

Memorandum

Date : October 2, 1998

To : Naser J. Bateni, Chief
Northern District

From : Curt Babcock
Northern District
Department of Water Resources

Subject: Offstream Storage Investigation Water Quality

Introduction

This memorandum summarizes the work done through August 1998 to assess water quality for the Offstream Reservoir projects. The purpose of the water quality studies is to identify chemical constituents in potential reservoir source water that may impair or degrade reservoir water quality and adversely affect beneficial uses. Beneficial uses may include irrigation of agricultural crops, aquatic life habitat (in the reservoirs), and waterfowl habitat (where reservoir releases may be used as a supply for wildlife refuges or fall flooding of fields).

Streams and reservoirs that are tributaries or that may have diversions to the proposed reservoirs were selected for water quality assessment. Sampling locations were selected to be as close as possible to the proposed diversion sources or the proposed dam sites for those streams that would directly feed into a proposed reservoir. Streams and reservoirs selected for assessments include:

Sites-Colusa Reservoir

Direct Inflow	Diverted
Stone Corral Creek	Colusa Basin Drain
Funks Creek	Stony Creek below Black Butte Dam
Logan Creek	East Park Reservoir
Hunters Creek	Stony Creek at Stony Gorge Reservoir

Thomes-Newville Reservoir

Direct Inflow	Diverted
North Fork Stony Creek	Thomes Creek

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Red Bank Project

Direct Inflow	Diverted
Red Bank Creek	
North Fork Red Bank Creek	
South Fork Cottonwood Creek	

The Sacramento River, which may be a primary source of water for most of the potential reservoirs, was not selected for sampling since a great deal of water quality data already exists for this stream. In addition, an extensive water quality assessment of the Sacramento River has begun by the Sacramento River Watershed Program, of which the Department of Water Resources is a participant. This program is currently planning to conduct water quality assessments of the river for at least a two year period.

Methodology

Water samples from most of these potential reservoir water sources were collected monthly from September 1997 through May 1998. Most of the water sources that feed directly into the potential reservoirs flow seasonally. However, for streams that flow year-round directly into the potential reservoirs, data collected during September 1997 and May 1998 represent summer month low-flow conditions. Samples were collected at various flows since different flow regimes may have different water quality characteristics. Additional sampling will occur during the coming rainy season, in particular for Stone Corral, Hunters, and Logan creeks for which high flows were not sampled during the past winter. East Park Reservoir and Stony Creek below Black Butte Dam, which have recently been identified as potential water sources, also have not been sampled but will be included in future assessments.

Chemical parameters analyzed from the potential water sources include:

Minerals:

calcium	magnesium	sodium
potassium	chloride	sulfate
boron	total dissolved solids	

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Nutrients:

nitrate and nitrite
total phosphorus

ammonia

orthophosphate

Trace metals:

arsenic
chromium
lead
nickel
zinc

aluminum
copper
manganese
selenium

cadmium
iron
mercury
silver

Organic Chemicals (Colusa Basin Drain only):

herbicides
carbamates

purgeable organics
organic phosphorus pesticides

chlorinated organic pesticides

In addition, several water quality parameters were measured in the field. These parameters include:

dissolved oxygen
alkalinity
temperature (continuous data logger)

pH
turbidity

conductivity
total suspended solids

All samples were collected using procedures approved by the U.S. Environmental Protection Agency. Samples for trace metals were collected according to EPA method 1669 for analyses at U.S. EPA water quality criteria levels. Analyses for minerals and nutrients were analyzed at DWR's Bryte Chemical Laboratory. Trace metals were analyzed by Frontier Geosciences in Seattle, Washington. Organic chemical analyses were performed by BSK Laboratories in West Sacramento.

Water quality goals used to assess study results include the U.S. EPA proposed California Toxics Rule (CTR) Ambient Water Quality Criteria for freshwater aquatic life and Food and Agriculture Organization of the United Nations Water Quality for Agriculture.

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Results

The Colusa Basin Drain was sampled during January of 1998. The only organic contaminant detected was 2,4-D, a herbicide, at a concentration of 0.39 ug/L, which is well below the U.S. EPA drinking water maximum contaminant level of 70 ug/L.

Additional samples will be collected from the CBD during the coming winter corresponding to the proposed diversion period from November through April.

Some trace metals have been found which exceed the CTR criteria or agricultural goals from the streams that would feed the proposed Sites, Colusa, and Thomes-Newville reservoirs. However, most of the water for these reservoirs may consist of high quality Sacramento River diversions. The combining of high quality Sacramento River diversions with these tributary streams is expected to result in levels of trace metals that are below any criteria.

Nutrient levels in several of the tributaries also appear to be high in comparison to other streams. Nutrient levels are comparable to streams feeding eutrophic Clear Lake, where nutrients carried into the lake from streams have been identified as a contributing factor to the high algal productivity. However, as with trace metals, combining tributary flows with much larger quantities of Sacramento River water is expected to reduce total nutrient loads below levels that may cause high algal productivity.

Estimated reservoir water quality will be determined by weighting the proportion of water derived from the various stream or reservoir sources. Operation studies will be used to estimate the proportion of reservoir water from various sources and tributary flows. This information will then be used with the chemical analyses for various tributary flows and Sacramento River water quality data to estimate reservoir water quality.