QUARTERLY PROGRAMMATIC REPORT

Component Project Title:
DSM2 Studies to Investigate the Use of Auxiliary Flow Pumps Across South Delta Flow Structures
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CALFED Project # **01-N61-??** (each PI to insert his/her project number)
Quarter Ending December 31, 2001

Deliverables

Name of Deliverable	Due Date	% of Work Complete	Date Deliverable Complete
Subtask 3.1 4.5-year hydrodynamic simulations to evaluate flows and water levels	Sep 30, 01	100	Nov 30, 01

(Due date reflects the date estimated prior to the revised scope of work. Additional Input set up and evaluative simulations were required to accommodate TAC and Alex Hildebrand suggestions)

Subtask 3.2 4.5-year water quality simulations to evaluate salinity regime	Sep 30, 01	100	Dec 31, 01

(Due date reflects the date estimated prior to the revised scope of work)

Subtask 3.4 Develop DSM2 boundary conditions for DO simulations	Oct 30, 01	90	Jan 10, 01

(Due date reflects the date estimated prior to the revised scope of work)

Subtask 3.5 Submit quarterly fiscal and Programmatic report	Dec 31, 01	100	Dec 31, 01
Subtask 3.6 Conduct DO simulations	Jan 31, 02	40	Jan 31, 02(Expected)
Task 4 Attend project meetings	Periodic	30	June 30, 02

Narrative

1. Revised DSM2 input was set up based on revised criteria recommended by Alex Hildebrand (see our memo dated 11/7/01). Simulations were performed to evaluate auxiliary pumping that would be necessary to create specified flows at DWSC. Additional simulations were conducted to evaluate the changes if the intake is moved to the proposed northern location and if the mode of intake operation were changed.

2. 4.5-year model runs (year 1996-2000) are proposed based on climate and DO data availability. 4.5 years of hydrodynamic and EC simulations were completed.

3. Projected expenses for each of the next three months in the following quarter (to assist in the timing of State bond sales which fund this project).

   Month 1 $ 10000 Month 2 $ 10000 Month 3 $ 4400 Total for quarter $ 24400

Budget Year: June 1, 2001 – June 30, 2002
Statement Quarter: December 31, 2001

Title:
Applicant:
CALFED Project Number:

Total Estimated Cost
Funding from CALFED:
Other Funding:

Total Project Estimated Completion Date:

		(Quarterly Budget)			(*Enter Current FY) Budget		
		Budget	Accrued Expenditures	Variance	Budget	Accrued Expenditures	Remaining Balance
Task 1:	*Develop Modeling Scenarios*	$0	$0	$0	$4760	$4760	$0
	100 % complete						
Task 2:	*Develop Estimates for the Auxiliary Pumping Rate* *100*	$0	$0	$0	$4760	$4760	$0
Task 3.1,3.2,3.3	Conduct and Evaluate Modeling Scenarios 25 (25% reflects remaining beyond 75% completed last quarter	$2970	$2970	$0	$12470	$12470	$0
Task 3.4,3.5	Develop boundary conditions for DO simulations 90	$2970	$2700	$270	$2970	$2700	$ 270
Task 3.6	Conduct DO simulations 40	$9310	$9310	0	$23170	$9310	$13860
Task 3.7,3.8,3.9	Submit draft report 0	0	0	0	$6530	0	$6530
Task 4	Attend Project Meetings etc. 30	$1600	$1600	0	$5340	$1600	$ 3740
Total:		**$16850**	**$16580**	**$270**	**$ 60000**	**$ 35600**	**$ 24400**

We budget at the subtask level only if active during the Quarter in question. If a subtask is complete, it rolls-up into the Task level.
Please explain significant variance from the quarter's estimated originally planned budget

QUARTERLY REPORT
DSM2 Studies to Investigate the Use of Auxiliary Flow
Pumps Across South Delta Flow Structures

Tasks 1 and 2 **Develop and Refine Modeling Study Scenarios and Assumptions and Develop a Reconnaissance-Level Estimate of the Pumping Rate Necessary to Create a Hydraulic Barrier at the Head of Old River (Revised)**

Original scope of work (SOW) called for analyzing four different barrier configuration:

I- Base Case- No South Delta flow control structures
II- Plan A- One Barrier Configuration (Head of Old River)
III- Plan B- Three Barrier Configuration (Grant Line Canal, Middle River, Old River)
IV- Plan C- Plan B with auxiliary pumping downstream of Grant Line Canal

Also all the analysis for task 2 centered around creating a hydraulic barrier at the head of Old River. Changes to SOW were proposed by Parviz Nader (based on ideas expressed by Mr. Alex Hildebrand) as follows:

1- Only two configurations will be analyzed:

Plan A - Three Barrier Configuration (Grant Line Canal, Middle River, Old River)
Plan B – Plan A with the addition of auxiliary pumping.

2- The objective for the auxiliary pumping changed from creating a hydraulic barrier at the head of Old River to meeting a flow target San Joaquin River downstream from Head of Old River.

The rationale for the change reflected in item 2 is as follows. On one hand, when San Joaquin River flow is around 3000 cfs, creation of a hydraulic barrier at the head of Old River would be unnecessary. On the other hand, when San Joaquin River flow drops to around 1000 cfs, creation of the hydraulic barrier at the head of Old River does not provide enough help to improve the dissolved oxygen issue in the Ship Channel.

At this point two flow targets at the San Joaquin River below the head of Old River were considered: a) 1500 cfs and b) 2500 cfs. Furthermore, it was assumed that the three barriers would be installed April through November. None of the model runs include the installation of the barrier at the head of Old River. The fundamental assumption is that with the inclusion of the three barriers and the auxiliary pumping at Grant Line, there would be no need for the head of Old River Barrier. A set of new runs were completed to determine the magnitude of the auxiliary pumping needed to achieve the flow targets. The previous estimate shown in Equation 2 in our last quarterly report is no longer applicable. Considering the area enclosed between the three barriers extending to the head of Old River and the San Joaquin River between Vernalis up to the head of Old River, conservation of mass requires:

$$Q_{Vernalis} + Q_{aux} + Q_{barrier} - Q_{chdep} = Q_{Target} \qquad (1)$$

Where
$Q_{Vernalis}$ = Flow in San Joaquin River at Vernalis (DSM2 boundary)

Q_{aux} = Amount of auxiliary pumping required at the Grant Line Canal Barrier site to achieve a flow target at the San Joaquin River below the head of Old River

$Q_{barrier}$ = Sum of gravity driven flows (net tidally averaged) through the barriers (+ for west to east).

Q_{chdep} = The sum of net channel depletion in the area bounded between east of the barriers and the head of Old River and the San Joaquin River between Vernalis and head Old River. This is different from the previous definition shown in the first quarterly report.

Q_{Target} = Flow target on San Joaquin River downstream from the head of Old River

Equation (1) can be solved for Q_{aux} :

$$Q_{aux} = Q_{Target} + Q_{chdep} - Q_{Vernalis} - Q_{barrier} \quad (2)$$

All the parameters appearing on the right side of the equation is user input with the exception of $Q_{barrier}$. Several DSM2 runs were conducted to get estimates for the term $Q_{barrier}$ for various hydrologic conditions. Model results indicated that for practically all the hydrologic conditions with $Q_{Target} > 1500$ cfs, the term $Q_{barrier}$ turns out to be a negligible amount. This is due to the fact that with the addition of auxiliary pumping, stage upstream (east) of the barriers is always greater than the stage downstream (even at high tide), thus stopping any natural gravity driven reverse flow. Thus equation (2) reduces to:

$$Q_{aux} = Q_{Target} + Q_{chdep} - Q_{Vernalis} \quad (3)$$

It should be noted that under high San Joaquin River flow ($Q_{Vernalis}$), equation (3) may lead to a negative number (+ , suggesting that in fact no auxiliary pumping is necessary to meet the target flow.

Tasks 3.1 and 3.2

Three sets of hydrodynamic runs covering July 1996 through September 2000 were completed for:

a) Base condition using hydrology based on historical conditions (No auxiliary pumping)
b) Alternative 1 auxiliary pumping based on Q_{Target} = 1500 cfs
c) Alternative 2 auxiliary pumping based on Q_{Target} = 2500 cfs

As mentioned above, it is also assumed that the three barriers are only operating April through November (auxiliary pumping only occurs during the months when all the three barriers are present). These runs were followed by three sets of water quality runs (EC based). A comparison of water quality results indicated that the addition of auxiliary pumping leads to water quality improvements mainly in the San Joaquin River from the head of Old River to the South Fork of Mokelumne River and to a lesser extent in the South Delta. All other areas showed little change. More details will be provided in the final report.

Task 3.4 Develop DSM2 boundary conditions for DO simulations

Water quality input for DSM2 included:

1. Regional Waste Control Facility (RWCF) Effluent data:

Five years of effluent data (1996-2000) were obtained from City of Stockton Municipal Utilities Department. Flow, BOD and temperature were available on approximately daily basis. The data for ammonia nitrogen were available at approximately every two days interval. These were interpolated to daily intervals. EC, organic nitrogen, nitrite nitrogen and nitrate nitrogen were available at approximately weekly intervals. These were also interpolated to daily intervals so that a regular (interval) DSS file could be generated. For most of these constituents, the values were sometimes given as "less than" some numbers. Approximations were made generally based on the values for the preceding and the following dates. These data were converted to DSS for use in DSM2. Data approximation and processing of the remaining constituents (DO, chlorophyll, organic phosphorus and dissolved phosphorus) is in progress.

2. Delta boundary conditions at Sacramento River at I Street, San Joaquin River at Vernalis and the seaward boundary at Martinez:

Processing of water quality data is nearly complete. Since the continuous data were not available at Vernalis, hourly values for temperature and DO from the nearby station at Mossdale will be used. Since the flows at Vernalis are primarily unidirectional, and the hydraulic residence time is relatively short, this assumption seems less critical.

3. Climate data:

Air temperature, wetbulb temperature, wind speed, cloud cover and atmospheric pressure, available from NOAA at hourly or 3-hourly intervals were processed and nearly complete for conversion to DSS. Electronic data were available only from July 1996, and for the most of 1996 these had to be approximated based on the daily maximum and minimum values. The details will be provided in the complete report.