PROGRESS REPORT
STORAGE AND CONVEYANCE
REFINEMENT PROCESS

BACKGROUND

Phase I of the CALFED Bay-Delta Program (Program) defines the program mission, objectives, and three general alternatives. The mission of the Program is to restore ecological health and improve water management for beneficial uses of the Bay-Delta system. The approach is to concurrently address problems in four resource areas:

- Water Supply Reliability (includes water use efficiency and water transfers)
- Water Quality
- Levee System Integrity, and
- Ecosystem Quality

The three alternatives developed in Phase I are differentiated by how they address the issues of Delta conveyance and type and amount of system storage.

The three concepts for Delta conveyance are:

- Alternative 1: More efficient use of the existing system of conveyance
- Alternative 2: Modified through-Delta conveyance
- Alternative 3: Dual conveyance using both through-Delta and isolated conveyance facilities

Each alternative includes varying configurations of system storage, including groundwater banking, in-lieu conjunctive use, and more surface storage capacity. These include storage upstream of the Delta on the tributaries of the San Joaquin River and Sacramento River systems, storage within the Delta itself, or storage connected to the SWP or CVP export aqueducts (historically referred to as south of Delta storage but for the purposes of this report referred to as aqueduct storage to differentiate it from storage on the San Joaquin River system).

CONSIDERATIONS FOR STORAGE AND CONVEYANCE DEVELOPMENT

The number of potential combinations of storage and conveyance facilities is too great to analyze each individually. Just as important, there is a wide range of operating rules for managing any new facilities. The challenge has been to find a reasonable number of configurations which can represent the range of options for evaluation at a programmatic level.

Phase II of CALFED Bay-Delta Program includes the following considerations that affect the storage and conveyance refinement process:

- **Component Refinement and Prefeasibility Analyses**. Sufficient analysis of conveyance concepts and potential storage sites must be completed to identify impractical and overly expensive options. In particular, over the long term, the alternative selection process must comply with Section 404(b)(1) of the Clean Water Act to the satisfaction of the Corps of Engineers and the EPA. This implies that in the short term, the storage and conveyance refinement process must comply with those requirements and that potential environmental impacts must be identified and given due consideration in the refinement and prefeasibility process.

- **Completion of the Programmatic EIR/EIS**. The EIR/EIS will include descriptions of potential impacts, define strategies for mitigation of those impacts, and document the selection of the preferred alternative. The alternatives will be defined in terms of general solution strategies and ranges of facility capacities. However, despite their programmatic nature, these ranges need to be founded on solid scientific and engineering information.

- **Collaborative Process**. CALFED agencies and stakeholders must have sufficient access to the process to be assured that the selected alternative is not only legally defensible, but generally meets the solution principles.

- **Focused Schedule**. All this work must move quickly, because the numerous technical, legal, biological, and institutional studies needed to complete the process become obsolete shortly after they are completed. Success can only be achieved by addressing all these challenges concurrently.

The remainder of this report summarizes the key elements of the refinement process and prefeasibility analysis which the Program designed to address the considerations and challenges outlined in the previous paragraphs.

SPECIFIC ELEMENTS OF THE PROCESS

Agency staff and stakeholders are involved in the process including model selection and selection of modeling assumptions.

Operating Concepts and Rules

Probably the most fundamental problem the Program faces is devising fair and reasonable operating concepts and rules for any new facilities. These rules will largely determine what resources will benefit from any new facilities, whether water supplies will be used to boost drought reliability or average annual water supplies. Concepts and rules for diversion or capture of flows for storage, as well as concepts and rules for release are intimately tied to Program visions for ecosystem restoration and Delta protective standards. The analysis process has been initiated by making some assumptions about concepts for diverting, releasing, and allocating water in the system. The key, though, is to fully explore the interactions of storage and conveyance components with the full range of CALFED goals. Input from the CALFED agencies and stakeholder community as to the appropriate range of operating concepts which will accomplish the goals is important to this process. The Program has been soliciting input on proposed operating concepts over the past six months and is incorporating them in the range of evaluations. These concepts will be refined into more specific operating rules as the process continues.

System Modeling

Any new facilities must fit into California's existing water management system. The Program can explore the effects of new facilities on water supplies, channel flows, reservoir elevations, by means of system modeling tools such as DWRSIM. This is a water accounting model, which estimates the storage and conveyance of water through the system, in accordance with all the concepts and rules devised to protect the Delta, instream flows, and water supplies. California's water management system is very complex, and so must be the model in order to be sufficiently realistic to be credible. As a result, it is a major effort to incorporate new facilities into the model in order to explore CALFED alternatives. Efforts to model the various potential CALFED storage and conveyance components using DWRSIM are underway.

Spreadsheet Post-Processing

Spreadsheet post-processing models are being used to do quicker evaluations to help guide the overall study effort. The spreadsheet models only work with unallocated water in the system. "Unallocated water" does not imply that the water is of no value to any of the beneficial uses including environmental; only that for a given month that there is more water in the system than is required to meet all existing mandated flow and water quality requirements plus water system operational needs. The spreadsheet models allow simulation of new facilities which can store and convey this water without really altering the operations of existing facilities. The Program

has been using spreadsheets to evaluate the potential benefits both to the environment and to consumptive uses of adding surface storage components to the existing system under a variety of operating assumptions.

Delta Simulation Modeling

DWRSIM and the spreadsheet models can only estimate in the broadest terms what their effects on conditions in the Delta might be. Detailed Delta modeling is required to evaluate the effects of various proposed conveyance and storage facilities along with proposed operating rules will have on flows, stages, velocities, salinities, and particle transport in the Delta.

The Program has begun the Delta simulation process by picking some representative time periods, without assuming any new facilities outside the Delta. The various proposed Delta conveyance components can then be compared in terms of general effects on tidal amplitudes, flows, and velocities. Later, as the list of Delta conveyance options is narrowed, the Program will integrate the modeling with proposed new facilities upstream and downstream of the Delta.

While advancing modeling of Delta conveyance alternatives, CALFED's modeling staff have also been working to improve the modeling tools themselves. In the fall of last year the U.S. Bureau of Reclamation and the U.S. Geological Survey raised concerns about the accuracy of the current Delta simulation modeling tool used by CALFED, DSM1. New, high quality velocity data has become available over the past several years, which indicated that instantaneous velocities in some channels were much higher than predicted by the model. They expressed concern that this could seriously affect the credibility of the model, which could be a key tool in the eventual selection of a CALFED Delta conveyance alternative. In response, the Program assembled a team of modelers, who have since been working to recalibrate the model, using both new velocity and channel geometry data.

Facilities Inventory

While the modeling efforts can conceptually show how new storage and conveyance might affect stream flows, the Delta, and water supplies, there is a need to also look at specific locations and opportunities for constructing facilities. Every potential dam, pump station, canal, or pipeline has its own particular pros and cons, costs, and impacts. The first step in sorting through all these issues is to develop an inventory of potential storage and conveyance facilities throughout the CALFED problem and solution areas. The Program has developed such an inventory, with about 100 different surface storage, conveyance, and groundwater storage or in-lieu conjunctive use facilities. The draft inventory is available for review and comment.

Having assembled this inventory, the Program will use a reasonable and systematic way to identify those potential projects which might be impractical or have excessive environmental impacts. As indicated earlier, such a process must satisfy regulatory requirements as well as meet CALFED objectives and solution principles. The Program has begun discussions with

Corps Regulatory staff regarding design of this process to meet 404(b)(1) requirements. This will require increasing levels of detail as the Program narrows the range of storage and conveyance options to a reasonable number for the EIR/EIS impact analysis.

Environmental studies

A preliminary review of potential environmental impacts of facilities construction, at a programmatic level of detail, will help in narrowing the number of options for impact analysis. At this point the Program is not conducting field studies; there are simply too many potential locations to make this practical. The review includes aerial photographs, previous reports, the Department of Fish and Game's Natural Diversity Data Base, and other published information. As a general rule, the harder you look at any given area, the higher the likelihood of finding resources of special significance. This means that the Program has to be somewhat cautious in interpreting the information, because the level of detail varies greatly from location to location, depending on how much interest there has been in the past.

Engineering Studies

Consistent and reliable engineering information upon which the Program can compare costs and evaluate practicality will be developed during the prefeasibility analysis (see paper on Phase II Technical Evaluations). The facilities inventory developed preliminary costs by simply indexing costs from previous studies, some of which are recent, others which are decades old. Given the need to progress, the Program will develop new engineering and cost data for the remaining projects so that the results will be fully comparable. The Program has selected some representative projects which approximate the ranges of potential capacities to simplify prefeasibility engineering and cost analyses for use in the Programmatic EIR/EIS. The opportunity to add to this list of representative projects remains as the Program narrows the range for impact analysis and receives comments from agencies, BDAC, and other stakeholders.

Groundwater Banking and In-Lieu Conjunctive Use

The potential for CALFED involvement in groundwater banking and in-lieu conjunctive use creates concerns for counties and for the local water agencies where the programs would be implemented. Although direct construction impacts are generally less than for surface storage facilities, there is a potential for affecting domestic wells, farm operations, stream flow, habitat, towns and cities. In direct response to local concerns to this issue, the Program's first priority is to listen carefully to concerns and interests and look for opportunities where there is local interest, the potential to combine local and statewide benefits, and to develop pilot programs which demonstrate that assurances can be established. The assurances must protect local interests while promoting common benefits to counties and local water agencies, hand-in-hand with system water supply reliability benefits.

IDENTIFICATION OF COMPONENT LINKAGES

Linkages can be divided into two categories:

Linkages which indicate adjustments in the four common programs to assure that all the proposed actions within each CALFED alternative are compatible. For example, the Delta conveyance component included within a particular alternative may offer specific opportunities for synergistic aquatic and terrestrial habitat enhancement.

Potential site specific and flow related benefits associated with construction of new facilities or changing operations of existing facilities. The preliminary environmental evaluations of individual facilities represent an effort to address these linkages. Additional, more comprehensive evaluations will be conducted as part of the programmatic EIR/EIS.

INITIAL STORAGE AND CONVEYANCE COMPONENTS

The Program will not be selecting storage and conveyance facilities with specific locations or sizes during the programmatic EIR/EIS evaluation. Rather, results will be described in terms of general solution approaches, with a range of capacities. However, those general solutions must be founded on comprehensive engineering, modeling, environmental, and cost evaluations. Therefore, the Program has defined the general solution approaches and ranges of capacities in terms of the configurations of each of the alternatives, assembled from components which are likely compatible with each other. They are not final alternative configurations. Rather, several configurations are suggested for each of the three CALFED alternatives in order to evaluate a reasonable range of facilities, costs, and impacts in the EIR/EIS. Additional studies will define more specific configurations within this range. ***When considering each of these configurations, please remember that each of these are combined with the ecosystem restoration program, the water quality program, the levee system integrity program, and the water use efficiency program.***

Storage and Conveyance Component of Alternative 1: Existing Delta

- **Configuration A.** Changes in Delta Operations
- **Configuration B.** State-of-the-Art CVP and SWP Screening Facilities plus Configuration 1A.
- **Configuration C.** 1.0 maf Upstream (Sacramento River Tributaries.) Storage plus Configuration 1B.

Storage and Conveyance Component of Alternative 2: Through-Delta Conveyance

- **Configuration A.** North Delta Channel Improvements with 10,000 cfs Screened Hood Intake and South Delta Channel Improvements with increased SWP Permitted Pumping Capacity

- **Configuration B.** Configuration 2A plus State-of-the-Art CVP and SWP Screening Facilities, CVP-SWP Intertie at Intakes, 2.0 maf Aqueduct Storage, 3.0 maf Upstream (Sacramento River Tributaries) Storage and 200 taf In-Delta Storage

- **Configuration C.** Three South Delta 15,000 cfs Isolated Intakes and CVP-SWP Intertie at Intakes (15,000 cfs total pumping capacity)

- **Configuration D.** East Delta Habitat and Conveyance Improvements Including 10,000 cfs Screened Hood Intake, New Clifton Court Forebay Gate, CVP-SWP Intertie at Intakes, and 2.0 maf Aqueduct Storage

- **Configuration E.** Tyler Island Habitat and East Delta Habitat, New Clifton Court Forebay Gate, CVP-SWP Intertie at Intakes, with 2.0 maf Aqueduct Storage, 3.0 maf Upstream (Sacramento River Tributaries.) Storage, 0.5 maf Upstream (San Joaquin River Tributaries) Storage

Storage and Conveyance Component of Alternative 3. Dual Transfer Conveyance

- **Configuration A.** 5,000 cfs Open Channel Isolated Conveyance with Screened Hood Intake, North Delta Floodway , and South Delta Channel Improvements (total conveyance capacity = 15,000 cfs)

- **Configuration B.** Configuration 3A plus CVP-SWP Intertie at Intakes, 3.0 maf Upstream (Sacramento River Tributaries.) Storage, 0.5 maf Upstream (San Joaquin River Tributaries.) Storage 2.0 maf Aqueduct Storage, and 200 taf In-Delta Storage

- **Configuration C.** Configuration 3A, Except 5000 cfs Isolated Pipeline Conveyance

- **Configuration D.** Configuration 3B, Except Isolated Pipeline

- **Configuration E.** Configuration 3B, except 15,000 cfs isolated

conveyance, (but no South Delta Channel Improvements)

- **Configuration F.** Chain of Lakes Conveyance with 10,000 cfs screened intake at Delta Cross Channel Plus Additional 5,000 cfs Capacity Intakes Distributed at Several Locations, North Delta Floodway, CVP-SWP Intertie at Intakes, 2.0 maf Aqueduct Storage and 3.0 maf Upstream (Sacramento River Tributaries.) Storage, 0.5 maf Upstream (San Joaquin River Tributaries) Storage

- **Configuration G.** 5000 cfs Screened Deep Water Ship Channel and West Delta Tunnel, North Delta Floodway, New Clifton Court Forebay Gate, Intertie at Intakes, 2.0 maf Aqueduct Storage, 3.0 maf Upstream (Sacramento River Tributaries.) Storage, 0.5 maf Upstream (San Joaquin River Tributaries.) Storage, and 200 taf In-Delta Storage

- **Configuration H.** Configuration 2D plus Configuration 3A including 5,000 cfs Open Channel Isolated Conveyance with Screened Hood Intake, North Delta Floodway , and South Delta Channel Improvements (total conveyance capacity = 15,000 cfs), East Delta Habitat with 10,000 cfs Screened Hood Intake, New Clifton Court Forebay Gate, CVP-SWP Intertie at Intakes, and 2.0 maf Aqueduct Storage