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REPORT TO THE CONGRESS



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Improvements Needed In Making Benefit-Cost Analyses For Federal Water Resources Projects

B-167941

Department of Agriculture
Department of the Army
Department of the Interior
Tennessee Valley Authority

BY THE COMPTROLLER GENERAL
OF THE UNITED STATES

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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To the Speaker of the House of Representatives
and the President pro tempore of the Senate

This is our report on improvements needed in making benefit-cost analyses for Federal water resources projects.

Our review was made pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

We are sending copies of this report to the Director, Office of Management and Budget; the Secretaries of Defense, the Army, the Interior, and Agriculture; and the Chairmen of the Tennessee Valley Authority and the Water Resources Council.

Sincerely yours,

A handwritten signature in cursive script, reading "Thomas P. Abate".

Comptroller General
of the United States

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ABBREVIATIONS

BOR	Bureau of Outdoor Recreation, Department of the Interior
BSF&W	Bureau of Sport Fisheries and Wildlife, Department of the Interior
EDA	Economic Development Administration, Department of Commerce
FPC	Federal Power Commission
GAO	General Accounting Office
SCS	Soil Conservation Service, Department of Agriculture
TVA	Tennessee Valley Authority

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COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

IMPROVEMENTS NEEDED IN MAKING
BENEFIT-COST ANALYSES FOR
FEDERAL WATER RESOURCES PROJECTS
Department of Agriculture
Department of the Army
Department of the Interior
Tennessee Valley Authority
B-167941

D I G E S T

WHY THE REVIEW WAS MADE

How are benefit-cost analyses made for water resources projects? GAO made this study to find out.

The importance of and the use made of benefit and cost analyses to Federal agencies and the Congress in reaching decisions on new projects is widely recognized. Projects are seldom authorized unless their estimated benefits exceed their estimated costs.

Accordingly, the steps followed in determining benefits and costs have become of increasing interest to the Congress, governmental agencies, and the public.

GAO reviewed methods and procedures used by the Bureau of Reclamation, Department of the Interior; the Corps of Engineers, Department of the Army; the Soil Conservation Service (SCS), Department of Agriculture; and the Tennessee Valley Authority (TVA) for making benefit-cost analyses for projects which include purposes, such as flood control, irrigation, power, recreation, fish and wildlife enhancement, and municipal and industrial water supply.

FINDINGS AND CONCLUSIONS

The importance of the benefit-cost analysis to decisionmaking requires that benefits and costs be determined using uniform methods and procedures consistent with the governing criteria and considering all pertinent beneficial and adverse effects.

Executive branch policies, standards, and procedures for formulation, evaluation, and review of individual project plans for developing water resources were issued in May 1962 and printed as Senate Document 97.

GAO selected seven projects--three Corps, two Bureau, one SCS, and one TVA--to evaluate the manner in which instructions were applied by agencies in determining benefits and costs.

GAO's review showed that:

--Benefits were not computed in a consistent manner (11 instances).

For example, in addition to benefit values for flood control protection to existing property, the flood control benefit determinations included

values for normal growth in some cases, induced growth in others, and neither in still others. (See p. 14.)

- Benefits were not based on analysis of conditions with and without the project (16 instances).

For example, a major portion of the flood control benefits claimed for six of the seven projects were computed using a systems approach rather than the incremental approach. (See p. 21.)

- Benefit computations were not adequately supported (21 instances).

For example, at one project, the Corps did not develop information on either the potential water users or the expected rate of use that was needed to adequately estimate the water supply benefits. (See p. 30.)

- Project costs and induced costs were not fully considered in the benefit-cost determinations (16 instances).

For example, the estimated value for Government-owned lands to be used for project purposes was not included in the benefit-cost computations at three of the projects. (See p. 38.)

Causes of the problems in the benefit-cost determinations included:

- Generalized and incomplete agency guidance and instructions.
- Varying interpretations and inconsistent application of Senate Document 97 criteria and agency implementing procedures.
- A lack of or incomplete studies and analyses by the agencies of data pertinent to making determinations and computations.
- Inappropriate or questionable assumptions for making benefit computations.

The Water Resources Council developed "Principles and Standards for Planning Water and Related Land Resources," which became effective on October 25, 1973, and superseded Senate Document 97.

These principles are intended to provide the broad policy for planning activities and the standards are intended to provide for uniformity and consistency in comparing, measuring, and judging beneficial and adverse effects of alternative plans.

These require that procedures for carrying out planning activities be developed by the water resources agencies and reviewed by the Council for consistency with the principles and standards and for uniformity among the agencies. The procedures include selection of objectives, measurement of beneficial and adverse effects,

and comparison of alternative plans for action.

As of August this year, the Bureau, Corps, and TVA were developing draft implementing procedures. SCS's procedures had been reviewed for consistency with the principles and standards and had been approved by the Council.

Council and agency officials informed GAO that agencies' implementing procedures generally will provide broad, conceptual, policy-type guidance to be followed in implementing the new principles and standards. However, the agencies had not planned to submit their detailed procedures--the specific instructions to their field offices on how to make benefit-cost analyses--to the Council.

Because of the problems identified in GAO's review, such as varying guidance and varying application by the agencies of their own procedures, a review by the Council of both the implementing and the detailed procedures is necessary to help promote consistent benefit-cost determinations among and within the water resource agencies.

RECOMMENDATIONS OR SUGGESTIONS

The Secretaries of Agriculture, the Army, and the Interior and the Chairman of the Board, TVA, should have their agencies:

--Revise or develop, as necessary, their detailed procedures for making benefit-cost determinations and submit them to the Water Resources Council.

--Periodically evaluate their detailed procedures to recognize changed objectives, needs, and conditions and improved methods and procedures.

--Strengthen their internal management procedures for assessing (1) benefit-cost determinations for conformance to the governing principles and standards, (2) implementing and detailed procedures, and (3) the completeness and adequacy of supporting documentation.

The Chairman, Water Resources Council, should have the Council:

--Review the agencies' detailed procedures for uniformity and consistency with the principles and standards.

--Periodically review the principles and standards to recognize changed objectives, needs, and conditions and improved methods and procedures.

AGENCY ACTIONS AND UNRESOLVED ISSUES

Comments on this report were obtained from the Departments of the Army, the Interior, and Agriculture, TVA and the Water Resources Council.

The Council and the agencies generally agreed with the conclusions and recommendations and advised GAO of their actions to implement the recommendations. (See p. 46.)

If the actions to be taken are properly carried out, the benefit-cost determinations should be improved.

MATTERS FOR CONSIDERATION
BY THE CONGRESS

This report on weaknesses in agencies' policies, procedures, and practices associated with benefit-cost determinations for Federal water resource projects and the corrective

actions to be taken by the Council and agencies should be informative to committees and individual Members of the Congress in their consideration of legislation authorizing and appropriating funds for such projects.

EXPLANATION OF TERMS

Associated costs	The value of goods and services over and above those included in project costs needed to make the immediate products or services of the project available for use or sale.
Discount rate	The interest rate used in evaluation of water (and other) projects for the purpose of calculating the present value of future benefits and future costs, or otherwise converting benefits and costs to a common time basis.
Economic costs	The value of all goods and services (land, labor, and materials) used on constructing, operating, and maintaining a project or program; interest during construction; and all other identifiable expenses, losses, liabilities, and induced adverse effects connected therewith, whether in goods or services, whether tangible or intangible, and whether or not compensation is involved.
Enhanced employment	The increased economic activity to the nation as a whole (net increase in productivity or national benefit) made possible by the project--measured in terms of the utilization of the unemployed or underemployed (subemployed).
Incremental approach (flood control)	The difference in flood control capability in the basin with and without the project is determined and the flood control benefits are assigned to the project according to the specific increment of flood control provided.
Induced costs	All uncompensated adverse effects caused by the construction and operation of a program or project, whether tangible or intangible.

Induced growth	The increased value of property expected from increased or higher use of property made possible by the increased protection provided by the project.
Mitigation	The prevention or replacement of losses or lessening of damages to wildlife resources due to water resource developments.
Normal growth	The value of property normally expected to develop in the flood plain over the project's economic life if the project were not constructed.
Primary benefits	The value of goods and services directly resulting from the project, less associated costs incurred in realization of the benefits and any induced costs not included in project costs.
Secondary benefits	The increase in the value of goods and services which indirectly result from the project under conditions expected with the project as compared to those without the project. Such increase shall be net of any economic nonproject costs that need be incurred to realize these secondary benefits.
Supplemental irrigation water	Irrigation water supplied to lands which are presently receiving a partial supply of irrigation water.
Systems approach (flood control)	Flood control benefits are accumulated for all projects in a river basin then redistributed in proportion to each project's flood control capability.

CHAPTER 1

INTRODUCTION

The Bureau of Reclamation, Department of the Interior; the Corps of Engineers, Department of the Army; the Soil Conservation Service (SCS), Department of Agriculture; and the Tennessee Valley Authority (TVA) plan and construct multiple-purpose water resource development projects. Such projects are constructed to provide benefits through flood control, irrigation, power, recreation, fish and wildlife enhancement, municipal and industrial water supply, and other project purposes authorized by the Congress.

Benefit-cost analyses are developed and reported to the Congress by Federal water resource construction agencies to show the economic feasibility of proposed projects. The benefit-cost analysis is one of several factors considered by the agencies and the Congress in project decisionmaking. It provides a quantified measure of a project's expected worth and thus serves a purpose similar to the estimated return on investment used in private business when expansion of facilities is considered. Water resource projects are seldom authorized or funded by the Congress unless the estimated project benefits exceed the estimated project costs.

Because the benefit-cost analysis is important in congressional and agency decisionmaking, the manner in which benefits and costs are determined has become of increasing interest and concern to Members of the Congress and various groups of citizens.

We, therefore, have reviewed the methodology and procedures applied by Federal agencies for making benefit-cost determinations and computations for water resource projects. The agencies and the seven projects covered in our review are shown in chapter 8.

CRITERIA FOR BENEFIT-COST DETERMINATIONS

In the Flood Control Act of 1936 (33 U.S.C. 701a), the Congress declared that benefits of Federal projects should exceed costs. This act led to the development of analytical procedures for evaluating the benefits and costs of proposed water resource, and related land

resource, projects. These procedures centered around a national economic efficiency analysis and were first published in a report entitled "Proposed Practices for Economic Analysis of River Basin Projects" in May 1950 and were revised in May 1958. This report was prepared by an interagency committee on water resources.

Bureau of the Budget Circular A-47 was issued on December 31, 1952, informing the agencies of considerations which would guide the Bureau of the Budget in its evaluations of projects and requiring uniform data to permit project comparisons.

On October 6, 1961, the President requested the Secretaries of the Interior; Agriculture; the Army; and Health, Education, and Welfare to review existing evaluation standards and to recommend improvements. Their report, "Policies, Standards, and Procedures in the Formulation, Evaluation, and Review of Plans for Use and Development of Water and Related Land Resources," was approved by the President on May 15, 1962, and published as Senate Document 97, 87th Congress, 2d session. Senate Document 97 replaced Bureau of the Budget Circular A-47 and provided the governing criteria for water resource project formulation.

The Water Resources Planning Act of 1965 (42 U.S.C. 1962) required the Water Resources Council¹ to establish--after consulting other interested entities and with the approval of the President--principles, standards, and procedures for the formulation and evaluation of Federal water and related land resources projects. Such principles and standards entitled "Principles and Standards for Planning Water and Related Land Resources" were established by the Council and approved by the President.

The principles and standards became effective October 25, 1973, and superseded Senate Document 97 as the governing criteria for water resource project formulation. The principles are intended to provide the broad policy for planning activities and include the conceptual basis for planning. The standards are intended to

¹The Water Resources Council, established by the Water Resources Planning Act, consists of the Secretaries of the Interior; Agriculture; the Army; Health, Education, and Welfare; and Transportation; and the Chairman of the Federal Power Commission.

provide for uniformity and consistency in comparing, measuring, and judging beneficial and adverse effects of alternative plans.

The principles and standards, however, require that procedures to provide more detailed methods for carrying out the various levels of planning--including the selection of objectives, the measurement of beneficial and adverse effects, and the comparison of alternative plans--be developed by the water resource agencies and reviewed by the Council for consistency with the principles and standards and for uniformity among the agencies. As of August 1974, the Bureau, Corps, and TVA were developing implementing procedures and SCS procedures had been reviewed for consistency with the principles and standards and approved by the Council. After the other agencies' procedures have been reviewed and approved, they will all be reviewed again by the Council for uniformity among the agencies.

According to Council and agency officials, these will be broad, conceptual, policy-type procedures which the agencies will follow in implementing the principles and standards. Further, each agency will continue to rely, as it did under Senate Document 97, on its own detailed procedures for computing and evaluating project benefits and costs.

In addition, a Council official stated, the Council will establish, when necessary, general procedures to be followed by the agencies in implementing the principles and standards. The Council has issued its first general procedure which establishes the criteria for determining whether a proposed project will be developed using the principles and standards or Senate Document 97.

The procedure requires that:

- Project plans formulated in accordance with Senate Document 97 criteria and transmitted to the Office of Management and Budget before October 25, 1973, including those transmitted to the Congress for approval or authorization, will remain as formulated.

- Project plans formulated in accordance with Senate Document 97 on which fieldwork was completed as of October 25, 1973, and which were transmitted to the Office of Management and

Budget or transmitted to the Office of Management and Budget and to the Congress for approval or authorization between October 25, 1973, and June 30, 1974, will be evaluated using Senate Document 97 criteria but will include addendum information concerning current information on benefits and costs and on environmental problems and will include an analysis of the need for reformulation.

- - Project plans formulated in accordance with Senate Document 97 criteria on which fieldwork was completed as of October 25, 1973, and which are transmitted to the Office of Management and Budget between July 1, 1974, and June 30, 1975, will be evaluated using Senate Document 97 criteria but will include addendum information concerning current information on benefits and costs; abbreviated information on environmental quality, regional development, and social well-being, consistent with the intent of the principles and standards; and an analysis of the need for reformulation.
- - Projects submitted to the Office of Management and Budget after June 30, 1975, will be evaluated using the principles and standards.

For authorized but unfunded projects, the principles and standards apply on a selective basis determined by the head of each water resource agency. This means that each agency will have to look at its backlog of authorized but unfunded projects and select those to be reformulated. Those projects not selected for reformulation will continue to be evaluated using Senate Document 97 criteria.

CHAPTER 2

PROBLEMS NOTED IN BENEFIT-COST DETERMINATION

METHODOLOGY AND PROCEDURES

Senate Document 97 provided the governing criteria for Federal water resource agencies for formulating and evaluating water resource projects from its approval on May 15, 1962, to the adoption of the principles and standards on October 25, 1973. The purpose of Senate Document 97, like that of the principles and standards, was to establish executive policies and standards for uniform application in the formulation, evaluation, and review of comprehensive river basin plans for use and development of water and related land resources in order that the executive and legislative branches of the Government would be able to make informed judgments of the merits and desirability of projects.

With the exception of TVA, each of the agencies included in our review was governed by Senate Document 97 criteria. Although not specifically named in Senate Document 97, TVA followed those criteria in evaluating projects.

A Water Resources Council official stated that the principles and standards do not represent a radical departure from Senate Document 97. He stated that many techniques used by the agencies in the past in evaluating projects will be just as appropriate under the principles and standards.

Our review of the water resource agencies' methodology and procedures for making benefit-cost determinations and computations showed varying interpretations and inconsistent application of Senate Document 97 guidance. Agencies' implementing procedures were, in many cases, general or incomplete. In addition, we found many problems in the manner in which agencies' implementing procedures were applied in determining benefits and costs.

AGENCY IMPLEMENTING PROCEDURES WERE
GENERAL AND INCOMPLETE

With the exception of TVA, each of the agencies had agency-wide policies and procedures for the economic evaluation of water resource projects. A TVA official stated that TVA had no need to develop a detailed procedural manual because it was a small organization which had one office preparing almost all its planning reports. He further stated that the TVA Division of Water Control Planning did, from time to time, issue instructions to provide for the comparability of the benefit and cost estimates which were supplied by the divisions participating in the planning process.

We found that the policies and procedures of other agencies were not clearly defined in certain matters and were incomplete in others. As an example, Corps guidelines on the use of growth rates provided only general criteria for determining both normal and induced growth rates for use in flood control benefit computations.

In addition, Bureau guidelines did not clearly state the policy or procedures for developing irrigation benefits on lands which were receiving supplemental irrigation water. Although Bureau instructions stated that farm budgets were to be prepared, detailed procedures were not provided for computing benefits for land receiving supplemental water.

Bureau instructions did not include detailed procedures for computing area redevelopment benefits, and the Corps had not developed uniform, detailed methodology for use by all its district offices for these benefits.

We also noted instances in which more detailed guidance for making benefit-cost determinations was promised to field offices but was not issued. For example, at the time the Reclamation Instructions were released by the Bureau in July 1959, it was stated that more detailed procedures and processes would be issued in a Technical Guide. When we completed our fieldwork, the Technical Guide still had not been issued. Also, a Corps manual dated April 1958 stated that methods and

procedures of damage appraisal and analysis for measuring flood damages would be included in a subsequent manual; however such methods and procedures had not been issued.

Bureau, Corps, and SCS officials told us that even with the written guidance provided, field offices were allowed substantial flexibility in their formulation of project proposals. An Agriculture official stated that due to the scale and objectives of their projects, some modification of basic procedures might be necessary during their evaluation of project benefits and costs.

An Army official said it should be recognized that the varied objectives each agency had been charged with by the Congress would result in differences in detailed applications of the governing criteria.

He also said implementing procedures should be sufficiently flexible to allow field offices to incorporate into their analyses unusual conditions related to specific projects. As an example, he stated that the nature of flood control benefit determinations is such that specific mechanical procedures or formulas cannot be set forth in a manual of instructions by which normal or induced growth rates can be determined.

We believe, however, the Corps' procedures should include the criteria for selecting the appropriate growth rate indicator or index for each category of property subject to flood damage, the manner in which the selected indicator should be used or evaluated to measure growth, and the type and nature of studies needed to reasonably evaluate factors affecting the growth rates.

Finally, we recognize the need for a degree of flexibility in the plan formulation and evaluation process; however, we believe that agency implementing procedures should clearly state the need to fully explain and document all instances in which deviations from the established procedures are deemed appropriate, including the reasons requiring the deviation and the methodology and procedures used in the analysis.

INCONSISTENCIES IN AGENCIES' POLICIES AND PROCEDURES

We found that agencies' policies and procedures were not always consistent. Because of such inconsistencies (intra-agency and interagency), benefit-cost analyses were not uniform.

We identified major inconsistencies among agency policies and procedures in the treatment of primary and secondary benefits and in the treatment of benefits for individual project functions.

Inconsistencies in treatment of primary and secondary benefits

In the formulation and evaluation of a project proposal, benefits were generally classed as either primary (direct) or secondary (indirect).¹ For example, in determining irrigation benefits, the increase in the water users' net income from improved crop production and reductions in farm operating costs made possible by the irrigation works should have been classified as primary benefits while the increase in net income to a food processing plant that may be expected to result from the increased crop production should have been classified as a secondary benefit.

Bureau, Corps, SCS, and TVA officials told us that they generally relied on primary benefits for justifying water resource projects, although secondary benefits might have been used when attributable to a project from a national viewpoint. Our review showed that some of the agencies included secondary benefits while others did not. The Bureau and SCS normally included two benefit-cost analyses in project plans while the Corps and TVA made only one. Bureau and SCS officials informed us that the first analysis contained the primary benefits which represented the economic feasibility of the project and that the second analysis contained primary and secondary benefits and was included in project plans for information only.

¹ In this report, primary and secondary benefits are synonymous to the concept of direct and indirect benefits, respectively, which were sometimes included in benefit-cost analyses.

A Bureau official informed us that secondary benefits were principally computed for the irrigation function in the second benefit-cost analysis for a project. An SCS official informed us, in contrast, that secondary benefits attributable to all project purposes were included as a separate benefit classification in the second benefit-cost analysis for a project. SCS policy provided that secondary benefits be computed as a fixed percentage of a project's primary benefits.

Unlike the Bureau and SCS, Corps and TVA officials stated that their benefit-cost analyses, under certain circumstances, included secondary benefits in project plans but were not specifically identified as such by means of a second analysis. Corps policy provided for including primary and secondary irrigation benefits for those projects with the irrigation function. Bureau officials informed us that they computed irrigation benefits for Corps projects in the same way as for their own projects.

TVA policy provided for including enhanced employment as a separate benefit classification when such effects were expected to be particularly significant and were a major objective of a project. A TVA official told us that these benefits were considered by TVA as "national secondary benefits."

Inconsistencies in treatment of benefits
for individual project functions

In addition to the inconsistencies in the treatment of primary and secondary benefits, there were inconsistencies in defining and computing the benefits.

Area redevelopment benefits

For example, for area redevelopment benefits in project formulation and evaluation, Senate Document 97 stated that:

"***project benefits shall be considered as increased by the value of the labor and other resources required for project construction, and expected to be used in project operation, project maintenance, and added

area employment during the life of the project, to the extent that such labor and other resources would--in the absence of the project--be unutilized or underutilized."

Bureau, Corps, SCS, and TVA officials told us that area redevelopment benefits were included in the benefit-cost analyses shown in their project plans. However, a Corps official stated it was Corps policy that area redevelopment benefits should not be used to justify a project which otherwise would not be economically feasible.

The Bureau, Corps, SCS, and TVA defined area redevelopment benefits as the value of local labor used in project construction and operation which would otherwise have been unemployed or underemployed in the absence of the project.

In addition, TVA policy provided for including not only the value of local labor used in project construction and operation but the value of additional employment of local labor in the area through the expansion of existing, or the introduction of new, industry as a result of services provided by the project. TVA referred to such types of development as enhanced employment benefits and included them as a separate project function in the benefit-cost analysis.

Senate Document 97 also stated that redevelopment benefits should be evaluated for areas having chronic and persistent unemployment or underemployment when such areas had been designated under the Area Redevelopment Act of 1961 (75 Stat. 47) or under other authorized procedures relating to resource underemployment.

For evaluating area redevelopment benefits, Bureau, Corps, and SCS policies and procedures stated that area redevelopment benefits should have been computed only for areas affected by the project and designated by the Economic Development Administration (EDA), Department of Commerce, under the Public Works and Economic Development Act of 1965, as amended (42 U.S.C. 3121 et seq.), as title IV redevelopment areas with chronic and persistent unemployment or underemployment.

TVA computed area redevelopment benefits for areas which were designated by EDA as title IV areas, as well as for areas which were not so designated. According to a TVA official, TVA was permitted to claim redevelopment benefits and enhanced employment benefits for locations not designated by EDA as title IV areas because of its mandate under the Tennessee Valley Authority Act of 1933, as amended (16 U.S.C. 831), to develop the resources of the Tennessee Valley, including the human resources. He stated that TVA views the act as being one of the other unspecified means of designation included in Senate Document 97.

Irrigation benefits

Another example of inconsistency among the Federal agencies in computing benefits was the difference in Bureau and SCS evaluations of irrigation benefits for water resource projects. A Bureau regional official indicated that two of the major differences involved the use of farm labor and livestock production in evaluations of irrigation benefits. The Bureau claimed the value of increased farm labor as a benefit because the irrigated land created new earnings. SCS disagreed and considered new earnings to be simply a return from labor and not a direct result of the project. The Bureau also considered increased livestock production as a primary benefit, while SCS did not consider it as a benefit. An Agriculture official stated that these differences had resulted from different basic assumptions, which were expected to be resolved as procedures implementing the principles and standards are developed.

Agency differences in the definition and treatment of benefits for flood control, recreation, and fish and wildlife are also discussed in chapter 3.

RESULTS OF OUR REVIEW OF BENEFIT-COST DETERMINATIONS FOR SEVEN PROJECTS

To evaluate the manner in which Senate Document 97 criteria and agency implementing instructions were applied for determining benefits and costs, we reviewed the benefit-cost computations for seven projects. The projects included three Corps projects, two Bureau projects, one SCS project, and one TVA project.

BEST DOCUMENT AVAILABLE

Our review showed that:

- Benefits were not computed in a consistent manner (11 instances).
- Benefits were not based on an analysis of conditions with and without the project (16 instances).
- Benefit computations were not adequately supported (21 instances).
- Project costs and induced costs were not fully considered in the benefit-cost determinations (16 instances).

Because of the problems identified--varying interpretations and inconsistent application of Senate Document 97 guidance, which itself was designed to achieve uniform evaluations of water resource projects, and the varying application by the agencies of their own implementing procedures--GAO believes that similar problems may continue to occur under the new principles and standards unless responsive corrective actions are taken, and thorough attention is given to such matters, by the Council and the water resource agencies. The results of our review of the benefit-cost computations for the seven projects are discussed in the following chapters.

CHAPTER 3

BENEFITS NOT COMPUTED IN A CONSISTENT MANNER

Project benefit computations should be based on uniform criteria, consistently applied, to assist the Congress in evaluating the relative merits of proposed projects submitted for authorization and funding. Senate Document 97, in its statement of purpose and scope, stated:

"The purpose of this statement is to establish Executive policies, standards, and procedures for uniform application in the formulation, evaluation, and review of comprehensive river basin plans and individual project plans for use and development of water and related land resources." (Underscoring added.)

Our review of the benefits computed for the seven projects showed a total of 11 instances of procedural inconsistencies--at least one instance for each of the water resource agencies covered by our review. The instances included both intra-agency and interagency inconsistencies and are discussed by the types of benefits involved in the following sections of this chapter.

FLOOD CONTROL BENEFITS

Senate Document 97 defines flood control benefits as the reduction in all forms of damage from inundation of property--disruption of business and other activity, hazards to health and security, and loss of life--and the increase in net returns from higher use of property made possible by lowering the flood hazard.

Our review showed inconsistencies in considering future growth and the crop prices and yields in flood control benefit determinations.

Inconsistencies in considering
future growth

In computing flood control benefits, consideration is given not only to the value of the protection afforded existing property in the flood plain but also to (1) the value of property normally expected to develop in the flood plain over the project's economic life if the project were not constructed (normal growth) and (2) the expected value from increased or higher use of property made possible by the greater protection provided by the project (land enhancement or induced growth).

Corps and SCS implementing procedures provided for including both normal and induced growth (changed land use benefits) in flood control benefit computations. Corps guidelines are also applicable to flood control benefit determinations for Bureau projects since the Bureau relies on the Corps to compute these benefits. A TVA official told us that TVA does not include factors for normal or induced growth in flood control benefit computations.

Our review showed that flood control benefit determinations for the seven projects included, in addition to benefits for existing property, normal growth in some cases, induced growth in others, and neither in still others.

For the Corps' Pattonsburg Lake project in Missouri, the Kansas City District estimated only normal growth for flood control benefits in the Grand River Basin because it was the Kansas City District's policy to exclude induced growth benefits. Also, because of uncertainties in predicting growth of any kind beyond 50 years, the Kansas City District projected no growth for the last half of the 100-year period of economic analysis.

The Corps' Portland District claimed benefits for normal future growth in the flood plain over the full 100-year economic life of the Lost Creek Lake project in Oregon but did not claim benefits for induced growth.

For the Trotters Shoals project¹ in Georgia and South Carolina, a Corps district official stated that the Corps did not claim benefits for either normal or induced growth in the flood plain because it viewed the flood control benefits as insignificant to the total project benefits claimed.

Both SCS and the Corps' Tulsa District computed flood control benefits for the SCS Cotton-Coon-Mission Creek project in Oklahoma and Kansas. The Corps computed the mainstream flood control benefits and included both normal and induced growth. SCS computed the tributaries' flood control benefits and included induced growth. SCS assumed the induced growth benefits would occur over a period of time and, therefore, discounted these benefits for a 10-year delay whereas the Corps' Tulsa District did not.

For the Bureau's Lower Teton Division in Idaho, the flood control benefits computed by the Corps' Walla Walla District included only normal growth. A Corps district official stated that it was the district's policy to include induced growth benefits, but, in this instance, they felt that this would duplicate benefits already claimed for the irrigation function.

TVA did not use a growth factor to estimate future urban flood control benefits for the Duck River project in Tennessee because it was their policy not to do so. Instead, benefits were based on flood protection to existing development.

Inconsistent use of crop
prices and yields

The Corps' Tulsa and Kansas City Districts and the Oklahoma State SCS office computed flood control benefits for crops differently. The Corps' Tulsa District used the agricultural prices received by farmers as of January of the year the feasibility study was prepared. The Kansas City District used a 5-year average of the season average of prices received by farmers. The Oklahoma State SCS office used adjusted normalized prices,

¹The Trotters Shoals project has been renamed the "Richard B. Russell Dam and Lake project."

consistent with the provisions of Senate Document 97. The adjustment was intended to reduce but not eliminate the influence of Government price support programs. The prices used by the Corps' districts included the Government price support and were generally higher than the adjusted normalized prices used by SCS.

In addition, crop yields used by SCS were about twice as high as yields for the same crops used by the Corps' Tulsa District for crops in relatively the same geographical area and period. We noted that the Corps and SCS had used different source data in determining these crop yield estimates.

RECREATION BENEFITS

Senate Document 97 defined recreation benefits as the value of net increases in the quantity and quality of boating, swimming, camping, picnicking, winter sports, hiking, horseback riding, sight-seeing, and similar outdoor activities resulting from the project.

The Federal Water Project Recreation Act (16 U.S.C. 4601 - 12 et seq.) states the policy of the Congress that

"in investigating and planning any Federal***water resource project, full consideration shall be given to the opportunities, if any, which the project affords for outdoor recreation***."

Under the provisions of the act, the views of the Secretary of the Interior on the outdoor recreation aspects shall be set forth in any report of any project within the purview of the act. These responsibilities are delegated to the Bureau of Outdoor Recreation (BOR) which reviews project proposals and, in some cases, participates in the planning of the projects.

Our review showed that the water resource agencies' practices vary in the use of BOR input for computing recreation benefits. A Bureau of Reclamation official stated that the Bureau relies primarily on BOR to provide the necessary information for the economic evaluation of a proposed project's recreational aspects. According to a Corps official, the Corps

generally relies on internal planning for recreation benefit evaluations but will accept BOR assistance when they are able to participate. Although the 1965 act does not apply to TVA, we noted that TVA used some BOR survey data to evaluate the recreation demand for one project but did not use BOR data to compute the benefits.

Our review showed differences in agencies' methodology for computing recreation days to which values are assigned for calculating recreation benefits. For example, recreation days for the SCS Cotton-Coon-Mission Creek project were determined by multiplying reservoir surface acres available for recreation use by the estimated visitors per acre per year. The policy of the Corps' Portland District for determining recreation days is to equate three recreational activities with one recreation day. TVA computed recreation days for the Duck River project by multiplying shoreline miles by annual visits per shoreline mile at a reservoir for another project, with minor modifications. An Interior official noted that the above methods for determining recreation benefits would be equally valid if public use data on a comparable recreation resource was the basis for the recreation days estimate.

AREA REDEVELOPMENT BENEFITS

In addition to the inconsistencies in defining area redevelopment discussed in chapter 2, we noted inconsistencies in the methodology and procedures used for computing these benefits.

The Corps claimed area redevelopment benefits when a project was located in, and drew labor from, counties designated by EDA as title IV redevelopment areas with chronic and persistent unemployment or underemployment. TVA, on the other hand, claimed area redevelopment benefits for the Duck River project even though the four counties in which the project was located, and from which it would likely draw labor, had not been designated under title IV as having special unemployment or underemployment problems.

In addition, the agencies used different procedures in computing these benefits. For example, Corps computations included only those wages accruing to the estimated unemployed labor that would

be hired directly for project construction, operation, and maintenance. TVA computed this benefit on the basis of increased wages (as compared with alternative income) to subemployed people who were expected to be hired for project construction, operation, and maintenance and on increased wages to subemployed people who were expected to fill the jobs vacated by the people hired for project construction, operation, and maintenance.

FISH AND WILDLIFE BENEFITS

Senate Document 97 defined fish and wildlife benefits of a project as the value of net increases in recreational, resource preservation, and commercial aspects of fish and wildlife.

Under the Fish and Wildlife Coordination Act of 1934, as amended (16 U.S.C. 661 et seq.), the Bureau of Sport Fisheries and Wildlife (BSF&W) makes surveys and investigations to determine means and measures that should be adopted to prevent loss or damage to wildlife resources and to provide for their development and improvement. BSF&W officials informed us that BSF&W was generally limited to the role of a consulting or recommending agency for the Federal construction agencies. Further, they stated that the act permitted the Federal agencies to accept, reject, or modify the proposals and recommendations of BSF&W.

According to a Bureau official, the Bureau relied on BSF&W for the economic evaluation of fish and wildlife aspects of a proposed project. An SCS official told us that BSF&W and State officials assisted in determining fish and wildlife losses and damages when they were able to participate.

According to a Corps official, BSF&W generally informed the Corps of adverse effects to fish and wildlife caused by the project; the mitigation recommended (in nonmonetary terms); and, if applicable, an enhancement recommended. The Corps assigned values to BSF&W findings and then determined their economic feasibility and the extent to which the recommended mitigation measures would be adopted. An Interior official stated that BSF&W objected to the Corps' method because it does not generally reflect in full the environmental values destroyed.

BSF&W computed fish and wildlife benefits for the Corps' Lost Creek project and the Bureau's Savery-Pot Hook project in Wyoming and Colorado, but the benefits claimed for the Corps' Trotters Shoals project were computed by the Corps.

Although Corps instructions state that the recommendations of BSF&W will be accepted to the fullest extent practicable, the Corps disagreed with BSF&W's view that the Trotters Shoals project would have an adverse effect on fishing in a downstream reservoir and claimed fishing benefits for Trotters Shoals without considering the offsetting induced costs to the existing downstream reservoir fishery. BSF&W officials felt that the water would be of lower quality than claimed by the Corps. BSF&W's view was supported by the Georgia State Game and Fish Commission, the South Carolina Wildlife Resources Commission, and other interested agencies. An Interior official stated that the Corps had rarely assigned fish and wildlife values to a proposed project against a BSF&W recommendation.

We noted that TVA calculated induced costs for animal habitat losses due to inundation; however, Bureau, Corps, and SCS officials informed us that they did not assign values to similar losses.

BSF&W officials stated that provision for mitigating all fish and wildlife losses was not made in project plans although enhancement benefits were included. These officials told us that, for projects with fish and wildlife enhancement benefits, such benefits may not be justified up to 90 percent of the time because mitigation provision for the fish and wildlife losses caused by the project were or could not be provided for.

IRRIGATION BENEFITS

Our review showed inconsistencies in the use of farm budgets to compute irrigation benefits and in the methods used to compute secondary irrigation benefits.

Senate Document 97 defined irrigation benefits as the increase in the net income of agricultural production from increased moisture content of the soil through the application of water or reduction in damages from drought.

Inconsistent use of farm budgets

Comparative farm budgets prepared for conditions with a project and for conditions without a project are used to determine the increase in net farm income from irrigation water made available by a project.

For the Lower Teton Division, the Bureau used farm budgets as the basis for computing irrigation benefits for supplemental service on lands already being irrigated. However, the Bureau did not develop farm budgets for computing the benefits from supplemental water service to be provided by the Savery-Pot Hook project. This subject is discussed further on page 27.

Inconsistent methods for computing secondary benefits

Bureau, Corps, and SCS instructions provide for the computation of secondary benefits attributable to irrigation. Agencies' treatment of primary and secondary benefits are discussed in chapter 2.

The Bureau, to determine the secondary benefits, applied varying percentages to increases or decreases in the value of individual commodities included in farm budget summaries. Bureau officials informed us that they computed benefits in a similar manner for the Corps. In contrast, SCS computed secondary benefits as a fixed percentage (10 percent) of the primary benefits and the increased costs that primary producers would incur for increased or sustained production.

We also noted an inconsistency in the application of procedures between two Bureau regional offices. Bureau instructions, issued in July 1959, eliminated the 18-percent benefit factor on "increased expenditure for farm production" in computing secondary irrigation benefits. For the Savery-Pot Hook project this benefit was omitted. However, for the Lower Teton Division the Bureau included the 18-percent factor in its benefit computations for project authorization.

CHAPTER 4

BENEFITS NOT BASED ON ANALYSIS OF CONDITIONS WITH AND WITHOUT PROJECT

Senate Document 97 defined benefits as the increases or gains, net of associated or induced costs, in the value of goods and services which resulted from conditions with the project compared to conditions without the project. Proper application of this criteria would have resulted in a determination of the specific or incremental benefits estimated to be contributed by each project purpose. The increase in benefits could then have been compared with the project's economic costs for a measure of the project's economic feasibility.

For the seven projects, we found 16 instances in which claimed benefits had not been determined from an analysis of conditions expected to exist with the project compared to conditions without the project. In general, these instances occurred because

- benefits were computed on a systems rather than an incremental approach,
- present and/or future conditions without the project were not considered, or
- appropriate with and without project comparisons were not made.

FLOOD CONTROL BENEFITS COMPUTED ON A SYSTEMS RATHER THAN AN INCREMENTAL APPROACH

A major portion of the flood control benefits claimed for six of the seven projects was computed using a systems approach. Only one project--the Corps' Trotters Shoals project--had all its flood control benefits computed on an incremental basis.

Under the systems approach, flood control benefits were accumulated for all projects in a river basin and then distributed to the projects in proportion to each project's flood control capability. This tended to understate the flood control benefits for projects installed first and overstate the benefits for projects installed last. The incremental approach, on the other hand, determined the difference in flood control capability in the basin with and without each project and assigned flood control benefits according to the specific increment of flood control provided by each project.

The Corps computes flood control benefits for its projects and for Bureau projects and provides assistance in flood control benefit determinations for SCS and TVA projects.

Corps guidelines allowed but did not require the use of the incremental approach. For example, Engineering Manual (EM 1120-2-101) regarding measurement of flood control benefits stated:

"Benefits attributable to flood control measures will include the difference between those flood damages that are to be expected if the project is not provided and those primary flood damages that are to be expected even if the project is provided, ***."

The manual suggested an analysis with and without the project and thus indicated use of the incremental approach.

Corps guidelines, however, also permitted use of the systems approach as indicated in the same Engineering Manual:

"***When several projects produce benefits in a reach^[1] those benefits will be divided equitably among such projects; generally in proportion to

GAO note 1: When typical flood damage is analyzed, the area subject to flooding is divided into subareas, usually designated as river reaches. In selecting the reaches, the district considers factors such as political boundaries, zoning plans, and differences in development.

the benefit each project would realize if acting alone ***. Relative individual justification may be computed by apportioning total benefits to the individual projects on a basis which will approximate the probable individual project benefit as nearly as possible. ***"

Use of the systems approach was illustrated by the Corps' Kansas City District's computation of flood control benefits for the Pattonsburg Lake project.

The authorized system for the Grand River Basin consists of five reservoirs, including Pattonsburg, and flood control levees. Flood control benefits estimated by the Corps for the system of projects and levees totaled \$5,071,900 annually. To determine Pattonsburg's share of the total system benefits, the Corps

- prorated the system benefits between (1) the five-reservoir system, considered as one operating unit, and (2) the levees on the basis of hydrological data and then

- prorated the benefits assigned to the system of five reservoirs to each reservoir.

Of the \$5,071,900 total system benefits, \$3,180,900 was prorated to the five reservoir system, and \$1,967,600 of the five reservoir system's benefits was prorated to Pattonsburg.

Under Corps plans, however, Pattonsburg was the first part of the five reservoir and levee system to be constructed in the Basin, and the use of an incremental approach for determining its specific contribution to flood control in the Basin showed markedly different results.

	Approach for determining benefits	
	<u>Systems</u>	<u>Incremental</u>
Grand River Basin		
--total benefits (note a)	\$5,071,900	\$5,071,900
Pattonsburg benefits	<u>1,967,600</u>	<u>3,032,100</u>
Remaining benefits (note b)	<u>\$3,104,300</u>	<u>\$2,039,800</u>

^a System benefits from five reservoirs and levees.

^b Benefits remaining for allocation to four reservoirs and levees.

Thus, use of the systems approach, compared to the incremental, resulted in (1) understating the benefits assigned to the first project to be constructed--Pattonsburg--and (2) overstating the benefits assignable to the system's projects and levees to be constructed later.

Although it was SCS policy to use the systems approach to measure flood control benefits, the allocation of these benefits by SCS differed from the procedure used by the Corps. SCS defined the flood plain and the area to be protected and determined the number of dams that would provide the level of flood protection agreed upon between SCS and the local sponsors. The flood plain was divided into reaches with dams located in each reach. Each reach, which may have several dams, received an allocation of the estimated system benefits. SCS did not determine the flood control benefits allocable to each dam in the reach. When SCS used this procedure, as on Cotton-Coon-Mission Creek project, it did not relate flood control benefits for each dam to its costs.

In contrast, Corps policy provided that each dam be economically feasible when using the systems approach. This policy was followed by the Corps for the Pattonsburg Lake project.

Senate Document 97 defined benefits as increases or gains in the value of goods and services which result from conditions with the project compared to conditions without the project. Thus, we believe that using an incremental analysis to determine a project's economical feasibility would best comply with Senate Document 97.

POWER BENEFITS CLAIMED FOR CAPACITY
TO BE PROVIDED BY ANOTHER PROJECT

The power benefits claimed for the Corps' Lost Creek Lake project included benefits for dependable capacity which would be provided by another project.

The Corps computed power benefits by applying Federal Power Commission (FPC) furnished power values to the resources which could be obtained from a power plant's:

- Dependable capacity, the load-carrying ability of the plant under adverse conditions expressed in kilowatts (kW).
- Average annual energy, the energy which the plant is capable of producing each year, based on a period of recorded water years and expressed in kilowatt hours.

The Lost Creek Lake power plant is to have an installed capacity of 49,000 kW, but because of operating restrictions relating to fishery enhancement under adverse flow conditions, its dependable at-site capacity will be limited to 14,100 kW. In computing the project's power benefits, the Corps included not only the value of its dependable at-site capacity (14,100 kW) but also the net value of 10,500 kW of additional capacity (substitute capacity which may be added to some other project in the system at some future time.

A Corps manual defined dependable capacity as continuous power divided by the load factor. That definition seems to preclude the inclusion of substitute capacity. The manual did not discuss the concept of substitute capacity and did not provide for its inclusion in benefit-cost analyses.

Discussions with Corps officials indicated that the substitute capacity was claimed because they believed the dependable at-site capacity of 14,100 kW was not a valid estimate of the project's capability. The dependable at-site capacity was based on that expected under adverse flow conditions associated with a possible recurrence of low flows experienced during the critical water month of January 1932, and operating restrictions necessary to maintain certain flow releases for fish enhancement. Corps officials told us that, if the historical adverse low-flow conditions were never experienced during the project's economic life, the project's dependable at-site capacity and related benefits would be understated. The 10,500 kW substitute capacity was apparently claimed to more fairly represent the project's expected dependable at-site capacity.

Corps officials stated that power facilities to provide the substitute capacity would be installed at another Corps project at some future date, whether or not Lost Creek was constructed, and that, since benefits would also be claimed for the project providing the substitute capacity, their calculations would result in double-counting of the benefits and costs for that capacity. They stated that a detailed evaluation would require assignment of the substitute capacity to a specific project and reduction of that project's benefits and costs by the amounts assigned to Lost Creek.

Although we agree that basing the project's dependable at-site capacity on historical low-flow conditions is a conservative approach, claiming benefits for additional capacity on the basis of generation to be added to some other project in the system does not meet the with and without test required by Senate Document 97. In our opinion, the additional capacity should be claimed as a benefit of the project which provides it.

We estimated that the inclusion of substitute capacity resulted in overstating annual power benefits for the Lost Creek Lake project by about \$185,000.

FISHING BENEFITS CLAIMED NOT
ADJUSTED FOR WITHOUT PROJECT
FISHING USAGE

The fishing benefits claimed for three of the seven projects were not adjusted for existing fishing usage. Failure to consider the without project fishing usage in computing project benefits was inconsistent with Senate Document 97 requirements and resulted in overstating fishing benefits.

For example, the Corps calculation of fishing benefits for the Lost Creek Lake project did not show a deduction for fisherman use of the proposed reservoir area without the project. On the basis of an Oregon State Game Commission estimate of angler days in the proposed reservoir area without the project, we estimated that the fishery benefits for the Lost Creek Lake project were overstated by about \$22,500 annually.

Similar overstatements were found for the Corps' Trotters Shoals project and the Bureau's Savery-Pot Hook project.

IRRIGATION BENEFITS NOT DETERMINED
FROM COMPARISON OF APPROPRIATE
WITH AND WITHOUT FARM BUDGETS

Irrigation benefits for two Bureau projects had not been computed from appropriate with and without farm budgets. For example, annual irrigation benefits claimed for the Bureau's Savery-Pot Hook project were understated because benefits for lands receiving supplemental water were based on the acre-foot value of water computed from farm budgets prepared for lands which were to receive a full service water supply.

The understatement resulted because full service farm budgets included costs for developing the farm for irrigation. Costs, such as clearing and leveling land, constructing a water distribution system, and interest on these capital expenditures, are included in full service budgets. Lands receiving supplemental water, however, were already being irrigated and development costs were less.

BEST DOCUMENT AVAILABLE

Bureau regional officials said that preparing supplemental water supply farm budgets was a long and costly process and was unnecessary since full water service analysis was a valid substitute where mostly full service lands were involved. On the basis of Bureau computations, the use of farm budgets for supplemental lands would have increased annual irrigation benefits for the Savery-Pot Hook project by about \$277,400.

Representative farm budgets were not prepared for the Bureau's Lower Teton Division. The Bureau prepared farm budgets for limited areas and projected them to all areas in computing irrigation benefits for the Lower Teton Division. Regional Bureau officials agreed that this procedure did not constitute a true with and without project comparison.

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Other cases of benefits claimed, which were not determined by an appropriate comparison with the project and without the project, include recreation benefits for TVA's Duck River project and the Corps' Trotters Shoals project, transportation savings on the Corps' Lost Creek Lake project, and shoreline development¹ on TVA's Duck River project.

¹Enhanced land values adjacent to the reservoir resulting from construction of the project.

CHAPTER 5

BENEFIT COMPUTATIONS NOT ADEQUATELY SUPPORTED

Current and comprehensive studies should be performed to provide data for project analysis. Senate Document 97 stated that such analyses should be as extensive and intensive as is appropriate to the scope of the project being planned.

At six of the seven projects, benefits claimed for one to four benefit categories were not adequately supported because

- studies of data pertinent to the computations were not made,
- computational techniques were based on inappropriate or questionable assumptions, and
- documentation was not sufficient to support benefit computations.

PERTINENT STUDIES NOT MADE

Benefits claimed should be supported by a study adequate to establish a reasonable probability of the benefits' being realized if the project is completed as planned. In some instances such studies had not been prepared to support claimed benefits. For example, area redevelopment benefits for the Corps' Lost Creek Lake project were not adequately supported because a study of local labor hiring was not done.

Corps instructions state that migrant labor wages are not creditable toward area redevelopment benefits because migrant hirings would not reduce local unemployment levels. District officials stated, however, that studies had not been performed to verify their estimates of the extent to which the Lost Creek project manpower requirements had been, or would be, filled from the local labor supply. The Corps based area redevelopment benefits on the assumption that 60 percent of construction labor would be unskilled or semiskilled and that 80 percent of these workers would come

from the local labor supply. Labor union officials, contractor representatives, and the Corps' Area Engineer stated that virtually none of the labor used at Lost Creek was unskilled or semiskilled. They said that most were highly skilled and specialized.

Officials of three labor unions, which represented about 75 percent of the labor of the main dam contractor, told us that workers with skills needed at Lost Creek did not reside in the area. Therefore, these workers would not have had a significant effect on the area's previous unemployment level. The Corps' Area Engineer agreed that some trades, such as ironworkers, were almost all from outside the area.

Union officials' estimates of local labor employment at the Lost Creek site indicated that the Corps had substantially overstated area redevelopment benefits. The Corps' Portland District agreed that the percentage of workers that would originate from the local area could not be determined without a study.

The Corps overestimated the man-years needed to construct Lost Creek, which overstated the local portion of the manpower requirement on which area redevelopment benefits were based. Man-year estimates were not revised to actual manpower being used for project construction when such figures became available. Had the Corps updated the manpower estimates, the annual area redevelopment benefits would have been reduced by about \$220,000.

A similar situation was found for the Corps' Trotters Shoals project. The Corps assumed that 75 percent of the required labor force would be from the ranks of the unemployed in the designated redevelopment counties. A Corps district official told us that there was no data available to support the assumption and that the 75-percent factor was based on his judgment and general knowledge.

In another case, the Corps did not develop information on either the potential water users or the expected rate of use. Such information was needed to adequately estimate the water supply benefits for the Pattonsburg Lake project. Corps personnel told us this information was not available when they

computed the benefits. In the June 1972 Interim Report, the Corps estimated \$413,000 annually for water supply benefits.

For the Bureau's Lower Teton Division, there was no documentation to substantiate the claim that the value of damageable property in the flood plain would increase seven times over the 100-year project economic life. About 40 percent of the flood control benefits attributable to the Lower Teton Division were due to the application of growth rates. The Corps' Walla Walla District prepared the estimate of flood control benefits for the project. Officials there told us that a study of the specific growth rates within the flood plain was not made because of time and money constraints.

The Corps also did not perform a detailed study to support the claimed benefit for future growth of value in property to be protected by the Lost Creek Lake project. Of the total annual flood control benefits of \$3,963,000 for Lost Creek, \$3,263,000 was attributable to the projected growth of property value.

For the Pattonsburg Lake project, a study was not performed to support the Corps' estimate that flood control benefits for preventing non-crop and transportation damages would grow 51 percent over 50 years. Instead, the Corps used Department of Agriculture data on other fixed costs of crop production, which are not related to non-crop and transportation damages. The Corps computed the expected normal growth of the other fixed costs of agricultural production. The use of this normal growth factor increased the flood control benefits by about \$198,700.

Another instance of inadequate support for benefit computations was the Corps' failure to consider the potential impact on recreation benefits associated with the lack of good access roads to the Trotters Shoals project.

The Corps' Savannah District also did not have records of flood damage to support its estimate for flood control benefits of \$72,000 annually for the Trotters Shoals project. District officials told us that the data was based on a survey of the Savannah River Basin in 1964 and adjusted, using results of prior surveys and professional judgment and experience, to a level which was considered more realistic. The Savannah

District officials were unable to locate records of the survey or to provide an explanation of the basis for adjustments made to the original data.

Corps' Portland District officials told us that the expected flood damages above the highest flood to date were not based on a damage survey of the flood plain to verify the anticipated damages for higher level floods for the Corps' Lost Creek Lake project. Also, the Bureau claimed flood control benefits for the Savery-Pot Hook project up to the 1,000-year flood level but the expected damages to support such benefits were not based on a damage survey of such a flood level.

About half of the annual redevelopment benefits for the Duck River project were based on increased wages to subemployed people who were expected to fill the jobs vacated by those hired for project construction, operation, and maintenance.

This estimate was not supported by a study. A TVA official stated that the benefits were too trivial to warrant an expensive supporting study to replace a reasonable assumption. We believe, however, that, when benefits were considered important enough to claim, they should have been adequately supported.

COMPUTATIONAL TECHNIQUES BASED ON INAPPROPRIATE OR QUESTIONABLE ASSUMPTIONS

The Corps estimated recreation benefits of about \$3.4 million annually for the Pattonsburg Lake project. The BOR Regional Office, Ann Arbor, Michigan, supplied data to the Corps on which these benefits were based. In making the estimate, BOR based its estimate of visitor-days on much greater densities than ordinarily arrived at in using BOR regional procedures. For example, BOR estimated that during peak periods there would be 40 campers an acre. BOR regional procedures ordinarily provide for 16 campers an acre. Use of BOR regional procedures would have resulted in benefits of about \$873,000 a year less than the BOR estimate. BOR regional officials agreed that the computations of recreation benefits were overstated.

At the Lost Creek Lake project, the Corps did not properly adjust the water supply benefit for the expected period of nonuse after project completion. Based on our discussions with future users, it appears that at least 85 percent of the proposed water supply will not be used during the first 15 to 20 years of availability. The Corps' adjustment for a period of nonuse assumed all water would be in use within 10 years after project completion. A Corps official told us that the Corps had not solicited dates of planned use from future users.

For the Trotters Shoals project, the Corps did not consider the difference in wage rates between skilled, semiskilled, and unskilled employees in calculating area redevelopment benefits. The Corps simply multiplied the total construction labor costs by their estimated percentage of labor from redevelopment counties. The acting chief of the Economic Evaluation Section agreed the benefits were somewhat overstated because of the procedure used.

For the Bureau's Savery-Pot Hook project, BOR estimated 15,000 annual recreation days in 1980 with a gradual increase to 40,000 in 2020, but the benefits were computed as though 40,000 visitors would use the facilities from the first year to the end of the project's economic life. As a result, the annual benefit was overstated by about \$10,580. In addition, the Bureau failed to adjust the costs associated with recreational facilities to be added at a later date, which resulted in an overstatement of average annual recreation costs of about \$10,000.

The Corps updated area redevelopment benefits, which are based on the value of local labor that would be used in project construction and operation, for the Trotters Shoals project by assuming that labor costs changed at the same rate as all other cost categories rather than by determining the increases in labor costs. Unless labor costs increase in proportion to other project costs, such computational techniques do not insure reliable benefit analyses.

The Corps, for the Lost Creek Lake project, claimed irrigation benefits of \$65,000 annually for the Bureau's Medford Division project which has not been authorized by the Congress. The Lost Creek Lake project, along with a nearby reservoir, would contribute water storage capacity for the Medford Division project.

Corps district officials have stated that, even if the Medford Division is not authorized before construction of the Lost Creek project, they will continue to plan for irrigation storage in the Lost Creek project because the Corps and the Bureau believe that sometime in the future the Medford Division would be economically feasible or some other greater need will be recognized for the stored water. In July 1974 we were advised by a Bureau official that a feasibility study for the Medford Division had been initiated but a feasible plan had not evolved and there were no current plans to study the project further.

LACK OF SUFFICIENT DOCUMENTATION

Documentation supporting benefits claimed should be developed and maintained to provide for review at supervisory levels and for updating and revising benefit determinations when conditions or requirements change and new information becomes available. However, for one project--the Corps' Lost Creek Lake project--a key file supporting the fish and wildlife benefits computation could not be found.

Fish and wildlife benefits for the project were estimated by BSF&W, region 1, and reported to the Corps' Portland District Office in December 1961. Although the reservoir fishery benefits were recalculated in 1966 and again in 1973, stream and ocean fishery and wildlife benefits had not been revised since they were initially computed in 1961. BSF&W officials told us their support for the 1961 benefit calculations was gathered into a file about 1967 but they were unable to locate the file. They said that, without the information in the file, it was impossible to reconstruct the computation of the fish and wildlife benefits other than those for the reservoir fishery claimed for the Lost Creek Lake project. Thus, \$555,000 of the annual fish and wildlife benefits totaling \$846,000, which was still being used in reporting to the Congress, did not have support sufficient to determine how it was developed.

Recreation benefits for the Normandy dam, one of the two reservoirs of the Duck River project, were based on visitation at a similar, existing TVA project. However, in our opinion, TVA's documentation was not sufficient to support the selection of the comparative reservoir used.

TVA compared the Watauga reservoir and the Blue Ridge reservoir with the Normandy dam and concluded that the visitation estimates for the Watauga reservoir should be used to compute the recreation benefits for the Normandy dam. The selection of Watauga resulted in the use of 8,516 annual visits per shoreline mile instead of the 2,393 for Blue Ridge.

Available documentation indicated that physical characteristics such as shoreline miles and surface acres were considered in the selection of the comparable reservoir. The physical characteristics of the Normandy dam appeared to more closely resemble the physical characteristics of the Blue Ridge than the Watauga reservoir. TVA officials stated selection of the comparable reservoir was not based solely on physical characteristics but that informed judgments on other factors, such as expected effects of proposed and existing projects, the expected access pattern, and the effect of the project on current recreational use of the Normandy portion of the river, were included in the selection criteria.

Our review did not disclose nor did TVA provide any written documentation to support these judgments made during the selection of the comparable reservoir.

A TVA official stated that TVA's recreation planning staff did not concur in our opinions and considered that, given the information available, the choice would have been upheld by a qualified recreation planner. We believe that all information should be documented to sufficiently support the judgments made during this type of evaluation.

CHAPTER 6

PROJECT COSTS AND INDUCED COSTS NOT FULLY CONSIDERED IN BENEFIT-COST DETERMINATIONS

Senate Document 97 provided that all plans should be formulated with due regard to all pertinent benefits and costs, both tangible and intangible. (Underlining supplied.) It defined project economic costs as the value of all goods and services (land, labor, and materials) used in constructing, operating, and maintaining, a project or program; interest during construction; and all other identifiable expenses, losses, liabilities, and induced adverse effects connected therewith, whether in goods or services, whether tangible or intangible, and whether or not compensation is involved. Project economic costs are the sum of installation costs; operation, maintenance, and replacement costs; and induced costs.

Induced costs include estimated net increases, if any, of the cost of Government services directly resulting from the project and net adverse effects on the economy, such as increased transportation costs. Induced costs could have been accounted for either by addition to project economic costs or deduction from primary benefits.

We found 16 instances where project economic costs, or induced costs, were not fully considered in the benefit-cost determinations made for six of the seven projects.

STATE AND FEDERAL LAND VALUES NOT INCLUDED IN BENEFIT-COST COMPUTATIONS

A Corps manual defined economic costs as:

***the values of the goods and services (land, labor, and materials) provided or contributed by all interests for the establishment, operation, and maintenance of the project, plus any loss due to adverse effects, whether or not some of these are paid for directly.
***. From the broad public viewpoint the economic

costs of a project are the values foregone in alternative uses of the goods and services required in project construction, maintenance and operation. Generally, market prices provide a measure of the value of goods and services in alternative uses. ***. The economic costs are ordinarily greater than the financial costs or outlays, and identification and evaluation to the fullest practicable extent are required for a sound determination of economic justification. "

Senate Document 97 and a Corps manual (EM 1120-2-104) require that the project "economic costs" include the value of land required for project construction and operation. The manual also provided that the value of the land production in other or alternative uses, which was foregone because of its use for project construction or operation, was part of the project's total economic costs.

The benefit-cost computation for the Lost Creek Lake project did not include either the estimated bare or cutover land value for 2,478 acres of Government-owned lands withdrawn for the project by Public Land Order No. 5105, dated August 6, 1971, or the estimated loss of future production of merchantable timber. In addition, the economic costs included only a portion of the value of existing merchantable timber on the withdrawn lands.

On the basis of a 1972 appraisal of similar land in the nearby Elk Creek area, we estimated the value of the land withdrawn for the Lost Creek Lake project at \$558,000. The value of the lost timber production is, we were told, difficult to estimate due to the abnormal inflation in the current lumber market. Concerning the existing merchantable timber, the Corps in 1966 omitted from project costs a value for part of the standing timber on the withdrawn Government-owned lands. The exclusion of these costs from the project economic analysis resulted in an understatement of project economic costs.

A Corps' Portland District official told us that the value of the withdrawn Government-owned lands and the estimated loss of future production of merchantable timber from such lands should have been included in the project's "economic costs." He said the omission was an error and the appropriate values would be determined and included in future reporting of the project's benefit-cost analysis.

Estimated costs for Government-owned lands were not included in the benefit-cost computations of two other projects. The Bureau's Savery-Pot Hook project had costs understated by \$58,100 for the estimated value of 1,660 acres of land, and the Corps' Trotters Shoals project had costs understated by \$254,000 for the estimated value of 1,230 acres of land.

INDUCED COSTS NOT FULLY IDENTIFIED OR NOT
INCLUDED IN BENEFIT-COST COMPUTATIONS

Senate Document 97 required that induced costs be fully considered and included in a project's formulation and economic evaluation. We noted three categories of induced costs which TVA should have more fully considered in the formulation and economic evaluation of the Duck River project.

The project would remove from production about 41,000 acres of better-than-average agricultural land. After the project was authorized and during the period the environmental impact statement for the project was being prepared, TVA estimated that the project would cause a direct loss of about \$1.3 million annually in farm sales, about \$3.3 million annually of lost farm-dependent business, and about \$1.5 million annually in net wages lost by the elimination of farms and the reduced volume of business suffered by industries serving these lost farms.

A TVA official stated that, in citing these figures, allowance should be made for the offsetting effects of (1) the payments which will be made to farmers for their lands and for relocation expenses, (2) agricultural production and related farm-dependent business which will be generated on relocated farms and through intensification and expansion of production

on other farms, and (3) the much larger number of nonfarm jobs and business which will be generated by project construction and subsequent increases in industrial and related-business employment in the area. However, TVA did not have studies supporting the offsetting effects.

The second category of induced cost would be the habitat losses and related hunter trip losses resulting from land development around the project reservoirs. During the preparation of the environmental impact statement, TVA determined that from 9,000 to 17,000 acres of present wildlife habitat would eventually be lost to industry, urbanization, recreation, and other types of shoreline development in the lands adjacent to the reservoirs. TVA estimated that this loss would range from about \$5,000 to \$12,000 annually.

We noted that TVA computed hunting and habitat losses only for the lands to be inundated and included them in their project plans. Habitat losses and related hunter trip losses resulting from land development around the project reservoirs should have been equally considered in project formulation and economic evaluation.

The third category of induced costs would be the adverse effects of industrial expansion and related growth. The expansion would result in increased water needs and increased quantities of raw wastes to be treated. TVA concluded that no induced costs relating to projected-related growth were appropriate for inclusion in the benefit-cost analysis. However, we noted that a study was not performed by TVA to determine such adverse effects. We believe that such a study was necessary to equally consider all aspects in project plans of industrial expansion and related growth.

The Corps and Department of Agriculture differed on the effect the Pattonsburg Lake project would have on agricultural production in the Grand River Basin. The Corps estimated that the Pattonsburg Lake project would provide annual net enhanced agricultural production benefits of about \$1.1 million. The Department of Agriculture had estimated that the project would incur annual net induced costs of about \$1 million.

For the Pattonsburg Lake project, the Corps will acquire 139,150 acres of land compared with 133,180 acres of land downstream that will be provided some flood control protection. Agriculture estimated that overall agricultural production would be less with the project than without the project.

The Corps reduced project benefits for a return of 5 percent investment on land in the acquisition area but not lost production attributable to other capital and labor. The Corps recognized that the land inundated in the acquisition area would not be available for production but held that the capital and labor freed by the inundation would be employed elsewhere to produce equivalent values.

Induced costs were not included in the benefit-cost computations of three other projects we reviewed.

- Estimated net loss of annual recreation during the period of project construction was not considered for the Corps' Lost Creek Lake project.
- Adverse effects on the quality of fishing for a downstream project from construction of the Corps' Trotters Shoals project were not adequately considered.
- Adverse effects of lost employment resulting from timber land that would be inundated were not evaluated for the Corps' Trotters Shoals project.
- Increased school enrollment costs resulting from the influx of families of workers and supervisors and engineering personnel for constructing the project were not assigned to the Corps' Lost Creek Lake project.
- Loss of wildlife habitat in the area of project construction and operation was not considered for the Corps' Lost Creek Lake project.
- Adverse effects on downstream water quality from increased water salinity levels in the Colorado River from the return flow of irrigation water from the Bureau's Savery-Pot Hook project were not included in the economic analysis.

ANNUAL OPERATION AND MAINTENANCE
COSTS UNDERSTATED

Senate Document 97 provided that all plans were to be formulated with due regard to all pertinent benefits and costs. Operation and maintenance (O&M) costs were included in the Document's definition of project economic cost.

In estimating the annual O&M cost for the Pattonsburg Lake project in the June 1972 feasibility report, the Corps understated the non-Federal O&M cost for recreation by about \$446,000. The Corps used an average O&M cost rate experienced by the Corps' Kansas City District office and other Government agencies. The Corps multiplied this rate by the estimated initial recreation days for the project instead of the estimated annualized recreation days. Initial recreation days are generally less because use starts out at a lower level and gradually increases as additional recreation facilities are developed.

District personnel told us that the annualized recreation day use estimate should have been used to compute the annual non-Federal recreation O&M costs. They said that the computational error was inadvertent because they normally use the annualized recreation day use estimate to compute O&M cost. We were advised that the district did not have instructions directing such use but that they would include the annualized recreation day use in the next computation of the project's annual non-Federal recreation O&M costs.

The Bureau overstated power benefits for the Lower Teton Division because the benefits included power to be used for project irrigation pumping. Annual project power benefits of about \$538,000 include \$385,000 for power to be used for irrigation pumping. Since this power will not be available for other purposes, it has no economic value except that accounted for in irrigation benefits. The Bureau included only \$18,700 rather than \$385,000 for the power in irrigation O&M costs.

Bureau instructions for treating power produced but consumed by the project stated that the cost of power required for pumping irrigation water was allocable to irrigation and resulted in benefits to irrigation rather than power. The Bureau regional

office did not follow these instructions when preparing the benefit-cost analysis for Lower Teton. Regional officials stated that all power produced, not only the saleable portion, was considered in computing benefits for power because this power added to the total system resources in the area.

In our opinion, the value of the power consumed in irrigation pumping should be treated as an annual cost attributable to the production of irrigation benefits.

CHAPTER 7

CONCLUSIONS, RECOMMENDATIONS, AND

AGENCY COMMENTS

CONCLUSIONS

The benefit-cost analysis for Federal water resource projects is an important factor used in project decisionmaking both by Federal water resource construction agencies and the Congress. The importance of the benefit-cost analysis in the decisionmaking process required that its component parts--benefits and costs--be determined using uniform methodology and procedures which are consistent with the governing criteria and which consider all pertinent beneficial and adverse effects.

In our opinion, the governing criteria should be uniformly and consistently applied. Agency implementing policies and procedures should be consistent with this criteria and should be sufficiently explanatory and detailed to promote uniform benefit-cost determinations.

We have concluded that the problems found in the benefit-cost determinations covered by our review were caused by:

- Generalized and incomplete agency implementing procedures.
- Varying interpretations and inconsistent application of Senate Document 97 criteria and agency implementing procedures.
- Incomplete or lack of studies and analyses by the agencies of data pertinent to making determinations and computations.
- Inappropriate or questionable assumptions as bases for benefit determinations and computations.

These factors identified a need for:

- a more uniform and consistent application of the governing criteria,

- more detailed and complete agency procedures,
- a continuing review by the agencies of their detailed procedures to insure that they are responsive to changed objectives, needs, and conditions and improved methods and procedures,
- a more uniform and consistent application of agency detailed procedures among agency field offices, and
- the agencies to strengthen their internal management procedures for reviewing their benefit-cost analyses during project formulation and evaluation to resolve the instances of inappropriate or questionable application of their detailed procedures and lack of adequate studies and documentation supporting the analyses.

In addition, we believe that the Council should periodically review the governing criteria to insure that it is responsive to changed objectives, needs, and conditions and improved methods and procedures.

The Water Resources Council, established by the Water Resources Planning Act of 1965, developed "Principles and Standards for Planning Water and Related Land Resources" which became effective on October 25, 1973, and superseded Senate Document 97 as the governing criteria for water resource project formulation. The principles are intended to provide the broad policy for planning activities. The standards are intended to provide for uniformity and consistency in comparing, measuring, and judging beneficial and adverse effects of alternative plans.

The principles and standards require that procedures to provide detailed methods for carrying out the various levels of planning--including the selection of objectives, the measurement of beneficial and adverse effects, and the comparison of alternative plans--be developed by the water resource agencies and reviewed by the Council for consistency with the principles and standards and for uniformity among the agencies.

As of August 1974, the Bureau, Corps, and TVA were developing implementing procedures and SCS procedures had been reviewed for consistency with the principles and standards and

approved by the Council. After the other agencies' procedures have been reviewed and approved, for consistency with the principles and standards, the procedures of all agencies will be reviewed again by the Council for uniformity among the agencies.

The actions being taken by the Council and the water resource agencies should help promote the establishment of uniform agency methodology and procedures, consistent with the principles and standards, and help resolve the types of problems noted in our review.

However, Council and agency officials have informed GAO that agencies' implementing procedures, which are being submitted to the Council for its review, will generally provide broad, conceptual, policy-type guidance which the agencies will follow in implementing the new principles and standards. They further stated that each agency will continue to rely, as it did under Senate Document 97, on its own detailed procedures for computing and evaluating project benefits and costs.

Because of the problems identified in the GAO review--varying interpretations and inconsistent applications of Senate Document 97 guidance which itself was designed to achieve uniform evaluations of water resource projects, and the varying application by the agencies of their own implementing procedures--GAO believes that similar problems may continue to occur under the new principles and standards unless responsive corrective actions are taken and thorough attention is given to such matters by the Council and the water resource agencies.

Accordingly, GAO believes that a review by the Council of the agencies' implementing and detailed procedures is necessary to provide more certainty of uniform and consistent benefit-cost determinations both among and within the water resource agencies.

RECOMMENDATIONS

The Secretaries of Agriculture, the Army, and the Interior, and the Chairman of the Board, TVA, should have their agencies:

- Revise or develop, as necessary, their detailed procedures for making benefit-cost determinations and submit them to the Water Resources Council.

- Periodically evaluate their detailed procedures to recognize changed objectives, needs, and conditions and improved methods and procedures.
- Strengthen their internal management procedures for assessing (1) benefit-cost determinations for conformance to the governing principles and standards, (2) implementing and detailed procedures, and (3) the completeness and adequacy of supporting documentation.

The Chairman, Water Resources Council, should have the Council:

- Review the agencies' detailed procedures for uniformity and consistency with the principles and standards.
- Periodically review the principles and standards to recognize changed objectives, needs, and conditions and improved methods and procedures.

AGENCY COMMENTS AND GAO EVALUATION

Water Resources Council

The Council advised us (see app. V) that the new principles and standards require the individual agencies to submit their implementing procedures for Council review for consistency with the established principles and standards.

Also, the Council stated that the review of agency procedures is already under way and that it is fostering a state-of-the-art review process designed to continually insure that the principles and standards are responsive to concepts, theory and techniques, and improved methods and procedures.

Agriculture

Agriculture stated that our report is timely in that it again calls attention to policy and procedural differences among agencies and will help in their resolution. These differences are being addressed in the development of Agriculture's procedures and guidelines to implement the principles and standards. (Agriculture's implementing procedures were approved for

consistency with the principles and standards on April 12, 1974, by the Council.) We were advised, regarding our recommendation on strengthening internal management procedures, that Agriculture's internal review procedures of proposed plans together with the review of other agency and the Council staffs are expected to provide the management procedures necessary to insure conformance with the approved guidelines. (See app. I.)

TVA

TVA stated that our report is appropriately directed toward implementing the Council's principles and standards which replaced Senate Document 97 in the latter stages of the GAO review. TVA advised us that it had no objections to our recommendations and that they essentially reflect the process TVA is already starting to follow in implementing the new principles and standards. (See app. II.)

Interior

Interior stated it recognized that the problems described in the report have existed in the past and that the Council's principles and standards strengthen the requirement for comparisons and alternative analyses. Interior informed us that the agencies of its Department, in conjunction with other departments and agencies through the Council, are developing guidelines to implement the principles and standards. (See app. III.)

Concerning our recommendation on strengthening its internal management procedures, Interior stated that such changes as were necessary in this area would be accomplished concomitantly with implementation of the Council's principles and standards.

Army

The Army (see app. IV), concurred in our view that water resources planning policies among Federal agencies should be applied uniformly and that the Council's principles should be evaluated periodically to recognize changed needs and objectives.

The Army informed us that instructions had been furnished to its field offices on applying the Council's policies and standards to its water resource program and that a formal regulation was

being finalized which would provide field offices appropriate guidance for implementing these new policies and standards. The Army also stated that a task force had been established in the Office of the Chief of Engineers to rewrite all regulations related to water resource evaluations and that our comments would be reviewed and given full consideration by this task force.

In commenting on our recommendation on strengthening internal management procedures, the Army stated that, to supplement instructions and guidance internal management would continue to include (1) continuing review and comments on reports submitted by field offices, (2) conferences between the field and the Chief of Engineers on reports, and (3) general conferences on economic evaluation. The Army said also that the new principles, standards, and approved agency procedures would provide a basis for increased efficiency in all levels of review of benefit-cost determinations, particularly, the comprehensive review by the Board of Engineers for Rivers and Harbors for completeness and adequacy of supporting documentation.

- - - -

In their comments on this report, the Council and agencies concurred in our recommendation that the agencies' detailed procedures be submitted to the Council for review for uniformity and consistency with the principles and standards. However, it appeared that their concurrence was limited to the implementing procedures rather than to both the implementing and detailed procedures used by the agencies to formulate and evaluate project benefits and costs. In later discussions to clarify this matter, the Council and agencies agreed that the agencies' detailed procedures should also be submitted to the Council for review.

If the actions to be taken are properly carried out, the benefit-cost determinations should be improved.

CHAPTER 8

SCOPE OF REVIEW

We reviewed pertinent legislation and agency guidance concerning the determination of benefits and costs for water resource projects. We examined the manner in which agencies implemented Senate Document 97 by reviewing the agencies' instructions and procedures, practices, project planning documents, and files; by discussions with agency officials; and by examining the methodology used in evaluating the seven projects covered by our review. The seven projects selected for our review are listed below.

CORPS OF ENGINEERS:

Lost Creek Lake project, Oregon
Pattonburg Lake project, Missouri
Trotters Shoals project, Georgia and South Carolina

BUREAU OF RECLAMATION:

Lower Teton Division, Idaho
Savery-Pot Hook project, Colorado and Wyoming

SOIL CONSERVATION SERVICE:

Cotton-Coon-Mission Creek project, Oklahoma and
Kansas

TENNESSEE VALLEY AUTHORITY:

Duck River project, Tennessee

Our review was made primarily at Bureau of Reclamation regional offices at Boise, Idaho, and Salt Lake City, Utah; the Corps of Engineers district offices at Walla Walla, Washington; Portland, Oregon; Savannah, Georgia; and Kansas City, Missouri; the Soil Conservation Service Area Planning Office, Claremore, Oklahoma; and the Tennessee Valley Authority at Knoxville, Tennessee. In addition, we held discussions with officials of the following agencies in Washington, D. C.: the

Soil Conservation Service, Corps of Engineers, Bureau of Reclamation, Water Resources Council, Office of Management and Budget, and Federal Power Commission.

When circumstances warranted, we also had discussions with other Federal agencies such as the Bureau of Outdoor Recreation, National Park Service, Bureau of Sport Fisheries and Wildlife, Bureau of Land Management of the Department of the Interior, and the Environmental Protection Agency.



DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D. C. 20250

Mr. Richard J. Woods
Assistant Director
Resources and Economic
Development Division
U.S. General Accounting Office
Washington, D. C. 20548

February 7 1974

Dear Mr. Woods:

This is in response to your letter of December 19, 1973, requesting comments by the Department of Agriculture on your proposed report to the Congress entitled "Need for Improvement in Benefit-Cost Determinations for Federal Water Resource Projects."

The draft report has two recommendations that involve the Secretary of Agriculture. It recommends that he have his agencies (1) develop and implement detailed policies and procedures for benefit-cost evaluations that are consistent with the Principles and Standards, and (2) strengthen internal management procedures for assessing their benefit-cost evaluations.

With respect to recommendation (1), procedural guidelines have been developed by USDA agencies. These have been submitted to the Water Resources Council for review and comment and we are now in the process of incorporating WRC suggestions in them.

With respect to recommendation (2), USDA's internal review procedure of proposed project plans together with the review of other agencies and the WRC staff are expected to provide the management procedures necessary to ensure conformance with the approved guidelines.

In addition, there are several points raised in the report which we think merit brief comments:

- The differences in irrigation benefit evaluations pertaining to the handling of labor costs and livestock production result from different basic assumptions. We expect that these will be resolved as detailed procedures implementing the Principles and Standards are developed.
- The use of "adjusted normalized prices" by the Soil Conservation Service was consistent with the provisions of Senate Document 97. The Water Resources Council is in the process of printing and distributing a new set of standard prices to be used by all water resource planning agencies. This will ensure uniformity among agencies in prices used.

APPENDIX I

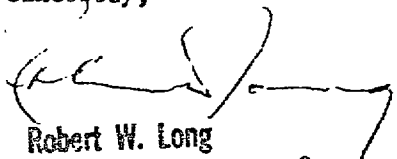
Mr. Richard J. Woods

- A uniform procedure for estimating both primary and secondary benefits is expected to result from the implementation of the Principles and Standards.
- Differences in crop yield estimates among agencies or even within an agency often are justified because of wide variations in soils, ground water conditions, and soil management practices. A uniform procedure for estimating crop yields is desirable but not necessarily uniform yields.
- SCS policy concerning the systems approach in measuring flood prevention benefits is correctly stated. The Principles and Standards require the development of an optimized national economic development plan as one alternative. Such a plan will require the use of economic efficiency analyses and result in the evaluation of incremental segments. This will modify the procedure currently used by SCS.
- We do not agree that exactly the same procedures should always be used by the agencies in project evaluation. For example, scale and purpose may require some modification of basic procedures. The detailed procedure for evaluation of a major reservoir or reservoir system in a major river basin may not be applicable to a small watershed project which involves only 30,000 acres of agricultural lands. The concepts and principles should be the same but some flexibility in procedures may be necessary.

This Department feels that your report is timely in that it again calls attention to policy and procedural differences among agencies and will help in their resolution. These differences are being addressed in the development of agency procedures and guidelines to implement the Principles and Standards.

We appreciate the opportunity to review this draft report and provide our comments.

Sincerely,



Robert W. Long
Assistant Secretary for Conservation,
Research and Education

TENNESSEE VALLEY AUTHORITY
KNOXVILLE, TENNESSEE
37901



February 19, 1974

Mr. Harold Pichney, Assistant Director
Resources and Economic Development Division
United States General Accounting Office
Washington, D. C. 20548

Dear Mr. Pichney:

We have reviewed the draft report, "Need for Improvement in Benefit-Cost Determinations for Federal Water Resource Projects," transmitted to Mr. Wagner with your letter of December 19, 1973, and offer the following comments for your consideration in preparing the final report.

Although the report deals with projects and analyses which were developed several years ago under the standards of Senate Document 97, the recommendations proposed appropriately are directed toward implementing the Water Resources Council's new "Principles and Standards" which replaced Senate Document 97 in the latter stages of the GAO review of this subject. We have no objection to the recommendations proposed on pages 55 and 56. These recommendations essentially reflect the process we are already starting to follow with the Water Resources Council in implementing the new standards.

There are several items in the draft which are inaccurate or misleading concerning the TVA project reviewed or our general planning policies. We consider it important that these matters be clarified in the final report. The following sections identify those items which are of particular concern and offer a brief explanation, together with suggestions for revision.

1. Applicability of Senate Document 97-- In the opinion of TVA's General Counsel, Senate Document 97 was applicable to TVA in practice even though the Presidential letter which approved these standards did not explicitly name TVA.

[See GAO note, p. 57]

APPENDIX II

Mr. Harold Fichney

February 19, 1974

2. Secondary Benefits--The section of the report dealing with treatment of secondary benefits and the use of one versus two benefit-cost ratios (pages 12 and 13) is unnecessarily confusing because it does not explain the provisions of section V.A. 8. of Senate Document 97 and state whether the practices mentioned are consistent with those provisions. The section cited provides for different treatment of national secondary benefits as compared with that for local secondary benefits. Consistent with this section, TVA does not include local secondary benefits in its ratio; therefore, the criticism implied at the beginning of the fourth paragraph on page 13 by the phrase ". . . but were not specifically identified as such by means of a second ratio" is inappropriate and should be deleted.

[See GAO note, p. 57]

3. Redevelopment Benefits--Because construction on most major TVA projects is done by force account, our construction organization and employment branch have developed a good insight into the employment effects of our projects. They are able to estimate rather accurately the numbers, wages, and skill levels of workers required and, from employment applications on file, to derive fairly current information on the employment status of prospective workers in the area under study. The evaluation methodology used incorporates this information, and it is appropriate that there would be a more refined approach than is practical for agencies which must make estimates for the less predictable effects of an unknown bidder for contract construction. Considering the results obtained, TVA has perhaps expended more effort in evaluating redevelopment benefits than is warranted. Such benefits are an insignificant part of total project benefits: for example, less than 2 percent of the benefits of the project included in the GAO review were in this category.

The above perspective on redevelopment benefits is totally missing from the draft report and needs to be added, but in brief form since the space devoted to the subject on pages 14, 15, 23, and 41 already appears to be out of proportion to its significance. The following additional points also appear to need attention:

- a. The third paragraph on page 15 should be deleted since it deals with secondary rather than redevelopment benefits; it is both out of place and a duplication of information in the immediately preceding section of the report. Furthermore, it includes an inaccurate statement of TVA's general policy because such secondary benefits have been evaluated only for a small minority of TVA's projects.

Mr. Harold Pichney

February 19, 1974

- b. Section V.A.3. of Senate Document 97 deals with redevelopment both in terms of unemployment and underemployment; it also provides for designation of areas not only under the Area Redevelopment Act but also by unspecified "other authorized procedures relating to resource underemployment."

- c. The explanations given in the last paragraph on page 23 and the first full paragraph on page 41

should be either deleted or revised in accordance with the following information:

The term "subemployed" refers to anyone not fully employed at their skill level; it is applicable to those who are hired for work on the project and to those who would fill the part-time or otherwise lower income jobs which are vacated by those hired for the project. For the project jobs which would be expected to be filled from the subemployed, the benefit claimed is not the total wage but is only the increased wage as compared with alternative income. Those who fill jobs vacated for project employment are then estimated to achieve a benefit equal only to half of the alternative income which has been netted out in the preceding step. Therefore, the benefit estimate is less than if the subemployed hired for the project were treated as unemployed (having zero alternative income). This approach is believed to be much more realistic than assuming that any significant numbers of truly unemployed persons would be hired directly for work on the project.

[See GAO note, p. 57]

APPENDIX II

Mr. Harold Pichney

February 19, 1974

5. Induced Costs--

The project in question has no significant omission of induced costs;

The following are more specific comments on the three categories cited in the draft:

- a. Agriculture--The data quoted for agriculture and agribusiness are gross inventory-type information specific to project lands. These figures are not pertinent as an induced cost for a national viewpoint benefit-cost analysis because they fail to allow for the offsetting effects of (1) the payments which will be made to farmers for their lands and for relocation expense under the Uniform Relocation Assistance Act, (2) agricultural production and related farm dependent business which will be generated on relocated farms and through intensification and expansion of production on other farms, and (3) the much larger number of nonfarm jobs and business which will be generated by project construction and subsequent increases in industrial and related-business employment in the area. With the benefits limited to a national viewpoint, the correct application of the induced-cost principle would involve only the extent to which people would be involuntarily unemployed with as compared to without the project. Since this condition is not expected to exist to any significant extent, there is no significant induced cost of this type to be evaluated.
- b. Wildlife Habitat--It seems inappropriate to single out the project for criticism on this small uncertain item of induced cost when, from information elsewhere in the report (page 25, paragraph 3), it appears that it was the only project reviewed with included any induced cost of this type.

[See GAO note, p. 57]

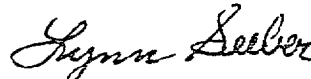
Mr. Harold Pichney

February 19, 1974

- c. Project-Related Growth--When costs are viewed from the same national viewpoint used for benefits in the analysis, there are no significant induced costs which are appropriate for inclusion. If the evaluation were done from a local viewpoint for both the public and private sectors, there would be some induced costs; but they would be more than offset by the additional benefits which would be included to evaluate them on a comparable basis.
6. Agency Instructions--The first paragraph on page 10 indicates that TVA had no agencywide policies and procedures for the evaluation of water resource projects. As a matter of clarification, it is true that there was no agency procedural manual; but our Division of Water Control Planning did from time to time issue instructions to provide for comparability of the benefit and cost estimates which are supplied by the divisions participating in our planning process. Since TVA is a small organization and had one office preparing almost all of our planning reports, we had not felt the need to invest in developing a detailed procedural manual.

We appreciate the opportunity to review and comment on the draft. If additional detail is desired, I shall be glad to provide it or arrange for discussions with appropriate staff members.

Sincerely,



Lynn Seeber
General Manager

GAO note: Material has been deleted because of changes to the final report. Page references refer to a previous draft report and are not applicable to this report.

APPENDIX III



UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

FEB 2 -1974

Mr. Philip Charam
Deputy Director
Resources and Economic
Development Division
U.S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Charam:

We have reviewed your draft report on "Need for Improvement in Benefit-Cost Determinations for Federal Water Resource Projects."

The draft report indicates that because of the incomplete agency guidance and instruction, inconsistent interpretation and application of benefit-cost methodology by the various resource development agencies has resulted. The report recommends that policies and procedures be developed by the agencies and reviewed by the Water Resources Council for adequacy and to determine that they are consistent with principles and standards for planning approved by the President, which became effective October 25, 1973.

We recognize that problems described in the report have existed in the past. The Water Resources Council's principles and standards, however, are now in effect and strengthen the requirements for comparisons and alternative analyses. The agencies of this Department, in conjunction with other departments and agencies through the Water Resources Council, are in the process of developing guidelines to implement these principles and standards. Bureau of Reclamation guidelines, for example, and Bureau of Sport Fisheries and Wildlife refuge guidelines are being reviewed at the Departmental level. The Department, of course, does not fully control the time schedule for development and implementation of guidelines since external coordination and review processes are involved.

Your second recommendation was to have agencies strengthen internal management procedures for assessing their benefit-cost evaluations for conformance to the governing principles, standards, and approved agency procedures, and for completeness and adequacy of supporting documentation. It is expected that such changes as are necessary in these areas will be accomplished concomitantly with implementation of the Water Resources Council's principles and standards.

[See GAO note, p. 61]

Because the new principles and standards are now being addressed, we will not attempt herein to comment on or interpret the report details related to the past. The following points, however, might be helpful in clarifying your report.

1. The first paragraph on Page 22 would be improved by the substitution of the following language:

The Federal Water Project Recreation Act (79 Stat. 213: 16 U.S.C. 4601 - 12 et seq.) states the policy of the Congress "that (a) in investigating and planning any Federal...water resource project, full consideration shall be given to the opportunities, if any, which the project affords for outdoor recreation...." Under the provisions of the Act, the views of the Secretary of the Interior on the outdoor recreation aspects shall be set forth in any report of any project within the purview of the Act. These responsibilities are delegated to the Bureau of Outdoor Recreation which reviews project proposals, and in some cases participates in the planning of the projects.

2. The third paragraph on Page 22 briefly describes three approaches for estimating anticipated recreation use. It should be noted that these approaches are equally valid if public use data on a comparable recreation resource was the basis for making the estimate. For example, observed use on an SCS project could have been determined to be 4,000 recreation days per year on a 100-acre impoundment. To apply this use (i.e., 40 recreation days/acre/year) to a proposed 200-acre impoundment that was comparable in all respects except surface area would be valid. This rationale would apply also to the TVA situation. Similarly, if the Corps had recorded use data by activities on an existing project, these data could be applied to a proposed project. Experience indicates that one person usually engages in three activities (i.e., swimming, picnicking, boating) during the course of one recreation day.

3. In the last paragraph on Page 24 it should be clarified that the values assigned by the Corps based on Bureau of Sport Fisheries and Wildlife (BSFW) findings were presumably related to loss prevention or mitigation situations and that these values were used to determine the justification of the measures recommended. BSFW objects to this practice. The basis used by the Corps is commonly the man-days of use lost -- i.e., hunting or fishing days. In typical situations where terrestrial habitat is inundated and therefore destroyed, the Corps commonly applies the standard daily unit values to such use and determines that the "benefits" do not justify the mitigation measure. Hunting use, for example, is an inadequate measure. Hunting is usually possible only for a short period of the year. It does not reflect the

APPENDIX III

full value of the environmental values destroyed. The practice is condemned in Senate Report 1981 (85th Congress) where it is pointed out that no "benefits" are created. In short, given the present state of the art, there is no satisfactory way of using dollar estimates of environmental amenities as a basis for determining whether they are worth what it costs to preserve and protect them.

4. The Trotters Shoals case, while accurately reported on Page 25, is exceptional. The Corps has rarely assigned fish and wild-life values to a proposed project against a BSW recommendation to do so. They have occasionally modified BSW estimates on some basis, but this has not been a recent problem of any serious consequence.

Concerning the last paragraph on that page, we strongly urge that another be inserted immediately following, which sets out the official BSW viewpoint. That viewpoint and policy are that it is better to achieve something tangible by way of specific measures to mitigate losses to fish and wildlife than to simply go through an exercise in "negative-benefit" arithmetic which reduces the benefit-cost ratio in some small degree. Given an option, construction agencies might prefer to do that arithmetic than to incur costs to acquire, develop, and manage lands to offset such losses. Although the BSW success ratio in achieving mitigation may be low, the principle is valid. Costs actually incurred, of course, do depress the benefit-cost ratio. The inadequacies of present monetary evaluation techniques, referenced above, also militate against evaluating losses.

[See GAO note, p. 61]

APPENDIX III

We appreciate the opportunity to review your draft report.

Sincerely yours,



Allan L. Reynolds
Director of Audit
and Investigation

GAJ note: Material has been deleted because of changes to the final report. Page references refer to a previous draft report and are not applicable to this report.

APPENDIX IV



DEPARTMENT OF THE ARMY
WASHINGTON, D.C. 20310

25 FEB 1974

Mr. Harold Pichney
Assistant Director
United States General Accounting Office
Washington, D. C. 20548

Dear Mr. Pichney:

This responds to your request for comments on a draft report entitled, "Need for Improvement in Benefit-Cost Determinations for Federal Water Resources Projects," (OSD Case 3754). With respect to the Department of the Army, your draft report recommends (1) that detailed policies and procedures for making benefit-cost determinations consistent with the principles and standards established by the Water Resources Council be developed and implemented, and (2) internal management procedures for assessing benefit-cost evaluations be strengthened.

The principles and standards recommended by the Water Resources Council and approved by the President on 3 August 1973 were implemented by the Corps of Engineers, Department of the Army on 30 October 1973. The 3-month time span since implementation of these new standards has not been sufficient to formally review and revise all affected Corps regulations and manuals. However, instructions have been furnished the field pertaining to the application of these new policies and standards to our water resources program. A formal regulation is currently being finalized which will provide field offices appropriate guidance for implementing these new policies and standards. In addition, a task force has been established in the Office of the Chief of Engineers which is charged with rewriting all regulations related to water resource evaluations. Comments noted in your report will be reviewed and given full consideration by this task force.

Procedures for implementing the principles and standards must be sufficiently flexible so as to allow field offices the ability to incorporate into their analyses unusual conditions related to specific projects. As an example, procedures for the economic evaluation of flood control benefits are such that specific mechanical procedures or formulas cannot be set forth in a manual of instructions by which normal and induced growth rates for flood plains can be determined.

However, the Corps' manual EM 1120-2-101 discusses procedures for estimating flood damages, and other interrelated directives provide specific guidelines related to flood damage determinations. A manual consolidating procedures for determining flood control benefits is currently under preparation in the Office of the Chief of Engineers.

Internal management to supplement instructions and guidance will continue to include (1) continuing review and comments on reports submitted by field offices, (2) conferences between the field and OCE on reports, and (3) general conferences on economic evaluation matters.

The new principles, standards, and approved agency procedures will provide a basis for increased efficiency in all levels of review of benefit-cost determinations, particularly the comprehensive review by the Board of Engineers for Rivers and Harbors for completeness and adequacy of supporting documentation.

We concur with your recommendations to the Water Resources Council that water resources planning policies among Federal agencies should be applied in a uniform manner, and that these principles be reevaluated periodically to recognize changed needs and objectives. It should be recognized, however, that the varied objectives each agency has been charged with by the Congress will result in differences in detailed application of these principles.

[GAO note: Material has been deleted because of changes to the final report.]

The opportunity to comment on the draft report is appreciated.

Sincerely,



Charles R. Ford
Chief
Office of Civil Functions

APPENDIX V



UNITED STATES WATER RESOURCES COUNCIL

SUITE 800 • 2120 L STREET, N.W. WASHINGTON, D.C. 20037

MAR 8 1974

Mr. Harold Pichney
Assistant Director
General Accounting Office
Washington, D. C. 20548

Dear Mr. Pichney:

In response to your letter of December 19, 1973, we have reviewed the draft report entitled "Need for Improvement in Benefit-Cost Determinations for Federal Water Resource Projects."

The draft report points out inconsistent methodologies which, in some cases, can and should be made more comparable. In our coordination with other agencies on this matter, it is obvious that the individual agencies, in their responses to you, are addressing questions on benefit-cost determinations related to their respective programs. For this reason, the Water Resources Council has limited its comments to the recommendations in your draft report.

Recommendation No. 1: That the Secretaries of Agriculture, the Army, and the Interior, and the Chairman of the Board, TVA, should have their agencies develop and implement detailed policies and procedures for benefit-cost evaluations that are consistent with the Principles and Standards established by the Water Resources Council.

Comment: We endorse this recommendation and note that the Principles and Standards require such action. It is incumbent on individual agencies to provide us with their implementing procedures for Council review for consistency with the established Principles and Standards, which includes procedures for evaluation of beneficial and adverse effects for the four accounts. We have received draft implementation procedures from the Department of Agriculture, and expect to receive draft procedures from other agencies as they are developed.

Recommendation No. 2: That the Secretaries of Agriculture, the Army, and the Interior, and the Chairman of the Board, TVA, should have their agencies strengthen internal management procedures for assessing their benefit-cost evaluations for conformance to the governing principles, standards, and approved agency procedures, and for completeness and adequacy of supporting documentation.

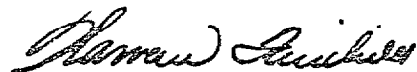
Comment: We concur with this recommendation to the extent that it applies to national economic development components. Equal emphasis must be given to developing and applying procedures responsive to the environmental quality objective.

Recommendation No. 3: That the Chairman, Water Resources Council, should have the Council review agency policies and procedures for uniformity and consistency with the established Principles and Standards, and periodically evaluate the established Principles and Standards to recognize changed objectives, needs, and conditions; and improved methods and procedures.

Comment: As noted above, the first part of this recommendation, namely the review of agency procedures for consistency to the Principles and Standards, is already underway. Also, we concur with the second portion of your recommendation relating to the feedback process designed to continually assure that the Principles and Standards are responsive to concepts, theory and techniques, and improved methods and procedures. We refer to this process as the "state-of-the-art review" and are fostering, through a number of activities, such review.

We appreciate the opportunity to comment on your draft report.

Sincerely,



Director

APPENDIX VI

PRINCIPAL OFFICIALS RESPONSIBLE FOR
ACTIVITIES DISCUSSED IN THIS REPORT

Tenure of office
From To

DEPARTMENT OF THE INTERIOR

SECRETARY OF THE INTERIOR:

Rogers C. B. Morton	Jan. 1971	Present
Fred J. Russell (acting)	Nov. 1970	Dec. 1970
Walter J. Hickel	Jan. 1969	Nov. 1970
Stewart L. Udall	Jan. 1961	Jan. 1969
Fred A. Seaton	June 1956	Jan. 1961

ASSISTANT SECRETARY, LAND
AND WATER RESOURCES (note a):

Jack O. Horton	Mar. 1973	Present
James R. Smith	Mar. 1969	Feb. 1973
Kenneth Holum	Jan. 1961	Jan. 1969
Fred G. Aandahl	Feb. 1953	Jan. 1961

COMMISSIONER OF RECLAMATION:

Gilbert G. Stamm	May 1973	Present
Gilbert G. Stamm (acting)	Apr. 1973	May 1973
Ellis L. Armstrong	Nov. 1969	Apr. 1973
Floyd E. Dominy	May 1959	Oct. 1969

DIRECTOR, BUREAU OF OUTDOOR
RECREATION:

James G. Watt	June 1972	Present
G. Douglas Hofe, Jr.	July 1969	June 1972
Edward P. Crofts	April 1962	July 1969

DEPARTMENT OF AGRICULTURE

SECRETARY OF AGRICULTURE:

Earl L. Butz	Dec. 1971	Present
Clifford M. Hardin	Jan. 1969	Nov. 1971
Orville L. Freeman	Jan. 1961	Jan. 1969

^aTitle changed from Assistant Secretary for Water and Power Resources in May 1973.

APPENDIX VI

	<u>Tenure of office</u>	
	<u>From</u>	<u>To</u>
ASSISTANT SECRETARY, CONSERVATION, RESEARCH AND EDUCATION (note b):		
Robert W. Long	Mar. 1973	Present
Thomas K. Cowden	May 1969	Mar. 1973
John A. Baker	Aug. 1962	Jan. 1969
ADMINISTRATOR, SOIL CONSERVATION SERVICE:		
Kenneth E. Grant	Jan. 1969	Present
Donald A. Williams	Nov. 1953	Jan. 1969

TENNESSEE VALLEY AUTHORITY

CHAIRMAN:		
Aubrey J. Wagner	July 1963	Present

DEPARTMENT OF DEFENSE

SECRETARY OF DEFENSE:		
James Schlesinger	June 1973	Present
William P. Clements, Jr. (acting)	May 1973	June 1973
Elliot L. Richardson	Jan. 1973	Apr. 1973
Melvin Laird	Jan. 1969	Jan. 1973
Clark M. Clifford	Mar. 1968	Jan. 1969
Robert S. McNamera	Jan. 1961	Feb. 1968

DEPARTMENT OF THE ARMY

SECRETARY OF THE ARMY:		
Howard H. Calloway	May 1973	Present
Robert F. Froehlke	July 1971	May 1973
Stanley R. Resor	July 1965	June 1971
Stephen Ailes	Jan. 1964	July 1965
Cyrus R. Vance	July 1962	Jan. 1964
Elvis J. Stahr, Jr.	Jan. 1961	June 1962
Wilber M. Brucker	July 1955	Jan. 1961

^bTitle changed from Assistant Secretary, Rural Development and Conservation in January 1973.

APPENDIX VI

	<u>Tenure of office</u>	
	<u>From</u>	<u>To</u>
CHIEF OF ENGINEERS:		
Lt. Gen. William C. Gribble, Jr.	Aug. 1973	Present
Lt. Gen. Frederick J. Clarke	Aug. 1969	July 1973
Lt. Gen. William F. Cassidy	July 1965	Aug. 1969
Lt. Gen. Walter K. Wilson, Jr.	May 1961	June 1965
Lt. Gen. Emerson C. Itschner	Oct. 1956	May 1961

WATER RESOURCES COUNCIL

DIRECTOR:		
Warren D. Fairchild	Sept. 1973	Present
Reuben Johnson (acting)	Apr. 1973	Aug. 1973
W. Don Maughan	Mar. 1970	Mar. 1973
Reuben Johnson (acting)	Sept. 1969	Feb. 1970
Henry Caulfield	Dec. 1965	Aug. 1969