STATEMENT OF COL. PETER A. FERINGA, UNITED STATES CORPS OF ARMY ENGINEERS

Colonel FERINGA. Mr. Chairman, the report on Foster Creek, Wash., is in response to a resolution adopted by the Committee on Rivers and Harbors on March 24, 1942.

In passing, I would like again to point out that we make reports only as we are directed to by the Congress, either by this committee or by rivers and harbors law, or by the Senate Committee on Commerce.

Foster Creek flows into the Columbia River near Bridgeport, Wash., 545 miles above the mouth and 200 miles downstream from the international border.

The River and Harbor Act, approved March 2, 1945, authorized construction of the multiple-purpose McNary—formerly known as the Umatilla—Dam.

Mr. Angell, of this committee, is very much interested in that dam. Shortly before the recess he telephoned me, and conversed about the fact—that there were funds available for the McNary Dam in the pending appropriation bill which, as you know, has passed the House and Senate and is now awaiting the President's signature.

So, at this time we can state that the McNary Dam which is upstream from the Bonneville Dam will be in a status of construction in the near future.

Columbia River power is distributed by a network serving the States of Idaho, Montana, Oregon, Utah, and Washington.

Mr. RANKIN. Right on that point, and before you get away from that McNary Dam, that is what we call the Umatilla Dam.

Colonel FERINGA. Yes.

Mr. RANKIN. There has been provided $2,600,000 to begin work on that dam? That has passed both Houses?

Colonel FERINGA. That is right.

Mr. RANKIN. So we are ready to begin work on that dam now?

Colonel FERINGA. Yes; as soon as the President signs the bill work will start.

Mr. PETERSON of Georgia. How far up the river from Bonneville Dam is the McNary Dam?

Colonel FERINGA. The Bonneville Dam is, roughly, where I am pointing here [indicating], and the McNary Dam comes up there [indicating]. The headwaters of the Bonneville Dam come up to The Dalles and the McNary Dam is, I suppose, 98 miles above The Dalles.

Mr. PETERSON of Georgia. This dam at Poster Creek is between the McNaryDam and Grand Coulee?

Colonel FERINGA. Yes. The Grand Coulee Dam was built by the Department of the Interior. The Bonneville Dam was built by the Corps of Engineers and is now being operated by the Corps of Engineers. The McNary Dam will be built by the Corps of Engineers and operated by the Corps of Engineers.

The 1940 population of the five-State region totaled 4,460,000, about evenly divided between rural and urban inhabitants.

The economic life of these States is based on the production and export of raw materials: lumber, agricultural products, and minerals.

In the coastal area fishing is a large industry. In recent years the processing locally of these raw materials has become a very important factor in the economic growth of the area.

The most significant recent industrial development was the establishment of light metal and special alloy plants for war production. They are consumers of electric power and were located in this area because of power supply and existing transmission networks. It is anticipated that some of these plants will remain active factors in the industrial and power market situation.

Mr. Chairman, I would like to state that Mr. Leland Olds, the chairman of the Federal Power Commission, who is a very able gentleman, is here and can talk more at length about the need of electric power. Therefore, I am not touching on that subject.

Mr. RANKIN. Colonel Feringa, in your report you say it will produce 960,000 kilowatts.

Colonel FERINGA. Firm energy, Mr. Rankin, and for the entire unit it will be 4,146,000,000 kilowatt-hours.

Mr. RANKIN. That is firm power?

Colonel FERINGA. Yes that is firm power.

Mr. RANKIN. How much secondary power would you produce?

Colonel FERINGA. Due to the position of Grand Coulee above this dam we have evaluated only the primary power. We have not evaluated the secondary power.

Mr. RANKIN. So then your first figure here is correct. Instead of 960,000——

Colonel FERINGA. That is installed capacity.

Mr. RANKIN. It would be 691,000 kilowatts, the first figure up there in paragraph 2?

Colonel FERINGA. I do not have that paragraph before me.

Mr. RANKIN. I am a bit confused here. In paragraph 2 you state that the project will consist of a concrete structure 235 feet high, 2,000 feet long, and the power plant will generate 691,000 kilowatts. In the fourth paragraph you talk about 960,000 kilowatts in 15 units.

Colonel FERINGA. As I will bring out later, we are going to recommend to the committee that the entire project be adopted at this time but that it be built in steps. At first we will install three generators and later put in the latter ones.

Mr. RANKIN. In other words, if the dam is fully completed, it will finally develop 960,000 kilowatts?

Colonel FERINGA. That would be the installed capacity.

Mr. RANKIN. There would be no use in installing the generators if you did not have the water to supply them.

Colonel FERINGA. The water can supply that many units sufficiently, and the output will be 4,146,000,000 kilowatt-hours.

Mr. RANKIN. I think that it would be more than that. If your installed capacity is 960,000 kilowatts, there would be a little more than 8,352,000,000 kilowatt-hours, using 8,760 hours in a year.

Colonel FERINGA. That is what my figures show without giving the details of the calculations. It depends on the load factor. Perhaps Mr. Olds can answer.

Mr. RANKIN. What I am after is this: If we are going to build this dam, let us finish it so that it can develop its full capacity. I took

that position on Grand Coulee and I have taken the same position on all the other dams in the country.

Colonel FERINGA. I agree with you. I think that is a proper procedure. Let us finish it and put it all in these as soon as needed. If my thought is correct, it will probably be needed as soon as the dam is finished.

Mr. RANKIN. When I came to Congress in 1921, this country was using 40,000,000,000 kilowatt-hours of electricity a year. Private power interests were flooding this capital with propaganda against the creation of the Tennessee Valley Authority and Muscle Shoals and saying that we had more power than we could use.

Last year we used, I believe, 220,000,000,000 kilowatt-hours, and at the rate we are going in 15 years—I will say 10 years from today—we will use a half a trillion, and long before the turn of the century it will take 1 trillion kilowatt-hours to supply the demand.

Our coal supply will be on the wane by that time, and probably our oil supply; so if we are going to build a dam to stand for several hundred years we ought to build it to develop the full capacity of the stream at that point.

Colonel FERINGA. This dam will be built for that purpose, Mr. Rankin, and it will be just a question of when to install the generators—whether to put in only the first 3 when the dam is completed, or put in the additional 12.

Mr. RANKIN. They can be installed as they are needed?

Colonel FERINGA. Yes. The dam will be built to develop full capacity. As I stated before, Mr. Olds is here, and we always work very closely with the Federal Power Commission, so undoubtedly we will ask his opinion when they should be installed.

Mr. RANKIN. If we cut this dam off and build a low dam, it will be almost impossible to reconstruct it.

Colonel FERINGA. It will be a high dam.

Mr. DONDERO. This dam is about 51 miles below Grand Coulee?

Colonel FERINGA. Yes.

Mr. DONDERO. Grand Coulee was built to generate about 1,600,000 kilowatt-hours; is that correct?

Colonel FERINGA. I do not know, but I believe so.

Mr. RANKIN. Grand Coulee will generate something like 18,000,000,000 kilowatt-hours, will it not?

Colonel FERINGA. I do not know.

Mr. DONDERO. I mean kilowatts. We have figures confused. Just kilowatts, it will generate about 1,800,000?

Colonel FERINGA. I do not know.

Mr. DONDERO. Is Grand Coulee fully completed?

Colonel FERINGA. Yes.

Mr. DONDERO. Have all generators been installed?

Mr. WARNE (Assistant Commissioner, Bureau of Reclamation). The installations are not completed at Grand Coulee Dam at the present time. Six of the large 108,000-kilowatt generators, unit L-1 to L-6, inclusive, are in operation in the left powerhouse. Three, units L-7 to L-9, inclusive, are being installed. The first of the similar-sized units in the right powerhouse is under construction, unit R-1, and we have plans now pending before the Congress to proceed with the next two units, units R-2 and R-3, of like capacity.

Mr. DONDERO. What portion of the total capacity of the dam is now installed?

Mr. WARNE. About 40 percent. The schedule for future installations is as follows:

Unit	Rated capacity	Date of installation
	Kilowatts	
L-9	108,000	November 1947.
L-8	108,000	February 1948.
L-7	108,000	May 1948.
R-1	108,000	April 1949.
R-2	108,000	July 1949.
R-3	108,000	October 1949.
R-4	108,000	April 1950.
R-5	108,000	July 1950.
R-6	108,000	October 1950

Mr. DONDERO. Do we have a market for the other 60 percent that remains undeveloped?

Colonel FERINGA. I will ask Mr. Olds to answer that. I think that he will answer that in the affirmative. I know that the Bonneville Dam, which is the one built and operated by the Corps of Engineers, has its units in, and that they are being used to capacity.

Mr. DONDERO. But we still have 60 percent to complete on Grand Coulee. What I am trying to determine in my own mind is whether or not there is a market there and whether there is use for the power and whether it is necessary to supply those people with adequate power.

Mr. JACKSON. I think that will be brought out. This one laboratory is going to take from 800,000 to 900,000 kilowatts, which would be the entire output of this one dam.

Colonel FERINGA. I think that Mr. Olds would be the best witness on that.

Mr. DONDERO. He is always a good witness.

Colonel FERINGA. I am sorry that I do not have all those figures at my command, sir.

At a hearing held by the district engineer, representatives of local, State, and National interests urged immediate authorization of Foster Creek project for early postwar construction. Lumbermen and miners cited the expansion of pulp and mineral production that will follow further low-cost power development.

The district engineer reports that energy generated in the States of Washington, Oregon, Idaho, Montana, and Utah, and served by existing interconnecting transmission systems, amounted to 19,201,000,000 kilowatt-hours in 1944. After discounting the present abnormal power production and making an allowance for postwar readjustment, he estimates that additional installations will be required by 1954, if the load should grow at the rate of 10 percent per annum, and by 1960, if the rate should be 5 percent per annum. He points out that frequently the load has doubled within a 7-year period or less, equivalent to the average growth at the rate of 10 percent per annum. He concludes that generating capacity, additional to that planned for the authorized Federal projects and all prospective private and municipal power plants, will be required in a few years, and that Foster Creek project, an element in the comprehensive plan of

improvement for the Columbia River, is one of the best remaining undeveloped power sites on the Columbia River.

The plan calls for construction of a concrete gravity dam with maximum height of 220 feet and a power plant with a rated capacity of 960,000 kilowatts in 15 units, with an initial installation of 192,000 kilowatts in 3 units.

The proposed Foster Creek project is essentially a power development, well suited and capable of producing at low cost a large amount of electrical energy for the needs of the Northwest area.

Mr. Chairman, it is essentially just what I have said—a power dam. Certainly enthusiasts can say that you may need it for navigation because the water is used for navigation. Also the power, as Mr. Horan has stated, might be used in the shipyards. Certainly an enthusiast can say it is an irrigation project, because the power from the dam is used for irrigation, but we feel that this is a power dam, and that is what we state to this committee.

The Board of Engineers for Rivers and Harbors recommends authorization, as part of the comprehensive plan for improvement of the Columbia River, of construction of Foster Creek Dam and powerhouse.

The Chief of Engineers concurs in the views and recommendations of the Board.

Cost of construction, 3 units	$71,000,000
Additional first cost for total of 15 units	33,000,000
Total cost of construction	104,000,000
Cost of annual maintenance and operation	650,000
Additional for maintenance and operation	550,000
Total cost of maintenance	1,200,000

Mr. PETERSON of Georgia. Colonel, when you install those initial units you will, of course, have built the entire dam.

Colonel FERINGA. We will complete the entire dam, Mr. Chairman; yes, sir. If there is still some doubt when that dam is completed and the three units are installed that the power will be needed, we might want to hold up completing the other operations.

Mr. PETERSON of Georgia. The initial cost represents the cost of building the dam and the installation?

Colonel FERINGA. Yes, sir; that is right, Mr. Chairman.

Mr. DONDERO. Colonel, why has not Grand Coulee been fully developed up to this time?

Colonel FERINGA. I do not know, Mr. Dondero. That has been run by the Department of the Interior, and I suppose they have been limited during the war in getting generator equipment.

Mr. DONDERO. The purpose of that question is obvious. I am trying to determine, with undeveloped power facilities there, why Grand Coulee has not been completed to its utmost capacity before beginning a project of this kind, unless you can show a market for the power developed from both.

Colonel FERINGA. The district engineer does show in his report that there will be a market for all of the power now being generated out there plus that now contemplated, and I think he said by 1960. I think Mr. Leland Olds, who is here, and who, as far as I know, is the best authority on the subject, will testify to the committee that

there will be need for all of the Grand Coulee power and the Bonneville power and the Foster Creek power at the time this dam can be constructed.

Of course, as you know, Mr. Dondero, this is an authorization item, and we properly must get authority from Congress before we can get the appropriation, and by the time that the committee and Congress feel that the funds can be spent, and, then, by the time the dam can be built it will be that this power will be necessary.

Mr. JACKSON. I think it might be well to consider in response to your original inquiry, Mr. Dondero, that the generators at Grand Coulee are the largest in the world, and they are custom-built. During the war we had to borrow generators from the Shasta project. Because of the critical shortage of materials and the tremendous job of building these generators, we had to borrow some generators from the southern project. As I understand it, they are going ahead and putting the generators in, but it is a terrific task to build one of these large generators. Nothing like them has ever been built before.

Mr. DONDERO. I suppose what you say, Colonel, about the demand for this power developed in the Northwest can also be said for the 2,200,000 horsepower on the St. Lawrence that would be needed and could be used in the eastern area of the United States.

Colonel FERINGA. Absolutely, sir.

Mr. DONDERO. I hope that may also be developed at the same time.

Colonel FERINGA. Mr. Dondero, I join you in that hope, and, as I recall it, the St. Lawrence would develop 12,600,000,000 kilowatt-hours of power.

Mr. DONDERO. The last estimate I had was 2,200,000 horsepower.

Colonel FERINGA. Yes, sir; but the total output would be 12,600,000,000 kilowatt-hours, and if you compare that figure with the figure for the proposed Foster Creek Dam you can see how vast the St. Lawrence project is.

One of the reasons this project is good and why the St. Lawrence seaway project is outstanding is because they have a vast body of water stored up which can be released at a steady rate and, therefore, you get practically all primary power instead of a large amount of secondary power.

Mr. DONDERO. How many years have you figured for the period of amortization of this project?

Colonel OLDS. Fifty years. We always stick to that 50-year period of amortization.

Mr. PITTENGER. Are you familiar with the Shipshaw project, the aluminum project up in Canada?

Colonel FERINGA. Where is that?

Mr. PITTENGER. Up in Canada. Did you know that the Government, somebody here in Washington, or somebody down in one of the the Government agencies, the War Department, or someone else, went up into Canada and contracted with the Aluminum Corp. with American money to build a great big power project, while they let one go by on the St. Lawrence? Did you know that that has been done?

Colonel FERINGA. I did not know that.

Mr. PITTENGER. It is truth that is stranger than fiction.

Mr. RANKIN. Colonel Feringa, Mr. Dondero asked you about the necessity for additional power in that area. Mr. J. D. Ross, who was

in charge of the Bonneville Administration, told me just shortly before he died that he was working on a plan whereby power could be transmitted by direct current for a distance of 1,000 miles economically, that it could be done very soon. If that program goes through the State east of the Columbia River, where they have no power, where they have no coal, and where they have no gas and very little water-power, will badly need the power that can be generated on the Columbia River.

Today the distribution radius is, according to the Army engineers, 350 miles. They are, however, transmitting power from Boulder Dam to Los Angeles, a distance of 268 miles, with a loss of only 6 percent for the entire distance.

Mr. PITTENGER. A distance of how many miles?

Mr. RANKIN. Two hundred and sixty-eight miles. So, if this system of transmitting power by direct current can be worked out so that this power can be transmitted economically a distance of 1,000 miles, you never will get enough power on the Columbia River to supply the demand.

Colonel FERINGA. The construction cost of all 15 units is estimated to be $104,050,000.

The generating capacity would be 960,000 kilowatts.

The firm energy would be 4,146,000,000 kilowatt-hours.

The cost per kilowatt-hour in mills, based on a 67-percent load factor, is estimated at 1.63 mills, although there is good reason to believe this is a high figure, but we prefer to be conservative and use that figure.

The annual cost of the project is $5,950,000, and the annual benefits $6,770,000, showing a cost-benefit ratio of 1.0 to 1.14.

Based upon those figures, Mr. Chairman, we feel the project is economically justified, and recommend that it be added to the bill including the authorized project.

In accordance with the law, we sent the report to all of the Governors concerned and they are all in favor thereof.

The following Governors were contacted:

The Governors of Idaho, Montana, Oregon, Washington, and Wyoming.

We have also sent it to the Department of the Interior, and although their letter will be made a part of the printed report, I would like to insert it in the record here at this time.

(The letter referred to is as follows:)

DEPARTMENT OF THE INTERIOR,
Washington 25, D. C., March 4, 1946.

Lt. Gen. RAYMOND A. WHEELER,
Chief of Engineers, War Department.

MY DEAR GENERAL WHEELER: On December 4, 1945, your proposed "report on a review of reports on Columbia River and tributaries, Oregon, and Washington, for improvements at and in the vicinity of Foster Creek," was received together with certain reports of the Board of Engineers for Rivers and Harbors and of the district and division engineers, respectively. These reports are bound in a volume entitled "Columbia River and tributaries, Oregon, and Washington, vicinity of Foster Creek," which was transmitted to me under date of November 29, 1945. The documents were transmitted in compliance with the requirements of section 1 of the act of December 22, 1944 (58 Stat. 887).

Your proposed report recommends authorization by the Congress of construction of Foster Creek Dam and power plant "as a part of the comprehensive plan for improvement of the Columbia River." You conclude that the proposed Foster Creek project is "essentially a power development, well situated and capable of

producing at low cost a large amount of electrical energy for the needs of the northwest area." You conclude that, "Its value for irrigation is small and it is of no value for navigation or flood control." And you also conclude that the Foster Creek project is "* * * unique among the potential developments below Grand Coulee Dam in that immediate construction will not affect the migratory fish problem" in the Columbia River Basin.

I am in substantial agreement with a number of your findings. The navigation or flood control values of the Foster Creek project are not impressive.

The Foster Creek Dam is assuredly "unique among the potential developments below Grand Coulee Dam in that immediate construction will not affect the migratory fish problem" in the Columbia River Basin. Additional power facilities will be needed to meet prospective demands for power in the area. It is my hope that these needs may first be met by the Foster Creek Dam, thereby affording additional essential time to provide safeguards for the valuable fishery resource which would be impaired by the premature construction of downstream dams, such as Umatilla. Both the Fish and Wildlife Service and the Office of Indian Affairs, as a result of their studies, urge that in scheduling construction of new major dams in the Columbia Basin, the initial requirements be met through Foster Creek.

I do not agree with your statement that the value of the Foster Creek project for irrigation is "small." The report of your own district engineer together with the report on the comprehensive plan now being prepared by the Department of the Interior, both indicate the possibility of direct irrigation of some 15,000 acres in the lower Okanogan River and Columbia River Valleys. In addition, the Bureau of Reclamation is already making plans for numerous other irrigation units which require large amounts of power, such as the 29,000-acre Greater Wenatchee project. Such areas can be served only by pumping against lifts of considerable magnitude. Low summer pumping power rates appear practicable because of the natural distribution of the annual run-off of the Columbia River and the irrigation demands required to be discharged from upstream storage, which permits the generation of large blocks of otherwise secondary summer power that can be used for irrigation pumping purposes. Thus it is evident that the irrigation aspects of the Foster Creek project when considered with power are of primary importance.

In the plan for the development of the resources of the Columbia River Basin, the economic feasibility of the works of which the plan is composed would be aided materially by financial coordination. Coordination in the physical operation of the works comprised in the plan is also a highly desirable objective. Irrigated agriculture and other related land-use developments receive benefits from their financial association with the power-generating aspects of other units in the plan for total development. It is essential, in order to safeguard the development of the Northwest, that the Foster Creek project be not excluded from the financial plan for the development of the entire area. If it were set up separately, without financial relationship to the irrigation developments, the benefits of financial assistance to irrigated agriculture would be denied. It is essential that this project be considered as one unit in a complete plan which would integrate irrigation and power and would give due consideration to power rates within the basin as a whole.

Furthermore, coordination in operation of the Foster Creek project with that of Grand Coulee and Bonneville projects, prior to the eventual completion of the basin development, is highly desirable. Similarly, coordination in time of construction and of installation of generation with basin-wide power needs is important to the realization of maximum benefits from power and irrigation. In this respect, it is desirable to reexamine the number and size of the generating units and to base them on the probable regional load factor, as experienced by the Bonneville Power Administration of the Department of the Interior in marketing power from Bonneville and Grand Coulee Dams.

Your report, in paragraph 147, page 92, under the heading "Effects on local interests" states "No objection to land acquisition at reasonable compensation is anticipated from owners either on the left bank or in the Colville Indian Reservation." I wish to point out that the acquisition and direct payment for Indian-owned lands which are located in the reservoir area may not meet fully the obligations of the United States with respect to our responsibility to the Indians themselves. The productive capabilities of the lands, in the Foster Creek Reservoir area, whether by grazing, crop raising, or by other means, should be suitably replaced to insure the continued economic welfare of the displaced

Indians. The solving of such problems is the responsibility of this Department through the Office of Indian Affairs.

In my opinion, the Foster Creek Dam project should be authorized at the present time, but it should be authorized for construction by the Bureau of Reclamation, Department of the Interior. In this connection, you will recall that the Commissioner of Reclamation advised your Board of Engineers for Rivers and Harbors by letter of October 30, 1945, when that Board was having a hearing on the proposed project, that inasmuch as the project would serve primarily the purposes of power production and irrigation, it was his opinion that, when economically justified, the project should be constructed and operated under the direction of the Secretary of the Interior and supervision of the Bureau of Reclamation, pursuant to the Federal reclamation laws. I concur fully with the statement of the Commissioner of Reclamation, and in his reasons for making that statement.

It will be possible for the authorization of the project, under those laws, to be handled by a report and findings by the Secretary of the Interior submitted to the Congress pursuant to section 9 of the Reclamation Project Act of 1939 (53 Stat 1187), and in the ordinary handling of the matter that would be the course which this Department would follow. It may be deemed desirable, however, to proceed in this case by means of special legislation. Such special legislation, as I see it, should do these things—(1) authorize, under the Federal reclamation laws, the construction and operation of a dam and power plant in the general location and of the same general characteristics as that described in your proposed report, (2) authorize the construction of transmission lines for the interconnection of the power plant with other Federal transmission systems in the area, (3) provide for an allocation of costs through a report to the Congress that would recognize, among other things, the benefits to be realized at this project from the construction and operation of Grand Coulee Dam and other upstream storage reservoirs, and (4) authorize, upon compliance with the provisions of the Federal reclamation laws, the construction of such irrigation works as the Secretary of the Interior found to be feasible as a part of the total development.

Sincerely yours,

OSCAR L. CHAPMAN,
Acting Secretary of the Interior.

Colonel FERINGA. I should like at this time to invite the especial attention of the committee to the last paragraph of the Secretary of the Interior's letter, which reads as follows:

> It will be possible for the authorization of the project, under those laws, to be handled by a report and findings by the Secretary of the Interior submitted to the Congress pursuant to section 9 of the Reclamation Project Act of 1939 (53 Stat. 1187), and in the ordinary handling of the matter that would be the course which this Department would follow. It may be deemed desirable, however, to proceed in this case by means of special legislation. Such special legislation, as I see it, should do these things: (1) Authorize, under the Federal reclamation laws, the construction and operation of a dam and power plant in the general location and of the same general characteristics as that described in your proposed report; (2) authorize the construction of transmission lines for the interconnection of the power plant with other Federal transmission systems in the area; (3) provide for an allocation of costs through a report to the Congress that would recognize, among other things, the benefits to be realized at this project from the construction and operation of Grand Coulee Dam and other upstream storage reservoirs; and (4) authorize, upon compliance with the provisions of the Federal reclamation laws, the construction of such irrigation works as the Secretary of the Interior found to be feasible as a part of the total development.

Mr. PITTENGER. Who signed that letter?

Colonel FERINGA. It was signed by Oscar L. Chapman, Acting Secretary of the Interior.

As you know, Mr. Pittenger, in the case of any projects west of the ninety-seventh meridian we send them to the Department of the Interior. We frequently also send projects east of the ninety-seventh meridian to that Department if we feel they are interested in them, but all projects west of ninety-seventh meridian must go to the Department of the Interior.

Mr. PITTENGER. As I understand it, they want to build the dam rather than have the War Department engineers do it?

Colonel FERINGA. I believe that is exactly it. However, I cannot answer that question.

Mr. PITTENGER. Was not that what you read?

Colonel FERINGA. I read it, Mr. Pittenger, because I am very anxious that the views of all of the departments are explained to this committee, in this case especially the views of the Secretary of the Interior. I was anxious that this letter be inserted in the record at this time and, of course, it will be made a part of the printed report, anyway.

Mr. PETERSON of Georgia. Did I understand you to read from the Secretary of the Interior's letter there that under the reclamation laws this project might already be authorized?

Colonel FERINGA. That is the way I read it, sir; yes, sir. He says:

> It will be possible for the authorization of the project, under those laws, to be handled by a report and findings by the Secretary of the Interior.

So, I believe the Secretary of the Interior feels that possibly this report is not necessary because that can be done by the Department of the Interior. We, of course, made a report on it because we are directed to do so by this committee.

Mr. JACKSON. The Solicitor from the Department of the Interior is here and I believe has, perhaps, some statement amplifying that.

Colonel FERINGA. Yes; I am anxious to bring it out. This project would be no different in that respect than Bonneville that we have constructed and operated, and Fort Peck that we have constructed and operated, and Dennison Dam that we have constructed and operated, and the McNary Dam which we will construct and operate, but I want to be sure that the position of the Department of the Interior is presented.

Mr. PITTENGER. Where is there any element of irrigation or reclamation in this Foster Creek Dam, Colonel?

Colonel FERINGA. In my opinion, Mr. Pittenger, this is a power project. I think the proponents can argue that the water will be used for navigation. I think the proponents of the project can also argue that the power to be generated will be used for pumping irrigation water on the fields, and I think the proponents of the project can argue that the power is needed for the shipyards; but the committee has asked us to make a report and we are reporting it as a power project.

Mr. PETERSON of Georgia. I want to get this clearly in mind, Colonel. Is it proposed that this project be constructed under the authorization of some other law, or possibly constructed by some other agency than the Corps of Engineers? If so, it seems that it is just a little out of place in this omnibus rivers and harbors bill. I am just asking the question to get my own mind clear on this. Is that your proposal, Colonel?

Colonel FERINGA. Our position, Mr. Chairman, is this: The committee has asked us to make a report, and we find that this is a power dam that can be economically justified and should be constructed, and, of course, we have, as you know, to send in reports on these projects.

However, the authorization of them is up to the Congress. The Secretary of the Interior, as I read the letter, in all deference, seems to feel that the dam can be constructed under the reclamation laws. So, therefore, if that is so, then we will not need this authorization.

Mr. PETERSON of Georgia. Then, as I understand it, you are presenting this project on the same basis as you are presenting all of the other projects that we are considering at these hearings?

Colonel FERINGA. Yes, sir, exactly; but I did not want to present this to you without inviting the attention of the committee to the Secretary of the Interior's letter.

I believe Mr. Olds, of the Federal Power Commission, is here and would like to testify.

Mr. PITTENGER. Yes; I suggest that we hear from Mr. Olds at this time, Mr. Chairman.

Mr. JACKSON. Before he is called, Mr. Chairman, I have one question I would like to ask Colonel Feringa.

Mr. PETERSON of Georgia. Yes.

Mr. JACKSON. I understand that the appropriation has been made for the Umatilla Dam?

Colonel FERINGA. Yes; but the President has not yet signed the bill.

Mr. JACKSON. The House and Senate conferees have agreed on an appropriation for Umatilla?

Colonel FERINGA. You are absolutely right, sir.

Mr. JACKSON. And there is no reason, then, why this project, if it is authorized, could not be ready for construction almost immediately as soon as Congress has appropriated the money?

Colonel FERINGA. Yes, sir; that is correct.

Mr. JACKSON. And there would be no reason for any delay on Foster Creek, assuming the money is appropriated?

Colonel FERINGA. Yes, sir. There is $2,600,000 set up in the bill for Umatilla which would enable us to make a start. Umatilla and McNary Dams are the same.

Mr. JACKSON. Yes.

Mr. HORAN. Colonel Feringa, I wish you would go into the history of Foster Creek Dam, as to who made the findings and the surveys, and just how long that has been going on, and just what has been done on it.

Colonel FERINGA. Mr. Horan, we were told by the rivers and Harbors Committee of the House by resolution adopted March 24, 1942, to make a special report on this Foster Creek Dam. Prior to that time, and I am talking from memory now, when General Robins was Colonel Robins, and the division or district engineer, there was a 308 report made on the Columbia River. That report touched upon this dam as it did upon Bonneville Dam and the McNary Dam, and made an over-all basin study of the Columbia River. There have been 308 reports made for nearly every river in the United States. They have been made for the Savannah, the Columbia, the Chattahoochee, and the Tennessee Rivers, and based upon the 308 report for the Columbia, we were appointed by Congress to study the very many possibilities that could be developed. I should say that study has gone on since 1930. I may be wrong, as I am talking from memory, but as I recall it, the 308 report was authorized in 1928.

Mr. JACKSON. The clerk informs me it started in 1927 or 1928.

Colonel FERINGA. Thank you, Mr. McGann. Does that answer your question, Mr. Horan?

Mr. HORAN. Yes; it does. Thank you.

STATEMENTS OF LELAND OLDS, CHAIRMAN, AND FRANK L. WEAVER, CHIEF, RIVER AND BASIN DIVISION, BUREAU OF POWER, FEDERAL POWER COMMISSION, WASHINGTON, D. C.

Mr. PETERSON of Georgia. Mr. Olds.

Mr. OLDS. Yes, sir.

Mr. PETERSON of Georgia. Mr. Olds, in order that the record may be clear would you mind giving your full name and your official position?

Mr. OLDS. Leland Olds, Chairman of the Federal Power Commission.

You have asked me to present the Federal Power Commission's views on the proposed Foster Creek project which will be located below the Grand Coulee development on the Columbia River.

Before addressing my remarks specifically to this project, I want to indicate briefly the Commission's approach to the study of such projects as established by Congress in the original Federal Water Power Act of 1920. This act is now part I of the Federal Power Act of 1935.

This basic act emphasizes the importance of the comprehensive development of the Nation's water resources for all beneficial purposes, with special provisions safeguarding in addition to power such primary purposes as navigation and irrigation. Thus it provides in section 10 (a) as one of the primary conditions to the licensing of projects for development by States, municipalities, or private interests:

> That the project adopted, including the maps, plans, and specifications, shall be such as in the judgment of the Commission will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water-power development, and for other beneficial public uses, including recreational purposes; and if necessary in order to secure such plan the Commission shall have authority to require the modification of any project and of the plans and specifications of the project works before approval.

The Federal Power Act conceived of such projects, on streams subject to the jurisdiction of Congress or involving public lands, as being constructed either (1) by States, municipalities, or private interests under licenses issued by the Federal Power Commission for not more than 50 years, with the right of recapture by the Federal Government at the end of the license period specifically reserved, or (2) by the Federal Government itself.

Thus the act provides specifically in section 7 (b) that—

> Whenever, in the judgment of the Commission, the development of any water resources for public purposes should be undertaken by the United States itself, the Commission shall not approve any application for any project affecting such development, but shall cause to be made such examinations, surveys, reports, plans, and estimates of the cost of the proposed development as it may find necessary, and shall submit its findings to Congress with such recommendations as it may find appropriate concerning such development.

As a basis for carrying out the purposes of Congress, to which I have briefly referred, section 4 (a) of the act authorizes and empowers the Commission:

To make investigations and to collect and record data concerning the utilization of the water resources of any region to be developed, the water-power industry and its relation to other industries and to interstate or foreign commerce, and concerning the location, capacity, development costs, and relation to markets of power sites, and whether the power from Government dams can be advantageously used by the United States for its public purposes, and what is a fair value of such power, to the extent that the Commission may deem necessary or useful for the purposes of this Act.

The authority to promote comprehensive river-basin development contained in the Federal Power Act has been implemented by the flood-control acts enacted since the Flood Control Act of 1938 and by the most recent river and harbor act which have provided in general that facilities adapted to possible future use in the development of hydroelectric power shall be installed at dams constructed by the War Department for the benefit of navigation and the control of floods—

when approved by the Secretary of War upon recommendation of the Chief of Engineers and of the Federal Power Commission.

Under the broad power of investigation referred to above, the Commission has cooperated with the United States Corps of Engineers in assuring that reservoir projects, constructed by that agency, include provision for the best feasible utilization of the power values of the streams to be developed.

Thus it should be clear that the Commission under its directive to study river-basin projects is not so much concerned with either the private or public development of power as with the best use of power values as a part of comprehensive plans for development of the Nation's water resources.

Comprehensive river-basin investigations and reports were started by the Federal Power Commission in 1921 with one on the Deschutes River in Oregon. This was followed by reports on the upper Columbia River, the Colorado River, the Great Falls projects on the Potomac River, and reports on the Trinity, American, and Stanislaus Rivers in California. All these reports were completed before the end of the fiscal year 1925.

Except for the Potomac River, these investigations and reports were initiated by the Commission, following the filing of applications for permits or licenses on these rivers, where the multiple use of the water resources for navigation, irrigation, and power early became evident. The Commission suspended action on the applications until its studies indicated the best over-all plan for coordinating all uses. The Potomac River investigation was authorized and directed by Congress as part of the original Water Power Act of June 10, 1920.

Since additional funds were provided under the flood-control acts the Commission has made investigations of a comprehensive nature involving the utilization of the water resources of a majority of the river basins of the country, with special reference to the development of water power, the markets for such power and relationship of the development of power to the economic growth of the regions involved. Such investigations have included the Columbia River Basin and specifically the Foster Creek project.

On this basis the Commission is of the opinion that the Foster Creek project, now under consideration by your honorable committee, is adapted to and is an essential unit in a comprehensive plan for the improvement and utilization of the water resources of the Columbia River Basin by the Government of the United States.

The Commission is further of the opinion that the output of the Foster Creek project, if constructed according to the schedule of the War Department referred to above, can be utilized in the region as it becomes available. This conclusion is based on the assumption of the prior construction of other proposed projects in the basin, including Detroit project, Hungry Horse project, Umatilla project, and completion of the Grand Coulee installation.

Just because of the questions that have been raised by members of the committee I want, perhaps, to amplify that a little.

Mr. PITTENGER. Would you permit a question right there, Mr. Olds?

Mr. OLDS. Yes, sir.

Mr. PITTENGER. You gentlemen are urging the same conclusions that the War Department has urged, and that we have had related to us here this morning, are you not?

Mr. OLDS. Very closely, yes, sir.

Mr. PITTENGER. There is not much difference between you?

Mr. OLDS. Of course, it must be understood, Mr. Pittenger, that this work is carried on very closely with the United States Corps of Engineers on this cooperative basis which is provided for in the flood control and the rivers and harbors acts, and our regional offices and their regional offices work very closely together in the analysis of all of these projects, and then they come up to the Washington office, again there is cooperation between the two agencies in working out what is finally determined to be a sound plan of development.

Mr. PITTENGER. In other words, there is cooperation all of the way through?

Mr. OLDS. Yes, sir; that is correct.

Mr. DONDERO. Mr. Olds, if you have them with you, can you give the committee figures on just what has happened to these dams in the way of amortization, whether they are ahead of schedule or whether the are behind schedule?

Mr. OLDS. I would like to furnish that for the record, because I do not have the figures here on that exact matter.

Mr. DONDERO. All right.

Mr. OLDS. I assume that you are referring to the two dams that have been completed to date, Bonneville and Grand Coulee?

Mr. DONDERO. In other words, I think it might be helpful to the committee if we had the picture as to just what has happened out there by way of development of power and return on the investment.

(The data desired is as follows:)

AMORTIZATION OF POWER FACILITIES

Mr. OLDS. The Bonneville Authority has prepared what it terms "pay out" schedules, scheduling the amortization of the allocated cost of power facilities at Bonneville and Grand Coulee and of the interconnected transmission system. The amortization period is 50 years from the date the last unit was installed at Bonneville (1944), 50 years after the last parcel of land is brought into irrigation at

Grand Coulee (giving for that project an amortization period of 73 years) and, in the case of transmission lines, 50 years from the dates of the respective investments therein.

As of June 30, 1945, the pay-out or amortization schedule had been met and, in addition, a surplus had been realized. The amortization accounted for as of that date was $13,628,960; the realized surplus in excess thereof amounted to $7,517,000.

I can say this Mr. Dondero, that we have recently had occasion to analyze the situation as far as amortization is concerned for the projects whose power is marked by the Bonneville Administration, and that includes the Bonneville project and the Grand Coulee project, and our analysis indicates that at present with the Bonneville rates the two projects will be amortized in accordance with law at least within the amortization period of 50 years, which is assumed under the Bonneville Act.

It is my recollection that the amortization will actually occur sometime before the expiration of the 50 years on the basis of the sale of power at the approved Bonneville Administration rates.

Mr. DONDERO. Now that the war effort has terminated will there be sufficient market in the private-enterprise field to take up the power that is generated for use in the production of consumer goods?

Mr. OLDS. The earlier estimates, which I will refer to very briefly, indicated that there would be some falling off in the years immediately following the war due to the anticipated decline in the production particularly of light metals and certain of the other metallurgical and chemical industries that were manufacturing primarily for the war.

The more recent data on the situation indicate to us that the decline following the cutting off of war production will probably be much less than had been anticipated immediately after VJ-day, the conclusion of the war. In other words, the present estimates, as contrasted with those made perhaps 6 months ago indicate that there will be less falling off and that there will be the continued production of light metals and other industrial products that represent heavier requirements in the way of power.

Just in calling attention to our estimates, on the basis of which we are of the opinion that the Foster Creek project power will be absorbed as rapidly as it can be constructed and made available we suggested those estimates on construction prior to the completion of Foster Creek, the Detroit, and the Hungry Horse project and Umatilla project and the completion of the Grand Coulee installation. In other words we estimate that with the full number of units now in the Bonneville project this complete project will be continuously building up.

We estimate that the Grand Coulee project will have 8 units installed in 1948, 10 in 1949, 12 in 1950, and 15 or 16 in 1951, which, I think, completes the installation of that project.

We estimate that the Umatilla project will come in with one unit in 1951, five units in 1952, and eight units in 1953.

We estimate that the Detroit project will come in with one unit in 1950, and two units in the next 3 years.

We estimate that the Hungry Horse project will come in in 1951 with two units, and three units in the succeeding year.

In other words, in recommending that the construction program before your committee for the Foster Creek project be followed we are assuming that it fits into the best possible schedule of projects for meeting the foreseeable requirements for power in the Pacific Northwest.

Mr. RANKIN. You spoke of the Detroit project a while ago. Where is that located?

Mr. WEAVER. On the Willamette River in Oregon.

Mr. RANKIN. It is a tributary of the Columbia?

Mr. WEAVER. Yes, sir.

Mr. DONDERO. When did you say that the balance of the potential power in Grand Coulee would come in?

Mr. OLDS. The installation would be finally completed in 1951. We are assuming that the Foster Creek project will be required and will come in to the extent of three units in 1953.

As I understand it the general estimate on the construction program is that it would bring in the first three units in slightly over 7 years, after the project is authorized by Congress, and that thereafter three units at a time would come in at intervals of about 2 years, so that the project would be completed to its full capacity in about 15 years from the time it is authorized.

Mr. PETERSON of Georgia. Mr. Olds, do you base those figures on an anticipated increase in industry or only on distributing this power in a wide area?

Mr. OLDS. We base our estimates on the expected requirements of the area which is, in general, considered the Bonneville Administration market area. Primarily that includes the States of Washington, Oregon, Idaho, and probably western Montana, I should say, but it does not assume the possibilities suggested by Congressman Rankin of ultimately distributing this power by direct transmission over distances of 1,000 miles.

We are thinking in terms not only of the growth of industry in the Pacific Northwest, but also in terms of the constant increase in the use of electricity in homes and increase in the use of electricity by the farms of the area.

Some very interesting side lights on that can be obtained from a study of what has happened in the city of Seattle where the so-called all-electric home rate has been made available to the residential consumers of Seattle. It has led to a jump in the average use of electricity per home to a figure which is something like five times the average use of electricity by homes in the United States. It has already passed over 7,000 kilowatt-hours a year average for the homes that are buying current on this all-electric home rate. That gives some indication of the possible expansion in the use of electricity in the region in addition to the development of industry, and all of these different projects producing electricity will be required at an early date.

Mr. PITTENGER. Right there, Mr. Olds, you said they use five times as much electricity as the average homes in the United States. Has it then displaced some other kind of fuel?

Mr. OLDS. I assume to a considerable extent it displaced oil, probably.

Mr. JACKSON. I think it is fair to say that up in the Northwest we are running out of our wood supply as fuel, and we have been using hog fuel, sawdust, and that sort of thing, which is practically nonexistent. It is actually not replacing any type of fuel. It is saving

a resource. The timber has been cut away rapidly, and we have very little hog fuel or sawdust. For the most part I would say it displaces wood which was used as fuel.

Mr. RANKIN. In the Tennessee Valley they are using more coal today than they did 20 years ago. They are using more coal, I am told, in the Tennseee Valley area, than when the TVA was created, and yet the consumption of electricity in my home town has increased from 42 kilowhatt-hours per family to 249 kilowatt-hours per family.

Mr. DONDERO. Does that include the use of electricity for heat in the homes?

Mr. OLDS. Yes; to a considerable extent it includes the use of electricity for heat which is growing out in the Pacific Northwest. Except for this hog fuel that the Congressman has mentioned the primary source of energy in the Pacific Northwest is hydroelectric power.

Mr. RANKIN. There is another thing, Mr. Olds, that I would like to call your attention to right there, and that is we are moving rather rapidly into an aluminum age. The amount of bauxite in the world is very limited, and the supply is rapidly diminishing. They have developed a process now of extracting aluminum from clay. Experts tell me that from 25 to 40 percent of all clay is aluminum and that there is enough aluminum in the first 10 feet of the earth's surface to cover the ground with aluminum a foot deep, all over the world. I get that from the best expert on the subject that I know.

It takes a terrific amount of electricity to process aluminum from clay and out on the Columbia River and in the Tennessee Valley are the two places where we are prepared to carry on that kind of development. The time is coming rapidly when we are moving into the aluminum age, and the time is not far distant when structures like this [indicating], and window sashes, door frames, automobile bodies, busses, streetcars, railroad cars, barges, and building material will be made of aluminum, and that is just as sure to come as night follows day, and when we move up into that period which we are doing now very rapidly, as I said a while ago it will just be impossible to develop too much electric power. The power developed from the Columbia River, the Tennessee River, the St. Lawrence River, and all other streams will be needed. Do you agree with that?

Mr. OLDS. I agree with most of it, Congressman.

Mr. RANKIN. If any experts take issue with me on that aluminum question I would like to have them speak up. I have made that statement on the floor of the House. I got my information from scientists who, in my opinion, are preeminent in the aluminum business, and I have found nobody who contradicts that statement. There is enough aluminum in the first 10 feet of the earth's surface to cover the earth's surface with aluminum to a depth of 1 foot. We are coming to a period when we are going to push forward its development. We are going to develop it rapidly as times goes on, and the two places to develop it now are on the Columbia River and in the Tennessee Valley.

Mr. OLDS. The Foster Creek project is a unit of the general plan which has been proposed by the War Department for the development of the water resources of the Columbia River Basin. The project is among those previously recommended in House Document 103, Seventy-third Congress, first session (1933), which included the following projects for the development of hydroelectric power and other purposes: Grand Coulee, Foster Creek, Chelan, Rocky Reach, Rock Island

Rapids, Priest Rapids, Umatilla Rapids, John Day Rapids, The Dalles, and Warrendale (now known as Bonneville).

Dams have been built by the Federal Government at Bonneville and at Grand Coulee; construction of a dam at Umatilla has been authorized; and the Rock Island site has been developed by a private electric power company under license from the Federal Power Commission.

The site of the Foster Creek project is on the Columbia River, 51 miles downstream from the Grand Coulee Dam. The primary purpose of the project will be the generation of hydro-electric power. It will consist of a dam which will back the water up to the Grand Coulee Dam. The location of the project is satisfactory in that it permits the complete utilization of all available head in this section of the river. The next damsite downsteam, Chelan, is satisfactory for the construction of a dam that will utilize all of the fall of the river between the foot of Foster Creek Dam and the Chelan Dam site. Foster Creek has long been considered as a proper unit in any plan for the comprehensive development of the water resources of the Columbia River Basin.

The dam would be of concrete gravity overflow type of 220 feet maximum height and with a crest length of 1,800 feet. The spillway would be provided with crest gates and the gross capacity of the reservoir formed by the dam would be 480,000 acre-feet, most of which would be utilized for the purpose of creating head. That is, head for the production of the maximum of power from the project.

The draw-down would be about 5 feet, thus providing about 36,000 acre-feet of pondage. The area of the reservoir would be 6,687 acres, of which 2,115 acres are now owned by the Federal Government.

The rated net head is 162 feet; the maximum gross head with a flow of 15,000 cubic feet per second is 183 feet; and a minimum gross head is 148.6 feet with a flow of 500,000 cubic feet per second, that is, flood flow.

In order to utilize this head the powerhouse would have an installed generating capacity ultimately of 960,000 kilowatts consisting of 15 units of 64,000 kilowatts each, exclusive of house units.

Based on an operation study covering a critical period of streamflow—with present regulation of flow and with Grand Coulee Reservoir and power plant operated in coordination with the Foster Creek project—the continuous power available at the Foster Creek project would be 526,000 kilowatts, corresponding to an output of 4,607,000,000 kilowatt-hours of firm energy annually. On the average 6,250,000,000 kilowatt-hours would be generated annually.

In other words, the difference between those figures would really represent the secondary power available at the project.

Mr. RANKIN. The secondary power is the power generated by the floodwater that comes into the streams from the melting snow and ice, and on the Columbia River it comes in the summertime?

Mr. OLDS. The secondary power that I am discussing in this case is the difference between the power that is available from the average flow of the stream and the power that would be available when the stream is at a minimum.

Mr. RANKIN. The secondary power on the Columbia River is produced by the flood water that comes from the melting snow and ice. It comes in the summertime, at the very time it is needed most for

irrigation purposes; and on the Tennessee River our floods come from the heavy rainfall in the wintertime at a time when we need the electricity for heating purposes.

Mr. OLDS. There are certain other situations involved in the effect of flood waters in the Columbia River Basin, and that is the fact that in projects of the Bonneville type there is a greater output at the relatively lower head, and then in the case of the Bonneville project the effect of the heavy discharges from the melting snow and the big flood is to reduce the amount of head available. In other words, you get less power per second-foot of water when you have floods than you do in periods of more normal stream flow.

Mr. RANKIN. Mr. Olds, some people have been inclined to refer to secondary power as dump power. That is a misnomer, because everywhere I have found, and that is especially true in the Columbia and Tennessee Rivers, secondary power is power that comes at a time when it is needed; and there is no difference in power, you understand, because electricity is just alike whether it is generated out of coal, gas, oil, corn cobs, wood, or any other fuel, electricity is just alike, so this secondary power that some people refer to as dump power, on the Columbia River and Tennessee River comes at the very time when it is needed most to satisfy the entire program.

Mr. OLDS. I would like to say in addition to what you have said, Mr. Rankin, with reference to secondary power, that on both the Columbia and the St. Lawrence Rivers it is very good secondary power.

Mr. RANKIN. Yes; and whether it is caused by excessive rainfall or melting snow and ice, you can always figure about what rise you are going to have in the river.

Mr. OLDS. The Foster Creek project would be constructed in five stages. The first stage would consist of the main dam and appurtenances and three generating units. Three additional units would be installed during each of the four succeeding stages. The War Department construction schedule provides for the completion of the initial stage in 7½ years and with ultimate completion in about 15 years. The cost of the complete project, based on 1940 prices, is estimated by the War Department at $110,430,000, or $115 per installed kilowatt, exclusive of transmission.

The Foster Creek project will depend, for its best operation, on utilization of storage provided by Grand Coulee and any other upstream plants which might be developed.

I might say there that as further storage is developed upstream, other projects, the quality of the power and the economic value of the power developed by further units will steadily increase.

This will require that Foster Creek be operated in conjunction with Grand Coulee in an integrated manner. Any other projects built on the river would likewise have to be operated integrally with all the other plants so as to obtain the best use of each of the projects. Since there exists a federally owned transmission system embracing the Grand Coulee Dam at one end, and the Bonneville Dam near the mouth of the Columbia River, it will be necessary that Foster Creek be constructed and operated by the United States in order that the benefits of integrated operation may be obtained.

More specifically, assuming Foster Creek using regulated flow from present upstream reservoirs including Grand Coulee, Flathead and Kootenay Lakes each operated to obtain maximum power at its own

plant, the project would provide 479,000 kilowatts of prime power. This would mean 798,000 kilowatts of firm capability at 60 percent load factor, or 684,000 kilowatts at 70-percent load factor.

If, however, the Foster Creek project is operated in coordination with Grand Coulee, with the same assumption as to use of storage at the Flathead and Kootenay Lakes, it will provide 526,000 kilowatts of prime power. This will mean 877,000 kilowatts of firm capability at 60 percent load factor, or 751,000 kilowatts at 70 percent load factor. In other words, the coordinated operation of Foster Creek and Grand Coulee projects will mean an increase of 39,000 kilowatts of prime power and either 79,000 kilowatts or 67,000 kilowatts, of firm capability, depending on the load factor at which the project's power will be absorbed by the load.

The development of Pit River, a tributary of the Sacramento River in northern California, provides a good example of coordinated development and operation. In this case, the development is by a private company, the Pacific Gas & Electric Co., under license from the Federal Power Commission. A few details concerning the development are given below to illustrate the degree and importance of a coordinated development of a river for power purposes.

The Pit 3 unit of development was constructed under a license (project No. 233) issued in 1923 for a power plant with 72,900 kilowatts installed capacity and for the Lake Britton storage reservoir. The license was enlarged in 1926 to include the proposed next downstream Pit 4 unit which has not as yet been constructed. In 1941 the company filed, in accordance with section 23 (b) of the act, a declaration of intention to construct the 146,000 kilowatt Pit 5 unit next downstream from the Pit 4 site. The Pit 3 and 4 units occupy lands of the United States and the Pit 5 unit is located on lands owned by the company.

After a hearing on the declaration of intention, the Commission (in its Opinion No. 70 of December 22, 1941) found that Pit 3 and 5 units, and eventually Pit 4 and a further proposed Pit 6 unit, were dependent on storage regulation provided by Lake Britton (upstream from Pit 3) and considered these two units, plus Pit 4 and 6 when constructed, as a single unit of development. Each plant is but an integral part of an over-all plan of development for utilization of the water resources of the Pit River.

Testimony during the hearing developed that some $430,000 a year additional revenue could be derived from the Pit 5 plant when operated for peaking purposes than when operated only with unregulated natural stream flow. This peaking capability results from the coordinated operation of Pit 5 as an integral part of the over-all comprehensive development on the Pit River.

The Commission in its opinion stated its responsibility under the act and as interpreted by the Supreme Court to consider the relation of individual projects to the comprehensive plan for watershed development, and stated that it could not isolate single parts from the over-all plan.

Studies by the Commission staff, based on a wide range of assumptions as to sales of the Foster Creek project's firm and secondary energy, indicate that the project power can be marketed by the Bonneville Power Administration at present Bonneville rates. In other words the project revenues may be expected to satisfy the requirements