

GAO

Report to the Chairman, Subcommittee
on Water, Power and Offshore Energy
Resources, Committee on Interior and
Insular Affairs, House of Representatives

March 1992

BUREAU OF RECLAMATION

Central Valley Project Cost Allocation Overdue and New Method Needed



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**Resources, Community, and
Economic Development Division**

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March 31, 1992

The Honorable George Miller
Chairman, Subcommittee on Water, Power
and Offshore Energy Resources
Committee on Interior and Insular Affairs
House of Representatives

Dear Mr. Chairman:

This report responds to your request that we examine how the Department of the Interior's Bureau of Reclamation allocates construction costs for the Central Valley Project (CVP). The CVP, located in California's Central Valley Basin, is the Bureau's largest water resource project, with authorized construction costs totaling \$6.55 billion as of September 30, 1990. Initially authorized by the Congress under the Rivers and Harbors Act of 1935, construction of the CVP continues today, with over \$2.85 billion spent on facilities that are completed and in service. The CVP supplies water for irrigation—about 85 percent is currently used for this purpose. Other purposes include municipal and industrial (M&I) use, hydroelectric power generation, flood control, recreation, and fish and wildlife conservation.

Reclamation law provides that the federal government recoup a portion of its investment by requiring project beneficiaries to reimburse the government for certain costs associated with irrigation, M&I use, and power; the costs for the other purposes generally are not reimbursed. In addition, the costs for some reimbursable purposes are repaid with interest, while costs for others are not. Through cost allocation, the Bureau (1) identifies and charges all CVP costs specifically associated with meeting an individual project purpose to that purpose and (2) distributes costs jointly shared by several project purposes among these purposes. The specific and joint costs thus allocated to each purpose help determine the rates charged to irrigators, M&I water users, and power users. The timeliness and appropriateness of the methodology used by the Bureau to allocate the CVP's construction costs are critical in determining what portion of the federal government's capital investment will eventually be recouped.

In 1986 the Congress required the Bureau to update its 1975 CVP cost allocation study and reallocate costs among the project purposes by January 1, 1988.

You asked us to (1) discuss the status of the Bureau's efforts to reallocate CVP costs in accordance with the 1986 congressional mandate, (2) describe the Bureau's current cost allocation method, and (3) determine whether the Bureau should adopt another cost allocation method.

Results in Brief

The congressional mandate to implement an updated cost allocation study by January 1988 has not been met. The study is now 4 years overdue because of funding and staffing constraints and the need to address numerous public comments received on a December 1988 draft allocation study.

Accordingly, the Bureau is charging rates to its CVP water users that are based on cost allocation percentages developed in 1970 and updated in 1975. The allocation method used to develop these percentages was recommended in 1950 by the Inter-Agency River Basin Committee, composed of representatives from various federal agencies, and relies on estimates of the benefits attributed to each purpose and the costs of alternatives that would achieve the same purpose. At least 17 years have passed since the percentages currently used were calculated. Because the current values of benefits and alternative costs for each purpose are very different from those last calculated in 1975, the allocation percentages almost certainly are now outdated.

Public comments received on the 1988 draft allocation study identified numerous problems. According to our analysis, the Bureau's 1988 draft study included inappropriate costs, was based on highly questionable assumptions, and often required data that are unavailable or difficult to obtain. These problems indicate that the Bureau's methodology is difficult to implement.

The delays in updating the cost allocation percentages could have significant financial consequences for the federal government. If the costs currently allocated to reimbursable purposes are understated, the federal government ultimately will recoup less of its capital investment because the value of the dollars received years late will be less than if these dollars had been received on time. Conversely, if such costs currently are overstated, future rates can be adjusted downward so that users do not pay more than they owe.

We discussed with Bureau officials two alternative cost allocation approaches that are simpler in design. Although the Bureau agreed to

explore the use of our two approaches, it was continuing to update its study with the methodology that we and others, through public comments, questioned. If the Bureau continues to rely on this method, it is likely that the problems we identified with the 1988 draft study will remain, causing additional delay in developing an acceptable cost allocation.

Background

The Bureau of Reclamation plans, constructs, and operates water resource projects to provide water for various purposes in the 17 western states. The Reclamation Project Act of 1939 (43 U.S.C. 485h) requires the Secretary of the Interior to allocate the costs of construction among project purposes to determine what costs will be repaid by project users; however, the Congress has not specified how to distribute these costs.

Despite the repayment requirement, the federal government has not recovered much of its reimbursable costs in the CVP. For example, by the end of fiscal year 1990, after receiving CVP water for over 40 years, M&I water users had effectively paid nothing toward repayment obligations and added over \$59 million in unpaid operation and maintenance costs to the \$468 million in construction costs owed. Similarly, by the end of fiscal year 1990, irrigators had repaid only \$10 million of over \$1 billion in construction costs owed. In both cases, fixed rates established in contracts were not always sufficient to allow full recovery of operation and maintenance costs, and therefore some users were able to defer repayment of federal construction costs. Water districts had entered into 40-year water service contracts with the Secretary of the Interior to receive subsidized water for irrigation under the Reclamation Project Act.¹

However, the 1986 amendments to the CVP's purposes require CVP users to pay their share of the federal investment in the CVP by 2030. The Secretary currently is renewing long-term water service contracts, under the 1956 amendments to the Reclamation Project Act. Interior renewed 11 contracts between May 1989 and February 1991, and over one-quarter of the remaining 227 irrigation contracts will expire over the next 5 years. Under the terms of the renewed contracts, the Bureau can adjust each water district's rates annually to meet the repayment deadline. Environmental and water use problems associated with these contracts are detailed in our report entitled Reclamation Law: Changes Needed Before Water Service Contracts Are Renewed (GAO/RCED-91-175, Aug. 22, 1991). Because of the problems associated with these contracts, we

¹Water delivered at rates that do not cover all costs, such as interest on the federal government's investment in the irrigation component of these water resource projects, is referred to as "subsidized water" because the lost interest is viewed as a subsidy to farmers.

concluded in that report that all contract renewals should be preceded by an analysis of the environmental, economic, and management impacts of renewal.

The Bureau Is Using an Accepted Cost Allocation Methodology

The Bureau currently uses the Separable Costs Remaining Benefits (SCRB) method to allocate CVP costs associated with facilities in service. This method was developed by the Inter-Agency River Basin Committee to equitably distribute costs among project users. The Committee recommended it in 1950 for general use in allocating costs in federal multipurpose projects.

The SCRB method is based on the principle that users should not pay more for a purpose than the benefits they receive or more than the cost of the most economical single-purpose alternative that would achieve the same purpose. Therefore, to develop distribution percentages for allocating joint costs, the SCRB method relies on estimates of the benefits attributed to each purpose and estimates of the costs of alternatives to each purpose. Appendix I describes the SCRB method in more detail.

Cost Allocation Has Not Been Updated

The Bureau's current policy is to complete a major allocation of CVP costs every 10 years to ensure that the allocation is compatible with current use, accomplishments, and benefits. Allocations may be updated in the interim 5 years if necessary. A major cost allocation was to be completed in 1979; however, because of personnel shortages and work that received higher priority, this allocation was never started.

Consequently, the Bureau currently is charging rates to its users in the CVP that are based on the cost allocation percentages it developed in 1970 and updated in 1975. Because the current values of benefits and alternative costs for each purpose are very different from those used in 1970 and 1975, the percentages are almost certainly outdated.

We attempted to verify the percentages used by the Bureau to allocate current costs for facilities-in-service, but documentation to determine how percentages were derived from the 1970 study and the 1975 update was not available. Therefore, Bureau officials could not explain to us the basis for these percentages. Consequently, we could not review the basis for rates currently being charged to irrigators, M&I water users, and power users.

Updated Cost Allocation Is Overdue

Because of funding and staffing constraints, the Bureau gave limited attention to the congressional mandate for an updated cost allocation before mid-1987, according to Bureau officials in the Mid-Pacific Regional Office. Drafts completed in December 1987 and June 1988 were revised by the Mid-Pacific Regional Office and the Denver headquarters office. The most recent draft was completed in December 1988 and approved by the Denver headquarters office in July 1989.

This draft was released for public review pursuant to notice in the Federal Register in January 1990; comments were received through May of that year. The Bureau currently is addressing those comments.

Significant Problems With the 1988 Study Have Been Identified

In its 1988 draft study, the Bureau used a variation of the SCRB method—the Alternative Justifiable Expenditure (AJE) method. The SCRB method requires the use of data developed during project formulation to identify costs specifically associated with a single project purpose; the AJE method does not. The AJE method was recognized by the Inter-Agency River Basin Committee as an acceptable alternative when original cost data are not available. Both methods rely on estimates of benefits and alternative costs to allocate joint costs among purposes.

Our review of the December 1988 draft study showed that the Bureau included inappropriate costs and made questionable estimates of project benefits and alternative costs. The comments submitted in the public comment period cited similar concerns. The three major problem areas identified are summarized below and described in more detail in appendix II.

First, inappropriate costs were included. To develop distribution percentages for the 1988 study, the Bureau first allocated among project purposes not only \$2.85 billion in costs incurred for facilities in service but also \$3 billion in authorized but unspent costs for facilities that, as of 1986, had not yet been, and may never be, constructed. Distribution percentages calculated from these values were then used to allocate the costs associated only with completed and in-service facilities. In addition, the Bureau included in its allocation certain costs that are specific to only one or a few water districts that have sole responsibility for repaying such costs directly.

Second, benefits and alternative costs assumptions are questionable. In some cases, the Bureau included benefits that are not applicable to the

project, while excluding others that are. For example, the Bureau included as CVP benefits (1) returns to farm equity, labor, and management from CVP irrigation water that standard economic principles assume would have been earned whether or not the land was irrigated with CVP water and (2) hydroelectric power not generated by the CVP. Conversely, the Bureau excluded the benefits of wildlife conservation because it had no methodology to estimate these benefits.

In addition, the U.S. Army Corps of Engineers' Sacramento District Office calculated flood control benefits for the Bureau by adjusting dated estimates of CVP flood control benefits calculated in the 1960s to 1987 dollars. The Corps District Engineer cautioned, however, that continual updating of this material will not accurately portray current benefits.

In identifying an alternative M&I water source, the Bureau considered the CVP's Shasta Dam on the Sacramento River to be the most likely alternative and updated earlier cost data for the dam. However, the cost data for Shasta Dam originally were developed to depict the estimated cost of water for both irrigation and M&I water supply. Therefore, these data represent a dam and reservoir larger than that needed only for M&I. In addition, Shasta Dam's location precludes water delivery to many M&I users. According to the Bureau's senior economist responsible for the CVP cost allocation, small reservoirs on several rivers throughout the CVP service area would be necessary to provide a realistic alternative source of water for CVP M&I users.

Finally, realistic data are unavailable or are costly and time-consuming to obtain. Bureau engineers informed the senior economist that reliable design and cost data for more realistic alternative M&I facilities no longer exist and that developing new data would be expensive and time-consuming. As an alternative, the Bureau asked CVP M&I water users to estimate how much an additional water supply would cost them if they had to rely on a nonfederal source. Most of the respondents replied that they did not have alternative nonfederal sources of water available. Therefore, they could not supply useful data.

Revised Draft Will Have Similar Problems

Mid-Pacific regional officials said they will revise the study to address problems identified by April 30, 1992. Public comments will be received from July through September of 1992. We discussed with the senior economist how he would be able to overcome the problems associated with estimating the value of project benefits and alternative costs that we

and others had identified. He explained that new assumptions will be used in some cases; in other cases, assumptions will not change but data will be updated.

For example, according to the senior economist, the alternative cost of water for M&I water uses will be based on the price of water purchased from California's 1991 state water bank. This bank was established to alleviate shortages during the ongoing drought. Alternative costs for waterfowl conservation and other water supply uses will also be based on the water bank price. We question the reasonableness of this new assumption. This price does not reflect the cost of a realistic, long-term water supply, but rather the value of short-term supplies under drought conditions.

We were also told that the Bureau will not estimate the value of waterfowl conservation benefits but will assume that the benefits are equal to or exceed the alternative cost calculated. The Bureau will rely on either the benefits or alternative costs estimated for most other purposes as well. In other words, the Bureau will not calculate both benefits and alternative costs and actually determine which is the lesser value, as required by the AJE method, but will assume that the one value estimated is less than the one not estimated. Irrigation is the only purpose for which both benefits and alternative costs will actually be calculated.

Other assumptions will not change. The Bureau will continue to rely on outdated estimates of flood control benefits, despite the Corps' objections. The Corps refused to adjust the outdated estimates to 1991 dollars, stating that new data should be developed. Because of the estimated time and cost involved, the Bureau has decided not to develop new data and plans to adjust the outdated data itself. The Bureau will also continue to include farm equity, labor, and management in its estimate of irrigation benefits, even though they are not attributable to the project.

The inappropriate costs included in the 1988 study will be excluded in the revised draft. However, inherent problems, such as obtaining realistic data for both benefits and alternative costs and the need to rely on subjective assumptions, will remain. Because of this, the Bureau's revised draft allocation study could be challenged during the public comment period again, and additional delay in deciding on final percentages is likely to occur.

Delays in Allocating Costs Can Affect Revenues

Delays in allocating CVP costs properly can significantly affect revenues to the U.S. Treasury in several ways. First, costs must be appropriately allocated between reimbursable and nonreimbursable project purposes. Allocation to reimbursable purposes could increase or decrease with an updated allocation. However, if allocation to reimbursable project purposes is currently too low, resulting repayment rates are also too low, reducing revenue to the Treasury until the allocation is updated. Similarly, if costs are incorrectly allocated to noninterest-paying purposes rather than interest-paying purposes, payments to the Treasury will be lower. Conversely, if allocation to certain reimbursable purposes currently is too high, future rates can be adjusted downward so that users do not pay more than they owe.

The Bureau believes it has time to adjust water and power rates to ensure cost recovery by 2030, as required in the 1986 amendments. However, while the correct amount owed may ultimately be repaid as a result of an updated cost allocation, the value of the dollars received years late will be less than if they had been received on time. This decrease occurs because of inflation and the lost opportunities for other productive uses of that money, such as reducing the federal debt.

In addition, if the allocation of costs for any reimbursable purposes currently is too low, the annual rates necessary to ensure repayment of the full allocated amount by 2030 must increase each year the cost allocation is delayed. It is possible that irrigation water users may not have the ability to pay the high rates ultimately necessary to repay their project costs by 2030. Under current reclamation law, shortfalls in irrigators' ability to pay are passed on to power users for ultimate repayment. However, the Bureau does not require power users to repay the irrigation assistance debt until the final year of the repayment schedule. As a result, the dollars that eventually flow to the Treasury are worth much less than if they had been repaid in annual irrigation rates. This is because the present value of money decreases the farther into the future this money is paid. Assume for example, that irrigators make equal annual payments between now and 2030, but repay only 90 percent of the amount they owe the federal government, and power users pay the remaining 10 percent in one lump sum at the end of the period. Using a discount rate of 8.15 percent, the present value of government receipts under this scenario will be \$28 million less than if irrigators pay the full amount in equal annual installments over the same period. Similarly, if irrigators pay only one half of the full amount, with the remaining half paid by power users at the end

of the period, the corresponding difference in present value will be over \$141 million.²

Alternate Allocation Approaches Are Available

While the Bureau has relied on accepted methods of cost allocation, it could also adopt other acceptable cost allocation methods that are simpler in design. In preparing its initial CVP cost allocation in 1946, the Bureau recognized that several cost allocation methods were available and that each had merit. It concluded that good judgment must be exercised in choosing allocation methods. Similarly, in 1952, when the House Committee on Public Works examined federal practices for allocating project costs, it was favorably impressed with the accepted SCRB method but cautioned that the history of some projects may indicate that it would be unreasonable to use this method. The Committee stressed that reason must enter into each cost allocation and that it would be undesirable to prescribe any rigid rules for allocations.

We discussed with the Bureau two alternative approaches to its cost allocation method. One approach allocates joint costs in direct proportion to the specific costs assigned to each purpose. For example, if specific costs associated with irrigation are 80 percent of all specific project costs, then irrigation would receive 80 percent of the remaining joint costs to be allocated among all project purposes.

The other approach allocates joint costs among purposes on the basis of use. For example, if 20 percent of the water in a reservoir is used for M&I purposes, while 80 percent is used for irrigation, then 20 percent of the costs of the dam and reservoir would be allocated to M&I purposes and 80 percent to irrigation. In many cases, dams and reservoirs are also used for flood control and hydroelectric power generation. In these cases, the percent of space in the reservoir dedicated to controlling floods would represent the share of joint costs dedicated to flood control. Often, almost all water released to water users generates power. Therefore, the remaining joint costs of the dam and reservoir could be divided equally between water and power users. The costs allocated to water users could then be suballocated on the basis of use.

These two approaches have the advantages of (1) eliminating the need to gather data and estimate benefits and alternative costs to allocate joint

²The 8.15-percent discount rate used is the 1991 average of the 30-year U.S. Treasury bond rate. In calculating the present value figures, we assumed equal annual payments between 1992 and 2020, inclusive. Sensitivity analyses one percentage point below and one point above this rate (7.15 percent and 9.15 percent, respectively) yielded present value differences that were quite similar.

costs among project purposes, (2) applying a cost allocation formula across all purposes, thus reducing subjective assumptions, and (3) generating a cost allocation more quickly with existing data.

We recognize that our suggested approaches, like the Bureau's, may not address all concerns. Bureau guidelines discuss allocating costs on the basis of use as a possible cost allocation method but express concern that use changes over time and that this approach may lead to inequitable results. However, Bureau policies require major cost allocations to be completed every 10 years and updates every 5 years as necessary, which could adjust for use changes. In addition, the Bureau used this approach to assign certain specific costs to various purposes in its 1988 draft study and will continue to do so in its revised draft. The SCRIB and AJE methods are designed to develop equitable cost distribution by ensuring that users do not pay more for a purpose than either the benefits they receive or the cost of the most economical alternative that would achieve the same purpose. While our approaches do not ensure that users do not pay more than the benefits or alternative cost of a purpose, they do allocate costs equitably by applying the same criteria across all purposes.

We discussed the appropriateness of these approaches with the Mid-Pacific Region's senior economist responsible for cost allocation. He agreed that our approaches were far less complicated and time-consuming than the method the Bureau had been pursuing and that they would address problems raised in public comments. In December 1991, he informed us that Bureau headquarters advised him to use the AJE method to revise the cost allocation study but also to explore the use of both of our suggested approaches.

Conclusions

The Bureau did not complete its updated cost allocation by the congressionally mandated deadline. In addition, the Bureau's method has two fundamental problems: (1) it relies on assumptions and subjective judgments about costs and benefits relating to each project purpose that are open to question and (2) it requires data that are not always available or that are time-consuming to generate. If the Bureau relies on this method to revise its 1988 draft study, problems identified with the draft are likely to remain, causing additional delay. Because of the potential adverse cost implications for the federal government that are associated with delays in completing the update, we believe the Bureau should adopt a cost allocation methodology that is less complicated and more timely, and relies on existing data.

Recommendation

To complete the CVP cost allocation expeditiously, we recommend that the Secretary of the Interior direct the Commissioner of the Bureau of Reclamation to use less costly and more timely methodologies to update the CVP cost allocation study. We have suggested two approaches: (1) allocating joint costs in direct proportion to specific costs or (2) allocating joint costs on the basis of use.

Agency Comments

We provided a draft of this report to Interior Department officials and met with Bureau officials in the Mid-Pacific Regional Office in Sacramento, California, to obtain oral agency comments. The officials generally agreed with the factual information in the report. They indicated that they were developing an updated cost allocation based on the A/E method as well as the two approaches we suggested. They are scheduled to provide the results of these three approaches to Bureau headquarters by April 30, 1992. Although they are exploring the use of our approaches, Bureau officials expressed concern that our approaches are not based on an economic analysis of the benefits and alternative costs of each purpose and therefore may not provide a fair allocation of costs among users.

We recognize that our approaches do not ensure that users do not pay more than the benefits received or the alternative cost of a purpose. We question the fairness of allocating costs on the basis of questionable estimates of benefits and alternative costs. In addition, our approaches have advantages over the Bureau's methods by eliminating the need to gather data and estimate benefits and costs, reducing subjective assumptions, and generating a cost allocation more quickly with existing data.

Bureau officials also stated that their guidelines do not include consideration of one of the approaches we suggest—the allocation of joint costs in direct proportion to specific costs. However, they believed that they could obtain approval for the use of this approach for the CVP.

Scope and Methodology

To describe the Bureau's current cost allocation method and determine the status of the cost allocation study that the Congress mandated be implemented by January 1, 1988, we reviewed the Bureau's 1970 cost allocation study, the December 1988 Central Valley Project Cost Allocation Study, and supporting documentation. We discussed the methodologies used to develop project benefit and alternative cost data with the Bureau's senior economist in charge of the cost allocation study and with

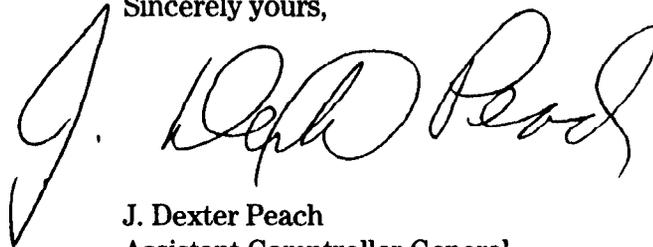
agricultural economic consultants Walter Butcher, from Washington State University, and Richard Howitt, from the University of California at Davis. We reviewed legislation, Bureau instructions, and other cost allocation guidelines to determine whether an alternate cost allocation method would be preferable.

Our work was conducted at the Bureau of Reclamation's Mid-Pacific Regional Office in Sacramento, California, between April 1991 and December 1991 in accordance with generally accepted government auditing standards.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to the Secretary of the Interior, the Commissioner of the Bureau of Reclamation, and other interested parties. We will also make copies available to others upon request.

This report was prepared under the direction of James Duffus III, Director, Natural Resources Management Issues, who can be reached at (202) 275-7756 if you or your staff have any questions. Other major contributors are listed in appendix III.

Sincerely yours,



J. Dexter Peach
Assistant Comptroller General

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Abbreviations

AJE	Alternative Justifiable Expenditure
CVP	Central Valley Project
GAO	U.S. General Accounting Office
SCRB	Separable Costs Remaining Benefits

Separable Costs Remaining Benefits Method

The Bureau uses the Separable Costs Remaining Benefits (SCRB) method to allocate 1991 CVP costs associated with facilities in service. Current costs are allocated on the basis of distribution percentages developed in 1970 and updated in 1975. This method was developed by the Inter-Agency River Basin Committee, composed of representatives from various federal agencies, which recommended it in 1950 for general use in allocating costs in federal multipurpose projects.

The SCR method is based on the principle that users should not pay more for a purpose than the benefits received or the cost of the most economical single-purpose alternative that would achieve the same purpose. The method involves the following steps:

- Estimates are made about the value of the benefits attributable to each purpose and the alternative costs of achieving each purpose. The smaller of these two estimates represents the amount that can justifiably be spent on each purpose, and is referred to as the justifiable expenditure.
- Separable costs specifically associated with each purpose are then subtracted from the justifiable expenditure to obtain the remaining justifiable expenditure. Separable costs for a purpose represent the difference between the total estimated cost of the multipurpose project, and the cost of the same project with the one purpose omitted.
- Joint costs are allocated to each project purpose in direct proportion to each purpose's share of the total remaining justifiable expenditure.

Table I.1 presents a simplified example of how the SCR method would allocate the costs of a \$30 project among three project purposes.

**Appendix I
Separable Costs Remaining Benefits Method**

**Table I.1: Simplified Example of the
SCRB Method**

Factor measured	Purpose			
	Irrigation	M&I	Power	Total
Estimated benefits	\$15	\$30	\$35	\$80
Estimated alternative cost	\$25	\$20	\$40	\$85
Justifiable expenditure	\$15	\$20	\$35	\$70
Less separable costs (assigned to each purpose)	(\$5)	(\$5)	(\$10)	(\$20)
Remaining justifiable expenditure	\$10	\$15	\$25	\$50
Percent of joint cost distribution (based on remaining justifiable total of 50)	20%	30%	50%	100%
Joint costs allocated	\$ 2	\$ 3	\$ 5	\$10
Share of total project costs	\$ 7	\$ 8	\$15	\$30

Notes: Total project cost = \$30 Separable costs total = \$20 Joint costs to be allocated = \$30 - \$20 = \$10

Separable costs associated with each purpose, plus the joint costs allocated to that purpose, represent each purpose's share of the total project cost. The keys to the SCRБ method are the estimated value of the benefits attributed to each purpose and the estimated cost of the single-purpose alternative, which determine the justifiable expenditure for each purpose. Joint costs primarily are the costs of the dams and reservoirs, which are used for many purposes. Because the CVP is financially and operationally integrated, the joint costs of these facilities combined, not the cost of each facility separately, are allocated among all project purposes.

Significant Problems With the 1988 Draft Study Have Been Identified

In its 1988 draft study, the Bureau used a variation of the SCRIB method—the Alternative Justifiable Expenditure (AJE) method. The AJE method identifies and charges specific costs clearly associated with each purpose to that purpose, rather than charging separable costs to each purpose, as the SCRIB method does. Specific costs are the actual costs that have been authorized for a project facility. Separable costs take into account the added costs of increased size of structure and changes in design over that required for other purposes and are generally developed during project formulation. According to the Bureau, separable costs for the CVP are now outdated and new data would be costly to develop. The Federal Inter-Agency River Basin Committee recognized that specific costs may be used in lieu of separable costs when necessary. Both methods rely on estimates of benefits and alternative costs to allocate joint costs among project purposes.

Our review and our consultants' evaluation of the December 1988 draft study showed that the Bureau included inappropriate costs and made questionable estimates of project benefits and alternative costs. The comments submitted in the public comment period cited similar concerns.

Inappropriate Costs Were Included

To develop joint cost distribution percentages for the draft 1988 study, the Bureau first allocated among project purposes costs incurred from facilities in service plus \$3 billion in authorized costs that have not yet been spent. These authorized costs include costs for project facilities that, as of 1986, had not yet been, and may never be, constructed. Distribution percentages calculated from these values were then used to allocate only the costs incurred from completed and in-service facilities among project purposes.

We do not believe that the costs of authorized but not completed project facilities should have been included in the distribution calculations. The benefits and alternative costs of future project features are at best difficult to estimate. Furthermore, basing allocation percentages on one set of benefits and alternative costs (those associated with all authorized features), and then allocating a subset of the benefits and costs (those associated with facilities that are complete and in service), potentially distorts the allocation of incurred costs. Actual experience with project facilities may differ significantly from potential future experiences.

In addition, the Bureau included in its allocation certain costs that are specific to only one or a few water districts that have sole responsibility

for repaying such costs directly. Unlike most other water supply costs, these costs are not repaid through general water rates that are based on cost allocation; they are repaid by the responsible water districts directly through individual repayment contracts. By assigning these costs to the general water supply purpose, the Bureau reduced the allocation of joint costs to water supply, thereby increasing the allocation of joint costs to other project purposes.

Benefits and Alternative Cost Assumptions Are Questionable

The Bureau's 1988 draft study includes benefits and alternative costs data that are based on questionable assumptions. To determine benefits, one must decide what to include and exclude as benefits of a purpose and then place a value on these benefits. To determine single-purpose alternative costs, one must identify feasible alternatives that would satisfy each purpose and then estimate the costs of each alternative. We question the reasonableness of many of the assumptions the Bureau used to determine benefits and alternative costs in its 1988 draft study. In some cases, the Bureau included benefits that are not applicable to the project, while excluding others that are. Examples of problems we identified are discussed below and illustrate the types of difficulties involved in estimating CVP benefits and alternative costs.

Identifying and Valuing Benefits

In identifying benefits, for example, the Bureau included those that would be present even if resources were used for other purposes. The Bureau relied on farm budget studies it had developed to compute the benefits associated with the irrigation water supply. Benefits were measured as the income generated from the use of CVP water for irrigation. According to our consultants, agricultural economists Walter Butcher from Washington State University and Richard Howitt from the University of California at Davis, the Bureau's computed benefits are too high. They note that the Bureau's farm budget studies include returns to certain resources—farm equity, labor, and management—as part of the CVP benefits. However, these returns normally are considered to approximately equal their opportunity costs. Opportunity costs are the return these same resources would have earned in an alternative investment. In other words, returns would have been earned by these resources in some other use if the land were not irrigated with CVP water.

In another instance, the Bureau included the costs of extra power purchased outside the CVP as a project benefit. Hydroelectric power generated by the CVP is used to drive the pumps that deliver project water.

Any excess is sold to public electric companies. As requirements for project power have increased, the CVP has kept more power for project use and has, therefore, not been able to provide enough power to meet growing requirements of the electric companies. To meet the shortfall, the Western Area Power Administration, which markets CVP power for the Bureau, has entered into contracts with power suppliers in the Pacific Northwest.

The Bureau considered power benefits of the project to be equal to the cost of a single-purpose alternative source of power for the purposes of cost allocation. After determining the benefits attributable to the power produced by the CVP, the Bureau included, as an additional project benefit, the costs of the extra power purchased from the Pacific Northwest as well as the cost of constructing transmission lines to deliver the power. However, this power is not produced by the project and therefore is not a benefit of the CVP.

In calculating total water supply benefits, the Bureau did not consider waterfowl conservation. The CVP water supply provides water for irrigation, M&I use, and waterfowl conservation. The project also has water that is not allocated to any specific purpose—25 percent of this is set aside temporarily by law for improvements in waterfowl habitat. However, according to the Bureau, there is no method available for computing the benefits of waterfowl conservation. Therefore, water supply benefits include only those benefits calculated for irrigation, M&I, and 75 percent of the unallocated water.

In addition, the U.S. Army Corps of Engineers' Sacramento District Office calculated flood control benefits for the Bureau by adjusting dated estimates of CVP flood control benefits calculated in the 1960s to 1987 dollars. The Corps District Engineer cautioned, however, that continual updating of this material will not accurately portray current benefits.

Identifying and Costing Alternatives

In identifying alternative M&I water sources, the Bureau considered the CVP's Shasta Dam on the Sacramento River to be the most likely alternative source and converted cost data contained in the 1970 CVP cost allocation study to 1987 price levels for use in its 1988 draft study. However, the alternative cost data for the Shasta Dam originally were developed to depict the estimated cost of water for both irrigation and M&I water supply and therefore represent a dam and reservoir larger than that needed only for M&I. In addition, Shasta Dam's location precludes water

delivery to many M&I users. According to the Bureau's senior economist responsible for the CVP cost allocation, small reservoirs on several rivers throughout the CVP service area would be necessary to provide a realistic alternative source of water to CVP M&I users.

**Realistic Data Unavailable
or Expensive and
Time-consuming to Obtain**

Reliable design and cost data for realistic M&I alternatives are difficult to obtain. The senior economist in charge of the CVP cost allocation study has determined the location of storage, conveyance, and pumping facilities necessary for supplying all CVP M&I water users. However, according to the economist, determining the appropriate size and costs associated with each of these facilities will be difficult. Bureau engineers informed him that reliable design and cost data no longer exist and that developing new data would be expensive and time-consuming.

As an alternative, the Bureau asked CVP M&I water users to estimate how much an additional water supply would cost them if they had to rely on a nonfederal source. Most of the respondents replied that they do not have alternative nonfederal sources of water available.

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