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THE NEW MELONES PROJECT

A Review of Current Economic and Environmental Issues

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THE RESOURCES AGENCY
STATE OF CALIFORNIA

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INTRODUCTION

The remaining decisions regarding the future management of the Stanislaus River basin and the New Melones Reservoir Project are most complicated and important. The decisions must recognize the interdependence between future characteristics of the river basin and the pending decisions with respect to the Reservoir Project. New Melones has been controversial for many years and has gone through many changes during its 35 years of planning and development. Simultaneously, the Central Valley Project, of which New Melones is an integral part, has been a highly complicated and controversial system.

The fundamental decision with respect to New Melones is whether it should now be considered a complete project, or whether it should be expanded for additional project purposes. Both alternatives are possible; each carries its own benefits and costs. Resolution of the controversy is further complicated by a complex institutional structure of federal, state, local public and private participants, laws, decisions and policies.

In these critical times it is also important that the new Melones Project be the best project possible. The project will be seen as a reflection on advances in water resource development and management over the last few decades. Increasingly, the public is becoming aware of the limitations of our water resources and the importance of establishing long term priorities which meet societal needs at a justifiable cost to the public. At the same time, Proposition 13 related impacts are focusing critical public attention on taxpayer-supported projects. Perhaps more than ever, the public is skeptical

about whether public projects are fulfilling the public interest. Simply stated, the public is increasingly skeptical about investing public funds in projects that do not pay for themselves.

The combination of historical planning and development, numerous project changes, and changes in outlook and methodology have left major information gaps for determining the advantages and disadvantages of each of the New Melones alternatives in 1979. In some cases, data are old and obsolete; in other cases, the analyses either have not been performed or have used outdated analytic approaches. In only a few cases the analyses policy makers are using today current and accurate.

This report draws on that incomplete data base in order to make some observations about the management options currently available. The report itself is not exhaustive; it does not purport to be definitive. Rather, the report identifies some major problem areas indicated by the data available. Specifically, this report addresses issues currently before the California State Water Resources Control Board ("the Board") and the overall responsibility of the U.S. Department of the Interior, Bureau of Reclamation ("the Bureau").

The State Water Resources Control Board has jurisdiction over water storage behind the reservoir for purposes other than flood control. In its Decision 1422 of April 1973, the Board allowed storage behind the reservoir for fish and wildlife maintenance, water quality protection, satisfaction of prior rights, and flood control. This report addresses each of these matters.

While the questions of management for power, irrigation, and recreation are not immediately before the Board today, decisions made by the Board today affecting reservoir levels can significantly influence when and if such questions come before it. Furthermore, although management decisions of the various aspects of the project may be parceled out among several different agencies, the issues at stake are not logically separable. Therefore, this report also reviews the power, irrigation, and recreation aspects of the Project.

The report is organized as follows: (1) findings with respect to power, irrigation, and recreational aspects; (2) findings with respect to Decision 1422 on fisheries, water quality, prior rights, and flood control issues; (3) recommendations; (4) discussion of power aspects; (5) discussion of irrigation aspects; (6) discussion of recreation; and (7) discussion of Decision 1422.

Findings on Power, Irrigation, and Recreation

- o Power: Operating New Melones for its full hydroelectric potential will likely cause at least a $385 million financial drain on the Central Valley Project, which has already been operating at a deficit.

- o Power: Operated at full hydroelectric potential, the power produced would only be available abut 2 1/2 hours a day for a maximum of 265 days per year.

- o Power: It appears that the more water stored and released from New Melones reservoir for power purposes, the greater the annual operating deficit on the CVP.

- o Power: The low plant factor (10%) of the hydroelectric plant is lower than PG&E currently considers acceptable for its system (32%).

- o Power: The combination of Stanislaus River hydrology and release requirements for fisheries, water quality, prior rights, flood control, irrigation, and recreation will likely further reduce the dependable capacity and plant factor of the Project.

- o Power: Power sales from New Melones may not cover annual power operations, maintenance, and transmission costs.

- o Power: Additional study of the power function is necessary to address these findings more comprehensively. Existing data are inadequate for a thorough examination.

- o Irrigation: Neither a service area for irrigation water nor contracts for the water have been established. As a result, it is not possible to accurately estimate water service costs.

- o Irrigation: Operating New Melones for irrigation purposes will likely result in a subsidy to the water users from the general public of $571 million over the 50 year repayment period.

- o Irrigation: In order to recapture construction costs allocated to irrigation plus annual operations, maintenance, and delivery costs the Bureau would have to charge substantially more for water than any existing CVP contract. Similarly, the Bureau would have to charge the grower a price equal to about twice the grower's cost of pumping groundwater.

- o Irrigation: It is unlikely a firm yield of 200,000 acre-feet of irrigation water per year could be provided from the reservoir. This would simultaneously increases the per unit cost of the water while making it less attractive to growers.

- o Irrigation: It is unlikely that New Melones irrigation water would be used entirely on lands currently not irrigated. This simultaneously lowers the value of the water to the grower and to society.

- o Irrigation: Changes in crop patterns could result from availability of additional irrigation water from New Melones, which would both aggravate water supply conditions in dry years and inhibit agricultural water conservation.

- o Irrigation: Additional study is needed to examine these findings with respect to the irrigation function with current data under current conditions.

- o Recreation: Analysis of recreational opportunities on the Stanislaus River and New Melones reservoir suggests recreational benefits can be maximized with a 3,320 acre reservoir.

- o Recreation: The Bureau's recreational use estimates of the New Melones reservoir are overly optimistic; they do not reflect actual local experience or the impact of having several comparable reservoirs in the same local area.

- o Recreation: The recreational analyses of alternative reservior sizes has not been consistent across each of the alternatives. This prevents comparison among the alternatives.

- o Recreation: Additional study of the recreation function is necessary to develop consistency among the alternatives with current data according to the most recent Water Resource Council Principles and Standards.

Findings on Decision 1422 Issues

- Fisheries: It is possible that desired temperature and stream-flow conditions for salmon can be obtained at any of the 300,000, 440,000 and 620,000 acre-foot storage alternatives.

- Fisheries: Maintenance of native salmon populations is dependent on streamflow and temperature which, in turn, depend on the reservoir operations plan and specific decision rules of the reservoir operator. A bigger reservoir is not necessarily better.

- Fisheries: More carefully designed Bureau of Reclamation operational studies are needed to provide the information to determine optimal releases for maintaining fish populations. The Bureau contention that its release schedule is not subject to adjustment prevents meaningful analysis.

- Fisheries: During dry and critical years it appears the salmon fishery will suffer some losses at any reservoir size.

- Water quality: The data used for earlier estimates of water quality requirements are outdated and inadequate. The Bureau has more recent data which could ba analyzed for a current assessment of water quality requirements.

- o Water quality: Capping the Tuolumne gas wells in 1977 should lead to a significant improvement in the San Joaquin River.

- o Water quality: The effect of capping the gas wells on water quality releases from New Melones during normal and dry years has not been analyzed by the Bureau and could easily be incorporated.

- o Prior rights: Provision for 93,000 acre-feet of active storage in addition to the 107,000 acre-feet actually stored behind Old Melones dam as prior rights is unreasonable in light of the Board's decision to recognize existing beneficial uses of the water upstream.

- o Prior rights: Recognition of water rights for prior water uses unrelated to the Stanislaus River, such as groundwater pumping, is unreasonable particularly if groundwater pumping by the local districts continues at the same rate.

- o Prior rights: Determination of reasonable and beneficial water needs based on a 4-5 acre-foot per acre consumptive use of water ignores the lessons of recent progress in agricultural water conservation techniques.

- o Flood control: The New Melones project authorized by Congress in 1962 provided for a maximum downstream flood flow of 8,000 cfs. The Corps has stated that it will release a maximum of only 3,500 cfs until the reservoir reaches 1,970,000 acre-feet, which may never occur.

- Flood control: Seventeen years after project authorization, the federal government has still not acted to acquire the necessary flood easements below the dam.

- Flood control: It is possible to draw the conservation pool of the reservoir down in the fall and winter to create storage capacity for flood flows; the amount would depend on fish, water quality and prior rights releases.

- General: During the period in which the Supplemental Environmental Impact Statement is being prepared and contracts for water and power are being negotiated, additional study should be directed at updating or filling in the missing data and analyses identified in this report. Proper use of resources, the fiscal integrity of the CVP, sound business principles, and the burdens on the general taxpayer can only be served by developing the best available information before making the remaining decisions.

- Power, Irrigation, Recreation and Flood Control: Congress should completely reexamine the New Melones project. This reexamination should include careful systematic evaluation of overall economics, subsidies, and financial impact on the CVP system for each of the alternatives using current and consistent data. Despite the often stated notion that it makes economic sense to fill the reservoir, it is not at all clear which version of the project will best serve the interests of the broad public. There are gains and losses with each alternative:

  -- At least same power can be generated at each reservoir size.

  -- At least some irrigation water can be provided at each reservoir size.

  -- Recreation benefits change dramatically at each reservoir size.

  -- Flood protection can be provided at each reservoir size.

o Decision 1422: We recommend the State Water Resources Control Board maintain the reservoir at elevation 808. A reasonable interpretation of pertinent data, stipulations as to prior water rights, and the requirements of California law demonstrates Decision 1422 can be satisfied with a 326,000 acre-foot reservoir.

-- The preliminary data show that the differences in the impacts on the salmon fishery between the different reservoir sizes and operations studied is unknown and that additional studies are needed.

-- Management for the salmon fishery may be possible with a 326,000 acre-foot reservoir, since Decision 1422 would not allow releases for power and irrigation that would compete with fishery releases.

-- Normal year releases of 98,000 acre-feet with dry and critical year releases of 69,000 and 45,000 acre-feet, respectively, may be able to meet the objectives of Decision 1422.

-- The data suggest that water quality, flood control, and a reasonable interpretation of prior rights may be met with a 326,000 acre-foot reservoir.

The original language on this page has been corrected in this printing to be consistent with the findings presented on page 8 and pages 43 to 46. Those findings show that additional studies will be required before definitive conclusions can be made on the impacts of various reservoir sizes and operations on the salmon fishery.

Hydroelectric Power

This section finds: (a) Operation of New Melones for full power production will cause at least a $385 million drain on the already distressed CVP system, (b) the usability of the power to meet peak load requirements of potential customers is questionable, and, (c) the costs of producing and delivering New Melones power are likely to be greater than the revenues.

Background

In 1962 Congress approved the New Melones Project with an installed hydroelectric capacity of 150 MW.(1) This was subsequently increased under the discretionary authority of the Secretary of the Army to 300 MW and the costs of the specific power installed features such as turbines, generators and penstocks now amount to about 22 percent of the total Project cost. All Project costs allocated to power (which includes part of the cost of building the dam itself) add up to about 31 percent of total Project cost.(2)

The hydroelectric plant constructed at the New Melones Dam is such that the power produced would be for peaking purposes. The plant has an annual capacity factor rating of ten percent, which generally means that the plant will only operate approximately ten percent of the time. Typically, the reservoir would store water and the releases from the dam through the power plant are for short intervals--2 to 2 1/2 hours a day during peak load periods. Furthermore, the useable capacity of the power plant will likely be

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(1) U.S. Army Corps of Engineers, House Document 453, June 15, 1962, page 32.
(2) U.S. Army Corps of Engineers, "New Melones Lake 1978 Cost Allocation", worksheets, December 12, 1978.

further constrained due to release requirements for fisheries, flood control, water quality, prior rights, irrigation contracts and recreation.

"The New Melones Project will be operationally and financially integrated into the CVP power system and will be operated on a peaking basis."(3) Thus, any effort to analyze the impact of the Project must analyze it in the context of the entire CVP. Three analyses follow: (1) financial impact on the CVP System of New Melones power, (2) useability of the power produced to meet potential customer peak load requirements, and, (3) an analysis of the unit costs and revenues of New Melones power.

Financial Impact on the CVP System of New Melones -- CVP System Deficits Aggravated

A careful, systematic, analysis of the financial impact of adding the New Melones Power Project on the CVP system has apparently not been performed. Furthermore, no analysis was found which incorporated changes in Project design to increase the installed capacity by 150,000 kw, the usability of the high degree of peaking power, a forecast of the preference agency power requirements, or water management for fisheries, water quality, flood control, prior rights, irrigation, and recreation. Currently the CVP is operating in the red. Historically, CVP has been unsuccessful in raising power rates once contracts have been signed. The Director of Audit and Investigation reported that even proposed power rate increases probably would not be great enough to eliminate the current CVP deficit.(4)

(3) U.S. Army Corps of Engineers, "Design Memorandum No. 10, New Melones Reservoir, General Design", page 26.
(4) U.S. Department of the Interior, Director of Audit and Investigatin, "Report on Audit of the Central VAlley Project, Bureau of Reclamation", January 31, 1978.

Reclamation laws and administrative regulations specify that certain CVP project costs, both investment costs and operation and maintenance costs, allocated to irrigation, other water uses, and power are to be paid by the respective user. Law also provides that revenues derived from the sale of hydroelectric power may be used to repay certain CVP system costs allocated to irrigation. As of January 1, 1977, the estimated reimbursable costs of the CVP comprised $3.6 billion of authorized and completed CVP projects.(5) The Department of the Interior's audit also reported: "if the proposed rates remain in effect throughout the repayment period used in the CVP Power Repayment Study, (PRS) i.e., until 2028, these rates will not be adequate to provide sufficient revenue to recover costs of over $8.8 billion. The project's current adverse financial condition is primarily attributable to CVP's inability to effect power rate increases, and its commitments to sell more power than could be generated from system hydro plants. These commitments in turn created the need for power brokerage arrangements involving the purchase of large amounts of power from outside sources, marketed at rates well below CVP's costs."(6)

Our analysis estimated the impact of adding New Melones for hydroelectric power by simulating current conditions through the use of a Bureau of Reclamation "1971 Power Rate and Repayment Study." Using conservative assumptions, it appears that operation of New Melones for hydroelectric power will produce at least a $385 million fiscal drain on the already distressed

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(5) U.S. Department of the Interior, "Report on Audit of the Central Valley Project, Bureau of Reclamation", page 2.

(6) ibid., page 6.

CVP system over the 50-year repayment period.(7) This loss would occur even though the entire CVP system Rate and Repayment schedule for the completed CVP projects would be extended. In other words, the existing components of the CVP would subsidize New Melones power and it would still produce a fiscal drain on the CVP of almost $400 million.

In 1962 the Army Corps of Engineers recognized that the New Melones Project would be a fiscal drain on the CVP, but the size of the drain expected was much less than is apparent today. From House Document 453 the Corps reports: "The study indicates that the CVP would still have a surplus of about $96,000,000 at the end of 50 years, even though the surplus would be reduced by $89,104,600 because of the inclusion of the New Melones Project." Today, it is unclear whether the CVP will have any surplus. In any event, inclusion of New Melones will further weaken its fiscal integrity.

The financial impact of New Melones was estimated by recalculating repayment of costs allocated to power and the irrigation costs assigned to power repayment and the CVP "earned surplus" using current power rates. Two adjustments were made to the repayment table to incorporate the effect of inclusion of the New Melones project and make the Rate and Repayment schedule as current as possible with available data: (1) The last year of repayment was extended to match the New Melones completion and repayment schedule. (2) Power rates incorporating current unit rates were applied to the total energy sales from all CVP power facilities.

(7) U.S. Department of the Interior, Bureau of Reclamation, "Power Systems Average Rate and Repayment Studies, FY 1971."

After costs allocated to power are repaid, power revenues are supposed to be used to subsidize irrigation and contribute to the system "earned surplus". The simulations with and without New Melones Project produced the following estimates of fiscal impact over the 50-year repayment period.

Central Valley Project

Power Rate and Repayment Study

	Without New Melones	With New Melones
Irrigation Assistance	$ 139,000,000	$223,000,000
Cumulative "earned Surplus"	911,000,000	442,000,000
Total Irrigation and "Surplus" Accounts	$1,050,000,000	$665,000,000
Difference	$385,000,000	

Thus, the total impact of New Melones power to the Central Valley Project is a drain of $385,000,000 over the repayment period. It should be noted that these data are from the 1971 Rate and Repayment Study. CVP experience and the Auditor's report suggest the "earned surplus" may very well be a deficit.

In summary, many factors, including underpricing, mismanagement and selection of bad projects have contributed to the continued deterioration of the fiscal integrity of the CVP.(8) Project expenditures for a questionable increase in usable capacity at the New Melones plant have also contributed. For example, the costs associated with increasing the New Melones capacity were 120 percent greater than those authorized in 1962 for power purposes. At the same time, the price of CVP power has remained essentially constant. The added costs of the power features have not been reflected in the power rates for the CVP, rates should reflect the total cost of power sold.

Thus, the manager-developers of the CVP took a major risk in more than doubling the capital outlay for a marginal increase in installed capacity. The New Melones Project is a graphic illustration of the management which has brought CVP fiscal problems listed by the Director of Audit and Investigation cited earlier.

The Army Corps of Engineers was alerted to the potential marketing and usable capacity problems as early as 1960. At that time, California's Department of Water Resources commented on the Corps "Report on Economic Feasibility, New Melones Project, Stanislaus River, California" (October 1, 1960):

"Studies of the Department indicate that the dependable power capacity of 119,000 Kilowatts estimated in the report may be higher than warranted" . . . "it may not be practical by 1969 for the Northern California system to absorb

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(8) U.S. Department of the Interior, "Report on Audit of the Central Valley Project."

power at the capacity factor assumed in the report. The physical limitations and contract requirements pertaining to certain plants limit the flexibiility, with respect to capacity factors, for proposed hydroelectric plants in Northern California."(9) These comments were written when the Bureau was using an annual capacity factor of 30 percent which is substantially higher than the New Melones' 10 percent.

The Corps apparently concurred with this analysis:

"The Bureau of Reclamation studies show that the energy of the existing CVP system is limited because of a shortage of water during the critical dry period. These studies also show that the maximum increase in the dependable capacity at the load center during the critical period would be about 107,000 kilowatts for the New Melones plant, which could be obtained with a 150,000 kilowatt installation, and that no additional dependable capacity could be obtained with an installation larger than 150,000 kilowatts" (emphasis added).(10)

Usability of the Power Questionable

The usefulness of the power in the CVP system, or elsewhere, is linked to the dependable capacity. The installed capacity is of New Melones 300 MW, but the dependable capacity is reported by the Bureau as 255 MW. The CVP system

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(9) Harvey O. Banks, Director, Department of Water Resources, correspondence to Colonel H.N. Turner, District Engineer, U.S. Army Corps of Engineers, December 9, 1960, and included in House Document 453, pages 87-100.

(10) U.S. Army Corps of Engineers, "Design Memorandum No. 10, New Melones Reservoir, Stanislaus River, California, General Design", page 28.

dependable capacity is changed each time a new project (New Melones) is added. The procedure for determining the new dependable capacity of the CVP system is through performing two integrated operation studies incorporating all generation and pumping facilities. Typically, two studies are done: one with and one without a new facility (New Melones). The incremental difference is then attributed to the new facility. The Bureau - PG&E contract further requires that the studies be performed using the hydrologic data for the relatively dry period 1930-33 with the assumption of full reservoirs in 1930. However, the estimated value of power from the new facility depends on how any additional capacity indicated fits into the CVP system or the system of any other potential customer.

There is no assurance that the dependable capacity will be as high as assumed by the Corps. Negotiations between the Bureau and PG&E will have to establish the hydrologic and usability criteria before the actual usable capacity is known.

Apparently no market survey has ever been done by the Corps of Engineers or the Bureau to determine either what potential customers could be served by New Melones power or what price for such power would be realistic in today's market situation. This is in spite of the fact that the Corps and the Bureau have been receiving signals fo the limited value of this power for over ten years.

New Melones was originally authorized to provide hydroelectric power for project pumping purposes as well as for commercial sale. It appears, however,

that there are no Project pumping requirements or preference agencies which could absorb a 255 MW burst of power for 2-1/2 hours per day. The Reclamation Project Act which is applicable to the sale of CVP power, including New Melones, provides that preference in sales of electric power "shall be given to municipalities and other public corporations or agencies; and also to cooperatives and other non-profit organizations financed in whole or in part by loans made pursuant to the Rural Electrificaton Act of 1936 and any amendment thereof." In 1969, PG&E wrote to Secretary of the Army Resor: "Our studies of future loads and resources in Northern California indicate that low plant factor peaking capacity such as that which would be provided by a 150 MW increase in installation will not be useable in the load at the time the New Melones Project is scheduled for completion."(11) In 1977, PG&E testified: "Preparing estimates of the need for peaking power, at an annual capacity factor of ten percent or less, for the period mid-1990's to 2000 is difficult and speculative at best. Energy conservation and peak load pricing may affect peaking needs far into the future. While we do not wish at this time to comment one way or the other on the FPC's projection of need, we wish to point out that these estimates show that the need for peaking generation is limited."(12)

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(11) Pacific Gas and Electric Company, correspondence to the Honorable Stanley R. Resor, Secretary of the Army, July 2, 1969.

(12) Pacific Gas and Electric Company, "Comments on Marysville Lake Project March 1977 Draft Environmental Impact Statement, and, April 1977 General Design Memorandum", June 1977.

There are no power contracts for the integration of the New Melones plant into the CVP, and the Bureau has reported that signed contracts could be four years away.(13) Considering the uncertainty of the need for the peaking power and the uncertainty of the amount of dependable capacity of the CVP including New Melones, it seems likely that both the forecasted power revenues and power benefits have been overstated by the Bureau and the potential markets have not been defined.

Financially, the CVP System would apparently be much better off delaying signing power contracts until it is in a better negotiating position. The CVP has an unsucessful record in raising power rates once contracts have been signed.(14)

Unit Costs and Revenues of New Melones Power -- Costs Potentially Greater Than Revenues

The U.S. Department of Energy (DOE) has estimated the cost of New Melones power at 12.6 mills per kwh with no transmission losses.(15) If we assume four percent transmission losses, the cost is 13.1 mills/kWh. If, for example, releases for any or all of the needs for fisheries, water quality,

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(13) U.S. Army Corps of Engineers before the State Water Resources Control Board, September 12, 1979.

(14) U.S. Department of the Interior, Director of Audit and Investigation, "Report on Audit of the Central Valley Project, Bureau of Reclamation", January 31, 1978.

(15) U.S. Department of Energy, Computation Sheet, "Computation of Cost of New Melones Power", August 14, 1979.

prior rights, flood control, irrigation, or recreation result in production at 80 percent of capacity, the cost of power at the load center would be 16.4 mills/kWh.(16)

The DOE estimates are based on New Melones costs allocated to power as of October 1, 1977, amounting to $84.5 million. If the December 15, 1978, costs allocated to power ($105.2 million) were used, power costs would be 15.6 mills/kWh.(17) None of the increases in power rates under discussion (that we are aware of) are as high as the 12.6-15.6 range. Selling power at less than cost is a subsidy to the purchaser (probably a privately owned utility), and furthermore, it seriously jeopardizes the financial capacity of the CVP system to repay the construction, operation, maintenance, and transmission costs required by law, if New Melones is operated for power.

We estimate that annual operations, maintenance and transmission costs as of October 1978 price levels would have been 5.31 mills/kwh. Even the most nominal inflation in operation and maintenance costs push per unit cost over 5.73 mills/kWh, the rate the Bureau would most likely charge for the power. Thus, not only would reimbursable power costs not be recovered, but

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(16) For example, Decision 1422 of the State Water Resources Control Board states at page 22: "Restrictions of storage for power purposes to the amount required for satisfaction of prior rights and flood control plus the amount allowed for fish and wildlife and water quality control would reduce the capacity of the powerplant from 300 MW, with an electrical energy production of 430,000 megawatt-hours, to some lesser but undetermined production", April 1973.

(17) U.S. Army Corps of Engineers, "New Melones Lake 1978 Cost Allocation", computation sheets for October, 1978 price levels, December 15, 1978.

operations, maintenance and transmission costs would also be lost. Certainly under such conditions, any financial aid to irrigation costs seems highly unlikely.

The combination of very high peaking capacity and low plant factors could create a peculiar situation where the CVP system may have to buy more power to balance out the load among pumping, preference agencies and the PG&E contract. This "brokering" function of the CVP has been a major contributing factor to the financial problems of the CVP. The Auditor reported (at page 26) "that the CVP should make every effort to discontinue this policy as soon as possible." The very tight revenue/cost situation that use of New Melones for power could create on the CVP system, and the relative rigidity of power contracts, suggest that a very careful analysis of the sensitivity of issues raised here should be performed before any contracts are signed. Project Dependable Capacity, power purchases--brokering, existing CVP deficits, existing contracts, etc., should be examined according to current project characteristics (high peaking capacity, low plant factor) and other interests in protecting upstream values of the Stanislaus River. Included in the Appendix is a copy of the "Recommendations to Improve Financial Outlook" of the CVP from the Auditor's 1978 Report to the Secretary of the Interior. It serves as a model for some of the problems the Bureau can prevent before it signs power contracts, if they are to be signed at all.

Irrigation

This section finds: (a) the New Melones project would deliver a $548 million subsidy from the taxpayer if the water is delivered, (b) the subsidy of New Melones water users would probably be greater due to most likely Bureau water prices, (c) New Melones water deliveries and benefits are probably overstated for the irrigators as well as for the taxpayers, (d) the resulting low water prices will work against water conservation.

Background

The New Melones project proposed in House Document 453 provides for 40.6% of project first costs allocated to irrigation. This amounts to about $46 million of the $114 million estimated cost in 1962.(18) Of the current $341 million cost estimate, 28% or $96.8 million is allocated to irrigation.(19) Thus, project costs have almost tripled since 1962, but the proportion attributable to irrigation has been reduced by one-third.

Since the service area for Project irrigation water has not been identified and contracts have not been signed, it is not possible for this analysis to be definitive.(20) Instead, drawing on Corps data and past Bureau practice,

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(18) U.S. Army Corps of Engineers, House Document 453, June 1962, page 52.
(19) U.S. Army Corps of Engineers, "New Melones Lake 1978 Cost Allocation", worksheet December 15, 1978.
(20) One may also observe that, absent service areas, water prices, and contracts all potential customers of highly subsidized CVP water will indicate strong interest in receiving the water. It does not follow that the same interest would be represented once contract terms and a delivered price of water is determined.

inferences about the project may be drawn. As much as any other findings of this report, the work presented here suggests very clearly that an overall systematic reexamination of the irrigation aspects of the Project, using current data in the context of the current financial condition of the CVP system, is needed.

New Melones Water Subsidies from the Taxpayer

The New Melones project would deliver a $571 million subsidy from the taxpayer if the water is delivered. Agricultural irrigation water development is subsidized in four general ways: (1) in original project design and approval, (2) in requiring repayment of only initial construction cost plus interest allocated to irrigation (i.e., interest is not charged on the unpaid-declining-balance of construction cost over time), (3) interest charged on initial construction cost is less than market rates, and (4) surplus revenues from CVP system power sales are allowed to repay construction costs allocated to irrigation.

Reclamation law is basically intended to encourage family farm agriculture and rural development while recapturing at least the initial federal investment through charges to the beneficiaries of the reclamation projects. Power users are expected to repay all allocated project costs, including interest, associated with the generation of power. In many projects, power revenues have been more than sufficient to meet this goal, and excess revenues have been used to repay some of the costs allocated to irrigation. Irrigation beneficiaries are not required to repay all costs associated with providing them with water. Power revenues are used to make up what irrigation water

users cannot repay on construction costs. On that basis, Reclamation programs are claimed to be self-financing. Since 1973, however, power revenues in the CVP have not been sufficient to meet the costs of power generation, let alone provide excess revenues to repay the costs of irrigation not borne by water users. The report of the Director, Audit and Investigation, of the Department of the Interior, concluded in 1978 (at page 7):

> "Power customers eventually must make up any deficit in payment of irrigation costs. In the long range outlook, the amount of such irrigation assistance would be less if CVP could revise irrigation water rate setting practices so that the burden of repayment is not unduly shifted to power customers in the future. This deficit arises because water rates are established based on CVP's estimate of irrigators' ability to pay. Most existing contracts for sale of irrigation water contain fixed rates established long before first delivery of water and applicable for the succeeding 40 years after this first delivery."

Because the CVP has not generated surplus power revenues, the traditional problems of insufficient repayment of irrigation costs by water users have become of much greater concern. The taxpayer rather than the rate payer must cover the costs not repaid by water users. Filling up New Melones will have little beneficial impact on the overall financial situation because of the current pricing practices under which water is sold at a price too low to recover both the costs of repayment of construction and the annual operation and maintenance of the dam and delivery system.

We estimate the interest subsidy to irrigation under point (2) above (no interest charged on construction costs over the repayment period) at $548 million from New Melones over 50 years. This is analogous to providing CVP irrigation customers an interest-free mortgage with the nation's taxpayers

paying the $548 million interest. This was estimated by charging 6.8% interest to the construction costs allocated to irrigation over the 50-year repayment period.(21) This brings the total cost of irrigation water from New Melones to $685 million. Water users, however, would have to pay at most $137 million which is initial construction cost allocation to irrigation plus interest during construction at 6.8%. The water users, therefore, receive a subsidy in the form of an interest exemption worth about $548 million which is paid by the general taxpayer.

In fact, however, water users will only pay interest during construction at 3-1/8%. Thus, instead of paying $137 million, they will likely pay about $114 million. This is an additional subsidy of $23 million under point (3) above (interest charged on initial construction cost is less than market rates). This practice has been strongly criticized by the Director of Audit and Investigation of the U.S. Department of the Interior (at pages 67 and 68).

If the full repayment of construction costs plus interest were to be required, water users would be charged about $68 per acre-foot if all 200,000 acre-feet of irrigation water could be provided by New Melones on a regular basis. If

(21) Even if water users repay construction costs without interest, they will, in fact, have repaid only a small fraction of total costs attributable to the project -- well under 10%. The interest rate of 6.8% used to estimate the "full-cost" repayment is very conservative, especially in light of inflation, which averages well over 6%. If future rates of inflation continue at the 6-12% rate of the past five years, the use of such a low interest rate is conservative because it implies a real rate of interest less than zero. That is, even if water costs were to be repaid at 6.5%, inflation-induced reduction in the value of the dollar would more than offset the value of interest repayments. If a more reasonable rate of interet were employed -- say closer to 10-12% (implying a real rate of interest of about 3%) -- the full-cost repayment level would be considerably greater, bringing the full cost of an acre-foot of water well over $100.

NEW MELONES PROJECT

IRRIGATION COSTS

Fiscal Year	Total Cost	Costs to Irrigation	Interest @ 6.8% During Construction
Total to 6/78	$ 7,503,300	$ 2,446,075	$ 2,592,840
1969	2,164,500	705,627	656,233
1970	766,100	249,748	199,798
1971	11,740,700	3,827,468	2,640,953
1972	21,074,100	6,870,156	3,984,690
1973	23,517,100	7,666,574	3,679,955
1974	33,393,000	10,886,118	4,245,586
1975	15,475,000	5,044,850	1,513,455
1976	35,165,800	11,464,051	2,522,091
1977	63,679,000	20,759,354	2,906,309
1978	67,331,000	21,949,906	1,536,493
1979	27,000,000	8,802,000	
1979	32,378,000	10,555,228	
TOTALS	$341,900,000	$111,230,000	$26,478,408

prices were set to recover only the construction costs of $137 million, they would pay about $13.75 per acre-foot at current price levels. Furthermore, water users would be required to pay an additional $1.65 per acre foot to cover current annual operation and maintenance costs of the dam attributed to irrigation. This does not include delivering the water to their irrigation district which means paying the costs of constructing (if necessary), operating and maintaining a conveyance system. Depending on the location of the district, the amount of electricity needed to pump the water to the district, and the kind of conveyance needed, these delivery costs could be very large. For example, if New Melones water were allowed to flow into the delta and were then pumped down the west side of the San Joaquin Valley, the delivery costs could be as high as $10 per acre-foot. Since there are no contracts for sale of New Melones water, we cannot estimate the size of these delivery costs, nor do we know the price that will be charged for this service.

These figures indicate that New Melones water would need to be priced at about $15.30 per acre-foot at the dam, while another $2-$12 should be added to get the water from the dam to the irrigation district (the district would also charge the farmer an additional fee to distribute the water to his fields). In other words, the cost of New Melones water should range between $17 to $27 per acre-foot if all reimbursable construction costs and operation and maintenance costs incurred by the federal government are to be recovered according to current practice. If actual taxpayer cost were to be repaid, $70-$80 per acre-foot would need to be charged. (NOTE: this is predicated on a firm delivery of 200,000 acre-feet/year, which may be high. If so, water prices would need to be higher. This is discussed later.)

Willingness-to-Pay for Water is Low - Water Subsidies Increase

At the present time, water is sold to CVP irrigators at rates of between $3 to about $11.80 per acre foot; nowhere is water priced as high as $17 per acre foot. Indeed, recent history demonstrates a strong unwillingness to pay such prices for irrigation water. Irrigation improvements to New Hogan reservoir were turned down by local voters because it was felt the $8.75 per acre-foot price of delivered water cost was too high. Similarly, recent settlement of the Westlands District contract with the Bureau arrived at a $9.09 acre-foot price for "old" delivered water and $11.80 acre-foot for new water to be delivered. Both of these rates are less than the costs of delivering the water. At the low prices now prevailing in other CVP districts, large deficits are being created because the revenues generated by water sales are insufficient to meet repayment obligations on construction costs and to cover the rapidly rising costs of operation and maintenance. In many districts, operation and maintenance costs are larger than the price of water, so not only do the water users fail to repay construction costs, they also do not repay the annual delivery costs.

One possible scenario is that New Melones water will be used to meet existing CVP contractual obligations and will be sold at rates now prevailing in the CVP. In this case, the price would likely range between $3 and $11.80 per acre-foot to the water district. At these prices, revenues would probably not be sufficient to even recover the annual operations and maintenance costs of the dam and delivery systems, and thus the deficit in the CVP system would grow even faster. The precise deficit cannot be estimated, of course, without more detailed information as to where the water will be used and at what price.

If New Melones water prices are set at high enough levels to insure repayment of construction costs plus annual operations, maintenance, and delivery costs, it is questionable whether the Bureau of Reclamation will find farmers willing to pay $17-$25 and up per acre-foot of water on a regular contractual basis (drought years not withstanding). At such high prices, grain and forage crops probably cannot be grown at a profit, yet according to the 1969 analysis done by the Army Corps of Engineers, these are apparently the most likely to be grown in the New Melones service area.

Finally, the record of the Bureau in renegotiating existing contracts or providing escalator clauses in new water contracts for inflationary and other cost increases must be noted. Solicitor Leo Krulitz of the Department of the Interior has argued that the Department did as well as it could in the recent Westlands settlement.(22) Similarly, efforts to provide for regular contract adjustments for cost increases in the Santa Clara Valley Water District resulted in conditions which will use 14-24 year old cost and pricing data as the basis for adjustment.(23) Thus, initial contract conditions for delivery of water will likely be the prevailing rates for decades, whatever happens to inflation and other project costs.

In summary, we have pointed out that the huge public cost associated with New Melones irrigation will not be recoverd even if the reservoir is filled to capacity. Three factors contribute to this: (1) the huge interest exemption

(22) Leo M. Krulitz, Solicitor, U.S. Department of the Interior, open letter to the Sacramento Bee, published September 7, 1979.
(23) Director of Audit and Investigation, "Report...", page 41.

for water users; (2) the tendency of the federal agencies to set prices so as not to recover most construction costs; and (3) because prices are not adjusted for the effects of inflation on operations and maintenance costs. Moreover, under the most likely situation, water will be sold at prices so low that construction costs will remain unrepaid and the annual operating and maintenance costs of the dam and delivery systems will not be covered by water sale revenues. In short, the more water sold from New Melones, the larger the costs to taxpayers. In sum, the financial impact of filling New Melones reservoir could be to make the treasury no better off and probably worse off than if the reservoir were left unfilled.

The 1978 audit of the CVP raised most of these concerns regarding the development and operation of the system as a whole. At this point, the New Melones Project seems to have most of the problems identified by the auditor. Before any further development is undertaken, a careful reexamination of alternative operational strategies is essential in order to ensure the best possible fiscal condition for the CVP system and to protect the taxpayer's interest.

Water Delivers and Benefits are Probably Overstated for the Irrigators as well as for the Taxpayers -- Low Water Prices Work Against Conservation

To the extent the benefits (costs) of the New Melones Project were overvalued (understated) or will not accrue to the extent originally estimated, the Project contained additional subsidies when approved. It is not the intent here to review the benefit/cost analysis of the Project as authorized or constructed. Rather, recent events and current conditions (some of which were

discussed above) suggest some irrigation benefits (costs) may not accrue according to original estimates. To the extent that is true, the fiscal integrity of the CVP system may be further jeopardized.

This section of the report will address three such areas of concern. (1) It is unclear whether a firm yield of 200,000 acre-feet of irrigation water can be provided, given the hydrologic features of the watershed and other reservoir operating requirements. (2) It is unlikely that whatever new water is provided for irrigation will be used entirely on lands currently not irrigated. (3) Changes in crop patterns could result which could both aggravate water supply conditions in dry years and also inhibit State agricultural water conservation.

1. It is unclear whether a firm yield of 200,000 acre-feet of irrigation water can be provided, given the hygrologic features of the watershed and other reservoir operating requirements.

   Historical hydrological data on stream flows (DWR Bulletin 130-74 Hydrologic Data, Vol. IV: San Joaquin Valley), prior rights of the South San Joaquin and Oakdale Irrigation Districts, and future upstream diversions suggest that the projected 200,000 A/F of new water will probably not exist.

   Further, using hydrologic simulation it was found that the new reservoir would provide no excess water for new irrigation in one-third of its operating years (i.e., for 10 years out of 30 streamflows will be

inadequate to maintain a reservoir level necessary to meet any new contracted water requirements.(24)

2. It is unlikely that new water will be used entirely on lands currently not irrigated.

In arriving at the $3.6 million net benefit for irrigation water, the Bureau assumed that all the water would be used on previously unirrigated farmland. This assumption yields the greatest net benefit among all the possible alternative uses for the irrigation water. Yet Decision 1422 (at page 16) suggests that the newly developed water should be used within the Stanislaus River Basin first, and that only after basin demands are satisfied should it be exported elsehwere.

Since the marginal value of water on currently unirrigated agricultural land is the greatest, the benefit to the Project and the grower is greatest if it were used on currently unirrigated farmland. If the water is used to substitute for some other water source, such as groundwater, the value of the Project water is much less. The same crops would be grown (presumably) with the same quantity of water. Growers would have to obtain the Project water at less cost than the next best alternative, such as groundwater pumping, in order to be willing to make a firm commitment for Project water. The only other alternative is to regulate groundwater pumping, which does not appear to be a popular idea among local water districts.

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(24) State Water Resources Control Board Decision 1422, April 1973, page 10.

3. Changes in crop patterns could aggravate water supply conditions in dry years and also inhibit State agricultural water conservation.

To the extent New Melones irrigation water prices would shift crop patterns toward tree and vine crops, relatively inflexible water use patterns would also develop. In dry years, it could be very difficult and expensive to adjust to new supply conditions.

To the extent New Melones irrigation water is priced low enough to be competitive with alternative sources of water, the price would likely be so low that there would be little incentive to conserve agricultural water. This has been demonstrated in numerous studies throughout the West.

What do these observations suggest? If the water supply is uncertain, users will be unwilling to pay much for it. Depending on how uncertain it is, they may not be willing to sign firm contracts for it at a price necessary to recapture even the operations, maintenance, and delivery costs. Furthermore, if the water is to be used to substitute for another source, the price for Project water must be competitive, if not favorable. (A farmer may be willing to contract for competitively priced surface water to supplement groundwater.) We have estimated the average 1978 cost of groundwater pumping in the area of $9.16 per acre-foot.(25) This is 54% or less of the estimated cost of delivering Project water.

(25) Basis of cost estimated for groundwater pumping: Dr. Robert M. Hogan in "Energy and Water" from the University of California, Davis, Agricultural Water Conservation Conference Proceedings reports 1.55 kwh/acre-foot/foot lift. The Sandia Laboratories reports an average lift for the San Joaquin Basin at 123 feet in "Agricultural Practices which Could Enhance Solar Powered Irrigation Plant Utility, by the Department of Soils, Water and Engineering and Agricultural Economics, University of Arizona, Tucson, 1978, page 40. Estimated PG&E average agricultural rates for 1978 were $.0407/hwh: (1.55 x 123 x .0407) = $9.16.

Recreation

The recreation resources of the Stanislaus River generally include: upstream whitewater rafting, fishing, hiking, camping, caving, and general recreation; reservoir boating, fishing and general recreation; and downstream fishing and general recreation. Each of these activities is valuable to the individual and to society in general. However, making decisions regarding optimizing those values under different reservoir regimes is much more difficult. We were not able to find any current, systematic and complete analysis of the recreational benefits and costs at the alternative reservoir pool elevations.

As is illustrated in the following table, our estimates suggest recreation benefits can be maximized with a 3,320 acre reservoir (326,000 acre-feet). The data suggest a higher reservoir would likely result in a substantial reduction in recreational benefits.

Generally, the Corps' recreational analyses do not provide parallel methodological treatment among alternative reservoir sizes and do not recognize other significant local resources which would affect some recreation activities. For example, the Corps should be consistent in applying its recreational use formula; it should be used for each of the alternative reservoir sizes. In projecting use for the new reservoir the Corps would typically predict potential use. Then investigate ways to improve access and use. This apparently has not been done for the 3,320-acre reservoir. From

Table IV-11 on page 21 of the Lake Area Master Plan, it is possible that recreational use of the 3,320-acre reservoir would range from 380,000 to 1,470,000 recreation days.(26)

Similarly, when considering the downstream recreational resource, the Corps incorporates a series of downstream access developments, wildlife lands, etc., for the full reservoir. It does not appear that they have done the same for alternative reservoir sizes. Furthermore, just as mitigation measures have been developed for the full reservoir, consistency would require comparable considerations for alternatives. The Corps is not justified in claiming that upstream fish and rafting opportunities need not be costs. Merely finding another area for some of the activities does not eliminate the cost, especially when the other areas are already intensively used. Apparently no effort has been made to estimate the future upstream recreational use of the river and incorporate it in the analysis. This compounds the Corps error in the treatment of the loss of upstream resources.

The 1978 Bureau of Land Management report on whitewater river opportunities in California demonstrated that the Stanislaus River whitewater opportunities are irreplaceable in any practical sense. In contrast, all of the reservoir options for New Melones result in a small (1 to 4 percent) increase in flat water lake acreage.

(26) U.S. Army Corps of Engineers, "Lake Area Master Plan", Design Memorandum No. 3, August 1976.

As a result, the projected recreation days for the full New Melones reservoir are too optimistic. Data in the "Lake Area Master Plan" show the 1975 general recreation usage for the two neighboring reservoirs, New Hogan on the northwest with an area of 4,400 acres and New Don Pedro on the southeast with an area of 12,960 acres. New Hogan had a general recreation usage of 241,120 person-days and New Don Pedro had a use level of 330,036 person-days. The increased size alone did not result in a proportionate increase in use. Furthermore, since both reservoirs are probably more accessible than New Melones; they will likely attract increased use before New Melones ever reaches the 800,000 (much less the 3,000,000) recreation days projected. Thus, actual experience indicates less recreational use than was predicted is likely to occur, and, other local flat water resources might absorb some of the use attributed to New Melones reservoir.

The following table was constructed using conservative assumptions for recreational opportunities of the smaller reservoirs. They are conservative, because they assume only a continuation of current upstream recreational use levels, and because no specific downstream recreational improvements were provided for those reservoir options. The table is only a first approximation of what could be done if serious consideration and analysis were given to all alternatives.

New Melones Recreation Benefits with Four Alternative Reservoir Sizes

	Alternative			
	I	II	IIIA	IIIB
Elevation (feet)	1,080	887	800	740
Reservoir Area (acres)	12,119	5,782	3,320	1,769
Whitewater (miles)	0	5	9	14
Whitewater Use (per year) (1)	0	12,000	49,000	49,000
Whitewater Unit Value (2)	--	$6.00	$9.00	$9.00
Whitewater Total at $6/$9 (per year)	--	$72,000	$441,000	$441,000
Whitewater Unit Value Alternative (3)	--	$50.00	$45.33	$45.33
Whitewater Total at $50.00/$45.33	--	$600,000	$2,221,170	$2,221,170
Non-reservoir General Recreation (4)	0	20,000	50,000	50,000
Reservoir General Recreation (5)	330,000	260,000	200,000	50,000
Total General Recreation	330,000	280,000	250,000	100,000
General Recreation Unit Value (6)	$1.50	$1.50	$1.50	$ 1.50
General Recreation Total	$495,000	$420,000	$375,000	$150,000
TOTAL Recreation Value @ $6/$9	$495,000	$492,000	$816,000	$591,000
TOTAL Recreation Value @ $61.33/$56.67	$495,000	$1,020,000	$2,596,170	$2,371,170

NOTES: (Continued on next page)

NOTES:

The original data in this table have been corrected in this printing for typographical errors and consistency. Travel expenses are not included in the daily recreational use value estimates.

(1) BLM Whitewater Recreation Survey, 1979 season.

(2) Whitewater recreation values used by the Corps of Engineers.

(3) The Water Resources Council Principles and Standards provide for an expression of user's "willingness to pay." This estimate includes the fee charged ($50.00 for the first day and $45.00 for the second). This estimate assumes 35,000 one day passengers and 14,000 second day passengers.

(4) BLM, "Report on Instream and Recreational Values of the Stanislaus River," December, 1978.

(5) U.S. Army Corps of Engineers and Department of the Interior, Bureau of Reclamation, "Lake Area Master Plan," based on 1975 use of New Hogan and New Don Pedro (see text).

(6) "Lake Area Master Plan," page 219.

This analysis is neither complete nor definitive. It does, however, illustrate that under reasonable assumptions, alternative reservoir pools can have significantly higher annual recreational benefits than the full reservoir. Furthermore, it illustrates the need for a complete and consistent analysis of each of the alternatives.

Decision 1422

The State Water Resources Control Board Decision 1422 of April 1973 specifies that water stored in New Melones reservoir is to be limited to the amount necessary for the "preservation and enhancement of fish and wildlife", "maintain water quality conditions", "satisfaction of prior rights", and flood control. "No additional impoundment shall be allowed for power and recreational purposes. Further order of the Board shall be preceded by a showing that the benefits that will accrue from a specific proposed use will outweigh any damage that would result to fish, wildlife and recreation in the watershed above New Melones Dam and that the permittee has firm commitments to deliver water for such other purposes."(27)

This section of the report will address the specific fisheries, water quality, prior rights and flood control conditions of the Board's order. A later section of the report will address the power and irrigation components of the overall Project.

No State or federal study exists which incorporates current data to determine how alternative project operations would meet the intentions of Decision 1422. Current data include information on current project design, operation, economics, and power or water supply conditions.

(27) State Water Resources Control Board, Decision 1422, W. W. Adams, Chairman, April 1973, page 30.

Fish and Wildlife

The principal concern here is maintenance of the salmon resource of the Stanislaus River. The size of the salmon run has been declining since construction of the Tulloch Reservoir. It has been estimated that, under careful management, the river could support a spawning run of 8,600 salmon, a substantial increase over current Stanislaus River salmon runs.

There are several components to the maintenance of satisfactory spawning conditions for the river's fall run of salmon. Basically, the concern is over the magnitude of the fall and spring flows (for spawners to get in and for fry to get out) and fall water temperatures. Fall water temperatures must be low enough to ensure spawning and a reasonable survival rate of the salmon eggs. Diversions from the Delta by CVP and SWP further compound the salmon maintenance problem.

Not enough is known of spawning and egg incubation conditions in the natural environment to ascertain just what flows and temperatures are needed just when and for how long to ensure an acceptable run. Some studies have suggested that the most desirable water temperatures are less than 56°F and that temperature related mortality can begin at 58°F. The "acceptable" exposure time, however, is unknown. For example, the impact of natural diurnal temperature changes is unknown. Not enough of natural conditions is known to determine what temperature and flow thresholds reduce salmon egg viability or cause embryo mortality to increase to unacceptable levels.

The Bureau of Reclamation has performed several operations studies which are intended to assist in determining release requirements for fish. In summary, the studies neither use relevant data nor do they satisfactorily address the questions.(28)

The basic methodological-analytic problems we have identified with the operations studies are listed below. The combination of data and methodological problems simply renders the operations studies inadequate to make a determination with respect to the long-term level of the reservoir.

(1) The operations studies treat water temperature as a residual consideration. That is, the reservoir is managed for all other purposes first, then temperature is predicted. A complete operation study should specify certain temperature conditions as part of reservoir operations.

(2) Much of the data used in the studies apparently are not specific to the Stanislaus. Rather, they are regional averages or are extrapolated from studies of other areas.

(3) The temperatures predicted are monthly averages, rather than mean maximum weekly or daily temperatures that could be used to evaluate the impact on salmon. Monthly temperatures are essentially useless in estimating temperature conditions during the period salmon are actually in the river.

(28) U.S. Department of the Interior, Bureau of Reclamation correspondence to E. C. Fullerton, California Department of Fish and Game, (not dated), received August 13, 1979.

(4) The operations studies do not incorporate realistic release requirements under Decision 1422 for water quality, prior rights and flood control and, at higher pool elevations, what the impact of releases for irrigation, power, and recreation would be on the intent of Decision 1422. As such, it is impossible to predict the effect of a multi-objective operations plan will have on the fishery. Conversely, it appears quite possible that a carefully planned and integrated operations study could illustrate the compatibility of Decision 1422 criteria at each reservoir size. This possibility cannot be tested with single factor studies.

(5) No quantitative estimates or measures of statistical significance are provided to give any perspective of whether different reservoir sizes or operations plans make a significant difference on the impact on the salmon fishery.

(6) The operations studies apparently assign a fixed maximum storage level and release schedule. This necessarily fixes the operational plan; flexibility should be provided (e.g., along the lines of point (5) above) in both storage level and release schedule. The Friends of the River proposal, which provides 98,000 acre-feet/year in normal years, and 69,000 acre-feet/year in dry years and 45,000 acre-feet in critical years, should be studied carefully.

(7) The actual temperature record is only a fraction of the 76 years of the study; as a result, the extrapolation itself needs to be tested for its accuracy.

Recognizing, however, that the State Water Resources Control Board needs to make some decisions for at least interim management, some inferences must be drawn from the work. It does not diminish the need for additional studies.

None of the operations studies for any reservoir size result in consistently satisfactory average monthly October temperatures. Large reservoirs do not necessarily result in average temperatures better than the 326,000 acre-foot reservoir. Even in the best case, the maximum desired temperature is exceeded in October in 45% of the years. Incorporating releases for other purposes could very likely compound the October temperature problem.

Testimony submitted by Friends of the River (FOR) before the State Water Resources Control Board on September 12, 1979 indicated that operation of the reservoir at 330,000 acre-feet with 98,000 acre-foot/year releases in normal years, 69,000 in dry and 45,000 in critical years, could result in substantially larger salmon runs than currently exist and slightly more than with a 597,000 acre-foot reservoir.(29) This acknowledged "rough comparison" is based on Department of Fish and Game and Bureau data. At a minimum, it further illustrates that the specific operations plan and decision criteria of the reservoir operator can result in a 326,000 acre-foot reservoir which meets the Decision 1422 goal of enhancing and preserving the salmon population.

Operation of the reservoir at higher pool elevations also means operating for irrigation and power under the criteria set forth by Decision 1422. Absent

(29) Friends of the River, Submittal Before the State Water Resources Control Board, State of California, September 12, 1979, Table 1 (Appendix), page 17 (text).

firm contracts for water and power from which water release schedules could be determined, it is not possible to conclude that larger reservoirs are beneficial for the salmon population. The operations studies by the Bureau are of no help here.

Water Quality

As previously reported by the Department of Water Resources (DWR), it is not possible at the present time to state conclusively what the relationships in the San Joaquin River are between water flow, total dissolved solids (TDS), and New Melones releases.(30) At a minimum, however, the effect of capping the Tuolumne gas wells (which previously discharged over a million tons of TDS per year into the San Joaquin system) in 1977 should be ascertained. Previous analyses are outdated and use data that the Bureau, Corps, DWR, FOR, and South Delta Water Agency agree are inadequate. Current water quality data which are available should be analyzed to determine the feasible water quality improvements under each reservoir size. It would then be possible to compare water quality differences for each reservoir size to the gains or losses to upstream values.

The FOR submittal to the Board, at pages 12-14, cites several more reasons why the Bureau should update its analysis of water quality considerations of New Melones operations. FOR also maintains that the outdated study results in

(30) California Department of Water Resources, correspondence from Director Ron Robie to Mr. Don Maughan, Chairperson, State Water Resources Control Board, July 11, 1979.

"approximately 50,000 acre-feet of needless reservoir impoundment" (at page 12). In summary, the FOR position is that the original Public Health Service estimates of water quality conditions consistently predict higher TDS than is realistic and that other changes in the San Joaquin system have occurred since the Public Health Service study which should improve San Joaquin water quality. If this is the case, water storage requirements for water quality behind New Melones would be reduced.

Prior Rights

As previously mentioned, Decision 1422 provides that the water rights at the existing (Old) Melones Reservoir must be protected. At issue here is the amount of prior rights that must be protected behind New Melones. DWR has reported that use of Tulloch Reservoir as a Project afterbay has the effect of transferring consumptive storage from Tulloch into New Melones (DWR correspondence to State WRCB, July 11, 1979). Similarly, FOR (at page 6) argues that such a transfer is, in effect, power storage behind New Melones. Both of these interpretations are inconsistent with Decision 1422 language and intent.

Generally, it would seem clear that the Board's intention under Decision 1422 was that only the water rights behind Old Melones should be considered "prior rights at existing Melones Reservoir" (page 30 of Decision 1422). While the numbers vary, Old Melones prior rights are apparently somewhere between 101,000 and 110,000 acre-feet. Attempts to claim additional rights appear to be an effort to obtain a free ride from New Melones and the Bureau.

To the extent the Bureau facilitates such efforts through proposing prior rights of 200,000 acre-feet, it is encouraging similar free rides for all water projects and is doing so at the expense of other resources which the Board has recognized as having substantial public interest.

Similarly, reservation of rights for uses unrelated to the Stanislaus River are inconsistent with the Board's decision. DWR's correspondence maintains that including 50,000 acre-feet of groundwater pumping as a prior right should be examined in light of Decision 1422 language and intent. To the extent such a provision is adopted absent a reduction in groundwater pumping, recognition of the groundwater pumping as a surface water right is merely giving local water users bonus water rights. Furthermore, such an interpretation rewards excessive groundwater pumping and encourages similar efforts in other water projects.

Finally, determination of reasonable and beneficial water needs for prior rights is apparently based on a 4-5 acre-foot per acre consumptive use of water.(31) This fails to recognize recent progress in water conservation techniques.

Flood Control

The Project was authorized partially on the basis of its flood control benefits. Jurisdiction over flood control operations for the most part remains at the federal level. That is, except for the way in which operations

(31) Department of Water Resources correspondence to Don Maughan, Chairman of the Water Resources Control Board, July 11, 1979.

for fisheries, prior rights, water quality, irrigation, power, and recreation impact on the flood control management options, jurisdiction remains at the federal level.

There is some issue regarding flood releases. The Project was authorized at a "nondamaging" 8,000 cfs maximum downstream flood flow.(32) In any case, the Corps has reported that it would only be releasing 3,500 cfs until the reservoir reaches 1,970,000 acre-feet.(33) This renders the operation study before the Board obsolete. Some flowage easements were to be acquired, but to date the Corps has done nothing on acquisition. No doubt, this would be disquieting to downstream landowners.

Both DWR and FOR have pointed out that the Bureau's operations studies for flood control do not provide for a reduction in the reservoir's conservation pool during the winter months in anticipation of heavy spring flows. This conventional practice should be incorporated in order to ascertain storage requirements while minimizing upstream inundation consistent with Decision 1422.

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(32) U.S. Army Corps of Engineers, "Design Memorandum No. 10, New Melones Reservoir, General Design", 1967, page 80.

(33) Correspondence from Colonel Paul Kavanaugh, U.S. Army Corps of Engineers, to Michael Campos, Chief Water Quality Division, State Water Resources Control Board, August 24, 1979.

APPENDIX

Recommendations to Improve the Financial Outlook of the Central Valley Project

From

Director of Audit and Investigation

"Report on Audit of the Central Valley Project, Bureau of Reclamation"

January 31, 1978

RECOMMENDATIONS TO IMPROVE FINANCIAL OUTLOOK

Based on our review of the management areas previously discussed in this report, we believe that the financial outlook for CVP could be improved by implementing the following recommendations:

1. Based on pending advice from the Solicitor's office, requested on September 20, 1977, a determination should be made if the CVP is required by Congressional direction to serve in the capacity of a power broker until the year 2005. If not, contracts for the sale of commercial power should not be renewed as they expire beginning in 1983. If, however, it is found that CVP must serve as a power broker until 2005, we recommend that as contracts for the sale of commercial power are renewed between 1983 and 1994, provisions be included in such contracts for a pass-through of the costs CVP will have to pay to purchase power from an outside source to meet customer requirements. (Pages 20 to 27).

2. It appears that in their power marketing efforts CVP management has not established a proper balance between the concept of distributing power in a manner to encourage the most widespread use at the lowest possible rates and the concept of sound business principles, as required by section 5 of the 1944 Flood Control Act. A reassessment and revision is needed of existing practices relative to the methods used to effect timely rate increases and to determine and demonstrate the adequacy of proposed rates. In addition to this methodology the process should place more emphasis on recovering costs and adhering to sound business principles. (Pages 27 to 30).

3. Attempt to amend the contract with PG&E so that PDC can be restored to a proper level after reductions due to "Acts of God," such as drought conditions. (Pages 31 to 34).

4. Reconsider the decision made by a prior Commissioner to forego retroactive billings to customers to reimburse the CVP for an estimated $2.7 million increase in wheeling costs which is an obligation of the customers in accord with power sales contracts. Further, CVP should have PG&E agree to pay, retroactively, interest on all amounts paid by CVP in excess of the final rates to be established by FPC. (Pages 35 to 37).

5. Establish initial M&I and irrigation water rates based upon cost data or payment capacity at the time water is first delivered to the customer. (Pages 41 to 43).

6. Establish conditions in future sale contracts to permit adjustment of water rates as frequently as necessary to cover increases in storage, conveyance, operation, maintenance, and replacement costs. (Pages 41 to 46).

7. For purposes of determining and supporting rate increase proposals, a short range forecast based on revenue necessary to recover operating and capital costs would be a more convincing method of determining the amount of required power rates. If long range PRS forecasts are prepared to evaluate the results power rates are expected to achieve, Departmental policy should be strictly adhered to. (Pages 48 to 62).

8. Discontinue the practice of extending the required repayment year for all irrigation and M&I water facility costs to 50 years beyond the date the last unit authorized for the project is placed in service. (Pages 63 to 66).

9. If determined to be necessary, seek legislative authority to revise the existing cost allocation policy so that costs allocated to the power function can be based upon a realistic cost of borrowed money to the Government. (Pages 67 to 69).

10. In our draft report we recommended that LBR prepare an analysis showing what must be done in order for the Secretary to comply with applicable laws relative to M&I users paying for the project M&I function deficit of $350 million. (Pages 28 to 39). The LBR responded to this as follows:

> "Such an analysis was made. A new M&I rate policy was developed and sent to the Commissioner from the Mid-Pacific Region on October 17, 1974. It was approved with some modifications by the Commissioner on November 8, 1974. This policy is being used to set water rates in new contracts when they are renewed. The recently executed Santa Clara Water District contract is indicative of this policy. The shift to the above policy for new and renewed contracts whould significantly reduce the M&I deficit. We believe this policy should satisfy the Audit's recommendation."

CVP personnel were unable to provide us with an analyses of the forecasted effect of this policy. Accordingly, we recommend that LBR prepare a year by year projection of available quantities of marketable M&I water together with anticipated revenues and costs in terms of today's dollars during the

appropriate repayment period. Without a reasonably accurate forecast of anticipated net revenues, we do not understand how LBR can assure the Secretary that M&I water rates will be adequate to meet repayment obligations as required by applicable laws.

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