Annual Water Quality Report

1999

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January 2000

I. Introduction

A. Requirements - This report follows the requirements of Engineering Regulation 1110-2-8154, entitled "Water Quality and Environmental Management for Corps Civil Works Projects". This regulation requires a summary of the water quality management program for the past fiscal year, and requires that the following items be addressed:

(1) Describe the goals and objectives of the overall water quality management program.
(2) Progress made toward meeting these goals and objectives.
(3) Activities that are planned for the out years.
(4) Changes in technical capabilities in the district office.
(5) Relationship between water quality and water control management activities.
(6) Pertinent division regulations.
(7) Laboratory facilities.
(8) Data management system.
(9) Training Obtained
(10) Training needs.
(11) A discussion of research and development needs.
(12) Special studies completed or required.
(13) Water quality coordination with other agencies.
(14) Scheduling for detailed project evaluations.
(15) Problems encountered with contracted work.
(16) Special assistance from other Corps elements or research facilities.
(17) A project-by-project summary of water quality conditions.
(18) Problems encountered and how addressed at each project.
(19) Opportunities identified and how addressed.
(20) Innovative techniques utilized to improve water quality.
(21) Action Items For The Lake Monitoring Program

B. Goals and Objectives – The goals and objectives of the water quality management program are to ensure that the US Army Corps of Engineer's projects in the planning, design, construction, and operation phases do not degrade water quality, so that the beneficial uses of the water can be achieved. This is achieved by having a water quality engineer participating in the Civil Works Process beginning from the Reconnaissance phase all the way to the Construction Phase. Critical involvement is in the middle phases when the feasibility and engineering work is being accomplished. A water quality engineer ensures that the Civil Works Process includes the application of monitoring programs, Best Management Practices, utilization of mathematical models, and the installation of mitigation devices where needed.

For the existing 12 lakes, the program goals in lake monitoring have been to establish baseline water quality conditions, to ensure that the lakes are protected against the entrance of undesirable nutrient and toxic loads, and to ensure that the water quality remains satisfactory to support the beneficial uses assigned to the lake and the downstream water.

C. Progress Made Toward Meeting The Goals and Objectives - During the planning, design, or construction stage of a typical project, a water quality engineer is usually involved in negotiating or reviewing the regulatory requirements such as the Waste Discharge Requirements (WDR) issued by the Regional Water Quality Control Board. If the regulatory requirements have already been established, the water quality engineer would issue a report evaluating the regulatory requirements and make recommendations to the Project Manager on specific steps necessary to ensure compliance. Some of these recommendations may include special environmental engineering to ensure water quality.

As an example, the Napa River Flood Control Project is a project which required the water quality engineer to issue three reports: (1) An Assessment Report of the Waste Discharge Requirements, (2) An Environmental Engineering Report proposing the use of Turbidity or Silt Curtains, and (3) A Report on the Recommended Best Management Practices to be employed to prevent Storm Water Pollution. Other projects usually involve Water Quality monitoring programs during construction. Monitoring data for both the background conditions and compliance downstream conditions are documented and the monitoring data is then reviewed by the water quality engineer. The data is then forwarded to the applicable regulatory agencies for proof of compliance. The water quality engineer resolves any non-compliance issue and this knowledge is applied on future projects in the planning phase to prevent a non-compliance problem from reoccurring.

For the Lake Monitoring Program, the baseline data has been established. The program will be progressing to address more site-specific problems such as mercury and MTBE that have been found in certain lakes.

D. Activities Planned For the Out-years - All of the current programs are expected to continue. Current planning for the existing annual lake water quality monitoring program is to start tailoring the program so that lakes which may start to experience problems have more monitoring done on them, while lakes with no apparent problems may have a reduced monitoring program. The data collected from the Sacramento Deep Water Ship Channel salinity monitoring program needs to be summarized and archived so that it is available for comparison to post-deepening data. The jet aerators in the Stockton Deep Water Ship Channel are expected to continue to be utilized during the fall salmon run. Sediment data in the Sacramento and San

Joaquin Deep Ship Channel are being documented and monitored to determine if there is any correlation between contaminant levels and hydrological data. Preliminary indications seem to imply that a hydrological wet or normal year should result in low contaminant levels while a hydrological dry year may result in elevated levels in the next following year after the hydrological dry year. If this correlation is confirmed, this will improve the planning process for maintenance dredging.

E. Changes in Technical Capabilities in the District Office - Technical capabilities continue to grow. There is more knowledge now on signal processing techniques for data analyses, on chemistry QA/QC activities for sampling, on acid mine drainage problems, and on wetland uses for water quality improvements. District knowledge is growing on groundwater treatment. The Internet is now becoming an important source of new information on water quality issues. The uploading of this Annual Water Quality Report on Sacramento District's WebPages also allows the sharing of water quality information. In 1999, one private contractor and two state agencies were directed to access the WebPages and they were impressed by the availability of the water quality data and its usefulness to their own water quality projects.

Due to turnover of key personnel, technical continuity binders are now being generated to retain corporate knowledge on water quality. The first technical continuity binder was generated in December 1999 at Sacramento District for maintenance dredging. The turnover binder is about 1-1/2 inches thick and consists of nine chapters, which includes the following:

Chapter A Overview of the Dredging Process in Sacramento District

Chapter B Historical Prospective

Chapter C Regulatory Requirements

Chapter D Test Methods Used for Dredging

Chapter E Water Quality Engineer's (Environmental Branch) Specific Responsibilities

Chapter F Points of Contact, Contractors, and Budget Information

Chapter G Contingencies and Future Development

Chapter H Supplemental Engineering Information

Chapter I FAQ (Includes recommended training)

The turnover binder for maintenance dredging includes or lists all vital documents and information in order to maintain continuity of water quality issues. More turnover binders are now being planned which will document water quality issues on Flood Control Projects, Lake Monitoring Program, and Bank Improvements Projects. The retention of corporation knowledge is considered an essential element in maintaining continuity and allowing the expansion of the current technical capabilities of Sacramento District.

F. Relationship Between Water Quality And Water Control Management Activities - The Water Quality activity is located within Environmental Engineering Branch, while the Water Control Management activity is located within Civil Design Branch. Personnel within the Environmental Engineering Branch are also involved in hazardous and toxic waste cleanup activities for DOD, EPA, and other federal agencies. Other Water Quality activity involvement include drinking water and wastewater treatment activities, in acid mine cleanup, and in Brownfield support. There is only occasional contact between the two activities as regards the Annual Water Quality Report. The Water Control Management activity writes a service contract for the U.S. Bureau of Reclamation to collect the water quality samples at the 12 Corps of

Engineer's Lakes. The Water Quality activity writes the contract specifications to the chemistry and biological laboratories, analyze the laboratory results, and then writes this report.

G. Pertinent Division Regulations - There are no pertinent South Pacific Division Regulations written at this time.

H. Laboratory Facilities - Private laboratories are utilized to perform the analyses. The chemistry laboratory selected has to be State-certified in the parameters being analyzed. For the biological analyses (phytoplankton), an algalogist at the University of California at Davis does the analyses.

I. Data Management System - The District does not have a data management system at this time. Data is simply stored in binders. The District is hopeful that it can start utilizing the EPA's national data storage and retrieval (STORET) system soon for this purpose, and is currently awaiting training for this.

J. Training Obtained -

a. **California Department of Water Resources Delta Simulation Model (DSM-2)** – This mathematical model simulates the water quality in the Sacramento-San Joaquin Delta. One District person attended this four-day training class.
b. **Bay-Delta Modeling Forum and Interagency Ecological Program Joint Annual Conference** – Four days of workshops, evening guest speakers, and poster session, held at Asilomar Conference Grounds.

c. **Bay Delta Modeling Forum Dam Removal Workshop** – One day workshop, with three–four District participants, and was related to the potential removal of the District's Daguirre Point Dam on the Yuba River.

d. **GIS User's Conference** - One week conference for one person in San Diego. Excellent introduction to how the District could use this very powerful tool to organize and visually display its water quality and dredging data.

e. **Corp's Dredge Essayons** – At the invitation of Frank Snitz of San Francisco District, a District water quality person was invited to board the ocean-going ship Essayons and watch its dredging of Richmond Harbor and its open water disposal at Alcatraz Island.

f. **Mine Tailings Conference** – One week conference for two persons at Colorado School of Mines. Training for cleanup of abandoned mines so as to improve downstream water quality.

K. Training Needs - The District personnel are obtaining the training needed. Training in the environmental effects of dredging, water quality mathematical modeling of rivers and lakes, chemistry procedures, GIS applications, and others are available and funded for. Future training will involve the use of the continuity manuals that are being developed.

L. Research and Development Needs - The District needs to develop its water quality Field Sampling Plan and its Quality Assurance Project Plan for the annual lake water quality monitoring program. A funding proposal was generated in January 2000 to initiate the development of these plans. Funding is not immediately available in Sacramento District for the development of these plans but the proposal will be reconsidered later this summer.

M. Special Studies Completed or Required - The District added the gasoline oxygenate MTBE (methly tertiary butyl ethylene) to its annual lake monitoring program, as this

recently has caused some local concern at one of the lakes. The concern is that jet skies may be putting this substance into the lakes in quantities that may affect the fish and the people who consume the fish. As indicated in the individual Lake reports, MBTE was found in detectable levels between 2 to 12 ug/L. As a result, MTBE monitoring will continue and may even expand on some of the Lakes that have a higher concentration relative to the other Lakes.

N. Water Quality Coordination With Other Agencies - The District maintained contact with the following agencies on water quality-related projects:

1. **CALFED** - This is a joint federal-state interagency group dedicated to preserving the environmental health of the San Francisco Bay-Delta system. The Sacramento District participates in the group's planning studies.

2. **Bay-Delta Modeling Forum** - The District is continuing to participate in this interagency voluntary group whose purpose is to encourage the peer review of mathematical models used in the San Francisco Bay, Delta, and Sacramento and San Joaquin Valleys. Another purpose is to sponsor workshops that pertain to hydrodynamic and water quality modeling. The Forum now has 19 institutional members, including the Corps, the USGS, the EPA, the USBR, and the State Water Resources Control Board. The Corps participates in the Forum because it has projects in the Delta, such as the two ship channels, the flood protection levees, the Long Term Management Study for the beneficial uses of dredged material, and the cooperation in the CALFED program, which occasionally require the use of mathematical models.

3. **National Ambient Water Quality Assessment Program** - The USGS has been tasked by Congress to select watersheds throughout the United States and perform rigorous analyses of water quality with the purpose of initiating a trend toward obtaining high quality data for 21st Century decisions. Three watersheds have been selected within the Sacrament District boundaries, these being the Sacramento River Basin, the San Joaquin - Tulare Basin, and the Carson River Basin. A liaison committee exists for each of these basin studies, and the Sacramento District sits on these committees.

4. **Lake Tahoe Water Quality Restoration Program** - The Sacramento District is preparing to become involved in this program, with the Lahonton Regional Water Quality Control Board as a sponsor. The District is participating along with such agencies such as the Tahoe Regional Planning Agency, the U.S. Geological Survey, the U.S. Forest Service, and the Universities of California and Nevada.

5. **Mexico Work** - The Sacramento District is working through the U.S. and Mexican embassies to obtain work in Mexico, some of which would be directed toward the cleanup of eutrophic lakes with severely impaired beneficial uses. The District intends to work with other Corps Districts to select the best teams for the job at hand, and to also utilize the Corps Waterways Experiment Station for some of this work. This work is currently on hold due to the political climate in Mexico. The US Embassy has recommended that solicitation for future work should wait until after the Mexican Election in July 2000.

6. **San Francisco Bay-Delta Circulation Studies** - The USGS is conducting a multi-agency study of circulation within and salinity intrusion into the bays and Delta. The District has loaned the USGS its six underwater S-4 computerized data loggers in support of this study. The resulting data will be of use to all agencies involved in restoring the environmental health to the fragile ecosystem, and to those agencies such as the Corps that have projects in the area.

O. Scheduling For Detailed Project Evaluations - Scheduling is currently underway for the water quality work that supports the Sacramento River bank protection work and the deep water ship channel dredging.

P. Problems Encountered With Contracted Work - No problems has been encountered.

Q. Special Assistance From Other Corps Elements Or Research Facilities - Assistance has been obtained from Waterways Experiment Station on mathematical modeling and dredging activities.

R. Project-By-Project Summary of Water Quality Conditions – These summaries for 1999 are attached in Section III.

S. Problems Encountered And How Addressed At Each Project –

1. **Maintenance Dredging -** It is becoming more difficult to meet the dredging water quality criteria as the regulatory agencies add more parameters and stricter numerical criteria to their Waste Discharge Requirements for dredging. A fate and transport model has been developed by the Port of Stockton which may eventually be used to predict the attenuation that can occur through the aquifer between the bottom of the dredged material disposal site and the nearest well or gaining stream. One desire of the District is to put its past sediment core data, modified elutriate test data, and bioassay results into easily read electronic format, so that data on new potential dredging projects can be compared to the existing data as serve as a basis for consideration by the regulatory agency in determining water quality impacts. Having the historic data easily accessible may also reduce the number of samples, which need to be collected in the future and thus reduce costs.

2. **Stockton Deep Water Ship Channel Permanent Deepening -** The Port of Stockton area of the San Joaquin River has been under a great deal of scrutiny in 1999, and will continue to be so for decades, if not centuries, to come. There are two reasons for this. One reason is the fact that the San Joaquin River is now on the nation's list of ten most endangered rivers. (The river has been described in the newspaper as the "lower colon of California".) The other reason is that the new national strategy of protecting the quality of water bodies by the "Total Maximum Daily Load" (TMDL) concept is now starting to be applied nationally. Using the TMDL criteria the San Joaquin River in the area of the Stockton Deep Water Ship Channel is classified as impaired in several parameters, including dissolved oxygen.

Dissolved oxygen is affected by the deepening of the ship channel. Thus a multi-agency TMDL task force has been formed to address the dissolved oxygen problems on the San Joaquin River. The reason that dissolved oxygen is such a large issue is that it blocks the passage of the anadromous salmon run up the San Joaquin River, and the San Joaquin River is the United State's southernmost river that supports a salmon run. Intensive efforts are being undertaken to reestablish this run (while many groups are even wondering whether the river can ever be saved, or is just to remain a gigantic agricultural drain and sewer for California's San Joaquin Valley wastes).

The involvement of the Sacramento District in the above scenario is in two areas. One area is that the last permanent deepening of the ship channel (1980's) is acknowledged to have reduced to a small extent the dissolved oxygen concentations in the river. The other area, and a beneficial one, is that to mitigate for the above small reduction in dissolved oxygen the District put in 16 jet aerators to aerate the river. These aerators are of much interest to the task force, which is starting to consider the utilization of more aerators to provide for additional mitigation for the dissolved oxygen deficit. This task force has contacted the District asking for knowledge gained in such applications. While the application of additional jet aerators may solve a portion of the problem, the problem is so extensive that waste loading into the river for over one hundred miles upstream of the Port are also going to have to be reduced.

The purpose of the above discussion is to give managers some indication of what lays ahead for the EIS and mitigation efforts if plans for further deepening of the ship channel come into being.

3. **Non-Attainment Zones –** The two Regional Water Quality Control Boards within the Sacramento District's area are being required by higher authority (i.e. Federal EPA) to disallow the use of mixing zones for any given parameter which does not now meet its required criteria. For example, if background concentrations of mercury, zinc, and cadmium in a river are below criteria, and the Corp's has a dredging project in the area, where the effluent has concentrations of these parameters above criteria, then the Corp's effluent can be disposed of into the river as long as the effluent is diluted to below criteria within the mixing zone allowed in the river. However, if the background concentration of copper in the river, for example, was above criteria, and if the effluent has concentrations of copper above criteria, then the effluent with its copper could not be disposed of into the river because it can only make the violation of copper go higher above criteria. This is a potential dilemma for future dredging projects, because then the only alternatives are to not dispose of the effluent back into the river but hold it in the confined disposal facility, or else treating the water in the confined disposal facility to remove the copper before the effluent is disposed of back into the river. Both of these mitigative methods are costly.

T. Opportunities Identified And How Addressed –

1. **Mexico Work -** An opportunity for marketing the services of the Corps exists in the potential Mexico work. Mexico would gain the benefits that could be provided by the Corps Waterways Experiment Station and handpicked District teams, and the Corps would gain additional skills on water quality techniques applicable to different environmental situations.

2. **Sacramento and San Joaquin River Basins Comprehensive Study** - There is an opportunity to use the results of this far-reaching study for future water quality predictions. The purpose of this study is to provide for flood control and ecosystem restoration on a watershed-wide scale throughout both the Sacramento and San Joaquin Valleys. Indirectly this study will impact water quality, through providing hydrodynamic mathematical models and related data that will provide information on the water velocity and water depths in hundreds of stream and river reaches throughout California. This study will affect water quality in that obtaining flow rates is the first step in being able to control and predict water quality. The extensive terrain data, hydrology, and flow rates obtained will allow for future predictions of water temperature, dissolved oxygen, nutrients, and algae growth when Corps projects are involved in those areas. For example, the terrain data collected have already been used to obtain channel cross-section data of the San Joaquin River that were used in a hydrodymanic model that will support a water quality model for that river. (The data being collected and the modeling being done make this project one of the largest data collection and modeling projects ever done west of the Mississippi River.)

The above efforts are being done by the Corp's Sacramento District and the California Reclamation Board, with about ten additional participating agencies, and the vast amount of data collected and models developed and calibrated will make this program an indispensable part of future water quality predictive work throughout the entire area. Most likely these data and models will provide input to much of the Total Maximum Daily Load (TMDL) work being started by the regulatory agencies. The District's Hydraulic Design Section is the repository of the data and models developed to date.

U. Innovative Techniques Utilized to Improve Water Quality - Two innovative techniques are currently being utilized by the District, as follows:

1. Jet Aeration System - Sixteen jet aeration nozzles mounted on two underwater manifolds are continuing to be utilized to input 300 pounds per day of dissolved oxygen into the San Joaquin River at the Port of Stockton during the Fall salmon run.

2. Signal Processing - Signal processing utilizing harmonic analysis with digital filtering is being used along with multi-dimensional data to determine how deepening the Sacramento Deep Water Ship Channel will affect the flow and salinity fields. The digital filtering essentially removes the tidal effects from the data and allows net flow and salinity effects to be seen over the vertical depth of the river. This knowledge for before- and after- deepening can be used to determine whether any mitigative effects might be needed for the channel deepening.

V. Action Items for the Lake Monitoring Program.

(1) Feedback from the Park Rangers will be requested this year (2000) to determine if there are any site specific water quality issues that should be addressed in future Lake Monitoring Reports.

(2) The Field Sampling Plan and the Quality Assurance Project Plan needs to be developed. The District is in the process of developing two SAP's, one for its ambient water quality monitoring programs and one for its dredging program. Each SAP would consist of a Field Sampling Plan and a Quality Assurance Project Plan. The Field Sampling Plans would be taken into the field by sampling crews and would describe the proper procedures to be used to obtain valid field data. The Quality Assurance Project Plans would be given to labs as they bid their projects and carried out their analyses, to ensure that legally defendable data is obtained. These SAP's would ensure that data collected by the District is valid data, and that it could confidentially be shared with and accepted by other agencies (sharing data is becoming more of a reality as agencies are being required to look at surface and ground water quality from a whole-watershed approach.)

(3) Fish tissue analyses will be accomplished for several lakes to check for mercury content.

(4) A Five Year Strategy Plan should be developed on how the Lake Monitoring Program should be managed in order to improve the planning process.

II. Projects in the Planning, Design, and Construction Phases

A. Lake Tahoe – The Tahoe Basin straddles the California and Nevada state line, about 85 miles northeast of Sacramento, California and 15 miles west of Carson City, Nevada. The Basin encompasses over 500 square miles and is comprised of Lake Tahoe and its 63 tributary watersheds. The Tahoe Basin ecosystem has been degraded by past and current human activities such as logging, grazing, stream channelization, road construction, recreational use, and urban development. The exceptional water clarity of Lake Tahoe is decreasing at a rate of about 1-foot per year due to accelerated inputs of nutrient and sediments. Other water resources and related problems in the Basin include lakeshore erosion, flooding along developed stream channels and lakeshore areas, aging wastewater infrastructure (threatening stream and lake water quality), and lack of public recreational access to the Lake Tahoe shoreline.

In June 1997, three multi-agency workshops were held in the Tahoe Basin focusing attention on water resources, transportation, forest health, and recreation and economic development problems and opportunities within the Basin. The Corps and Environmental Protection Agency (EPA) cohosted one workshop which focused on water quality and other water resource issues. The three workshops culminated in a highly successful visit by the President and Vice-President in July 1997. A key output of the Presidential visit was Executive Order 13057 which directed the EPA, and the Departments of Agriculture, Interior, Transportation, and Army to establish a Lake Tahoe Federal Interagency Partnership. The purpose of the Partnership is to ensure that Federal actions are coordinated and protect the extraordinary natural, recreational, and ecological resources in the Lake Tahoe Basin and the economies that depend on them.

The Sacramento District is currently involved in the following efforts within the Basin:

1. <u>Upper Truckee River Watershed Feasibility Study</u> - An expedited reconnaissance study was completed in July 1997, which focused on the Upper Truckee River watershed, the largest sub-watershed in the Tahoe Basin. Environmental problems and potential improvement plans, primary identified by local interests, were considered in the study, but was unable to provide the non-Federal share for feasibility-level studies. After continued coordination with other local authorities, the California Regional Water Quality Control Board (Board) has indicated a willingness to be the primary non-Federal sponsor. The District is working with the Board to develop a Project Study Plan for the feasibility phase.

2. <u>Supplemental Tahoe Basin Reconnaissance Study</u> - The 1998 Energy and Water Development Act (EWDA) included $750,000 to continue general investigations within the Tahoe Basin. The Sacramento District is using $100,000 of this appropriation to conduct a reconnaissance study to investigate environmental restoration opportunities in the remainder of the Basin (exclusive of the Upper Truckee River watershed). This study was initiated in January 1998 and the 905(b) analysis was completed in September 1998. Coordination in the basin indicated that additional work in the California watersheds was not currently feasible due to limited non-Federal funds. The primary focus of this study has been with the Nevada Department of Transportation, Douglas and Washoe Counties in the Nevada portion of the basin, and with the numerous Public Utility Districts around the lake.

3. <u>Upper Truckee River Aquatic Ecosystem Restoration Project</u> - The 1998 EWDA also included direction and funding to conduct an ecosystem restoration project under Section 206 of WRDA 96 in the Upper Truckee River Watershed. The City of South Lake Tahoe is the potential non-federal sponsor for the project. The California Tahoe Conservancy, the U.S. Forest Service, and the Tahoe Regional Planning Agency are also involved in development of this project. Preparation of a Preliminary Restoration Plan (PRP) describing the proposed restoration project was completed in August 1998. The next steps, an Ecosystem Restoration Report (ERR) and Plans and Specifications, are scheduled to be completed in fall 2000 with construction to begin during the following summer.

4. <u>There are a number of other proposed projects anticipated to begin in fiscal year 2000.</u> They include several Aquatic Ecosystem Restoration Project at Incline and Third Creeks, Neveda; at Edgewood Creek, Nevada and Blackwood Creek, California.

B. Napa River Flood Control Project – As a result of the Napa River Community Coalition Group the District changed its design to include a setback levee downstream of the city of Napa. This involves the relocation of 6,000 feet of railroad track. The existing track and surrounding area was inspected to determine whether there were any hazardous and toxic waste sites that might impair water quality. Also, the Waterways Experimental Station finished their water quality modeling work, using the Corps model CE-QUAL-W2

C. Bank Protection Projects Along the Sacramento and Feather Rivers - Bank protection work is being done at eight sites along the Sacramento River. Water Quality studies are being

done to determine if the construction of toe trenches at the bottom of the river banks or the placement of imported borrow material into the water will cause impaired water quality. If so, then mitigation methods will be decided on.

D. Stockton Deep Water Ship Channel - The jet aeration system, installed as a mitigative device for the permanent deepening of the Ship Channel, remains in operation to mitigate for dissolved oxygen in the San Joaquin River for the Fall salmon run. Sediment cores and modified elutriate tests have been run in preparation for the next dredging project.

E. Brownfield Projects - Work continues by the District's marketing personnel to relate Corps authorized studies, many of which can improve water quality conditions, to the nationwide Brownfield effort to restore slightly contaminated lands in the inner-cities so that industry and jobs will move there. The Salt Lake City Gateway project is such an example. The District has tied its aquatic restoration project into the Brownfield work there, with the intent to improve water quality in the city creeks, in the stormwater management ponds, and in the Jordan River. The Stockton Brownfield project is another example. Several events are going on in the same area there that can benefit from a coordinated action. The District is planning an aquatic restoration project near Mormon Slough to attract salmon into that area. The District is assisting the EPA in cleaning up an underwater Superfund site in Old Mormon slough that effects water quality. The City of Stockton has a Brownfield project along the river shores adjacent to both the salmon restoration site and the Superfund site. Some coordination has started to ensure that the net result of the actions tends to improve the water quality in the river there.

F. Lake Kaweah – It has been decided by the National Economic Development (NED) Plan to raise the Lake Kaweah spillway by 21 feet to provide flood control for Visalia and Farmersville. The non-Federal Sponsors are the Kaweah Delta Water Conservation District and Tulare and King Counties. This will have the effect of raising the thermocline (the sharp interface between warmer lake surface water and deeper colder water) by the same distance, and thereby provide for the availability of more volume of cold water during the summer. This will thereby expand the volume of the lake for a cold water fishery. It will also provide for releases of colder tailwater later in the summer as the thermocline drops due to lake releases, and thereby maintain a cooler downstream summer and fall water temperature.

G. Sacramento Deep Water Ship Channel – Meetings have occurred between the Port of Sacramento personnel and District personnel on reauthorization of the DWSC. The study for permanent deepening may be sponsored by the State of California, in addition to the Port of Sacramento. One question now is what additional studies have to be done to supplement the water quality studies done in the mid-1980's. The questions center around the sediment quality and potential wetlands development with the dredged sediment. The need for additional sediment cores, modified elutriate tests, and column settling tests, was addressed. An associated study is whether the Sacramento Lock should be re-operated so as to provide flushing flows in the dead-end channel to improve water quality there. Dye studies may be needed to address the question of flushing flows, and also to determine the mixing (and therefore dilution) that may occur from effluent being drained back into the ship channel from uplands confined disposal facilities.

H. Dam Removal – Several meetings were held on the potential removal of the Daguirre Point Dam on the Yuba River. (Dam removal is being considered for several dams in northern California for the purpose of restoring native fish runs in the rivers.) The District's main concern, and a very large one for this dam or any other sizeable dam, is what to do with any contaminated sediments that would be accumulated behind the dam. If, for example, there is mercury in the sediments, and there is 50,000 cubic yards of sediment, what could be done with that sediment? Would it have to be classified as a hazardous waste and hauled to an expensive hazardous waste landfill, could it be used for construction purposes if covered over, or could it be sluiced down the river?

I. Remedial Action of Mine Sites (RAMS) Program – The District is continuing to participate in the RAMS program for acid mine drainage cleanup in the western states. The South Pacific Division, Pacific Ocean Division, and Northwest Division are jointly participating in this program. One objective of this program is to protect downstream water quality in streams into which these mines are draining. The District is marketing in this effort, such as with the abandoned mines on U.S. Forest Service property. This program will involve the participation of geologists and water quality engineers in determining how to neutralize the massive tailings piles below the mines, to hydraulically seal the conduits within the mines, and how to put in remote treatment plants to treat the runoff water.

J. Guadalupe River Water Temperature Model – There was some concern over whether the spreadsheet mathematical model developed by Jones and Stokes Associates was adequate for predicting project effects upon water temperature. The District has a flood control project on the

Guadalupe River, and the river supports an anadromous fish run. The Waterways Experiment Station had thought it would be better to model the hydrodynamics of the river with a deterministic computer based model, and then to utilize the velocity and water depth determined from the hydrodynamic model as input into a deterministic water temperature model. This would have been a very adequate and rigorous approach to the predictions, but would have required the obtaining of channel cross-section geometry for a 40-mile reach of the river. After some discussion between the South Pacific Division representatives and the Sacramento District representatives, it was decided that the Jones and Stokes spreadsheet model was adequate for the predictions desired. This determination was made because substantial flow rate data had been obtained for the river, and Jones and Stokes had directly measured the corresponding river velocities and water depths in the field for given flow rates. This project really brought forth the continuing concern as to how much modeling is needed for the question that has to be answered.

III. Annual Lake Water Quality Monitoring Program

A. Parameters Being Monitored - The District samples the 12 lakes during the Spring and during the Summer. The Spring monitoring reflects the lake condition after it has received the bulk of the incoming nutrients, organic loads, and other contaminants that may have washed off of the watershed, and before thermal stratification sets in. Some Spring blooms of phytoplankton may already have occurred. The Summer monitoring reflects the lake condition during strong thermal stratification, after most of the organic decay has occurred toward the lake's bottom, and most of the Spring and Summer phytoplankton blooms have occurred. The parameters monitored and the locations are shown in the attached figure.

B. QA/QC Techniques - The District is in the process of incorporating more QA/QC techniques into the annual lake monitoring program, so that the methodology is comparable to the USGS's NAWQS program. This will then allow a multitude of agencies to share their data in the future with a feeling of confidence in support of better 21st Century decisions affecting water quality. QA/QC techniques will be built around a Field Sampling Plan and a Quality Assurance Project Plan.

1. <u>Field Sampling Plan</u> - The U.S. Bureau of Reclamation does the field sampling for the District. In their work they follow several protocols on field sampling, as follows:

- USGS Field Guide for Collecting Stream Quality Samples
- USGS ring binder entitled "Guide for Collection, Treatment, and Analysis of Water Samples, Western Region Field Manual, Sept. 1990.
- California Dept. of Water Resources, State Water Project Water Quality Field Manual, 1991.
- Various EPA protocols

The District is currently starting work on developing their own field manual which will incorporate the above by references but also take into account special needs of the District's program, such as the phytoplankton sampling program and field calibration techniques.

2. **Quality Assurance Project Plan** - The District is currently starting work on developing this plan. The guidance put out by the Corps entitled "Standard Guidance for the Preparation of Quality Assurance Project Plans" by Russell H. Plumb, dated November 1997, will be utilized. This document was developed specifically by the Waterways Experiment for Corps water quality programs, which cover such activities as sampling lakes and the water quality resulting from dredging activities. The requirements of this plan will be placed into future field sampling and chemistry laboratory contracts. Hopefully the District's Field Sampling Plan and Quality Assurance Project Plan will be finished this year and be available for view on the District's web site

C. Lake Annual Water Quality Reports for 1999

The following lakes have had reports written for them. These reports only contain the highlights or summaries of the complete report. The complete report for each lake is available from the District office and contains such additional information as QA/QC results with their Quality Control Summary Reports (QCSR's), complete laboratory analytical data results, and raw field data. They were not put into this summary report so as not to add too much bulk to this document.

D. Water Quality Results for 1999

The attached water quality reports provide details of the monitoring program. Two parameters of concern were identified on most of the Lakes:

(1) Detectable levels of MTBE were found to be between 2 and 12 ug/L. Generally, higher levels of MTBE was found in the Summer compared to the Spring. Since 1999 is the

first year of MTBE sampling, additional sampling will be accomplished in 2000 to determine if this is related to recreational activities during the Summer.

(2) Levels of dissolved mercury exceeded the fish criteria of 0.012 ug/L at the bottom of the Lakes during the Summer. No mercury data is available on the surface of the Lakes in the Summer of 1999. Additional sampling will be accomplished in 2000 for both top and bottom of the Lakes to determine if the elevated dissolved mercury levels is only at the bottom of the Lake during the Summer.

As discussed earlier in this report, fish tissue analysis is also being planned in the year 2000.

In 1999, severe dissolved oxygen depletion occurred at the bottom of some of the Lakes. Dissolved Oxygen depletion occurs when there is the natural decomposition of organic material. However, the dissolved oxygen depletion was more severe in 1999 compared to 1998. The levels of Dissolved Oxygen will continue to be monitored in 2000.

Other than dissolved mercury and MTBE, the Lake monitoring program did not detect any elevated levels of pesticides, PCBs, inorganics (other than dissolved mercury), organics, etc. that can be considered a parameter of concern.

The following Individual Lakes Reports are attached:

1. Black Butte Lake
2. Eastman Lake
3. Englebright Lake
4. Hensley Lake
5. Isabella Lake
6. Kaweah Lake

7. Martis Creek Lake

8. Mendocino Lake

9. New Hogan Lake

10. Pine Flat Lake

11. Sonoma Lake

12. Success Lake