bottom line is that supply and demand cannot be determined independently. There are two possible scenarios that require a response:

  1. For the case where demand is constrained by supply (but not price), as they would

be in alternatives 1 and 2, we should evaluate the equilibrium demand that would develop in response to available deliveries, then use this value in DWRSIM. We would also need to evaluate the cost of demand management measures which would be caused by the shortfall.

2. A more frightening scenario is one in which demand is limited by cost -- where the cost of facilities and ecosystem restoration raises the unit cost of water high enough that expected demand for water disappears. As an extreme case, consider what would happen if the CALFED Program costs $500 million/year and is paid for through a volumetric charge upon the urban exports from the Delta (2 MAF/year say). All of a sudden, the marginal cost of water would have jumped by $250/acre-foot. Now a new round of reclamation becomes cost effective, and water transfers from Kern and the WWD become irresistibly attractive to urban agencies. They continue to divert water, but at much reduced volumes. Now we are forced to raise the unit price of water again and the process repeats itself. MWD is experiencing this effect right now in the financing of its East Side Reservoir. There is every reason to believe that CALFED is susceptible to the same forces. There are several possible responses to this phenomenon: (1) Spread the burden of paying for the program widely to avoid major increases in costs to any one sector; (2) Use fixed charges to avoid huge hikes in the volume charge. However, the SWP experience with fixed charges has not been a happy one. (3) Calculate demand and supply simultaneously. If program costs are likely to suppress demand, then the size and cost of facilities should be scaled back until the supply and projected demand match.

- I see several places where there is an assumption that SWP may be the operator and sole supply beneficiary of new facilities. Page 18.I.D presents an SWP only option of the IF. Page 18.II.A.1 assumes that all storage is only for the purpose of meeting SWP requirements. Page 19.II.C.7 indicates that In Delta storage belongs to the SWP and is not subject to sharing with the CVP. Page 20.III.G indicates that SDGS recharge and extraction are functions of SWP delivery and Oroville storage. These assumptions will strike many readers as self serving. No decision has been made about institutional arrangements by CALFED. We simply don't know who will operate any facilities that might be built or how the benefits might be shared among partners. It may be that these kinds of assumptions are needed to make DWRSIM work right. If so, then there needs to be a very explicit disclaimer. If these assumptions are not necessary, then they should be expunged.

- The chapter focusses on shifts in project deliveries and doesn't include data that would allow people to see how important environmental parameters would be changed. For example, environmentalists are not simply interested in whether or not minimum X2 standards are being met, but in the actual projected changes in X2. Bruce Herbold (EPA) came up with list of outputs he thought should be included when DWRSIM runs are presented. Those outputs should be included from now on.

II. Old Issues

- I continue to feel that we need some way of analyzing how operations can influence raw water quality, not just at the south Delta pumping plants, but also at the Edmonston pumping plant (where Delta water is sent over the hill to southern California). As we have discussed, it may well be possible to segregate water of different quality in the export system so that urban deliveries are of the highest possible quality. If water quality ends up determining the minimum size of an IF or a through Delta facility, I don't want us to be in the position of recommending a size which is unnecessarily large, simply because we lack the analytical ability to develop an optimal set of operational rules.

- I continue to feel that we should analyze the possible supply and environmental benefits which would accrue from eliminating or reducing the navigational flow requirements in the upper Sacramento River. The requirements are left in place largely to avoid the need to lengthen a number of intakes in the river. It may well be worth the cost of extending those intakes if we can gain new flexibility on water releases.

- I continue to feel that we need some way of giving extra credit for solutions which provide for extra flexibility (e.g., solutions which allow for spacial or temporal shifting in diversions, solutions which provide the infrastructure which will allow a market to flourish). As I said earlier in my discussion of SDI, increased flexibility does not always show up in standard DWRSIM runs. One way to measure flexibility would be to create a more complex, real world set of operational rules such that more flexible solutions would score higher. This would be kind of like the computer programs that are created to test the speed of computers on real operating conditions.

  For example, the allowable diversions from the south Delta facilities and into an IF or through-Delta facility could be generated statistically, rather than simply set using year type. This would be a proxy for real time operations designed to protect fish. The statistics could mirror the actual historical frequency of the proximity of fish (or eggs etc.) to intakes -- so south Delta facilities might have one statistical description and an IF another. I am convinced that configurations with an IF, SDI, in Delta storage, etc. would perform much better in such a test than less flexible configurations. Without this kind of information, these key operational flexibility benefits are obscured.

  For transfers, we somehow need to estimate how much water could be moved through the system, assuming that there were buyers and sellers for the water. From a modeling

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perspective, I think that you could simply reduce upstream depletions during dry years (to simulate fallowing transfers) until export levels begin to max out. On the other hand, such a methodology might not be well received by upstream interests. Another way to do it would be to introduce magic water at either Shasta or Oroville during dry years and see how much of it could be moved through the Delta. This would give similar results, but would not be based directly upon fallowing. In this case, the IF would very likely show clear superiority over other approaches.

For security, why don't we simulate a series of export outages caused by earthquake. The program would cause an outage, with timing randomly selected by the program. We could estimate the length of the outage for purposes of Delta pumping based upon flow levels and storage levels. The length of outage for an IF and/or south of Delta aqueducts would be constant at some reasonable level. This test would favor alternatives which have south of Delta storage, eastern in Delta storage, and an IF(assuming that it could be brought back on line more quickly than the levee system.).

o On page 19.C.2, The rule that water cannot be put into storage in NDGS, NDSS, and IDS while water is being released to meet Delta In-Basin requirements seems overly conservative to me. Moving water out of on stream storage into off stream or groundwater storage is one of the most efficient ways to generate new useful water that we have. The most fundamental constraint on developing yield in this way is the need for sufficient storage in the on stream reservoir to assure adequate environmental and contractual flows and temperatures which cannot be served by other storage sites (e.g., right below the dam). If there is plenty of storage behind the dam, why not go ahead and fill up off stream sites if capacity is available? That is, the operational rules for filling up off stream and groundwater storage should be based upon projected on stream storage levels, not upon whether or not other releases are being made for Delta In-Basin needs.