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Annual report of the
Administrator of the Bonneville
United States Dept. of the Int

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INTERIOR, Harold L. Ickes, Secretary

BONNEVILLE POWER ADMINISTRATION

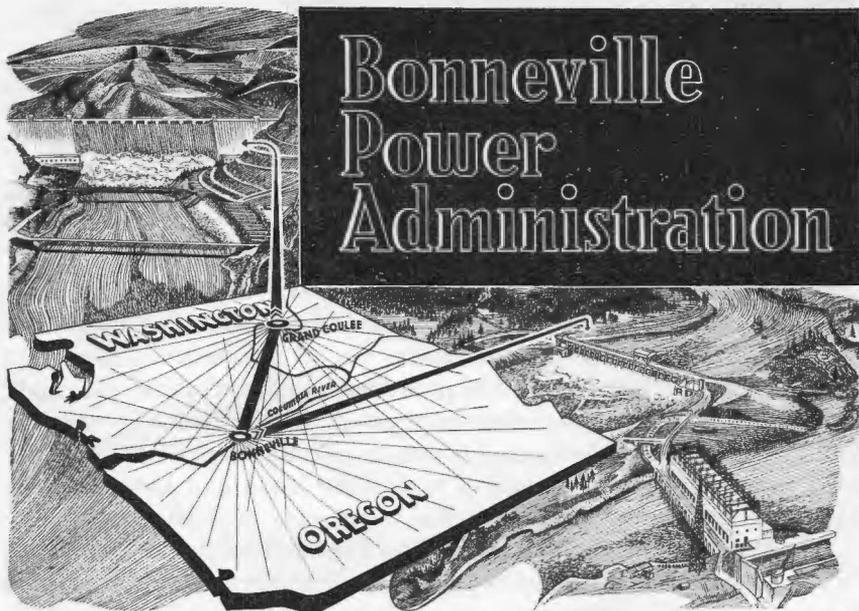
Paul J. Raver, Administrator

Annual Report
of the ADMINISTRATOR
OF THE BONNEVILLE
POWER ADMINISTRATION
to the SECRETARY OF
THE INTERIOR

1457



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Year ended June 1941



PAUL J. RAVER, Administrator

Conservation and Defense

THE WEIGHT of the Bonneville Power Administration's resources was brought into play during the fiscal year 1941 in behalf of the national-defense effort without impairment of the Government's long-time program for development of the Pacific Northwest in accordance with sound conservation practice.

During the 12-month period the Administration's power sales made possible the production of nearly 60,000,000 pounds of aluminum pig metal—thus greatly enhancing the over-all volume of this vital defense metal.

The year also brought establishment of new power-using aluminum plants which, as they approached capacity operation at the close of the period, were producing metal at a rate sufficient to build one-fourth of all planes scheduled for production in the Nation during the ensuing 12 months.

In addition to this accomplishment, the power administration contributed to the establishment of a number of new electrometallurgical and electrochemical plants scheduled to facilitate the defense effort by the production of calcium carbide, chlorate compounds and ferro alloys vitally essential to the manufacture of explosives and other strategic materials.

Although of tremendous immediate importance to defense, development of all of these plants was even more significant from the standpoint of sound conservation. Since its inception, the Bonneville project, in its broadest aspects, had been devoted to the principle of balancing the Pacific Northwest's ailing timber and farm economy by the application of low-cost power in the large electro industries which, during the last 20 years, have become the key to modern technical enterprise.

The plan already was well under way early in the fiscal year 1941 when the first units of the Aluminum Co. of America's Vancouver, Wash., reduction plant went into production. The skeletal essentials of a high-voltage transmission implement already were in service. The impact of the defense emergency in the autumn of 1940 meant, simply, accomplishing in from 3 to 5 years what had been planned for a decade's normal development.

Accordingly, from September 1940 to June 30, 1941, the Bonneville Power Administration found it necessary to enlarge its activities, not in scope but merely in degree.

Net results at the close of the fiscal year showed 321,880 kilowatts of power sold under contract; annual rate of power income increased from \$367,970 to \$1,874,332; generating capacity increased from 86,400 kilowatts to 208,400 kilowatts; the transmission system increased from 142.3 to 1,176.8 miles; and the development of six new industrial customers, all of which involved production for defense and all of which were the first of their types to be established west of the Mississippi River.

With all this, the soundness of the principle of public ownership proved itself anew, not only from the long viewpoint but as an immediate contribution to the defense effort. From a practical standpoint, defense industries looking for new power sources found public ownership had made migration of their enterprises to the Pacific Northwest entirely feasible in spite of the region's distance from the nation's heavy production and market centers. Fundamentally, this feasibility was built upon the fact that Columbia River power was nonprofit power, for sale at a wholesale rate lower than any other in the country.

First Years Show Steady Progress

From the perspective of June 30, 1941, the first years of the Columbia River program showed a steady progression.

Aside from the construction many years ago of the Celilo Canal, east of The Dalles, Oreg., no concentrated Federal development of the river began until September 30, 1933, when the War Department, under the immediate direction of the U. S. Army Corps of Engineers,

started construction of Bonneville Dam, 40 miles east of Portland, Oreg.

On December 19, 1933, construction of Grand Coulee Dam on the upper river, 90 miles west of Spokane, was undertaken by the Department of the Interior under immediate direction of the Bureau of Reclamation.

Both dams were of the multiple-purpose type: Bonneville for the dual purpose of improving navigation and the generation of hydroelectric power; Grand Coulee, for irrigation and the generation of hydroelectric power.

By 1937, construction at Bonneville was largely complete. The spillway dam had been erected, a mammoth single-lift shipping lock was in operation, and two generating units had been installed in the powerhouse.

In August of that year the Bonneville Power Administration was created by act of Congress as a provisional agency set up for the transmission and sale of Columbia River hydroelectric power.

The Administration's first fiscal year (August 1937 to June 30, 1938) was devoted largely to formation of initial policies and staff organization.

The second fiscal year (July 1, 1938, to June 30, 1939) saw the launching of a basic construction program which involved the design and building of an initial network of high-voltage transmission lines. First funds for construction facilities were appropriated by the Congress in May 1938, and were made immediately available. Actual erection of the first steel tower line began in March 1939.

In the third fiscal year (July 1, 1939, to June 30, 1940) the Administration's first high-voltage transmission lines were completed and energized. By the end of the year's first quarter the first power sales contract had been executed; and during ensuing months sales multiplied rapidly. Staff reorganizations were effected to meet the rising volume of demand for lines and power. At the close of the third year 188,415,993 kilowatt-hours of electricity had been sold to seven agencies of all types.

Growth Great in Fourth Year

It was in the Bonneville Administration's fourth fiscal year (July 1, 1940, to June 30, 1941) that the agency, by virtue of its substantial volume of power sales and deliveries, assumed a major status as a utility enterprise and as a regional institution.

It was during this period that the agency, through its carefully planned sales program, found itself in a key position for determining the role which the Northwest region would play in arming the Nation.

It was during this period that data, resulting from actual opera-

tions records, were available for the first time for accurate analysis of the success of the broad conservation program as mapped by Congress in the statute of 1937.

Finally, it was during this period that the agency's operating function became of equal significance with its planning and construction functions.

The Defense Contribution

Development of a new northwest industry with which to correct the unbalanced regional economy, which in the past has been too dependent upon agriculture and timber, has long been a fundamental of the Bonneville Administration's conservation program. Before the close of the fiscal year 1940 considerable advance had been made in this direction. A large number of industries had filed applications for power or had made inquiry as to the feasibility of establishing plants within the region. One large aluminum manufacturing firm, during the latter half of the fiscal year 1940, had executed contracts for the purchase of power and was bringing to completion a metal reduction plant as the year closed. Thus, the impact of the defense emergency in September 1940, found the Bonneville Administration ready. (See pl. I.)

Considerable power capacity existed at Bonneville Dam. Additional capacity at both Bonneville and Grand Coulee was on order for delivery within the near future. Basic circuits of a region-wide transmission network were in place. Contracts for the interconnection of the Government's system with the largest municipal utility systems in the region were executed or in final negotiation. All that remained to put the Northwest on a full defense footing was the execution of contracts with new defense industry which already, in large measure, had begun to investigate the Northwest's possibilities. Under the direction of a market development staff, comprising experts in the field of electrometallurgical, electrochemical, and industrial research, this program was vastly intensified during the fiscal year 1941.

As a result of this wide cooperative effort embodying comprehensive industrial research, coordination with Federal defense agencies and regional groups, the Bonneville Administration was able to report on June 30, 1941, a total of 265,500 kilowatts of power under contract for delivery to six first-line defense industries, as follows:

	<i>Kilowatts</i>
Aluminum Co. of America, 3 contracts.....	182, 500
Reynolds Metals Co., 2 contracts.....	60, 000
Oregon Shipbuilding Co.....	6, 000
Electro Metallurgical Co., 2 contracts.....	13, 000
Pennsylvania Salt Co.....	2, 000
Pacific Carbide & Alloys Co.....	2, 000

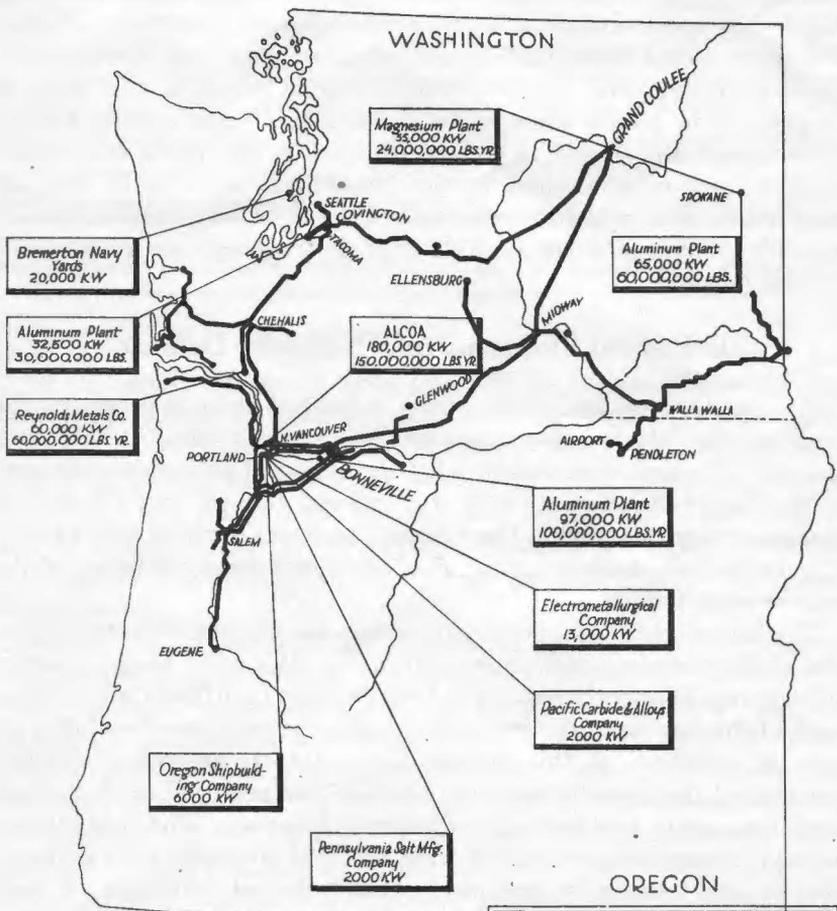


PLATE I

**INDUSTRIAL CONTRACTS
EXECUTED OR PENDING
FOR PURCHASE OF COL-
UMBIA RIVER POWER
(AS OF JUNE 30, 1941)**

In addition to these executed contracts, the Administration had applications for industrial power totaling nearly 1 million kilowatts. As the fiscal year came to a close, preliminary negotiations had been undertaken with the Office of Production Management for the establishment of three additional aluminum reduction plants and one magnesium reduction plant early in the calendar year 1942. Tentative plans called for establishment of these plants at Spokane and Tacoma, Wash., and in the lower Columbia gorge in the State of Oregon. The plants were to be financed and constructed by the Government and leased to private companies for operation. Combined output of aluminum in the Northwest, as a result of their completion, was scheduled to reach a total of 400 million pounds annually—approximately 25 percent of the country's entire proposed defense output.

Industrial Planning and National Defense

For greater ease in handling this industrial-defense program, the work of the Market Development Section was divided into two phases. The first was concerned with industrial power development in the Pacific Northwest, both for national defense and for normal peacetime requirements. The second phase was devoted to a variety of economic problems primarily related to long-range planning of the transmission system.

The largest industrial power consumers are the electrometallurgical and electrochemical industries. Normally, the work of the Market Development Section would have been devoted to deliberate investigations of the raw materials required by, and the economic feasibility of, various industries of this group. The national defense emergency accelerated the need for such information and required that the staff meet immediate problems as they currently arose. The Administrator and numerous industrialists were supplied promptly with information on raw materials, processes, and technical problems of such defense industries as aluminum, magnesium, electrolytic zinc, electrolytic chromium, and iron and steel. In addition, industries contemplating locations in the region were provided with data on community resources and plant sites in over 50 cities and towns. A publication completed during the year covering the industrial facilities of 37 communities on the lower Columbia River from The Dalles to Astoria was of material aid to these industries. The significance of this work, both in guiding the policies of the administration and in assisting industries, may be appreciated from the fact that except for the specialized information within the section, there does not exist in the Northwest or elsewhere a centralized and broad body of technical and economic data dealing with the region.

The year saw the following new electroprocess plants initiated, under construction, or completed:

TABLE 1.—New Northwest electroprocess plants established in 1940 and 1941

Name	Location	Products	Regional source of capital	Approximate plant investment ¹	Date power contract signed
Aluminum Co. of America.	Vancouver, Wash.	Pig aluminum..	East.....	\$15,000,000	Dec. 23, 1939
Electro Metallurgical Co. (subsidiary of Union Carbide & Carbon Co.)	Portland, Oreg....	Calcium carbide and ferroalloys.	.....do.....	2,500,000	May 29, 1941
Ohio Ferro-Alloys Co. ²	Tacoma, Wash....	Ferroalloys.....	.....do.....	250,000	1941
Pacific Carbide & Alloys Co.	Portland, Oreg....	Calcium carbide	California...	250,000	July 13, 1940
Pennsylvania Salt Co....	.....do.....	Chlorates.....	East.....	400,000	Dec. 18, 1940
Reynolds Metals Co.....	Longview, Wash..	Pig aluminum..	South.....	5,000,000	Feb. 24, 1941

¹ As reported in the press.

² Customer of Tacoma Department of Public Utilities.

Of the above six plants, only one, the Reynolds Metals Co., unquestionably owes its existence to the defense program. The Aluminum Co. of America is reported to have based its initial plans upon normal peacetime requirements, as did the Pacific Carbide & Alloys Co. The other plants are in the class that had been anticipated in the course of the normal power development of the Pacific Northwest, although it is possible that the defense emergency accelerated their inauguration.

At the end of the year, in addition to approval by the Office of Production Management of four additional aluminum plants in the region and one magnesium plant, the Market Development staff was engaged in discussions with some six other electroprocess prospects, at least three of which were known to be based upon normal peacetime markets in and near the Pacific Northwest. With the materialization of the plans of the Office of Production Management plus those industries which had already signed contracts with the administration, it was evident that six new products would contribute some diversification to the present overspecialized economy of the region. These included calcium carbide, ferrochrome, ferrosilicon, chlorates, and magnesium. In the case of aluminum, the Northwest was well on its way to becoming a strategic producing center for the Nation, with a scheduled output above 400,000,000 pounds per year, or approximately 25 percent of the present program of national output.

While it was apparent at the close of the fiscal year that needs of the defense emergency would continue to impose heavy responsibilities upon the staff for additional investigations related to defense plants, work had already begun on the long-run fundamental problems of adjusting the new defense industries of the Northwest into the permanent regional economy. A repetition of unemployment and

the contraction of industry that followed World War I appeared entirely possible in the Northwest unless an aggressive program of investigations could be followed with appropriate policies by the various Federal agencies concerned. In this direction, the Market Development Section increased its efforts.

Obstacles to this work were found to be great. Much more knowledge is needed regarding the extent, quality, and availability of mineral deposits in the region. There is too little private fragmentary information about Northwest iron, magnesite and alunite, and other deposits and too little public authentic information available. Another obstacle to sound diversified industrial development in the Northwest is the restraining influence exercised by certain large corporations in many ways. Some of these control certain western mineral deposits and will develop them only under conditions acceptable to their interests. A number of industrialists have indicated considerable interest in the industrial power opportunities of the region, but they lack formal investigations of these opportunities. Investors and industrialists with moderate capital resources are unable to finance the necessary research on raw materials, markets, and processes. Technical knowledge of many of the electro-process industries is concentrated in the staffs of a few corporations.

As a contribution toward mitigation of these stumbling blocks, the Bonneville Administrator prepared detailed recommendations for presentation to proper authorities.

Principal recommendations included suggestions that governmental agencies be implemented to assist small, as well as large, private and independent enterprises to develop western mineral resources; that new appropriations be made immediately available to prevent delays in Bonneville's 1943 construction program for supplying power to new western industries; and that construction of a new multiple-purpose dam on the Columbia River be undertaken as rapidly as possible.

Specifically the Administrator suggested that the United States Bureau of Mines and the United States Geological Survey receive greater appropriations for mineral explorations in the West. He pointed out that changes in production technology make it necessary to reappraise known mineral deposits from time to time in the light of new discoveries in processing methods. He pointed out that the defense effort makes it imperative that these reappraisals and additional explorations be expedited.

In order to overcome the lack of knowledge of western mineral deposits, the Administrator suggested that the results of all minerals investigations by the Government be more widely publicized and distributed. He also suggested that it "may be that the present authority of the United States Geological Survey and the Bureau of

Mines should be so modified as to permit access by these agencies to any mineral deposits, regardless of ownership."

It was further pointed out that Government agencies should be given adequate financing to conduct exhaustive studies on the feasibility of developing individual mineral deposits.

In order to overcome handicaps suffered by smaller enterprises which lack necessary resources for research, it was recommended that Government research be expanded to cover not only the problems of raw materials and processes, but the problems of marketing, transportation facilities and costs, magnitude of competition and related matters.

Further recommendations included the suggestion that Federal action be taken to facilitate investments in new, even though small, business enterprises.

The continuous planning of the power facilities of the Bonneville Power Administration through the year required constant analysis of changing trends in the economies of the various subregions of the Northwest as they will affect the demand for industrial, commercial, agricultural, and domestic power. The market development staff continued its compilation and analysis of a wide variety of economic data pertaining to these subjects.

As part of the problem of surveying industrial resources and opportunities in different parts of the region and at the same time making this information available to industrialists, the staff issued the first in a series of industrial reports, "The Columbia River Industrial Site Survey." This report proved to have extensive demand among industries, railroads, private utilities, and chambers of commerce. Work during the year continued on similar studies of the Willamette Valley and the lower Puget Sound areas. Through reports of this type, an adequate picture of the industrial facilities of the Northwest was steadily built up, offering for the first time to private business and Government a detailed cross-section analysis of a large region.

System Planning and National Defense

In addition to its heavy power sales to defense and peacetime industry, and in addition to its extensive surveys and correlation of data on the availability of raw products and the feasibility of specific electro-industrial operations within the region, the Bonneville Administration, during the fiscal year, made exhaustive reappraisals of future power needs in the light of the new defense developments. These planning activities were vitally necessary as a basis for determining the direction in which the Government's Northwest grid should be expanded to serve both normal and defense load growth in the period between 1943 and 1948.



BONNEVILLE'S TOWERS OF DEFENSE

Swinging high 'twixt land and sky, daredevil linesmen rushing to completion a high-tension transmission line in the Columbia River Gorge, symbolize the new era of low-cost electric power for home and defense use brought to the Pacific Northwest through the conservation program of the Bonneville Power Administration.

Studies by the System Planning Section directed to this end, supplementary to earlier surveys conducted in the fiscal year ending in 1940, were systematically carried out during the fiscal year 1941. These investigations covered economic trends in the Bonneville-Coulee service area, the load and rate of load growth in the region. From them, a workable program was devised for the installation of generating equipment, transmission lines and substations, so scheduled as to supply a maximum amount of power in the minimum amount of time. Near the close of the year all findings were made available to the Federal Power Commission and to the Office of Production Management.

In conducting these researches, moreover, the System Planning staff, assisted by a staff of outside consulting engineers, kept in mind the necessity for providing a generating and transmission schedule in keeping with a sound and rational long-time conservation program, and at the same time it was constantly necessary to review its findings in the light of rapidly changing defense needs. In the most recent review of its findings, for example, the staff found it advisable to reevaluate all previous power needs of the region in terms of a complex economic setting, a result of the national emergency, in which the establishment of a number of new defense industries in the Columbia River area had brought about an actual and increasing shortage of electrical energy.

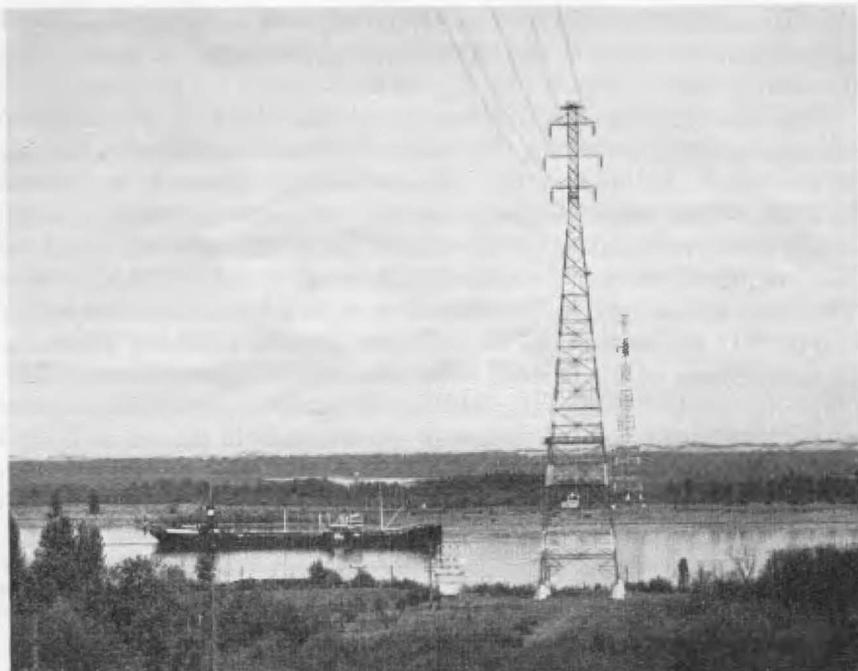
Therefore, as the fiscal year closed, the staff concluded that to meet not only the power demands for 1948, but also those of 1943 and 1945 with an adequate and unfailing supply of power, preparations and construction should begin at once if the required generating and transmission facilities were to be brought to completion as rapidly as needed. So imperative appeared the power requirements already existing in the area, it was recommended that a program which earlier had been planned to cover a period extending to 1948 must now be advanced to achieve completion in 1945. The net result of these recommendations would be to advance the Government's hydroelectric power installation schedule in the Columbia River region from 3 to 5 years.

Formulation of the 6-year construction program.—Early in the fiscal year 1941, the System Planning staff worked out a program of construction for the 1942-47 interval. This program, drawn up in conformance with Executive Order No. 8455 and filed with the Bureau of the Budget in September 1940, presented in detail the power demands for the area and listed the generating facilities required at Bonneville and Grand Coulee, together with the transmission facilities necessary to meet the anticipated load. The schedule as formulated at that time reflected the need of the national defense program inaugurated 3 months earlier (June 26, 1940) by the signing of the defense appropriation bill (H. R. 1055).

On March 11, 1941, the President signed the "lend-lease bill" (H. R. 1776). The direct effect of the measure was to advance the entire defense production program to an extent far exceeding all previous estimates. Accordingly, by May 1941, and in the face of rapidly expanding industrial activity throughout the Pacific Northwest, the staff completed a comprehensive report presenting a revised 6-year construction program for the Bonneville Power Administration, and covering the new requirements for hydroelectric power brought about by defense production. By June 1941, this latter report was itself carefully revised and addenda were supplied so as to take into consideration policies formulated very recently by the Office of Production Management, especially with respect to the production of such strategic materials as aluminum and magnesium. Thus, as a result of events of nationwide scope, a schedule had been submitted whereby new generating capacity could be made available as fast as generators could be manufactured and installed, and whereby the program for transmission and substation facilities could be correspondingly accelerated.

Definition of problems involved in the revised 6-year program.—In working out a revised 6-year program reflecting the needs for national defense, the System Planning staff discerned that four basic and closely related problems required analysis. First, there was the broad problem of the present impact and the anticipated future effects of the national defense program on the industrial activity and power requirements of the Pacific Northwest, with special reference to the States of Washington, Oregon, and northern Idaho. The second problem concerned the actual generating capacity of the existing utilities in the region, and the relation of this capacity to the new demands for power brought about by the young defense industries. In other words, there was required an analysis of present power loads in the Bonneville-Grand Coulee service area, together with estimates of the anticipated rate of increase in these loads under the impetus of expanding industrial production. A determination of the additional generating capacity required at Bonneville and Grand Coulee constituted a third problem. Finally, there was needed also a detailed schedule of the necessary transmission facilities during the 1943-48 interval so as to conform with the estimates of power supplies and power demands as already analyzed.

Economic impact of the defense program.—Studies made by the staff of industrial activity in the area revealed that power demands were increasing markedly and at a rate hitherto unknown in the Pacific Northwest. Furthermore, the increase began even prior to the organization of the defense program. This was because low-cost Bonneville power had already attracted certain industries to the area before June 1940. There was every reason to believe that the rise in indus-



NATION'S NEWEST TRADE ROUTE

Ocean-going vessels plying the Seven Seas pass through giant locks at Bonneville to bring greater economic advantage to interior Northwest points, where growing industry benefits by electric power surging over cables such as these swung from steel towers over the Willamette River near Portland, Oreg.

trial power needs would continue even without the stimulation of specific emergency production.

The effect of the defense activities was to hasten and increase the power shortage. The shortage, in fact, became critical when there was superimposed upon expanding peacetime production a number of new manufacturing and industrial enterprises operating under defense contracts. In Oregon and Washington defense contracts alone for the period from June 1940 to March 1941, totaled \$720,606,730. These covered mainly the emergency construction of aircraft, ships, ordnance, barracks, airports and docks. Further studies revealed a corresponding trend, for by the fall of 1940 employment, pay rolls, and department store sales in Oregon and Washington began to rise steadily as a direct result of defense production.

Moreover, the defense program increased in particular the power needs of the new high-current consuming industries employing electrolytic, electrothermal, and electrochemical processes. It was significant, for example, that full operation of the Vancouver, Wash., plant of

the Aluminum Co. of America alone required a volume of power approximately equal to the combined requirements of Seattle and Tacoma in 1939.

The clearest expression, however, of the effect of the national emergency on the power requirements of the region appeared in the rate of increase in the needs of the 12 major utilities operating in the area in 1939. Their power requirements in that year prior to the inauguration of the national program, totaled 1,009,000 kilowatts. In 1940 total requirements had increased 15 percent to 1,166,000 kilowatts. This gave almost incontrovertible support to the estimate that by the end of 1941 the total would rise to approximately 1,528,000 kilowatts, or an increase of 30 percent over 1940 and 51 percent over 1939. This unprecedented rise attained added significance when compared to the 50 percent increase in power requirements in the whole United States from 1914 to 1918, when for 2 years the Nation was at war.

Present load and future load growth in the region.—An examination of the factors contributing to these increasing power demands convinced the staff that a satisfactory load survey for the area must be one which would allow for a maximum of flexibility and permit rapid revision. Therefore, a study was made to determine, first, the expected rate of increase in the power loads of the 12 districts of the area, wherein are found the major operating utilities. Second, owing to the new developments in defense production, a further survey was made of the prospective needs of the new industries operating or seeking to operate in the area.

As a result of investigations made early in 1940, it was known that the major existing utilities had been able in 1939 to supply approximately 92 percent of all the electrical energy required for public use. It was also learned that the annual rate of increase in each of the 12 districts had been fairly uniform. Proceeding on the basis of uniformity, utility loads for the approaching period were estimated to increase in 1942 by 15 percent, in 1943 by 12 percent, in 1944 by 12 percent and in 1945 by 10 percent.

To estimate the present and future outlook for the industrial load, the new industries were subdivided into two categories: Industries already under contract for power; and industries which were engaged in negotiations for power. Here it was found that by May 17, 1941, five industrial establishments in the Puget Sound subregion and in the lower Columbia area had already executed contracts requiring a total of 285,500 kilowatts. In the lower Columbia area alone the contracts called for 246,000 kilowatts during each year in the period 1942-45. Moreover, there were in addition 14 industries engaged in negotiations for contracts. The survey indicated that the total power demand in Oregon and Washington of these plants would reach 402,000 kilowatts in 1945, making a total of approximately

660,000 kilowatts required for new industrial uses in that year. Thus, it was apparent that the demand for power was increasing at a rate far in excess of the normal load growth of the operating utilities.

In order to make large blocks of prime power available by 1943 to the industries expected to sign contracts, the studies pointed to the conclusion that earlier schedules for the installation of generating units and the construction of transmission facilities would need to be markedly accelerated. In fact, only through such a stepping-up of the program could the companies begin successful operation.

To fulfill the demands for Washington, Oregon, and northern Idaho, it was originally estimated that there must be available in 1941 a total of 1,528,000 kilowatts; in 1943 a total of 2,314,000 kilowatts; and in 1945 a total of 2,703,000 kilowatts. However, these figures were later revised when it was learned that the Office of Production Management had set up a regional quota for the production of additional aluminum in an amount which would result in a distinct increase in the power demand. In the revised estimate it was determined that the demand would reach 1,628,000 kilowatts in 1941; 2,746,000 kilowatts in 1942; and 3,135,000 kilowatts in 1945. (See Plate II.)

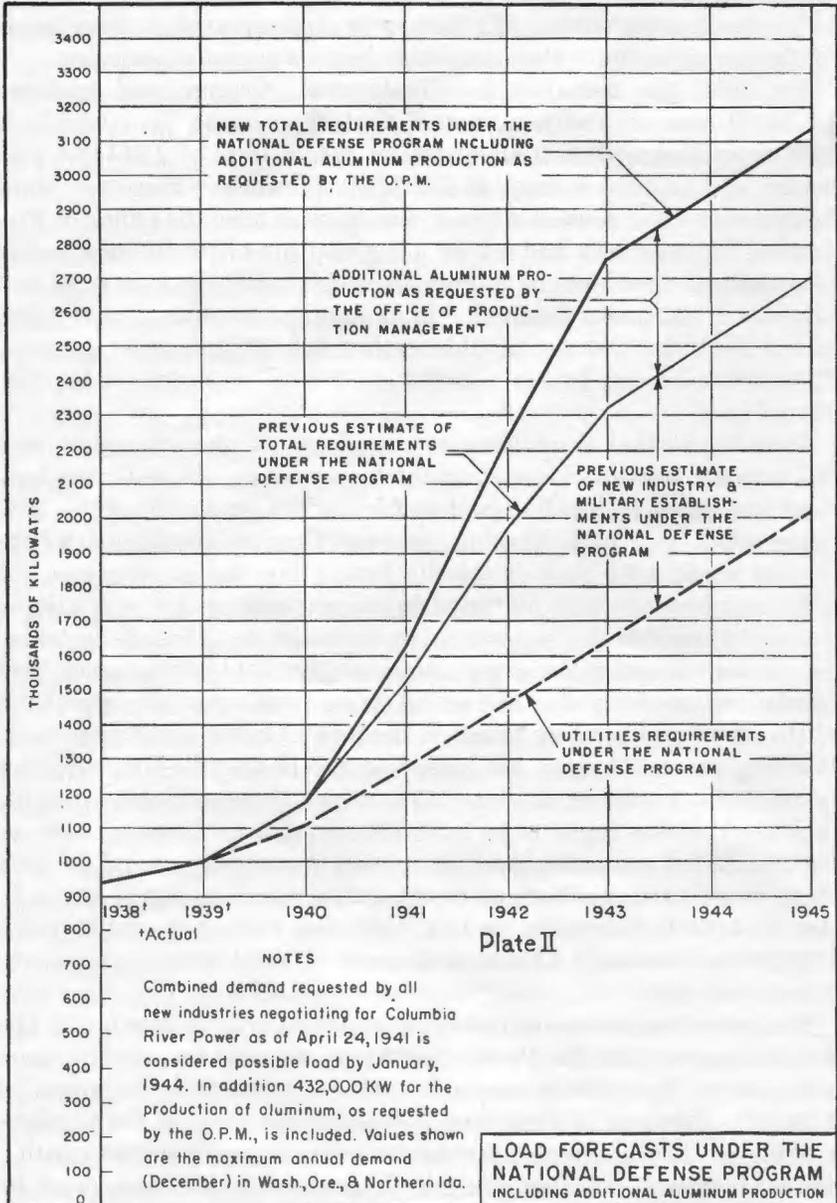
Detailed studies were likewise completed to show in what load districts the greatest increase might be expected. Here it was foreseen that loads in the Portland district would be $3\frac{1}{4}$ times the 1939 value, while the Seattle-Tacoma, Spokane, Eugene, and Klamath Falls district would more than double by 1945. For the entire region the 1945 requirements were indicated to exceed those of 1939 by $2\frac{1}{2}$ times.

Required additional generating capacity in the Federal system.—Succeeding investigations, supplemented by field inspections, were carried out to determine the actual limitations upon the operations of the existing generating plants in the area. In the eight districts in Washington and Oregon, but excluding the Bonneville-Grand Coulee system, the available capacity of existing plants without counting their reserves was found to be 1,062,000 kilowatts. However, according to detailed estimates based on annual maximum demand, in 1941 there would exist a deficiency in the generating capacity of the utilities of 446,000 kilowatts, and in 1943 the deficiency would reach 1,252,000 kilowatts. A total deficiency of 1,641,000 kilowatts was forecast for 1945.

The above estimates, of course, were considered in relation to the data indicating that the Pacific Northwest must be prepared to meet a maximum demand for power in 1941 of 1,628,000 kilowatts, of 2,746,000 kilowatts in 1943, and 3,135,000 kilowatts in 1945. Considering in their computations the available capacity of the existing plants, it was found that the additional load in the area must be met by the Federal system, which must be ready to supply 566,000

kilowatts of firm power in 1941, 1,684,000 kilowatts in 1943, and 2,073,000 kilowatts in 1945.

To meet these demands, a schedule was worked out for the installation of generators at Grand Coulee and Bonneville. All of the 10 units at Bonneville having already been authorized, the new schedule called for their completion by 1943. Four were in operation by the



close of the fiscal year 1941. The fifth and sixth units were to be installed in August and December 1941. The last 4 units were scheduled for completion in 1943.

At Grand Coulee six units had been authorized by the close of the year. The first was to be completed in September and the second in December 1941. The third was to be completed in April 1942, and the remaining three units in about 2 years. Combined capacity of these first three units at Grand Coulee was scheduled to bring the combined capacity of Bonneville and Coulee to 680,400 kilowatts by April 1942. However, as load studies had already indicated that there would be a deficiency of 910,000 kilowatts in 1942, exclusive of the Federal system, a power shortage would necessarily continue unless further installations at Grand Coulee could be authorized and completed.

It was found, however, that by stepping up installation to correspond with load requirements, the proposed capacity for Bonneville and Grand Coulee could be brought to 1,166,000 kilowatts by 1943, leaving a deficiency in that year of only 86,000 kilowatts. Moreover, by further accelerating the installation schedule for Grand Coulee it was estimated that the deficiency would be eliminated in 1944.

To this end, the System Planning Section prepared a revised program for installations at Grand Coulee. According to this new schedule, it was recommended that units at Grand Coulee originally planned for completion by 1945 be advanced to 1943, and those previously scheduled for installation by 1948 be advanced to 1945. This can be accomplished only by simultaneous installation of units in both the "left" and "right" powerhouses at Grand Coulee. In detail, the recommended schedule of generator installation follows:

TABLE 2.—Revised recommended schedule of generator installations

Date of installation	Units added		Total installed capacity (kilowatt)		
	Bonneville	Grand Coulee	Bonneville	Grand Coulee	Total
Existing as of—					
June 1, 1941.			194,400		194,400
Aug. 1, 1941.		L3	194,400	108,000	302,400
Aug. 18, 1941	5		248,400	108,000	356,400
Dec. 1, 1941.		L2	248,400	216,000	464,400
Jan. 1, 1942.	6		302,400	216,000	518,400
Mar. 1, 1942.		L1	302,400	324,000	626,400
January 1943.	7 ¹		356,400	324,000	680,400
July 1943.	8 ¹	L4 & R1	410,400	540,000	950,400
September 1943.	9 ¹	L5 & R2	464,400	756,000	1,220,400
November 1943.		L6 & R3	464,400	972,000	1,436,400
December 1943.	10		518,400	972,000	1,490,400
January 1944.		L7 & R4	518,400	1,188,000	1,706,400
March 1944.		L8	518,400	1,296,000	1,814,400
May 1944.		R5	518,400	1,404,000	1,922,400
September 1944.		L9	518,400	1,512,000	2,030,400
March 1945.		R6	518,400	1,620,000	2,138,400

¹ Delivery of Bonneville generator units Nos. 7 to 10, inclusive, can probably be advanced from 30 to 60 days by the payment of overtime and the securing of necessary priorities.

In summary, it can be said that during the fiscal year 1941 the Bonneville Administration maintained firm consciousness of its role in aiding defense production in the Pacific Northwest. The need for careful planning, always important in any broad conservation program, was met as fully as possible in connection with the agency's adjustment to the defense effort. Basic plans were modified to fit the new need wherever required, and effort was made to complete the revisions and to present recommendations to defense leaders at dates sufficiently early to insure proper consideration and effective action.

Sales to Public Agencies

Demand for Columbia River power by public owned distribution agencies, such as cooperatives, municipalities and public utility districts, continued to grow during the fiscal year 1941. Continued strength of the public ownership movement in the Pacific Northwest was evidenced by the fact that 44 local utility districts had been formed under the Oregon and Washington statutes by the close of the year. In addition to this, rural electric cooperatives, financed for the most part by Rural Electrification Administration funds, and municipally owned power distribution systems had reached a total of 90 in the two States. This evidence of steady growth of the public ownership movement came about despite the bitter and well-organized opposition of private utilities.

Principal progress from the standpoint of the number of projects placed in operation during the year lay with the rural electric cooperatives. However, substantial gains were made during the period by the utility districts, especially in the State of Washington. By the close of the fiscal year 1941, 11 such districts had begun power distribution, 45 cooperatives were in actual operation and 35 municipalities were in business for themselves.

It was in the development of the public utility districts that the major problems presented themselves. Principal problems centered about the acquisition of lines and substations by the districts. In numerous cases districts had been formed by local election under the impetus of a necessity for lower electric rates and for a wider distribution of the benefits of electricity to rural areas. Once formed it was necessary to issue bonds and to negotiate for existing privately held systems within the district boundaries or to plan the construction of new systems. These latter two procedures were fraught with legal and financial difficulties. In some cases the companies owning existing distribution systems were unwilling to sell. In other cases the cost of purchasing the local portion of a large regional utility property carried the handicap of heavy severance damages. In some cases, where the privately owned system to be purchased was small and not

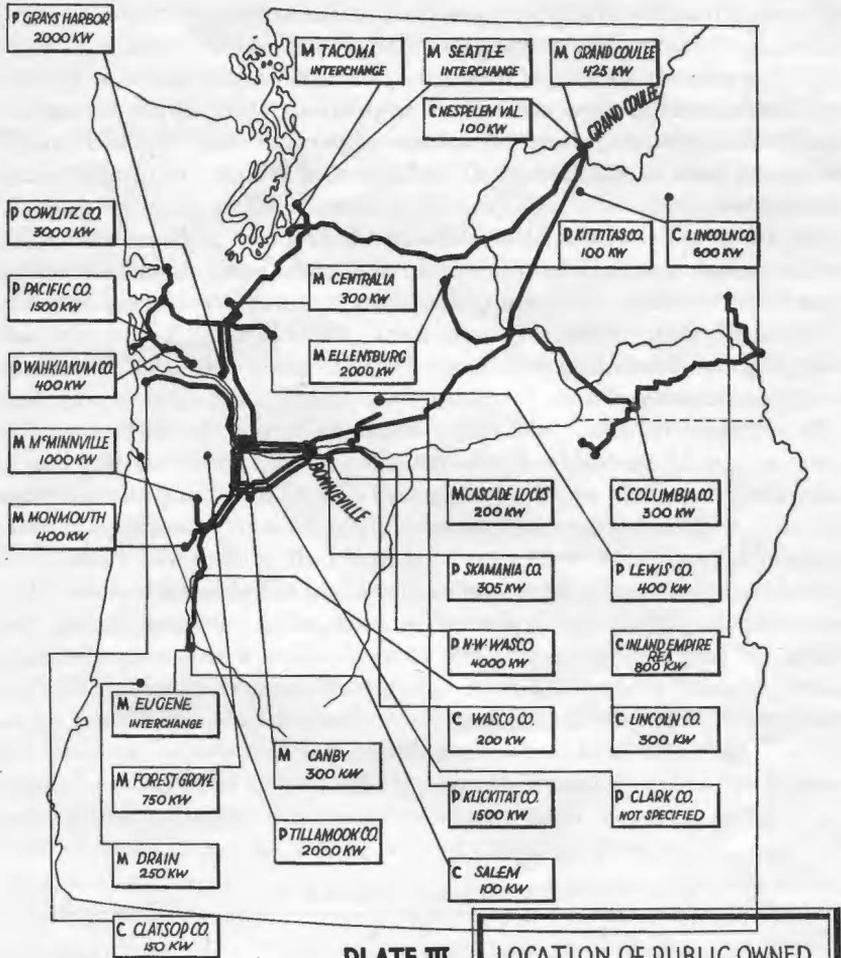


PLATE III

LOCATION OF PUBLIC OWNED AGENCIES UNDER CONTRACT FOR COLUMBIA RIVER POWER (AS OF JUNE 30, 1941)

LEGEND:

- P - PUBLIC UTILITY DISTRICTS
- C - RURAL ELECTRIC COOPERATIVES
- M - MUNICIPAL SYSTEMS

part of a larger integrated system, these problems were readily solved. In a number of other cases it was necessary for the districts to embark upon lengthy condemnation proceedings in order to establish a fair purchase price—proceedings which in a number of instances had not been terminated as the fiscal year drew to a close.

In order to fulfill the principles of the Bonneville Act, the Bonneville Administration undertook, at the beginning of the year, to give public utility districts such aid as was legally feasible in the acquisition of their distribution systems. In response to requests by groups of district commissioners, the Bonneville Administrator consented to act

as their representative in negotiations for the system-wide purchase of privately owned utility properties, with a view to obviating the necessity of severance damages through system-wide purchases. To this end the administration set up an acquisition staff which concerned itself with appraising various facilities of private utilities which might become a part of the Bonneville system and which the districts proposed to acquire.

As the year drew to a close substantial progress in negotiations for several systems had been made. In two cases joint acquisitions had been consummated, the local utility districts involved taking over the companies' distribution systems and the Power Administration acquiring the transmission lines for incorporation into its own Northwest transmission grid.

To further facilitate the acquisition of privately owned utility systems, the Department of the Interior, on the advice of the Power Administration, had explored the possibility of obtaining the cooperation of the Reconstruction Finance Corporation in financing the purchase of several large utility systems in behalf of the local districts.

In detail, power sales by the administration to public-owned distribution agencies of all types showed a substantial increase during the year. Of 44 power contracts executed, 31 were with public distribution agencies. Of these, 11 were with public utility districts, 12 were with municipally owned systems, and 8 were with rural electric cooperatives. (See Plate III.) Power sales to agencies of this type, on the basis of contracts executed, totaled nearly 30,000 kilowatts. Following is a list of power sales contracts with public agencies in force at the close of the fiscal year 1941:

TABLE 3.—Public utility districts

Name	Number of kilowatts	Date executed	Name	Number of kilowatts	Date executed
Skamania.....	305	Aug. 2, 1939	Northern Wasco.....	4,000	Oct. 28, 1940
Pacific.....	1,500	Oct. 5, 1939	Grays Harbor.....	2,000	Nov. 7, 1940
Wahkiakum.....	400	Oct. 10, 1939	Clark.....	(1)	Apr. 17, 1941
Klickitat.....	1,500	Dec. 5, 1939	Cowlitz.....	3,000	Apr. 28, 1941
Tillamook.....	2,000	May 15, 1940	Total.....	15,205	
Kittitas.....	100	Oct. 3, 1940			
Lewis.....	400	Oct. 4, 1940			
MUNICIPALITIES					
Cascade Locks.....	200	Feb. 14, 1939	Seattle.....	(2)	May 6, 1940
Forest Grove.....	750	Nov. 7, 1939	Ellensburg.....	2,000	Aug. 1, 1940
Canby.....	300	Dec. 22, 1939	Eugene.....	1,500	Aug. 20, 1940
Monmouth.....	400	Jan. 4, 1940	Drain.....	250	Mar. 15, 1941
McMinnville.....	1,000	Jan. 13, 1940	Grand Coulee.....	425	May 1, 1941
Centralia.....	300	Feb. 13, 1940	Total.....	7,125	
Tacoma.....	(2)	Feb. 23, 1940			
COOPERATIVES					
Oregon 4 Lincoln.....	300	June 27, 1940	Washington 39 Nespelem.....	100	Feb. 19, 1941
Washington 20 Columbia.....	300	Oct. 1, 1940	Salem Electric Co-operative.....	100	Mar. 17, 1941
Oregon 25 Wasco.....	200	Oct. 2, 1940	Washington 37 Lincoln.....	600	May 1, 1941
Washington 18 Spokane.....	800	Oct. 3, 1940	Total.....	2,550	
Oregon 5 Clatsop.....	170	Oct. 7, 1940			

1 Not specified.

2 Interchange.

Of principal significance in the year's program affecting power distribution through public agencies was the performance record made by these agencies in the distribution of Columbia River power. By the close of the year a total of nine such agencies had been receiving and distributing Government-generated electricity for periods ranging from 6 to 18 months. The record of these operations was the first definitive measure of the success of the ownership program delineated by the Bonneville Act. It offered the first substantial body of fact on which scientific analysis of the public power program from generator to ultimate consumer could be based.

From the day each of these power distribution agencies began distributing Columbia River energy, analysts and engineers of the Power Administration's Rates and Statistics and Project Operations staffs maintained a close observation of all financial and other operating procedures. Monthly records were kept of per capita power use within each community served, of monthly billings, of operations costs, of depreciation and amortization costs, and of disposition of net revenues.

All nine of the distribution agencies had subscribed to principles of operation suggested by the Bonneville Administration. These principles provided that in each case revenues from power sales would be used, in the order named, for payment of all current operating expenses, including salaries, wages, cost of materials and supplies, power at wholesale, taxes and insurance; for payment of interest due on system indebtedness and for debt amortization charges; for replacement of plant, contingencies and cash working capital; and for surplus which should be used as a basis for reduction of rates.

For the convenience of these distribution agencies, the Power Administration had suggested a basic retail rate structure which accurately reflected the savings made possible by Bonneville's low wholesale rate, plus necessary margins to cover all operations, including payments in lieu of taxes which ordinarily would have been paid were the systems privately operated. These rates, in cases where system indebtedness was low, were adopted without change. In cases where systems had recently been purchased small surcharges were added to cover amortization costs.

In all cases distribution agencies purchasing Columbia River power were urged to operate their systems in accordance with well established, conservative, fiscal practices.

The performance record by these nine publicly owned agencies at the close of the fiscal year 1941 proved gratifying to the administration. Without exception the cost of power to the retail customers on these systems was reduced, in some cases as much as 50 percent—an unusual record for first-year operation.

The city of Cascade Locks, Oreg., was the first to distribute Co-

lumbia River power through its municipal system. It began operations in August 1939, and in the following November made substantial rate reductions. In the subsequent months, until June 30, 1941, total rate reductions reached an average of 31 percent. In spite of this, as a result of increased power use per customer, the city maintained its total revenue from power sales. Domestic power users more than doubled their monthly consumption of electricity with only a 4 percent increase in their monthly billings.

The municipal system of Forest Grove, Oreg., became the second Columbia River power distributor on November 27, 1939. By the close of the fiscal year 1941 rate reductions at Forest Grove ranged from 35 to 40 percent. As with Cascade Locks, heavy increases in power use resulted in no decline in total revenues to the city system.

The Canby, Oreg., municipal plant began its operations under a Bonneville power contract on February 1, 1940. Already a highly successful municipal operation, the savings resulting from Columbia River power permitted the city to reduce its rates until for liberal users of electricity they were the lowest in the United States. Reductions made possible by power purchase from the Government have averaged 44 percent.

Skamania County public utility district began distribution of Columbia River power in January 1940. After a series of retail rate reductions, the district reported that in the last 6 months of the fiscal year 1941 revenues from its power sales had increased by 15 percent.

The municipal system of McMinnville, Oreg., purchased Columbia River power on January 13, 1940. The purchase enabled it to make an immediate rate reduction of 27 percent, and during the fiscal year 1941 its retail power sales jumped 24 percent.

Wahkiakum County and Pacific County districts in southwestern Washington reported similar progress. Following its first deliveries of Columbia River power the Wahkiakum district made an initial residential rate reduction of about 10 percent, which resulted in an 18 percent increase in its power sales. The Pacific County district, following rate reductions averaging 25 percent, incurred no reduction in monthly revenues and increased its power sales in 1941 by 50 percent. The Pacific County district was able during the year to bring power service to 800 families which never before had had the benefits and conveniences of electricity.

Other Power Sales

Under the terms of the Bonneville Act power sales activities for the year were, of necessity, confined almost wholly to industry and to publicly owned distribution agencies. In order to relieve power shortages in certain areas served by privately owned utility com-

panies, it was considered consistent with sound policy to execute temporary contracts to supply power to the companies involved. Contracts covering such agreements were written for periods of not more than 2 years. One such contract was in force during the year with the Portland General Electric Co., which serves the city of Portland and certain sections of the Willamette Valley, and the Pacific Power & Light Co., which serves communities in eastern Oregon and Washington and in the Clatsop County, Oreg., area. Through execution of these contracts immediate power shortages in the Portland and Astoria, Oreg., districts were forestalled. Other power contracts involving interchange and power transfer agreements were in force between the Power Administration and the Northwestern Electric Co. and the West Coast Power Co. ↑

Revenue from all power sales mounted rapidly during the year. Total income from power sales during the previous year had been \$367,970. Completion of the huge Aluminum company plant near Vancouver, Wash., and the start of power distribution by numerous public agencies during the year increased power revenues for the fiscal year 1941 to a total of \$1,874,332.

At the close of the year, it was evident from a study of contracts executed and in negotiation that revenues from power sales during the fiscal year 1942 would approximate \$6,400,000.

A month-by-month statement of power revenues during the 12 months ended June 30, 1941, follows:

TABLE 4.—Kilowatt-hour sales and revenues, fiscal year 1941

	Kilowatt-hours	Revenue
July 1940.....	34, 893, 640	\$79, 922. 57
August 1940.....	37, 489, 220	86, 031. 13
September 1940.....	41, 012, 250	94, 209. 44
October 1940.....	49, 414, 475	110, 064. 66
November 1940.....	37, 844, 645	87, 422. 06
December 1940.....	59, 973, 869	131, 744. 80
January 1941.....	70, 303, 284	157, 711. 50
February 1941.....	68, 315, 235	164, 014. 39
March 1941.....	79, 848, 362	170, 572. 94
April 1941.....	101, 432, 167	220, 269. 51
May 1941.....	123, 606, 714	263, 090. 93
June 1941.....	144, 427, 994	309, 268. 50
Total.....	848, 561, 855	1, 874, 322. 43

Bonneville as an Operating Agency

Extensive power deliveries, as well as power sales, to all classes of customers during the fiscal year 1941 put the Bonneville Power Administration in a major position as an operating utility enterprise.

Operations as distinct from sales, construction, and planning had begun in a relatively small way during the preceding fiscal year; but

with the completion of plants by industrial consumers and the acquisition of distribution systems by public agencies, operations services had developed in major volume by June 30, 1941. This activity required the development of an operations staff to fill three principal functions.

First, it was necessary to develop personnel and procedures for transmission line and substation maintenance, for power dispatching and control, and for the emergency service necessary with the occurrence of system outage. This function was made the responsibility of an Operations Section of the Engineering Division. Second, it was necessary to maintain a research and consulting staff to give technical service and advice to the administration's customer systems on such mutual operating problems as accounting procedures, rate-making and distribution engineering. This function was made the responsibility of a Project Operations Section under the supervision of a principal electrical engineer. Third, it was necessary to establish an advisory and consulting service for the agency's wholesale customers in the planning of load building campaigns and procedures. This service was made the responsibility of a power utilization unit within the Project Operations Section.

Major developments in the operation of the physical transmission system during the fiscal year included the establishment of mobile line patrols equipped with short-wave radio, the design and initial installation of carrier telephone service over major lines of the system, and the development of procedures for emergency break-down relief on all parts of the transmission network.

Advisory service by the Project Operations Section was given during the year to nearly every customer on technical operating problems both engineering and fiscal. A small staff of statisticians was maintained to aid the newly established utility districts and other agencies in the establishment and maintenance of reporting procedures on all phases of their activities. Reports from such customer agencies were carefully analyzed each month by the statistical staff with a view to correcting any weaknesses and suggesting methods for more efficient operation.

The utilization staff was instrumental during the 12-month period in suggesting to the administration's customer agencies numerous methods for increasing the use of domestic and farm power appliances as a means of increasing consumption of electricity in the areas involved. Considerable success was obtained with the small municipal systems in increasing local sales of electric ranges, electric water heaters, refrigerators, milking machines, irrigation pumps, and similar appliances. Experimental work was done in cooperation with two municipal systems in testing the efficiency and cost of heating homes with low-cost power.

The Construction Program

By June 30, 1941, the Bonneville Power Administration had 1,176.8 miles of transmission line energized and in service. Twenty power substations also had been energized. With this progress the agency found itself in a position to render service to nearly every major power load center in the States of Oregon and Washington. More than 1,000 miles of the system and 17 of the substations had gone into service during the year. Completion of this program made it possible for the administration to supply electricity to major communities on the Oregon and Washington seacoast, to the cities of the Puget Sound area, to the Yakima Valley in Washington and the Willamette Valley in Oregon, to certain parts of eastern Washington and to the central and lower Columbia River Valley.

During the year interconnections were completed between the Bonneville network and the large municipal power systems of Seattle and Tacoma. Interconnections also were effected with municipal systems in the Willamette Valley, Oreg., and with public utility district systems in western Washington.

As of June 30, 1941, the Bonneville transmission network comprised 459.8 miles of top capacity line constructed to carry power at 230,000 volts, and 471.1 miles of 115,000-volt construction. Miscellaneous lower voltage lines, constructed primarily for service connection purposes, totaled slightly more than 200 miles.

The following tables list the substations and transmission circuits placed in service during fiscal 1941:

TABLE 5.—Substations placed in service during fiscal year 1941

Substation	Size	Date	Customers served
	<i>Kilovolts</i>		
Alcoa.....	115	Aug. 31, 1940	Aluminum Co. of America.
Albany (additions).....	115	Oct. 12, 1940	Benton-Lincoln Electric Cooperative.
McMinnville.....	57	Oct. 18, 1940	City of McMinnville.
Raymond.....	115	Oct. 30, 1940	Grays Harbor, Pacific Co., and Wahkiakum PUD.
Eugene.....	115	Nov. 28, 1940	City of Eugene.
Monmouth.....	12.45	Dec. 5, 1940	City of Monmouth.
St. Johns.....	115	Dec. 13, 1940	Pacific Carbide, P. G. E., Oregon Shipbuilding Corporation.
North Bonneville.....	230	Dec. 22, 1940	Skamania County PUD.
Forest Grove (additions).....	22	Dec. 30, 1940	City of Forest Grove.
Chehalis.....	230	Jan. 1, 1941	Lewis County public utility division.
Midway.....	230	Mar. 22, 1941	Northwest Electric Co. and Washington Water Power Co., interchange.
The Dalles.....	115	May 24, 1941	Wasco Electric Cooperative, Inc.
Ellensburg.....	115	May 27, 1941	City of Ellensburg, Kittitas County PUD.
Walla Walla.....	115	June 1, 1941	Columbia County Rural Electrification Administration.
Pendleton substation.....	69	do	
Pendleton Airport.....	12.45	June 2, 1941	U. S. Army airport.
Astoria.....	115	June 30, 1941	Nehalem Valley Electric Cooperative, Pacific Power & Light.

NOTE.—Cities of Forest Grove and Canby served through interconnection with P. G. E. Seattle City Light interchange made through temporary facilities at Covington substation. Tacoma interchange will be put in service upon completion of facilities at Covington substation.

TABLE 6.—Transmission lines placed in service during fiscal year 1941

Line	Size	Date	Miles
	<i>Kilowatts</i>		
Bonneville-Grand Coulee.....	230	Aug. 4, 1940	234.0
Vancouver-Alcoa double circuit.....	115	Aug. 31, 1940	8.4
Salem-Albany.....	115	Oct. 12, 1940	23.7
Salem-McMinnville.....	57	Oct. 18, 1940	21.7
Chehalis-Raymond.....	115	Oct. 30, 1940	45.5
Raymond-Cosmopolis.....	22	do	18.3
Vancouver-Chehalis.....	230	do	71.7
Condit-Glenwood.....	12.45	Nov. 6, 1940	22.6
Albany-Eugene.....	115	Nov. 28, 1940	39.8
Salem-Monmouth.....	12.45	Dec. 5, 1940	13.7
North Vancouver-St. Johns (No. 2).....	115	Dec. 13, 1940	7.1
Bradford Island Crossing No. 3.....	230	Dec. 22, 1940	7.7
Chehalis-Centralia.....	66	Jan. 1, 1941	11.1
Chehalis-Covington.....	230	Mar. 9, 1941	69.4
Covington-Tacoma.....	115	do	13.1
Chehalis-Mossy Rock.....	66	May 1, 1941	25.7
Oregon Shipbuilding Service.....	11.5	May 23, 1941	1.3
Bonneville-The Dalles.....	115	May 24, 1941	38.7
Covington-Seattle.....	230	May 25, 1941	11.2
Midway-Ellensburg.....	115	May 27, 1941	64.1
Midway-Walla Walla.....	115	June 1, 1941	81.2
Walla Walla-Pendleton.....	69	do	39.3
Pendleton Airport Line.....	12.45	do	5.2
St. Johns-Astoria.....	115	June 30, 1940	84.2
Rehabilitation west coast property.....	115	Oct. 30, 1940	82.8
Total.....			1,034.5

Management of the Enterprise

Speed-up of the entire Columbia River power program from 3 to 5 years, as a result of the imposition of national defense demands upon an already swiftly moving program, required extreme vigilance in the adaptation of management procedures during the fiscal year 1941. In the previous year considerable headway had been made in streamlining production schedules, the conversion of funds, inventory operations and movement of materials and supplies. The defense effort brought more new problems, such as the operation of priorities and the need for revision in construction schedules, which added greatly to the complexity of administration. Establishment of a management office during the 1940 fiscal year enabled the agency to meet these new complexities as they arose. A small staff of business analysts maintained close scrutiny of all procedures and during the year found ways to revise or eliminate or combine many of the agency's procedures in the light of new conditions.

Through the operation of time studies and a system of follow-up reports on all activities, all operations were maintained at schedule. New records were set as a result of improved procedures in the procurement of implements and materials. Particular attention was given to speeding field operations by decentralization of control through the use of branch offices located through the transmission area.

By the close of the year the management office was able to report an increase of 67 percent over the previous year in the processing of funds.

The vastly augmented construction program was reflected in the steady increase in the number of employees, an increase confined for the most part to the Engineering Division.

At the close of the fiscal year 1940 the agency had a total of 2,421 employees. At the close of 1941 the number had increased to 3,189. Of this number, 847 were laborers employed on work in connection with the construction program, 1,725 were civil-service appointees and 102 held professional, consultant or expert positions. Of the entire personnel, all but 28 employees were residents of Oregon, Washington, Idaho, or California.

Financial and accounting procedures also were further perfected during the fiscal year 1941. The financial or general ledger accounts were kept in accordance with the requirements of the General Accounting Office, and the detailed records incident to construction, operation and maintenance activities were kept in accordance with the Federal Power Commission's uniform system of accounts. Progress was made in further harmonizing the two very different methods of accounting required under existing laws and regulations. Consistent effort was made to reduce added expenditures incident to the harmonization of the two types of accounting.

A comparative income statement showing yearly and cumulative totals to June 30, 1941, follows:

TABLE 7.—Department of the Interior, Bonneville Power Administration, comparative income statement

	Cumulative to June 30, 1939, adjusted	Cumulative to June 30, 1940, adjusted	Cumulative to June 30, 1941	12 months fiscal year 1940 adjusted	12 months fiscal year 1941	Increase in fiscal year 1941
Electric operating revenue:						
Commercial and industrial sales		\$274.80	\$1,088,982.42	\$274.80	\$1,088,707.62	\$1,088,432.82
Sales to public authorities for redistribution		12,347.03	130,197.09	12,347.03	117,850.06	105,503.03
Sales to other electric utilities		405,113.55	1,072,390.70	405,113.55	667,277.15	262,163.60
Other sales to public authorities			254.37		254.37	254.37
Customers' forfeited discounts and penalties			120.02		120.02	120.02
Miscellaneous electric revenues		-.32	-.32	-.32		.32
Total operating revenue ¹		417,735.06	2,291,944.28	417,735.06	1,874,209.22	1,456,474.16
Operating revenue deductions:						
Operating expenses						
Transmission expense	\$1,490.69	46,798.61	264,202.01	45,307.92	217,403.40	172,095.48
Customers' accounting and collecting expense	122.02	3,788.10	12,358.49	3,666.08	8,570.39	4,904.31
Sales promotion expense			62,980.80		62,980.80	62,980.80
Administrative and general expenses ²	254,207.43	444,952.48	725,917.92	190,745.05	280,965.44	90,220.39
Total operating expenses	255,820.14	495,539.19	1,065,459.22	239,719.05	569,920.03	330,200.98
Depreciation ³	824.73	13,951.83	92,835.79	13,127.10	78,883.96	65,756.86
Total operating revenue deductions	256,644.87	509,491.02	1,158,295.01	252,846.15	648,803.99	395,957.84
Net operating revenue	-256,644.87	-91,755.96	1,133,649.27	164,888.91	1,225,405.23	1,060,516.32

See footnotes at end of table.

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TABLE 7.—Department of the Interior, Bonneville Power Administration, comparative income statement—Continued

	Cumulative to June 30, 1939, adjusted	Cumulative to June 30, 1940, adjusted	Cumulative to June 30, 1941	12 months fiscal year 1940 adjusted	12 months fiscal year 1941	Increase in fiscal year 1941
Income deductions.						
Interest on long-term debt ¹	\$45,572.68	\$295,677.97	\$861,005.62	\$250,105.29	\$565,327.65	\$315,222.36
Interest charged to construction—credit ²	17,570.13	219,466.53	566,196.81	201,896.40	346,730.28	144,833.88
Miscellaneous income deductions.....		10,286.33	94,991.37	10,286.33	84,705.04	74,418.71
Total income deductions.....	28,002.55	86,497.77	389,800.18	58,495.22	303,302.41	244,807.19
Net income.....	-284,647.42	-178,253.73	743,849.09	106,393.69	922,102.82	815,709.13

GENERAL NOTES.—This statement does not reflect the cost of electric energy delivered into the Bonneville Power Administration transmission system by either the U. S. Army Engineer Corps from Bonneville Dam or the Bureau of Reclamation from Grand Coulee Dam. The U. S. Army Engineer Corps delivered 34,202,833 kilowatt-hours in the fiscal year 1939; 208,571,138 kilowatt-hours in the fiscal year 1940; and 894,184,700 kilowatt-hours in the fiscal year 1941. The Bureau of Reclamation delivered 7,455,000 kilowatt-hours in the fiscal year 1941. This statement does not reflect a contingent revenue of \$182.25 resulting from interchanges of power.

¹ Does not agree with the amount shown on comparative revenue statement by \$120.02, forfeited customers' discounts and penalties, and \$0.32 which represents loss on an emergency sale of poles to a municipality due to failure to include stores handling on the bill.

² The difference in administrative and general expenses for the fiscal year 1940 as shown in this statement as compared with those shown in the 1940 annual report results from the capitalization of laboratory equipment charged to expense in error in 1940.

³ Depreciation for the fiscal years 1939 and 1940 has been adjusted to reflect the depreciation accrual applicable to those years. Depreciation has been temporarily established on a straight-line basis, pending determination of the most suitable method of computation.

⁴ "Interest on long-term debt" is the interest applicable to the total expenditures of the Bonneville Power Administration at 2.4 percent per annum on a dollar-month basis. The fiscal year 1939 and 1940 income statements have been adjusted to reflect the interest applicable to each of those fiscal years. The Bonneville Power Administration does not pay interest, but its rates are established with the view of repaying interest on the investment as well as amortizing the investment. This fact, coupled with the Administration's desire to keep records comparable to those of private industry, has led to reporting this item as an income deduction.

⁵ "Interest charged to construction-credit" represents the amount of interest which has been capitalized by the application of interest at 2.4 percent per annum on construction work in progress on a dollar-month basis. The fiscal year 1939 and 1940 income statements have been adjusted to show the "interest charged to construction-credit" applicable to each of those fiscal years. (See Note 4.)