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HEARING

BEFORE THE

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS UNITED STATES SENATE

EIGHTY-NINTH CONGRESS

FIRST SESSION

ON

S. 1761

A BILL TO AUTHORIZE THE SECRETARY OF THE INTERIOR
TO CONSTRUCT, OPERATE, AND MAINTAIN A THIRD
POWERPLANT AT THE GRAND COULEE DAM, COLUMBIA
BASIN PROJECT, WASHINGTON, AND FOR OTHER PURPOSES

APRIL 13, 1965



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COMPTON

THIRD POWERPLANT, GRAND COULEE DAM

TUESDAY, APRIL 13, 1965

U.S. SENATE,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The committee met at 10 a.m., in room 3110, New Senate Office Building, Hon. Henry M. Jackson (chairman of the committee) presiding.

Present: Senators Jackson, Anderson, Moss, Burdick, Hayden, Allott, Simpson, and Fannin.

Also present: Jerry T. Verkler, staff director; Stewart French, chief counsel; and Richard N. Little, minority counsel.

Senator JACKSON. The committee will come to order.

The hearing this morning is on S. 1761, a bill to authorize the Secretary of the Interior to construct, operate, and maintain a third powerplant at the Grand Coulee Dam, Columbia Basin project, Washington, and for other purposes.

(S. 1761 follows:)

[S. 1761, 89th Cong., 1st sess.]

A BILL To authorize the Secretary of the Interior to construct, operate, and maintain a third powerplant at the Grand Coulee Dam, Columbia Basin project, Washington, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That (a) the Secretary of the Interior is hereby authorized to construct, operate, and maintain a third powerplant with a rated capacity of approximately three million six hundred thousand kilowatts, and necessary appurtenant works, including a visitor center, at Grand Coulee Dam as an addition to and an integral part of the Columbia Basin Federal Reclamation project.

(b) Construction of the third powerplant may be undertaken in such stages as in the determination of the Secretary will effectuate the fullest, most beneficial, and most economic utilization of the waters of the Columbia River.

SEC. 2. There are hereby authorized to be appropriated such sums as may be necessary to carry out the purposes of this Act.

Senator JACKSON. As chairman, I am very proud to sponsor this bill in association with my senior colleague, Warren G. Magnuson.

Grand Coulee Dam is one of man's greatest engineering achievements—a wonder of the modern world. Even today, jaded as we are by the spectaculars of the space age, Grand Coulee continues to impress us with its sheer size and the magnitude of its impact on resource development. For all the many times I have seen this huge structure—high as the Washington Monument and a mile wide—I am still awed, as many of you are, by this great project.

Grand Coulee Dam has proved the wisdom and the foresight of the men who were determined to build it. It was finished just in time to help win World War II, when one out of every three of our aircraft was built with aluminum which Grand Coulee power produced. It is the keystone structure of the Columbia River system. It has

impounded water for the irrigation of almost half a million arid acres and still retains the capacity to irrigate half a million more. Kilowatts from Grand Coulee, consumed in the region's farms and factories and homes, have helped the Pacific Northwest achieve the highest standard of electric living in America.

This dam is now the greatest power producer in the Western Hemisphere—its 18 generators in 2 powerhouses are capable of generating 2 million kilowatts of electric energy. The bill we consider today proposes to authorize construction of a third powerhouse which will overshadow the existing 2—with 12 generators producing 3.6 million kilowatts.

Think of it: The third powerhouse will produce almost twice as much power as the present facilities at Grand Coulee—our largest dam—now produce. Thus, when the new generators go on the line and all 30 turbines in all powerhouses are humming, Grand Coulee Dam will be generating 5.6 million kilowatts—more than any dam in the world today.

This is a giant step in achieving the maximum benefit from the great water resource of the Columbia River. By moving ahead now with authorization, we can make it possible for power from the first generators to be on the line from the third powerhouse in 1973, and the last generator, I believe, would be on the line in 1983, when the Northwest will need the additional firm power it can produce and when the entire West will need its peaking capacity.

The first witness this morning is my senior colleague, Warren G. Magnuson, who has followed this project very closely during his long service in the House and the Senate. As a member of the Appropriations Committee, assigned to the Subcommittee on Interior Appropriations, he has been closely and intimately associated with the Grand Coulee project and the other projects on the Columbia River system.

Senator Magnuson.

STATEMENT OF HON. WARREN G. MAGNUSON, A U.S. SENATOR FROM THE STATE OF WASHINGTON

Senator MAGNUSON. Thank you very much, Mr. Chairman. I appreciate you calling on me first, because I have a meeting with my own committee this morning. I have a very short statement. I appreciate your remarks about the fact that both of us for many long years have been looking forward to the day when we ultimately tap the full potential of the Grand Coulee project.

The third powerplant is needed to make use of improved stream-flows resulting from the Canadian treaty and to help meet the growing power needs, as pointed out by the chairman, of the entire West. The project should be authorized this year if its first units are to be in service by 1973 when power will be needed and when the last of the three Canadian storage dams has been completed to level out the flow of the Columbia. Any later schedule could waste water and waste kilowatts.

As we act again to make Grand Coulee the world's greatest dam, it might be well to contemplate what it has meant to our region and the Nation during its first 25 years.

Power first came on the line in time to help win World War II. As of last January 30, Grand Coulee had produced some 224 billion kilowatt-hours of energy, about 48 percent of the total generated since 1938 by all Federal dams in the Columbia River Basin.

Some 485,000 acres of arid land have been made fertile and productive, with water lifted by Grand Coulee pumps, and provided a living for more than 5,000 farm families.

Additionally, the project has created thousands of jobs in basin towns and cities and made possible the sales of farm implements and freight payments running to millions of dollars. Property taxes on this new irrigated land increased sixfold in 15 years between 1948 and 1963—from \$940,000 to \$5.6 million. Assessed property values in the project area likewise are up nearly six times, from \$16 million in 1947 to \$93 million in 1962. About \$63 million of the increase in property valuation is attributed to project lands proper.

In light of these impressive statistics, Mr. Chairman, let me interject the thought that we must concentrate, too, on completing the Columbia Basin project rapidly. There are another one-half million acres waiting for water which will double the economic benefits I have enumerated.

Then there is the matter of Federal income tax payments generated by the great Grand Coulee project. The Bureau of Reclamation, I am told, says that about \$31 million in Federal income tax payments were made in 1963 alone as the result of increased local and regional economic activity generated by Grand Coulee power sales and irrigation pumping.

Now, I bring that out to show the necessity of the continued development of these projects, the great potential of the third powerhouse and these other things that, in fact, literally we repay to the Federal Government for the loan they give us.

The Senator from Arizona is here, and I remember some years ago we compiled statistics on the Salt River project. My memory is that the amount of taxes that have been paid to date as a result of the project is something like 10 times the cost of the project. This is in taxes alone.

Senator HAYDEN. That is correct.

Senator MAGNUSON. That fact in itself is one reason why we think this particular bill, and the development of the complete potential of Grand Coulee and the Columbia Basin system, is going to be worth not only a great deal to the people who are going to reap its immediate benefits there, but to the U.S. Government itself.

Thank you, Mr. Chairman.

Senator JACKSON. Thank you, Senator Magnuson. Any questions?

Senator MAGNUSON. And I hope the same principles are applied to the Upper Colorado River Basin.

Senator ALLOTT. Thank you.

Senator JACKSON. Thank you, Senator Magnuson. We appreciate having your fine statement.

The next witness is Congressman Foley, in whose district the third powerhouse will be located. The members of the committee will recall Congressman Foley served very ably on the staff of this committee. During his service he long was engaged in research and staff work in connection with the third powerplant.

Congressman Foley.

**STATEMENT OF HON. THOMAS S. FOLEY, A REPRESENTATIVE IN
CONGRESS FROM THE FIFTH DISTRICT OF WASHINGTON**

Congressman FOLEY. Thank you, Mr. Chairman, and members of the committee. I appreciate this opportunity to come before you in support of what I believe to be one of the most important proposals that will come before this committee in the 89th Congress.

I am proud to represent the Fifth Congressional District of the State of Washington, the district in which the Grand Coulee Dam is located. The bill which is before you today would authorize a third powerhouse at Grand Coulee, making it again the largest hydroelectric generating facility in the world.

The facility would be constructed on the east bank of the Columbia adjoining Grand Coulee; it would incorporate 12 turbine generator units of 300,000-kilowatt capacity, eventually totaling 3,600,000 kilowatts and raising the total capacity of the dam, as the chairman mentioned, to over 5½ million kilowatts, making it the largest in the world and doubling its present capacity.

Construction costs of this project are estimated at \$364,310,000, but the benefit-to-cost ratio is 3.24 to 1. The feasibility report of the Secretary of the Interior indicates that a third powerhouse project would be not only a great addition to the power generating capacity of the Pacific Northwest and the Nation, but would be one of the finest of the many wise investments the Federal Government has made in the development of our natural resources.

The 3,600,000 kilowatts of capacity of the third powerhouse will provide peaking power not only for the Northwest, but for California and other Southwest points as well. Greater capacity also will permit full utilization of the improved streamflows resulting from Canadian storage projects. Without additional generators at Grand Coulee Dam all the water in the river could not be used there.

Its 140,000 kilowatts of prime power—all resulting from the first 4 of the 12 units to be installed—will be needed in the Northwest by 1973-74, the earliest date the first 4 units can come on the line.

Additionally, the third powerplant will produce substantial quantities of secondary power which can be marketed in the Pacific Southwest if it is not needed in the Northwest.

Hydraulic capacity of the third powerplant will make all of the usable storage for flood control effective, and eliminate the need for additional outlets for this purpose.

A benefit-to-cost ratio of better than 3 to 1 makes the third powerplant a highly economically feasible project. Power revenues will assure payout—with a considerable margin to spare—within the traditional 50 years after each unit comes on the line.

The construction schedule is extremely important. The first four units must be completed in 1973-74 in time to take full advantage of the Canadian storage projects and to fill firm power requirements of the Pacific Northwest. For the first four units to be completed by then, authorization must come this year. I am pleased that the Appropriations Committees—with concurrence of the authorizing committees—have recognized the need for this kind of construction schedule by approving reprogramming of \$100,000 of the Bureau of Reclamation appropriations for preconstruction work on the right switchyard.

And I would like to express my appreciation to the Department of the Interior and the Secretary for seeing the need for this reprogramming to meet this construction schedule if we are to maintain full advantage of the Canadian treaty and the storage that will be available in the 1973-74 period.

I know of no opposition to this project from either side of the political aisle or from any State or Federal agency. It is enthusiastically supported by utilities, farm groups, newspapers, chambers of commerce, and citizens from all walks of life in my district, and in the Pacific Northwest, and I think in the whole country. I hope the committee will act favorably and expeditiously on the authorization of this important project. I am going to introduce comparable legislation today in the House.

It is always a privilege, Mr. Chairman, to come before the Senate Interior Committee and see so many old friends and associates here.

Senator JACKSON. Thank you, Congressman Foley, for your very able and helpful statement.

Are there any questions of Congressman Foley?

Thank you very much.

Is Congressman Meeds here? The Chair will leave the record open for statements by the members of the delegation from the State of Washington and elsewhere, including the statement by Representative Meeds.

(The statements referred to follow:)

STATEMENT OF HON. LLOYD MEEDS, A REPRESENTATIVE IN CONGRESS
FROM THE SECOND DISTRICT OF WASHINGTON

Mr. Chairman, I am pleased to support the authorization of a third powerhouse at Grand Coulee Dam for three important reasons. First, my own district has a vital stake in this project. Second, regional increase in the use of electricity requires it. Third, it is in the national interest. Let me discuss each of these points in order, with emphasis on the first.

My congressional district lies entirely within the Puget Sound area, where power requirements are the fastest growing in the Pacific Northwest and among the fastest growing in the Nation. We in the Second Congressional District—as, indeed, most of the people on the west side of the Cascade Mountains—are highly dependent upon power from Federal dams on the Columbia River. Fifty-five to sixty percent of the electric power sold in my district can be attributed to Federal hydroelectric projects on the Columbia River.

Last year peak electric power demand in my district was slightly more than 1 million kilowatts. Of this the public agencies which buy wholesale power from the Federal Columbia River dams through BPA served 510,000 kilowatts, or about half. BPA directly provided another 50,000 kilowatts to industries. The balance was provided by the investor-owned utility which also obtains a good portion of its power supply from the Columbia River, albeit from non-Federal dams.

By 1973-74, when the first units of the third powerhouse could be on the line peakloads in my district are expected to increase to over 2.1 million kilowatts. By 1983, when all 12 units in the third powerhouse are scheduled for completion, these loads are predicted to reach 4 million kilowatts.

BPA power flow studies show that to serve these growing loads BPA will have to bring about 3 million kilowatts into the district—about 2 million would flow from Chief Joseph Dam, where empty spaces are waiting for 11 more generators, and about 1 million from Grand Coulee. About 800,000 of the 1 million kilowatts from Grand Coulee will come from the third powerhouse.

By then, Snohomish PUD will have completed its three projects on the Sultan River, with combined capacity of 140,000 kilowatts. This is the only additional hydrogeneration scheduled for my district.

Grand Coulee and Chief Joseph are the nearest Federal dams to serve my district, affording the lowest transmission cost and greatest transmission economy

for the region. If additional generation is not installed there, and if BPA is to continue serving the power requirements of distributing utilities and industries in my district, it will have to be installed elsewhere in the system.

Let me cite just two examples to show how dependent the economic growth of my district is on electric power, and particularly Bonneville power.

The first is the Bellingham-Anacortes area, the economy of which historically has been based on lumber, fishing, and farming. As the Douglas-fir timber was cut, concern grew for the future of the area. However, pulp and paper mills, served by the investor-owned utility, expanded utilizing hemlock and spruce. Pulp and paper is second only to aluminum as a power consumer in the Northwest. Then came three big oil refineries, two at Anacortes and one at Ferndale, near Bellingham, which also are big power users. Next BPA signed a contract with the Georgia-Pacific Corp. for 16,000 kilowatts for a chlorine and caustic soda plant. And last year BPA signed a contract with the International Aluminum Co.—Intalco—for 135,000 kilowatts to start one potline with an investment of \$60 million. This potline will employ 400 persons directly and another 800 indirectly. Intalco already is negotiating with BPA for a power supply for a second potline, to be in operation by 1967, with another \$40 million investment and 230 additional direct jobs.

Thus the Bellingham-Anacortes area is getting a balance to its economy, with pulp and paper mills, refineries, metals, and chemicals industries. The area can look forward to future growth in the electroprocess industries.

Together with the new balance to its economy and the new jobs for its citizens, the area is benefiting from an ever-expanding tax base. The Georgia-Pacific Corp., for its Bellingham pulp and paper plant, paid \$218,000 in local taxes last year. The refinery near Bellingham paid \$323,741 in county taxes and \$13,670 to its school district. The two refineries at Anacortes together paid about \$960,000 to the county and about \$314,000 to their school district. Intalco, on the basis of experience at other aluminum plants will ultimately pay between \$400,000 and \$500,000 in State and local taxes for each potline.

The second example of how my district is dependent on Bonneville power can be found in Snohomish County. The Snohomish County Public Utility District last year purchased all of its power supply, 410,000 kilowatts, from BPA, which made it the biggest PUD in the State and BPA's third largest customer. Some 20 percent of Snohomish PUD's power purchases from BPA went to serve the big pulp and paper mills in the county—Scott and Simpson-Lee and Weyerhaeuser. These mills employ 3,100 persons directly and last year paid \$2.7 million in State and local taxes.

The foregoing are local taxes. I have been unable to compute the Federal income taxes paid by the employees and executives of these industries, but the amount would be considerable.

I have purposely dwelt upon the importance of Bonneville power—and specifically the third powerhouse—to my district. But similar arguments can be made for the entire Pacific Northwest. In the next 10 years BPA load studies, made in cooperation with the public and private utilities, show the region will require about 12½ million kilowatts of new installed hydro capacity. Non-Federal utilities plan to install about 3½ million kilowatts. Another 900,000 kilowatts will be installed at High Mountain Sheep Dam when it is decided who will build it. The remaining 8 million kilowatts can and should be installed on the Federal Columbia River Power System. Of these additional kilowatts, I am advised that some of the most economic will be the 3.6 million at the third powerhouse.

My third reason for urging authorization of the third powerhouse is that it will serve the national interest. It will make maximum use of Canadian storage dams now under construction, and permit use to be made of this storage downstream. This means full development of a natural resource, which certainly is a national purpose. The third powerhouse will bring Grand Coulee's total capacity to 5.6 million kilowatts—more than any powerplant existing in the world today.

The third powerhouse will contribute greatly to the economic growth of the Northwest and, in so doing, to the economic growth of the Nation. This is because as our regions prosper, our Nation prospers. More jobs in the Northwest means more sales of Detroit cars and Pittsburgh steel and California organs and Boston shoes and so on.

Finally, power revenues will more than pay the cost, with interest, within the traditional 50 years for payout established by congressional policy.

The third powerhouse will be an investment not only in the Northwest, but an investment in the future of America.

Thank you for giving me this opportunity to appear before your committee.

STATEMENT OF THE HONORABLE JULIA BUTLER HANSEN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WASHINGTON

Mr. Chairman, I welcome this opportunity to cross the Capitol to testify in favor of authorization of a third powerplant for Grand Coulee Dam, a necessary and most worthwhile project.

Not only is the third powerplant a necessary and worthwhile project, it is the most economical remaining hydro project in the Columbia River Basin. Its 3.6 million additional kilowatts of peaking capacity can be installed at a cost of only \$3.69 per kilowatt.

The next most economical capacity available in our region is at Chief Joseph Dam where the cost of additional generators is estimated at \$4.16 per kilowatt of nameplate capacity. Contrast the \$3.69 cost per kilowatt for the third powerplant with \$15.96 at Dworshak Dam, or \$13.60 at Rocky Reach, one of the great public utility district dams in our region.

Energy for the third powerplant can be produced for 0.52 mills per kilowatt-hour, compared with 2 mills for Dworshak and 1.62 mills for Rocky Reach.

It is small wonder, then, that the project can easily be paid out, with interest, within the traditional 50 years after each generating unit comes on the line.

The third powerplant will provide, chiefly, peaking capacity. Of the 4.6 billion kilowatt-hours to be produced by the 12 units, I understand nearly 3.9 billion kilowatt-hours, about 84 percent, could be produced by the first four units. However, the capacity of all 12 units is necessary to provide peaking for the prime hydroelectric production and the thermal capacity which is expected to be built after the mid-1970's.

While we in the Northwest still have a virtually all-hydroelectric system, we too, soon will have to turn to thermal for base load. By the year 2010, Conneville Power Administration experts predict, nearly all of our hydro in the Northwest will be used primarily for peaking. Hydro provides the most economical peaking. It can be turned off and on by simply opening or closing the intake gates. Unlike steamplants, it requires no heating-up process. So this third powerplant will prove more valuable as the years go by.

Some of the power from the third powerplant will flow to the people and the industries in my district. We welcome this orderly addition to our region's power resources. Equally important, we welcome the additional flood control protection it will give us. The active storage space behind Grand Coulee Dam totals 5.2 million acre-feet, but only about 3 million is effective now for lack of outlet facilities. The third powerplant, however, will provide the necessary additional hydraulic capacity to make all 5.2 million acre-feet effective. I need not tell you how important this is in view of the terrible flooding we experienced in the Northwest this past winter.

Senator JACKSON. Next, we would like to have the Secretary of the Interior come forward with his associates to present the views and position of his Department on the third powerhouse.

The Chair will include in the record at this point the reports from the departments, including a letter from the President of the United States, which will be made public at 11 o'clock this morning. It will be an executive communication, addressed to the President of the Senate and the Speaker of the House.

(The material referred to follows:)

THE WHITE HOUSE,
Washington, D.C., April 13, 1965.

HON. HUBERT H. HUMPHREY,
President of the Senate,
Washington, D.C.

DEAR MR. PRESIDENT: Electricity is a basic requirement of modern society. It is vital to our industries, farms, and homes. The Nation's rapidly expanding use of electricity is expected to more than double and perhaps triple by 1980. This calls for the combined efforts of all segments of the power industry—private, cooperative, and public. Therefore, I am pleased to transmit herewith the report of the Secretary of the Interior concerning the economic and engineering feasibility of a third powerplant at Grand Coulee Dam on the Columbia River and a draft of authorizing legislation. I have approved the Secretary's report and recommend that the draft legislation be enacted to authorize the construction of this outstanding project.

The proposed third powerplant will ultimately add 3.6 million kilowatts of generating capacity to the 2 million kilowatts at the two existing powerplants. When completed, the total capacity of the powerplants at Grand Coulee Dam will total 5.6 million kilowatts. It will be larger than any single hydroelectric development in the world today.

Authorization and construction of the third powerplant at the Grand Coulee Dam will further the orderly development of the vast water resources of the Columbia River. This is the next logical step following two important events which occurred last year.

First, Prime Minister Pearson of Canada and I met last September to proclaim the Columbia River treaty for cooperative development of the Columbia River—one of the great rivers of this continent. Canada has already started construction of huge dams to store water on its side of the border. These reservoirs will provide 15.5 million acre-feet of water storage in Canada. This storage capacity will provide increased protection of people and property in both countries from devastating floods and greatly enhance the hydroelectric potential of powerplants on the Columbia River.

The United States must construct additional power-generating facilities at its existing system of dams to take full advantage of this potential. The Grand Coulee Dam, because of its location in relation to other Columbia River powerplants, its height, its large reservoir capacity, and the reregulation of riverflow by Chief Joseph Dam immediately downstream, will develop a major share of the increased power potential made possible by the treaty.

Second, the Congress approved last year a four-line, extra-high-voltage transmission intertie between the Pacific Northwest and the Pacific Southwest. It represents exciting new developments in electric power technology. It is the largest single electrical transmission program ever undertaken in this country and is one of the finest examples of cooperation among publicly owned and privately owned utilities and the Federal Government.

The rapidly growing demands for electric power in the Pacific Northwest will readily absorb the power produced by the proposed powerplant. However, some peaking power and secondary (not regularly available) power that is surplus to the needs of the Northwest in the early years of the project can be marketed in the Pacific Southwest over the intertie. Thus, the intertie will permit maximum utilization of the waters flowing past Grand Coulee Dam, resulting in conservation in its truest sense.

The economic and financial feasibility of the third powerplant are exceptionally favorable. The benefit-cost ratio is more than 3 to 1. Revenues from the sale of power will more than pay for the capital investment within 50 years. In addition to power benefits, the project will provide increased flood-protection benefits by improving control of water stored in Franklin D. Roosevelt Lake behind Grand Coulee Dam.

Accordingly, I commend the Secretary's report to your consideration and recommend early enactment of the authorizing legislation which I have transmitted.

Sincerely,

LYNDON B. JOHNSON.

A BILL To authorize the Secretary of the Interior to construct, operate, and maintain a third powerplant at the Grand Coulee Dam, Columbia Basin project, Washington, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That (a) the Secretary of the Interior is hereby authorized to construct, operate and maintain a third powerplant with a rated capacity of approximately 3,600,000 kilowatts, and necessary appurtenant works, including a visitor center, at Grand Coulee Dam as an addition to and an integral part of the Columbia Basin Federal reclamation project.

(b) Construction of the third powerplant may be undertaken in such stages as in the determination of the Secretary will effectuate the fullest, most beneficial, and most economic utilization of the waters of the Columbia River.

SEC. 2. There are hereby authorized to be appropriated such sums as may be necessary to carry out the purposes of this Act.

DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., March 29, 1965.

THE PRESIDENT,
The White House,
Washington, D.C.

(Through Bureau of the Budget).

DEAR MR. PRESIDENT: My report on the third powerplant, Grand Coulee Dam, Columbia Basin project, Washington, is transmitted herewith pursuant to section 9(a) of the Reclamation Project Act of 1939 (53 Stat. 1187) and section III-E-3 of the procedures approved by the President on May 15, 1962 (S. Doc. 97, 87th Cong.).

The third powerplant would be constructed on the right bank of the river adjoining the Grand Coulee Dam. Reservoir water would be conveyed around the existing dam to a new forebay to be formed by a concrete forebay dam. Penstocks from this forebay would lead to the powerhouse at the downstream river level. Twelve turbine-generator units would be installed in pairs as the power market builds up, with the final pair now expected to be in operation by 1983. As now planned, each generator would have a capacity of 300,000 kilowatts, eventually totaling 3,600,000 kilowatts for the third powerplant and nearly 5,600,000 kilowatts for the entire project. Before construction we intend to reexamine the planned capacity, and minor adjustments may be made. New visitor facilities at the dam would be required to replace those which would be displaced by the new construction.

The construction cost of the third powerplant and appurtenant works is estimated at \$364,310,000. The benefit-cost ratio is 3.24 to 1. The report and its accompanying documents demonstrate that the third powerplant is engineeringly feasible and economically justified.

My proposed report was transmitted to the States of the Columbia River Basin and to the interested Federal agencies for review, as required by law and the procedures approved by the President on May 15, 1962. Copies of the comments received are attached to the report. There are no objections to the proposal.

This powerplant proposal has been analyzed as an increment to the Columbia Basin project. No costs have been allocated to the flood control function or to the recreation function. We recognize that the report therefore does not reflect the full multiple-purpose value of the third powerplant. We intend to rectify this situation in the future by a complete reallocation of all Columbia Basin project costs, which will include the third powerplant as a feature of the overall project.

I recommend that the third powerplant, Grand Coulee Dam, Columbia Basin project, Washington, be authorized for construction as presented in the enclosed report. I shall appreciate your advice concerning the relationship of this proposal to your program before the report is transmitted to the Congress for its consideration and appropriate action as provided by the Reclamation Project Act of 1939.

Sincerely yours,

STEWART L. UDALL,
Secretary of the Interior.

DEPARTMENT OF THE INTERIOR,
BUREAU OF RECLAMATION,
Washington D.C., March 26, 1965.

THE SECRETARY OF THE INTERIOR.

SIR: This is my report on the third powerplant, Grand Coulee Dam, Columbia Basin project, Washington. It is based upon and includes our proposed report of February 8, 1965, which you approved and adopted as your proposed report on February 10, 1965.

Copies of the proposed report were transmitted on February 11, 1965, to the States of the Columbia River Basin and to the Secretary of the Army for review as required by the Flood Control Act of 1944 (58 Stat. 887), and to the State of Washington for comments from the head of the agency exercising administration over the wildlife resources of that State as required by the Fish and Wildlife Coordination Act. Copies of the report were sent also to the interested Federal agencies for review in accordance with Presidential instructions. Copies of all the comments received are attached to and made a part of this report.

Governor Evans of Washington, in a letter and a telegram, commends this forward-looking proposal and hopes for early congressional authorization and

appropriation of funds for construction of the third powerplant. He feels, however, that the report is probably unduly conservative in respect to the evaluated recreation benefits and disregard in the cost allocation for the flood control benefits that will be provided by the third powerplant. As a matter for congressional consideration, the Governor also suggests that the payout schedule should be extended beyond the presently planned 50 years.

We recognized that benefits will accrue to both the recreation and flood control functions by the third powerplant increment, but since they would be realized in large measure by use of the joint facilities of the dam and reservoir, and since we propose to prepare a complete reallocation of costs for the entire Columbia Basin project, it is preferable not to complicate the third powerplant report by making allocations to those purposes in this report.

The Washington Department of Game advises that the proposal would have no adverse effect on the fishery in the Columbia River, and suggests that the possibility of lowering temperatures in the river through powerplant releases be further explored. As indicated in our proposed report, this possibility will be studied following construction of the initial stage of development.

The Acting Chief of Engineers, Department of the Army, states that there will be no conflict between the proposal and any Corps of Engineers' projects and suggests the schedule for additional generating units at Grand Coulee be coordinated with schedules for installations at other projects. He also suggests that it is not apparent that the addition of the third powerplant provides basis for identification of recreation as a purpose of the proposal. We recognized this and are providing herein that no costs for the new visitor facilities be allocated to recreation. When the complete reallocation of costs for the Columbia Basin project is made, some of the joint costs of the dam and reservoir as well as the specific costs of recreation facilities will be allocated to recreation.

Based on its consideration of our proposed report and the studies of its own staff, the Federal Power Commission concludes that the construction of the third powerplant is economically justified and financially feasible. Also, that the added power output could be utilized within a reasonable period of time.

The comments of the other States and Federal agencies are generally favorable or express no objection to the authorization of the third powerplant.

Upon further consideration of the proposed report of February 8, 1965, and the comments of the various reviewers, we conclude that the report should be revised to eliminate the allocation of costs to recreation at this time. The forthcoming report on reallocation of the entire Columbia Basin project will reflect consideration of the recreation and flood control functions of the third powerplant.

I recommend that you approve and adopt this report as your report on the third powerplant, Grand Coulee Dam, Columbia Basin project, Washington, and that you transmit it, together with the attached comments, to the President and subsequently to the Congress in accordance with the Reclamation Project Act of 1939.

Respectfully,

FLOYD E. DOMINY, *Commissioner.*

Approved and adopted:

STEWART L. UDALL,
Secretary of the Interior.

DEPARTMENT OF THE INTERIOR,
BUREAU OF RECLAMATION,
Washington, D.C., February 8, 1965.

The SECRETARY OF THE INTERIOR.

SIR: This is my proposed report on the third powerplant, Grand Coulee Dam, Columbia Basin project, Washington. It is based on and includes the attached report of the regional director, Bureau of Reclamation, Boise, Idaho, dated January 1965, and the report of the National Park Service which is appended thereto.

The purpose of this proposal is to provide sufficient generating capacity at Grand Coulee Dam to make most effective use of the hydroelectric potential of the site to help meet the growing power requirements of the Pacific Northwest. The recent Columbia River Treaty with Canada will result in construction of dams which will triple the existing usable storage for regulation of the Columbia River above Grand Coulee Dam. The regulated flow of the river can be utilized most efficiently by installing additional generating capacity at Grand Coulee Dam to provide a large share of the region's peaking power requirements. The existence of Chief Joseph Dam and Reservoir immediately downstream from

Grand Coulee Dam provides necessary reregulation to permit such peaking operation.

The additional hydraulic outlet capacity inherent in such additional turbine-generator units would permit greater flexibility and scope in regulating the level of Franklin D. Roosevelt Lake (the reservoir created by Grand Coulee Dam) for flood control purposes, and thereby substantially increase its effectiveness in reducing future flood peaks.

The third powerplant would be located on, and approximately parallel to, the east bank of the Columbia River, immediately below Grand Coulee Dam and in the general area now occupied by the right switchyard. Water would be delivered to the powerplant through penstocks embedded in a forebay dam which would consist of a nearly right angle extension of the present dam along the right abutment. The forebay would be connected to Franklin D. Roosevelt Lake by an open cut.

The new powerplant is presently designed for 12 turbine-generator units with an installed capacity of 300,000 kilowatts each. It is proposed initially to construct the forebay and forebay dam, the entire powerhouse substructure and superstructure, and penstocks, turbines, and generators for the first four units. Generation of power by 1973 is contemplated in this initial stage, with the remaining units being installed in pairs, over the next 10 years.

The construction of the new powerplant on the site of the existing right switchyard would require relocation of the right switchyard facilities. A new switchyard would be built to handle third powerplant output, tentatively at a site about 2 miles downstream from the dam.

Existing visitor facilities of the tour center on the right bank and in the right powerhouse would have to be vacated early in the construction period. Temporary facilities would be provided on the left side during construction, and new permanent facilities with greater capacity, including observation galleries, would be built in the third powerplant.

The long-range situation on power supply and requirements has changed substantially within the last year with the ratification of the Columbia River Treaty and the authorization of the Pacific Northwest-Pacific Southwest power transmission lines. Creation of the 15,500,000 acre-feet of storage in Canada and construction of the Libby Dam and Reservoir project in the United States will substantially increase the usable streamflow available to Grand Coulee powerplant. Even during a critical hydrologic period, the streamflows would nearly equal the capacity of the existing 18 units, so that overall streamflows generally would exceed the capacity of the turbines, thereby wasting potential energy and not permitting peaking power operations to meet fluctuating loads. Concurrently, the intertie transmission system would create a ready market for excess capacity and seasonal energy from the Pacific Northwest. Installation of a large additional amount of generating capacity at Grand Coulee Dam is clearly indicated by consideration of these facts.

Electric loads and resources for the Pacific Northwest area and sales and exchange agreements with the Pacific Southwest area have been most thoroughly studied, along with estimates of load growth made by the Bonneville Power Administration with the cooperation of the private utilities and other Federal agencies. On this basis, a long-range projection of electric base and peak loads, assuming an annual rate of growth less than heretofore experienced, has been prepared to determine the most probable requirements for new generating capacity. The projections include consideration of the effect of river regulation in accordance with the Columbia River Treaty and the sale of the Canadian share of benefits in the United States. A comparison of the requirements so determined with the existing resources and contemplated additional installations reveals that both peak load requirements and firm energy requirements under critical hydrologic conditions would exceed the power and energy resources in 1973. The magnitude of the resource deficit would increase in the years following 1973. An additional installation of 3,600,000 kilowatts at Grand Coulee Dam would be entirely absorbed by the peaking requirements of the system by 1982. Legislation to authorize construction of the powerplant should be sufficiently flexible to permit adjustments in the number and size of units and the scheduling of installations if future circumstances indicate such adjustments are necessary.

The popularity of Grand Coulee Dam and Franklin D. Roosevelt Lake as a tourist attraction and recreation area has increased steadily since its construction. The limited facilities now available at the dam and powerplants have been provided from revenues associated with the power function, since no provision for recreation was made in the authorization of the Columbia Basin project. Con-

struction of the new powerplant would provide an opportunity to include adequate facilities to handle the anticipated doubling of the number of annual visitors by the year 2000.

Some improvement in the Columbia River fishery below Grand Coulee Dam may be possible through operation of the outlets to control water quantity and temperature, but the benefits associated with such releases have not been evaluated. An analysis of the effects on downstream water temperatures will be made after development of the initial stage. Detailed studies of the effects of the powerplant operations on fishery resources, as may be justified, will also be made at that time. Such modifications would be made in the structures and in the operations as the Secretary of the Interior determines to be justifiable and feasible for fishery management purposes and compatible with the purposes for which the facilities and reservoir were authorized.

The cost of constructing the third powerplant and other facilities described herein is estimated at \$364,310,000. The first stage, consisting of the major features, four generating units, and the visitor facilities, which should be completed by 1973, would cost \$230,760,000. The incremental annual costs of operation, maintenance, and replacements attributable to the third powerplant are \$1,682,000.

The annual equivalent costs for economic analysis, including investment and operating costs, are \$14,092,000. Average annual benefits to be realized are computed as \$43,838,000 for power, \$1,470,000 for flood control, and \$389,000 for recreation. The benefits, therefore, exceed the costs in the ratio of 3.24 to 1.

This proposal has been analyzed as an increment to the Columbia Basin project. A complete reallocation of all Columbia Basin project costs, including the third powerplant, is to be prepared at a future date. For this reason, we have not for this report allocated any costs to flood control, and only specific costs of recreation features to recreation. All costs except the specific costs associated with the recreation (visitor) facilities have been assigned to commercial power. Those costs, including interest during construction, amount to \$399,473,000, and are repayable with interest. The recreation costs (\$1,292,000) are recommended to be nonreimbursable.

Power and energy generated at the third powerplant in excess of project requirements will be marketed by the Bonneville Power Administration, and repayment of the costs will be provided through the pooled revenues of the Columbia River Federal power system within 50 years of the date each major power unit becomes operative. The proposed development can be demonstrated to be an excellent financial investment at existing Bonneville Power Administration rates.

I, therefore, concur in the recommendations of the regional director, as set forth on page 49 of his report.

I recommend that you approve and adopt this report as your proposed report on the third powerplant, Grand Coulee Dam, Columbia Basin project, Washington, and that you authorize me in your behalf to transmit copies of this report to the States of the Columbia River Basin, to the Secretary of the Army, and to the interested Federal agencies for review as required by the Flood Control Act of 1944 (58 Stat. 887), the Fish and Wildlife Coordination Act (48 Stat. 401, as amended), and procedures approved by the President on May 15, 1962 (S. Doc. 97, 87th Cong.).

Respectfully,

FLOYD E. DOMINY, *Commissioner.*

Senator JACKSON. Secretary Udall, we are pleased to have you with us this morning. We know that you personally have long been associated with the development of the third powerhouse. Your efforts in connection with the Columbia River Treaty with Canada in particular and the Pacific Northwest-Pacific Southwest intertie, which are integral parts of this enormous development at Grand Coulee, are greatly to be commended. The present project comes as a result of the treaty which the President signed last September, in concert with the Prime Minister of Canada, Mr. Lester Pearson. It also comes as a result of the conclusion of the negotiations that resulted in the culmination of the Pacific Northwest-Pacific Southwest intertie.

In both undertakings your leadership was an important factor, in my judgment, in the two great agreements which culminate in this meeting here today on the third powerhouse at Grand Coulee.

We welcome you and your associates, Mr. Dominy, of the Bureau of Reclamation, and Mr. Luce, of the Bonneville Power Administration, here today.

STATEMENT OF HON. STEWART L. UDALL, SECRETARY OF THE INTERIOR; ACCOMPANIED BY FLOYD DOMINY, COMMISSIONER OF THE BUREAU OF RECLAMATION, AND CHARLES LUCE, ADMINISTRATOR OF THE BONNEVILLE POWER ADMINISTRATION

Mr. UDALL. Thank you, Mr. Chairman. I think this is certainly an auspicious day not only for the Northwest, but for the entire country and, indeed, for North America because the Canadian people as a result of the treaty have a very direct and intimate interest in this matter that we are going to discuss today.

There are several things—I have a prepared statement and I should like it to appear in the record, and I will read part of it and summarize the highlights.

Senator JACKSON. Without objection, the statement will appear in its entirety in the record. The Secretary will discuss the most salient points of it in his verbal remarks.

(The statement referred to follows:)

STATEMENT OF HON. STEWART L. UDALL, SECRETARY OF THE INTERIOR

Mr. Chairman, we welcome this opportunity to appear before the committee to urge authorization this year of the third powerplant at Grand Coulee Dam.

This is the logical next authorization of a Columbia River project. It has a benefit-to-cost ratio of better than 3 to 1. It will take full advantage of improved streamflows resulting from the Treaty with Canada for Joint Development of the Columbia River, and make efficient use of the Pacific Northwest-Pacific Southwest intertie.

The third powerplant is a big project. Its planned 12 generators will provide 3.6 million kilowatts of installed capacity. This added to the approximately 2 million kilowatts of installed capacity in the existing two powerplants will raise Grand Coulee's total to about 5.6 million kilowatts. This is more installed capacity than at any dam in the world today. The 300,000 kilowatt units themselves are the largest hydrogenerators ever installed in the United States and are nearly three times the size of those now installed at Grand Coulee.

It is a timely project. By the time its first units can be brought on the line in 1973 the Northwest will need all the additional prime power it can produce, plus some of the secondary energy and peaking capacity it will add. The balance of the secondary energy and peaking capacity can be sold in the Pacific Southwest over the intertie.

It is an economical project. It will more than pay for itself. Annual revenues from the sale of power from the third powerplant will exceed by an average of nearly \$4 million per year the annual sums required to repay the capital within 50 years.

Under existing procedures we have obtained the views and comments of the State governments and other departments of the Federal Government. There is no opposition to the project. Expressions indicated concurrence, endorsement, or wholehearted support for authorization at the earliest possible date for this project which would be of great benefit to the multiple-purpose development of the Columbia River.

Before discussing in detail our proposal for the third powerplant, may I describe Grand Coulee Dam as it exists today and recall some of the colorful history that led to its construction.

KEYSTONE STRUCTURE

When the basic structure was completed in 1941 it was the biggest thing ever built by man. For 7,000 years before, that distinction had gone to the Great

Pyramid of Gizeh. Grand Coulee is three times as big. It is so big that four U.S. Capitols could be imbedded in its bulk.

The dam itself stands 550 feet above bedrock—as tall as the Washington Monument. At its base it is 500 feet thick. At its crest it is three-quarters of a mile long. It contains more than 10 million cubic yards of concrete—enough to build a superhighway from Los Angeles to New York. It is the keystone structure of the U.S. Columbia River power system. Located at mile 596.6 on the Columbia River, it backs water 148.4 miles to the Canadian border. It has over 25 percent of the developed power head on the Columbia River in the United States, and nearly 30 percent of the total generating capability on the present U.S. Columbia River power system.

Its six big irrigation pumps (with space for six more) provide water for half a million acres of arid but otherwise fertile soil. Ultimately, 12 units will irrigate a million acres.

Its 5,232,000 acre-feet of storage not only provides valuable flood control, but also reregulates the flows of the Columbia to enable Grand Coulee and the 10 run-of-the-river dams downstream, 5 Federal and 5 public non-Federal, to produce much more firm power than otherwise possible.

Grand Coulee is the major reservoir included in the Pacific Northwest Coordination Agreement recently signed by all the generating utilities, Federal and non-Federal, in the region. This is the operating agreement under which all reservoirs are coordinated as if under one ownership to produce the maximum power possible from existing hydroresources.

HISTORY

It seems to be a political law that every great project be surrounded by controversy. And it certainly is true that very great project must have men of vision to breathe life into it. Grand Coulee had its share of both.

It was denounced as a wild scheme, an engineeringly impossible project, a raid on the Treasury, the most colossal fraud in the history of America, and a project that won't have any more usefulness than the Pyramids of Egypt.

Its backers saw it as the economic salvation of the arid Columbia Basin, as the greatest dam on earth, as a depression public works project that would put thousands of men to work, as a multipurpose project that would more than pay for itself, and as a project to create job and business opportunities as nothing else in the region could.

Conceived as an irrigation project of unprecedented proportions, it got its final push as a public works project to put men to work and help pull a great Nation out of a great depression. It was finally started July 16, 1933, as a project of the Columbia Basin Commission, an agency created in 1933 by the Washington State Legislature. Preliminary engineering was accomplished with \$377,000 of Statal relief funds after President Roosevelt had assured Senator Clarence Dill that a \$60 million RFC loan would be available to the State. The \$60 million would be enough only to build a low dam, 145 feet above water, but with a base massive enough to hold the high dam we have today. Later, the President and the Public Works Board approved use of \$63 million of PWA funds for the Federal financing of the project. And in December 1933, Secretary Ickes administratively declared it a Federal project of the Bureau of Reclamation. Not until 1935, nearly 2 years after it was started, was it finally authorized by Congress along with a number of other projects already under construction. By decision of Secretary Ickes, June 6, 1935, it was made a high dam in one step instead of two steps.

Cost of the dam, reservoir, and appurtenant works (joint facilities) was \$159 million. Specific power facilities cost \$112 million and specific irrigation facilities \$289 million, for a total investment in the Columbia Basin project of \$560 million as of June 30, 1964. Of this, power revenues will repay \$434 million—\$175 million charged to power and \$259 million irrigation assistance.

A young Ephrata, Wash., lawyer named Billy Clapp is generally credited with having had the first vision, in 1918, of a high dam at the Grand Coulee site to irrigate the Columbia Basin.

One summer day in 1918 Billy and a friend, Paul Donaldson, were visiting the Grand Coulee. "What," "Billy asked," "do you suppose ever created such an immense coulee?" "It was made by the river," his friend replied, "millions of years ago when an ice dam blocked the regular channel."

If the ice could do it, Billy mused, why couldn't man build a dam that would divert the river back down the coulee and provide all the water anybody would ever need for irrigation?

Rufus Wood, the fighting editor of the Wenatchee Daily World, heard of Billy Clapp's idea from Donaldson, talked to Billy, and soon had a story with a headline across the entire front page of his paper. That was July 18, 1918, and the long struggle for Grand Coulee Dam was on. A judge wrote Rufus Wood, "Dam the Columbia. Verily, Baron Munchausen, thou art a piker."

What Billy Clapp had not realized was that the river lay some 600 feet below the Grand Coulee and a dam of sufficient height to force the river into its old coulee channel would have flooded hundreds of square miles in Canada.

But in 1919 an old carpenter named Ole Kallsted who had visited the coulee wrote Senator Miles Poindexter that a smaller dam would do the job by producing enough power to lift water 350 or 400 feet. That is exactly the plan finally settled upon.

About this time a Michigan lawyer-contractor named James O'Sullivan was visiting the Columbia Basin where he had lived for a few years. Rufus Woods asked him for an opinion on the dam, from a contractor's point of view. O'Sullivan bought a book on principles of dam building, looked over the site, became its foremost champion, and stayed in the basin to fight for it. Perhaps more than any other single individual he was responsible for success of the dam. Low-cost electric power, he held, would create its own market, and sale of electric energy, he was convinced, would pay for all the project costs. First as a layman, then as executive secretary of the Columbia Basin Development League financed by passing the hat for depression pennies, nickels and dimes, and finally as secretary of the first Columbia Basin Commission, O'Sullivan devoted the remainder of his life to the high dam pumping plan for the Columbia Basin project.

Meanwhile, in 1921, a private utility filed on the Kettle Falls site 117 miles upstream from Grand Coulee for a smaller project that would be flooded out by the high Grand Coulee. The Federal Power Commission withheld approval of this application pending further study of the multipurpose potential of this stretch of the Columbia River. For the next few years a number of boards and commissions studied, surveyed, and reviewed plans for Columbia Basin irrigation.

In 1928 the Chief of Engineers assigned Maj. John S. Butler, Seattle district engineer, to conduct a reconnaissance of the Columbia above the mouth of the Snake. Butler recommended a detailed survey, completed July 31, 1931, which became known as the 308 report.

The 308 report was the first comprehensive plan for development of the Columbia River. It went far beyond the wildest dreams of Jim O'Sullivan and the rest of the pumpers by calling not only for a high Grand Coulee Dam backing water all the way to the Canadian border, but also for full-scale development of the Columbia River with storage at Hungry Horse and the Flathead site.

In 1932 a bill authorizing the dam came within two votes of being reported out of House committee; even if it had, the economy mood of a Congress faced with mounting depression deficits would have made passage unlikely.

However, a year later, the very depression that worked against Grand Coulee Dam in 1932 prompted the new administration to proceed with the biggest project up to then ever built by man.

GRAND COULEE BENEFITS

While opponents had questioned the market for Grand Coulee power, "Who will use the power, the jackrabbits?", the proponents had proudly worn big buttons proclaiming, "Columbia Basin Dam will pay Uncle Sam." It certainly has. Repayment of all project costs allocated to power costs is on schedule.

Power from Grand Coulee produced aluminum for one out of every three U.S. planes in World War II. It enabled a single Portland shipyard to launch more ships than the total launched in the Nation during World War I. It helped manufacture the fissionable material that went into atomic bombs that ended World War II.

As of June 30, 1964, Grand Coulee Dam had produced 224 billion kilowatt-hours of energy, or 47.9 percent of the total kilowatt-hours produced on the U.S. Columbia River power system since 1938. Grand Coulee is responsible for the bulk of the 15,000 direct jobs in industry dependent upon BPA power and the 45,000 indirect jobs sustained by those industries.

Water lifted by Grand Coulee pumps is now available to 485,000 acres occupied by 5,392 farm units. Irrigated farms on the Columbia Basin project produced 63 different crops in 1964 with a gross crop value of \$64.2 million. Total crop value since 1948 now exceeds \$406 million.

Property taxes on the irrigated acres increased from \$940,000 in 1948 to \$5.6 million in 1963. Assessed valuation of property in the project area increased from \$16 million in 1947 to \$91.3 million in 1962, and approximately \$63 million of the increase is estimated by the Bureau of Reclamation to have been generated solely because of reclamation of the project lands.

The project has created thousands of jobs in basin towns and cities and millions of dollars in farm implement sales and freight payments.

Finally, the Bureau of Reclamation has estimated that \$31 billion in Federal income tax payments were paid in 1963 as a result of increased local and regional economic activity generated by power sales from Grand Coulee Dam and irrigation of project lands—\$12 million from power sales and \$19 million from irrigation development.

This, then, is a brief history of the project for which we now seek authorization for a third powerplant that will once again make Grand Coulee Dam the world's biggest hydro project.

LOCATION AND PHYSICAL DESCRIPTION

As shown in the picture (drawing) before you, the third powerplant would be located on and approximately¹ parallel to the east bank of the Columbia River, immediately below Grand Coulee Dam and in the general area now occupied by the east switchyard.

Project facilities include a forebay and forebay dam, the third powerplant, its separate switchyard, and a permanent tour center to accommodate the increasing number of visitors to the dam.

Water would be delivered to the powerplant through penstocks embedded in the forebay dam, which would consist of a nearly right angle extension of the present dam along the right or east abutment. The forebay would be connected to Franklin D. Roosevelt Lake by an open cut.

A separate 500,000-volt switchyard would most likely be located at Washington Flats on the east river bank about 2 miles downstream from the dam, although alternative switchyard locations are available and under study.

COSTS AND BENEFITS

The accompanying chart shows costs and benefits. Capital investment in the powerplant on the basis of price levels prevailing in April 1964, is estimated at \$324,354,000. To this must be added \$38,664,000 for the switchyard and \$1,292,000 for the tour center, for a total project cost of \$364,310,000. The net Federal investment is about \$400,700,000, including interest during construction.

Annual equivalent investment and operating costs total \$14,092,000. We have computed average annual benefits for power at \$43,838,000, for flood control at \$1,470,000, and for recreation at \$389,000. Thus total average annual benefits add up to \$45,697,000. This gives a benefit-to-cost ratio of 3.24 to 1. I will discuss these benefits more fully later.

No benefits have been assigned to fish and wildlife, although some improvement in the Columbia River fishery below Grand Coulee Dam may be possible through operation of the outlets to control water quality and temperature. However, no attempt has been made to evaluate this benefit.

Since diversion of water for irrigation is one of the primary functions of Grand Coulee Dam, the plan for development of a third powerplant was carefully considered from this viewpoint. We concluded the third powerplant would have no appreciable effect on irrigation pumping. Neither will it have any appreciable effect on navigation.

COST ALLOCATIONS

The entire cost of the third powerplant has been assigned to commercial power for the present. Later, after comprehensive reanalysis of the Columbia Basin project, all benefited functions will be included in a comprehensive reallocation of the entire project. The applicable interest rate for fiscal year 1965 is 3½ percent.

REPAYMENT

Full repayment of all costs allocated to power can be achieved with annual average repayments of \$15,700,000. This amount will cover annual operating costs during the repayment period and amortization with interest at 3½ percent of the power investment associated with each stage of development in 50 years from the time it becomes revenue producing.

Power from the third powerplant would be marketed by the Bonneville Power Administration. Sale of power produced by the third powerplant at applicable existing BPA rates is estimated to average about \$30.7 million. Deducting annual transmission costs of about \$11.2 million, BPA would be left with net revenues creditable to the third powerplant of about \$19.5 million on the average during the power repayment period.

Thus the prospective annual revenues creditable to the third powerplant under applicable rates and allowing for transmission costs would exceed the prospective annual repayment costs by about \$3.8 million.

POWER NEEDS

The Bonneville Power Administration, with the cooperation of non-Federal utilities and other Federal agencies, has made a careful analysis of loads and resources for the Pacific Northwest for the next 10 years and has made projections beyond. The projections are conservative in that they assume Northwest power requirements will not grow as fast as they have in recent years. These studies and projections have taken into account increased amounts of power available in the Northwest as a result of the treaty with Canada, sale in California of Canada's share of treaty power for several years, and opportunities to exchange power and sell peaking power in the Pacific Southwest over the intertie. These studies and projections likewise have taken into account the generation planned to be built in the region by Federal and non-Federal entities.

Weighing all these factors, there will be in 1973, without the third powerplant, a shortage of firm power in the Northwest and a shortage of peaking capacity to make maximum economic use of the intertie lines. The size of the resource deficit would increase in the years after 1973. On the other hand, with the third powerplant, Bonneville Power Administration could maintain a reasonable balance between requirements and resources, as shown in table 6 of the bureau's third powerplant study and the chart before us, through 1980. These projections take into account construction of High Mountain Sheep Dam and installation there of 900,000 kilowatts by 1974 by whatever entity eventually constructs it.

CONSTRUCTION SCHEDULE

To meet forecasted loads, then, a construction schedule is necessary under which the first 300,000-kilowatt generator would be producing by April 1973; the next 3 generators by 1973-74; and all 12 by 1983. In order to have the first generator on the line by April 1973, all the principal features of the project must be completed by then. This includes the forebay and forebay dam, the entire powerplant substructure and superstructure, and the penstocks. This represents nearly two-thirds of the total cost. The turbines and generators can be added unit by unit.

We do not believe the schedule could be speeded up. To meet such a tight construction schedule authorization for the third powerplant should be provided this year. The Appropriations Committees took cognizance of this schedule when, with the concurrence of the authorizing committees early this year, they approved reprogramming of \$100,000 of Bureau of Reclamation funds for pre-construction work on the right switchyard relocation and other planning.

This schedule for development of the third powerplant units is in addition to an accelerated schedule for development of units in plants downstream from Grand Coulee and the prospective development of reversible pump-turbine units in the Grand Coulee pumping plant.

You may be aware that early in our investigations we compared the relative economics of adding units at Grand Coulee and at other Federal hydroplants in the Columbia River system. That evaluation indicated that, except for several existing plants where provision has already been made for future units the initial units of the third powerplant would be most favorable for early development. However, it now appears that the estimated load growth in the Pacific Northwest together with opportunities associated with the intertie make it desirable to accelerate installation of capacity at all existing main stem Columbia River dams. Because the third powerplant schedule cannot be speeded up it has been necessary to schedule additional units in downstream plants ahead of the third powerplant, even though the economic analysis shows the initial units of the third powerplant should be developed first. I point this out to emphasize, again, how important it is for the third powerplant to be authorized this year.

MAXIMIZING WATER USE

The third powerplant is especially important in order to permit full use of the improved streamflows that will result from construction by Canada of the three storage projects provided for in the treaty and construction by the United States of Libby Dam. The first of the three Canadian storage projects is already under construction.

These projects will nearly triple storage above Grand Coulee Dam and greatly increase the usable streamflow available to Grand Coulee Dam by holding back floodwaters and releasing them during the low-water season. But even in a critical year; that is, even under lowest streamflow conditions, the existing 18 units at Grand Coulee could not make effective use of all the usable water. Under these conditions, when the region would be short of power without the third powerplant, water would be wasted that could produce about 140,000 kilowatts of prime power if the first four units of the third powerplant were in place.

Without additional units, Grand Coulee would be operating continuously at between 95 and 100 percent plant factor. Much usable secondary energy would be spilled and wasted downstream. The ability to fluctuate storage releases with changing load and resource conditions would be severely limited. Sudden requirements for changes in storage releases would require immediate or subsequent spill of otherwise firm energy or high-grade secondary. Further, maintenance requirements or outages take at least 1 of the 18 existing units out of service much of the time.

With the first four units of the third powerplant, however, maximum prime power could be obtained from the improved streamflows. The Bonneville Power Administration estimates the extra prime power at roughly 140,000 kilowatts, which at average load factor represents 200,000 kilowatts of additional salable firm power.

The third powerplant would not only assure production of additional prime power, but also substantial quantities of usable secondary power which would be wasted with only an 18-unit installation. The third powerplant additions also will provide for flexibility in changing storage releases to meet variations in loads and other resources without waste or spill.

Altogether, the third powerhouse ultimately will permit generation of some 4.6 billion kilowatt-hours of needed electrical energy and 3.6 million kilowatts of capacity.

Increased energy production, however, is not the primary purpose for development of most of the units in the third powerplant. Of the 4.6 billion kilowatt-hours to be produced by the 12-unit plant, nearly 3.9 billion kilowatt-hours or 84 percent would be produced by the first 4 units.

The capacity of all 12 units is needed, however, to provide peaking for the prime hydroelectric production and the nearly 9 million kilowatts of thermal capacity which is expected to be built and operating to help carry the Pacific Northwest base load by 1982, as well as to provide flexibility in the system after the treaty reservoirs and the intertie are built. Thus the third powerplant will bring multiregional benefits. As Canadian treaty power is withdrawn from the Southwest, the third powerplant will be available to assure peaking capacity for California as well as Northwest utilities.

By the year 2010 we expect that virtually all of the hydro in the Northwest will be used primarily for peaking purposes, with the base load carried by conventional and nuclear steamplants. Hydro, of course, is ideal for peaking purposes because it can be turned on and off by simply opening and closing the intake gates. Unlike steamplants, it requires no heating up process.

Water releases through Grand Coulee units to meet the swing in loads would be effectively reregulated for downstream use by Chief Joseph pondage. The reregulation was evaluated by a series of hourly pondage studies carried out to show the full hourly coordination of power development at Grand Coulee Dam and 10 downstream hydroplants. These studies also indicate that maximum utilization of the high head at Grand Coulee for peaking purposes provides the best use of water and head in the reach of the Columbia River south of the Canadian border.

FLOOD CONTROL

Grand Coulee storage has been included in all major plans for flood control on the Columbia. In the most recent of these plans prepared by the Corps of Engineers (printed as H. Doc. 403, 87th Cong.), the entire active storage space behind Grand Coulee Dam, 5,232,000 acre-feet, is considered to be usable for

flood control storage. However, the effectiveness of this total active storage space was predicated upon modification of the lower tier of outlets in the dam. Without modification of the existing outlet facilities, only about 3 million acre-feet of this capacity is effective for flood control. The third powerplant, however, will ultimately provide 35 or 40 percent more hydraulic capacity than the lower tier of outlets. This with provision of Canadian storage and the third powerplant, the total 5,232,000 acre-feet of active storage at Grand Coulee can be made effective for flood control and modification of the lower tier of outlets would be unnecessary.

The Corps of Engineers has valued present flood control benefits from Grand Coulee Dam at \$5,350,000 per year and with additional outlets, \$6,820,000. Thus, \$1,470,000 of annual flood control benefits can be credited to the third powerplant which would accomplish for flood control purposes everything modification of the present outlets would do. Further, the flood control benefits credited to the third powerplant would be achieved without expenditure of funds specifically for this purpose.

A complete reallocation of all Columbia Basin project costs, including the third powerplant, is to be prepared at a future date. Hence, we have not at this time allocated any costs to flood control.

TRANSMISSION

Transmission of the generation from the existing two powerplants presently is at 230,000 volts. Studies by BPA in cooperation with the Bureau of Reclamation indicate that it is not feasible to convert present transmission from Grand Coulee to a higher voltage but that power from the third powerplant could and should be transmitted over new facilities at 500,000 volts. As I indicated earlier, the 500,000-volt switchyard for the third powerplant most likely will be located at Washington Flats, 2 miles downstream from the new powerplant.

Inasmuch as the third powerplant will be built on space now occupied by the switchyard for the right (east) powerplant, this switchyard must be relocated and in service before construction of the third powerplant can be started.

The 500,000-volt lines coming out of the third powerplant switchyard will interconnect with Bonneville's new 500,000-volt backbone grid now under construction. Power will flow over this grid to the Pudget Sound area, central Washington, and to John Day Dam from which point it will supply either the Portland-Willamette Valley area or the Pacific Northwest-Pacific Southwest intertie as loads require.

RECREATION

Construction of the third powerplant would require removal of present tour facilities, provision of temporary facilities during construction, and installation of permanent facilities after construction.

In 1963, 300,000 people visited the area. By the time the third powerplant is completed, the figure is expected to increase to 450,000 per year and by the year 2000 to about 600,000.

One of the prime visitor attractions at Grand Coulee is the spillway lighting during summer evenings when reservoir spills are necessary. Construction of the third powerplant would not affect this program, but construction of the upstream storage dams provided for by the Canadian treaty could. Studies indicate that with the added storage, spills could be eliminated during the tourist season in 7 of 30 years and spills in many other years could be intermittent or curtailed.

The National Park Service desires to retain this attraction if at all possible, and an analysis of the feasibility of furnishing controlled spills during at least the peak of the tourist season will be made part of a forthcoming report on the Columbia Basin project.

Other forms of recreation in the Columbia Basin project, including overnight camping, picnicking, boating, and other forms of water sports, will not be affected by the third powerplant.

JOB OPPORTUNITIES

The Bureau of Reclamation estimates that construction of the third powerplant will create nearly 40,000 man-years of employment on the job and in the Nation's factories producing materials and equipment. Of this total, about 21,000 man-years would result from project construction and engineering and an estimated 18,550 man-years from materials and equipment purchases nationwide.

Direct employment at the damsite is estimated at 10,000 man-years during the first stage of construction, which will be spread over 7 years and involve

about two-thirds of the total construction job. Employment the first year will reach 500. It will peak at about 3,000 during the third and fourth years and gradually taper off.

SUMMARY

Before concluding, let me urge that legislation to authorize construction of the third powerplant be sufficiently flexible to permit adjustments in the number and size of units and the scheduling of installations if future circumstances indicate such adjustments are necessary. In summary:

1. A third powerplant at Grand Coulee Dam with at least 3.6 million kilowatts of installed generating capacity is engineeringly and economically feasible.

2. Electric loads in the Northwest will approximately double in the next decade. The Grand Coulee site, with an existing large storage capacity, high head, and location with respect to downstream reregulatory pondage and new Canadian upstream storage, is the most logical and desirable location for adding additional generating capacity.

3. Load growth in the Pacific Northwest together with opportunities associated with the Pacific Northwest-Pacific Southwest intertie make it desirable to accelerate construction of the third powerplant and installation of capacity at all existing main stem Columbia River dams.

4. The operation of the third powerplant will not adversely affect the irrigation pumping at Grand Coulee Dam, nor navigation nor fisheries, and there may be some small benefit to fisheries resulting from better temperature control of the river.

5. Better tourist facilities will ultimately be constructed, the night spillway lighting program may be adversely affected, other recreational opportunities around the project will not be affected.

6. Construction of the third powerplant will eliminate the need and expense of modifying outlets to permit maximum effective use of Grand Coulee storage for flood control purposes.

7. The project is economically well justified with a benefit-to-cost ratio of 3.24 to 1.

8. The project will more than pay for itself with average annual revenues from the sale of power, allowing for transmission costs, exceeding average annual sums required for repayment within the allowable 50-year period after each stage of development.

9. Grand Coulee Dam with the third powerplant will have more installed capacity than any dam existing today in the world.

10. The third powerplant should be authorized this year.

Mr. UDALL. There are several very striking things about this hearing—among others it is a very rare event when the President of the United States chooses to sign and send up a report such as this himself. I have talked with him over the weekend. He likes big projects, particularly big resource development projects, and he is pleased to have the opportunity to send up the report on this project himself. We are participating in an historic event here this morning.

I think it is also very significant, Mr. Chairman, that Grand Coulee project began in great controversy back in 1933. In its early period of construction there was a storm of controversy surrounding it, there were reservations by many people as to whether it was a good idea—yet we appear here today and can report to this committee that there is entire harmony as far as we know in the region and in the country as a whole in regard to this project.

There is no dispute between public power and private power; there is no argument between the Federal Government and the States. Everyone is satisfied that this project is in the national interest. Indeed, I am happy to report to you I think we are proposing here today a building of a powerplant which will be the most efficient hydroelectric plant in the United States and perhaps in the world.

We have opened the door to this last big phase of the development of the Columbia, our greatest hydroelectric river, by an intertie and

a treaty with Canada. The benefits from this project are not going to be confined to the Northwest. They will flow ultimately, we think, into most of the Western States. So we are testifying today on this project, not celebrating it as an accomplishment for the Northwest alone, but for the entire Western United States.

I should like to say, Mr. Chairman, that the events that have led us to this hearing today—the Columbia Treaty and the Northwest-Southwest intertie—that for my part I think if I were to single out two individuals who did the most to bring those events to consummation I think Chuck Luce, sitting at the table here with me, Bonneville Power Administrator, and the chairman of this committee, Senator Jackson, would be the two people I would single out as having provided the leadership that made this possible.

The third powerplant is the key element in every plan studied to use most effectively the improved streamflows resulting from the treaty with Canada for joint development of the Columbia River. In addition, it will make efficient use of the Pacific Northwest-Pacific Southwest intertie.

Early in this investigation, at the request of the House Appropriations Committee, we compared the relative economics of adding units at Grand Coulee Dam and other Federal plants in the Columbia River system. Except for several existing plants where provision has already been made for future units, the initial units of the third powerplant proved to be the most favorable for early development based on the needs of the Pacific Northwest alone. Estimated load growth in the Pacific Northwest, together with existing opportunities associated with the Pacific Southwest intertie, make it desirable now to accelerate this installation at the fastest possible rate.

The Canadian treaty and the intertie, as this committee knows, are complementary. Because of the intertie, the Canadian power entitlement can be marketed through the early years of its availability in all the Pacific Coast States.

Conversely, the treaty advanced the intertie. The Canadian share of treaty power, surplus to needs of Canada and the Pacific Northwest in the early years, have made the intertie an important and acceptable development for the Pacific Southwest.

The third powerplant, Mr. Chairman, is a big project. Its planned generators will provide 3.6 million kilowatts of installed capacity and 4.6 billion kilowatt-hours of energy. This, added to the approximately 2 million kilowatts of installed capacity in the existing two powerplants, will raise Grand Coulee's total to about 5.6 million kilowatts, making it larger than any existing hydroelectric project in the world.

I would like to review this for the committee, because I think it is a fact the country can take pride in. The Grand Coulee power project originally was nearly 2 million kilowatts, and at the time it was finished, was the largest in the world. A lot of things have happened, however, in the last decade, particularly the very striking effort that has been made in the Soviet Union in Siberia and on the Volga. Some of us here in the room have seen some of the projects to develop the great rivers in that country. During the last decade three hydroelectric plants in the Soviet Union surpassed Grand Coulee and they moved into world leadership. At present, in terms of installed capacity the largest powerplant in the world is the Bratsk plant on the Angara

River in Siberia, which Chuck Luce, Commissioner Dominy, and I saw with a group in the finishing stages of construction 3 years ago. It now has 3.6 million kilowatts capacity.

Senator SIMPSON. How many?

Mr. UDALL. 3.6 million kilowatts of installed capacity.

Senator JACKSON. Compared with only 2 million at Grand Coulee.

Mr. UDALL. Correct. The third powerhouse will move Grand Coulee back into a position of world leadership at 5.6 million kilowatts. The Soviets have another very large dam, a larger one than Bratsk, that they are building. We do not know yet what the ultimate installed capacity will be, but I think they are going to have to achieve the very fullest potential of it to reach the level that Grand Coulee will have after the third powerplant is installed.

So I think this is something of special interest to the country and to the committee.

The 300,000-kilowatt units themselves will be the largest hydro-generators ever installed in the United States and are nearly 3 times the size of each of Grand Coulee's existing 18 units.

This, incidentally, is a measure of the advance of technology in terms of building very large hydroelectric generators.

This is a timely undertaking. The Northwest will need all the additional prime power it can produce by 1973. Some of the secondary energy and peaking capacity it will add, and which will, for a time, be surplus to the needs of the Pacific Northwest, can readily be sold in the Pacific Southwest over the intertie.

It is an economical project. It will more than pay for itself. The addition of the third powerplant to the Columbia River Federal power system will improve the financial feasibility of that system during the 50-year payout period.

Non-Federal power interests have participated fully in these significant developments, both as power producers and distributors. The proposal has attracted enthusiastic support from all segments of the Pacific Northwest economy as its potential benefits will accrue directly or indirectly to the entire region and the Nation. No opposition has been expressed by any of the States or Federal agencies.

Incidentally, the amount of money that will be spent on this project, when added to the nearly \$700 million that public and private power agencies will spend on the intertie, adds up to a total project of over a billion dollars. The moneys spent on the third powerhouse will be spent about half in the Northwest and about half in other parts of the country producing the equipment and the materials that will ultimately go into the project. I think this is something the committee and the Congress would certainly want to take note of.

When the Grand Coulee Dam was completed in 1941, it was the biggest structure ever built by man. It stands 550 feet above bed-rock, as high as the Washington Monument, and raises the water surface of the Columbia 350 feet above the old riverbed. The storage capacity of the reservoir is 9,604,000 acre-feet, of which 5,232,000 acre-feet is active capacity. At normal pool, Franklin D. Roosevelt Lake has a surface area of 80,000 acres and stretches upstream a distance of 151 miles to the Canadian border.

Grand Coulee Dam, powerplant, and reservoir are keystones of the U.S. Columbia River power system. Over 25 percent of the power-

head on the Columbia River in the United States is developed at this site and nearly 30 percent of the total generating capability on the main stem is proposed to be installed here.

Existing power facilities include two powerplants at the foot of the dam on each side of the river; a 230-kilovolt and a 115-kilovolt switchyard on the left bank of the river; and a 230-kilovolt switchyard on the right bank. There are 18 main generating units of 108,000 kilowatts, 9 in each powerplant, and 3 station service units of 10,000 kilowatts each, in the left bank plant. The installed capacity totals 1,974,000 kilowatts which is the limit under present authorization.

This is the reason we are here before this committee today.

Six large irrigation pumps are installed near the left abutment of the dam to lift water into Banks Lake, which was formed by sealing both ends of an ice age channel in the upper Grand Coulee. From there, it is fed by gravity to the irrigation distribution system.

Ultimately, a total of 12 pumps will be installed to irrigate over 1 million acres of fertile dry lands. Each of these pumps is capable of lifting 720,000 gallons of water per minute 284 feet.

Franklin D. Roosevelt Lake, with a storage capacity greater than the capacity of all other main stem reservoirs combined, provides valuable flood control protection for downstream areas and regulates the riverflow to enable the at-site generators and those at 10 run-of-river plants downstream—5 Federal and 5 public non-Federal—to produce much more firm power than would otherwise be possible.

Turning to the third powerplant, we are proposing that this plant would be located on and approximately parallel to the east bank of the Columbia River, immediately below Grand Coulee Dam and in the area now occupied by the right [pointing] east switchyard.

Let me refer to the large picture just a moment. Here [pointing] is the switchyard I was referring to a minute ago which will have to be moved. The present generators, of course, are installed in the powerhouses at the foot of the dam.

Over here is the pumping plant and the irrigation system.

The overlay on the larger picture will show you what is proposed as the third powerplant. We move this east switchyard and we have to construct a new forebay and a forebay dam, then this whole bank of 300,000-kilowatt generators would constitute the third powerplant.

As you can see, this is a very, very big construction project. Ultimately, including transmission lines, it will come close to or in the neighborhood of, \$400 million.

Senator JACKSON. Mr. Secretary, for the benefit of some of the members of the committee who may not be familiar with it, the reason, I take it, that we are here today to take up the authorization of the third powerhouse stems from two preceding events: one of these is the treaty that we have with Canada; is that not right?

Mr. UDALL. That is correct.

Senator JACKSON. Whereby Canada will build three storage reservoirs on headwaters of the Columbia in British Columbia, and the United States will build Libby Dam, which added together will give us the number of millions of acre-feet of upstream storage capacity to make possible, in turn, the third powerhouse?

In other words, we have not been able to do this before because of the lack of upstream storage; is that correct?

Mr. UDALL. Without the Columbia treaty, without these four big storage reservoirs upstream, we would not be here today proposing this. So this was the prerequisite that was necessary.

Senator JACKSON. So we are not raising the dam. The basic structure of the dam will remain the same. The point is that there will be more water available on a constant flow basis, and better regulation of the flow, which, in turn, make possible this tremendous increase from 2 to 5.6 million kilowatts of installed capacity.

The second of the preceding events to which I referred is the enactment of the intertie legislation, Public Law 88-552, by which surplus power from Bonneville may be sold in the Southwest.

Mr. UDALL. Mr. Chairman, there is one other point I should make right now of interest to the committee. When the Bonneville people project the growth loads in the Northwest after 1975, there will have to be a tremendous growth in stream generating capacity. One of the big needs of the region in the future will be peaking power. This third powerhouse is primarily designed as a peaking plant. It will provide much of the peaking power that will be needed in the future in the entire region.

Senator JACKSON. Which includes the Pacific Southwest as well?

Mr. UDALL. And some of that peaking power will get down into Senator Hayden's State—Arizona—into Nevada and California. We might even get some into New Mexico, I do not know yet.

Senator ANDERSON. That would be the first time.

Mr. UDALL. Taken alone, the third powerplant is a giant in its own right. There are no existing powerplants with a greater installed generating capacity than this addition to Grand Coulee.

Project facilities include, as I pointed out, a forebay and forebay dam, the third powerplant, its separate switchyard, and a permanent tour center to accommodate the increasing number of visitors to the dam.

Water would be delivered to the powerplant through penstocks embedded in the forebay dam, which would consist of a nearly right angle extension of the present dam at the right abutment. The forebay would be connected to Franklin D. Roosevelt Lake by an open cut.

Designs and estimates for the third powerplant are based upon an installation of 12 hydraulic turbines and generator units with rated capacities of 300,000 kilowatts each. These are arranged in a single line paralleling the river bank below the existing dam.

A separate 500,000-volt switchyard is planned to be located at Washington Flats on the west bank of the river about 2 miles downstream from the dam, although alternative switchyard locations are available and under study by the Bureau of Reclamation.

It is important to recognize that the final designs, continuing studies, and future power and energy load conditions may indicate the wisdom of modifying the present design, particularly the capacity of the forebay channel and the number or capacity of the units. We consider that the bill introduced provides sufficient flexibility to permit us to adopt reasonable modifications.

Capital investment in the third powerplant on the basis of price levels prevailing in April 1964 is estimated at \$324 million. To this must be added \$38 million for the switchyard and \$1 million for the tour center, for a total project cost of \$364 million. The net Federal

investment will be about \$400 million, including interest during construction.

Studies which will result in a comprehensive reanalysis of the Columbia Basin project are now underway, considering the third powerplant as one of the integral features of the project and incorporating all benefited functions as part of the analysis. The powerplant's contributions to the multiple purposes of the project will be integrated with those of the other features for overall cost allocation and repayment analyses.

Diversion of water for irrigation is one of the primary functions of Grand Coulee Dam, and the plan for development of a third powerplant was carefully considered from this viewpoint. We find that the third powerplant would have no appreciable effect on irrigation pumping; nor will it have any appreciable effect on navigation.

The entire capital investment of \$400 million, including interest during construction, is considered in this analysis to be repaid through the power marketing revenues of the Bonneville Power Administration. Annual operating costs during the repayment period and amortization with interest at 3½ percent of the power investment associated with each stage of development will be repaid within 50 years from the time it becomes revenue producing. This, of course, is fully consistent with the principles governing present operation of the BPA system and other Federal power systems.

The third powerplant will more than pay for itself. Annual revenues from the sale of power from this source will exceed by an average of nearly \$4 million per year the annual sums required to repay, with interest, the capital investment as well as all operating costs.

The reason, Mr. Chairman, that we are before the committee at this time is that there is an urgency with regard to action concerning this project. To meet forecasted loads, a construction schedule is necessary under which the first 300,000-kilowatt generator would be producing by April 1973; the next 3 generators during 1973-74; and all 12 by 1983.

In order to meet this 1973 deadline, all the principal features of the project must be completed by April 1973, including the forebay and forebay dam, the powerhouse substructure and superstructure, and the penstocks. This represents nearly two-thirds of the total cost.

The first-stage construction schedule is tight at best. Under the Columbia River Treaty—and we have to gear our construction schedule, Mr. Chairman, to the construction schedule that the Canadian Government is following with regard to these upriver storage dams—the Canadian Government is committed to complete all three of its reservoirs by April 1973. In fact, the first of those reservoirs is already under construction and a contract has been let for construction of the second. And there is money in this year's budget to begin the Libby Dam in this country.

Therefore, if we are to meet the current schedule, authorization for the third powerplant should be provided this year. The third powerplant is especially important in order to permit full use of the improved streamflows that will result from construction by Canada of the three storage projects provided for in the treaty and construction by the United States of Libby Dam.

In summary:

1. A third powerplant at Grand Coulee with at least 3.6 million kilowatts of installed generating capacity is, in our judgment, economically feasible.

2. Electric loads in the Northwest will approximately double in the next decade. The Grand Coulee site, with an existing large storage capacity, high head, and its location with respect to downstream reregulatory pondage and new Canadian upstream storage, is the most logical and desirable location for adding needed additional generating capacity.

3. Load growth in the Pacific Northwest, together with opportunities associated with the Pacific Northwest-Pacific Southwest intertie, make it desirable to accelerate construction of the third powerplant at the fastest possible rate.

4. Operation of the third powerplant will not adversely affect the irrigation pumping at Grand Coulee Dam or downstream navigation or fisheries. There may be some benefit to fisheries resulting from better temperature control of the river.

5. Construction of the third powerplant will eliminate the need and expense of modifying outlets to permit maximum effective use of Grand Coulee storage for flood control purposes.

6. The project is economically well justified with a benefit-to-cost ratio of 3.24 to 1. Its economic stimulus will be felt in many parts of the Nation.

7. The project will more than pay for itself as a unit of the Columbia River Federal power system, and will enhance the economic and financial feasibility of the system.

Therefore, Mr. Chairman, we urge the committee to favorably report this pending legislation to authorize the construction of the third powerplant this year, at this session, in order to enable us to get on in a timely way with our work.

Senator JACKSON. Thank you for your very fine statement, Mr. Secretary.

As a further summing-up, am I not correct in understanding that the total capital investment, including interest, for construction is \$400,700,000, and that this amount in its entirety will be repaid through the power marketing revenues of the Bonneville Power Administration?

Mr. UDALL. This is a very accurate way of describing it, Mr. Chairman, over a 50-year period.

Senator JACKSON. Over a 50-year period. Present indications are that there will be an indicated surplus of about \$4 million per year during this annual payout period. We do not have projects up here very often that have that kind of payout provision. I thought after all the fine testimony by the Secretary we should get the full picture here of the total cost, everything, including interest. This is the kind of project in which the Government does receive interest on the investment made in connection with the construction of the project, and the interest runs as each unit comes into production, as I understand it.

Mr. UDALL. Mr. Chairman, Commissioner Dominy tells me it is even more favorable than that. I will let him paint the picture.

Mr. DOMINY. At the present Bonneville power rates and computed at $3\frac{1}{8}$ percent interest on the investment, this will pay out at 36 years, and as you point out, that means that in 50 years you will have a reserve of \$265 million, a surplus above investment.

Senator JACKSON. A net profit of a little more than \$4 million each year, over a 50-year period, is, as you point out, over a quarter of a billion dollars, and still the Government will receive its entire investment back with interest.

Mr. DOMINY. Three and an eight percent interest.

Senator JACKSON. Whereas, on flood-control projects the money all comes out of general revenues and for irrigation projects, there is no interest charged on the capital investment.

Are there any questions of the Secretary?

Senator ANDERSON?

Senator ANDERSON. I was just going to ask about this \$4 million annually. I understand you figured that would run \$265 million in a 50-year period?

Mr. DOMINY. Yes, sir; it will pay out with a \$265-million surplus.

Senator ANDERSON. Where will that go, into the reclamation fund?

Mr. DOMINY. Yes, sir; it will be available into the reclamation fund or into a possible basin account. At present, it would go into the surplus in the Treasury.

Senator ANDERSON. Just where would it go?

Mr. DOMINY. At the moment there is no basin account, so it would go into the reclamation fund.

Senator JACKSON. These revenues would go to the general receipts of the Treasury, would they not?

Mr. DOMINY. They go into general receipts of the Treasury for credit to the reclamation fund, Mr. Chairman.

Senator ANDERSON. That is what I am trying to get at, whether we put it into a special basin account.

Senator JACKSON. The Chair will say that we do not have a basin account yet. That is a matter into which we are going to look at subsequent hearings. We all know that we are subsidizing certain reclamation projects in the Columbia River Basin. We have authorized individual irrigation projects with subsidies from power revenues from this dam and other dams in the Columbia River system. Otherwise, it would not be possible to build them. I do think that we do need a policy decision on this question of the Columbia Basin account.

Senator ANDERSON. I am only trying to find out if you plan to put this in the Columbia Basin account, where it is available only to the Columbia Basin, or into the reclamation fund where it is available to the whole country. What is the plan of the Department?

Mr. UDALL. I think until a basin act is devised and approved by the Congress, and we expect some work on such an act this year, that the result will be as Commissioner Dominy described a minute ago, until the basin act is set up, it would go into the reclamation fund.

Senator ANDERSON. On page 3 you talk about the undertaking—

The Northwest will need all the additional prime power it can produce by 1973. Some of the secondary energy and peaking capacity it will add, and which will, for a time, be surplus to the needs of the Pacific Northwest, can readily be sold to the Pacific Southwest.

Do you have any idea what sort of rate such power would get down there? Do you have a postage-stamp rate applying there?

Mr. LUCE. Senator Anderson, the postage-stamp rate applies to any delivery point on Bonneville's system within the Pacific Northwest. Therefore, purchasers of the power in the Southwest would pay the postage-stamp rate at the edge of our primary marketing

area, which happens to be the boundary of Oregon and Nevada, or Oregon and California. At that point, they would pay for peaking capacity, \$9 per kilowatt, if it is year-around capacity, or \$5 per kilowatt if it is summertime capacity. Down in your area, the latter is a valuable item, because your peakloads come in the summertime. But the cost of transmission of this capacity from the southern boundary of Oregon to load centers in the Southwest would be in addition to the rates I have quoted you.

Senator ANDERSON. Do I understand at the point of delivery, say in the State of California, that the postage-stamp rate would apply at that point?

Mr. LUCE. Yes, sir, and that delivery point would be the boundary of Oregon and California.

Senator ANDERSON. I understood the postage-stamp rate applied only inside the Bonneville service area.

Mr. LUCE. It applies only inside the Bonneville service area, yes. Our service area extends to the southern boundary of Oregon, but not further.

Senator ANDERSON. On page 16 there is reference to irrigation. Ultimately a total of 12 pumps will be installed to irrigate over 1 million acres of land.

What is under irrigation now?

Mr. DOMINY. There are a little less than 500,000 acres that we are capable of serving water to on the Columbia Basin project now this year.

Senator ANDERSON. What is under irrigation now?

Mr. DOMINY. I say a little less than 500,000 now and an ultimate total project a little over a million, so about half of it is irrigated now.

Senator JACKSON. We have 485,000 acres, approximately, under irrigation now with a total capability of 1,028,000 acres, roughly.

Senator ANDERSON. I wanted to ask you, Mr. Secretary, will this mean new acreage under irrigation because of this project or has the new land been already provided for in the Columbia Basin project? I remember I worked out the Columbia River Basin project in the House of Representatives twenty-some years ago and we were talking then of a million acres. So this is not an extension of the irrigation project, is it?

Mr. UDALL. I think I can answer very flatly on that, Senator. This third powerhouse has no effect, really, on the irrigation potential. There is no irrigation aspect to this. This is largely power production, almost a straight power-production project. It has no adverse effect, and no favorable effect, on irrigation.

Senator ANDERSON. Would it not be correct to say that the present Columbia River Basin project has provision for all the water needed to irrigate the land now authorized to be irrigated?

Mr. UDALL. I am sure this is a correct statement.

Senator ANDERSON. We have this constant question of bringing in new land. This is not new land at all.

Mr. UDALL. It is not involved in any way. In fact, the orderly development of the irrigation potential is, of course, moving forward under a regular program.

Senator ANDERSON. I have no further questions.

Senator JACKSON. I would like to direct some questions to Mr. Luce on the power aspect of this that might be helpful.

How does the cost of power from the third powerhouse compare with the revenues that Bonneville Power Administration expects to receive from the sale of power?

Mr. LUCE. Mr. Chairman, the statistics, in answer to your question, have been put on a chart.

Senator JACKSON. I wonder if you can pull out that chart and put it in front of the picture of the dam.

(The chart referred to follows:)

**COMPARISON: COST AND RATES
THIRD POWERPLANT**

	<u>COST OF THIRD POWERPLANT GENERATION</u>	<u>BPA TRANSMISSION COST</u>	<u>TOTAL</u>	<u>COST AT MARKET</u>	<u>BPA RATES</u>
PEAKING CAPACITY ----	\$3.69 ^{1/} PER KW-YR.	\$3.50 ^{1/} PER KW-YR.	\$7.19 PER KW-YR.	\$7.69 ^{2/} PER KW-YR.	\$9.00 PER KW-YR.
ENERGY ----	0.52 MILLS PER KW-HR.	NOT APPLICABLE	0.52 MILLS PER KW-HR.	0.55 MILLS ^{3/} PER KW-HR.	2.0 MILLS PER KW-HR.

^{1/} BASED UPON NAMEPLATE CAPACITY.

^{2/} ADJUSTED FOR 6½% TRANSMISSION LOSSES.

^{3/} ADJUSTED FOR 5½% TRANSMISSION LOSSES.

Mr. LUCE. The short answer to your question is that the cost of power from the third powerhouse is below the existing Bonneville rates.

The specifics are as follows: Peaking capacity at the third powerhouse costs us \$3.69 a year. Add to that the cost of transmission to get the power from the third powerhouse into the load centers anywhere within the Bonneville service area under the postage-stamp basis, that costs an additional \$3.50, totaling \$7.19. We must then take into account the line losses between the third powerhouse and the load centers, that brings the effective cost to \$7.69. The present Bonneville rate for peaking is \$9. You can see there is a spread of about \$1.30 profit for each kilowatt, on these 3,600,000 kilowatts.

The energy that comes out of this project costs only about a half a mill, and our rate is 2 mills. So it is a very attractive project and strengthens our financial position.

Senator JACKSON. Will the third powerhouse be used principally for serving base load or will it be primarily for peaking purposes?

Mr. LUCE. As Secretary Udall pointed out, primarily for peaking purposes.

Senator JACKSON. Will you explain, so we will have it for the record, what we mean by peaking purposes and how it will work?

Mr. LUCE. Electric loads do not run in a constant amount; that is, the demand for electricity during the day rises and falls, and during the week it rises and falls.

For example, over the weekend the demand goes down, and on Monday the demand goes up.

The demand also varies as to the season of the year.

Now, in order to meet the fluctuations in load, hydroelectric capacity is the most economical means. This is because you do not have to do anything more to start the electricity flowing than to open a valve and let the water flow through the turbine; whereas if you are attempting to put on additional generating capacity that is steam fired, you must first fire up the boiler and keep it on a standby, so-called spinning-reserve, basis. All of this takes fuel and costs money.

So the hydroelectric installations of the kind that we are presenting to the committee today are the ideal way to meet these fluctuations in load which we call peaking.

Senator JACKSON. And, of course, there is a heavy requirement for peakloads in the Pacific Northwest and likewise in the Pacific Southwest during certain periods?

Mr. LUCE. That is correct. The peaking capacity that is required normally is in this relation: that your average amount of electrical use and your peaking bears a relationship of about 60 to 100, so you have to be overinstalled with peaking capacity at about that ratio.

Senator JACKSON. How does the cost per kilowatt of peaking power from Grand Coulee Dam compare with the cost at other projects in the Columbia Basin? Do you have that?

Mr. LUCE. Again, the answer to your question shows a very favorable comparison for the third powerhouse project.

We have shown on a chart the annual cost of capacity at the third powerhouse. I have previously given it, \$3.69, at the bus bar. At certain non-Federal projects comparable peaking costs are: at Wells, \$11.44, and at Mossyrock, a project Tacoma is now building on the Cowlitz River, \$16.15. At Federal Libby Dam, proposed for initial construction appropriations this year, annual peaking costs will be \$7.13 per kilowatt. I will not give the rest of the figures, because this chart will be placed in the record.

(The chart referred to follows:)

COST COMPARISONS THIRD POWERPLANT

	<u>CAPACITY</u>	<u>ENERGY</u>
	\$/kw Nameplate Rating	Mills/kwh Ave. Annual Energy
<u>THIRD POWERPLANT</u> -----	\$ 3.69	0.52
 <u>NON-FEDERAL</u>		
Wells -----	11.44	1.44
Rocky Reach -----	13.60	1.62
Priest Rapids -----	7.69	0.89
Wanapum -----	9.38	1.09
Mayfield -----	14.28	1.90
Mossyrock -----	16.15	2.13
Round Butte -----	12.06	1.32
 <u>FEDERAL</u>		
Dworshak		
Initial -----	15.96	2.00 ^{1/}
Ultimate ^{2/} -----	10.48	1.33 ^{1/}
Libby		
Initial -----	7.13	2.33 ^{1/}
Ultimate -----	8.10	2.46 ^{1/}
 <u>CHIEF JOSEPH ADDITIONS</u> -----	 4.16	 0.48

^{1/} Includes downstream power benefits.

^{2/} Includes benefits & costs for reregulation (Lenore Project).

Senator JACKSON. In other words, it is extremely favorable, is that right?

Mr. LUCE. Yes; the cost of peaking power at the third powerhouse is less than half of the cost at most of the other projects in the region, and the other projects also are good projects.

Senator JACKSON. How important will this peaking capacity be in the Pacific Northwest when in the years ahead we may have to build steam electric plants?

Mr. LUCE. Well, it will be more and more important as the region has to build steam electric plants. According to our present load projections, we are going to be getting into steam electric plants in about the middle 1970's. The efficient way to run a steam electric plant is to run it full time. These very large generating units, fired either atomically or with coal, can be most efficient only when they are run 100 percent of the time, less whatever time is necessary for maintenance, which is usually about 10 or 12 percent. You use the steamplant for a baseload plant, then you use your hydroelectric capacity for peaking in combination with it. The result is the lowest power cost to the consumer.

Senator JACKSON. Could you tell the committee how this power or where this power will be used, starting when the first unit goes on the line in the present plan in 1973, the last one, I believe, in 1983.

Mr. LUCE. According to our present predictions?

Senator JACKSON. Under present plans.

Mr. LUCE. Yes. In the Pacific Northwest power from the third powerhouse will be used in the Spokane area and, principally, in the Puget Sound area, because power seeks the closest market, the load closest by. The closest load area, big load area, to the third powerhouse is Spokane, which is only about 80 miles away, but the very largest is the Puget Sound area.

However, we will construct four 500,000-volt transmission lines out of this third powerhouse, some of which will bring this power into the Willamette area around Portland, Salem, and Eugene, Oreg., and another will make it possible to send third powerhouse power into the Pacific Southwest via the John Day switchyard and substation.

When the first four units at the third powerhouse are completed, we will be delivering to the Pacific Southwest about 2,700,000 kilowatts of economical power. If we are going to continue those deliveries, the third powerplant is a project that is most important.

Senator JACKSON. And the critical period will be during the time between when the first generator goes on the line and the last one?

Mr. LUCE. That is right. Another fact that may be of interest to the committee is that by 1974 the load growth per year in the Northwest will be exceeding 1 million kilowatts every year.

Senator JACKSON. Will there be any problems with respect to fish? Our fisheries always are of concern in the Northwest. Is there any problem concerning the fish runs in connection with the third powerhouse?

Mr. LUCE. We are happy to report to the committee that there is no fish problem. The anadromous salmon do not get above the Chief Joseph Dam just below Grand Coulee. If the third powerhouse has any effect on fish, it will be a beneficial effect in that there may be some cooling of the water by reason of the outlets for the turbines in the third powerhouse. However, we have not assigned any specific dollar benefit for this cooling effect.

Senator JACKSON. And will the third powerhouse have any effect on the use of Lake Roosevelt, which is the water impounded by the dam, for recreation?

Mr. LUCE. The third powerhouse, together with the Canadian storage, and I think these things have to be considered as a package, will actually result in our having to draw down Lake Roosevelt behind Grand Coulee Dam less than we have to at the present time without Canadian storage and without a third powerhouse. So that we do not see any detrimental effect to recreation on the reservoir area back of Grand Coulee Dam, a very important and delightful recreation area.

Senator JACKSON. Senator Anderson?

Senator ANDERSON. Mr. Chairman, could you not help us out? We had the Touchet project the other day which had to do with salmon. How does it tie in with this project?

Senator JACKSON. It does not tie in. I think the point is that at the dam immediately below Grand Coulee, Chief Joseph, the experts came to the conclusion that fish ladders would be impractical. Whereas

COMPARISON OF LOADS AND RESOURCES

PEAK LOAD AND PEAK GENERATING CAPACITY
(CRITICAL HYDRO CONDITIONS - WITH PACIFIC SOUTHWEST INTERTIE)
(Thousands of Kilowatts)

Item	1965-66	1967-68	1969-70	1971-72	1973-74	1975-76	1977-78	1979-80
FIRM PEAK LOAD								
Pacific Northwest Area	12,891	14,816	16,690	18,768	21,328	24,100	27,200	30,300
Sales to the Pacific Southwest Including Losses	--	1,000	2,208	2,348	2,704	2,882	2,882	2,882
Total Peak Load	12,891	15,816	18,898	21,116	24,032	26,982	30,082	33,182
PEAK RESOURCES								
Hydro Firm Capability ^{1/} Thermal Capacity	15,187	17,232	19,621	21,980	24,850	27,729	30,017	31,136
New Production Reactor Capacity	601	601	601	601	601	601	1,851	4,101
Interregional Imports	570	786	786	786	843	843	843	843
	--	--	--	--	--	--	--	--
Total Peak Resources	16,358	18,619	21,008	23,367	26,294	29,173	32,711	36,080
Less Reserves	1,455	1,694	1,784	1,890	2,036	2,212	2,435	2,688
Peak Resources Available for Load	14,903	16,925	19,224	21,477	24,258	26,961	30,276	33,392
COMPARISON OF PEAK RESOURCES WITH LOADS								
With Third Powerplant Surplus or Deficit	2,012	1,109	326	361	226	-21	194	210
Without Third Powerplant Surplus or Deficit	2,012	1,109	326	361	-974	-1,771	-2,106	-2,090
ANNUAL FIRM ENERGY - LOADS AND RESOURCES (CRITICAL HYDRO CONDITIONS - WITH PACIFIC SOUTHWEST INTERTIE) (Billions of Kilowatt-Hours)								
FIRM ENERGY LOAD ^{2/}								
Pacific Northwest Area	72.0	83.0	93.1	104.1	118.0	132.9	150.5	168.1
Sales to the Pacific Southwest Including Losses	--	--	5.0	5.0	5.0	2.5	2.5	1.5
Total Energy Load	72.0	83.0	98.1	109.1	123.0	135.4	153.0	169.6
FIRM ENERGY RESOURCES								
Hydro Firm Capability ^{1/} Thermal Capacity	70.6	78.4	98.0	100.5	114.7	127.1	136.6	137.6
New Production Reactor Capacity	2.3	2.3	2.9	2.9	0.8	0.8	10.7	28.4
Interregional Imports	1.7	5.4	5.6	5.6	5.9	6.3	6.3	6.3
	0.4	0.4	--	--	1.4	1.5	0.7	--
Total Firm Resources	75.0	86.5	106.5	109.0	122.8	135.7	154.3	172.3
Less Reserves	--	--	--	--	--	--	0.5	1.4
Firm Resources Available for Load	75.0	86.5	106.5	109.0	122.8	135.7	153.8	170.9
COMPARISON OF FIRM RESOURCES WITH LOADS								
With Third Powerplant Surplus or Deficit	3.0	3.5	8.4	-0.1	-0.2	0.3	0.8	1.3
Without Third Powerplant Surplus or Deficit	3.0	3.5	8.4	-0.1	-1.4	-1.0	-0.6	-0.1

1/ Including Grand Coulee (Third Powerplant) units on the line (Units 19-22 in 1973-74, Units 23-24 in 1974-75, and Units 25-26 in 1976-77).

2/ Includes, after 1972-73, a gradually increasing proportion of certain industrial loads which, prior to that time, are served on an interruptible basis.

the dams below where the Touchet-Walla Walla River flows into the Columbia have fish ladders so that the fish are up in that area, whereas at Coulee it is not possible to get the fish above the dam.

Senator ANDERSON. Touchet, then, will enhance fish and wildlife?

Senator JACKSON. All of the dams starting with Bonneville through McNary on the lower Columbia have fish ladders so that the fish are able to migrate up river to a point below Chief Joseph Dam. The Columbia River makes a swing at the Tricity area and then goes on north, and there are some low dams up in that area. But when you get to Chief Joseph, that is the barrier. It is not possible to get the fish over that dam and then, of course, on over Grand Coulee.

Mr. LUCE. There are steelhead now in the Touchet River that come up the fish ladders on the Columbia River and get in there. I think the point on the Touchet project would be that the water flows would be improved and you would have a better fish run than you have at the present time.

Senator JACKSON. But the dams on the lower Columbia are not as high. This is the answer, and, therefore, it is possible to get the fish up over the dams through a series of fish ladders.

Senator ANDERSON. Thank you.

Senator JACKSON. In all of this, have you taken into account the scheduling of the other new generating projects in the Pacific Northwest for the proper timing of the third powerhouse?

Mr. LUCE. Yes, Mr. Chairman, we have, and we have presented for the record a chart which shows that according to the best predictions that we can make of the load growth and of the schedule of new generation, both Federal and non-Federal, we will need the third powerhouse in 1973-74 to avoid a peaking deficit of about 900,000 kilowatts.

Senator JACKSON. One last question, Mr. Luce. I have received a telegram from the public utility districts and companies that have dams and interest in dams below Chief Joseph and, of course Grand Coulee Dam, supporting the third powerhouse. The telegram is as follows:

SEATTLE, WASH.,
April 12, 1965.

HON. HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

MY DEAR MR. CHAIRMAN: The undersigned organizations are all of the generating utilities that own, or presently use the output of, non-Federal dams downstream from the proposed third powerhouse at Grand Coulee Dam. Therefore the construction of the powerhouse and the method of operation of Grand Coulee thereafter is of crucial importance to us and the customers we serve.

By this telegram we wish to record our unanimous approval of the construction of the powerhouse, subject to the following reservation. The operation of Grand Coulee after the third powerhouse is operative should be coordinated with other affected projects in order to secure optimum usable generation at all affected projects and equitable distribut on of the benefits resulting from such coordination. In no event should the downstream non-Federal projects (1) be forced to suffer a reduction in available usable energy as a result of stored water being discharged from Grand Coulee to accommodate Government requirements for power to be used outside the Pacific Northwest, or (2) be required to pay for services similar to load factoring in order to avoid such reduction.

Therefore, we respectfully request an appropriate indication from the proper agencies of the Government that such a plan of operation will be worked out and adopted as soon as possible and we stand ready to cooperate in devising such

a plan. We further request that this telegram be included in the hearing record, and we very much appreciate this opportunity to make our views known to the committee.

Public Utility District No. 1 of Chelan County, Wash., Kirby Billingsley, manager; Public Utility District No. 1 of Douglas County, Wash., by Fred W. Lieberg, manager; Public Utility District No. 2 of Grant County, Wash., by E. B. Gibbons, manager; Public Utility District No. 1 of Cowlitz County, Wash., by O. G. Hittle, manager; City of Seattle Department of Lighting, by John M. Nelson, superintendent, City of Tacoma Department of Public Utilities, Light Division, by C. A. Erdahl, director; Eugene Water and Electric Board, by Byron Price, superintendent; Pacific Power & Light Co., by E. R. Deluccia, vice president; Portland General Electric Co., by Frank M. Warren, president; Puget Sound Power & Light Co., by Ralph M. Davis, president; Washington Water Power Co., by M. L. Blair, vice president; Colockum Transmission Co., Inc., by W. N. Farquhar, vice president.

Senator JACKSON. I wonder, in view of this concern expressed by them, if you are in a position to respond to the request that they have made?

Mr. LUCE. Yes, Mr. Chairman. There are five non-Federal projects on the main stem of the Columbia River below Grand Coulee and Chief Joseph Dams: Wells under construction by Douglas County PUD, Rocky Reach and Rock Island owned by Chelan County PUD, and Wanapum and Priest Rapids owned by Grant County PUD. Most of the major utilities in the region, public and private, presently use the output of these projects. Our studies show that the discharge from Grand Coulee to accommodate Government loads outside the region can be made without loss of usable energy at the non-Federal dams, except at Rock Island Dam which has limited hydraulic capacity.

And I might say that Rock Island was the first mainstem dam ever built on the Columbia River, and it just does not have enough installed capacity nor is it possible to enlarge that dam to take advantage of the amount of water that comes down the Columbia River.

Senator JACKSON. That was originally built by Puget Sound Power & Light.

Mr. LUCE. By the holding company that owned it at that time, Mr. Chairman.

This conservation of energy can be accomplished through reregulation at Federal Chief Joseph Dam, which is the first dam below Grand Coulee, and has 6 to 16 feet of pondage.

In other words, Mr. Chairman and members of the committee, as the third powerhouse is operated for peaking purposes, we will use the pondage in Chief Joseph Dam, the Federal dam next downstream, to absorb those surges so that they do not hit the non-Federal dams below Chief Joseph in such a way that they cannot use the water that comes down the river.

Bonneville is willing to amend the existing Coordination Agreement or to enter into other agreements with the utilities that are signatories to this telegram in order to secure optimum useful generation at the affected projects and equitable distribution of the benefits resulting from such coordination.

Need for coordination of water releases is not peculiar to the third powerhouse at Grand Coulee. Additional generating units are being installed at non-Federal projects as well as at other Federal projects.

Turbine discharge capacity, the time of flow to the next project, the amount of pondage, and the load shape to be served, all will affect ability to secure optimum energy from the water releases. For example, even two plants close together, such as Wanapum and Priest Rapids, both owned by the Grant County PUD, must have coordinated discharges to achieve optimum energy generation. The attached table shows discharge and distance between Columbia River projects.

Senator JACKSON. The chart will be included in the record at this point, if there is no objection.

(The chart referred to is as follows.)

Columbia River system—Basic plant and discharge data

Project	River-mile (mile)	Distance to next plant (mile)	Number of units (number)	Installed capacity (megawatts)	Maximum discharge (cubic feet per second) ¹	Theoretical maximum change in tailwater (feet) ²	Average time of flow to next project (hours) ³
Grand Coulee.....	596.6	51.5	18	1,944	92,200	11	1 to 3
Chief Joseph.....	545.1	28.5	30	5,544	235,400	21	
			16	1,024	104,000	5	1 to 2
Wells.....	516.6	42.1	27	1,728	177,000	10	
Rocky Reach.....	474.5	21.1	10	774	230,000	14	2 to 3
			7	712	121,000	10	1 to 2
			11	1,118	202,000	14	
Rock Island.....	453.4	38.4	10	212	82,000	3	1
Wanapum.....	415.0	17.9	10	831	180,000	8	0.5 to 1
			16	1,330	300,000	14	
Priest Rapids.....	397.1	105.1	10	788	187,000	10	8 to 12
			16	1,262	300,000	16	
McNary.....	292.0	76.4	14	980	217,000	3	2 to 3
			20	1,400	306,000	5	
John Day.....	215.6	24.1	16	1,350	205,000	3	1 to 2
			20	2,700	440,000	9	
The Dalles.....	191.5	46.0	14	1,119	209,000	4	2 to 5
			22	1,743	320,000	8	
Bonneville.....	145.5		10	518	140,000	10	
			16	842	230,000	15	

¹ Full gate discharge at maximum head.

² Based on increasing generation from minimum load to full load and average downstream pool elevation.

³ Time of flow between project based on average wintertime regulated streamflows.

Mr. LUCE. As to the second request in the telegram, BPA will not make a load-factoring charge to utilities interested in the output of the five non-Federal dams below Grand Coulee to the extent such load factoring is required to conserve energy at these dams because of discharges of water from the third powerhouse to serve Federal loads outside the Pacific Northwest, and if the affected utility cannot itself do the load factoring.

I might say that we have had a most cooperative relationship with the utilities who signed this telegram. We now have a 39-year coordination agreement with them whereby our Federal plants and their non-Federal plants are operated as if they are in a single ownership and the benefits equitably distributed among all of the some 12 or 14 owners of these dams. I am sure that the problem raised by the telegram, though a legitimate problem and one that we have to solve, can be solved and that we will solve it.

Senator JACKSON. I think your statement makes very clear the willingness of the Bonneville Power Administration to take the necessary steps to reach a proper solution.

Senator Anderson has a further question.

Senator ANDERSON. The question gets to problems between publicly owned and privately owned utilities. Do we not have a record to show whether the power preference provision will apply to disposition of power from the third powerhouse?

Mr. LUCE. Yes, sir; it will.

Senator ANDERSON. It will?

Mr. LUCE. Yes.

Senator ANDERSON. Thank you.

Mr. LUCE. Mr. Chairman, there was a question about the use of power revenues to pay for this powerhouse and the answer was correctly given that the power revenues could pay for the entire powerhouse within even less than 50 years. I wish to point out for the record, however, that the third powerhouse does have flood-control benefits as well as power benefits. There are 5,280,000 acre-feet of potential flood-control storage in Lake Roosevelt behind Grand Coulee Dam, but with the present outlets in the dam we can use only about 3 million acre-feet, because we cannot evacuate the reservoir rapidly enough to use the balance. With the new powerhouse, we will have the turbines in the 12 new generators for this reservoir to make possible the evacuation of all flood-control storage, and so will be able to use the full 5,280,000 acre-feet of flood-control storage. It may be that at some future time there will be a flood-control allocation that takes this benefit into account.

Senator JACKSON. It is quite clear that there are flood-control benefits. It is equally clear that the calculation presented to the committee as far as payout is concerned has not taken into consideration the flood-control benefits that are there. Is that a fair statement?

Mr. LUCE. Yes, Mr. Chairman.

Senator JACKSON. It now is 11 o'clock, so the President's communication can be made public at this time. Then I will turn to Senator Simpson. But first I would like to read the letter from the President of the United States to the President of the Senate approving the project which was just released.

DEAR MR. PRESIDENT: Electricity is a basic requirement of modern society. It is vital to our industries, farms, and homes. The Nation's rapidly expanding use of electricity is expected to more than double and perhaps triple by 1980. This calls for the combined efforts of all segments of the power industry—private, cooperative, and public. Therefore, I am pleased to transmit herewith the report of the Secretary of the Interior concerning the economic and engineering feasibility of a third powerplant at Grand Coulee Dam on the Columbia River and a draft of authorizing legislation. I have approved the Secretary's report and recommend that the draft legislation be enacted to authorize the construction of this outstanding project.

The proposed third powerplant will ultimately add 3.6 million kilowatts of generating capacity to the 2 million kilowatts at the two existing powerplants. When completed, the total capacity of the powerplants at Grand Coulee Dam will total 5.6 million kilowatts. It will be larger than any single hydroelectric development in the world today.

Authorization and construction of the third powerplant at the Grand Coulee Dam will further the orderly development of the vast water resources of the Columbia River. This is the next logical step following two important events which occurred last year.

First, Prime Minister Pearson of Canada and I met last September to proclaim the Columbia River treaty for cooperative development of the Columbia River—one of the great rivers of this continent. Canada has already started construction of huge dams to store water on its side of the border. These reservoirs will provide 15.5 million acre-feet of water storage in Canada. This storage capacity will provide increased protection of people and property in both countries from

devastating floods and greatly enhance the hydroelectric potential of powerplants on the Columbia River.

The United States must construct additional power-generating facilities at its existing system of dams to take full advantage of this potential. The Grand Coulee Dam, because of its location in relation to other Columbia River powerplants, its height, its large reservoir capacity, and the reregulation of riverflow by Chief Joseph Dam immediately downstream, will develop a major share of the increased power potential made possible by the treaty.

Second, the Congress approved last year a four-line, extra-high voltage transmission intertie between the Pacific Northwest and the Pacific Southwest. It represents exciting new developments in electric power technology. It is the largest single electrical transmission program ever undertaken in this country and is one of the finest examples of cooperation among publicly owned and privately owned utilities and the Federal Government.

The rapidly growing demands for electric power in the Pacific Northwest will readily absorb the power produced by the proposed powerplant. However, some peaking power and secondary (not regularly available) power that is surplus to the needs of the Northwest in the early years of the project can be marketed in the Pacific Southwest over the intertie. Thus, the intertie will permit maximum utilization of the waters flowing past Grand Coulee Dam, resulting in conservation in its truest sense.

The economic and financial feasibility of the third powerplant are exceptionally favorable. The benefit-cost ratio is more than 3 to 1. Revenues from the sale of power will more than pay for the capital investment within 50 years. In addition to power benefits, the project will provide increased flood-protection benefits by improving control of water stored in Franklin D. Roosevelt Lake behind Grand Coulee Dam.

Accordingly, I commend the Secretary's report to your consideration and recommend early enactment of the authorizing legislation which I have transmitted.

Sincerely,

LYNDON B. JOHNSON.

Senator SIMPSON. Mr. Chairman, I always seem to be the fly in the ointment on some of these things, but I am going to register my perennial peeve with respect to the presentation by the various agencies. For two and a half years I have asked that these departmental reports, both favorable and unfavorable, be available sufficiently in advance of the hearing for us to have some little opportunity to study them. I am not against this great installation out there and I know it is very dear to the heart of our very able and distinguished chairman.

I do not want to throw a monkey wrench in the proceedings, but here is a bill introduced Friday last; it was referred to the committee, the Irrigation and Reclamation Subcommittee. We learned about it this morning about 9:30, that it would go before the whole committee.

We have no time to prepare and ask the questions we would like to. Fortunately, the chairman and other learned people on this committee have done a good job of it.

Senator JACKSON. If the Senator will yield, I would like to make the record clear. I discussed with Senator Anderson, chairman of the Reclamation Subcommittee, the matter of referral of the bill. It is specifically a power project, so we decided that it should be heard in the full committee. Therefore, the bill was not referred to the Irrigation and Reclamation Subcommittee, but rather retained it in full committee.

Senator SIMPSON. I can understand that. But the fact remains that we did not have the necessary material for study. Obviously, the executive agencies have had plenty of time to prepare, because they have some marvelous exhibits here. It would be appropriate to let the members of the committee know the departmental opinion,

not at the 11th hour, but a week or so in advance. As president of the board of trustees of the University of Wyoming, we came across the same thing with presentations being made the same day without advance information. As chairman of that board, I insisted that the president of the university and other departments should present their reports a week in advance for study by the committee.

Senator JACKSON. May I help on this a little bit, because your point is a reasonable one.

This proposal for a third powerhouse was referred to the Governors of the various States concerned and has been pending with them. We had hoped to have the president's message up here last week, but as a result of developments in Vietnam, and so on, we were not able to get it. We did, however, make a public announcement a week ago yesterday advising that the hearing would be held and I think we notified the members on the seventh.

I do want to say to my good friend that as he knows, the last thing we ever do is try to railroad anything through, and certainly the Secretary or his assistants will be available to answer further questions. We do not intend to act on this bill today. We wanted to get the testimony before the Easter recess. I want to assure him of that fact. After he has gone through the whole record and reports, I will be glad to reconvene the committee.

Mr. UDALL. We will be very happy to come back, too, at any time, if needed.

Senator SIMPSON. It has been my pet peeve since I have been on the committee, Mr. Chairman. We rarely get information in advance and here is a wealth of valuable material that we hear paraphrased or read in full.

Congressman Foley made a very wonderful address.

Off the record.

(Discussion off the record.)

Senator SIMPSON. I just want the chairman to know that I would like to make the request again which I have made before the subcommittee on which I sit that the boys from downtown give us these things in advance in sufficient time to enable us to make an intelligent résumé.

Senator JACKSON. I agree with you. The department in this case had the reports all ready, but because this was to be a formal communication by the President of the United States, they could not properly release the reports and I take the blame in part for that, because we were anxious that the President send up the message. The President, unfortunately, was deeply involved by the events in Vietnam. Hence, no reports could be released.

I just wanted to assure the Senator there was no intent to withhold or delay information.

Senator SIMPSON. I appreciate that, Mr. Chairman.

Senator JACKSON. Any further questions at this time, Senator Simpson?

Senator SIMPSON. No.

Senator JACKSON. Senator Fannin?

Senator FANNIN. Mr. Chairman, I have been very much impressed with the agreement as worked out with the Canadians, this Columbia Treaty. As far as conservation is concerned, I am just wondering about the figure that is given here, 15½ million acre-feet of storage in

Canada. Then is there additional storage that would be available by the construction of the Libby Dam, Mr. Secretary?

Mr. UDALL. Yes.

Senator FANNIN. Do you have any idea how much additional storage is involved?

Mr. UDALL. This is an extra 5 million. Of course, as Mr. Luce described, we are getting an extra 2 or 3 million at Grand Coulee itself.

Senator FANNIN. So the conservation and storage benefits are tremendously important. There would be flood control, with overall control of the flow of the river. A controlled supply of water would be available below the Canadian dams as far down as Grand Coulee, and Grand Coulee itself would receive additional storage water. Is that right?

Mr. UDALL. That is right, Senator. Basically, what the Canadian Treaty has made possible is the full control and regulation on a conservation storage basis of the waters of this great river and the benefits conservationwise, of course, are that we can now enlarge the capacity of Grand Coulee and ultimately most of the dams down below will install additional powerplants, too.

Senator FANNIN. Well, I think that is very commendable and I certainly agree that by having this control and having the benefits of the additional power developments, it is very beneficial. I am just hoping there will be other benefits that will accrue from the conservation component.

Senator JACKSON. Senator Fannin, I think it might be well if the Secretary or one of his associates pointed out the advantages that accrue to the dams below Grand Coulee as a result of the Columbia River Treaty with Canada. I think this is a point that we have not made here, and it would be helpful to the members of the committee. This affects the publicly owned and privately owned utilities. Mr. Luce, would you comment on that?

Mr. LUCE. Below the Grand Coulee Dam are five non-Federal dams, Wells, Rocky Reach, Rock Island, Wanapum, and Priest Rapids.

Senator JACKSON. Will you point those out?

Mr. LUCE. One of them, Rock Island Dam, cannot be enlarged. I believe I previously referred to it as the oldest one. Wells and Rocky Reach each have space for new generators. The owners of the Wells project have announced they are putting in three more generators than they planned, and this will complete all the generators at Wells. The owners of Rocky Reach have announced they are putting in four generators and this will complete all of the generators at that dam. The owners of Wanapum and Priest Rapids each have stalls for 6 more generators, making a total of 12. As yet, they have not announced the time schedule on which they are going to put in their additional generators.

Now, in terms of total power, this Canadian storage means to these non-Federal dams a total of 600,000 kilowatts of additional firm power. As the Senators know, that is a very large block of economical power. Everyone benefited from this treaty—the Federal Government and the non-Federals.

Senator JACKSON. Then, in addition, on the Federal dams down lower the grand total is about 2½ million kilowatts; is it not?

Mr. LUCE. The grand total share of the United States is 1½ million on the Federal system and 600,000 kilowatts on the non-Federal system, and then the Canadians get 1,400,000 kilowatts that we give back to them as compensation in part for their building these three storage projects. So that the total additional firm kilowatts that we can generate because of this Canadian storage, including Libby, are about 3,500,000 kilowatts.

Mr. DOMINY. Let me supplement that for a minute.

Senator JACKSON. Yes, Mr. Dominy.

Mr. DOMINY. For instance, at Grand Coulee now, without the Canadian storage and Libby, we actually waste 34 percent of the annual flow, because there is no way to regulate it. With the Canadian storage and without the third powerplant, we would only be wasting about 15 percent. But with the third powerplant, we will waste none of it, we will put it all through the generators and get full utilization of the water.

Mr. UDALL. I would say the very dramatic conservation story to me is the water.

Senator JACKSON. The beneficiaries happen to represent the Federal Government, the local State interests through the public utility districts and the private utilities.

Senator Hayden, do you have any questions?

Senator HAYDEN. No questions.

The CHAIRMAN. Senator Moss?

Senator MOSS. I have none at this time, Mr. Chairman.

Senator JACKSON. The Chair has received a number of letters and statements which will be included at this point in the record, and the Chair will hold open the record to receive further statements for 10 days, if that is agreeable.

(The material referred to is as follows:)

STATEMENT OF ROY MUNDY, DIRECTOR OF CONSERVATION, STATE OF WASHINGTON

Mr. Chairman, we appreciate this opportunity to present this statement to the committee today. The State of Washington long has awaited the completion of Columbia River treaty arrangements with Canada and other factors which would lead to construction of the Grand Coulee Dam third powerplant.

The Bureau of Reclamation, and the staff of region 1 in particular, is to be commended for the forward looking coverage it has given the third powerplant studies. The planned use of 300,000-kilowatt units will be unprecedented in size for this country. The proposed ultimate installation of 12 such units, which will make Grand Coulee again the world's largest generating plant, demonstrates the advanced engineering and planning which went into the report of the Secretary of the Interior.

The report can be appreciated by comparing it with an earlier report on the third powerplant which was released in 1954. The earlier report proposed that the ultimate installation of the third powerplant be only 864,000 kilowatts (less than 25 percent of the currently proposed capacity) and that peaking power be valued at only \$3.67 per kilowatt. The low value on peaking capacity made the third powerplant proposed by the 1954 study economically infeasible.

Although the report is forward looking and has introduced new evaluation techniques, it is probably unduly conservative in several respects.

The recreational benefits based on \$0.65 per visitor-day appears low considering values placed on other recreational opportunities in the region. The 1964 draft of the Wild Rivers study team, for example, places a value of \$5 per fisherman-day on another of our Washington rivers, the Skagit.

The allocation of \$399,473,000, or all but \$1,292,000 of the investment cost, to commercial power disregards the flood control benefits of the third powerplant. A comprehensive reanalysis of the Columbia Basin project is expected to reflect these benefits.

In the meanwhile, the benefit-to-cost ratio of 3.24 to 1, assigned to the project, indicates its significant value to the development of the region's water and power resources. We are pleased to note that the third powerplant can be repaid with interest during the 50-year amortization period, at rates less than those now prevailing in the Bonneville Power Administration system.

It is my hope that the committee will report this legislation favorably so that funds for its construction may be provided by the Congress at the earliest possible date.

Thank you very much.

STATEMENT OF GUS NORWOOD, EXECUTIVE SECRETARY, NORTHWEST
PUBLIC POWER ASSOCIATION

My name is Gus Norwood. For the past 18 years I have served as executive secretary of the Northwest Public Power Association comprising 124 public and cooperative electric systems serving Alaska, British Columbia, Montana, Idaho, Washington, and Oregon, and minor portions of California, Nevada, Utah, Wyoming, and North Dakota.

Consumer-owned electric systems in our region provide electricity to about 4,300,000 people or 50.7 percent of the 8,500,000 population. They own about \$2.5 billion in electric plant, have a \$1.6 billion construction program, own about 5-million-kilowatt of generating capacity and pay about \$45 million per year into the U.S. Treasury for electricity purchased from Federal power systems.

Through our payments for power from Federal power systems we participate in providing financial assistance for repayment of that portion of the irrigation investment which is determined by the Secretary of the Interior to be beyond the capacity of the water user to repay.

ASSOCIATION RESOLUTION

As recently as March 11, 1965, the 25th annual membership meeting of the Northwest Public Power Association adopted a resolution urging the authorization and construction of the third powerplant at Grand Coulee Dam.

COMMENTS ON PROJECT REPORT

Referring to the project report approved by the Secretary of the Interior February 10, 1965, we submit first the following comments by way of emphasis:

1. Timing of the first four units is very important to meet the schedule of both the west coast interties and the treaty with Canada. The added upstream storage and the available market in the Pacific Southwest emphasize the need for immediate authorization to meet the construction deadlines and peaking power needs of the west coast.

2. Maintenance of the existing generators at Grand Coulee Dam will be easier. Damage to the spillway apron and toe will virtually cease when river regulation is improved.

3. Flood control benefits will be improved without the need for modifying the lower tier of outlet valves.

4. The added 3,600,000-kilowatt peaking capacity will improve the power system of the entire west coast.

5. The alternative proposals of a left bank powerhouse of a right bank underground powerhouse were determined in a previous report to be less attractive.

6. We also concur that the open forebay is superior and less costly than the previous tunnel plan.

7. The additional 4,608 million kilowatt-hours of average energy production, an amount greater than that of Bonneville Dam, will virtually harness the remaining water available at the project, increasing such utilization from about 75 percent to about 99 percent of the available water.

8. The amount of thermal capacity in the Pacific Northwest is shown as 4,101,000 kilowatts for 1979-80 in table 6, increasing in 1982 to 8,674,000 kilowatts in chart 3, and increasing in 1991 to 23,203,000 kilowatts in chart 4. The figure for 1980 also appears in FPC's national power survey. Basically the shift to thermal appears to start in 1976 and goes up fast from then on. As the region goes into the thermal hydro period, more of the wasted hydro secondary energy will be used and more hydro will be upgraded as peaking power.

The project is most attractive from a physical and engineering standpoint.

We also concur with the recommendation in the project report that a comprehensive financial reanalysis of the Columbia Basin project should be made

including a proper cost allocation to flood control. This analysis should in turn be a part of, or should be integral with, the repayment schedule for the U.S. Columbia River power system.

The construction of the third powerplant at Grand Coulee Dam will enhance the repayment ability and strengthen the U.S. Columbia River power system.

For these reasons in part we urge that Congress authorize construction of the third powerplant at Grand Coulee Dam.

Thank you.

NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION,
Washington, D.C., April 22, 1965.

HON. HENRY M. JACKSON,
*Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.*

DEAR SENATOR JACKSON: I am writing on behalf of our 976 member rural electric cooperatives in 46 States to urge authorization by your committee of the third powerplant at Grand Coulee Dam.

Our members have always depended to a very great extent upon low-cost Federal power for their wholesale supply. In fiscal 1964 power generation at Federal projects supplied 38 percent of the 41 billion kilowatt-hours used by all rural electric systems that year; for this Federal power they paid \$76 million into the U.S. Treasury. As their loads continue to grow at about 7 percent each year, continued availability of Federal power is naturally of great importance. Their interest in prompt authorization and construction of the proposed Grand Coulee addition is therefore immediate and substantial.

In fiscal 1964, REA borrowers in Washington, Oregon, and Idaho consumed nearly 2 billion kilowatt-hours of energy. At an annual growth rate of 7 percent, they will require a total of 3.4 billion kilowatt-hours by the year 1973, when the first units of the third powerplant can be on the line. The incremental increase in co-op loads alone would, by our estimates, account for fully 10 percent of the additional energy the third powerplant would make available by continuous operation. Our member systems stand ready and willing to buy this energy.

By 1973, it is estimated by the Secretary of the Interior that the Northwest will need all of the prime power the new units can produce, plus some of the secondary energy and peaking capacity they would provide. That energy which is unmarketable in the Northwest could be sold in the Pacific Southwest over the intertie line.

It is our belief that the third powerplant would serve as a great symbol of the viability of the Federal power program. The 3.6 million kilowatts it would add to the existing 2 million kilowatts at Grand Coulee would raise the project's total capacity to 5.6 million kilowatts, making it the largest hydroelectric project in the world today. Every kilowatt would be marketable.

It would be a highly feasible addition to the Bonneville system. The Secretary of the Interior estimates that annual revenues from the sale of power would exceed by an average of nearly \$4 million per year, the annual charges required to repay the capital within 50 years. Its benefit-to-cost ratio would be 3.24 to 1. It would make the fullest use of the improved regulation of streamflow resulting from the treaty with Canada for joint development of the Columbia River, and represent the maximum development of the resources.

We also respectfully second the Secretary of the Interior's decision to construct a new 500-kilovolt transmission system to be associated with the full-strength Grand Coulee, inasmuch as it was unfeasible to modify the existing system.

Sincerely yours,

KERMIT OVERBY,
Director, Legislation and Research Department.

WALLA WALLA, WASH, April 13, 1965.

HON. HENRY M. JACKSON,
*Chairman, Senate Interior and Insular Committee,
Senate Office Building, Washington, D.C.:*

As per resolutions already in your hands, the Inland Empire Waterways Association and Northwest Rivers and Harbors Congress heartily support the

third powerhouse at Grand Coulee. Your favorable consideration at coming hearings is most earnestly solicited. Regards,

HERBERT G. WEST,
Executive Vice President, Inland Empire Waterways Association.

WASHINGTON STATE SENATE,
May 4, 1965.

HON. HENRY M. JACKSON,
*U.S. Senator,
Washington, D.C.*

DEAR SENATOR JACKSON: I have the honor to transmit herewith a certified copy of Senate Resolution No. 1965-Ex 30 which was adopted by the Washington State Senate on May 4, 1965.

Respectfully yours,

WARD BOWDEN,
Secretary of the Senate.

IN THE LEGISLATURE OF THE STATE OF WASHINGTON

SENATE RESOLUTION NO. 1965-EX 30

By Senators Nat Washington, Wilbur G. Hallauer, W. C. Raugust, Mike McCormack, and H. B. Hanna.

To the Honorable Lyndon B. Johnson, President of the United States, to the President of the Senate and Speaker of the House of Representatives of the United States, and to the Senate and House of Representatives of the United States, in Congress assembled:

Whereas the construction of the third powerhouse at Grand Coulee Dam is necessary to utilize the upriver storage which is to be provided pursuant to the recent treaty between the United States and Canada; and

Whereas the electric power from this huge project will be needed to serve rapidly increasing demands in the Pacific Northwest; and

Whereas, the \$400 million project will produce an additional 3,600,000 kilowatts, making Grand Coulee the largest producer of electric power in the world, and will again move the United States ahead of the Soviet Union in this important field; and

Whereas the construction of the project will provide additional employment and will provide a great economic boost to the immediate area and to the entire state: Now, therefore, be it

Resolved, by the Washington State Senate, That the Congress of the United States and those committees concerned with appropriations be requested to provide funds so that the construction of the third powerhouse at Grand Coulee can be commenced at the earliest practical date; and be it further

Resolved, That the secretary of the senate transmit copies of this resolution to the Honorable Lyndon B. Johnson, President of the United States, to the President of the Senate and Speaker of the House of Representatives of the United States, to each Member of Congress from the State of Washington, and to the Secretary of the Department of the Interior.

I, Ward Bowden, secretary of the senate, do hereby certify this to be a true copy of the resolution adopted by the senate on May 4, 1965.

WARD BOWDEN,
Secretary of the Senate.

SEATTLE, WASH., April 12, 1965.

U.S. Senate, Committee on Interior Affairs, Senate Office Building, Washington, D.C.

GENTLEMEN: On April 14, 1965, you will hold a hearing on the Department of Interior's request for authorization to build a third powerhouse at Grand Coulee Dam.

I would like to go on record as opposed to Federal construction of this facility at this time.

The primary reason for opposition to authorization at this time is based upon the lack of comprehensive planning for the development of electrical power in the Northwest. The Canadian treaty has made feasible the addition of 4 million kilowatts of capacity at Federal dams in the next 10 years. This is based upon

only 1.8 million kilowatts at the third powerhouse, 810,100 kilowatts at John Day, 624,000 kilowatts at The Dalles, and 704,000 kilowatts at Chief Joseph. Beyond this, there is proposed a second powerhouse at Bonneville Dam and additional units at the third powerhouse and John Day Dam. Dams on the Columbia River not owned by the Federal Government will have increased capacity in proportion to above.

The people of the Pacific Northwest have a vital interest in what manner this potential is developed. A cooperative effort by all electrical distributors and producers would be the best way.

Recent experiences have shown that the electrical power producers and distributors, both public and private, have and can work together to plan, finance, and build Pacific Northwest electrical facilities. Examples of these efforts are the Columbia System Power Exchange and Pacific Northwest Electrical Test Facility in Grant County, Wash.

The role of the Federal Government should be one of cooperation with the people of the Pacific Northwest in developing the potential of the Columbia River.

In conclusion, I oppose authorization of the third powerhouse at Grand Coulee for the following reasons:

1. Authorization is not essential at this time.
2. The additional investment needed on the Columbia River may be provided by private money instead of substantial tax money; \$364 million at Grand Coulee alone.
3. The third powerhouse is power development and is not essential to the Interior Department's Bureau of Reclamation. It represents 52 percent of the present Federal generating capacity on the Columbia River system.
4. The power-producing and distribution agencies or entities of the Pacific Northwest should have an opportunity to plan and develop their own resources together.
5. The people of the Pacific Northwest should be given a chance to study the requirements of the region and the feasibility of constructing the additional potential capacity of the Federal dams and other projects on the Columbia River.

Your consideration of this proposal is appreciated.

Sincerely yours,

BERNARD J. HEAVEY, Jr.

Senator JACKSON. In addition, I want to say to my colleagues that the Chair will call for further hearings if any member of the committee should have questions about any matter in connection with the pending project. I think the request and the suggestion of the Senator from Wyoming, my good friend Senator Simpson, was a proper question. I just wanted to make that clear, and if there are any further questions, we will have further hearings.

We do have one last group. Mr. Secretary, we want to thank you and Mr. Dominy and Mr. Luce—

Excuse me, Senator Hayden has some questions.

Senator HAYDEN. I would like to ask Mr. Dominy some questions.

I understand the testimony to be that the third powerplant is designed to produce peaking capacity. Will you explain peaking capacity in more detail?

Mr. DOMINY. I would be happy to, Senator Hayden. I think Mr. Luce, the Bonneville Administrator, gave a very good explanation of it.

Actually, the power requirement in any system is not static, it fluctuates widely during the day and during the week. Power available when needed to meet such peaks in the load is called peaking capacity. It is this peaking capacity that is the most expensive to provide by thermal processes, because of the cost of keeping the generators heated up, and the steam loss during the standby time. But if hydro is there on the line available at a moment's notice and it can be actually governed with a governor, so that when a load comes

on the line the hydro starts spinning faster and takes care of the peak requirement.

Senator HAYDEN. That is my understanding, but if you recall, Mr. Dominy, both the Bridge Canyon and the Marble Canyon Dam on the Colorado River were also designed for other than peaking capacity. Are these approximately equivalent in peak?

Mr. DOMINY. Well, the two plants, the Columbia Basin plant here, the third powerplant, together with the two existing plants, would give us a peaking capacity at Grand Coulee Dam of a total of 5.6 million kilowatts. At Marble and Bridge Canyons on the Colorado River, these are smaller powerplants. We would have a peaking capacity there of 1,795,000, but that 1,795,000 could go into the system for peaking purposes exactly as Grand Coulee can go into the system here for peaking purposes. They will each have about the same load factor, the design of the plant would be about 35 to 40 percent load factor at Bridge and Marble, and we are designing the third powerhouse with the 12 new generating units and the existing units to operate at 38 percent load factor for peaking purposes.

Senator HAYDEN. With the Northwest-Southwest intertie and the expectation of the Northwest peaking capacity at least some of the power generated by the third powerplant could be transmitted to the Southwest. What would be the relationships of the Bridge Canyon and Marble Canyon projects?

Mr. DOMINY. Well, the total preference customers' peakloads in the Colorado River Basin States and the Central Valley of California will, by 1974, not only require the full output of Bridge and Marble Canyon projects, but they will require imports over the intertie equivalent to the output of more than four generator units of the Grand Coulee third powerplant.

You recall that the third powerplant is scheduled to have four units on the line by 1974, and the last unit would not be on until 1983.

Senator HAYDEN. Do you expect the loads in the Southwest area will be adequate to take care of this peaking capacity?

Mr. DOMINY. Even if we disregarded the Central Valley project loads and considered only the peakload requirements of the Colorado River Basin States and southern California, the full output of Bridge and Marble Canyon hydro installations will be required as soon as they can be constructed and placed in operation, sir; and if these projects were authorized this year, we could not have them on the line until about 1973, because of the construction time.

Senator HAYDEN. Well, can Bridge and Marble production be used in the wintertime to provide power for transmission north over the intertie?

Mr. DOMINY. Yes. The peakload period in the Southwest occurs during the summer and that is the slack time and the heavy-water time in the Northwest, and the peakload period in the Northwest occurs in the winter and that is the slack time in the Southwest for power requirements. And this is one of the great advantages of the intertie, that once we have a line in place we can move this power both directions and cut down our total investment in our peaking requirement.

Senator HAYDEN. Thank you.

Senator JACKSON. Are there any further questions of Mr. Dominy?

Thank you, Mr. Dominy.

Our last witness is Mr. James J. Stout, Chief of Division of River Basins, Bureau of Power, Federal Power Commission. He is accompanied by Mr. John C. Mason, Deputy General Counsel, and Mr. David J. Bardin, Assistant General Counsel.

Mr. Stout, we will be very pleased to have your statement.

STATEMENT OF JAMES J. STOUT, CHIEF OF DIVISION OF RIVER BASINS, BUREAU OF POWER, FEDERAL POWER COMMISSION

Mr. STOUT. Mr. Chairman and members of the committee; Mr. Joseph C. Swidler, Chairman of the Federal Power Commission, asked me to appear here this morning and to present a brief statement in support of the construction of the third powerplant at Grand Coulee.

The Federal Power Commission has for many years played a leading role in the development of hydroelectric power throughout the United States. This role has been particularly significant in the Pacific Northwest, which has both the greatest development of hydroelectric capacity in the country and the greatest potential of undeveloped hydroelectric capacity.

Five projects on the Columbia River downstream from Grand Coulee are being operated or constructed under licenses issued by the Commission. These are Wells, Rocky Reach, Rock Island, Wanapum, and Priest Rapids.

In addition, the Federal Power Commission and its staff cooperate with the Federal construction agencies in the development of Federal projects. Studies are made of the value of power, the market for power, and the economic and financial feasibility of potential projects.

For projects of the Corps of Engineers, the Commission makes recommendations to the Secretary of the Army on the number and size of generating units to be installed, and on provisions, if any, which should be made for the installation of future generating capacity.

For some multiple-purpose projects, the Commission has the responsibility for allocating the costs to power, and it has the responsibility for approving the electric power rates of the Bonneville Power Administration.

In December 1964, the Commission issued its National Power Survey report, which presents a guideline pattern for development of the Nation's electric power industry designed to encourage full regional and countrywide coordination of all electric power systems by 1980.

The survey projects that the Nation will need 2.8 trillion kilowatt-hours of electric energy in 1980—more than 2½ times the estimated 1964 total of 1.1 trillion.

To produce this energy, it showed that a well interconnected and coordinated utility industry will need an installed capacity of about 525 million kilowatts, compared with about 200 million kilowatts at the end of 1963. Existing hydroelectric capacity of approximately 40 million kilowatts was expected to double by 1980.

Included in the hydroelectric capacity expected to be available in 1980 was power from a third powerplant at Grand Coulee.

The Commission received on February 15, 1965, copies of the proposed report of the Department of the Interior on the third powerplant, Grand Coulee Dam, Columbia Basin project, Washington. The Federal Power Commission's comments on this report are included in Chairman Swidler's letter of March 12, 1965, to the Secretary of the

Interior. I assume that copies of this letter accompany the report which has been transmitted to the committee.

However, I have copies with me if you would like to have them.

The CHAIRMAN. We have the copies, thank you, of Mr. Swidler's letter to Mr. Udall.

(The letter referred to follows:)

FEDERAL POWER COMMISSION,
Washington, D.C., March 12, 1965.

Re 736.

HON. STEWART L. UDALL,
Secretary of the Interior,
Washington, D.C.

DEAR MR. SECRETARY: The following comments on the proposed report of the Department of the Interior on the third powerplant, Grand Coulee Dam, Columbia Basin project, Washington, are in response to the letter of February 11, 1965, from the Commissioner of Reclamation.

The proposed report recommends construction of a third powerhouse at the Grand Coulee Dam with a rated capacity of not less than 3.6 million kilowatts, and appurtenant and related facilities including a tour center. The new powerhouse would be located along the east bank of the Columbia River. Water would be delivered to the plant through penstocks embedded in a forebay dam which would consist of a nearly right angle extension of the present dam along the right abutment. The cost of constructing the third powerplant and related facilities, including the installation of twelve 300,000-kilowatt generating units, is reported to be \$364,310,000. The first stage, to be completed by 1973 and to include four generating units, would cost an estimated \$230,760,000. The remaining units would be installed in pairs and the full installation would be completed by 1982. The added generation creditable to the third powerhouse would be 4.6 billion kilowatt-hours annually, of which 3.8 billion could be produced by the first four units.

The Commission staff has reviewed the report of your Department and finds that the proposed enlargement of the power installation at the Grand Coulee Dam is well planned. The staff agrees with the findings in the report that additional generating capacity will be needed at this project when greater upstream storage capacity is provided, including that to be constructed under terms of the Canadian treaty. Completion of the planned Pacific Northwest-Pacific Southwest intertie will also add to the demand for a greater installation at Grand Coulee. We are in agreement with the view expressed in the report that legislation to authorize construction of the third powerhouse should be sufficiently flexible to permit adjustments in the number and size of units and the scheduling of installations if future circumstances indicate such adjustments are necessary.

On the basis of the estimates of costs given in the report, the staff finds the third powerhouse to be economically well justified. Using the unit power values shown in the report, which were those furnished by the staff, and the report's estimates of nonpower benefits, the staff derives a benefit-cost ratio of 2.7 to 1 under an assumed 50-year period of analysis.

The load projections given in the report for the Pacific Northwest are consistent with those shown in the Commission's national power survey. The estimated market for additional capacity at Grand Coulee, as indicated in the report, also appears to be consistent with market estimates in the power survey.

On the basis of adding hydroelectric capacity in the Pacific Northwest to meet load growth in that region, the power survey found that about 1¼ million kilowatts of added capacity at Grand Coulee could be utilized by 1980, together with other capacity additions. With the intertie in operation, it is reasonable to expect that such a capacity addition, equivalent to the planned first four units, could be utilized much sooner, possibly as early as the date of 1973 shown in your Department's report. The first stage units would provide greater values per unit than later additions because they would produce the bulk of the added generation at the dam. The incremental energy output of the first four units would provide an annual load factor of about 37 percent.

The time when the full 12-unit additional installation could be utilized in the region depends in part upon the scheduled installation of other capacity in the region. The report indicates that the cost of added capacity at Grand Coulee would compare favorably with costs of capacity from other available projects. Also, Grand Coulee Dam with substantial regulatory storage capacity and with a normal operating head of about 340 feet, amounting to approximately one-

fourth of the total head on the Columbia River in the United States, is well suited as a source of peaking capacity. It is reasonable to expect, therefore, that the full capacity addition of 3.6 million kilowatts could be utilized within the reasonable future, possibly by 1982 as indicated in the report.

Studies by the staff indicate that the planned third powerhouse at Grand Coulee would be financially feasible. Applying the current Bonneville Power Administration rates to the output of the third powerhouse, the staff finds that, over a 50-year repayment period, the annual equivalent power revenue would exceed the annual power costs. This confirms the conclusion in the report of your Department.

Based on its consideration of the report of your Department and the studies of its own staff, the Commission concludes that the construction of a third powerhouse at the Grand Coulee dam is economically justified and financially feasible, and that the added power output could be utilized within a reasonable period of time.

Sincerely,

JOSEPH C. SWIDLER, *Chairman.*

Mr. STOUT. Briefly, the Commission concluded that the construction of a third powerhouse at the Grand Coulee Dam is economically justified and financially feasible, and that the added power output could be utilized within a reasonable period of time.

Grand Coulee is one of the best hydroelectric sites in the United States. Unless a third powerplant is constructed, the site will be grossly underdeveloped when the upstream storage becomes available under terms of the Canadian treaty. Grand Coulee develops more than one-fourth of the total head of the Columbia River in the United States.

With the downstream Chief Joseph project available to reregulate the water discharges, Grand Coulee is well suited as a source of low cost peaking capacity.

The need for such capacity will be accelerated by the construction of the high-voltage interties with the Pacific Southwest.

As a region, the Pacific Northwest's electric power costs are the lowest in the Nation. Construction of new projects such as the proposed third powerhouse at Grand Coulee will enable the Northwest to maintain this enviable position.

Thank you, Mr. Chairman.

Senator JACKSON. Thank you, Mr. Stout. That is a very fine statement, and I take it it is in general in accord with the testimony that we have had from the Department of the Interior here today.

Mr. STOUT. Yes.

Senator JACKSON. We appreciate your cooperation and your help on this, and the letter from Mr. Swidler, Chairman of the Federal Power Commission, to Mr. Udall, dated March 12, has been included in the record.

Senator MOSS, did you have any questions?

Senator MOSS. No, I have no questions.

Senator JACKSON. Thank you, gentlemen.

Does anyone else desire to be heard?

This will conclude the testimony in connection with the public hearings on this bill subject to the stipulation made by the chairman, if any member of the full committee desires to raise further questions or call witnesses, that will be arranged for.

The record will remain open to receive statements for the next 10 days.

Thank you.

(Whereupon, at 11:45 a.m., the committee adjourned.)

(Under authority previously granted the following communication was ordered printed:)

RESOLUTION OF THE COLUMBIA BASIN DEVELOPMENT LEAGUE, MOSES LAKE, WASH.

To the Congress of the United States:

Whereas:

1. The administration has proposed that a third powerhouse be built at Grand Coulee Dam in the State of Washington, and that the Congress authorize and finance it;

2. The powerhouse is necessary to implement the treaty between the United States and Canada relative to development of the Columbia River's power, flood control, and navigation potential;

3. The electric power from this huge project, and the upriver storage it will create, are needed to serve rapidly increasing demands in the Pacific Northwest;

4. Addition of the third powerhouse at Grand Coulee will increase its capacity from 1,974,000 to 5,574,000 kilowatts, making it again the largest power producer in the world and moving the United States ahead of the Soviet Union in this important field;

5. Construction of this project will provide a great economic lift to the immediate area and the entire State, as well as creating needed employment; and

6. Development of Grand Coulee Dam to its maximum capacity can go hand in hand with development of the million-acre Columbia Basin reclamation project to its full potential: Now, therefore, be it

Resolved, That the Congress of the United States be requested to authorize the third powerhouse at Grand Coulee Dam and to appropriate funds for its construction at the earliest feasible time.

Dated this 11th day of May 1965.

COLUMBIA BASIN DEVELOPMENT LEAGUE,
By NED THOMAS, *President*.

Attest:

LOGAN O. BEAM, *Secretary*.



THE UNIVERSITY OF CHICAGO
DIVISION OF THE PHYSICAL SCIENCES

DEPARTMENT OF CHEMISTRY
57 SOUTH EAST ASIAN AVENUE

CHICAGO, ILLINOIS 60637
U.S.A.

TEL: 773-936-5000
FAX: 773-936-5000

WWW: WWW.CHEM.UCHICAGO.EDU

ADMISSIONS: 773-936-5000

OFFICE OF THE DEAN: 773-936-5000

DEAN: JOHN O. WATSON

DEAN OF STUDENTS: JOHN O. WATSON

DEAN OF RESEARCH: JOHN O. WATSON

DEAN OF FINANCE: JOHN O. WATSON

DEAN OF FACILITIES: JOHN O. WATSON

DEAN OF INTERNATIONAL AFFAIRS: JOHN O. WATSON

DEAN OF COMMUNITY RELATIONS: JOHN O. WATSON

DEAN OF ALUMNI AFFAIRS: JOHN O. WATSON

DEAN OF DEVELOPMENT: JOHN O. WATSON

DEAN OF LEGAL AFFAIRS: JOHN O. WATSON

DEAN OF PUBLIC AFFAIRS: JOHN O. WATSON



