OFFICE MEMO

TO: PARVIZ NADER	**DATE:** 11-19-01
	SUBJECT: Running DSM2 in Planning Mode Using Daily Varying Hydrology and Non-Repeating Tide
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DWR Delta Modeling Section uses Delta Simulation model (DSM2) to simulate the hydrodynamics (flow and stage) and water quality (often measured in terms of Electric Conductivity, EC) in the Sacramento San-Joaquin Delta. Traditionally, under a 'Planning' mode setup, the Delta Modeling Section conducts a 16-year simulation, covering water years 1976 to 1991 using monthly average hydrology rim input. The rationale behind the selection of this period was discussed in detail in the CALFED report ("Status Reports on Technical Studies for the Storage and Conveyance Refinement Process", August 1997). The monthly average hydrology input is obtained directly from the output of CALSIM (the Statewide Operation Model). To simplify the procedures the following approach had been introduced:

1- A repeating tide (which is based on the 19-year mean tide) was used as the stage boundary condition at Martinez with a 25-hour cycle (See Delta Modeling Section's 2001 Annual Report, Chapter 9).

2- A separate DSM2-Hydro run was completed for each month. During each run, the hydrology was kept constant. The model run continued until a condition of dynamic steady-state was achieved.

3- The results (flow, stage, etc) were saved in a tide file (25 hour long). These conditions were assumed to repeat every day for the entire month.

The main reasons for following this approach was to reduce the CPU time and storage requirements.

Standard outputs generated from these simulations included monthly average net flows, monthly minimum water surface levels and monthly average EC.

In Delta Storage was the first project that required specification of daily varying hydrology. As such, it was obvious that the current setup could not handle this. Starting from early summer 2001, Delta Modeling Section initiated efforts to implement a new approach allowing for daily variation of hydrology. The following is a list of major changes required to implement the new approach:

1- Since the hydrology changes daily, DSM2- Hydro will be used to run every day of every month. With this approach instead of individual model runs (one per month), the entire 16-year simulation will be conducted in a single run.

2- A non-repeating tide at Martinez will be used as the stage boundary, since there are no benefits to be gained from using the "repeating tide" (See Delta Modeling Section's 2001 Annual Report, Chapter 10).

3- Previously, gate operations were specified on a monthly time-scale. The new approach allows specification of gate operation on a daily time scale (or even smaller time-scale if needed).

There are distinct advantages for using the new approach. The major advantage is that the new approach simulates conditions as close as possible to the way they are specified. The non-repeating tide captures spring and neap tides, which was not possible when the repeating tide was used. In addition, a much more complex analysis can be made possible using the output. One can go beyond reporting the monthly average flows, ECs, and monthly minimum water levels. As a result, Delta Modeling Section plans to have a totally new (possibly statistically based) output system. This is expected to be an ever-evolving process.

Table 1 highlights the major differences between the new approach versus the traditional approach. More details will be provided in the Delta Modeling Section's 2002 annual report.

Table 1: Comparison between the new approach versus the traditional planning run setup

Item	Category	Monthly hydrology with repeating tide	Daily hydrology with non-repeating tide
1	CPU Time	Takes approximately 16 hrs to complete a DSM2 Hydro and Qual run	Takes approximately 32 hrs to complete a DSM2 Hydro and Qual run
2	Disk space requirement	Needs about 250MB for Hydro binary tide file and outputs	Needs about 4GB for Hydro binary tide file and outputs
3	Ease of Computation	Easy to design model input as each run is separate for each month of a given year	Complex, need to design the run and input for entire simulation period
4	Accuracy	Accurate in monthly time period scale Only predicted monthly average output has any value. Monthly extreme values are based on the repeating tide, and therefore provide information of little value Gate operation can only be monthly scale	Accurate in daily time period scale Since non-repeating tide is used, spring and neap tidal effects are modeled and therefore extreme value analysis is possible. Gate operation can be continuous with any time scale.