QD - Bridge Canyon Dam, 2

Calendar No. 153

82D CONGRESS, 1st Session } SENATE { REPORT No. 163

BRIDGE CANYON PROJECT

MARCH 12, 1951.—Ordered to be printed

Mr. MCFARLAND, from the Committee on Interior and Insular Affairs, submitted the following

REPORT

[To accompany S. 75]

The Committee on Interior and Insular Affairs, to whom was referred the bill (S. 75) to authorize the construction, operation, and maintenance of a dam and incidental works in the main stream of the Colorado River at Bridge Canyon, together with certain appurtenant dams and canals, and for other purposes, having considered the same, report favorably thereon and recommend that the bill do pass.

GENERAL STATEMENT

The bill S. 75, which is the same as S. 75 reported by this committee in the Eighty-first Congress and passed by the Senate by a vote of 55 to 28, with a few amendments hereinafter described, authorizes the construction of a multipurpose project known as the Bridge Canyon project, which includes a dam and other works on the Colorado River in northwestern Arizona, works in central Arizona, and a dam and works in New Mexico. The primary purposes are to provide urgently needed irrigation water for more than 725,000 acres in Arizona and New Mexico; and to furnish an installed capacity of approximately 770,100 kilowatts of power needed for domestic, commercial, and pumping purposes.

The project recommended by this bill, which has been approved by the Department of the Interior, has been exhaustively studied by the committee during 15 days of testimony in the Eightieth Congress on a predecessor and a related bill (S. 1175 and S. J. Res. 145) and 20 additional days in the Eighty-first Congress. In all, more than a hundred witnesses were heard and the printed records comprise several thousand pages of testimony, tables, charts, and diagrams.

Those hearings prove beyond question that the project here authorized is not only one of the most important reclamation programs in the entire United States but that the economy of much of the

State of Arizona is largely dependent upon its completion. Thousands of farmers live on the 725,000 acres in Arizona which would receive irrigation water from the project; additional thousands of familes, merchants, suppliers, bankers, and workers on these farms are directly dependent for their very existence on the continued production of these areas. The area will revert to desert if additional water is not soon made available.

The committee is also impressed with the fact, brought out at the hearings, that not only is there at present a serious shortage of electrical power in the entire lower basin area—Utah, New Mexico, Arizona, Nevada, and California—but that the demand for electrical energy will continue to grow far beyond present means of supply. It is clear that the industrial economy of these five States will be severely impaired and retarded if additional hydroelectric energy is not quickly developed.

There exists a dispute between two States, Arizona and California, as to the right to use Colorado River water. While it is clear that both States have rights to the use of the water, witnesses representing Nevada and California questioned the right of Arizona to use Colorado River water for the project here recommended.

The committee is firmly of the opinion that regardless of the contesting claims of the States which have rights to Colorado River water that the project here recommended should be authorized and the bill, S. 75, be passed. The bill contains the provision known as the O'Mahoney-Millikin amendment which was adopted by the committee in reporting S. 75 in the Eighty-first Congress, which preserves the rights of the contesting parties by permitting a suit to be brought within 6 months from the date of enactment of this bill, which suit would judicially determine the rights of the parties. The amendment provides that the Government of the United States may be made a party to that suit. Moreover, the amendment fully protects the rights of the States involved by the prohibition of expenditures during such period and the pendency of such litigation for works which are required solely for diverting, transporting, and delivering water from the main stream of the Colorado River for use in Arizona.

The bill also contains what was known as the Watkins amendment which was adopted by the committee in the Eighty-first Congress, which eliminates from the project the construction of a dam, designed for silt control, on the San Juan River at what is known as the Bluff site. Construction of the Bluff Dam was, in the committee's opinion, made unnecessary in view of abundant evidence before it that the entire problem of silt control for the over-all project herein authorized would be fully and adequately solved by the construction of a dam at the Glen Canyon site, a project strongly favored by the Colorado River Basin States, and on which a report is being prepared by the Bureau of Reclamation for consideration by the committee. The Glen Canyon project is described in The Colorado River, a 300-page comprehensive report on the development of water resources by the Bureau of Reclamation. The Bureau's factual analysis of the value of constructing the Glen Canyon Dam is explained on page 146 of that report.

The Glen Canyon Dam, in the opinion of the committee, should and will be authorized and constructed at an early date as a separate

and distinct project, not alone for silt control, but is essential in the development of the river for two additional primary reasons:

(*a*) To provide for the regulation of the flow of the Colorado River which would enable the upper basin States to meet their obligation under the Colorado River compact to deliver 75,000,000 acre-feet of water to the lower basin States every 10 years; and

(*b*) To help meet the acute power shortage in that area.

The amendment herein adopted reduces the over-all cost of the Bridge Canyon project by $29,628,000, thus bringing the total cost down to $708,780,000 at 1947 prices, of which approximately 99 percent is reimbursable. Such a reduction will aid water users and others who must meet repayment costs.

The bill also incorporates the provision worked out and agreed to by the Department of the Interior and the Hualpai Tribal Council for the protection of the rights of the Indians.

The amendment requested by the National Park Service was adopted by the Senate in the Eighty-first Congress. The present bill contains that provision which provides that the Bridge Canyon Dam shall be constructed at an elevation of not more than 1,877 feet.

The committee also desires to call attention to the fact that a resolution is now pending before it, Senate Joint Resolution 26, successor to Senate Joint Resolution 4 in the Eighty-first Congress, which would give consent to a suit in the Supreme Court to settle the conflicting claims to use of Colorado River water. The committee feels that these claims do not constitute a justiciable issue at this time. The purpose of the resolution is accomplished by the O'Mahoney-Millikin amendment which is incorporated in the bill, while at the same time authority is given to undertake the project so urgently necessary. A substantial part of the project here recommended is not in dispute by any party; and construction of that part should not be affected or halted by the claims of contesting parties, the committee believes.

The committee is of the opinion that to delay the construction of nondisputed features of this project would be tragic for those thousands of citizens who are dependent for their future livelihood on its early completion. There is no dispute from any witness that the benefits of the noncontested features of the project are vitally needed and should be constructed. In recommending the passage of this bill, the committee has provided an opportunity for the judicial determination of conflicting claims but at the same time is authorizing the beginning of construction on a project which is essential to the economic welfare of a substantial portion of the United States.

A more detailed consideration of the features of the bill follows:

SCOPE

S. 75 authorizes works and facilities for the delivery of Colorado River water to the area embraced in the central Arizona project and to generate hydroelectric energy, the principal features of which are as follows:

(*a*) A dam and incidental works (including a generating plant) at Bridge Canyon on the Colorado River above Lake Mead in northwestern Arizona. The dam would be 673 feet high above the bed of the Colorado River, at an elevation of not more than 1,877 feet above sea level.

(*b*) A related system of main conduits and canals for the transportation of water to the project area, including a main canal from Lake Havasu above Parker Dam to the Salt River above Granite Reef Dam, and incidental pumping plants required to raise water from the lake to flow by gravity; a canal from the Salt River to the Gila River above the town of Florence, Ariz.; thence a canal to Picacho Reservoir; and thence a canal to the flood plains of the Santa Cruz River.

(*c*) A dam at the Hooker site in New Mexico, and such other dams, canals, and other works as may be necessary for the transportation of water and the effectuation of exchanges of water between the users in the lower regions of the Salt and Gila Rivers and the users on the higher elevations of such rivers which cannot be reached by a gravity flow of the Colorado River. These exchanges would permit the supply of Colorado River water to lower lands now receiving water from the Salt and Gila Rivers and their respective tributaries, thereby releasing the demands upon such latter waters in the lower areas and making the released water available for use on the higher lands.

(*d*) Complete plants, transmission lines, and incidental structures suitable for the fullest economic development and delivery of electric energy generated from water at the works to be constructed under the bill, both for use in the operation of the project and for sale in accordance with Federal reclamation law.

The construction of the tunnel contained in S. 75, as passed by the Senate in the Eighty-first Congress, was eliminated in accordance with action taken by the Irrigation and Reclamation Subcommittee of the Public Lands Committee in the House. This does not change the authorization for the project as the provisions of the original bill provided for pumping plants and also required additional authorization action by Congress before the tunnel could be constructed. The tunnel's elimination is the answer to California arguments of extravagant costs of the project. The project report submitted by the Interior Department was based on the construction of the project without the tunnel. Hence the bill now conforms to the report in this respect.

PURPOSE

The main purposes of the project are briefly summarized as follows:

(*a*) To supply supplemental water for the Central Arizona project and for lands now being irrigated from the Gila River in New Mexico. In describing this phase of the project, the regional director of the third region of the Bureau of Reclamation, in his report to the Bureau (p. 118, H. Doc. No. 136, 81st Cong., 1st sess., Central Arizona project) said:

> It has been shown previously that the Central Arizona project is essentially a "rescue" project designed to eliminate the threat of a serious disruption of the area's economy.

(*b*) To provide a great new source of hydroelectric power to supply the rapidly expanding economy of the area and the tremendously increasing demand for electric energy. The Bureau of Reclamation (p. 181, H. Doc. No. 136) states that the most conservative forecast indicates that present total energy requirements would be doubled by about 1966. The Federal Power Commission, in a survey made by it based on data available through 1946, declares that energy requirements would be doubled by 1958.

(*c*) To furnish other substantial benefits such as flood and erosion control, advantageous exchanges and conservation of water, augmented supplies of water for municipal purposes, fish and wildlife conservation, and recreation.

A portion of the costs of the project, corresponding to over-all public benefits for flood control and fish and wild life conservation, approximately 1 percent of the cost, is nonreimbursable. However, a much larger portion of the cost, approximately 99 percent, is reimbursable. The committee points out that as to such reimbursable costs, the project will be a self-supporting and financially solvent undertaking. A related feature lies in the circumstance that part of the power generated at the Bridge Canyon plant will operate the pumps required to lift the water from Lake Havasu; and the balance of that power, about two-thirds of the total output, will be available for commercial sale.

The Central Arizona project consists of approximately 725,000 acres, which are located about as follows: 445,000 acres in Maricopa County, 200,000 acres in Pinal County, and 40,000 acres in Graham and Greenlee Counties. The report of the Bureau of Reclamation was thorough and complete as to the need for a supplemental supply of water for these lands. This report was fully corroborated to the satisfaction of the committee by testimony during the hearings on S. 75 in the Eighty-first Congress and its predecessor, S. 1175, in the Eightieth Congress.

Two examples pointing up the need for additional water may be cited. The Salt River Valley Water Users Association project, comprising 242,000 acres in Maricopa County, is the largest and oldest project in Arizona and has had the most adequate water supply. That supply consists of waters stored in the Roosevelt Dam and three other dams on the Salt River and two dams on the Verde River with a total capacity of approximately 2,000,000 acre-feet and a supplemental water supply secured by pumping from underground water. Storage capacity is sufficient, yet water supply has been adequate in only two of the last 25 years. It has fallen as low (in 1947) as 2 acre-feet per acre and this year (1951) to less than 1 acre-foot per acre. But the Bureau of Reclamation estimates that the minimum per acre requirement to produce crops under proper irrigation practices is 4 acre-feet at the farmer's headgate.

The second example of severe deficiency of water is afforded by the San Carlos irrigation and drainage district, which comprises 100,000 acres of land irrigated in part by pumped water and in part by water flowing by gravity from the Coolidge Reservoir on the Gila River. The San Carlos district is the second largest of the subdivisions of the Central Arizona project, and half of the district lands is owned by the Pima Indians who with their forebears are the pioneer irrigators of Arizona. In 1947 there was only one-fourth enough water for the San Carlos district and this year Coolidge Reservoir is dry. Supplemental water will not only rescue these lands, but will afford a solution to one of Arizona's problems with its Indian residents.

Other Arizona lands have a similar or even more inadequate supply of water.

According to letters received by the committee the prospects for for water for 1951 are most serious.

In the San Carlos project the Coolidge Dam Reservoir is dry and the farmers can only rely on such water as can be pumped, which is

less than one-half acre-foot per acre. This means not more than one-eighth of the project land can be irrigated in 1951.

The evidence shows that most of the farmers have similar water rights and that there is no way of just eliminating part of the land from cultivation. The economy of the whole 725,000 acres is affected.

However, in the committee's opinion, benefits to be received from the development of the project cannot be measured merely by the number of acres which will have to go back to the desert if the project is not authorized. The testimony showed that the economy of the whole State depends largely upon irrigation. It was testified by witnesses that from 150,000 to 250,000 people would have to seek new homes if the economy of the State is not saved by this project. Banking institutions, stores, and other businesses now both serving and depending upon these people would be seriously affected by these lands going out of productivity, which would result in the loss of homes and work for this large number of people.

The Bureau of Reclamation estimates that 1,200,000 acre-feet of water must be annually diverted from the Colorado River for use in the project area in order to save this economy. Allowing for adequate outflow, the net annual depletion of the Colorado River would be 1,077,000 acre-feet of water.

NEED

There is no question that Arizona needs a great quantity of water to maintain her economy. Witnesses representing California acknowledged the existence of Arizona's need but merely questioned the extent of water necessary to meet such need. The Bureau of Reclamation, in condensing various of its conclusions regarding the project referred to the need (p. 191, H. Doc. No. 136, 81st Cong.) in this language:

> Unless additional irrigation water is made available to the project area, the equivalent of a 30-percent reduction in the presently cultivated lands in the area must eventually be effected. The central Arizona project is needed to sustain the existing agricultural economy of the area.
>
> * * * * * * *
>
> Substantially all surface water resources in the project area are controlled and utilized. Pumping from the ground-water basins in the area has increased progressively until the draft is about double the recharge. The only adequate source of supplemental water is the Colorado River.

In the above-noted report of the regional director appears the following language (p. 114, H. Doc. No. 136):

> In spite of the developments now available, there is an acute water shortage in the project area. The 1940–44 average annual surface water supply was 1,676,600 acre-feet. This figure includes some reuse of surface water. To supplement the surface water supply an average of 1,163,000 acre-feet annually was pumped from the ground-water basin during the same period. This pumpage is estimated to be about 468,000 acre-feet in excess of the safe annual yield of the underlying ground-water basins. Obviously continued pumping at the present rate will lower the water table to such a point that many of the wells will become dry. The wells on the edge of the water basin could not be rehabilitated by deepening because the perimeter of the water-bearing strata will be constricted as this process continues.

Your committee is of the opinion that if this project is not authorized the farmers of the area will continue to lower their water level by overpumping. There will not be available sufficient water to keep the salt washed out of their soil and the whole 725,000 acres will gradually become submarginal. This will continue until the whole economy of the area is affected.

There is unanimity as to the need for additional electric energy in this area. The situation is well summarized by excerpts taken respectively from the report of the regional director and the report of the Bureau of Reclamation:

There is an urgent and measurable need for additional electrical energy in Arizona, southern California, southern Utah, and southern Nevada. Studies by the Federal Power Commission, power distributing agencies, and the Bureau of Reclamation indicate that the present power load in this area, already taxing existing facilities, will double in the next 10 or 15 years. The major potential sources of electrical energy to serve these requirements are hydroelectric developments on the Colorado River and steam or Diesel developments. Steam and Diesel generating power plants consume natural gas, oil, or coal. Diminishing natural gas and oil supplies in southern California have already caused major concern. There are no sources of inexpensive coal available to the power-market area. These natural resources should be conserved by utilizing hydro power whenever practicable (p. 115, H. Doc. No. 136).

An examination of the marketing possibilities in the lower basin power-market area for energy produced by the potential power developments of the central Arizona project indicates that an ample market would exist for the output of these plants when they are completed. As previously noted, the rapidly expanding economy of the area has created a tremendous demand for electric energy. This condition, combined with the drought of recent years and the lag in the installation of new generating facilities during the war, has caused a power shortage in the area. This shortage is particularly acute in Arizona and seems likely to continue for some time. Generating equipment planned for installation in the near future will eliminate most of the deficiency, but large-scale additions to the system will be needed to continue meeting the rapidly growing load.

The two most important factors causing the rapid increase in total energy requirements have been industrial expansion and population increase. During the war the growth in these phases of the economic life was very rapid. In the postwar period the growth has continued, with the result that total energy requirements in the area are greater than during the last year of the war. The States of Nevada, California, and Arizona are among the States experiencing the greatest percentage increase in population during recent years. Both Arizona and California have recorded gains exceeding 25 percent. Postwar building construction and industrial expansion in the urban areas of southern California has been unprecedented in the market area. The metropolitan area of Los Angeles is now rated as the second largest manufacturing center in the Nation.

TABLE E–8.—*Summary of power features*

Power plants	Installed capacity in kilowatts	Gross average power head in feet	Annual firm energy at plant in million kilowatt-hours		
			Initial conditions	Average during first 50 years of operation	Ultimate conditions
Bridge Canyon	750,000	612	4,675	4,395	4,114
Horseshoe	10,000	141	40	40	40
McDowell	4,100	54	23	21	19
Buttes	6,000	144	35	35	35
Total	770,100		4,773	4,491	4,208
Energy replacement at Stewart Mountain			25	28	31
Total			4,748	4,463	4,177
Energy requirements Havasu and McDowell pumping plants			1,154	1,393	1,633
Firm commercial energy			3,594	3,070	2,544

In addition to the growth in population and industry, several other fields of activity have contributed to the increased demand for electric energy. Among these are agricultural expansion and new industrial uses. Increased irrigation pumping, added farm use, and the use of electrometallurgical processes in the mineral industry have all caused an increase in the total requirements. Residential use of electricity has greatly increased in recent years not only because of the increased population but also because of the trend of increased per capita use (pp. 180–181, H. Doc. No. 136).

The demand for electric energy in Arizona, southern California, and southern Nevada is increasing at an estimated rate of 1,000,000,000 kilowatt-hours annually. The area is looking to the Colorado River for energy to meet that increasing demand, and to forestall the requirements for burning oil and natural gas reserves in meeting those demands (p. 191, H. Doc. No. 136).

Witnesses testifying on Arizona's need declared that there would be a demand in that State for all of the electricity generated in the project by the time it is completed, and introduced as evidence an application by the Arizona Power Authority for the acquisition of all such electricity. The purchase by Arizona's citizens of the hydroelectric output of the project combined with the payment by Arizona water users for water delivered to them would result in the complete repayment of the reimbursable portions of the costs of the project, plus routine maintenance and operation expenditures.

The regional director briefly summarizes the remaining needs in this language:

In addition to furnishing the project area with a much-needed water supply, the potential Central Arizona project would provide for silt retention, flood control, river regulation, municipal water supply, recreation, salinity control, and fish and wildlife propagation (p. 118, H. Doc. No. 136).

COSTS

The costs of the project were estimated on factors prevalent July 1, 1947. Upon that basis, such costs may be broken down as follows:

	Total
Coconino Dam and Reservoir	$7, 487, 000
Bridge Canyon Dam and Reservoir	191, 939, 000
Bridge Canyon power plant	73, 419, 000
Havasu pumping plants	25, 973, 000
Granite Reef aqueduct	131, 716, 000
McDowell pumping plant and canal	3, 346, 000
McDowell Dam and Reservoir	16, 326, 000
McDowell power plant	1, 012, 000
Horseshoe Dam (enlargement) and Reservoir	7, 078, 000
Horseshoe power plant	2, 628, 000
Salt-Gila aqueduct	34, 585, 000
Buttes Dam and Reservoir	29, 037, 000
Buttes power plant	1, 159, 000
Charleston Dam and Reservoir	9, 270, 000
Tucson aqueduct	6, 401, 000
Safford Valley improvements	4, 090, 000
Hooker Dam and Reservoir	15, 484, 000
Irrigation distribution system	54, 086, 000
Drainage system for salinity control	9, 973, 000
Power transmission system	83, 771, 000
Total	708, 780, 000

The committee desires to emphasize that the original project embraced a dam and reservoir at the Bluff site in Utah. These particular works were eliminated by the committee, and the corresponding cost ($29,628,000) has been subtracted from the originally estimated total of $738,408,000. The details of this procedure are set forth hereinafter in the treatment of amendments (pp. 12–16).

There will be allocated to flood control $6,641,000, and to fish and wildlife conservation $3,129,000, which are nonreimbursable.

All other costs will be allocated to power, irrigation, and municipal water supply and are fully reimbursable.

While the 1951 prices have risen because of the emergency, because of the law suit and because section 15 of the bill, which provides that no part of the project may be constructed while materials or labor is needed for national defense, this project will not be constructed under present conditions.

AVAILABILITY OF WATER

While reasonably accurate computations are made and used in planning reclamation projects, the determination of the physical quantity of water flowing during a given period of time in a particular river is by no means an exact science. In this project the question of availability of water involves mixed considerations of law and fact.

The Bureau of Reclamation, however, has studied the problem closely and submitted the following table of water availability in consonance with interpretations by Arizona. These computations were supported by witnesses who testified in behalf of S. 75. This table, which follows, appears at page 151 of House Document No. 136:

[Acre-feet a year]

Division between upper and lower basins and Mexico:		
Virgin flow of Colorado River at international boundary		17, 720, 000
Apportioned to the upper basin by art. III (a) of Colorado River compact	7, 500, 000	
Apportioned to lower basin by art. III (a) and (b) of Colorado River compact	8, 500, 000	
Allocated to Mexico by terms of Mexican treaty	1, 500, 000	
Subtotal		17, 500, 000
Total surplus to be allocated under the terms of art. III (f) of Colorado River compact		220, 000
Water available to Arizona:		
Apportioned to lower basin under art. III (a) and (b)		8, 500, 000
Apportioned water for California under Limitations Act	4, 400, 000	
Nevada contract	300, 000	
Lower basin uses by New Mexico and Utah	130, 000	
Subtotal		4, 830, 000
Remainder		3, 670, 000
To be allocated to Arizona under art. III (f) of the compact		55, 000
Available to Arizona		3, 725, 000
Disposition of water available to Arizona:		
Present irrigation depletions:		
Little Colorado River Basin	59, 000	
Virgin River and Kanab Creek Basins	5, 000	
Williams River Basin	3, 000	
Gila River Basin	1, 135, 000	
Colorado River Indian Reservation	15, 000	
Gila project	34, 000	
Yuma project	157, 000	
Subtotal		1, 408, 000
Losses from reservoirs on or benefiting main-stem developments of Colorado River present and future:		
Estimated total losses 900,000 acre-feet a year Arizona charged with proportion based on ultimate use of main stream Colorado River water		313, 000
Increased depletion by potential projects:		
Snowflake project	10, 000	
Hurricane project	12, 000	
Hassayampa project	20, 000	
Colorado River Indian Reservation	285, 000	
Gila project	566, 000	
Central Arizona project	1, 077, 000	
Unassigned water	34, 000	
Subtotal		2, 004, 000
Total, all uses		3, 725, 000

The Bureau's table plainly shows the presence in the river of a sufficient quantity of water to supply the central Arizona project, and the testimony further established that this quantity of water is now flowing in the river, wasted and unused.

ECONOMIC AND ENGINEERING FEASIBILITY

The testimony established that the project is definitely feasible, both on an economic and engineering basis.

The economic feasibility of the project, of course, entails many factors which are intangible and all of which inhere in the future, so that it is not susceptible of exact appraisal now. However, as has been previously indicated, the committee has concluded that the project can reasonably be expected to develop revenues to repay the reimbursable portions of the cost of construction within the useful life of the project.

As pointed out by the Bureau of Reclamation (p. 139, H. Doc. No. 136), the soils in the central Arizona project are friable, have good water-holding capacity, and are highly productive under irrigation and proper farming methods. For example, it was shown that the gross value of crops grown in the Salt River Valley Water Users Association project for the year 1946 was $41,043,385 or $179.62 per acre (p.132 of the hearings on S. 1175, 80th Cong., 1st sess.).

The Bureau of Reclamation reports that the "total tangible benefits from the Central Arizona project are measured by evaluation of the difference in the economic conditions expected to occur with and without the project" (p. C–110 of the appendixes to the Department of the Interior report on the Central Arizona project, being Project Planning Report No. 3–8B.4–2). At page C–111 of said appendixes the Bureau presents such tangible benefits in a statistical form as follows:

(1) Annual damages expected to develop without the project, but which would be prevented by the project:		
Decrease in crop production measured in terms of gross crop value	$5, 272, 370	
Increase in pumping cost	1, 194, 700	
Total annual damages to be prevented		$6, 467, 070
(2) Annual advantages expected to develop with the project:		
Increase in crop production measured in terms of gross crop value	$18, 306, 210	
Reduction in pumping costs	494, 400	
Total annual advantages		18, 800, 610
(3) Total tangible irrigation benefits (rounded)		25, 268, 000

The Bureau summarizes the subject of tangible benefits in this language (p. 187, H. Doc. No. 136):

(*a*) *Tangible benefits*

(1) *General.*—The Central Arizona project, through its functions of irrigation, power, silt control, recreation, municipal water supply, flood control, fish and wildlife conservation, and salinity control, provides benefits that are tangible in nature and national in scope. As a measure of the desirability of the project, the national benefits are compared with the national costs in the following discussion.

In comparing benefits and costs, the Bureau reports as follows (p. 190, H. Doc. No. 136):

(*c*) *Comparison of benefits and costs*

A summary of the various national benefits and costs ascribed to the Central Arizona projects is presented in table F–9. As developed therein, total annual benefits would amount to $41,971,000, and total annual costs would amount to

$25,783,500. The relationship between these factors can best be expressed in the form of a benefit-cost ratio, which in this case would have a value of 1.63 to 1. This indicates that the development of the Central Arizona project would return to the Nation, in the form of benefits, $1.63 for each dollar required to construct, maintain, and operate the project.

The Bureau summarizes intangible benefits in this manner (p. 190, H. Doc. No. 136):

(*d*) *Intangible benefits*

In addition to the benefits just indicated, there are many others of an intangible nature. The serious consequences that would result from a retrenchment in the economy of the area, including a probably enforced migration of many rural and urban families to more substantial places of livlihood, could be averted. Instead, much additional employment would result during construction, and as a result of operating the project and project lands. The increased production of electric energy would encourage industrial expansion throughout the entire power market area. Increased productive capacity and the wider use of electric energy for domestic use would improve living standards. Such benefits and many similar ones add to the desirability of the development. In addition, the strengthening of a unit of our national economy will add to the strength of the whole, both in normal times and in emergencies.

As is the case in multipurpose projects, the farmer cannot afford to repay all costs attributable to the irrigation features, and it is therefore necessary that some portion of the proceeds from sale of power be devoted to repayment of the cost of irrigation features. This is the normal situation, and accords with our established national policy. By way of illustration and comparison, the following table is submitted to demonstrate the situation of the Central Arizona project as compared with several other well-known projects.

	(A) Average firm power rate [1]	(B) Portion of rate required for irrigation subsidy [2]	(B/A) Percentage
	Millions of kilowatt-hours	*Millions of kilowatt-hours*	
Central Valley	5.30	0.68	13
Colorado-Big Thompson	5.10	.89	17
Columbia Basin	1.00	.36	36
Missouri Basin	5.50	2.47	45
Central Arizona	4.82	.72	15

[1] Estimated average power rates in Average Rate and Repayment Studies for Power System on Bureau of Reclamation Projects, dated January 1949.

[2] Increase in estimated average power rate to provide for necessary irrigation subsidy.

The sale of power at the rates indicated, and the sale of water to irrigators at the rate of $4.75 per acre-foot, which the farmers state they are able and willing to pay, and of municipal water at 15 cents per thousand gallons are the basis for the Bureau's estimates. The net result is that the project will liquidate the reimbursable items of its cost over a period not to exceed 75 years, a not inappropriate length of time in proportion to the magnitude and importance of the project. The present bill is different from that passed by the Senate in the Eighty-first Congress in that the repayment period is definitely limited not to exceed 75 years.

Witnesses representing California interests presented arithmetical comparisons and illustrations, such as expressions of the cost of the project on a per-acre basis in accordance with a premise or assumption

preconceived by them. For example, they divided the entire cost of the entire project by the limited number of acres which they asserted would be benefited, thus arriving at the conclusion that the project was extremely expensive when expressed on a cost-per-acre basis. The committee has not elected to proceed upon any such restricted hypotheses, but has viewed the project wholly and objectively against the perspective of the long period of its life and the over-all interests of the Nation and region affected. Thus considered, it is the opinion of the committee that the project is entirely feasible and economically sound.

The evidence at the hearings is replete with data and opinion upon the engineering aspects of the project. The situation is succinctly stated in the report of the Bureau of Reclamation (p. 191, H. Doc. 136) in these words:

> The potential development has engineering feasibility in the sense that no insuperable construction problems appear to be present.

LEGAL ISSUES

It is undisputed that there is a sufficient quantity of water in the Colorado River, available for use in the lower basin but not now in use, to supply the Central Arizona project under S. 75. Witnesses for California and Nevada question Arizona's right to the use of this water.

The committee is of the opinion that the project should be authorized; but in fairness to these two States, the committee feels that they should have an opportunity to present their claims in the Supreme Court, and that in deference to their allegation that the United States is a necessary party consent should be given for the joinder of the latter as a party to the litigation. The committee in the Eighty-first Congress gave tangible expression to its views upon this point in an amendment to the original bill. The present bill contains that provision in sections 12 and 13.

A. Litigation in Supreme Court

Witnesses for California differed with those of the other States over the relative rights of California and Arizona to waters in the lower basin of the Colorado River, and as to the right of Arizona to the water required to effectuate the principal irrigation features contemplated under this bill. On the other hand, there was essential agreement among all witnesses that many features of the project are urgently required and that such features should be promptly authorized so that construction could be expedited.

The Honorable Earl Warren, Governor of California, in a letter written December 29, 1948, to the Secretary of the Interior makes clear that opposition to the Central Arizona project stems from the dispute over the legality of the claims of the two States. He wrote, in part, as follows (p. 16, H. Doc. No. 136):

> Until there is a final settlement of the water rights by some method, the aggregate of Arizona and California claims to Colorado River water will exceed the amount of water available to the lower-basin States under the Colorado River Compact and relevant statutes and decisions. It is only because a determination of the respective rights of the lower-basin States to the waters of the Colorado River system has not been made, that California submits any criticism of your proposed report. Whenever it is finally determined what water belongs legally

to Arizona, it should be permitted to use that water in any manner or by any method considered best by Arizona, so long as that use does not conflict with the right of California to the use of its water from the Colorado River system. However, as long as the present unsettled situation exists, it is my opinion that each State in the lower basin must of necessity interest itself in the other's projects which would overlap its claims. For this reason the State of California cannot concur in the proposal of the Secretary of the Interior for the authorization and construction of the Central Arizona project. Accordingly, the attached report of the division of water resources deals with matters of water supply, water requirements and utilization, and feasibility of the Central Arizona project.

Hon. Sheridan Downey, former Senator from California, proposed an amendment (Committee Print No. 3, June 20, 1949) which among other things would have authorized most, if not all, of the construction projects recommended in this bill as to which there was no contention. His amendment would have authorized studies and reports as to other features in this bill, including the construction of dams and incidental works at Glen Canyon and at Marble Canyon in the Colorado River. The construction items which Senator Downey's amendment would have authorized, and their estimated costs, are as follows:

Bridge Canyon Dam and Reservoir	$191, 939, 000
Power plant	73, 419, 000
Coconino Dam and Reservoir	7, 487, 000
Buttes Dam and Reservoir	29, 037, 000
Power plant	1, 159, 000
Hooker Dam and Reservoir	15, 484, 000
Safford Valley improvements	4, 090, 000
Charleston Dam and Reservoir	9, 270, 000
Tucson aqueduct	6, 401, 000
Horseshoe Dam (enlargement) and Reservoir	7, 078, 000
Power plant	2, 628, 000
Power transmission system	83, 771, 000
Total	431, 763, 000

Analyzing the proposals thus made by Senator Downey, who presented California's view on the project herein recommended, it seems clear to the committee that the various objectives could be accommodated by a program which would authorize the project, yet defer appropriations required solely for the purpose of diverting, transporting, and delivering water from the main stream of the Colorado River for beneficial consumptive use in Arizona during the pendency of litigation to settle the conflicting legal claims. It also is clear that the works for such diversion, transportation, and delivery would be the last to be constructed in the normal course of completing the project. Under these circumstances the litigation which is specifically authorized in this bill might be well under way or even completed during construction of the uncontested features. The need both to facilitate and expedite litigation (if any were desired) is plainly recognized. To attain these ends, when the bill was under consideration in the Eighty-first Congress, Senators O'Mahoney and Millikin proposed an amendment and submitted it to the Department of Justice for comment. The Department expressed concern that the amendment might be unduly restrictive. Whereupon, Senator O'Mahoney wrote to the Attorney General as follows:

JULY 13, 1949.

Hon. TOM C. CLARK,
The Attorney General, Department of Justice, Washington 25, D. C.

DEAR MR. ATTORNEY GENERAL: I am in receipt of the Department's letter of June 30, 1949, transmitted by Mr. Ford, the Assistant to the Attorney General, setting forth objections to the then proposed amendment to S. 75, which amendment was submitted by Senator Millikin and myself under date of June 20.

It is thought that the following language encompasses the desirable objectives and meets the criticisms expressed in the Department's letter:

"SEC. 12. If any State or States within 6 months after the effective date of this act shall begin a suit or suits in the Supreme Court of the United States to determine the right to the use of water for diversion from the main stream of the Colorado River through aqueducts or tunnels to be constructed pursuant to this act for beneficial consumptive use in Arizona, and to adjudicate claims of right asserted by such States or States or by any other State or States, under the Colorado River compact, the Boulder Canyon Project Act (45 Stat. 1057), the California Self-Limitation Act (Cal. Stat. 1929, ch. 16), and the Boulder Canyon Project Adjustment Act (54 Stat. 774), consent is hereby given to the joinder of the United States of America as a party in such action or actions. Any State of the Colorado River Basin may intervene or be impleaded in such suit or suits. Any such claims of right affected by the project herein authorized and asserted by any defendant State, impleaded State, or intervening State under said compact and statutes, or by the United States, may be adjudicated in such action. In any such suit or suits process directed against the United States shall be served upon the Attorney General of the United States."

It is therefore requested that the foregoing language be considered by the Department and that, if agreeable, an expression of your approval thereof be given at your early convenience.

Thanking you in advance for your courtesy and cooperation, and with every good wish, I am

Sincerely yours,

JOSEPH C. O'MAHONEY.

In due course the following reply was received:

JULY 21, 1949.

Hon. JOSEPH C. O'MAHONEY,
Chairman, Committee on Interior and Insular Affairs,
United States Senate, Washington, D. C.

MY DEAR SENATOR: This is in response to your letter to the Attorney General dated July 13, 1949, in which you request the views of the Department of Justice on a proposed substitute for section 12 of the amendment to S. 75 submitted by Senator Millikin and you and designated Committee Print No. 1 of June 20, 1949.

The language of the proposal, which is intended to encompass the objectives and to meet the criticisms expressed in the letter of this Department dated June 30, 1949, has been considered as requested by you, and you are advised that the Department of Justice is of the view that it is in accord with the suggestions made in the letter of June 30.

Yours sincerely,

PEYTON FORD,
The Assistant to the Attorney General.

The amendment as set forth above in Senator O'Mahoney's letter, in which the Department of Justice concurred, was accordingly adopted by the committee and was incorporated in the present bill.

Section 15 of the bill provides that no construction shall be begun so long as materials or labor necessary for construction of the project are needed for national defense. This section will probably mean no part of the project will be constructed for years, but inasmuch as the project is authorized it will constitute a threat sufficient to make a justiciable issue for the courts and the issues can be litigated during the present emergency.

B. Works at Glen Canyon and Bluff Canyon

The project originally contemplated a dam at Bluff Canyon on the San Juan River in Utah, above the works at Bridge Canyon. These improvements originally were intended primarily as an adjunct to Bridge Canyon Dam and Reservoir. Their principal functions were to control silt and thus protect the Bridge Canyon Reservoir from filling and to afford river regulation and flood control. However, more extensive and much more beneficial works at Glen Canyon, in the Colorado River in Utah, would not only fully protect the Bridge Canyon works from silt but would render the facilities at Bluff Canyon unnecessary. The Glen Canyon Dam, which is to be reported on by the Bureau of Reclamation, is, according to testimony presented to the committee, an essential project in accordance with the Colorado River compact for the regulation of river flow and power production. It is to be presented as a separate project due for early consideration by the committee. That the construction of works at Glen Canyon will be of great public interest and value seems clear to the committee. Therefore, in accord with Senator Watkins' views and suggestions, S. 75 was amended, in a manner to eliminate the dam at Bluff Canyon and to protect the site at Glen Canyon from flooding, in the Eighty-first Congress. This amendment is included in the present bill.

BUREAU OF RECLAMATION AND OTHER REPORTS

The Secretary of the Interior has approved and submitted an extensive report on the Central Arizona project, which report was prepared by the Bureau of Reclamation and is entitled "Project Planning Report No. 3–8b.4–2, December 1947." The report is contained in two volumes, the first of which is somewhat of an epitome of the second, the latter being much more extensive.

The first volume is printed in the latter part of House Document No. 136, Eighty-first Congress, first session, entitled "Central Arizona Project, Letter From the Secretary of the Interior Transmitting a Report and Findings on the Central Arizona Project." The first part of this House document is devoted to reports and matters collateral to the Secretary's report, a circumstance necessitating a degree of care in differentiating the collateral material from the report proper, which begins at page 110 of the House document.

The report recommends that Arizona adopt an underground water code. Arizona has done so. The code will stabilize the present underground water situation and in future will conserve and contribute to the effective utilization of the supplemental water which S. 75 would provide.

The House document sets forth certain letter reports from the Secretary of Agriculture and from the Chairman of the Federal Power Commission. More recent and pertinent letters from both sources are not included in the publication, but they do appear in the hearings on S. 75 in the Eighty-first Congress and do give data in support of the project.

The Secretary of the Interior, by letter to the chairman of the committee dated March 5, 1951, made a favorable report on the present bill. Similarly a letter from the Bureau of the Budget, dated March 2, 1951, has been received. Both letters are made a part of this report, appearing as an appendix.

CONCLUSIONS

In reporting the bill, S. 75, favorably and recommending its immediate enactment, the committee has come to the following conclusions:

1. There is palpably an urgent need for the benefits which this bill would provide, and construction work to speed such benefits should be authorized promptly.
2. The welfare and livelihood of a large number of citizens and the economic future of a substantial area of this country are dependent upon the early completion of this project.
3. No substantial opposition has been raised against many of the constituent parts of the project, including the dam and power plant at Bridge Canyon and works within Arizona and New Mexico.
4. Water litigation in the Supreme Court may require, as it has in the past, a period of many years.
5. California possesses the physical works and facilities by means of which she can divert Colorado River water even to the extent of her maximum claim, so that in this respect she enjoys a distinct advantage. Arizona has no facilities to obtain Colorado River water for use in Arizona.
6. If litigation is deemed necessary to settle the conflicts between California and Arizona, such litigation should in fairness be both facilitated and expedited toward a full resolution of issues. Although it seems undesirable for the Congress to attempt to constrain any State to participate in any such litigation, by the same token participation should not be denied to any State, the rights of which may be affected by the project or by litigation in connection therewith.
7. The project will make a substantial contribution to the conservation and utilization of great natural resources and a corresponding contribution to national and regional welfare.
8. The project is feasible.

The committee therefore urges prompt authorization of the project, subject to the limitations appearing in the bill.

APPENDIX

DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington 25, D. C., March 5, 1951.

Hon. JOSEPH C. O'MAHONEY,
Chairman, Committee on Interior and Insular Affairs,
United States Senate, Washington 25, D. C.

MY DEAR SENATOR O'MAHONEY: The Committee on Interior and Insular Affairs has requested a statement from this Department on S. 75, a bill authorizing the construction, operation, and maintenance of a dam and incidental works in the main stream of the Colorado River at Bridge Canyon, together with certain appurtenant dams and canals, and for other purposes.

The works which enactment of this bill would authorize are substantially those, with an exception noted below, which are described in this Department's project planning report on the Central Arizona project. That report was, subject to certain conditions precedent therein set forth, favorable. It has been published as House Document 136, Eighty-first Congress. Your attention is invited to this report for an exposition of this Department's findings with respect to, among other things, the need for the project, its physical features, the acreages which it is designed to serve, the quantities of electric energy which it would produce, the estimated construction cost of the various features of the project as of the time when the report was prepared, the allocations of this cost among the various

functions served by the project as outlined in section 3 of the bill, the repayment capacity of the irrigation and municipal water users, the amount which it is expected would be returned from the sale of electric energy, and the benefit-cost ratio of the project.

In transmitting this report to the Speaker of the House of Representatives the conclusions were expressed that "the project has engineering feasibility and the proposed reimbursable costs probably can be repaid in 78 years under the plan outlined," that "the 78-year period * * * for return of the reimbursable costs of the project is considered fully justifiable," that "if such a project as this is not undertaken, the economy of the heart of Arizona is destined to deteriorate seriously with consequent losses to the State, the region, and to the Nation," and that "those losses would far exceed the costs of the physical works that are necessary to assure continued productivity of the land and the existing values of commerce, industry, and the extensive civilization that already prevail." In a subsequent letter to the chairman of the Public Lands Committee of the House of Representatives, dated April 20, 1950, it was pointed out that, under S. 75, Eighty-first Congress, as amended up to the time of that letter, "the Central Arizona project, if constructed on the pumping plant and aqueduct route from Lake Havasu, could be paid out in a period of about 73 years, which would be well within the useful life of the project * * *." The present S. 75 includes the amendments there referred to, and provides for construction on the Lake Havasu route.

In the letter transmitting the project planning report to the Congress, to which reference has already been made, particular notice was given to the controversy surrounding the water supply required by the project for diversion to central Arizona. It was there said:

"Assurance of a water supply is an important element of the plan yet to be resolved. The showing in the report of the availability of a substantial quantity of Colorado River water for diversion to central Arizona for irrigation and other purposes is based upon the assumption that the claims of the State of Arizona to this water are valid. It should be noted, however, as the regional director and the Commissioner of Reclamation have pointed out, that the State of California has challenged the validity of Arizona's claim. If the contentions of the State of Arizona are correct, there is an ample water supply for this project. If the contentions of California are correct, there will be no dependable water supply available from the Colorado River for this diversion. While the necessary water supply is physically available at the present time in the Colorado River, the importance of the questions raised by the divergent views and claims of the States is apparent. The Bureau of Reclamation and the Department of the Interior cannot authoritatively resolve this conflict."

I note that section 12 of S. 75 provides a means whereby this very important question can be placed before the Supreme Court for solution. I note, furthermore, that section 13 of the bill provides that, for 6 months after its enactment and during the pendency of any suit commenced in the Supreme Court within those 6 months pursuant to the provisions of section 12, no moneys shall be spent for the construction of any of the features of the project "which are required solely for the purpose of diverting, transporting, and delivering water from the main stream of the Colorado River for beneficial consumptive use in Arizona," these being the features which are intimately involved in the projected litigation.

The proviso beginning on page 3, line 23, of S. 75 that "this authorization shall not include * * * any works, dam, or reservoir at the Glen Canyon site or any other site in the upper Colorado River Basin" will prevent construction of the reservoir at the Bluff site in Utah which was proposed in our central Arizona report as a sediment retention measure. The cost of Bluff Dam and Reservoir was estimated in our report at approximately $29,600,000. In its report on S. 75, Eighty-first Congress, your committee explained its action in adopting an identical proviso eliminating Bluff Dam in these words:

"A second amendment was * * * adopted by the committee which would eliminate from the project the construction of a dam, designed for silt control, on the San Juan River at what is known as the Bluff site. Construction of the Bluff Dam was, in the committee's opinion, made unnecessary in view of abundant evidence before it that the entire problem of silt control for the over-all project * * * would be fully and adequately solved by the construction of a dam at the Glen Canyon site, a project strongly favored by the Colorado River Basin States * * *.

"The Glen Canyon Dam, in the opinion of the committee, should and will be authorized and constructed at an early date as a separate and distinct project * * *."

I share the committee's view that the Glen Canyon Dam and Reservoir, if constructed, will do all that the reservoir at the Bluff site could do by way of protecting the Bridge Canyon Reservoir from excessively rapid siltation. As you know, this Department's proposed report on the Colorado River storage project—a project that includes Glen Canyon Dam as one of its principal features—is now before the States of the Colorado River Basin for review and comment. I hope to be able to present the completed report to the Congress for consideration in advance of the close of this session.

The exclusion of Bluff Dam and Reservoir from the purview of S. 75 is the only material particular in which the works to be constructed under the bill would deviate from those described in the project planning report referred to above. It may be well to note at this point that, in accordance with that report as prepared by the Bureau of Reclamation and approved by the Department, the works which would be authorized by S. 75 do not include any water-control structures above Bridge Canyon Dam which would divert or substantially change the main flow of the Colorado River through Grand Canyon National Park. In particular, they would not include the Marble Canyon-Kanab Creek development, which has never been the subject of a project planning report by the Department.

For your further information, reference is made to the response of this Department on June 28, 1950—a response made with the concurrence of the Bureau of the Budget—to certain questions propounded by the Public Lands Committee of the House of Representatives. The answers given to these questions are, in many respects, pertinent to the project that would be authorized if S. 75 becomes law since they were predicated on a bill from which, as in S. 75, authorization of Bluff Dam and of the so-called tunnel route—a route for conveying water by gravity from Bridge Canyon Reservoir to central Arizona—had been eliminated.

In the event favorable consideration is given to the enactment of S. 75, it is believed that the clarity of the bill would be improved by the following perfecting amendments:

1. At page 3, line 8, strike out the comma after the word "dams".
2. At page 9, line 5, strike out the words "aqueducts and tunnels", and insert in lieu thereof the words "conduits and canals".
3. At page 11, line 6, strike out the word "interest", and insert in lieu thereof the word "interests".

This report to your committee is not to be considered as being in any respect a modification of or an enlargement upon the advice concerning the relationship of the proposed legislation to the program of the President heretofore transmitted by the Bureau of the Budget in its letters of February 4 and April 20, 1949, to us, in its letter of February 11, 1949, to you, and in its letter of April 19, 1950, to the chairman of the Public Lands Committee of the House of Representatives.

We have been advised by the Bureau of the Budget that there is no objection to the submission of this report to your committee.

Sincerely yours,

OSCAR L. CHAPMAN,
Secretary of the Interior.

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington 25, D. C., March 2, 1951.

Hon. JOSEPH C. O'MAHONEY,
Chairman, Committee on Interior and Insular Affairs,
United States Senate, Washington, D. C.

MY DEAR SENATOR O'MAHONEY: This will acknowledge receipt of your letter dated January 11, 1951, requesting a report on S. 75, a bill authorizing the construction, operation, and maintenance of a dam and incidental works in the main stream of the Colorado River at Bridge Canyon, together with certain appurtenant dams and canals, and for the other purposes.

S. 75, as introduced in this session of Congress is understood to provide, except for the elimination of Bluff Dam and Reservoir, for substantially the same works as contained in the project planning report of the Department of the Interior, published in House Document 136, Eighty-first Congress, first session.

You are advised that there has been no change in the relationship of the proposed legislation to the program of the President as outlined in our letters to the Secretary of the Interior dated February 4 and April 20, 1949, our letter to you dated February 11, 1949, and our letter to the chairman of the Public Lands

Committee of the House of Representatives dated April 19, 1950, copies of which have been furnished you.

In our letter of April 19, 1950, to the chairman of the Public Lands Committee of the House of Representatives we drew attention to the fact that national policies governing Federal participation in water resources developments were then under study by the President's Water Resources Policy Commission. Since that time the Commission has reported and its recommendations are now under review within the executive branch. Until we have had an opportunity to complete this review, I am unable to inform the committee on the effect which the Commission's recommendations might have upon the authorization contemplated in S. 75.

Sincerely yours,

F. J. LAWTON, *Director.*