Strengthened Cost Estimating Procedures Needed For Water Resources Projects B-167941

Corps of Engineers (Civil Functions)
Department of the Army

UNITED STATES
GENERAL ACCOUNTING OFFICE

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

RESOURCES AND ECONOMIC
DEVELOPMENT DIVISION

B-167941

Dear Mr. Secretary:

This is our report on strengthened cost estimating procedures needed for water resources projects by the Corps of Engineers (Civil Functions). The report contains recommendations to ensure that the Congress is being provided with reliable cost estimates and updated financial feasibility determinations on the continued recoverability of reimbursable power costs.

Copies of this report are being sent to the Director, Office of Management and Budget; the Chairmen, House and Senate Committees on Government Operations, Appropriations, and Public Works.

Sincerely yours,

Henry Eschwege

Director, Resources and Economic
Development Division

The Honorable
The Secretary of the Army

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Contents

ABBREVIATIONS

ED	Engineering and Design
GAO	General Accounting Office
SA	Supervision and Administration

GENERAL ACCOUNTING OFFICE
REPORT TO THE
SECRETARY OF THE ARMY

STRENGTHENED COST ESTIMATING PROCEDURES NEEDED FOR WATER RESOURCES PROJECTS

Corps of Engineers (Civil Functions)
Department of the Army B-167941

D I G E S T

WHY THE REVIEW WAS MADE

In the past several years, the Congress has expressed concern over costs in Government procurements, notably in the Department of Defense. The General Accounting Office (GAO), in response to this concern, reviewed the cost estimates developed by the Army Corps of Engineers (Civil Functions) for the nine reservoirs in the Osage River Basin project, one of the projects authorized by the Flood Control Act of 1954.

Background

The Congress uses estimates developed by the Corps to evaluate the economic feasibility of water resources projects and to determine the necessary funding.

GAO selected the reservoirs in the Osage River basin, which drains a 15,300-square-mile area in east-central Kansas and west-central Missouri, for review because the reservoirs were in various stages of completion--deferred, in planning, under construction, or operational.

FINDINGS AND CONCLUSIONS

The estimated cost of the Osage River Basin reservoirs increased from $243.3 million when authorized in 1954 to $529.5 million in fiscal year 1972.

GAO noted the following deficiencies in the Corps' practices for estimating project costs.

--Cost and pricing data were inadequately considered.

--Engineering and design and supervision and administration estimates were based on target amounts rather than on experienced costs. (See p. 6 to 9 and 11.)

--Annual costs, used in computing the benefit-to-cost ratio to determine the economic feasibility of the project, were understated for interest during construction and operation and maintenance costs. (See pp. 12 to 15.)

Supervisory reviews of cost estimates were not recorded. Project estimates were not analyzed after projects were completed to provide a more complete knowledge of trends for future estimating purposes. (See pp. 9 and 10.)

In 1966 the Corps approved installation of turbines to provide hydroelectric power at the Harry S. Truman Reservoir even though information from the marketing agency for the power--Southwestern Power Administration, Department of the Interior--indicated that revenues from power sales probably would not be adequate to recover the Federal investment cost within the required 50-year repayment period. In addition, the Corps continued to present

data to the Congress indicating that the Federal investment in power at the reservoir would be recovered. (See p. 16.)

RECOMMENDATIONS OR SUGGESTIONS

The Secretary of the Army should require the Chief of Engineers to:

--Take action to strengthen estimating procedures to insure that the Congress is being provided with reliable cost estimates. (See p. 15.)

--Provide the Congress periodically with information on future Corps projects having power as an authorized purpose based on updated financial feasibility determinations to show the continued recoverability of reimbursable power costs. (See p. 21.)

AGENCY ACTIONS AND UNRESOLVED ISSUES

The Department concluded that the procedures and guidelines used for cost estimating were adequate. It agreed that its cost estimating required strengthening and stated that the Corps would direct all field offices to stress the importance of this function by requiring strict compliance with existing manuals and regulations. (See p. 15.)

With respect to GAO's proposal for better information on reimbursable aspects of power costs, the Department stated that current Corps procedures pertaining to cost allocations and financial feasibility determinations were considered adequate for fully informing the Congress. The Department stated also that, due to the circumstances of the Truman project, it recognized that improvement in implementing these procedures could be achieved. In line with GAO's recommendations, the Department said the Corps in the future would specifically inform the marketing agencies whenever previously estimated power costs exceeded estimated power revenues so that financial feasibility determinations could be updated. (See pp. 21 and 22.)

The Southwestern Power Administration generally concurred in GAO's findings with respect to the Truman project and said that the decision to go ahead with the power facilities at the Truman project should be carefully reviewed by all concerned agencies. (See p. 22.)

CHAPTER 1

INTRODUCTION

The Flood Control Act of 1954 (68 Stat. 1256) authorized new water resources projects in 19 river basins at an estimated cost of about $456.5 million. The Osage River Basin project--one of the projects authorized by the act at an estimated cost of $243.3 million--was selected for review because the nine reservoirs comprising the project were in various stages of completion--deferred, in planning, under construction, and operational--which offered us an opportunity to review the different phases of the Corps' estimating process.

The Corps of Engineers develops projects in three phases: (1) a general investigation which serves as the basis for authorizing the project, (2) preconstruction planning, which results in a general design memorandum, provides a basic development plan and cost estimate and serves as the basis for the initial appropriation of funds, and (3) construction.

As of July 1, 1971, the estimated cost of the nine Osage River Basin reservoirs was $529.5 million, an increase of $286.2 million over the estimated cost at the time the project was authorized. The status and estimated cost of each of the nine reservoirs are shown on the following page.

Reservoir	Status	Fiscal year placed in status	Fiscal year 1972 estimated cost (millions)	Percentage of estimated cost allocated to reservoir through fiscal year 1971
Harry S. Truman	Construction	1965	$276.0	24
Stockton	"	1964	73.0	98
Garnett	Deferred[a]	1971	38.6[a]	-
Melvern	Construction	1966	33.9	74
Hillsdale	Planning	1968	34.1	3
Fort Scott	"	1965	27.5	3
Hackleman Corner	Deferred[a]	1963	18.1[a]	-
Pomme de Terre	Operational	1962	15.0[b]	100
Pomona	"	1964	13.3[b]	100
Total			$529.5	

[a]Deferred because of marginal economic justification. A restudy is necessary to determine whether an economically justified and locally supported plan of authorized scope can be developed. The Garnett and Hackleman Corner estimates are for fiscal years 1971 and 1963, respectively, because the projects were deferred at that time. Funds have been appropriated for a restudy of Garnett Reservoir.

[b]Final project completion estimates for Pomme de Terre and Pomona are for fiscal years 1964 and 1965, respectively.

The Osage River Basin drains a 15,300 square mile area in east-central Kansas and west-central Missouri. This area has a history of floods and droughts which the nine Osage River Basin reservoirs and two local protection works were planned to alleviate. The Kansas City District of the Corps' Missouri River Division is responsible for planning and constructing the reservoirs, which are intended to provide such benefits as flood control, hydroelectric power, water supply, water quality, and recreation.

The Corps of Engineers reported, as of July 1, 1971, a backlog of civil works construction projects having a total estimated cost of $11.8 billion. At the fiscal year 1972 funding level of about $928 million, more than 13 years would be required to finance these projects, assuming there were no additional cost increases.

CHAPTER 2

WEAKNESSES IN ESTIMATING PRACTICES

The Congress and Corps officials rely on estimates of project costs and benefits to determine the economic feasibility of reservoir projects and the funds required to finance their construction. If data supporting the estimates are not adequately documented or properly reviewed, there can be no assurance that all significant factors have been considered. Our examination showed that certain estimates of project costs were unreliable because significant factors affecting the estimates had not been considered, estimators frequently had not recorded the bases for their estimates, and supervisory reviews of estimates had been limited.

We noted also that, in determining the economic feasibility of the Osage River Basin project, the Corps had underestimated interest costs during construction and operation and maintenance costs.

UNRELIABLE ESTIMATES OF CONSTRUCTION COSTS

Corps regulations provide that a general design memorandum[1] for a project not be prepared until a suitable design has been completed to enable developing a reliable cost estimate. It is important that a project's overall plan, which serves as the basis for the general design memorandum, include a reliable cost estimate because the initial construction appropriation in most cases is based on this estimate. For example, funds to begin construction of the three Osage reservoirs, under construction in 1971, were appropriated on the basis of cost estimates in the general design memorandums.

We reviewed the cost estimate in the February 1970 general design memorandum for the Hillsdale Reservoir

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[1] The general design memorandum is a composite of detailed information dealing with a particular reservoir or project, including detailed estimates of construction costs prepared prior to, and used as a basis for, the initial appropriation of funds by the Congress.

because it was the most recent estimate available. Our review showed that this cost estimate was understated because pertinent cost and pricing data had not been adequately considered. The bases for the estimated prices had not been adequately reviewed, and the results of any supervisory reviews that may have been made had not been recorded.

Inadequate consideration of cost and pricing data

The February 1970 general design memorandum for the Hillsdale Reservoir showed an estimated cost of $33.4 million as of July 1970. We examined material quantities accounting for 39 percent of this amount and unit prices accounting for 57 percent. In most instances, available workpapers showed how the quantities had been determined but generally did not show the bases for the unit prices. For 38 percent of the unit prices, the estimators could not explain how the prices had been determined. In other instances, support for the unit prices used in the estimate had been obtained by the Kansas City District after the estimate was prepared.

In discussing the estimate with District officials and in examining the available data, we identified the following discrepancies:

1. The $33.4 million cost estimate for the reservoir was published as "*** based on [the] July 1970 cost index" although at least $16,310,000 of the amount was based on 1969 prices. This resulted in the estimated cost being understated by about $1.3 million.

   In commenting on our draft report, the Department of the Army stated that the $16,310,000 portion of the estimate was prepared in 1969 because the entire general design memorandum estimate had to be completed and reviewed in the District office prior to forwarding it to higher authority in early 1970. The Department stated that cost estimates used in developing the $33.4 million estimate were judged by the District Estimates and Specifications Section to be adequate for July 1970 price levels. However, our review of the supporting workpapers and

discussions with the estimators showed that the $16,310,000 was based on July and November 1969 prices and had not been increased to July 1970 price levels by applying any cost or pricing indexes which were then available.

2. A contingency of $114,000 was duplicated.

3. Riprap for relocations was estimated to cost $4.50 a cubic yard when $6.60 a cubic yard should have been used, based on the then-current market prices. This resulted in the estimated cost of $157,500 being understated by about $73,500. Filter material for relocations was estimated at $4.50 a cubic yard when $5.70 a cubic yard should have been used, based on the then-current market prices. This resulted in the estimated cost of $67,500 being understated by about $18,000.

   The Department of the Army agreed that these estimates were understated but commented that relatively minor quantities were involved in the relocation estimates and that proper unit costs for riprap and filter material had been used in developing the main dam estimate.

Although the general design memorandum is supposed to provide a reliable cost estimate for a project, in March 1971 the estimators revised the estimate for the embankment portion of the Hillsdale project, as of the date of the general design memorandum, from $7.4 million to $12.5 million, an increase of $5.1 million, or about 69 percent. Our review showed that this increase was made up of average increases in quantities of 41 percent, in lump-sum estimates of 54 percent, and in unit prices of 49 percent.

The estimators and their supervisors informed us that the quantities had been changed on the basis of a change in design resulting from an analysis of a more extensive soil exploration and that some of the unit price increases could be attributed to these changes in quantities. However, they were unable to explain the bases for the increases in the lump-sum and unit price estimates for the individual items.

The bases for unit prices used in a cost estimate should be documented, not only to provide sufficient data for an adequate management review of the estimates but also to provide the data necessary for any subsequent review and analysis of the estimates.

Engineering and design and supervision and administration estimates based on target amounts rather than experienced costs

The Hillsdale Reservoir cost estimate of $33.4 million included $3.5 million for engineering and design (ED) and supervision and administration (SA). This amount was calculated by applying percentages to the estimated direct construction costs. The percentages were based on an anticipated schedule of costs called a target curve, published by the Corps' Missouri River Division.

The curve was presented as being the relationship of ED and SA costs to direct construction costs for 35 reservoirs. When the target curve was developed, however, construction of only 11 of these reservoirs had been completed, seven were under construction, and 17 were in the planning stage. Thus, the target curve had been developed largely on the basis of estimated construction costs.

The following table shows that use of the target curve percentages resulted in lower estimated ED and SA costs than were actually incurred for six of seven completed reservoirs in the Kansas City District.

Comparison of ED and SA Percentages of Estimated (Target Curve) and Actual Direct Construction Costs

Reservoir	Percent			Actual costs over or under(-) estimated costs
	Target curve	Actual	Actual over or under(-) target curve	
Milford	15.8	16.6	5.1	$ 217,000
Perry	15.7	16.2	3.2	142,800
Pomme de Terre	17.5	23.1	32.0	576,800
Pomona	17.7	21.1	19.2	287,200
Rathbun	16.9	21.8	29.0	1,060,240
Tuttle Creek	14.7	14.3	-2.8	-200,600
Wilson	17.1	18.3	10.1	157,000
Total				$2,240,440

We believe that the use of the target curve published by the Missouri River Division in determining ED and SA costs for the Hillsdale Reservoir will result in differences similar to those shown above for the seven reservoirs. To provide more reliable estimates of ED and SA costs for the Hillsdale Reservoir and for other construction projects, the Division should have established and periodically revised the target curve on the basis of actual costs rather than estimated or anticipated costs. Division officials agreed with this observation.

The Department of the Army, in its letter of July 25, 1972, stated that target curves were normally revised to reflect additional cost experience and were published as a division office management tool and that the Corps was considering better controls on target curve preparation.

Review of cost estimates limited and results of reviews not recorded

District supervisory personnel told us that their review of general design memorandum cost estimates was based on experience, judgment, and knowledge of costs. They said that they discussed any differences of opinion with the estimators but did not record the differences or any revisions that resulted from the discussions. Division personnel have told us that they rely on the districts for valid cost estimates and that they make only cursory reviews of the general design memorandum cost estimates. Based on our discussions with district supervisory personnel and our review of construction cost estimates, it appears that the reviews at the district level were also limited.

The Department stated that cost estimates were reviewed before approval but that, because of the amount of data used in developing a cost estimate for a multimillion dollar project, it was difficult to document cost review findings. The Department stated also that its regulations required cost estimates to be reviewed and that the Corps would emphasize the need for adequate reviews of estimates for future projects.

No postanalysis of general design memorandum cost estimates

The Corps made no postanalysis of general design memorandum cost estimates to determine where improvements in estimating procedures and practices might be warranted. Indicative of the need for such analysis, in our opinion, is the increase of 69 percent in the Hillsdale embankment cost estimate over the amount shown 13 months earlier in the general design memorandum. The Department stated that a postanalysis of the general design memorandum cost estimate would have no effect on this increase because the increase was due to redesign which resulted from information gained from foundation studies made after the general design memorandum estimate was developed. We recognize that postanalysis would have no effect on the cost estimate for the Hillsdale embankment. We believe, however, that postanalyses of general design memorandum cost estimates should be made, particularly when later estimates vary significantly, to provide a more complete knowledge of trends for future estimating purposes.

The Department stated that, although all Corps cost estimates were reviewed, there was no program of systematically making postanalyses of estimates in general. The Department said it had felt for some time that postanalyses of cost estimates would be very desirable but personnel and funds had never been available for such an effort and that, should resources become available, such a capability would be established.

UNRELIABLE ANNUAL COST REVISIONS

We noted problems in the annually updated cost estimates which raised questions as to their reliability. For six Osage reservoirs for which estimates were updated for fiscal year 1971, the total increase over the previous estimates was $32.5 million. Of the increase, about $3.3 million resulted from revised construction cost estimates, $10.6 million from revised estimates of land costs, and $18.6 million from price level increases. The bases for the revised construction cost estimates generally were not documented. The documentation for 11 changes (increases and decreases) totaling $4.4 million reviewed by us contained brief reasons for the changes but no explanations as to how the amounts of the changes were computed. Estimates and various other adjustments cited to us by district personnel in support of five of these changes did not reconcile with the amounts of the changes. For example, support cited for an increase of $257,000 totaled $275,500 and support cited for an increase of $1,054,000 totaled only $709,000.

The land-cost estimates were increased as much as 50 percent. For example, the land cost estimate for the Garnett Reservoir was increased from $10.1 million in fiscal year 1970 to $15.5 million in 1971. The reasons for the increase, as recorded by one estimator, were that land costs were being driven up because of increased interest and land speculation in the area and that earlier estimates were much too conservative. Furthermore, the estimator noted that:

> "Although the attached current estimate is considered sound, it will in all likelihood be outdated within another three to six months if the present trend continues. Early acquisition would appear most desirable if spiraling upward cost of real estate is to be kept to a minimum."

The division provides the district with the percentages to be used in updating estimates to provide for changes in price levels. These percentages are based on changes in the national construction index.

The updating of the cost estimates for the fiscal years 1972 and 1973 budgets were based on an increase in the

national construction cost index of 23 percent, which was substantially lower than the increase in the Kansas City construction cost index of 50 percent. Therefore, some weight should have been given to the Kansas City or other local index in determining the percentage to be used in updating the estimates.

Use of the national construction cost index for updating estimates without considering greater changes in the local index resulted in understated estimates. The fiscal year 1972 cost estimate of $276 million for the Truman Reservoir was $48 million higher than the 1971 estimate. This increase included $26.1 million to bring the estimate into agreement with the amount of a recent contract award on the project. A Division official attributed the need for the increase of $26.1 million principally to the fact that prior years' estimates had been developed on the basis of inadequate price indexes. District personnel said that, if they were responsible for selecting the percentages to be used for updating estimates to provide for changes in price levels, they would divide the District into three geographical areas and establish different percentages for each area because factors influencing price level increases varied between the areas.

The Department agreed that using a divisionwide cost index for updating estimates might not provide for the desired degree of flexibility and that consideration would be given to allowing districts greater latitude in selecting the percentages to be used in updating estimates.

ANNUAL COST ESTIMATES UNDERSTATED

The Corps compares estimated annual costs for a project with the estimated annual benefits to determine if the benefit-to-cost ratio indicates the economic feasibility of the project. A benefit-to-cost ratio which shows that benefits are equal to or greater than costs is considered satisfactory.

Annual costs include (1) interest on the initial investment in a project, (2) amortization of the investment, (3) operation and maintenance costs, (4) cost of major replacements, and (5) economic losses due to flooding. Annual

benefits include values for such items as (1) flood control, (2) power, (3) recreation, and (4) fish and wildlife.

Our review showed that the benefit-to-cost ratio for the Osage River Basin project was overstated because the District understated interest during construction and operation and maintenance costs. For the fiscal year 1972 budget, the estimated annual costs of the nine Osage reservoirs were as follows:

Interest on unpaid investment	$16,641,000
Amortization of investment (including interest during construction)	1,110,000
Operation and maintenance costs	1,806,000
Replacements	293,000
Economic losses due to flooding	1,306,000
Total	$21,156,000

Understated interest during construction

Construction costs and interest during construction comprise the project investment to be amortized. Although Corps procedures provide that interest during construction is to include interest on land costs, the District did not include such costs for six of the reservoirs. The inclusion of interest on land costs would have increased the estimated investment by $4,861,000 and the estimated annual costs by $156,000.

Slippages in the estimated construction completion dates also caused estimates for interest during construction to be understated. For the Truman Reservoir, a 6-year construction period was used in computing interest during construction whereas the estimated completion schedule for the fiscal year 1972 budget indicated that the construction period would be 11 years. Use of an 11-year construction period instead of the 6-year period would have increased the estimated annual cost by about $228,000.

Understated operation and maintenance costs

Estimates of annual operation and maintenance costs for a project should represent as nearly as possible the costs necessary to maintain the project at full operating efficiency throughout its life.

The Corps had no documentation on file to support the estimates of operation and maintenance costs for any of the nine Osage reservoirs except the Truman Reservoir. The estimate for this reservoir included operation and maintenance costs for only one of the three operating divisions within the District having such responsibilities for the reservoir. The two divisions not included in the estimate generally incur about 40 percent of such costs.

A further understatement in the annual estimated operation and maintenance costs resulted because these costs had not been increased to the extent that they had been increasing at operating reservoirs in the Kansas City District. For fiscal years 1966 through 1970, these costs increased an average of 20 percent a year, whereas the estimates for the five Osage reservoirs under construction and in planning were increased an average of only 8.5 percent a year. Corps officials said that the increases for the five Osage reservoirs were based on a "general understanding of Federal pay increases" and that they had made no analysis of trends in actual costs. They also stated that the 20-percent annual increase was high for regular operation and maintenance costs and would appear to include some one-time expenditures for items on older reservoirs that were being installed during the construction of new reservoirs.

As a result of the apparent adjustments needed to make the fiscal year 1972 estimates realistic, we requested the Corps to revise the operation and maintenance estimates for the five Osage reservoirs under construction or in planning. The revised estimates totaled $3,050,000, an increase of $1,639,000 over the original 1972 estimate of $1,411,000.

We believe that the deficiencies in these estimates demonstrate the need for a more thorough review by management. In commenting on our draft report, the Department of the Army indicated that the Kansas City District had recently

established a revised procedure to improve the estimating of annual operation and maintenance costs and that the revised procedure should result in eliminating deficiencies which had caused some costs to be omitted.

CONCLUSION

The deficiencies noted in the Kansas City District's estimating practices raise significant questions as to the validity of project cost estimates presented to the Congress. Factors affecting the estimates for the projects we reviewed were frequently not considered, and the bases for the estimates were not adequately documented to enable supervisory reviews of the estimates. The reviews that were made were limited and no postanalysis of the estimates were made. The result has been (1) unreliable estimates of project costs and updated revisions of such costs and (2) underestimated annual operating costs presented to the Congress. We believe that similar deficiencies in estimating practices may exist at other Corps districts.

RECOMMENDATION TO THE SECRETARY OF THE ARMY

We recommend that the Chief of Engineers take action to strengthen estimating procedures to insure that the Congress is being provided with reliable cost estimates.

AGENCY COMMENTS

The Department of the Army, in commenting on our draft report, generally concluded that Corps procedures and guidelines for cost estimating were adequate. The Department agreed, however, that the cost estimating area required strengthening and stated that the Corps would direct all field offices to stress the importance of this function by requiring strict compliance with existing manuals and regulations.

CHAPTER 3

INCLUSION OF POWER AT HARRY S. TRUMAN RESERVOIR

In 1966 the Corps approved the installation of turbines to provide hydroelectric power at the Harry S. Truman Reservoir, even though revenues from the sale of the power probably would not be adequate to recover the cost of the Federal investment within the required 50-year repayment period. In addition, the Corps continued to present data to the Congress indicating that the Federal investment in power at the reservoir would be recovered.

ESTIMATED COSTS EXCEEDED EXPECTED REVENUES

Power was authorized at the Harry S. Truman Reservoir by the Flood Control Act of 1962 (72 Stat. 1187) although financial feasibility had not been demonstrated by the Corps in its authorizing study. In a letter dated September 10, 1962, which was made a part of the authorizing study presented by the Corps to the Congress, the Office of Management and Budget (then the Bureau of the Budget) stated:

> "As you know, Section 5 of the Flood Control Act of 1944 requires that power produced at reservoir projects under control of the Department of the Army be sold at rates which will recover costs of power production and transmission, including capital investment allocated to power, over a reasonable period of years. As a matter of policy, a period of 50 years has been considered appropriate for the recovery of power investment. Such a period was most recently affirmed by the Congress as a condition of the authorization of Laurel River Reservoir in the Flood Control Act of 1960. Accordingly, the Bureau of the Budget would expect that construction of power features of the Kaysinger Bluff [now Harry S. Truman] Reservoir project, other than penstocks or other provisions for future power installations, not be undertaken until there is specific assurance that all costs including joint costs allocated to power

can be returned with interest within a period of 50 years."

After several design studies and proposals, installation of six turbines was approved by the Office of the Chief of Engineers on November 25, 1966. At that time estimated costs allocated to power totaled $43,369,000. Earlier, however, the marketing agency for the power--Southwestern Power Administration, Department of the Interior--advised the Corps, by letter dated August 17, 1966, that it could recover costs of $43,574,000 but not costs of $45,008,000 which the Corps had proposed under alternative operating conditions.

We believe that it should have been obvious to the Corps in November 1966 that producing power at the Truman Reservoir would not be financially feasible because the costs could not be recovered through power revenues. The costs of $45,008,000 that the marketing agency said could not be recovered are only about 3.8 percent more than the costs of $43,369,000 that was then allocated to power. Because construction costs were increasing from 3 percent to 4 percent a year, Corps officials should have known that, within a few months, the costs would exceed those which could be recovered.

Corps records show that by September 1967 the estimated costs allocated to power totaled $45,927,000, or $2,353,000 in excess of the amount the marketing agency said could be recovered. The Corps nevertheless awarded a contract for the manufacture of the turbines in April 1968.

The financial feasibility of the power part of the project has continued to worsen, and as of December 1970 the estimated costs allocated to power exceeded the amount that the marketing agency said could be recovered by about 40 percent. The estimated costs allocated to power are shown below.

Date of updated cost of allocation	Allocated costs
September 1967	$45,927,000
August 1968	47,193,000
October 1969	49,539,000
December 1970	60,819,000

Corps officials told us that they had proceeded with the project on the basis of the 1966 estimates and would not again consider the financial feasibility of the power part of the project unless something occurred that would significantly affect the project.

We noted that Southwestern Power Administration was aware of the increasing costs and asked why it had not advised the Corps that the costs had exceeded the amount considered to be recoverable. Administration officials stated that they did not usually comment on Corps costs unless requested to do so. Subsequent to our inquiry, however, the Assistant Secretary of the Interior informed the Chief of Engineers, by letter dated January 4, 1971, that:

> "The Southwestern Power Administration last replied officially by letter dated August 17, 1966, *** concerning financial feasibility of a proposed power installation for the Harry S. Truman Reservoir.
>
> * * * * *
>
> "We have been advised by *** that no change has occurred in the marketing considerations since 1966 which would allow it to return any greater revenue and that, therefore, it cannot demonstrate 50-year payout for the increased power investment shown in the latest preliminary cost allocation.
>
> "*** We do feel that it is necessary to let you know that based on the latest cost data available as indicated, the power installation under consideration by your office cannot be financially justified at the Harry S. Truman Project by the Southwestern Power Administration."

As a result, the Kansas City District reanalyzed the power part of the project and forwarded the results to the Chief of Engineers on February 11, 1971. The District, on the basis of its analysis, proposed three options: (1) continue installation of power at the project as programed, (2) defer further power installation until some indeterminate future date, or (3) delete power from the project.

The District concluded that, if installing power at the project were deferred, the prospect of payout would worsen because additional costs of at least $11 million would have to be expended if power were installed in two stages. The District, in July 1970, had estimated that the project with power would cost $276 million and without power would cost $239 million. The estimated cost, therefore, of retaining power would be $37 million. Because the cost of retaining power was less than the maximum amount the marketing agency indicated could be recovered within 50 years, the District recommended that power be retained and the Office of the Chief of Engineers approved this retention.

LACK OF DISCLOSURE ON PROJECT FINANCIAL FEASIBILITY

We believe that the Corps did not fully disclose to the subcommittees of the Senate and House Committees on Appropriations all facts pertinent to the financial feasibility of adding power to the Harry S. Truman Reservoir project. In accordance with Corps regulations prescribing the format for project justifications to be submitted to the Congress, the costs of power at the Truman Reservoir have been presented each year to the subcommittees as reimbursable even though such costs exceeded the amounts that the marketing agency said could be recovered.

For example, in the fiscal year 1972 Senate appropriation hearings, the Corps presented the following facts in its justification for the Harry S. Truman Reservoir.

"Future non-Federal reimbursement $57,870,000

* * * * *

"Non-Federal costs. -- Cost allocable to power are reimbursable. The preliminary estimate of the amount of reimbursement of the estimated project cost for power is $57,870,000.

"Status of local cooperation. -- None required for construction. Responsibility for repayment of power rests with the marketing agency of the Department of the Interior."

Corps files showed, however, that the reimbursable costs exceeded $57,870,000 because the costs allocated to power at the reservoir did not include interest during construction and certain indirect costs at other reservoirs that were allocable to power at the Truman Reservoir. The costs allocable to power totaled $60,819,000, or $17,272,000 in excess of the amount the marketing agency said was recoverable.

CONCLUSION

The Corps' November 1966 decision to install power at the Truman Reservoir was questionable because the Corps had prior knowledge that power revenues probably would not be adequate to recover the costs. Because a contract for the manufacture of turbines was not awarded until after cost estimates clearly showed that the estimated costs exceeded the estimated amount recoverable through revenues, the final decision should have been deferred and the Congress advised of the situation and of other possible courses of action.

We believe that the Congress is entitled to the most current information available in its consideration of the recoverability of power costs. In our opinion, the Corps presented misleading data to the Congress on estimated power costs and revenues for the Truman Reservoir and did not update and furnish full information on the recoverability of the power costs.

RECOMMENDATION TO THE SECRETARY OF THE ARMY

We recommend that, for future Corps projects having power as an authorized purpose, the Chief of Engineers periodically provide the Congress with information based on updated financial feasibility determinations to show the continued recoverability of reimbursable power costs.

AGENCY COMMENTS

In commenting on our draft report, the Department of the Army stated that Corps policies and practices required, prior to installation of power-generating facilities in water resources developments, findings that (1) incremental benefits exceed incremental costs, (2) there was no more economical alternative of providing equivalent power benefits evaluated on a comparable basis with the determination of project costs, and (3) estimated power revenues would be sufficient to recover allocated power costs within 50 years. The Department stated that preconstruction planning studies indicated favorable findings in all three respects on the Truman project and that the Southwestern Power Administration had stated that estimated revenues were more than sufficient to recover allocated power costs. Also, in the absence of major changes

in power features, costs, regional market pictures, or specific negative comments regarding the financial feasibility of power at the project, the Corps continued to consider the marketability of project power as satisfactory.

The Department stated further that current Corps procedures pertaining to cost allocations and financial feasibility determinations were considered to provide an adequate means for fully informing the Congress. It stated that, in view of the circumstances related to the Truman project, it now recognizes that improvement in the implementation of these procedures can be achieved and that, in line with our recommendation, the Corps, in the future, would specifically inform the marketing agencies whenever the reimbursable power costs exceed previously estimated power revenues so that financial feasibility determinations could be updated. Additionally, the Department said that the Congress would be provided with the results of these feasibility studies.

The Southwestern Power Administration, in commenting on a draft of our report by letter dated May 15, 1972, stated that it generally concurred in our findings with respect to power at the Truman project. The Administration emphasized that the effect of the entire procedure for justifying and funding multiple-purpose projects had been to increase reimbursable power costs in such a way that the marketing agency had virtually no control. The Administration stated also that it could not adequately plan for rate setting and sales contracting for a project because firm allocated power costs became available only when the project was completed and sometimes long thereafter.

The Administration stated further that the decision to go ahead with the power facilities at the Truman project should be carefully reviewed by all concerned agencies.

CHAPTER 4

SCOPE OF REVIEW

We reviewed pertinent legislation, Corps regulations and manuals, project cost estimate planning documents, and general design memorandums incident to the nine reservoirs in the Osage River Basin project, as well as other relevant files and records. Also, we held discussions with appropriate agency personnel.

Our review was conducted primarily at the Corps District Office in Kansas City, Missouri. To the extent we deemed appropriate, we did review work at other locations concerned with the Osage River Basin project--the Office of the Chief of Engineers, Washington, D.C.; the Corps Division Office, Omaha, Nebraska; the Corps District Office, St. Louis, Missouri; and the Southwestern Power Administration, U.S. Department of the Interior, Tulsa, Oklahoma.

PRINCIPAL OFFICIALS OF THE DEPARTMENT OF DEFENSE AND THE DEPARTMENT OF THE ARMY RESPONSIBLE FOR ADMINISTRATION OF ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
DEPARTMENT OF DEFENSE		
SECRETARY OF DEFENSE:		
Melvin R. Laird	Jan. 1969	Present
Clark Clifford	Mar. 1968	Jan. 1969
Robert S. McNamara	Jan. 1961	Feb. 1968
Thomas S. Gates, Jr.	Dec. 1959	Jan. 1961
Neil McElroy	Oct. 1957	Dec. 1959
Charles E. Wilson	Jan. 1953	Oct. 1957
DEPARTMENT OF THE ARMY		
SECRETARY OF THE ARMY:		
Robert F. Froehlke	July 1971	Present
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
CHIEF OF ENGINEERS:		
Lt. Gen. Frederick J. Clarke	Aug. 1969	Present
Lt. Gen. William F. Cassidy	July 1965	July 1969
Lt. Gen. Walter K. Wilson, Jr.	May 1961	June 1965
Lt. Gen. Emerson C. Itschner	Oct. 1956	Mar. 1961
Lt. Gen. Samuel D. Sturgis	Mar. 1953	Sept. 1956