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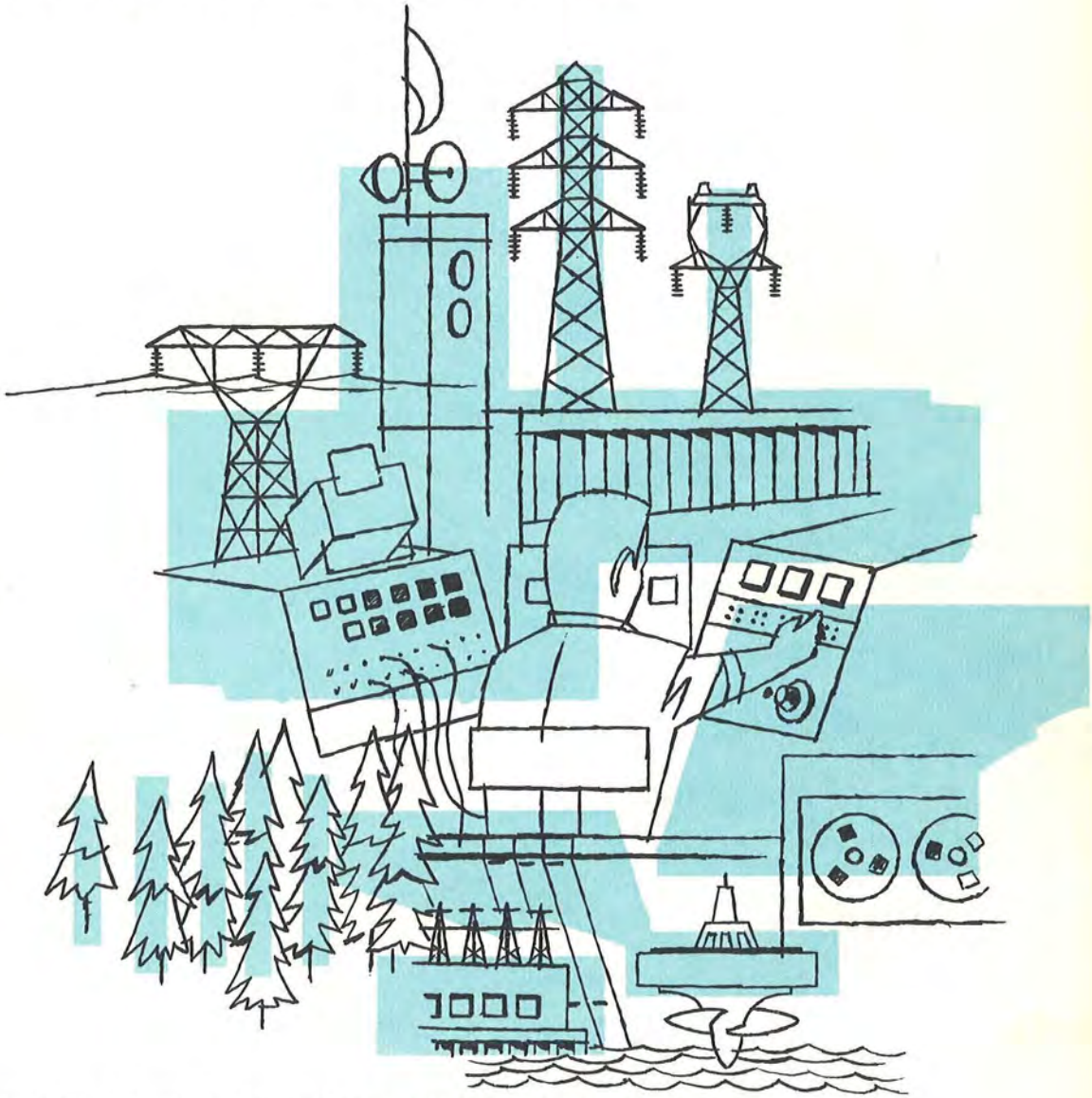
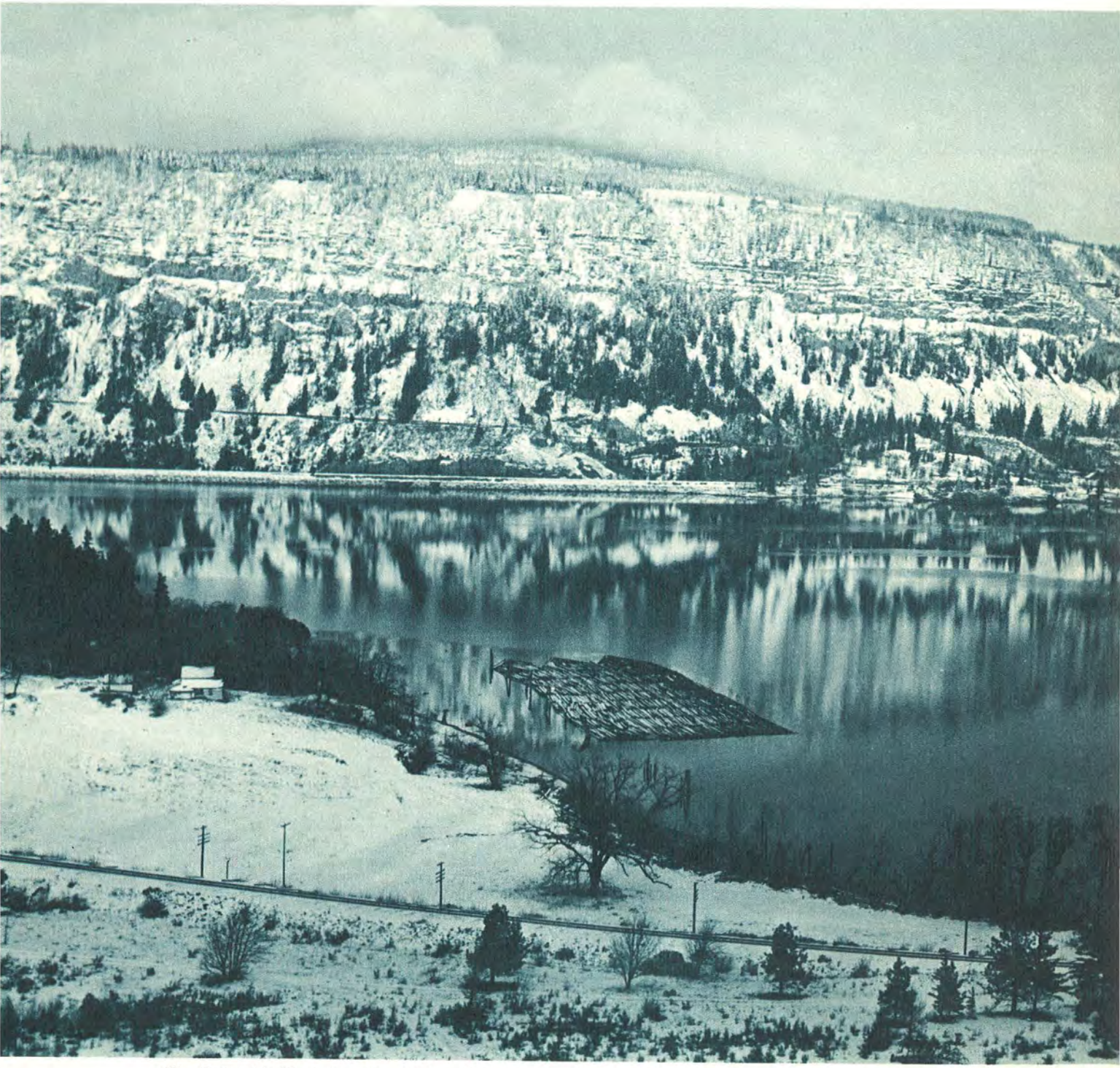
# 1972
# ANNUAL REPORT



U. S. DEPARTMENT OF THE INTERIOR

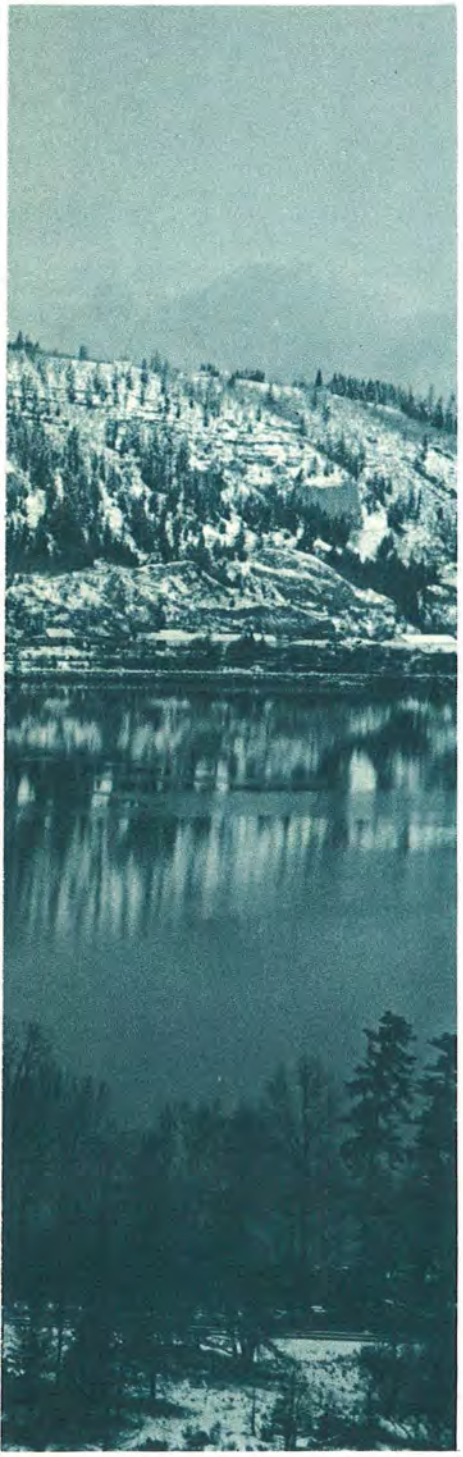
BONNEVILLE POWER ADMINISTRATION



*The Columbia River near Hood River, Oregon.*

DECEMBER 31, 1972

# FEDERAL COLUMBIA RIVER POWER SYSTEM



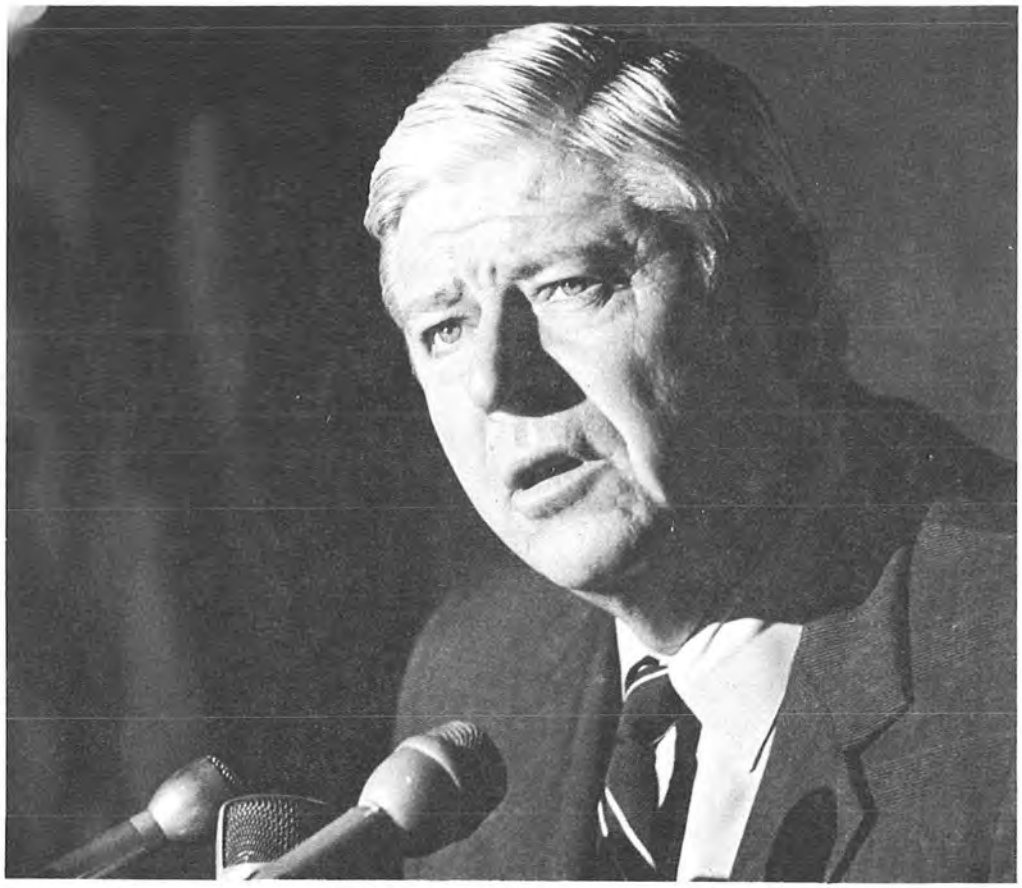
# 1972 ANNUAL REPORT

U. S. DEPARTMENT OF THE INTERIOR

ROGERS C. B. MORTON, SECRETARY

BONNEVILLE POWER ADMINISTRATION

DONALD PAUL HODEL, ADMINISTRATOR



*Secretary Morton answers press query.*

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# LETTERS TO THE SECRETARY

*November 30, 1972*

*Honorable Rogers C. B. Morton*
*Secretary of the Interior*
*Washington, D.C. 20240*

*Dear Mr. Secretary:*

*H. R. Richmond, Bonneville Administrator October 20, 1967- November 30, 1972*

*This is the Bonneville Power Administration's 35th Annual Report on the Federal Columbia River Power System and it is also my last report to you in my capacity as Bonneville Power Administrator. The report covers events of fiscal year 1972 and significant developments that have occurred since the fiscal year ended on June 30.*

*The keystone of BPA activity during the year, as during the past several years, was the Hydro-Thermal Power Program. This cooperative venture of 108 public and private utilities and the Bonneville Power Administration continued to apply itself to the goal of assuring the Pacific Northwest of an adequate supply of electric energy in the critical years ahead.*

*Since the Hydro-Thermal accord was reached in 1968, the public and privately owned systems have made commitments for a series of large thermal plants, which are scheduled to come into commercial operation through fiscal year 1982. The first plant constructed under the Hydro-Thermal Power Program is the coal-fired facility near Centralia, Washington. Its second 700-megawatt unit came on the line in August 1972. Problems with its pollution-abatement system have prevented this plant from achieving full output, but these are hopefully being resolved. The second plant under the program is the Trojan nuclear plant near Rainier, Oregon, which is scheduled for completion in September 1974. Coal fields in northern Wyoming will provide fuel for a plant there which is scheduled for completion there during the mid-1970's. To round out the package by 1982, utilities in the Pacific Northwest must construct three additional large nuclear steam plants and convert the Hanford N-Reactor to a more conventional nuclear plant.*

*Meeting the construction timetables for these thermal plants is but one side of the energy coin. While these facilities should keep pace with expanding base loads, we must still rely upon Federal hydroelectric generation to meet growing peak demands. This can only be done if we adhere to a tight construction schedule for increasing Federal generation.*

*During the period since the program was initiated, many Federal hydro projects have also gotten underway. Eight additional generating units at The Dalles are being installed and the first unit is scheduled to go on line in December 1972. On November 4, 1971, the first power from the 16th generator at*

*John Day Dam was transmitted. The dam now produces 2 million kilowatts and makes it currently the largest hydroelectric power project in the United States. The second three generators at Ice Harbor Dam will be available in the spring of 1975. Dworshak Dam has been completed and its reservoir filled for full operational use. Its powerplant, after a delay, is now scheduled for completion in 1973. Libby Dam, also nearing completion, will have four 105,000-kilowatt generating units with the first unit scheduled for service by July 1975. Work on the third powerplant at Grand Coulee Dam is about half completed and the first 600,000-kilowatt unit, the largest ever built, is scheduled to begin commercial operation in February 1975. A total of three such units should be available a year from that date. Several of these projects have suffered delays which have had a detrimental effect upon the load-resource balance in the Northwest. Their revised schedules must be maintained if the deficit situation between now and 1982 is not to be compounded.*

*Even with the scheduled addition of large amounts of peaking capacity and energy from Federal and non-Federal plants during the next 10 years, the area will experience peak deficits in each of the next 6 years, ranging from a low of 54 megawatts in 1976-77 to a high of 2,112 megawatts in 1974-75. The area will also experience energy deficits in 6 of the next 10 years, but not in the same 6 years. Such deficits will range from 26 average-megawatts in 1974-75 to 370 average-megawatts in 1979-80.*

*Gross revenues for the Federal Columbia River Power System increased from $155.7 million in fiscal year 1971 to $176 million during fiscal year 1972, an all-time high. However, the increase in revenues, although still leaving BPA in the black, is more than offset by rapidly rising expenses due in large part to the greater cost of energy from thermal plants, inflation factors, and higher interest rates paid by the Federal Government and the private sector. Thus, while gross revenues increased by $20 million, net revenues decreased by $10 million during the past fiscal year.*

*On a happier note, the W. A. Dittmer BPA System Control Center building is now completed. When fully operational in fiscal year 1974, it will be one of the most advanced power system control centers in the world. Also, the extra-high-voltage d-c intertie line, which went out of service when an earthquake caused major damage to its California terminus in early 1971, was restored to full commercial operation on September 5, 1972. It had been operating partially since March of 1972, by a special hookup developed jointly by BPA, the Los Angeles Department of Water and Power, and ASEA engineers. During the year Bonneville continued to extend its 500-kv grid with the addition of 233 circuit miles. A number*

*Assistant Secretary Smith speaks to BPA employees.*

*of 230-kv lines were also added, as were 12 new substations.*

*An interesting footnote is that in fiscal year 1972 the highest peak flow and the largest April-through-June runoff volume of the century would have occurred had the Corps of Engineers not been able to retard the flow through regulation of upstream reservoirs. In the absence of the dams and the large storage capacity of their reservoirs, the Lower Columbia would have experienced a more disastrous flood than that of 1948.*

*The Bonneville Power Administration continued its commitment to the preservation of the environmental quality of the Pacific Northwest. We are exploring better ways of constructing transmission lines and substations in order to minimize their environmental impact. Transmission line rights-of-way and access roads are being built and maintained in a manner which least impairs their natural surroundings. In furthering our environmental goals, we work in close cooperation with the Forest Service, the Bureau of Land Management, and Federal, State, and local environmental agencies. Our environmental impact statement is not completed until preliminary drafts have been widely circulated and reviewed in public meetings throughout the Pacific Northwest.*

*I take my leave of the Bonneville Power Administration confident that its mission will be carried out successfully by the capable and dedicated team of public servants which has developed over three and a half decades. This confidence is considerably enhanced by knowing that I am turning over the reins to Don Hodel, who, during his tenure as Deputy Administrator, has clearly demonstrated his ability to effect a smooth transition and to meet the challenges which lie ahead.*

*I wish to express my personal thanks and gratitude to you, to Assistant Secretary Smith, and to the members of your staff in the Department of the Interior who have been so understanding of our problems and so helpful in support of our program.*

*Sincerely,*

H R Richmond

*H. R. Richmond*
*Administrator*

*December 31, 1972*

*Honorable Rogers C. B. Morton*
*Secretary of the Interior*
*Washington, D.C. 20240*

*Dear Mr. Secretary:*

*Mr. Richmond's letter to you highlights our existing program and the salient events which occurred during fiscal year 1972. Since becoming Administrator on December 1, I have already encountered major power supply problems caused by severe weather conditions. As a result, BPA curtailed service to a record extent during nine days beginning on December 4, 1972. Our actual deficits were nearly double the shortages predicted for the winter of 1972-73, and underlined the seriousness of the power deficits anticipated in upcoming years.*

*Recognizing that we might be unable to serve our firm load by Thursday, December 7, I issued a public request on December 5 for voluntary curtailment on the part of the general public in the region to augment the BPA curtailment of industrial loads.*

*Unfortunately, the planning, financing and construction of additional generating facilities to alleviate these crises require leadtimes of five to ten years. It is therefore mandatory that we establish effective procedures for coping with the power shortages which face us during the next few years. We must also devise early solutions to the longer-range shortages we will confront.*

*Most importantly, the cooperative regional Hydro-Thermal Power Program must be continued. Because of the ever-lengthening leadtime required for construction of larger hydro and thermal powerplants, as well as for transmission increments, we must begin to plan immediately for continuation of that program from fiscal year 1983 through fiscal year 1993. We estimate that the Federal investment for hydroelectric generation and transmission facilities needed during this period will be $2.6 billion. During this same period, the investment for thermal powerplants and associated facilities, all of which must come from the public and private utilities in the area, will approximate $11.7 billion.*

*Unfortunately, it appears that the net-billing procedure adopted by Bonneville to help finance non-Federal thermal powerplants will no longer be feasible after fiscal year 1982. Acceptable alternatives for underwriting the plants and thereby avoiding an otherwise certain regional power shortage have not yet been identified. It is hoped that a solution will be found and found soon to keep the unique Hydro-Thermal Power Program viable, because the economic life and well-being of the entire region are at stake.*

*Russ Richmond announces his retirement.*

*As suggested by the fiscal outlook described in Mr. Richmond's letter to you, it is almost certain that our fiscal year 1973 financial statement will show a deficit.*

*The law requires that BPA set its rates at a level sufficient to recover the costs to the Federal Government of generating and transmitting electric power. Power revenues must also help to repay Federal irrigation construction costs beyond the water users' ability to repay. Thus the pressures upon our revenues can only be met by substantial increases in wholesale rates. We accordingly advised our preference customers on December 14, 1972 that our preliminary analyses indicate the need for raising firm power rates by 20 to 30 percent. If approved, the new rate structure will be in effect for the five-year period beginning on December 20, 1974, which is the earliest date that new rates can become effective. We expect that rates will be raised for each subsequent five-year period as permitted under our power sales contracts.*

*Energy conservation is an area that we have explored intensively this year and will continue to explore as long as the energy crisis is with us. Because the per capita consumption of electric energy in the Pacific Northwest has long exceeded that of the rest of the nation, we must take special pains to instill in the residents of the region a positive approach to conserving their use of this precious resource. It is the responsibility both of BPA and of the utilities in the region to make consumers aware of the consequences of wasting electric power. We must also convince the public that an expanding energy base and a clean environment can be compatible. As part of our rate structure review, we are considering proposals for pricing policies which will encourage energy conservation.*

*I am fully aware that the Bonneville Power Administration is charged with tremendous responsibilities. I consider myself extremely fortunate to have served under the able leadership of Russ Richmond. I assure you that I will devote all my energies to meeting the high standards which he has set.*

*Sincerely,*

Donald Paul Hodel

*Donald Paul Hodel*
*Administrator*

*500-kv line near Keeler Substation, Oregon.*

# INTRODUCTION - THE ENERGY CRISIS

Fiscal year 1972 may go down in history as the year in which "energy crisis" became a household phrase.

This was impressively demonstrated by the power emergency which later confronted the Pacific Northwest in December 1972. During the period December 4-13, temperatures dropped to as much as 30 degrees below normal for this time of the year. The effect upon the regional load/resource balance was aggravated by the prolonged duration of the cold spell, the continuing inability of the Centralia coal-fired plant to meet its anticipated output, and by the fact that the Hanford nuclear plant was closed down for scheduled refueling during this period.

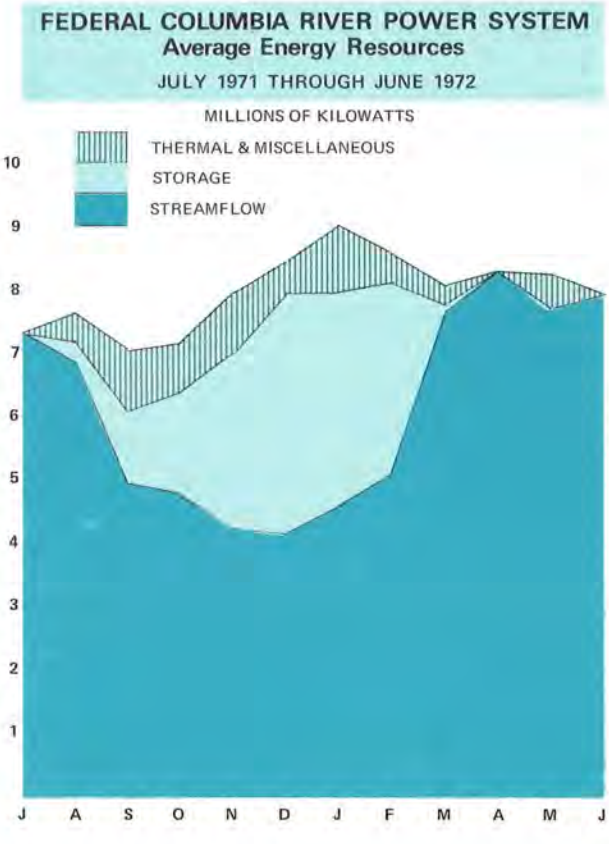
What ensued was a scramble to bridge the threatening load resource gap. BPA initiated curtailments of interruptible energy on December 4, and a record level of curtailment ensued during all but one of the following nine days. In all, the curtailments amounted to 34,000,000 kilowatt hours of interruptible energy. On December 11 alone, there were 15 hours of curtailment totalling 8,600,000 k w h.

During the period December 10-13, BPA also found it necessary to purchase over 11,400,000 kilowatt hours of energy from the Pacific Southwest at a total cost exceeding $100,000.

The prolonged series of interruptible power curtailments had a severe impact upon the industrial customers. Not only did they lose substantial production, but for a time they faced the possibility of having some of their potlines freeze, which would have been extremely disruptive and costly. To avoid this, they purchased some six million k w h of power from Southern California utilities and from B. C. Hydro at a cost of more than 12 mills per k w h.

During the cold spell, the ponds behind the dams declined because of the long, high peak power demands. Lower Columbia ponds fell to minimum levels, even interrupting some navigation. To alleviate this situation, water had to be released from the Arrow Lakes Reservoir to provide hydroelectric generation at Lower Columbia projects. This excessive spillage will have unfortunate consequences for the future, since most of this water was being stored for later firm power use. By the end of the cold period, Federal reservoirs were nearly 400 million k w h below firm operating plan levels for this time of year. Not only will this deficit make it necessary for BPA to purchase additional energy in the future, but regular direct-service deliveries of interruptible power to industrial customers may be delayed nearly two months beyond the anticipated winter curtailment period.

During the critical cold spell, BPA took an unprecedented step which could well be a harbinger for the future. The BPA Administrator issued a public appeal to all consumers to restrict voluntarily their consumption of elec-



*Powerlines cross Mt. Hood's slopes.*

tricity. The effect of such voluntary cutbacks cannot be ascertained, but hopefully they helped to alleviate further curtailments.

In the Pacific Northwest, 43 percent of the energy required for residential, commercial, and industrial usage comes from hydroelectric generation. This compares with a national average of only 4 percent, nearly all of the remainder being served by fossil fuel sources of energy.

Ninety-four percent of our regional demand for electricity is presently satisfied by hydroelectric power, but this ratio is bound to shrink. The plain fact is that we are fast approaching the feasibility limits for increasing hydro generation. Thermal power must fill the widening gap between hydro capacity and the projected 70 percent increase in regional demand for electricity over the next ten years.

So the energy crisis is as real in the Pacific Northwest as it is in the relatively rich fossil resource areas of the nation. The region can expect electric power shortages over the next six years. BPA load and resource forecasts indicate resource deficits for total peak load in each of the next six years (through 1977-78) and a resource deficit for firm peak load (excluding interruptible loads) in the winter of 1974-75. *The region has only a 10-percent chance of meeting firm peaks during that winter.*

Both load and resource forecasts for this region are extremely sensitive to weather conditions. Hydroelectric generation forecasts are based upon the lowest flows we can reasonably expect in the Columbia River system. These occur on an average of once every 20 or more years. Load forecasts are based upon relatively cold wintertime temperature conditions. A one-degree drop below this winter base level increases the region's peak power load by about 100,000 kilowatts. A five-degree drop requires the additional output of one Bonneville Dam.

The region will avoid the predicted deficits over the next six years only if most of the following things happen:

- Water and weather conditions are favorable.
- New sources of power are found outside the region which can be imported.
- Loads do not grow as rapidly as predicted.
- Adequate generation can be quickly added (that is, combustion turbines).

Because the region depends upon the Federal Columbia River Power System for a substantial portion of its total power supply, it is imperative that all scheduled Federal generation and transmission be funded and constructed in a timely manner. But even if new generation, both Federal hydro and non-Federal thermal, is installed as scheduled, the region will still experience power deficits in the next few years unless most of the aforementioned favorable conditions are also met.

*Assistant Secretary Smith gets briefing.*

BPA has obtained some imported power for the winter of 1973-74, but it does not appear that additional amounts of surplus peak capacity can be imported on a firm basis during the entire six-year shortage period. BPA's partners in the Hydro-Thermal Power Program (which is discussed in a later chapter) are developing new short-leadtime sources of power. Schedules for major thermal plants have already been advanced as far as practicable through 1977. An additional 4,650,000 kilowatts of new thermal generation is scheduled to become available from 1978 through 1981. This means that BPA will be able to meet its preference customer requirements until July 1984, if current load estimates prove to be accurate.

Delays in both non-Federal and Federal generation have contributed to the deficit situation facing the region. Nearly 50 hydrogenerators have fallen behind the original installation schedules of the Hydro-Thermal Power Program and only five have been advanced. Continued postponements will increase resource deficits and increase the very real possibility of firm load curtailments. The crux of the Hydro-Thermal Program is that 108 utilities and the Federal Government have in essence agreed to plan and construct the region's power facilities as if they were under a single ownership. The alternative would be to return to individual utility planning with a resultant loss of the economy-of-size advantages inherent in the program. This would ultimately lead to even higher consumer power bills and less efficient use of national resources.

A major challenge facing BPA and the region's utilities is to implement the Hydro-Thermal Program and at the same time protect our natural environment. Some environmental crusaders want to halt all economic and technological progress and to stop the building of power facilities. Without additional energy to meet future demand, per capita consumption would inevitably shrink as our population expands. We would have to give up progressively more per capita industrial capability and energy conveniences. A significant growth in loads cannot be deterred without seriously compromising the future well-being of consumers and jobholders alike. Environmentalists must participate responsibly in the planning process. The National Environmental Policy Act puts them into the game. The voice given them by NEPA also gives them some responsibility for dealing with future growth in the region.

The following chapters of this report detail what has been accomplished since July 1, 1971, to help solve the region's energy problems and what must be accomplished to keep the region both economically and environmentally livable.

*New Bandon-Gold Beach line at left.*

# THE OPERATING YEAR

Streamflows throughout the Federal Columbia River Power System receded rapidly in August 1971 from the high levels experienced during the runoff period. Thereafter, interruptible power, secondary energy, and sales of surplus energy to the Southwest were periodically curtailed to meet high load conditions and/or low waterflows. Such curtailments were imposed intermittently during the period mid-August 1971 through mid-February 1972 as follows:

| *Curtailment Period* | *Type of Curtailment* |
|---|---|
| August 24 – September 19, 1971 | All Non-firm Energy |
| August 24, 1971 – February 16, 1972 | Surplus Energy to the Southwest |
| October 18 – 31, 1971 | All Non-firm Energy |
| November 1 – 24, 1971 | All Non-firm Energy except that to Public Agencies |
| December 28, 1971– January 12, 1972 | All Non-firm Energy except that to Public Agencies |

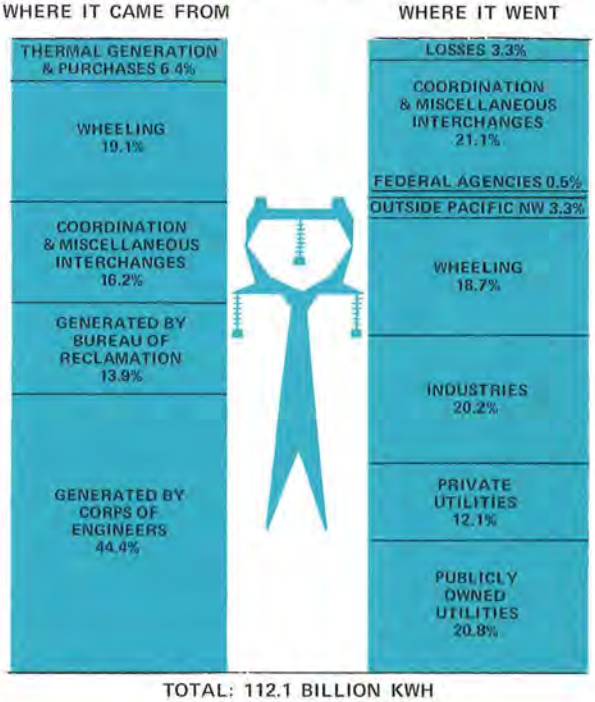
The only actual cut-off of power to industrial customers, and the only such cut-off since January 1969, occurred on the evening of December 28, 1971. The physical curtailment of power deliveries was neccessary during only the evening peak-load hours. Because of the short duration of this interruption, industrial operations were not seriously affected.

Interruptible load requirements were reduced in September 1971 for the remainder of the operating year because the aluminum industry was operating substantially below rated capacity.

Test operation of the first 700,000-kilowatt unit at the Centralia steamplant began August 13, 1971, with energy generated during test periods being delivered to BPA. Commercial operation was scheduled to begin September 1, 1971, but difficulty with the stack emission precipitators resulted in delays and reduced output from the plant. Average generation during the September-December period was only 155,000 kilowatts. The first unit was declared in commercial operation for a rating of 300,000 kilowatts on January 1, 1972. Principally because of continuing difficulty with the precipitators, average generation for the remainder of the year was about 260,000 kilowatts.

**SOURCE AND DISPOSITION OF TOTAL ENERGY HANDLED BY BPA**

FISCAL YEAR 1972




TOTAL: 112.1 BILLION KWH

Streamflows of the Columbia River rose substantially during late January 1972 as a result of a warm Pacific storm throughout the basin. Some streams west of the Cascades experienced record-breaking floods. Power loads increased rapidly on the 21st because of the cold snowy weather that followed the wet storm, and at the same time, the capability of the Federal system

*B.C. Hydro loses Peace River power.*

*Slide takes out B.C. Hydro line.*

was reduced by more than two million kilowatts because of the flood control operation. Fortunately, with the Hanford thermal plant operating at full output over the high load period, the Federal system was able to meet all requirements with available generation.

What was a very wet storm in the United States proved to be a very icy storm in British Columbia. Shortly after 4 p.m. on January 20, the British Columbia Hydro and Power Authority lost its Peace River generation. The B. C. Hydro system immediately drew more than a million kilowatts from the BPA system, which caused a temporary frequency drop in the Pacific Northwest. Power was actually drawn over the interconnected systems from the Pacific Southwest (420,000 kilowatts), from Idaho and Montana (55,000 kilowatts), and from BPA and other Pacific Northwest utilities (550,000 kilowatts). B. C. Hydro requested that another 300,000 kilowatts of emergency power be scheduled. This was granted, but 20 minutes later another frequency excursion occurred and again power was drawn from the United States.

Subsequent reports showed that both of B. C. Hydro's 500,000-volt lines between Vancouver and Kelly Lake had gone down because of heavy icing. In addition, a 360-kv line and two 230-kv lines between Vancouver and the Bridge River generating plant, which has 550,000 kilowatts of generation, went out of service because of coincidental relay trouble. B. C. Hydro appealed to its commercial and residential customers to curtail power uses and to its industrial customers to shut down as much as possible. The shortage lasted for more than a week before lines were restored.

By mid-February, projections indicated sufficient storage energy to meet all Northwest needs for the remainder of the power year, and so BPA declared surplus energy available for sale to the Pacific Southwest. The Federal Power System remained on a surplus energy status from February 17 through August 21, 1972, and again from August 24 to 29. Because of above-median streamflows in August and September, the Federal system was able to meet all Northwest secondary energy demands through September 1972.

The spring flood control operation had little adverse effect on power operations and the refill operation was successful from a power point of view except at Hungry Horse. The delay of the Hungry Horse refill until August 24, 1972, caused some loss in surplus energy sales to the Pacific Southwest. The delayed refill was caused mainly by a volume inflow forecast that was over 300,000 acre-feet too high. The Water Management Group (a Federal-State interagency management entity) has agreed to re-

evaluate the seasonal runoff forecasting procedure and the refill strategy for Hungry Horse to reduce the possibility of the reservoir not refilling.

**Power System Operations**

The Federal system established a new 60-minute peak generation record of 11,513,000 kilowatts on December 13, 1972. A new 24-hour generation record of 248,681,000 kilowatt-hours had previously been set on January 27, 1972.

The year was highlighted by the return to service of the direct-current intertie to California which had been out of service since the earthquake severely damaged the d-c terminal at Sylmar, California, on February 9, 1971. Partial restoration of the Sylmar terminal in March 1972 permitted transmission of up to 360,000 kilowatts. In April, a third valve group was added, resulting in a total line carrying capability of 680,000 kilowatts. This was particularly timely because substantial surplus energy was then available in the Pacific Northwest and there was a high demand for energy by the Pacific Southwest. In fact, the intertie lines to California were loaded at 84 percent of available capacity for the fiscal year and nearly 100 percent during the last four months of the fiscal year. The direct-current intertie was restored to full operation on September 5, 1972.

On August 4, 1972, the interconnected power system of the West suffered a power loss of approximately 3.2 million kilowatts – three times that which triggered the East Coast blackout of November 1965 – but relatively few consumers were affected, thanks to the reliability of the system. This near-catastrophe occurred during the process of de-energizing approximately one mile of 230-kv transmission line with a motor-operated disconnect switch at the Celilo Converter Station. This switching operation had been performed successfully several times previously, but this time a protective rod gap flashed over at the Big Eddy Substation. Clearing this fault dropped the Celilo Converter Station, which was transmitting 1,035,000 kilowatts to Los Angeles Department of Water and Power. Loss of the d-c delivery initiated insertion of the series capacitors at Bakeoven and Fort Rock on the 500-kv a-c intertie lines to California. However, the swing initiated by the loss of the d-c line caused an operation of the relays at Malin Substation. This relay action interrupted both the 500-kv a-c Grizzly-Malin and Malin-Round Mountain intertie lines. The actual a-c flow south of Malin was 2,200,000 kilowatts. The loss of the a-c lines activated generator dropping in the Northwest and brought the Four Corners "islanding scheme" into play.

These actions separated the Western Systems Coordinating Council region into three areas: the Northwest – consisting of British Columbia, Washington, Oregon, Idaho, and western Montana; the Southwest – consisting of California, Nevada, Arizona, New Mexico, and a small portion of Texas; and the Eastern Area – consisting of Utah, Colorado, Wyoming, and eastern Montana.

In the Northwest Area, the frequency rose on the initial swing; in the Southwest Area, the frequency dropped; and in the Eastern Area, the frequency rose. These frequency excursions caused some loss of load throughout all of the Western States but power was generally restored in about 10 minutes and no area-wide power blackouts occurred.

The Western Systems Coordinating Council has made an intensive study of the above crisis. Based upon study recommendations, procedures will be strengthened and equipment will be modified to reinforce the reliability of the interconnected systems.

We have continued to experience serious loading and voltage difficulties in northern Idaho because of inadequate transmission into the area. Several improvements were made in fiscal year 1972 to support the area and to compensate for the delay in Libby Dam generation. Shunt capacitors were installed at Albeni

*Recreation behind McNary Dam.*

Falls, and an arrangement was made to hold the level of Pend Oreille Lake to two feet above normal to increase the generating capacity at Albeni Falls. Pacific Power & Light Company has also installed a 27,000 kilowatt gas-turbine generator at Libby to support the northern extremity of the area. The long-term correction of the problem will include service from a new substation near Newport, Washington.

# STORAGE DAMS PROVE THEIR WORTH

Of the three Columbia River Treaty storage projects, only Mica Dam remains to be completed. It is on schedule and will be ready for operation by April 1, 1973. Mica is also the only Canadian project which will include generation. Two units of 430,000 kilowatts each are scheduled for installation in 1976 and two additional units for 1977. In addition, with the completion of the Corps' Libby Dam, four 105,000-kilowatt generators are now scheduled for installation during fiscal year 1976.

More significant were the flood control benefits achieved during 1972 as a result of the reservoir capacity at Arrow Lakes and Duncan in Canada and the Libby reservoir in the United States.

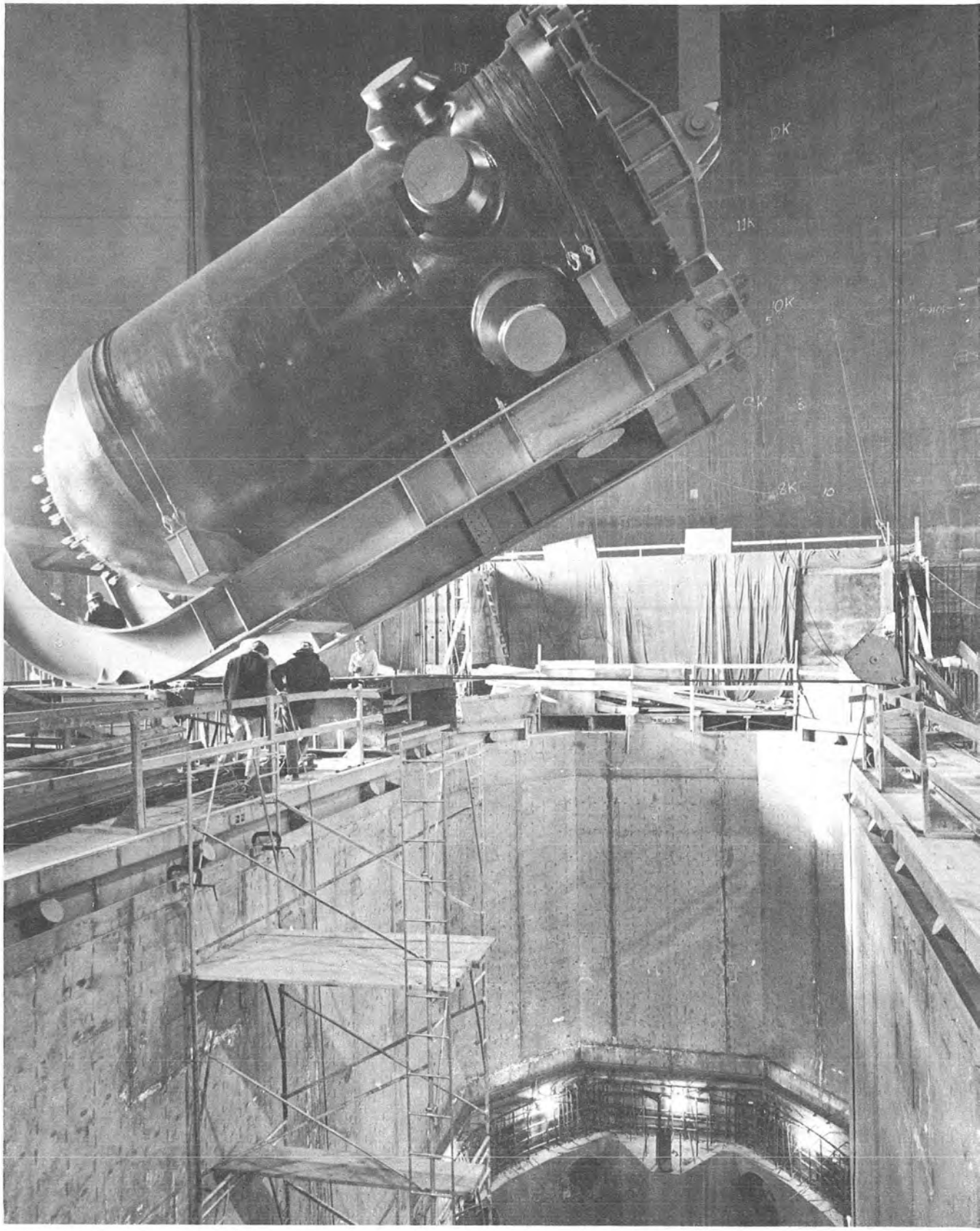
Without regulation of upstream reservoirs, the 1972 high water season would have produced both the highest peak flow and the largest April-through-June runoff volume of the century as measured at The Dalles, Oregon. The computed unregulated peak discharge at The Dalles was 1,050,000 cubic feet per second (cfs) on June 12. The actual observed peak discharge was 618,000 cfs on June 20. By comparison, during the disastrous 1948 flood in the Pacific Northwest, observed peak discharge was 1,010,000 cfs. At Vancouver, Washington, the key gaging station for evaluating flooding on the lower Columbia River, the 1972 maximum stage was 21.5 feet instead of a computed unregulated stage of 31.5 feet. Major flood stage at Vancouver is 26 feet. Again, unregulated discharges at Bonners Ferry, Idaho, would have caused stages near 38 feet, a major flood. The operation of Libby reservoir held the observed maximum to 24 feet.

It is estimated that Libby, Duncan, and Arrow projects contributed about 31 percent of the total effective storage for flood control regulation of the lower Columbia River during the peak runoff month of June 1972. Approximately $213 million of potential flood damage along the lower Columbia River was avoided, thanks to the flood control capabilities of these three projects.

*Libby Dam nears completion.*

*Mica — Canada's highest earthwork dam.*

*Vanport 1948 — It might have happened again.*



 *Trojan reactor vessel being placed.*

# POWER FOR THE FUTURE

## The Hydro-Thermal Power Program

Since publication of the last Annual Report, sponsors have been found for all of the large thermal plants scheduled under the Hydro-Thermal Power Program to come into commercial operation through fiscal year 1982.

The first of these, the Centralia coal-fired steam plant, went into test operation with one 700,000 kilowatt unit in August 1971. The second unit came on line for testing in August 1972.

The Jim Bridger coal-fired plant located near Rock Springs, Wyoming, will include three 500,000-kilowatt units. Construction is on schedule. Water supply intake structural construction is underway and is to be completed in 1973.

**PACIFIC NORTHWEST GENERATING CAPACITY**
**WEST GROUP AREA**

| | Millions of kw |
|---|---|
| Generating Capacity (Nameplate) In Service And Under Construction At June 30, 1968 – Immediately Prior To Initiation Of The Hydro-Thermal Power Program: | |
| Federal Hydro | 15.4 |
| Non-Federal Hydro | 9.4 |
| Thermal | 2.7 |
| Total | 27.5 |
| Generating Capacity (Nameplate) In Service, Under Construction And Committed For Construction Pursuant To The Hydro-Thermal Power Program Announced In October Of 1968 – (As Of October, 1972): | |
| **Federal Hydro:** | |
| Placed In Service[1] | 3.1 |
| Under Construction | 6.2 |
| Scheduled Through F.Y. 1982 | 2.8 |
| Sub-total | 12.1 |
| **Non-Federal Hydro:** | |
| Placed In Service[1] | 1.0 |
| Under Construction | 0.0 |
| Scheduled Through F.Y. 1982 | 0.0 |
| Sub-total | 1.0 |
| **Thermal:** | |
| Placed In Service[1] | 1.4 |
| Under Construction | 4.1 |
| Scheduled Through F.Y. 1982 | 4.6 |
| Sub-total | 10.1 |
| Grand Total | 23.2 |

[1] Amount placed in service after June 30, 1968

*Trojan nuclear plant.*

The Trojan nuclear plant, located on the Columbia River near Rainier, Oregon, was about 50 percent completed as of September 1, 1972. It will consist of one unit with a nameplate rating of 1,130 megawatts.

The Washington Public Power Supply System's Nuclear Project No. 2, located on the Hanford Reservation near Richland, Washington, will have a capacity of approximately 1,100 megawatts and is scheduled for commercial operation in September 1977. It was originally scheduled to come on line in March 1978, but this schedule was advanced to close the gap left by the loss of the proposed Eugene Water and Electric Board nuclear plant which was delayed four years by Eugene voters in the spring of 1970.

Dual-purpose operation of the Hanford NPR generator has been extended for an additional year to July 1, 1975, because of the critical power situation during the 1974-75 operating year. After a five-year construction shut-down, the converted plant – WPPSS Nuclear Project No. 1 – is scheduled to become operative in

**INVESTMENT BY FEDERAL AND NON-FEDERAL UTILITIES IN GENERATION AND TRANSMISSION FACILITIES AS PART OF THE INITIAL PHASE OF THE PACIFIC NORTHWEST HYDRO-THERMAL POWER PROGRAM THROUGH F.Y. 1982**

| | Millions of $ |
|---|---|
| Investment in Service and Under Construction As Of Initiation of Program: | |
| Federal—As of June 30, 1968: | |
| Hydro | 1,962 |
| Transmission | 921 |
| Total Federal | 2,883 |
| Non-Federal—As of December 31, 1968: | |
| Hydro | 1,750 |
| Thermal | 174 |
| Transmission | 513 |
| Distribution | 1,500 |
| Total Non-Federal | 3,937 |
| Total Federal and Non-Federal | 6,820 |
| Investment in Service, Under Construction and Scheduled through F.Y. 1982: | |
| Federal—As of June 30, 1972: | |
| Hydro—In Service | 1,900 |
| —Under Construction | 870 |
| —Scheduled through F.Y. 1982 | 1,100 |
| Total Federal Hydro | 3,870 |
| Transmission—In Service | 1,145 |
| —Under Construction | 169 |
| —Scheduled through F.Y. 1982 | 1,321 |
| Total Federal Transmission | 2,635 |
| Total Federal | 6,505 |
| Non-Federal—As of December 31, 1971: | |
| Hydro—In Service | 1,922 |
| —Under Construction | 1 |
| —Scheduled through F.Y. 1982 | 40 |
| Total Non-Federal Hydro | 1,963 |
| Thermal—In Service | 178 |
| —Under Construction | 808 |
| —Scheduled through F.Y. 1982 | 2,913 |
| Total Non-Federal Thermal | 3,899 |
| Transmission and Distribution—Placed in Service | 2,439 |
| —Under Construction | 401 |
| —Scheduled through F.Y. 1982 | 2,811 |
| Total Non-Federal Transmission and Distribution | 5,651 |
| Total Non-Federal | 11,513 |
| Total Investment | 18,018 |

1980. Current plans are to replace the present reactor with a modern nuclear steam supply system and to add a topping turbine which will increase the capacity of the plant from 800 megawatts to 1,200 megawatts.

Also scheduled for completion in 1980 is the nuclear plant to be built by Portland General Electric Company. A site near Boardman, Oregon, and two other locations are presently being considered for this 1,200-megawatt facility.

Siting studies are currently underway for the WPPSS Nuclear Project No. 3, which will have a 1,200-megawatt capacity when it comes on line in 1981.

With the sponsorship of the above seven thermal plants now resolved, the next major challenge is to assure that they are completed on schedule. The ever-lengthening lead time for siting and developing new thermal plants, particularly nuclear facilities, has already caused severe delays throughout the nation. This makes it doubly imperative that construction of future thermal plants be given high priority if the energy needs of the Northwest in the 1980's are to be met.

Table 5 summarizes the current status and projected timetables — through 1982 — for the thermal plants now under construction or in the planning stage. They include those scheduled under the Hydro-Thermal Power Program and supplemental generating facilities.

Adhering to the critical timetables for those facilities scheduled through 1982 poses grave problems due to factors already described. The construction of additional thermal plants to serve public agency loads beyond that date faces yet another major problem.

The BPA net billing procedure cannot continue to be used for acquiring power from plants to be constructed after 1982 because, from a planning viewpoint, the total annual costs of all the plants would exceed the amount which can be offset against BPA billings to public agencies.

This jeopardizes the ability to finance thermal energy needed by BPA for blending with Federal hydroelectric power — the very keystone of the Hydro-Thermal Power Program. If this program and its attendant advantages of cooperative regional planning and construction

*Dworshak Dam tops out.*

*Generators under construction at The Dalles Dam.*

of generation and transmission facilities are to be preserved, this financing problem must be resolved. The Northwest utilities are now exploring various solutions to this problem.

**Bonneville Dam Modifications**

Work is underway on several aspects of Bonneville Dam's function in handling the peaking discharges from upstream plants. This entails a sequence of functions at Bonneville which are:

- Re-regulation of the added generating capability at The Dalles with present Bonneville normal pool elevation at 74.0 feet, with increased normal pool elevation of 76.5 feet,
- Bonneville Second Powerplant completed and in operation.

The starting date of each function depends upon progress in solving the problems which have been encountered. The major controlling factors are (1) availability of eight units now being added at The Dalles, (2) construction for raising the Bonneville pool, (3) provision of right-of-way for the higher pool, and (4) development and approval of new operating criteria. The operating criteria will be influenced strongly by the need for coordinating with non-power river uses – sport, commercial and Indian fishing, navigation, irrigation, flood control and recreation.

**The Dalles Dam Additional Units**

Construction of the eight additional generating units at The Dalles has continued so that the first went on line in December 1972. The last one is now scheduled for August 1973, as compared to the previous date of May 1974. This provides some relief from power peaking shortages, but full use of the units is inhibited by the operating limitations at Bonneville.

**John Day Dam**

Power from the 16th generator at John Day Dam was initiated onto the BPA system lines November 4, 1971.

John Day is one of the largest hydroelectric power projects in the world and, until Grand Coulee's first 600,000-kilowatt unit comes on line, it will be the largest such producer outside the Soviet Union. With all 16 of the initial turbine-generator units operating, it can produce more than two million kilowatts. There is space in the powerhouse for four more generating units. When they are constructed, the project will provide 3.1 million kilowatts.

**Ice Harbor Dam Additional Units**

The second three generators at Ice Harbor Dam will raise the project capacity to 603,000 kilowatts. They are scheduled to be available in early 1975.

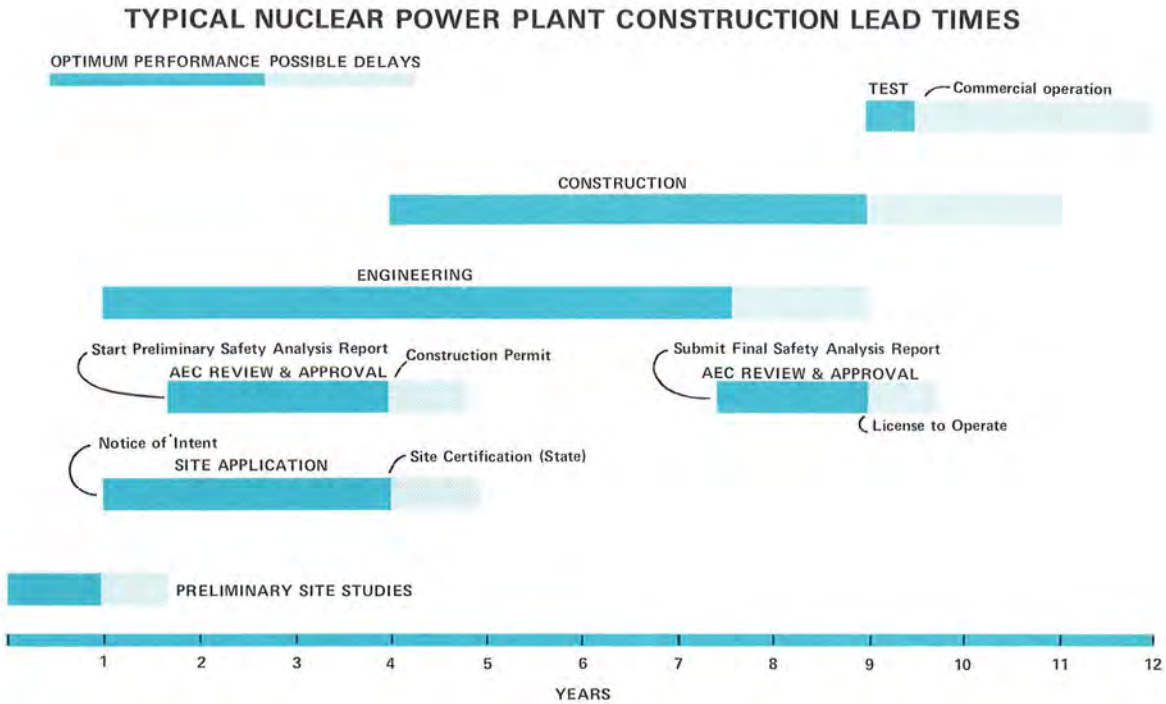
**Lower Granite Dam**

The Lower Granite Project, which will complete the navigation stairway from the Pacific to Lewiston, Idaho, will have three generators with 405,000 kilowatts of capacity by 1975. This installation will ultimately be doubled by installation of three additional units.

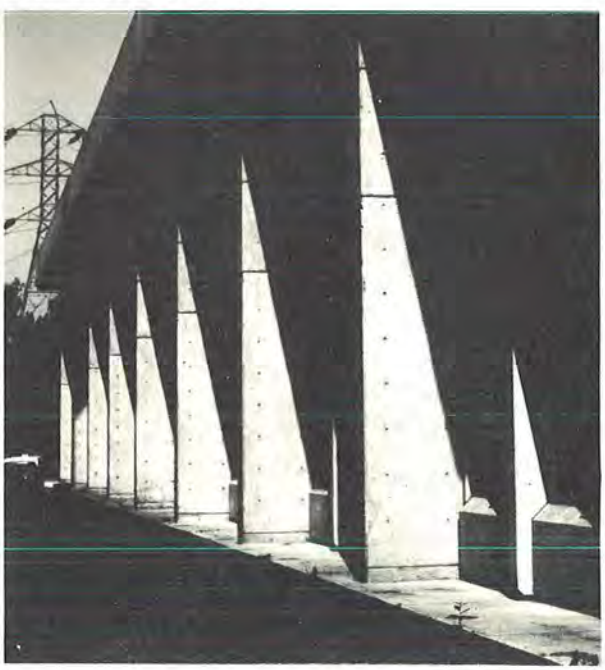
**Dworshak Dam**

Dworshak Dam was completed and the reservoir filled for the first time in the 1972-73 storage release year. The reservoir provides nearly two million acre-feet of storage for flood control and power generation.

The powerplant at Dworshak was begun in April 1970 and is now scheduled for comple-




*Dittmer Control Center.*



tion in the spring of 1973. This is a delay from the initial generation scheduled for November 1972. Because of this delay, the peak deficit in 1972-73 is increased by the capacity of the first unit.

### Libby Dam

Construction of Libby Dam is nearly completed. The reservoir filled to elevation 2,405 feet this year. It is currently being drafted to an elevation of 2,230 feet to permit construction of a rockfill buttress on the left bank upstream from the dam. The buttress will insure against landslides which might occur because of reservoir fluctuations. The buttress will be built to a height sufficient to permit storage to full pool elevation of 2,459 feet. Thereafter, draft to 2,287 feet will provide live storage of 4.9 million acre-feet.

Powerhouse construction is underway to provide four 105,000-kilowatt generating units, the

*Third Powerhouse at Grand Coulee Dam.*

first to be in service by July 1975. Four additional units can be installed later but will necessitate construction of an authorized reregulating reservoir.

**Grand Coulee Dam Third Powerplant**

Work on the Third Powerplant at Grand Coulee Dam is about half completed. The first unit of 600,000 kilowatts capacity, an unprecedented size, should begin commercial operation in February 1975. Two more such units will be on line by February 1976. These dates are a full year behind those originally scheduled. The second group of three units is tentatively scheduled to follow the first three with only a six-month interval between the completion of the first bank and start of installation of the second. This should shorten the total installation schedule by nearly two years from that originally planned.

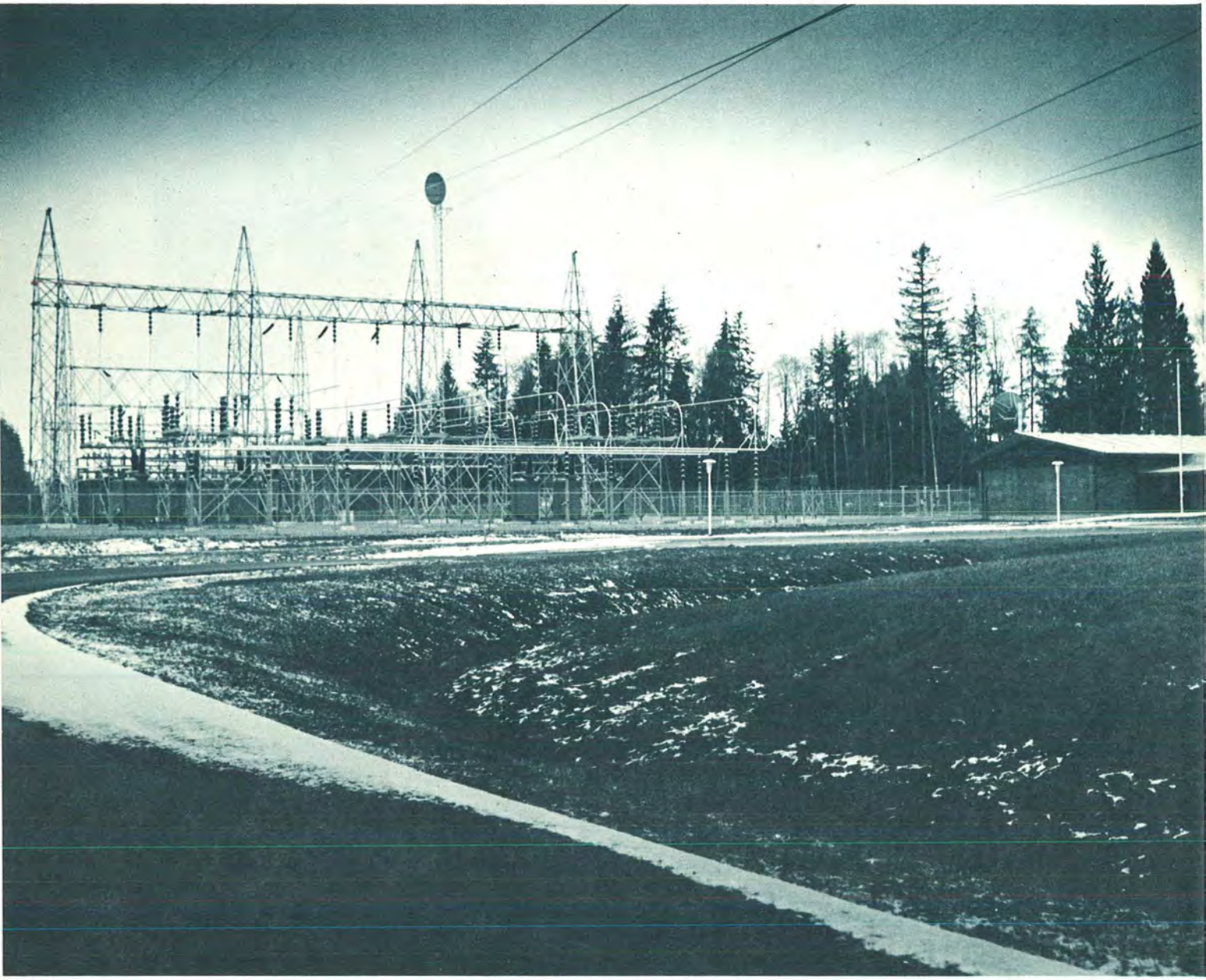
Completion of forebay and penstock has been delayed to the point that removal of cofferdam and bridge plus channel inlet excavation will not be possible in 1973 as previously scheduled. Deep drawdown of the Coulee reservoir will therefore be postponed from 1973 to 1974.

The seventh and eighth irrigation pumps being constructed at Grand Coulee are of a pump-turbine design. These units, each with a generating capacity of 50,000 kilowatts and scheduled by June 1973, will provide power capability during daily peak periods in addition to irrigation pumping.

**Non-Federal Hydro Projects**

Four units with 119,000 kilowatts of new peaking capacity from each unit were completed at the Rocky Reach plant during the year. The last unit came into commercial operation in December 1971. This increased the peaking capacity of that plant from 815,000 kilowatts to 1,291,000 kilowatts.

There were no non-Federal hydroelectric projects under construction in 1972. Additional generator installation at Rock Island project has been under study and may soon be initiated. Construction of large pumped storage plants has been under investigation at several sites. Delay or elimination of Federal peaking units collectively would improve the feasibility of pumped storage to an earlier date.



*Murray Substation near Arlington, Wash.*

# BUILDING THE TRANSMISSION SYSTEM

Although BPA has assumed a leadership role in the Hydro-Thermal Program, its principal mission remains the construction and operation of a major transmission grid for marketing power. BPA continues to build to meet the demands of the region.

**Transmission Construction**

Fiscal year 1972 saw the extension of the 500-kv grid by 233 circuit-miles. This included 33 miles of transmission line from Grand Coulee to Chief Joseph and 122 miles from Chief Joseph to Monroe. The latter transmission line replaces two 230-kv circuits and carries four times as much power on the same right-of-way. The higher capacity lines are necessary to carry power generated at the Grand Coulee and Chief Joseph Dams to the Puget Sound area in western Washington.

Other 500-kv lines added were the 45-mile Chief Joseph-Sickler line, the Paul-Olympia No. 1 line which runs 20 miles from the new Paul Substation at the Centralia steam plant to Olympia, Washington, and the 13-mile Sno-King Tap to the Monroe-Sammamish No. 1 line.

A number of 230-kv lines were also added. The 107-mile Olympia-Port Angeles line is the major addition. The total system mileage on July 1, 1972, stood at 11,766 circuit-miles, a net increase of 284 miles over last year. By the end of fiscal year 1973, the system will have more than 12,000 circuit-miles of high-voltage transmission.

Efforts to update existing lines wherever possible is reflected in the fact that 86 circuit-miles of lower voltage lines were retired from service during this fiscal year. The 135-mile-230-kv North Bonneville-Midway No. 1 line has been deenergized to permit the right-of-way to be used for the 500-kv Hanford-Ostrander line.

New BPA substations completed during fiscal year 1972 were Murray, Boardman, Colville and Mesa.

The 500-kv Dworshak-Hot Springs line, tying the Dworshak Dam and Lower Snake generation to Montana, was completed in mid-November 1972.

Other projects underway, but not yet completed, are the Lower Snake 500-kv lines and terminals; the Hanford-Ostrander 500-kv line; the Paul-Allston No. 2 line and terminals; the Ostrander-Troutdale 500-kv line with a 500-kv transformer bank at Troutdale; the Toledo-Wendson 230-kv line with terminals and transformer banks at both ends.

*Helicopter places concrete on Lewiston Grade.*

*Sky-crane picks up tower bridge.*

*W. A. Dittmer BPA System Control Center.*

Special techniques were used to build 12.5 miles of the Lower Granite-Hatwai 500-kv line across the face of the scenic Lewiston Grade in Idaho. Tools and materials for tower footings were hauled in by horseback and the rest of the construction work from concrete placing to conductor stringing was done with helicopters to avoid scarring the hillside with access oads. These techniques added about one-third to the cost of construction for the line.

A major system addition was the laying of a third San Juan cable. This 35,000-volt cable was laid in two sections between Lopez and Decatur Islands and Decatur and Fidalgo Islands in August 1972 and energized in November. The first San Juan cable (previously damaged and since out-of-service) was declared surplus during the year and salvaged by the Orcas Power and Light Company, which was able to use sections of it between other Islands in the system. A second cable operating at 25,000-volts remains in service.

**Control and Dispatch**

The Control and Dispatch System is nearing completion. The W. A. Dittmer BPA System Control Center building at Vancouver, Washington, was completed in December 1971, and a $5 million computer system, termed a "Real Time Operations Dispatch and Scheduling (RODS) System," has been installed in the center and is undergoing acceptance tests.

Other key subsystems already installed at Dittmer include an 800-kw Gas Turbine Emergency Generator System, a solid-state Uninterruptible Power Supply (UPS) System, and five microwave system terminals relocated from Portland. To date, 34 Supervisory Control and Data Acquisition Terminals have been installed at certain substations, and 16 other systems presently are being installed or are scheduled for installation.

When fully operational in fiscal year 1974, this control center will be one of the most advanced power system control centers in the world.

Design work got underway in fiscal year 1972 for the Eastern Control Center at Moses Lake, Washington. This facility, which will be energized in early 1976, will provide control and dispatch for the subtransmission system east of the Cascade Mountains. It will also provide emergency backup control for the main grid in the event that Dittmer control center is rendered inoperative by natural or other disasters.

**Intertie**

The high-voltage direct-current Intertie was restored to full commercial operation on September 5, 1972. Partial operation had been in effect since March 1972. A special circuit arrangement known as monopolar metallic return, developed jointly by BPA, the Los Angeles Department of Water and Power, and ASEA engineers, was a major factor in this early restoration.

Related to the BPA pioneering effort in high-voltage direct-current transmission is a contract with a noted consultant for earthquake studies. This includes provision for the establishment of criteria for corrective measures to protect BPA facilities at susceptible locations from future earthquake damage. Specification criteria for the procurement of new equipment with seismic resistance and a program for installation of strong-motion accelerograph stations are included.

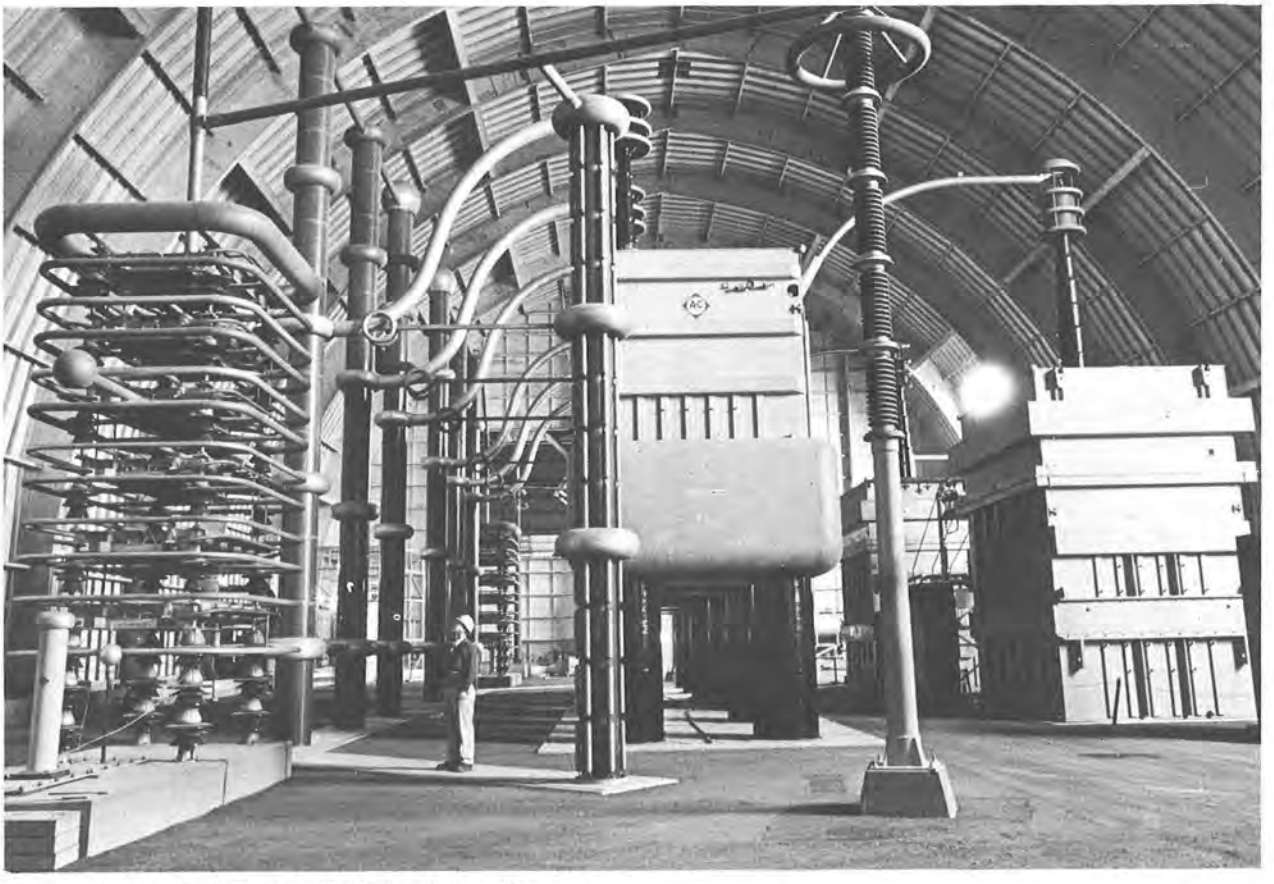
*Realtime Operation, Dispatch and Scheduling Computer—Dittmer.*

*Console of RODS Computer—Dittmer.*

**Research for the Future**

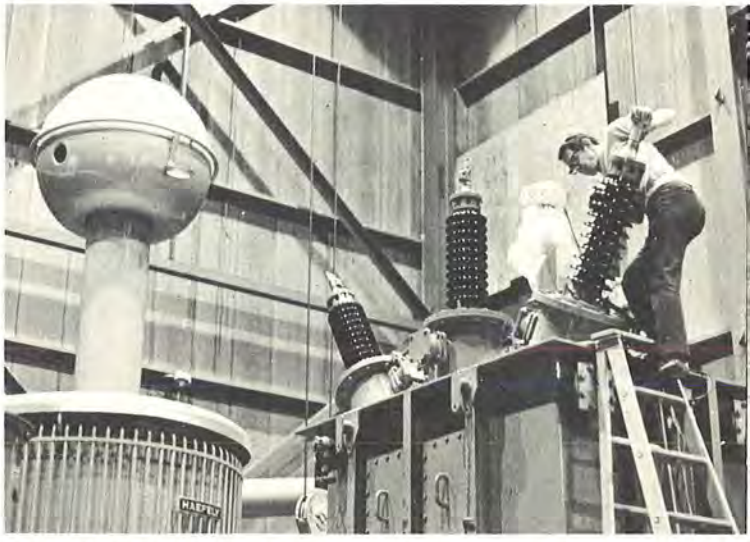
More and more emphasis has been placed on research and development as BPA anticipates the needs of the future.

At the HVDC Test Center at The Dalles, a joint three-year research and development project with the Edison Electric Institute is progressing. This project will provide operating information on HVDC up to ± 600 kv. During the project's first year, the power supply has been upgraded from 550 to 600-kv bipolar and from 825 to 900-kv monopolar, the building and associated equipment have had their test capabilities increased accordingly, and a new fog test chamber has been built. Utilizing these revised facilities, line and fog chamber tests began during the fall of 1972.



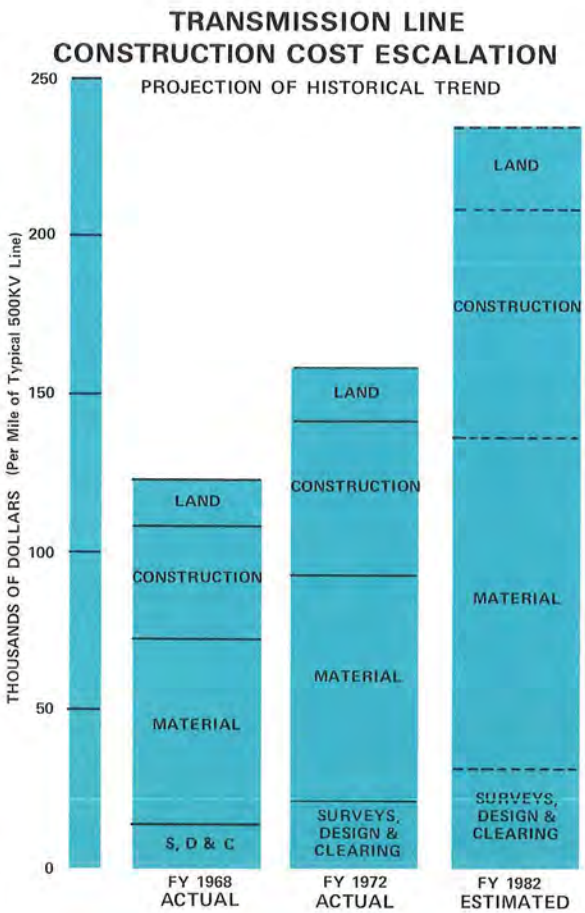
*Direct Current Test Center—Big Eddy Substation.*

*New San Juan cable goes ashore.*



*Extra High Voltage Laboratory—Ross Substation.*

Design of a series of double-circuit towers for 500-kv high capacity lines has recently been completed. Three of these tower types will undergo full-scale loading tests this winter at the National Tower Testing Station near Bristol, England.




Towers being fabricated in Japan for the Hanford-Ostrander 500-kv crossing of the Columbia River at Bradford Island, near Bonneville Dam, are designed for eventual upgrading to 765-kv.

In addition to these projects, the Boeing Company recently completed a contract with BPA for developing a computerized mathematical technique whereby transmission line configurations can be analyzed for potential subconductor oscillation. This program will be useful in predicting problems, establishing performance specifications for spacer dampers and minimizing the need for field testing. Some further research and testing will be required to validate certain of the mathematical models developed for the program.

BPA is also working on design and construction of a braking resistor, a new concept in power engineering. By damping power surges, this device serves to stabilize the system, thus making it possible to increase the load on the transmission network without sacrificing reliability.

Other engineering research carried out or contracted by BPA includes projects geared to the solution of electrical and mechanical problems on ultra-high-voltage systems. These include such items as a long-term design development project for ultra-high-voltage systems; radio and audible noise and interference phenomena

*Laying new San Juan cable.*

and their mitigation; structural analysis of bundle conductors; and development of higher speed fault clearing devices such as a one-cycle breaker – in other words, one that will operate in 1/60th of a second. Environmental data related to power system performance are being collected. Included are studies of wind and wind forces on high towers and measurement of earth currents which influence d-c operations.

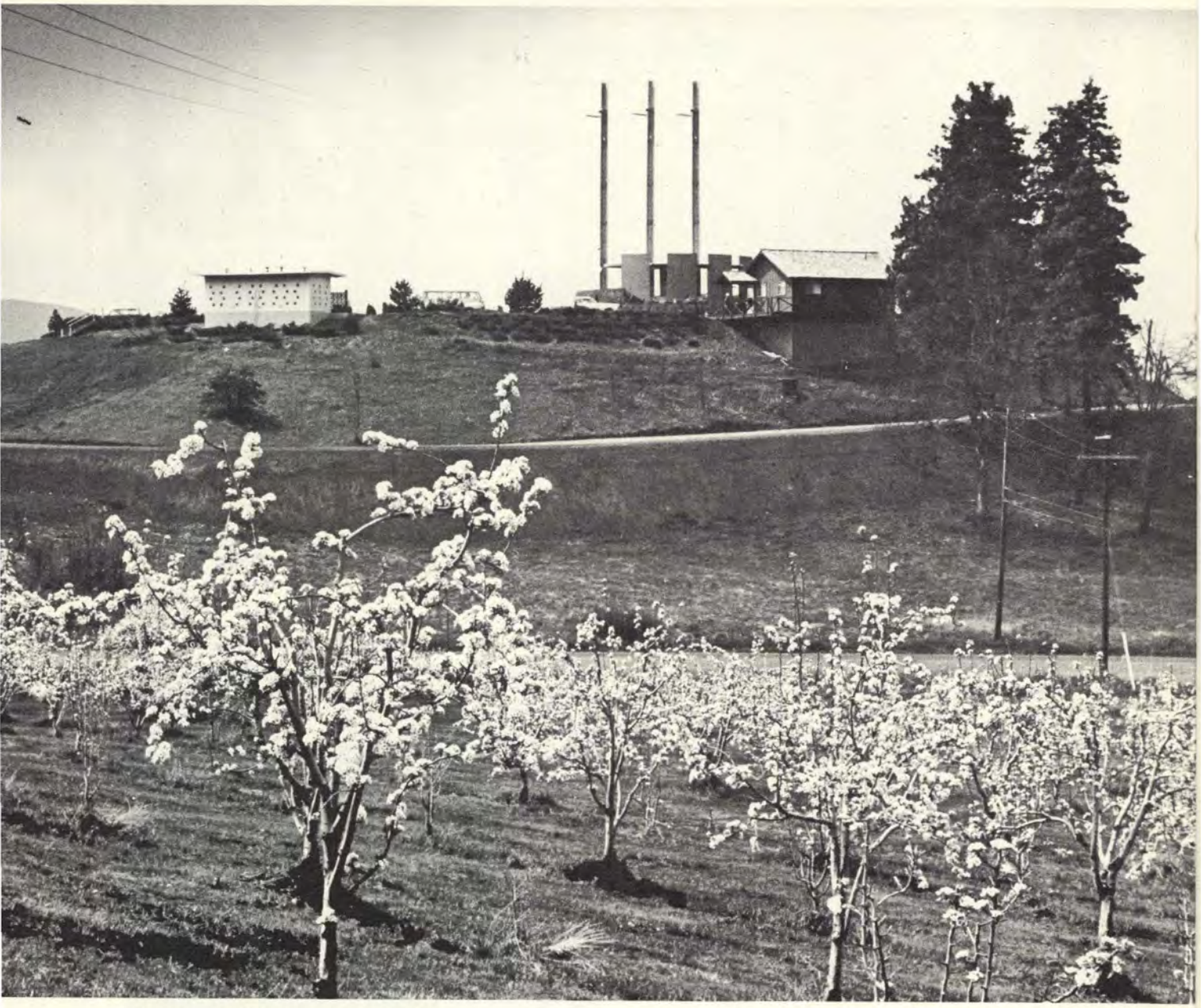
Research in control systems proceeds in many directions. Two projects are devoted to mitigating the effects of system transients. Short circuits and other transient disturbances can cause a power system to "break up" if these effects are not minimized.

Computer-oriented studies are underway to anticipate system problems and to determine what reaction will be most effective in maintaining a stable system.

Other control projects involve collection of hydrometeorological data from many geographical points. A new inexpensive radio system, which uses ion trails left in the atmosphere by meteors to bounce radio signals from point to point, has been successfully tested and is ready for use in the hydrometeorological network.

Use of a technique called multiplexing (similar to stereo-FM radio) is proving successful in transmitting information within a substation. By using a single cable and multiple frequencies, many miles of communication cable may be eliminated. The cable can also be heavily protected against electromagnetic interference. A test installation at Chief Joseph has proved successful and the multiplexing technique will be used for control of the Hatwai Substation.

*Sky-crane places tower steel on Lewiston Grade.*



*Blossoms at Panorama Point, Oregon.*

# CONCERN FOR THE ENVIRONMENT

In the three years since passage of the National Environmental Policy Act, the intense public concern for the quality of the environment shows no sign of lessening.

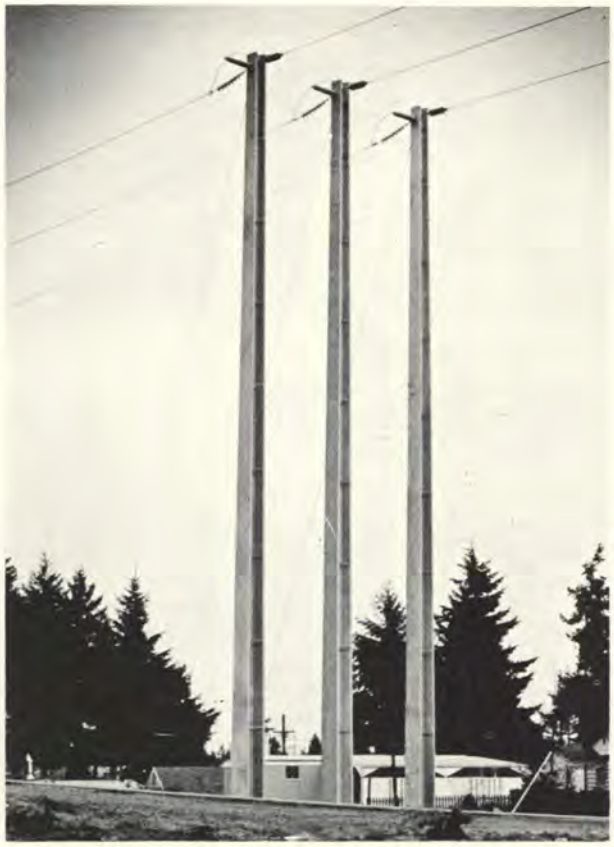
BPA's response to this concern and to the Act itself has involved long-term efforts and new technological developments. Both have made a significant contribution to efforts to minimize the impact on the environment that results from building and maintaining transmission facilities to serve the people of the Pacific Northwest.

One of the salient means of achieving BPA's environmental goals is the maximum use of existing transmission corridors. This technique has been used by BPA for many years. It involves rebuilding existing lines to higher capacity on the same or slightly larger right-of-way. Where this is not possible, BPA builds new lines parallel to existing ones, allowing some sharing of right-of-way. Thus the new transmission lines required to meet increased demand can be built with only slight additional right-of-way, which substantially reduces the environmental impact.

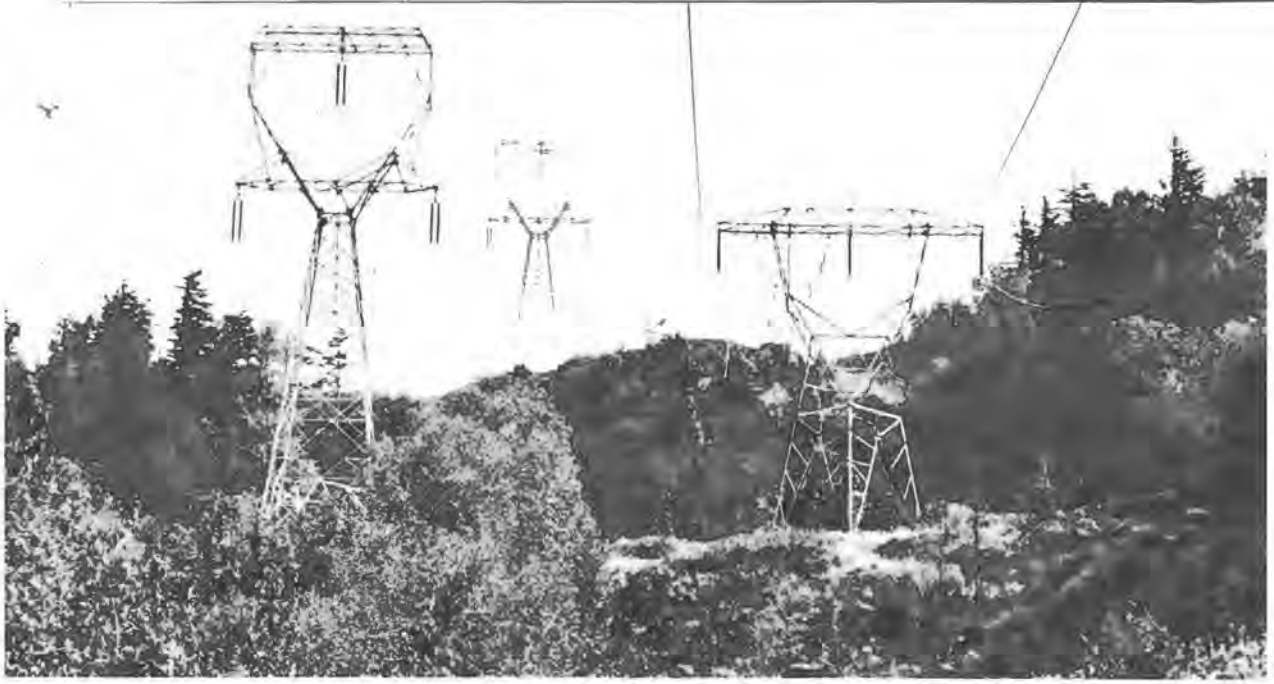
Despite this policy of building on existing rights-of-way, the rapid growth in demand requires the construction of some lines in new areas. BPA traditionally has exercised care in locating its new transmission facilities to minimize particularly the disruption of existing land use. The placement of lines and individual towers is given careful study. Where a new transmission line must cross a farm tract, for example, locating lines and towers along fence rows does much to reduce their impact on farming.

Recently, BPA has become aware that new techniques for locating corridors give promise of significantly improving the ability to locate new transmission corridors so to minimize the impact on the environment. These techniques utilize a formal inventory of regional environmental resources and their evaluation as to environmental compatibility with transmission facilities. To refine these techniques, BPA has entered into a study contract with a noted land use planning firm. The first phase of this study was completed in July 1972. Its results look promising, and BPA expects to adapt these new techniques to its facility location procedure.

BPA also recognizes the importance of public participation in planning. A major requirement of the National Environmental Policy Act of 1969 is that an environmental impact statement be developed covering any proposed major Federal activity, such as BPA's annual construction and maintenance programs. In drafting its first Environmental Statement in 1970, BPA decided to use the statement procedure to involve the public in its planning process. Eight public meetings were held in cities throughout the region to explain the FY 1972 program and to obtain public comment. While this public



*Environmentally designed towers.*



*The new 500-kv (left); the old 230-kv (right).*

sounding-board goes beyond the NEPA requirements, it has served to heighten BPA awareness of environmental impacts.

Based upon this first year's experience, the second Environmental Statement prepared in the fall of 1971 involved 18 public meetings. This increase allowed the meetings to be held close to the facilities proposed for FY 1973 and to the people directly involved.

This technique proved valuable. In the meetings held during fiscal year 1972, comments from the public resulted in a number of changes in plans for specific transmission facilities. BPA has followed a similar procedure in preparation of the fiscal year 1974 program Environmental Statement. During the months of October and November 1972, 20 public meetings on the proposed program and the fiscal 1974 draft statement were held.

The Environmental Statement serves other purposes as well. In recognition of the value of resource analysis techniques being developed by the BPA consultant, our Environmental Statements now contain maps displaying the environmental resources and constraints in the area of proposed new facilities. These maps and accompanying narrative help to define the potential impact of BPA proposals, serve as vehicles for more effective public and agency comment, and provide input into the planning process itself. The Environmental Statement on the fiscal year 1973 proposed program, filed with the Council on Environmental Quality on April 6, 1972, contains more than 150 resource maps covering 26 facilities.

Careful attention to locating new facilities is but one facet of environmental concern. In addition, much can and is being done in the design and construction of the facilities to further reduce impacts. The use of screening vegetation where transmission lines cross roads, the use of special improved appearance designs where appropriate, and steps taken during construction to minimize disturbance of natural vegetation all play a part in BPA's efforts to reduce environmental impact.

Other considerations come into play in minimizing the impact of proposed new facilities upon the physical environment. Transmission line locations and designs consider the potential effect of construction on wind and water erosion. To minimize pollution from disposal of slash created during clearing of transmission line rights-of-way, special burning techniques are being used in sensitive areas. High temperature, controlled-burning techniques were employed in constructing the Paul-Allston No. 2 line during the past year. These techniques substantially reduce emissions into the atmosphere and their use on additional lines in the future can be expected. BPA's concern with the environment is not limited to the location, design, and construction of new transmission facilities. Low-growing shrubs and grasses are carefully maintained in rights-of-way, and access roads are seeded to improve their appearance and to minimize water erosion.

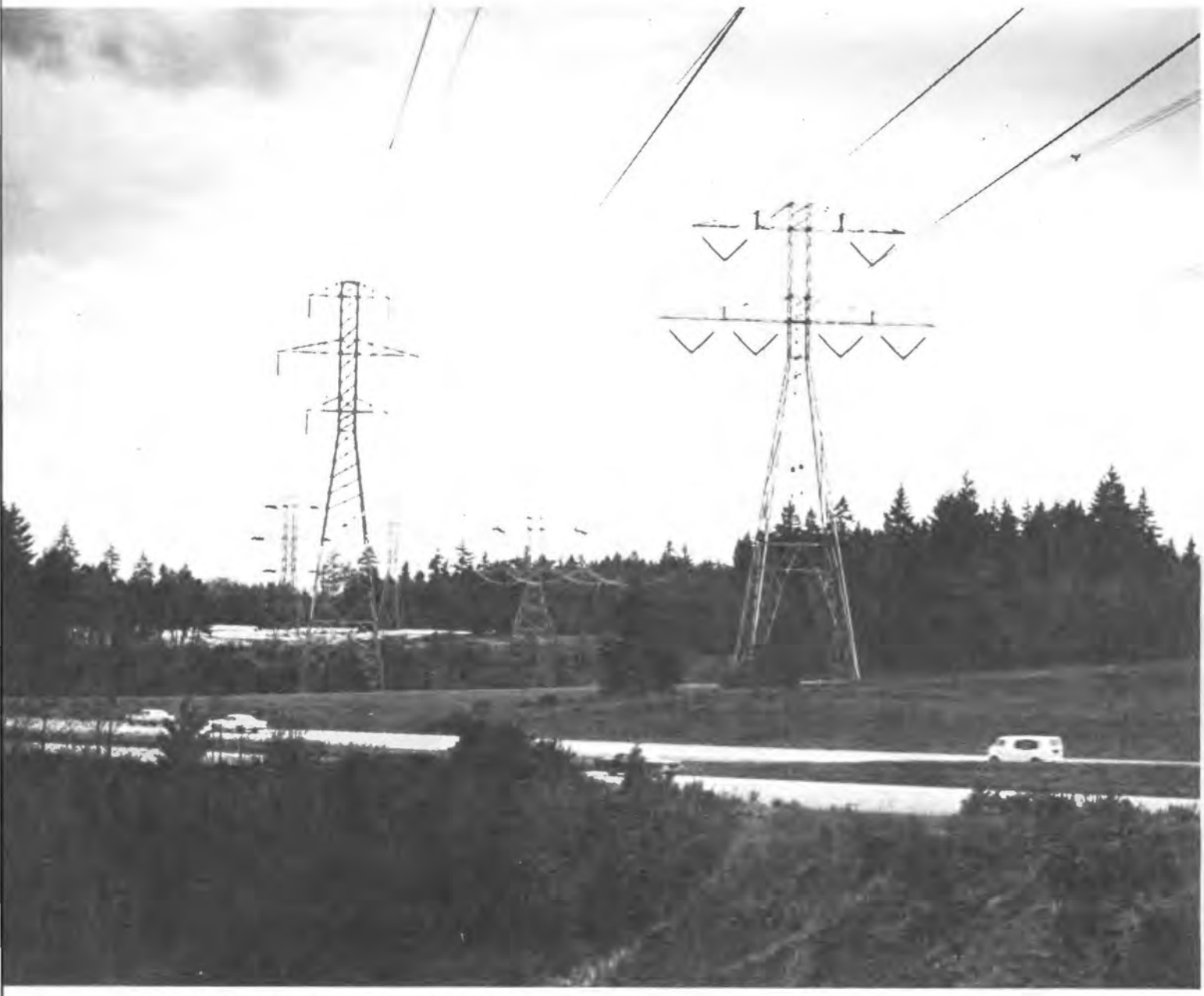
A key element in all BPA environmental efforts is the continuing development and adaptation of new technology. For example, BPA's

efforts to perfect and utilize higher voltages in its transmission lines are fundamental to upgrading existing lines and permitting maximum use of existing rights-of-way. Special techniques using photogrammetry minimize the amount of timber which must be cleared for new transmission lines. These procedures also provide a more natural "scalloped" appearance to rights-of-way. Photogrammetric techniques have been applied to all transmission lines designed during fiscal year 1972. Also, multiple-bundle conductors have been adopted as standard designs for high-voltage lines to minimize audible and radio noise.

These efforts to improve the ecological technology continue. The study contract to develop new location techniques described above is a key component of this regard. As new techniques are developed and perfected, they are incorporated into BPA's basic designs and procedures.

Some of the efforts which have been made to protect the environment cost little – that is, they were achieved simply through an awareness on the part of BPA staff, from the location engineer to the construction inspector, of environmental quality goals and objectives. In many cases, however, significant gains can be achieved only through a substantial commitment of funds and manpower. Although evaluation of environmental costs is difficult because they are so closely intertwined with its basic program, BPA estimates that it spent approximately $3.5 million in fiscal year 1972 to meet its environmental obligations. We can expect BPA's annual investment in environmental protection to grow in response to the nation's concern for the quality of the environment.

*Radio interference testing equipment trailer.*



*Double circuit lines near Federal Way, Wash.*

# POWER SALES FOR THE YEAR

During fiscal year 1972, BPA sold 63.7 billion kilowatt-hours of electric energy – an increase of 10.6 percent over fiscal year 1971 sales.

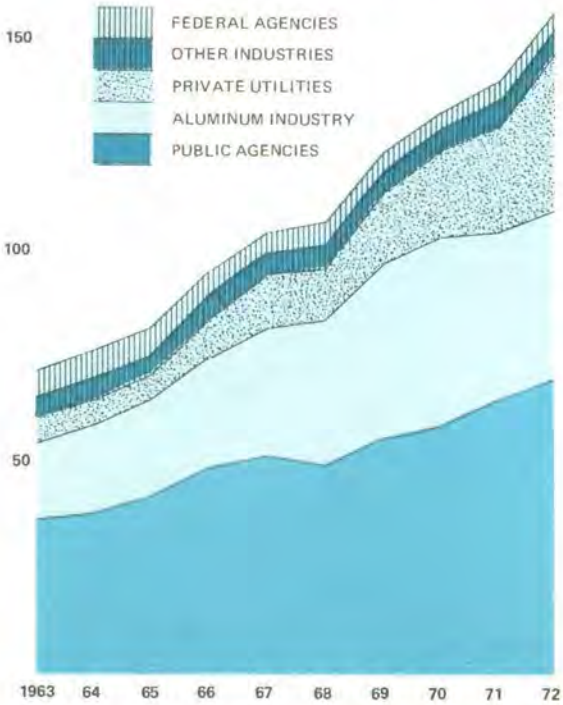
The average revenue realized from the sale of energy to all of its customers was 2.39 mills per kilowatt-hour excluding sales of capacity and revenues from other services.

There was a 39.8 percent increase in the sale of capacity over fiscal year 1971 sales. The Central Valley Project accounted for one-half of the increase and the Pacific Northwest public agency and investor-owned utilities accounted for the remainder.

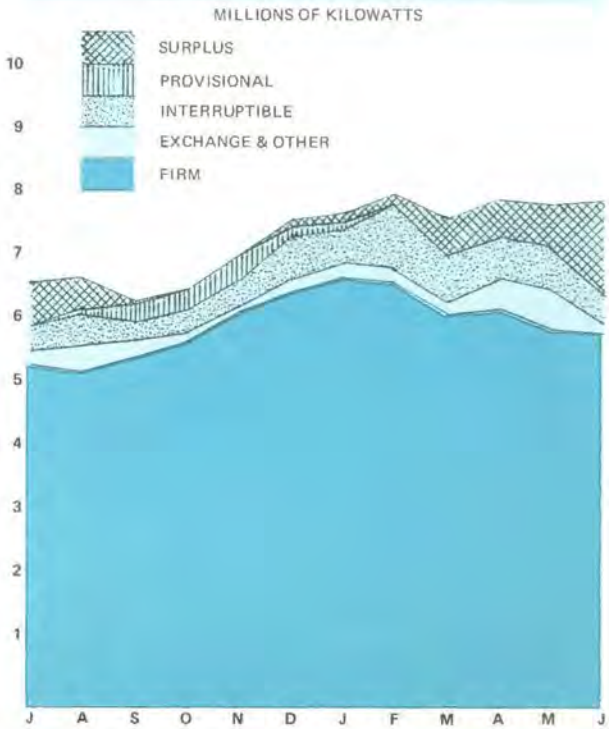
*Public and Peoples Utility Districts, Cooperatives, and Municipal Systems* purchased a total of 23.2 billion kilowatt-hours of energy during fiscal year 1972. Snohomish PUD was the largest purchaser among the public agencies with 3.2 billion kilowatt-hours. Public agency customers purchased 36.4 percent of the energy sold by BPA during the fiscal period, a slightly lower proportion than last year, but a 7.2 percent increase over fiscal year 1971 energy sales. No one customer was primarily responsible for this increase. Growth in public agency energy sales from FY 1971 to 1972 (7.2 percent) declined from the 9.7 percent growth rate experienced from FY 1970 to FY 1971.

BPA sold 13.6 billion kilowatt-hours to *Northwest investor-owned utilities* for resale during FY 1972, a 28.7 percent increase over FY 1971. These utilities accounted for 21.3 percent of BPA's total energy sales for the year,

**BPA SALES OF ELECTRIC ENERGY**
FISCAL YEARS 1963 – 1972
MILLIONS OF DOLLARS




**FEDERAL COLUMBIA RIVER POWER SYSTEM**
**Average Energy Sales**
JULY 1971 THROUGH JUNE 1972



# PACIFIC NORTHWEST POWER SYSTEM

**Major Facilities Existing and Under Construction**

AS OF DECEMBER 31, 1972

*"Banjo" tower on 500-kv line.*

and they used 25 percent more BPA firm power than in FY 1971. In order to supplement their own nonfirm power resources, they purchased 2.0 billion kilowatt-hours (17.7 percent) of the nonfirm energy sold by BPA.

Sales to Federal agencies in the Pacific Northwest continued to decline in FY 1972, amounting to just 1 percent of the BPA total. The purchase of 607 million kilowatt-hours was a decrease of 17.7 percent from FY 1971 purchases. Curtailment of operations at the Atomic Energy Commission's Hanford Works was principally responsible for the decrease.

In FY 1972, sales to the *aluminum industry* increased 1.5 percent over FY 1971 and amounted to 20.1 billion kilowatt-hours or 31.6 percent of BPA's total sales. Although some curtailments of interruptible power were required, the industries were able to obtain replacement sources by arrangement through BPA.

As of June 30, 1972, nine of the 45 potlines in the Northwest were shut down. Reynolds Metals Company temporarily closed its plant in Troutdale, Oregon, in November 1971, but has since restarted it. Present indications are that most of the other lines will be reopened during fiscal year 1973. Martin-Marietta (formerly Harvey Aluminum) began taking low-cost at-site power from John Day Dam in July 1971.

*Industries other than the aluminum industry* purchased 2.4 percent more energy in FY 1972 than in FY 1971. The 2.5 billion kilowatt-hours used by these plants was 3.8 percent of total BPA sales.

Surplus energy sales to the *Pacific Southwest* reached 3.7 billion kilowatt-hours in FY 1972, a 5.3 percent increase over FY 1971. During much of the period, while the d-c line was inoperative or in limited service, the a-c line capacity limits were increased. This permitted BPA to deliver 5.9 percent of its total energy sales to the Pacific Southwest to displace expensive steam generation there.

# THE FINANCIAL YEAR

Gross revenues for the Federal Columbia River Power System continued their upward trend during fiscal year 1972, the $176 million total setting another all-time record. This reflects a $20 million, or 13 percent increase over the preceding year. The revenue increase was more than offset, however, by rapidly rising expenses which left net revenues of only $4 million, a decrease of $10 million from fiscal year 1971.

## BASIS OF FINANCIAL REPORTING

To comply fully with all legal requirements, BPA prepares (1) cost accounting financial statements (found with the Comptroller General's opinion on pages 50 through 61), which present historical financial results similar to the statements used by business organizations to measure their profit or loss; and (2) the repayment study (found on page 48), which begins with cumulative historical results through June 30, 1972, and forecasts future revenues and costs for the purpose of determining the adequacy of power rate levels to repay the Federal investment in power facilities as required by Congress.

This report, for the first time, contains a correlation between the two types of statements. Schedule B, page 58, shows cumulative revenues and costs to June 30, 1972. These figures can be found on the first line of the repayment study, Table 6.

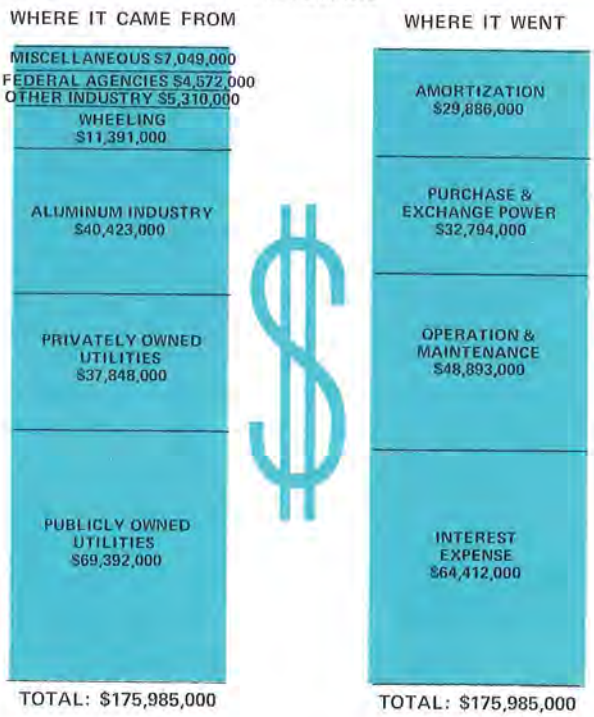
## COST ACCOUNTING RESULTS

Exhibit I on page 51 shows that gross revenues of $176 million were $7 million more than the $169 million estimated for fiscal year 1972 in the fiscal year 1971 Annual Report repayment study. This increase is basically attributable to having a better water year than anticipated, and a timely demand for surplus power in the Pacific Southwest. Sales to publicly and privately owned utilities accounted for essentially all of the increase. Sales increased over the preceding year to privately owned utilities by 50.7 percent, and to publicly owned utilities by 8.3 percent. The high percentage increase in sales to the privately owned utilities, however, was due in part to the proportionately lower starting base.

Publicly owned utilities and the aluminum industry continue to be the largest revenue producers. As shown on the chart below, publicly owned utilities contributed 39.4 percent of gross revenues, and the aluminum industry 23.0 percent. The BPA Sales of Electric Energy chart on page 33 shows ten year trends of revenues by class of customer. This chart shows that the most striking increases have been in sales to the privately owned utilities. In fiscal year 1972 the privately owned utilities contributed 21.5 percent of gross revenues, as compared with 16.1 percent the year before.

### SOURCE AND DISPOSITION OF THE REVENUE DOLLAR

FISCAL YEAR 1972



Total expenses for fiscal year 1972 amounted to $172 million, an increase of $30.8 million over fiscal year 1971. A $20 million increase in purchase and exchange power accounts for most of this total, and is due to the increased payments to the Atomic Energy Commission pursuant to the agreement negotiated with the AEC to keep the Hanford No. 1 nuclear plant operating through June 30, 1975. Other noteworthy increases were in interest expense which went up $5 million, and in operation and maintenance expense, up $4 million. These increases were due to the continued expansion of the power system, which increases the investment base for interest and provides more facilities which must be operated and maintained, as well as to higher interest rates on new investment and generally higher price levels. The disposition of the revenue dollar is shown graphically on page 37.

As pointed out in previous annual reports, revenues have been increasing at a substantial rate, about 9.4 percent per year on the average over the past five fiscal years. Expenses, however, have been increasing at an even more rapid rate, thus drastically reducing net revenues. This is illustrated by the graph on page 39. Both revenues and expenses are expected to continue this trend as the power system continues to expand and as larger amounts of higher cost thermal power are acquired under the Hydro-Thermal Power Program. This trend most likely will lead to a deficit on the cost accounting basis for fiscal year 1973, possibly as much as $26 million, and to the need to increase the BPA power rate level in the future as discussed in the following section.

## REPAYMENT STUDY RESULTS

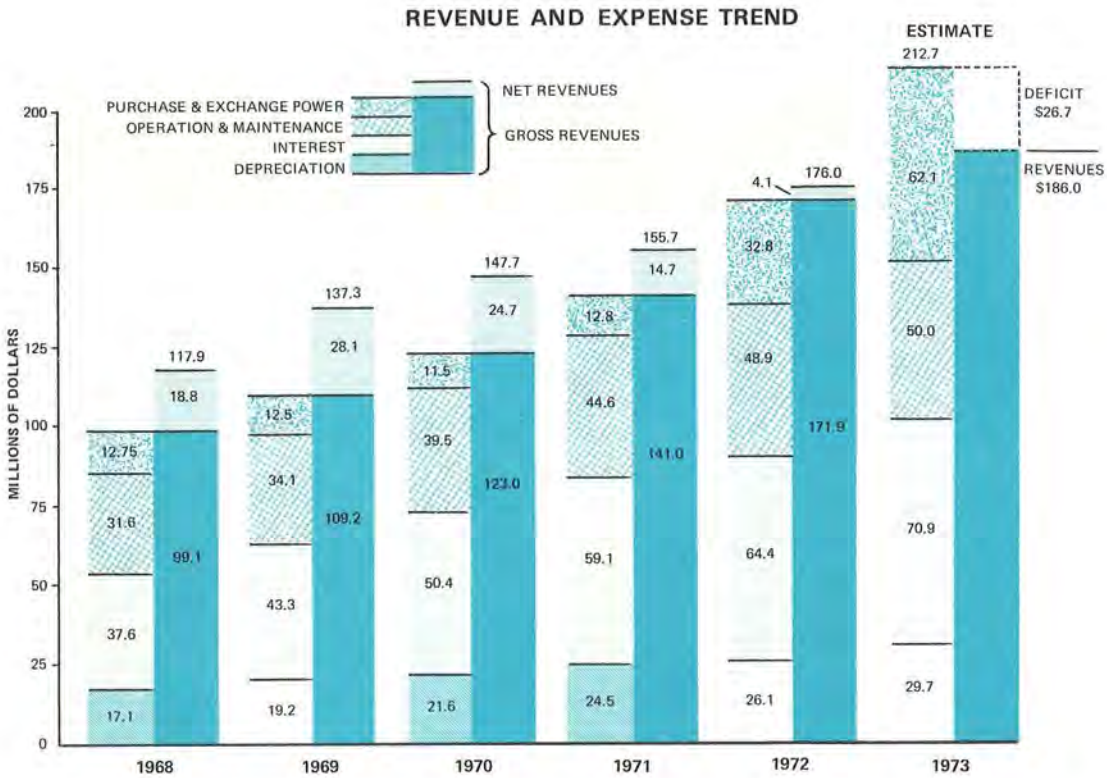
To test the adequacy of the power rate level, BPA is required by law to prepare annually and submit to the President and Congress a consolidated financial statement on the repayment basis (see table 6, page 48).

For the rate level to be judged adequate, the repayment study must show that revenues will be sufficient to satisfy the following repayment criteria:

1. Pay the cost of operating and maintaining the power system.
2. Pay the cost of obtaining power through purchase and exchange agreements with other utilities.
3. Pay interest on the unamortized portion of the commercial power investment at the interest rates established for each generating project and for each annual increment of investment in the BPA transmission system.
4. Repay:
   a. each increment of the power investment at the generating projects within fifty years after it becomes revenue producing,
   b. each annual increment of the capital investment in the transmission system, including replacements, within the average service life of the transmission facilities (currently forty years), and
   c. the investment in each replacement of a facility at a generating project within its service life.

   In accomplishing such repayment, the investment bearing the highest interest rate will be amortized first, to the extent possible, while still completing repayment of each increment of investment within its prescribed repayment period.
5. Repay the portion of construction costs at Federal reclamation projects which is beyond the ability of the irrigation water users, and which is assigned for repayment from commercial power revenues, within the same overall period available to the water users for making their payments. These periods range from 40 to 66 years with 60 years being applicable to most of the irrigation repayment assistance.

The repayment criteria were modified in several respects during fiscal year 1972 by the Office of the Assistant Secretary of the Interior for Water and Power Resources to provide greater uniformity in the repayment practices

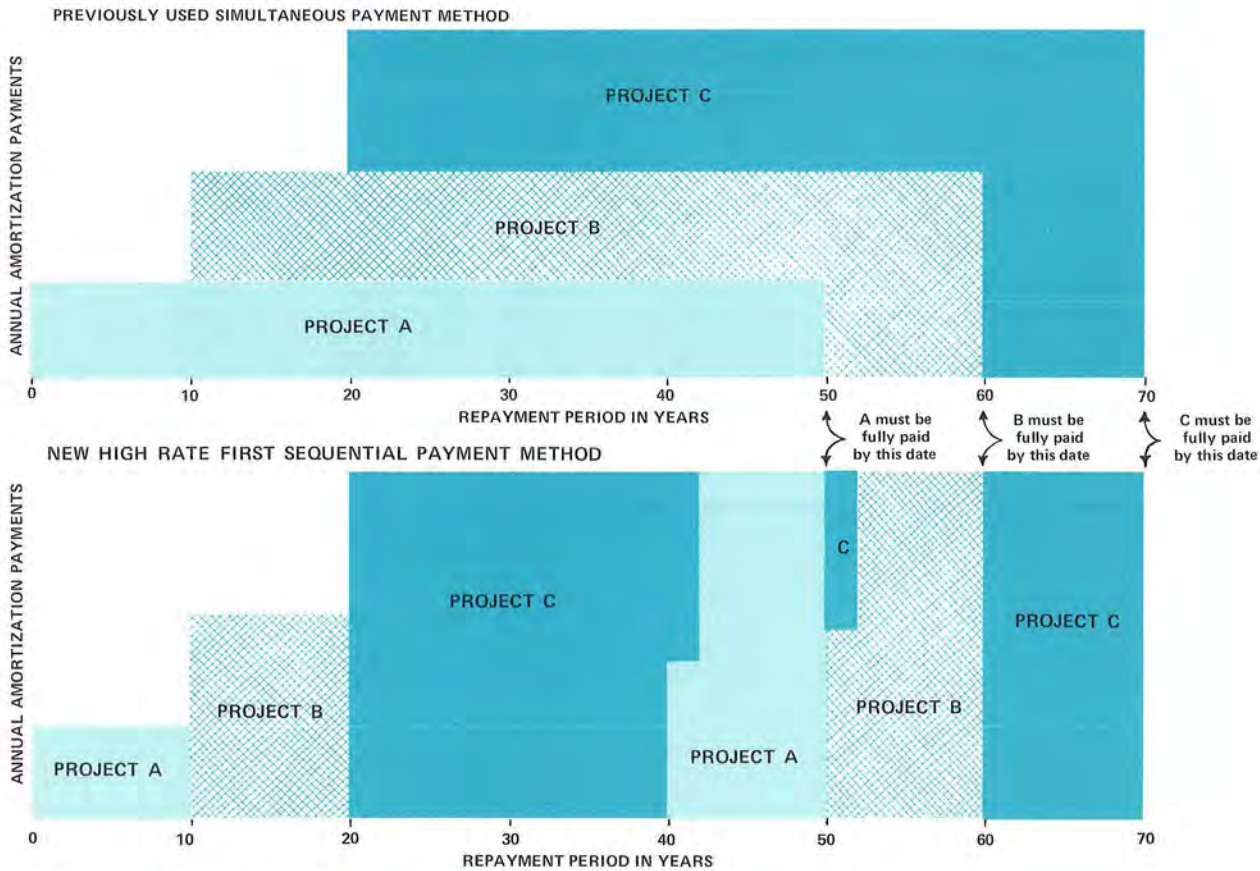



of BPA and the other Interior Department power marketing agencies. These changes provide that the repayment period for the generating projects shall commence with the first fiscal year following the time at which a project becomes revenue producing, whereas in previous FCRPS repayment studies, the practice was for the repayment period to commence with the first fiscal year following a project's completion. This is a very minor change, however, and affects only a relatively few projects in the system.

Of greater significance is the amended policy provision that, to the extent possible, the highest interest-bearing investment will be amortized first, provided that each increment of investment will be fully repaid within its prescribed repayment period. BPA implemented this policy during fiscal year 1972 by applying substantially all available receipts, i.e., those remaining after covering operation and maintenance expense, interest, and purchase and exchange power expense, plus a small contingency allowance, to the amortization of the fiscal year 1972 new investment in the BPA transmission system, which, at 5-3/8 percent, bears the highest interest rate of any block of investment in the Federal Columbia River Power System. This method of amortization is expected to save substantial amounts of interest expense over the full repayment period, thus offsetting to a small degree the aforementioned trends of continuously increasing expenses.

The "high rate first" method of amortization is illustrated by the graph on page 40 which shows a simplified amortization schedule for a hypothetical system consisting of three projects having different interest rates and repayment

## OLD AND NEW AMORTIZATION METHODS




Project A bears 2-1/2% interest, Project B 3% and Project C 5-1/2%. Each project must be fully amortized within 50 years. This is accomplished by both methods. The new High Rate First method saves interest expense, however, by reducing the unpaid balance on the higher interest bearing investment at an earlier date.

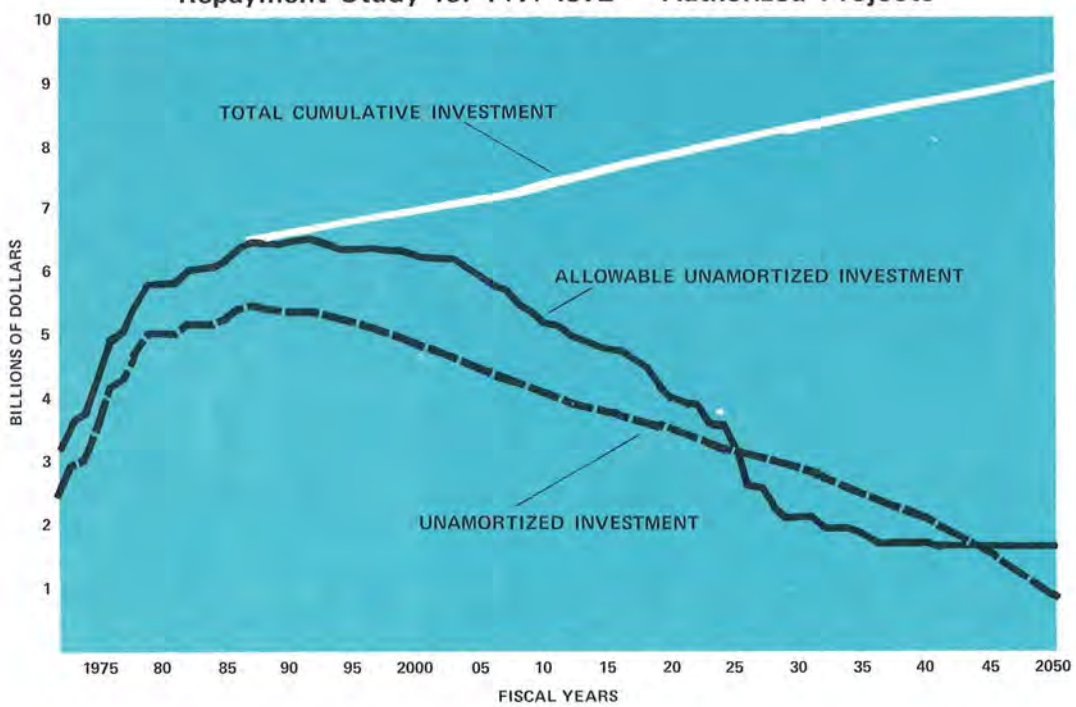
periods. As can be seen from the graph, the primary difference is in the sequence in which the project investments are amortized. In the method previously employed by BPA, the investment in the different projects was amortized concurrently, i.e., some payments were made on amortization for all of the projects each year until the end of their respective repayment periods. Under the "high rate first" concept, the various blocks of investment will be amortized sequentially, i.e., all receipts available for amortization will be applied each year to the investment bearing the highest interest rate provided that such sequential amortization will still fully repay each block of investment within its prescribed repayment period. This optimization of the amortization scheduling is accomplished through a newly developed computer program. Interest expense is thus reduced by repaying at an earlier date the amount of investment which bears the highest rate of interest.

Another change of significance implemented by BPA was the adoption of new depreciation lives for BPA transmission facilities effective as of July 1, 1972. The new lives are shorter than those previously used, and reflect more recent experience with the transmission system, which shows that a larger number of facilities will be retired at an earlier date than previously anticipated for the purpose of replacing them with larger capacity facilities to conserve scarce rights-of-way. The new depreciation lives for the various facilities average 40 years for the transmission system as a whole. The previous average life was 45 years. As the average depreciation life of the transmission facilities is used as the repayment period for the transmission system investment, the repayment period for the transmission investment is accordingly reduced from 45 to 40 years.

The fiscal year 1972 repayment study (Table 6) shows that cumulative revenues through June 30, 1972, totaled $2.1 billion. These have been applied to pay interest costs of $726 million, purchase and exchange power costs of $108 million, and operation and maintenance costs of $581 million, with the remaining $688 million applied to amortization of the capital investment in power facilities.

Starting with these cumulative results, the repayment study forecasts future revenues and costs over the balance of the repayment period. The study includes all Federal hydroelectric projects existing and under construction as well as those which are both authorized and under active consideration for construction by the constructing agency. The study also includes the expense for the present acquisition of thermal power through purchase and exchange

**FEDERAL COLUMBIA RIVER POWER SYSTEM**
**Repayment Study for F.Y. 1972 — Authorized Projects**



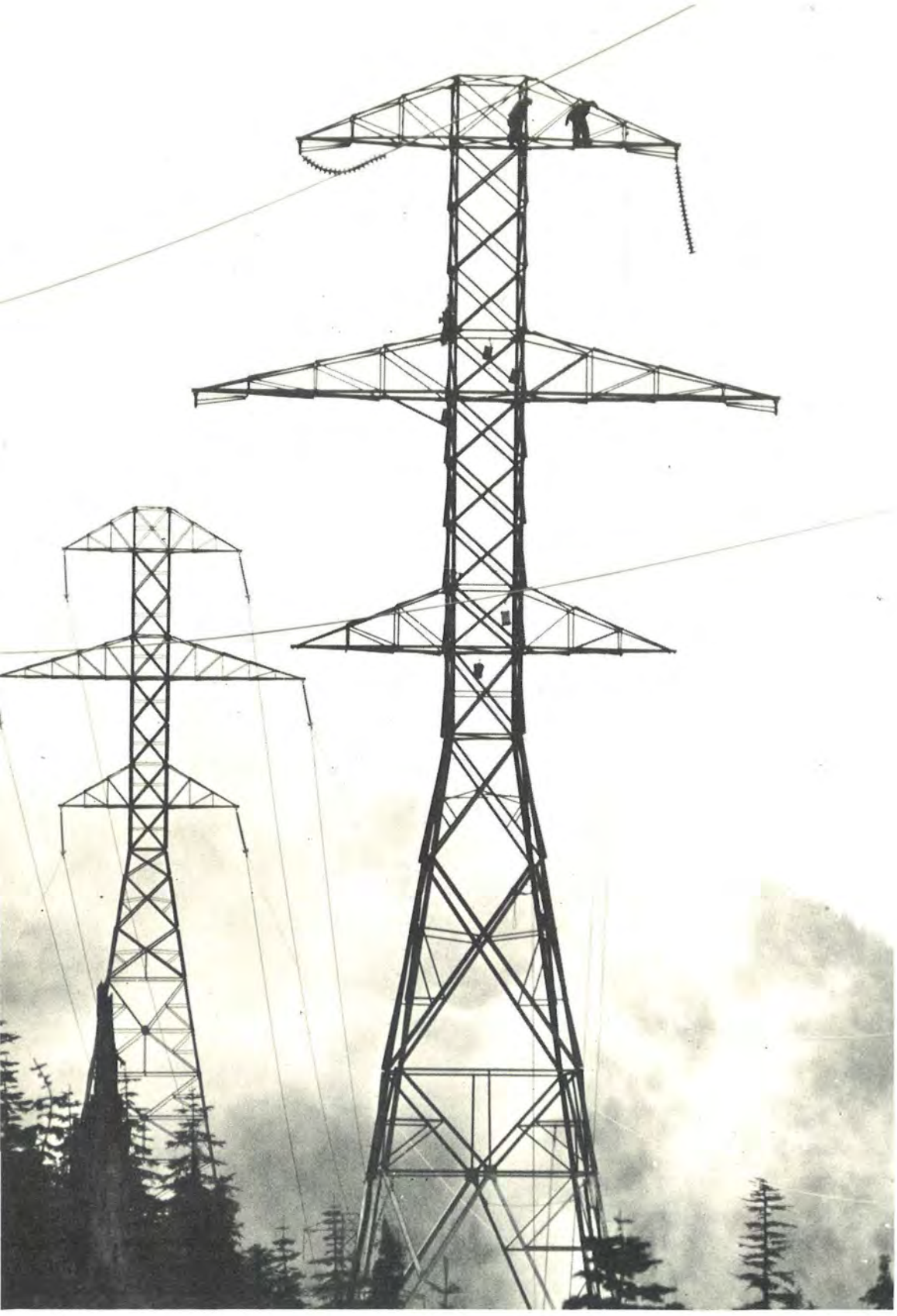
agreements for the Hanford No. 1 and Centralia projects. The fiscal year 1972 study, however, does not include the costs of future thermal power acquisitions under the Hydro-Thermal Power Program, as this study seeks only to measure the adequacy of the power rate level as of fiscal year 1972. Future repayment studies will include the costs of the forthcoming thermal power acquisitions as they come into effect.

The repayment study tests the adequacy of the current rate level by comparing the forecasted unamortized investment (column 13) with the allowable unamortized investment (column 16). To meet the repayment criteria, the amount in column 13 must be lower than the amount in column 16 for each corresponding year of the study.

For the first time since BPA increased its power rates in 1965, this year's repayment study shows that all of the power investment is not repaid within the allowable repayment period, i.e., the amount in column 13 exceeds the amount in column 16 from fiscal year 2026 through fiscal year 2043, thus indicating that the current power rate level is no longer sufficient. This result is graphically illustrated by the chart on page 41.

Under the conditions assumed in the repayment study, a revenue increase of approximately 2 percent would increase amortization payments sufficiently to meet the repayment criteria.

The law requires that whenever the repayment study shows a deficiency, the BPA power rates must be increased at the earliest opportunity by an amount sufficient to assure the coverage of all repayment requirements. As previously noted, the earliest this can be accomplished is December 20, 1974, at which time FPC approval of the present rates expires and BPA's power sales contracts permit the rates to be adjusted. Although the fiscal year 1972 study indicates the need for a revenue increase of only about 2 percent, a substantially higher increase is anticipated in 1974. This is because the 1974 rate adjustment studies will have to consider the costs of a large amount of additional thermal power acquisition which will take effect during the 1974 through 1979 rate period, plus any escalation of hydro generation and transmission costs which may occur between now and 1974.



*Double circuit towers in Stevens Pass, Wash.*

TABLE 1

## SALES OF ELECTRIC ENERGY

FISCAL YEAR 1972

| Customer | Energy Delivered for Year (000) KWH | Revenue from Sales of Energy |
|---|---|---|
| NORTHWEST AREA | | |
| Publicly Owned Utilities | | |
| Municipalities | | |
| Albion, Idaho | 2,887 | $ 9,375 |
| Bandon, Oregon | 43,374 | 147,651 |
| Blaine, Washington | 25,873 | 85,703 |
| Bonners Ferry, Idaho | 18,200 | 86,697 |
| Burley, Idaho | 69,606 | 219,465 |
| Canby, Oregon | 49,262 | 173,872 |
| Cascade Locks, Oregon | 21,798 | 58,837 |
| Centralia, Washington | 49,115 | 254,637 |
| Cheney, Washington | 88,069 | 290,825 |
| Consolidated Irrigation District, Wash. | 1,158 | 4,580 |
| Coulee Dam, Washington | 26,383 | 92,289 |
| Declo, Idaho | 1,779 | 5,791 |
| Drain, Oregon | 25,203 | 86,186 |
| Ellensburg, Washington | 142,529 | 459,815 |
| Eugene, Oregon | 1,328,540 | 3,351,646 |
| Forest Grove, Oregon | 118,368 | 400,615 |
| Heyburn, Idaho | 55,453 | 170,102 |
| Idaho Falls, Idaho | 216,508 | 703,749[1] |
| McCleary, Washington | 31,114 | 102,947 |
| McMinnville, Oregon | 193,760 | 700,789 |
| Milton-Freewater, Oregon | 87,277 | 283,256 |
| Minidoka, Idaho | 678 | 2,331 |
| Monmouth, Oregon | 55,489 | 191,025 |
| Port Angeles, Washington | 373,320 | 1,072,838 |
| Richland, Washington | 329,054 | 1,062,783 |
| Rupert, Idaho | 43,160 | 135,771 |
| Seattle, Washington | 1,273,680 | 2,703,600 |
| Springfield, Oregon | 206,779 | 642,494 |
| Sumas, Washington | 5,211 | 18,211 |
| Tacoma, Washington | 1,010,932 | 2,533,104 |
| Vera Irrigation District, Wash. | 85,580 | 274,381 |
| Wash. Public Power Supply System | 8,063 | 20,160 |
| Total Municipalities (32) | 5,988,202 | $16,345,525 |
| Public Utility Districts | | |
| Benton County PUD No. 1 | 651,281 | $ 1,884,529 |
| Central Lincoln PUD | 858,768 | 2,626,002 |
| Chelan County PUD No. 1 | 336,185 | 751,341 |
| Clallam County PUD No. 1 | 238,561 | 769,795 |
| Clark County PUD No. 1 | 1,712,850 | 5,544,093 |
| Clatskanie PUD | 674,626 | 1,629,443 |
| Cowlitz County PUD No. 1 | 1,910,066 | 4,649,527[1] |
| Douglas County PUD No. 1 | 295,623 | 838,552 |
| Ferry County PUD No. 1 | 35,225 | 109,065 |
| Franklin County PUD No. 1 | 333,645 | 1,032,920 |
| Grant County PUD No. 2 | 502,527 | 1,575,912[1] |
| Grays Harbor County PUD No. 1 | 933,131 | 2,808,606 |
| Kittitas County PUD No. 1 | 31,833 | 104,884 |
| Klickitat County PUD No. 1 | 154,337 | 480,342 |
| Lewis County PUD No. 1 | 379,600 | 1,181,705 |
| Mason County PUD No. 1 | 32,716 | 105,693 |
| Mason County PUD No. 3 | 284,422 | 896,167 |
| Northern Wasco County PUD | 59,418 | 194,284 |
| Okanogan County PUD No. 1 | 314,603 | 957,924 |
| Pacific County PUD No. 2 | 201,388 | 667,743 |
| Pend Oreille County PUD No. 1 | 1,547 | 3,866 |
| Skamania County PUD No. 1 | 72,889 | 249,162 |
| Snohomish County PUD No. 1 | 3,226,939 | 10,037,810 |
| Tillamook PUD | 279,699 | 948,895 |
| Wahkiakum County PUD No. 1 | 37,536 | 126,268 |
| Whatcom County PUD No. 1 | 85,919 | 231,038 |
| Total Public Utility Districts (26) | 13,645,334 | $40,405,566 |
| Cooperatives | | |
| Benton Rural Elec. Assn. | 117,068 | $ 352,706 |
| Big Bend Elec. Coop. | 214,371 | 570,214 |
| Blachly-Lane County Coop. | 91,277 | 303,217 |
| Central Elec. Coop. | 100,101 | 296,179 |
| Clearwater Power Co. | 112,293 | 369,150 |
| Columbia Basin Elec. Coop. | 90,853 | 264,166 |
| Columbia Power Coop. Assn. | 31,024 | 107,269 |
| Columbia Rural Elec. Assn. | 95,883 | 265,180 |
| Consumers Power | 203,738 | 659,822 |
| Coos-Curry Elec. Coop. | 221,598 | 757,540 |
| Douglas Elec. Coop. | 92,603 | 310,645 |
| East End Mutual Elec. Co. Ltd. | 5,415 | 17,625 |
| Fall River Elec. Coop. | 54,982 | 172,407 |
| Farmers Elec. Co. | 4,234 | 14,056 |
| Flathead Elec. Coop. | 58,672 | 179,290 |
| Harney Elec. Coop. | 71,787 | 191,476 |
| Hood River Elec. Coop. | 63,864 | 206,301 |
| Idaho Co. L&P Coop. Assn. | 25,816 | 81,469 |
| Inland Power & Light Co. | 248,707 | 787,474 |
| Kootenai Elec. Coop. | 73,419 | 232,328 |
| Lane Co. Elec. Coop. | 221,453 | 724,822 |
| Lincoln Elec. Coop.—Montana | 44,123 | 149,474 |
| Lincoln Elec. Coop.—Washington | 85,400 | 235,815 |
| Lost River Elec. Coop. | 21,439 | 61,104 |
| Lower Valley Power & Light, Inc. | 111,054 | 351,701 |
| Midstate Elec. Coop. | 81,152 | 241,198 |
| Missoula Elec. Coop. | 49,693 | 149,666 |
| Nespelem Valley Elec. Coop. | 26,182 | 82,211 |
| Northern Lights | 86,037 | 271,192 |
| Okanogan Co. Elec. Coop. | 17,024 | 54,035 |
| Orcas Power & Light Co. | 67,836 | 219,687 |
| Prairie Power Coop. | 2,636 | 8,747 |
| Raft River Elec. Coop. | 109,159 | 280,958 |
| Ravalli Co. Elec. Coop. | 46,262 | 148,937 |
| Riverside Elec. Co. | 3,900 | 12,861 |
| Rural Elec. Co. | 37,088 | 117,726 |
| Salem Electric | 167,054 | 545,596 |
| Salmon River Elec. Coop. | 18,985 | 53,554 |
| South Side Elec. Lines | 11,931 | 37,106 |
| Surprise Valley Elec. Corp. | 43,447 | 136,481 |
| Tanner Electric | 9,930 | 33,220 |
| Umatilla Elec. Coop. Assn. | 145,970 | 426,015 |
| Unity Light & Power Co. | 25,680 | 83,008 |
| Vigilante Elec. Coop. | 39,488 | 116,601 |
| Wasco Elec. Coop. | 58,188 | 193,290 |
| West Oregon Elec. Coop. | 47,367 | 154,756 |
| Total Cooperatives (46) | 3,556,183 | $ 11,028,275 |
| Total Publicly Owned Utilities (104) | 23,189,719 | $ 67,779,366 |
| Federal & State Agencies (19) | 607,127 | 1,743,914 |
| Privately Owned Utilities | | |
| California-Pacific Utilities Co. | 34,481 | $ 86,445 |
| Idaho Power Co. | 29,550 | 59,100 |
| Montana Power Co. | 1,139,784 | 2,545,082[1] |
| Pacific Power & Light Co. | 5,468,060 | 12,088,494[1] |
| Portland General Elec. Co. | 4,925,951 | 11,200,324[1] |
| Puget Sound Power & Light Co. | 1,483,253 | 3,202,597 |
| Utah Power Co. | 0 | 0 |
| Washington Water Power Co. | 474,493 | 1,072,761 |
| Total Privately Owned Utilities (8) | 13,555,572 | $ 30,254,803 |
| Aluminum Industries | | |
| Aluminum Co. of America | | |
| Vancouver Plant | 1,924,209 | $ 4,028,755 |
| Wenatchee Plant | 984,623 | 2,105,209 |
| Anaconda Aluminum Co. | 3,137,314 | 5,900,970 |
| Intalco Aluminum Co. | 3,516,243 | 7,204,051 |
| Kaiser Aluminum & Chemical Corp. | | |
| Spokane Reduction Plant | 2,923,998 | 6,000,187 |
| Spokane Rolling Mill | 400,757 | 984,740 |
| Tacoma Reduction Plant | 1,261,862 | 2,590,718 |
| Martin-Marietta Aluminum Inc. | | |
| The Dalles Plant | 1,558,657 | 2,666,716 |
| Goldendale Plant | 1,178,649 | 2,051,494 |
| Reynolds Metals Co. | | |
| Longview Plant | 2,887,960 | 5,960,596 |
| Troutdale Plant | 372,911 | 934,674 |
| Other Industries | | |
| Carborundum Co. | 202,789 | 425,409 |
| Cominco American Inc. | 0 | 0 |
| Crown Zellerbach Corp. | | |
| Port Angeles Plant | 6,689 | 16,511 |
| Port Townsend Plant | 92,089 | 200,257 |
| Foote Mineral Co. | 98,719 | 215,470 |
| Georgia-Pacific Corp. | 205,013 | 441,526 |
| Hanna Nickel Smelting Co. | 742,544 | 1,657,399 |
| ITT Rayonier, Inc. | 38,124 | 89,159 |
| Oregon Metallurgical Corp. | 6,978 | 17,904 |
| Pacific Carbide & Alloys | 56,416 | 127,798 |
| Pennwalt Corporation | 353,648 | 747,927 |
| Stauffer Chemical Works | 487,733 | 1,071,817 |
| Stewart Elsner | 40 | 273 |
| Union Carbide Corp. | 160,987 | 345,772 |
| Total Industries (19) | 22,598,952 | $ 45,785,332 |
| OUTSIDE NORTHWEST AREA | | |
| British Columbia Hydro & Power Authority | 12,423 | $ 27,284 |
| Burbank, Calif. | 31,451 | 68,596 |
| Glendale, Calif. | 48,031 | 96,062 |
| Los Angeles, Calif. | 138,960 | 438,463 |
| Pasadena, Calif. | 28,725 | 75,527 |
| Sacramento, Calif. | 40,992 | 81,984 |
| U.S.B.R.—Central Valley Proj. | 1,044,070 | 3,259,404[1] |
| U.S.B.R.—Region 3 | 0 | 3,315 |
| State of California—Dept. of Natural Resources | 50,956 | 101,912 |
| Pacific Gas & Electric Co. | 309,069 | 618,138 |
| San Diego Gas & Electric Co. | 201,770 | 403,540 |
| Southern California Edison Co. | 1,849,612 | 4,346,223 |
| Total Outside Northwest Area (12) | 3,756,059 | $ 9,520,448 |
| Total Sales of Electric Energy (149) | 63,707,429 | 155,083,863[2] |

[1] Includes capacity sales.
[2] Includes statistical adjustments.

TABLE 2

## FEDERAL COLUMBIA RIVER POWER SYSTEM

General Specifications, Projects Existing, Under Construction and Authorized
Nameplate Rating of Installations as of June 30, 1972

| | | | | Existing | | | Under Construction | | Authorized | | Other Potential | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Project | Operating Agency[1] | Location | Stream | Initial Date in Service | Number of Units | Total Capacity Kilowatts | Number of Units | Total Capacity Kilowatts | Number of Units | Total Capacity Kilowatts | Number of Units | Total Capacity Kilowatts | Number of Units | Total Capacity Kilowatts |
| Bonneville | CE | Ore.-Wash. | Columbia | June 1938 | 10 | 518,400 | – | – | 8 | 544,000 | – | – | 18 | 1,062,400 |
| Grand Coulee | BR | Washington | Columbia | Sept. 1941 | 18-3 | 2,127,000[2] | 6 | 3,753,000[3] | – | – | 6 | 3,600,000 | 36-3 | 9,780,000 |
| Grand Coulee (Pump-Generator) | | Washington | Columbia | | – | – | 2 | 100,000 | 4 | 200,000 | – | – | | |
| Hungry Horse | BR | Montana | S. Fk. Flathead | Oct. 1952 | 4 | 285,000 | – | – | – | – | – | – | 4 | 285,000 |
| Detroit | CE | Oregon | North Santiam | July 1953 | 2 | 100,000 | – | – | – | – | – | – | 2 | 100,000 |
| McNary | CE | Ore.-Wash. | Columbia | Nov. 1953 | 14 | 980,000 | – | – | – | – | 6 | 420,000 | 20 | 1,400,000 |
| Big Cliff | CE | Oregon | North Santiam | June 1954 | 1 | 18,000 | – | – | – | – | – | – | 1 | 18,000 |
| Lookout Point | CE | Oregon | M. Fk. Willamette | Dec. 1954 | 3 | 120,000 | – | – | – | – | – | – | 3 | 120,000 |
| Albeni Falls | CE | Idaho | Pend Oreille | Mar. 1955 | 3 | 42,600 | – | – | – | – | – | – | 3 | 42,600 |
| Dexter | CE | Oregon | M. Fk. Willamette | May 1955 | 1 | 15,000 | – | – | – | – | – | – | 1 | 15,000 |
| Chief Joseph | CE | Washington | Columbia | Aug. 1955 | 16 | 1,024,000 | – | – | 11 | 1,045,000 | 13 | 1,573,000 | 40 | 3,642,000 |
| Chandler | BR | Washington | Yakima | Feb. 1956 | 2 | 12,000 | – | – | – | – | – | – | 2 | 12,000 |
| The Dalles | CE | Ore.-Wash. | Columbia | May 1957 | 14-2 | 1,119,000[4] | 8 | 688,000 | – | – | – | – | 22-2 | 1,807,000 |
| Roza | BR | Washington | Yakima | Aug. 1958 | 1 | 11,250 | – | – | – | – | – | – | 1 | 11,250 |
| Ice Harbor | CE | Washington | Snake | Dec. 1961 | 3 | 270,000 | 3 | 332,880 | – | – | – | – | 6 | 602,880 |
| Hills Creek | CE | Oregon | M. Fk. Willamette | May 1962 | 2 | 30,000 | – | – | – | – | – | – | 2 | 30,000 |
| Minidoka[5] | BR | Idaho | Snake | May 1909 | 7 | 13,400 | – | – | – | – | – | – | 7 | 13,400 |
| Boise Diversion[5] | BR | Idaho | Boise | May 1912 | 3 | 1,500 | – | – | – | – | – | – | 3 | 1,500 |
| Black Canyon[5] | BR | Idaho | Payette | Dec. 1925 | 2 | 8,000 | – | – | – | – | – | – | 2 | 8,000 |
| Anderson Ranch[5] | BR | Idaho | S. Fk. Boise | Dec. 1950 | 2 | 27,000 | – | – | – | – | 1 | 13,500 | 3 | 40,500 |
| Palisades[5] | BR | Idaho | Snake | Feb. 1957 | 4 | 118,750 | – | – | – | – | 2 | 135,000 | 6 | 253,750 |
| Cougar | CE | Oregon | S. Fk. McKenzie | Feb. 1964 | 2 | 25,000 | – | – | 1 | 35,000 | – | – | 3 | 60,000 |
| Green Peter | CE | Oregon | Middle Santiam | June 1967 | 2 | 80,000 | – | – | – | – | – | – | 2 | 80,000 |
| Foster | CE | Oregon | South Santiam | Aug. 1968 | 2 | 20,000 | – | – | – | – | – | – | 2 | 20,000 |
| John Day | CE | Ore.-Wash. | Columbia | July 1968 | 16 | 2,160,000 | – | – | 4 | 540,000 | – | – | 20 | 2,700,000 |
| Lower Monumental | CE | Washington | Snake | May 1969 | 3 | 405,000 | – | – | 3 | 405,000 | – | – | 6 | 810,000 |
| Little Goose | CE | Washington | Snake | May 1970 | 3 | 405,000 | – | – | 3 | 405,000 | – | – | 6 | 810,000 |
| Lower Granite | CE | Washington | Snake | | – | – | 3 | 405,000 | 3 | 405,000 | – | – | 6 | 810,000 |
| Teton | BR | Idaho | Teton | | – | – | 2 | 20,000 | 1 | 10,000 | – | – | 3 | 30,000 |
| Lost Creek | CE | Oregon | Rogue | | – | – | 2 | 49,000 | – | – | – | – | 2 | 49,000 |
| Dworshak | CE | Idaho | N. Fk. Clearwater | | – | – | 3 | 400,000 | 3 | 660,000 | – | – | 6 | 1,060,000 |
| Strube | CE | Oregon | S. Fk. McKenzie | | – | – | – | – | 1 | 4,500 | – | – | 1 | 4,500 |
| Libby | CE | Montana | Kootenai | | – | – | 4 | 420,000 | 4 | 420,000 | – | – | 8 | 840,000 |
| Asotin[6] | CE | Wash.-Ida. | Snake | | – | – | – | – | 4 | 540,000 | – | – | 4 | 540,000 |
| Total installed capacity | | | | | | 9,935,900 | | 6,167,880 | | 5,213,500 | | 5,741,500 | | 27,058,780 |
| Total number of projects | | | | | | 26 | | 5 | | 2 | | 0 | | 33 |

[1] CE–Corps of Engineers; BR–Bureau of Reclamation.
[2] Includes three service units and increase of 17,000 kw each for nine rewound main units.
[3] Includes an increase of 17,000 kw each for nine units to be rewound and six 600,000 kw units being installed at the Third Powerplant.
[4] Includes two fishway units of 13,500 kw each at The Dalles plant.
[5] U.S. Bureau of Reclamation project incorporated into the Federal Columbia River Power System, effective July 1, 1963.
[6] Not being actively considered for construction.

*Joint Power Planning Council deliberates.*

TABLE 3

**ELECTRIC ENERGY ACCOUNT FOR FISCAL YEAR 1972**

| | |
|---|---|
| Energy Received (millions of kilowatt-hours) | |
| Energy Generated for BPA | |
| Bureau of Reclamation | 15,559 |
| Corps of Engineers | 49,719 |
| Washington Public Power Supply System | 2,775 |
| Centralia Thermal Project | 1,615 |
| Power Interchanged In | 42,475 |
| Total Received | 112,143 |
| Energy Delivered (millions of kilowatt-hours) | |
| Sales | 63,707 |
| Power Interchanged Out | 44,688 |
| Used by the Administration | 70 |
| Total Delivered | 108,465 |
| Energy losses in transmission and transformation | 3,678 |
| Total | 112,143 |
| Losses in percent of total received | 3.3 |
| Maximum demand on Federal plants (kilowatts) (Date and Time) | 11,024,000 |
| Load factor in percent of total generated for BPA | 71.9 |

TABLE 4

**GENERATION BY THE PRINCIPAL ELECTRIC UTILITY SYSTEMS OF THE PACIFIC NORTHWEST[1]**

Fiscal Year 1972

| Utility | Kilowatt-Hours (Billions) | Of Total Generation (Percent) |
|---|---|---|
| Publicly Owned: | | |
| Federal Columbia River Power System[2] | 69.7 | 54.4 |
| Grant County PUD | 10.1 | 7.9 |
| Chelan County PUD | 6.8 | 5.3 |
| Seattle City Light | 5.9 | 4.6 |
| Douglas County PUD | 3.8 | 3.0 |
| Tacoma City Light | 3.4 | 2.6 |
| Eugene Water & Electric Board | 0.5 | 0.4 |
| Pend Oreille County PUD | 0.4 | 0.3 |
| Total Publicly Owned | 100.6 | 78.5 |
| Privately Owned: | | |
| Idaho Power Company | 9.1 | 7.1 |
| Pacific Power & Light Co. | 5.4 | 4.2 |
| Montana Power Company | 4.9 | 3.8 |
| Washington Water Power Co. | 3.7 | 2.9 |
| Portland General Electric Co. | 2.9 | 2.3 |
| Puget Sound Power & Light Co. | 1.5 | 1.2 |
| Total Privately Owned | 27.5 | 21.5 |
| Total Generation | 128.1 | 100.0 |

[1] Generation shown is for members of the Northwest Power Pool plus Pend Oreille County PUD and Washington Public Power Supply System. Utah Power & Light Co., British Columbia Hydro and Power Authority and West Kootenay Power and Light, who are members of the Power Pool, are not included because their service area lies outside the Pacific Northwest.

[2] Includes generation from the Washington Public Power Supply System's Hanford steamplant (NPR) and the Centralia steamplant.

TABLE 5

## INSTALLATION SCHEDULE FOR THERMAL POWER PROJECTS

(as of December 31, 1972)

Fiscal Year 1972 Through Fiscal Year 1982

| Project | Status[7] | Type of Fuel | Nameplate Rating MW | Commercial Operation Date | Principal Sponsor[1] | Approximate % Private | Ownership % Public |
|---|---|---|---|---|---|---|---|
| Centralia #1 | O | Coal | 700 | Sept. 1971 | PP&L/WWP | 72 | 28 |
| #2 | O | Coal | 700 | Sept. 1972 | | | |
| Combustion Turbine (Libby, Mont.) | O | Oil | 26 | Oct. 1972 | PP&L | 100[5] | – |
| Combustion Turbines (Salem, Ore.) #1 & 2 | UC | Oil/Gas | 65 ea.[2] | Sept. 1973 | PGE | 100 | – |
| (Portland, Ore.) #3-6 | UC | Oil/Gas | 65 ea.[2] | Sept. 1973 | PGE | 100 | – |
| Combustion Turbine (Puget Sound Area) | UC | Oil | 27 | Sept. 1973 | PSP&L | 100 | – |
| Trojan | UC | Nuclear | 1,130 | Sept. 1974 | PGE | 70 | 30 |
| Colstrip #1 | UC | Coal | 175[3] | July 1975 | PSP&L | 100 | – |
| #2 | UC | Coal | 175[3] | July 1976 | | | |
| Jim Bridger #2[4] | UC | Coal | 500 | Sept. 1975 | PP&L | 100 | – |
| #3 | | | 500 | Sept. 1976 | | | |
| Combustion Turbine (Puget Sound Area) | C | Oil | 27 | July 1977 | PSP&L | 100 | – |
| WPPSS Nuclear Project #2 (Hanford) | UC | Nuclear | 1,100 | Sept. 1977 | WPPSS | – | 100 |
| Colstrip #3 | T | Coal | 525[3] | Sept. 1978 | PSP&L | 100 | – |
| #4 | | | 525[3] | Sept. 1979 | | | |
| Boardman | C | Nuclear | 1,200 | Sept. 1980 | PGE | 90 | 10 |
| WPPSS Nuclear Project #1 (Hanford) | C | Nuclear | 1,200 | Sept. 1980 | WPPSS | – | 100[6] |
| WPPSS Nuclear Project #3 (State of Wash.) | C | Nuclear | 1,200 | Sept. 1981 | WPPSS | 30 | 70 |
| | | Total | 10,100 | | | | |

[1] Abbreviations are: PP&L—Pacific Power & Light Co.; PGE—Portland General Electric Co.; PSP&L—Puget Sound Power & Light Co.; WPPSS—Washington Public Power Supply System; WWP—Washington Water Power Co.

[2] Nominal rating 65 mw at 25° F. - 50 mw at 80° F.

[3] Colstrip Units #1 and #2 are rated 350 mw each; one-half of each unit will be used by West Group Area. Colstrip Units #3 and #4 are rated 700 mw each; three-fourths of each unit will be used by West Group Area.

[4] Jim Bridger Unit #1 is scheduled outside the Hydro-Thermal Power Program.

[5] Output available to BPA for exchange energy through June 1975.

[6] Private utilities will receive 400 mw at 85% load factor 1980-96.

[7] Status on 12-1-72; O—Operating or available for operation; UC—Under construction; C—Committed; T—Tentatively scheduled.

TABLE 6

**FEDERAL COLUMBIA RIVER POWER SYSTEM**
**REPAYMENT STUDY FOR F.Y. 1972**
AUTHORIZED PROJECTS

(All Amounts in $1,000)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Plant Allocated to Commercial Power | | | | | | | | Irrigation Assistance | | | | | |
| | | | | | Investment Placed in Service | | | Cumulative Investment Placed in Service | | | | | Allowable Unamortized Investment | | | | | | | | |
| Fiscal Year Ending June 30 | Revenues | Operation and Maintenance Expense | Purchase and Exchange Power | Interest Expense | Initial Project | Replacements | Total | Initial Project | Replacements | Total | Amortization | Unamortized Investment | Initial Project | Replacements | Total | Cumulative Amount in Service | Amortization | Unamortized Amount | Allowable Unamortized Amount | Cumulative Surplus Revenues | Fiscal Year Ending June 30 |
| Cumulative to 6-30-72 | 2,103,333 | 581,109 | 108,538 | 725,664 | 3,131,054 | | 3,131,054 | 3,131,054 | | 3,131,054 | 688,022 | 2,443,032 | 3,130,298 | | 3,130,298 | 415,548 | | 415,548 | 415,548 | | |
| 1973 | 186,000 | 54,684 | 52,464 | 81,912 | 456,921 | 4,699 | 461,620 | 3,587,975 | 4,699 | 3,592,674 | (3,060) | 2,907,712 | 3,587,219 | 4,699 | 3,591,918 | 493,935 | | 493,935 | 493,935 | | 1973 |
| 1974 | 192,100 | 58,155 | 22,764 | 88,084 | 122,039 | 5,330 | 127,369 | 3,710,014 | 10,029 | 3,720,043 | 23,097 | 3,011,984 | 3,709,258 | 10,029 | 3,719,287 | 493,935 | | 493,935 | 493,935 | | 1974 |
| 1975 | 204,500 | 60,335 | 26,686 | 103,303 | 502,939 | 10,749 | 513,688 | 4,212,953 | 20,778 | 4,233,731 | 14,176 | 3,511,496 | 4,211,099 | 20,778 | 4,231,877 | 501,586 | | 501,586 | 501,586 | | 1975 |
| 1976 | 212,900 | 63,925 | 12,933 | 122,797 | 632,345 | 6,775 | 639,120 | 4,845,298 | 27,553 | 4,872,851 | 13,245 | 4,137,371 | 4,843,444 | 27,553 | 4,870,997 | 501,586 | | 501,586 | 501,586 | | 1976 |
| 1977 | 224,200 | 67,473 | 8,809 | 130,349 | 148,188 | 9,569 | 157,757 | 4,993,486 | 37,122 | 5,030,608 | 17,569 | 4,277,559 | 4,991,357 | 37,122 | 5,028,479 | 513,027 | | 513,027 | 513,027 | | 1977 |
| 1978 | 233,000 | 70,266 | 8,908 | 146,903 | 443,495 | 7,834 | 451,329 | 5,436,981 | 44,956 | 5,481,937 | 6,923 | 4,721,965 | 5,434,852 | 44,956 | 5,479,808 | 530,959 | | 530,959 | 530,959 | | 1978 |
| 1979 | 258,600 | 73,176 | 9,167 | 161,574 | 292,815 | 10,071 | 302,886 | 5,729,796 | 55,027 | 5,784,823 | 14,683 | 5,010,168 | 5,726,736 | 55,027 | 5,781,763 | 569,461 | | 569,461 | 569,461 | | 1979 |
| 1980 | 272,000 | 73,985 | 9,252 | 164,592 | 1,807 | 14,165 | 15,972 | 5,731,603 | 69,192 | 5,800,795 | 24,171 | 5,001,969 | 5,723,978 | 69,173 | 5,793,151 | 598,935 | | 598,935 | 598,935 | | 1980 |
| 1981 | 282,300 | 74,050 | 8,410 | 164,473 | 31,356 | 10,566 | 41,922 | 5,762,959 | 79,758 | 5,842,717 | 35,367 | 5,008,524 | 5,736,972 | 79,728 | 5,816,700 | 613,870 | | 613,870 | 613,870 | | 1981 |
| 1982 | 286,700 | 74,515 | 8,149 | 170,537 | 188,142 | 12,125 | 200,267 | 5,951,101 | 91,883 | 6,042,984 | 33,499 | 5,175,292 | 5,918,549 | 91,853 | 6,010,402 | 629,871 | | 629,871 | 629,871 | | 1982 |
| 1983 | 294,000 | 74,820 | 7,959 | 173,295 | 31,356 | 13,347 | 44,703 | 5,982,457 | 105,230 | 6,087,687 | 37,926 | 5,182,069 | 5,933,260 | 105,197 | 6,038,457 | 660,363 | | 660,363 | 660,363 | | 1983 |
| 1984 | 293,500 | 74,945 | 7,984 | 172,609 | 10,890 | 14,806 | 25,696 | 5,993,347 | 120,036 | 6,113,383 | 37,962 | 5,169,803 | 5,943,505 | 120,000 | 6,063,505 | 680,864 | | 680,864 | 680,864 | | 1984 |
| 1985 | 296,500 | 75,399 | 8,003 | 175,341 | 108,445 | 15,626 | 124,071 | 6,101,792 | 135,662 | 6,237,454 | 37,757 | 5,256,117 | 6,046,565 | 135,559 | 6,182,124 | 714,988 | | 714,988 | 714,988 | | 1985 |
| 1986 | 302,200 | 76,321 | 7,921 | 182,087 | 169,682 | 18,267 | 187,949 | 6,271,474 | 153,929 | 6,425,403 | 35,871 | 5,408,195 | 6,213,943 | 153,816 | 6,367,759 | 743,323 | | 743,323 | 743,323 | | 1986 |
| 1987 | 307,900 | 77,442 | 7,919 | 186,225 | 72,517 | 17,042 | 89,559 | 6,343,991 | 170,971 | 6,514,962 | 36,314 | 5,461,440 | 6,283,303 | 170,818 | 6,454,121 | 751,413 | | 751,413 | 751,413 | | 1987 |
| 1988 | 313,300 | 77,782 | 7,937 | 186,011 | | 20,819 | 20,819 | 6,343,991 | 191,790 | 6,535,781 | 41,570 | 5,440,689 | 6,268,762 | 191,614 | 6,460,376 | 773,247 | | 773,247 | 773,247 | | 1988 |
| 1989 | 323,800 | 77,782 | 7,800 | 184,117 | | 18,768 | 18,768 | 6,343,991 | 210,558 | 6,554,549 | 54,101 | 5,405,356 | 6,254,072 | 210,166 | 6,464,238 | 796,081 | | 796,081 | 796,081 | | 1989 |
| 1990 | 323,600 | 77,782 | 9,143 | 182,158 | | 26,271 | 26,271 | 6,343,991 | 236,829 | 6,580,820 | 54,517 | 5,377,110 | 6,229,418 | 236,109 | 6,465,527 | 823,415 | | 823,415 | 823,415 | | 1990 |
| 1991 | 323,600 | 77,911 | 8,411 | 181,868 | 43,343 | 26,296 | 69,639 | 6,387,334 | 263,125 | 6,650,459 | 55,410 | 5,391,339 | 6,241,427 | 262,396 | 6,503,823 | 850,416 | | 850,416 | 850,416 | | 1991 |
| 1992 | 324,300 | 77,911 | 3,700 | 180,779 | | 35,132 | 35,132 | 6,387,334 | 298,257 | 6,685,591 | 61,910 | 5,364,561 | 6,202,933 | 296,865 | 6,499,798 | 868,848 | | 868,848 | 868,848 | | 1992 |
| 1993 | 342,200 | 77,911 | 3,700 | 178,137 | | 25,747 | 25,747 | 6,387,334 | 324,004 | 6,711,338 | 82,452 | 5,307,856 | 6,108,142 | 322,539 | 6,430,681 | 885,515 | | 885,515 | 885,515 | | 1993 |
| 1994 | 342,800 | 77,911 | 3,700 | 175,200 | | 32,985 | 32,985 | 6,387,334 | 356,989 | 6,744,323 | 85,989 | 5,254,852 | 6,016,582 | 355,422 | 6,372,004 | 907,181 | | 907,181 | 907,181 | | 1994 |
| 1995 | 343,700 | 77,911 | 3,700 | 172,512 | | 40,237 | 40,237 | 6,387,334 | 397,226 | 6,784,560 | 89,577 | 5,205,512 | 5,995,059 | 395,378 | 6,390,437 | 925,016 | | 925,016 | 925,016 | | 1995 |
| 1996 | 344,200 | 77,911 | 3,700 | 168,887 | | 30,494 | 30,494 | 6,387,334 | 427,720 | 6,815,054 | 93,702 | 5,142,304 | 5,948,845 | 425,799 | 6,374,644 | 943,017 | | 943,017 | 943,017 | | 1996 |
| 1997 | 344,700 | 77,911 | 3,700 | 165,982 | | 36,424 | 36,424 | 6,387,334 | 464,144 | 6,851,478 | 86,402 | 5,092,326 | 5,922,512 | 461,916 | 6,384,428 | 952,018 | 10,705 | 941,313 | 941,313 | | 1997 |
| 1998 | 345,000 | 77,911 | 3,700 | 163,310 | | 30,016 | 30,016 | 6,387,334 | 494,160 | 6,881,494 | 100,079 | 5,022,263 | 5,858,754 | 491,818 | 6,350,572 | 979,352 | | 968,647 | 968,647 | | 1998 |
| 1999 | 345,700 | 77,911 | 3,700 | 159,980 | | 34,726 | 34,726 | 6,387,334 | 528,886 | 6,916,220 | 104,109 | 4,952,880 | 5,825,441 | 526,136 | 6,351,577 | 998,685 | | 987,980 | 987,980 | | 1999 |
| 2000 | 347,800 | 77,911 | 3,700 | 156,449 | | 40,615 | 40,615 | 6,387,334 | 569,501 | 6,956,835 | 109,740 | 4,883,755 | 5,720,183 | 565,301 | 6,285,484 | 1,030,852 | | 1,020,147 | 1,020,147 | | 2000 |
| 2001 | 347,900 | 77,911 | 3,700 | 154,137 | | 35,613 | 35,613 | 6,387,334 | 605,114 | 6,992,448 | 102,160 | 4,817,208 | 5,651,198 | 600,316 | 6,251,514 | 1,055,519 | 9,992 | 1,034,822 | 1,034,822 | | 2001 |
| 2002 | 348,300 | 77,911 | 3,700 | 150,902 | | 34,680 | 34,680 | 6,387,334 | 639,794 | 7,027,128 | 115,787 | 4,736,101 | 5,603,206 | 634,579 | 6,237,785 | 1,074,852 | | 1,054,155 | 1,054,155 | | 2002 |
| 2003 | 348,300 | 77,911 | 3,700 | 147,048 | | 35,628 | 35,628 | 6,387,334 | 675,422 | 7,062,756 | 119,641 | 4,652,088 | 5,548,134 | 669,354 | 6,217,488 | 1,091,519 | | 1,070,822 | 1,070,822 | | 2003 |
| 2004 | 348,300 | 77,911 | 3,700 | 143,765 | | 33,820 | 33,820 | 6,387,334 | 709,242 | 7,096,576 | 122,143 | 4,563,765 | 5,380,206 | 702,954 | 6,083,160 | 1,109,854 | 781 | 1,088,376 | 1,088,376 | | 2004 |
| 2005 | 348,300 | 77,911 | 3,700 | 142,758 | | 41,133 | 41,133 | 6,387,334 | 750,375 | 7,137,709 | 123,931 | 4,480,967 | 5,202,327 | 742,991 | 5,945,318 | 1,126,521 | | 1,105,043 | 1,105,043 | | 2005 |
| 2006 | 348,300 | 77,911 | 3,700 | 142,219 | | 39,959 | 39,959 | 6,387,334 | 790,334 | 7,177,668 | 124,470 | 4,396,456 | 5,042,988 | 781,714 | 5,824,702 | 1,150,023 | | 1,128,545 | 1,128,545 | | 2006 |
| 2007 | 348,300 | 77,911 | 3,700 | 141,483 | | 39,841 | 39,841 | 6,387,334 | 830,175 | 7,217,509 | 125,206 | 4,311,091 | 4,926,946 | 820,695 | 5,747,641 | 1,173,024 | | 1,151,546 | 1,151,546 | | 2007 |
| 2008 | 348,300 | 77,911 | 3,700 | 140,943 | | 50,843 | 50,843 | 6,387,334 | 881,018 | 7,268,352 | 122,878 | 4,239,056 | 4,645,269 | 871,467 | 5,516,736 | 1,204,691 | 2,868 | 1,180,345 | 1,180,345 | | 2008 |
| 2009 | 348,300 | 77,911 | 3,700 | 141,016 | | 47,168 | 47,168 | 6,387,334 | 928,186 | 7,315,520 | 119,397 | 4,166,827 | 4,472,456 | 917,566 | 5,390,022 | 1,227,024 | 6,276 | 1,196,402 | 1,196,402 | | 2009 |
| 2010 | 348,300 | 77,911 | 3,700 | 141,014 | | 53,358 | 53,358 | 6,387,334 | 981,544 | 7,368,878 | 125,675 | 4,094,510 | 4,244,390 | 965,711 | 5,210,101 | 1,247,692 | | 1,217,070 | 1,217,070 | | 2010 |
| 2011 | 348,300 | 77,911 | 3,700 | 141,119 | | 59,062 | 59,062 | 6,387,334 | 1,040,606 | 7,427,940 | 125,570 | 4,028,002 | 4,142,131 | 1,024,196 | 5,166,327 | 1,267,692 | | 1,237,070 | 1,237,070 | | 2011 |
| 2012 | 348,300 | 77,911 | 3,700 | 137,317 | | 39,747 | 39,747 | 6,387,334 | 1,080,353 | 7,467,687 | 128,826 | 3,938,923 | 3,949,041 | 1,062,045 | 5,011,086 | 1,286,193 | 546 | 1,255,025 | 1,255,025 | | 2012 |
| 2013 | 348,300 | 77,911 | 3,700 | 135,867 | | 53,777 | 53,777 | 6,387,334 | 1,134,130 | 7,521,464 | 94,806 | 3,897,894 | 3,829,041 | 1,110,705 | 4,939,746 | 1,305,027 | 36,016 | 1,237,843 | 1,237,843 | | 2013 |
| 2014 | 348,300 | 77,911 | 3,700 | 132,807 | | 61,374 | 61,374 | 6,387,334 | 1,195,504 | 7,582,838 | 96,020 | 3,863,248 | 3,696,138 | 1,165,658 | 4,861,796 | 1,319,386 | 37,862 | 1,214,340 | 1,214,340 | | 2014 |
| 2015 | 348,300 | 77,911 | 3,700 | 130,100 | | 42,812 | 42,812 | 6,387,334 | 1,238,316 | 7,625,650 | 100,251 | 3,805,809 | 3,591,138 | 1,201,125 | 4,792,263 | 1,330,243 | 36,338 | 1,188,859 | 1,188,859 | | 2015 |
| 2016 | 348,300 | 77,911 | 3,700 | 130,365 | | 54,167 | 54,167 | 6,387,334 | 1,292,483 | 7,679,817 | 89,723 | 3,770,253 | 3,516,138 | 1,248,056 | 4,764,194 | 1,341,100 | 46,601 | 1,153,115 | 1,153,115 | | 2016 |
| 2017 | 348,300 | 77,911 | 3,700 | 130,636 | | 37,606 | 37,606 | 6,387,334 | 1,330,089 | 7,717,423 | 98,292 | 3,709,567 | 3,365,890 | 1,278,208 | 4,644,098 | 1,351,957 | 37,761 | 1,126,211 | 1,126,211 | | 2017 |
| 2018 | 348,300 | 77,911 | 3,700 | 131,053 | | 43,915 | 43,915 | 6,387,334 | 1,374,004 | 7,761,338 | 116,289 | 3,637,193 | 3,208,077 | 1,312,166 | 4,520,243 | 1,362,814 | 19,347 | 1,117,721 | 1,117,721 | | 2018 |
| 2019 | 348,300 | 77,911 | 3,700 | 132,333 | | 47,587 | 47,587 | 6,387,334 | 1,421,591 | 7,808,925 | 82,798 | 3,601,982 | 2,883,970 | 1,349,475 | 4,233,445 | 1,378,208 | 51,558 | 1,081,557 | 1,081,557 | | 2019 |
| 2020 | 348,300 | 77,911 | 3,700 | 134,576 | | 46,856 | 46,856 | 6,387,334 | 1,468,447 | 7,855,781 | 110,714 | 3,538,124 | 2,657,971 | 1,381,061 | 4,039,032 | 1,378,208 | 21,399 | 1,060,158 | 1,060,158 | | 2020 |
| 2021 | 348,300 | 77,911 | 3,700 | 136,658 | | 48,540 | 48,540 | 6,387,334 | 1,516,987 | 7,904,321 | 119,120 | 3,467,544 | 2,535,289 | 1,415,615 | 3,950,904 | 1,378,208 | 10,911 | 1,049,247 | 1,049,247 | | 2021 |
| 2022 | 348,300 | 77,911 | 3,700 | 138,210 | | 41,999 | 41,999 | 6,387,334 | 1,558,986 | 7,946,320 | 117,426 | 3,392,117 | 2,483,280 | 1,443,718 | 3,926,998 | 1,378,208 | 11,053 | 1,038,194 | 1,038,194 | | 2022 |
| 2023 | 348,300 | 77,911 | 3,700 | 140,170 | | 42,487 | 42,487 | 6,387,334 | 1,601,473 | 7,988,807 | 120,373 | 3,314,231 | 2,145,359 | 1,471,709 | 3,617,068 | 1,378,208 | 6,146 | 1,032,048 | 1,032,048 | | 2023 |
| 2024 | 348,300 | 77,911 | 3,700 | 142,670 | | 39,838 | 39,838 | 6,387,334 | 1,641,311 | 8,028,645 | 110,710 | 3,243,359 | 2,131,320 | 1,497,403 | 3,628,723 | 1,378,208 | 13,309 | 1,018,739 | 1,018,739 | | 2024 |
| 2025 | 348,300 | 77,911 | 3,700 | 145,289 | | 42,098 | 42,098 | 6,387,334 | 1,683,409 | 8,070,743 | 113,241 | 3,172,216 | 1,707,381 | 1,521,305 | 3,228,686 | 1,378,208 | 8,159 | 1,010,580 | 1,010,580 | | 2025 |
| 2026 | 348,300 | 77,911 | 3,700 | 150,218 | | 48,023 | 48,023 | 6,387,334 | 1,731,432 | 8,118,766 | 98,201 | 3,122,038 | 1,110,036 | 1,549,138 | 2,659,174 | 1,378,208 | 18,270 | 992,310 | 992,310 | | 2026 |
| 2027 | 348,300 | 77,911 | 3,700 | 154,536 | | 48,524 | 48,524 | 6,387,334 | 1,779,956 | 8,167,290 | 87,727 | 3,082,835 | 1,038,848 | 1,570,201 | 2,609,049 | 1,378,208 | 24,426 | 967,884 | 967,884 | | 2027 |
| 2028 | 348,300 | 77,911 | 3,700 | 151,333 | | 36,739 | 36,739 | 6,387,334 | 1,816,695 | 8,204,029 | 98,304 | 3,021,270 | 743,353 | 1,587,777 | 2,331,130 | 1,378,208 | 17,052 | 950,832 | 950,832 | | 2028 |
| 2029 | 348,300 | 77,911 | 3,700 | 155,788 | | 47,382 | 47,382 | 6,387,334 | 1,864,077 | 8,251,411 | 104,815 | 2,963,837 | 542,538 | 1,608,006 | 2,150,544 | 1,378,208 | 6,086 | 944,746 | 944,746 | | 2029 |
| 2030 | 348,300 | 77,911 | 3,700 | 156,998 | | 48,024 | 48,024 | 6,387,334 | 1,912,101 | 8,299,435 | 109,691 | 2,902,170 | 540,731 | 1,622,099 | 2,162,830 | 1,378,208 | | 944,746 | 944,746 | | 2030 |
| 2031 | 348,300 | 77,911 | 3,700 | 153,347 | | 38,615 | 38,615 | 6,387,334 | 1,950,716 | 8,338,050 | 103,457 | 2,837,328 | 509,375 | 1,637,204 | 2,146,579 | 1,378,208 | 9,885 | 934,861 | 934,861 | | 2031 |
| 2032 | 348,300 | 77,911 | 3,700 | 149,732 | | 36,823 | 36,823 | 6,387,334 | 1,987,539 | 8,374,873 | 116,957 | 2,757,194 | 327,233 | 1,648,620 | 1,975,853 | 1,378,208 | | 934,861 | 934,861 | | 2032 |
| 2033 | 348,300 | 77,911 | 3,700 | 145,297 | | 35,846 | 35,846 | 6,387,334 | 2,023,385 | 8,410,719 | 121,392 | 2,671,648 | 296,877 | 1,658,609 | 1,955,486 | 1,378,208 | | 934,861 | 934,861 | | 2033 |
| 2034 | 348,300 | 77,911 | 3,700 | 140,518 | | 33,157 | 33,157 | 6,387,334 | 2,056,542 | 8,443,876 | 126,171 | 2,578,634 | 292,987 | 1,667,291 | 1,960,278 | 1,378,208 | | 934,861 | 934,861 | | 2034 |
| 2035 | 348,300 | 77,911 | 3,700 | 135,532 | | 37,876 | 37,876 | 6,387,334 | 2,094,418 | 8,481,752 | 123,506 | 2,493,004 | 210,542 | 1,675,330 | 1,885,872 | 1,378,208 | 7,651 | 927,210 | 927,210 | | 2035 |
| 2036 | 348,300 | 77,911 | 3,700 | 130,840 | | 38,489 | 38,489 | 6,387,334 | 2,132,907 | 8,520,241 | 107,800 | 2,423,693 | 80,860 | 1,682,137 | 1,762,997 | 1,378,208 | 28,049 | 899,161 | 899,161 | | 2036 |
| 2037 | 348,300 | 77,911 | 3,700 | 127,072 | | 40,120 | 40,120 | 6,387,334 | 2,173,027 | 8,560,361 | 119,268 | 2,344,545 | 42,343 | 1,688,146 | 1,730,489 | 1,378,208 | 20,349 | 878,812 | 878,812 | | 2037 |
| 2038 | 348,300 | 77,911 | 3,700 | 122,524 | | 33,037 | 33,037 | 6,387,334 | 2,206,064 | 8,593,398 | 128,064 | 2,249,518 | 42,343 | 1,692,193 | 1,734,536 | 1,378,208 | 16,101 | 862,711 | 862,711 | | 2038 |
| 2039 | 348,300 | 77,911 | 3,700 | 117,438 | | 38,126 | 38,126 | 6,387,334 | 2,244,190 | 8,631,524 | 127,706 | 2,159,938 | 42,343 | 1,695,276 | 1,737,619 | 1,378,208 | 21,545 | 841,166 | 841,166 | | 2039 |
| 2040 | 348,300 | 77,911 | 3,700 | 112,768 | | 47,476 | 47,476 | 6,387,334 | 2,291,666 | 8,679,000 | 109,704 | 2,097,710 | 42,343 | 1,699,265 | 1,741,608 | 1,378,208 | 44,217 | 796,949 | 796,949 | | 2040 |
| 2041 | 348,300 | 77,911 | 3,700 | 109,015 | | 35,444 | 35,444 | 6,387,334 | 2,327,110 | 8,714,444 | 138,895 | 1,994,259 | | 1,700,882 | 1,700,882 | 1,378,208 | 18,779 | 778,170 | 778,170 | | 2041 |
| 2042 | 348,300 | 77,911 | 3,700 | 103,326 | | 35,464 | 35,464 | 6,387,334 | 2,362,574 | 8,749,908 | 143,183 | 1,886,540 | | 1,701,552 | 1,701,552 | 1,378,208 | 20,180 | 757,990 | 757,990 | | 2042 |
| 2043 | 348,300 | 77,911 | 3,700 | 97,724 | | 47,210 | 47,210 | 6,387,334 | 2,409,784 | 8,797,118 | 134,294 | 1,799,456 | | 1,701,552 | 1,701,552 | 1,378,208 | 34,671 | 723,319 | 723,319 | | 2043 |
| 2044 | 348,300 | 77,911 | 3,700 | 92,759 | | 40,838 | 40,838 | 6,387,334 | 2,450,622 | 8,837,956 | 153,429 | 1,686,865 | | 1,700,942 | 1,700,942 | 1,378,208 | 20,501 | 702,818 | 702,818 | | 2044 |
| 2045 | 348,300 | 77,911 | 3,700 | 86,679 | | 44,918 | 44,918 | 6,387,334 | 2,495,540 | 8,882,874 | 140,412 | 1,591,371 | | 1,699,774 | 1,699,774 | 1,378,208 | 39,598 | 663,220 | 663,220 | | 2045 |
| 2046 | 348,300 | 77,911 | 3,700 | 81,684 | | 54,281 | 54,281 | 6,387,334 | 2,549,821 | 8,937,155 | 156,670 | 1,488,982 | | 1,698,131 | 1,698,131 | 1,378,208 | 28,335 | 634,885 | 634,885 | | 2046 |
| 2047 | 348,300 | 77,911 | 3,700 | 75,536 | | 35,483 | 35,483 | 6,387,334 | 2,585,304 | 8,972,638 | 183,063 | 1,341,402 | | 1,696,080 | 1,696,080 | 1,378,208 | 8,090 | 626,795 | 626,795 | | 2047 |
| 2048 | 348,300 | 77,911 | 3,700 | 67,540 | | 39,892 | 39,892 | 6,387,334 | 2,625,196 | 9,012,530 | 177,315 | 1,203,979 | | 1,693,702 | 1,693,702 | 1,378,208 | 21,834 | 604,961 | 604,961 | | 2048 |
| 2049 | 348,300 | 77,911 | 3,700 | 60,360 | | 53,629 | 53,629 | 6,387,334 | 2,678,825 | 9,066,159 | 183,495 | 1,074,113 | | 1,691,051 | 1,691,051 | 1,378,208 | 22,834 | 582,127 | 582,127 | | 2049 |
| 2050 | 348,300 | 77,911 | 3,700 | 52,779 | | 37,694 | 37,694 | 6,387,334 | 2,716,519 | 9,103,853 | 186,576 | 925,231 | | 1,688,173 | 1,688,173 | 1,378,208 | 27,334 | 554,793 | 554,793 | | 2050 |
| TOTALS | 27,729,033 | 6,538,606 | 567,457 | 11,620,933 | 6,387,334 | 2,716,519 | 9,103,853 | | | | 8,178,622 | | | | | | 823,415 | | | | |

# FINANCIAL STATEMENTS

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-114858

*December 15, 1972*

*Dear Mr. Secretary:*

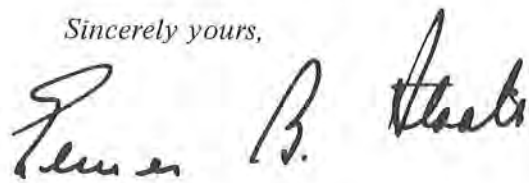
*We have examined the Statement of Assets and Liabilities of the Federal Columbia River Power System (see note 1 to the financial statements) as of June 30, 1972, and the related Statements of Revenues and Expenses and of Changes in Financial Position for fiscal year 1972. Our examination was made in accordance with generally accepted auditing standards and included tests of the accounting records of the Corps of Engineers, the Bureau of Reclamation, and the Bonneville Power Administration and such other auditing procedures as we considered necessary in the circumstances.*

*The accompanying financial statements were prepared on a cost-accounting basis which included depreciation. The statements do not present the financial results on a basis designed to show whether power rates are adequate to repay the Federal investment in the System, either for the fiscal year or cumulatively. (See note 1 to the financial statements.)*

*Subject to the financial effects of future adjustments related to the adoption of firm cost allocations as explained in note 2 and of the resolution of the matters involving interest credit and irrigation assistance as explained in notes 3 and 4, the accompanying financial statements, in our opinion, present fairly the assets and liabilities of the Federal Columbia River Power System at June 30, 1972, the financial results of its power operations, and the changes in financial position for the year then ended, in conformity with accounting principles and standards prescribed for executive agencies of the Federal Government by the Comptroller General of the United States. These accounting principles and standards were applied on a basis consistent with that of the preceding year.*

*Copies of this report are being sent to the Director, Office of Management and Budget; the Chairman, Federal Power Commission; the Administrator, Bonneville Power Administration; the Commissioner of Reclamation; the Secretary of the Army; and the Chief of Engineers.*

*Sincerely yours,*



*Comptroller General*
*of the United States*

*Enclosures – 5*

*The Honorable*
*The Secretary of the Interior*

EXHIBIT 1

FEDERAL COLUMBIA RIVER POWER SYSTEM

STATEMENT OF REVENUES AND EXPENSES
FOR THE FISCAL YEARS ENDED JUNE 30, 1972 AND JUNE 30, 1971

(In thousands)

| | 1972 | 1971 |
|---|---|---|
| OPERATING REVENUES: | | |
| Bonneville Power Administration | | |
| Sales of electric energy: | | |
| Publicly owned utilities | $ 69,392 | $ 64,078 |
| Privately owned utilities | 37,848 | 25,121 |
| Federal agencies | 4,572 | 5,403 |
| Aluminum industry | 40,423 | 40,058 |
| Other industry | 5,310 | 5,361 |
| Total | 157,545 | 140,021 |
| Other operating revenues: | | |
| Wheeling revenues | 11,391 | 10,386 |
| Other revenues | 4,014 | 2,321 |
| Total | 15,405 | 12,707 |
| Total Bonneville Power Administration revenues | 172,950 | 152,728 |
| Association projects | | |
| Other operating revenues | 3,035 | 2,950 |
| Total power system operating revenues | 175,985 | 155,678 |
| OPERATING EXPENSES OTHER THAN DEPRECIATION: | | |
| Purchase and exchange power (Note 8) | 32,794 | 12,813 |
| Operation and maintenance expense: | | |
| Operation expense | 31,558 | 29,680 |
| Maintenance expense | 17,335 | 14,907 |
| Total operation and maintenance expense | 48,893 | 44,587 |
| Total operating expenses other than depreciation | 81,687 | 57,400 |
| Net operating revenues | 94,298 | 98,278 |
| INTEREST EXPENSE: | | |
| Interest on Federal investment (projects in service) | 74,612 | 67,742 |
| Related interest charged to construction | 10,200* | 8,603* |
| Net interest expense | 64,412 | 59,139 |
| NET REVENUES AVAILABLE FOR REPAYMENT | 29,886 | 39,139 |
| LESS DEPRECIATION | 25,788 | 24,512 |
| NET REVENUES (Schedule B) | $ 4,098 | $ 14,627 |

*Denotes deduction

"Notes to the financial statements" are an integral part of this statement.

FEDERAL COLUMBIA RIVER POWER SYSTEM

STATEMENT OF ASSETS AND LIABILITIES
AS OF JUNE 30, 1972 AND JUNE 30, 1971

(In thousands)

ASSETS

| | June 30 | |
|---|---|---|
| | 1972 | 1971 |
| FIXED ASSETS: | | |
| Completed plant (Schedule A) | $3,045,072 | $2,927,283 |
| Retirement work in progress | 26,253 | 20,049 |
| | 3,071,325 | 2,947,332 |
| Less accumulated depreciation | 275,489 | 253,375 |
| | 2,795,836 | 2,693,957 |
| Construction work in progress (Schedule A) | 1,031,977 | 826,497 |
| Total fixed assets | 3,827,813 | 3,520,454 |
| CURRENT ASSETS: | | |
| Unexpended funds | 137,572 | 89,094 |
| Special funds | 7,033 | 6,500 |
| Accounts receivable | 26,259 | 29,182 |
| Materials and supplies | 14,968 | 17,056 |
| Total current assets | 185,832 | 141,832 |
| DEFERRED CHARGE FOR PAYMENT OF IRRIGATION ASSISTANCE (Schedule A) (Note 4) | 415,548 | 401,440 |
| OTHER ASSETS AND DEFERRED CHARGES: | | |
| Trust funds | 5,912 | 6,218 |
| Other assets and deferred charges | 10,443 | 4,663 |
| Total other assets and deferred charges | 16,355 | 10,881 |
| TOTAL ASSETS | $4,445,548 | $4,074,607 |

"Notes to the financial statements" are an integral part of this statement.

## LIABILITIES

| | June 30 | |
|---|---|---|
| | 1972 | 1971 |
| PROPRIETARY CAPITAL: | | |
| Investment of U.S. Government: | | |
| Congressional appropriations | $4,575,475 | $4,181,368 |
| Revenues transferred to continuing fund | 4,287 | 4,033 |
| Transfers from other Federal agencies, net | 31,274 | 27,983 |
| Interest on Federal investment (Note 7) | 948,597 | 857,647 |
| Gross Federal investment | 5,559,633 | 5,071,031 |
| Less funds returned to U.S. Treasury | 1,957,148 | 1,822,167 |
| Net investment of U.S. Government | 3,602,485 | 3,248,864 |
| Accumulated net revenues (Schedule B) | 354,155 | 351,592 |
| Total proprietary capital | 3,956,640 | 3,600,456 |
| COMMITMENTS (Note 5) | | |
| CURRENT LIABILITIES: | | |
| Accounts payable | 57,742 | 57,153 |
| Employees accrued leave | 4,639 | 4,890 |
| Total current liabilities | 62,381 | 62,043 |
| LIABILITY OF U.S. GOVERNMENT FOR PAYMENT OF IRRIGATION ASSISTANCE (Schedule A) (Note 4) | 415,548 | 401,440 |
| OTHER LIABILITIES AND DEFERRED CREDITS: | | |
| Trust fund advances | 5,912 | 6,218 |
| Other deferred credits | 5,067 | 4,450 |
| Total other liabilities and deferred credits | 10,979 | 10,668 |
| TOTAL LIABILITIES | $4,445,548 | $4,074,607 |

FEDERAL COLUMBIA RIVER POWER SYSTEM

STATEMENT OF CHANGES IN FINANCIAL POSITION
FOR THE FISCAL YEARS ENDED JUNE 30, 1972 AND JUNE 30, 1971

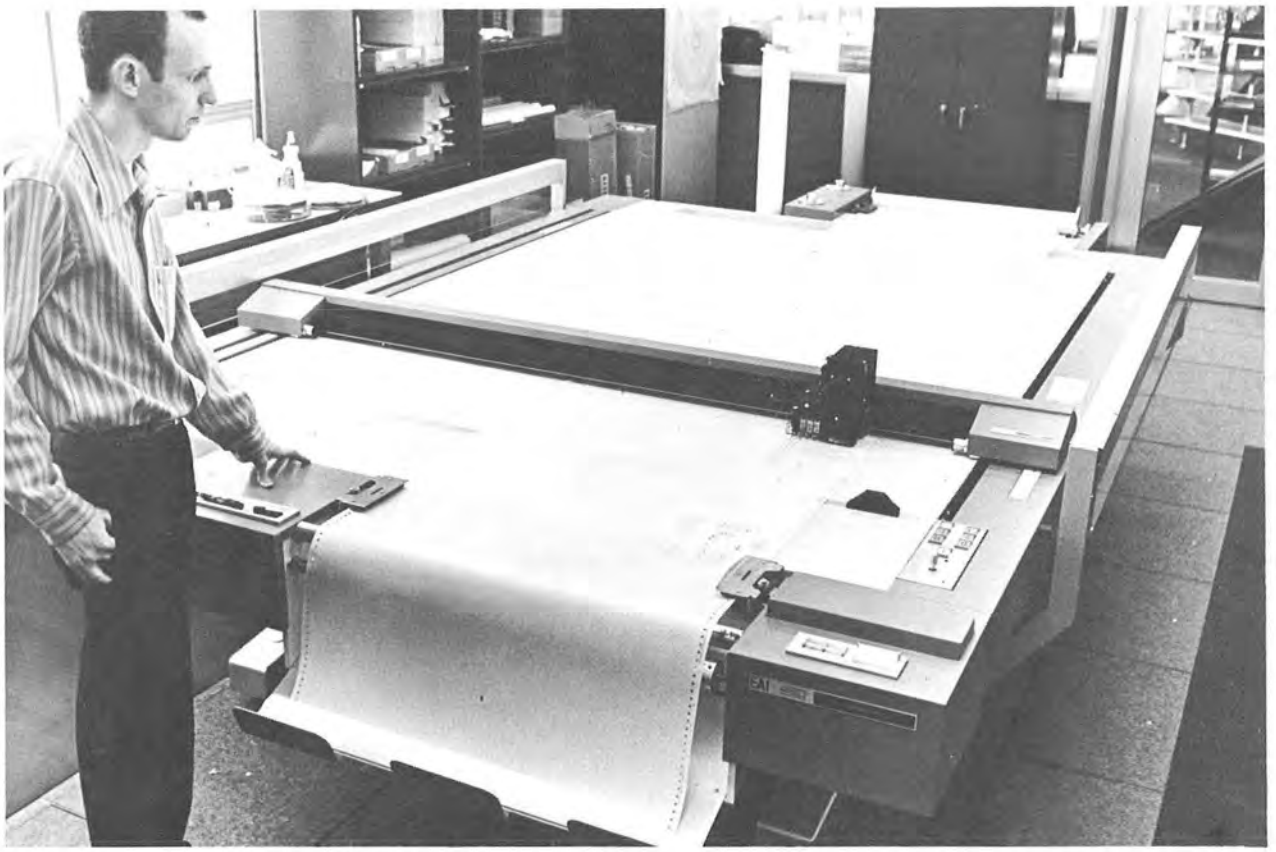
(In thousands)

| | 1972 | 1971 |
|---|---|---|
| SOURCE OF FUNDS: | | |
| Net revenues (Exhibit 1) | $ 4,098 | $ 14,627 |
| Add non-fund provision for depreciation | 25,788 | 24,512 |
| Prior years adjustments | 1,535* | 9,423* |
| Net funds from operations | 28,351 | 29,716 |
| Federal investment: | | |
| Congressional appropriations | 394,107 | 335,155 |
| Transfers from other Federal agencies, net | 3,291 | 219 |
| Interest on Federal investment | 90,950(a) | 81,360 |
| Transfers to continuing fund | 254 | |
| Total funds from Federal investment | 488,602 | 416,734 |
| Total source of funds | $516,953 | $446,450 |
| APPLICATION OF FUNDS: | | |
| Investment in electric utility plant and facilities, net | $333,147(a) | $330,295 |
| Funds returned to U.S. Treasury | 134,981 | 132,149 |
| Increase in current assets net of current liabilities | 43,662 | 15,966* |
| Increase in other assets net of other liabilities | 5,163 | 28* |
| Total application of funds | $516,953 | $446,450 |

(a) Includes capitalized interest of $10,200 on projects in service and $16,338 on projects under construction.

*Denotes deduction

"Notes to the financial statements" are an integral part of this statement.



*Computer controlled plotting (drafting) table.*

*Russian visitors visit Celilo Converter Station.*

TABLE 6

**FEDERAL COLUMBIA RIVER POWER SYSTEM**
**REPAYMENT STUDY FOR F.Y. 1972**
AUTHORIZED PROJECTS

(All Amounts in $1,000)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Plant Allocated to Commercial Power | | | | | | | | Irrigation Assistance | | | | | |
| | | | | | Investment Placed in Service | | | Cumulative Investment Placed in Service | | | | | Allowable Unamortized Investment | | | | | | | | |
| Fiscal Year Ending June 30 | Revenues | Operation and Maintenance Expense | Purchase and Exchange Power | Interest Expense | Initial Project | Replacements | Total | Initial Project | Replacements | Total | Amortization | Unamortized Investment | Initial Project | Replacements | Total | Cumulative Amount in Service | Amortization | Unamortized Amount | Allowable Unamortized Amount | Cumulative Surplus Revenues | Fiscal Year Ending June 30 |
| Cumulative to 6-30-72 | 2,103,333 | 581,109 | 108,538 | 725,664 | 3,131,054 | | 3,131,054 | 3,131,054 | | 3,131,054 | 688,022 | 2,443,032 | 3,130,298 | | 3,130,298 | 415,548 | | 415,548 | 415,548 | | |
| 1973 | 186,000 | 54,684 | 52,464 | 81,912 | 456,921 | 4,699 | 461,620 | 3,587,975 | 4,699 | 3,592,674 | (3,060) | 2,907,712 | 3,587,219 | 4,699 | 3,591,918 | 493,935 | | 493,935 | 493,935 | | 1973 |
| 1974 | 192,100 | 58,155 | 22,764 | 88,084 | 122,039 | 5,330 | 127,369 | 3,710,014 | 10,029 | 3,720,043 | 23,097 | 3,011,984 | 3,709,258 | 10,029 | 3,719,287 | 493,935 | | 493,935 | 493,935 | | 1974 |
| 1975 | 204,500 | 60,335 | 26,686 | 103,303 | 502,939 | 10,749 | 513,688 | 4,212,953 | 20,778 | 4,233,731 | 14,176 | 3,511,496 | 4,211,099 | 20,778 | 4,231,877 | 501,586 | | 501,586 | 501,586 | | 1975 |
| 1976 | 212,900 | 63,925 | 12,933 | 122,797 | 632,345 | 6,775 | 639,120 | 4,845,298 | 27,553 | 4,872,851 | 13,245 | 4,137,371 | 4,843,444 | 27,553 | 4,870,997 | 501,586 | | 501,586 | 501,586 | | 1976 |
| 1977 | 224,200 | 67,473 | 8,809 | 130,349 | 148,188 | 9,569 | 157,757 | 4,993,486 | 37,122 | 5,030,608 | 17,569 | 4,277,559 | 4,991,357 | 37,122 | 5,028,479 | 513,027 | | 513,027 | 513,027 | | 1977 |
| 1978 | 233,000 | 70,266 | 8,908 | 146,903 | 443,495 | 7,834 | 451,329 | 5,436,981 | 44,956 | 5,481,937 | 6,923 | 4,721,965 | 5,434,852 | 44,956 | 5,479,808 | 530,959 | | 530,959 | 530,959 | | 1978 |
| 1979 | 258,600 | 73,176 | 9,167 | 161,574 | 292,815 | 10,071 | 302,886 | 5,729,796 | 55,027 | 5,784,823 | 14,683 | 5,010,168 | 5,726,736 | 55,027 | 5,781,763 | 569,461 | | 569,461 | 569,461 | | 1979 |
| 1980 | 272,000 | 73,985 | 9,252 | 164,592 | 1,807 | 14,165 | 15,972 | 5,731,603 | 69,192 | 5,800,795 | 24,171 | 5,001,969 | 5,723,978 | 69,173 | 5,793,151 | 598,935 | | 598,935 | 598,935 | | 1980 |
| 1981 | 282,300 | 74,050 | 8,410 | 164,473 | 31,356 | 10,566 | 41,922 | 5,762,959 | 79,758 | 5,842,717 | 35,367 | 5,008,524 | 5,736,972 | 79,728 | 5,816,700 | 613,870 | | 613,870 | 613,870 | | 1981 |
| 1982 | 286,700 | 74,515 | 8,149 | 170,537 | 188,142 | 12,125 | 200,267 | 5,951,101 | 91,883 | 6,042,984 | 33,499 | 5,175,292 | 5,918,549 | 91,853 | 6,010,402 | 629,871 | | 629,871 | 629,871 | | 1982 |
| 1983 | 294,000 | 74,820 | 7,959 | 173,295 | 31,356 | 13,347 | 44,703 | 5,982,457 | 105,230 | 6,087,687 | 37,926 | 5,182,069 | 5,933,260 | 105,197 | 6,038,457 | 660,363 | | 660,363 | 660,363 | | 1983 |
| 1984 | 293,500 | 74,945 | 7,984 | 172,609 | 10,890 | 14,806 | 25,696 | 5,993,347 | 120,036 | 6,113,383 | 37,962 | 5,169,803 | 5,943,505 | 120,000 | 6,063,505 | 680,864 | | 680,864 | 680,864 | | 1984 |
| 1985 | 296,500 | 75,399 | 8,003 | 175,341 | 108,445 | 15,626 | 124,071 | 6,101,792 | 135,662 | 6,237,454 | 37,757 | 5,256,117 | 6,046,565 | 135,559 | 6,182,124 | 714,988 | | 714,988 | 714,988 | | 1985 |
| 1986 | 302,200 | 76,321 | 7,921 | 182,087 | 169,682 | 18,267 | 187,949 | 6,271,474 | 153,929 | 6,425,403 | 35,871 | 5,408,195 | 6,213,943 | 153,816 | 6,367,759 | 743,323 | | 743,323 | 743,323 | | 1986 |
| 1987 | 307,900 | 77,442 | 7,919 | 186,225 | 72,517 | 17,042 | 89,559 | 6,343,991 | 170,971 | 6,514,962 | 36,314 | 5,461,440 | 6,283,303 | 170,818 | 6,454,121 | 751,413 | | 751,413 | 751,413 | | 1987 |
| 1988 | 313,300 | 77,782 | 7,937 | 186,011 | | 20,819 | 20,819 | 6,343,991 | 191,790 | 6,535,781 | 41,570 | 5,440,689 | 6,268,762 | 191,614 | 6,460,376 | 773,247 | | 773,247 | 773,247 | | 1988 |
| 1989 | 323,800 | 77,782 | 7,800 | 184,117 | | 18,768 | 18,768 | 6,343,991 | 210,558 | 6,554,549 | 54,101 | 5,405,356 | 6,254,072 | 210,166 | 6,464,238 | 796,081 | | 796,081 | 796,081 | | 1989 |
| 1990 | 323,600 | 77,782 | 9,143 | 182,158 | | 26,271 | 26,271 | 6,343,991 | 236,829 | 6,580,820 | 54,517 | 5,377,110 | 6,229,418 | 236,109 | 6,465,527 | 823,415 | | 823,415 | 823,415 | | 1990 |
| 1991 | 323,600 | 77,911 | 8,411 | 181,868 | 43,343 | 26,296 | 69,639 | 6,387,334 | 263,125 | 6,650,459 | 55,410 | 5,391,339 | 6,241,427 | 262,396 | 6,503,823 | 850,416 | | 850,416 | 850,416 | | 1991 |
| 1992 | 324,300 | 77,911 | 3,700 | 180,779 | | 35,132 | 35,132 | 6,387,334 | 298,257 | 6,685,591 | 61,910 | 5,364,561 | 6,202,933 | 296,865 | 6,499,798 | 868,848 | | 868,848 | 868,848 | | 1992 |
| 1993 | 342,200 | 77,911 | 3,700 | 178,137 | | 25,747 | 25,747 | 6,387,334 | 324,004 | 6,711,338 | 82,452 | 5,307,856 | 6,108,142 | 322,539 | 6,430,681 | 885,515 | | 885,515 | 885,515 | | 1993 |
| 1994 | 342,800 | 77,911 | 3,700 | 175,200 | | 32,985 | 32,985 | 6,387,334 | 356,989 | 6,744,323 | 85,989 | 5,254,852 | 6,016,582 | 355,422 | 6,372,004 | 907,181 | | 907,181 | 907,181 | | 1994 |
| 1995 | 343,700 | 77,911 | 3,700 | 172,512 | | 40,237 | 40,237 | 6,387,334 | 397,226 | 6,784,560 | 89,577 | 5,205,512 | 5,995,059 | 395,378 | 6,390,437 | 925,016 | | 925,016 | 925,016 | | 1995 |
| 1996 | 344,200 | 77,911 | 3,700 | 168,887 | | 30,494 | 30,494 | 6,387,334 | 427,720 | 6,815,054 | 93,702 | 5,142,304 | 5,948,845 | 425,799 | 6,374,644 | 943,017 | | 943,017 | 943,017 | | 1996 |
| 1997 | 344,700 | 77,911 | 3,700 | 165,982 | | 36,424 | 36,424 | 6,387,334 | 464,144 | 6,851,478 | 86,402 | 5,092,326 | 5,922,512 | 461,916 | 6,384,428 | 952,018 | 10,705 | 941,313 | 941,313 | | 1997 |
| 1998 | 345,000 | 77,911 | 3,700 | 163,310 | | 30,016 | 30,016 | 6,387,334 | 494,160 | 6,881,494 | 100,079 | 5,022,263 | 5,858,754 | 491,818 | 6,350,572 | 979,352 | | 968,647 | 968,647 | | 1998 |
| 1999 | 345,700 | 77,911 | 3,700 | 159,980 | | 34,726 | 34,726 | 6,387,334 | 528,886 | 6,916,220 | 104,109 | 4,952,880 | 5,825,441 | 526,136 | 6,351,577 | 998,685 | | 987,980 | 987,980 | | 1999 |
| 2000 | 347,800 | 77,911 | 3,700 | 156,449 | | 40,615 | 40,615 | 6,387,334 | 569,501 | 6,956,835 | 109,740 | 4,883,755 | 5,720,183 | 565,301 | 6,285,484 | 1,030,852 | | 1,020,147 | 1,020,147 | | 2000 |
| 2001 | 347,900 | 77,911 | 3,700 | 154,137 | | 35,613 | 35,613 | 6,387,334 | 605,114 | 6,992,448 | 102,160 | 4,817,208 | 5,651,198 | 600,316 | 6,251,514 | 1,055,519 | 9,992 | 1,034,822 | 1,034,822 | | 2001 |
| 2002 | 348,300 | 77,911 | 3,700 | 150,902 | | 34,680 | 34,680 | 6,387,334 | 639,794 | 7,027,128 | 115,787 | 4,736,101 | 5,603,206 | 634,579 | 6,237,785 | 1,074,852 | | 1,054,155 | 1,054,155 | | 2002 |
| 2003 | 348,300 | 77,911 | 3,700 | 147,048 | | 35,628 | 35,628 | 6,387,334 | 675,422 | 7,062,756 | 119,641 | 4,652,088 | 5,548,134 | 669,354 | 6,217,488 | 1,091,519 | | 1,070,822 | 1,070,822 | | 2003 |
| 2004 | 348,300 | 77,911 | 3,700 | 143,765 | | 33,820 | 33,820 | 6,387,334 | 709,242 | 7,096,576 | 122,143 | 4,563,765 | 5,380,206 | 702,954 | 6,083,160 | 1,109,854 | 781 | 1,088,376 | 1,088,376 | | 2004 |
| 2005 | 348,300 | 77,911 | 3,700 | 142,758 | | 41,133 | 41,133 | 6,387,334 | 750,375 | 7,137,709 | 123,931 | 4,480,967 | 5,202,327 | 742,991 | 5,945,318 | 1,126,521 | | 1,105,043 | 1,105,043 | | 2005 |
| 2006 | 348,300 | 77,911 | 3,700 | 142,219 | | 39,959 | 39,959 | 6,387,334 | 790,334 | 7,177,668 | 124,470 | 4,396,456 | 5,042,988 | 781,714 | 5,824,702 | 1,150,023 | | 1,128,545 | 1,128,545 | | 2006 |
| 2007 | 348,300 | 77,911 | 3,700 | 141,483 | | 39,841 | 39,841 | 6,387,334 | 830,175 | 7,217,509 | 125,206 | 4,311,091 | 4,926,946 | 820,695 | 5,747,641 | 1,173,024 | | 1,151,546 | 1,151,546 | | 2007 |
| 2008 | 348,300 | 77,911 | 3,700 | 140,943 | | 50,843 | 50,843 | 6,387,334 | 881,018 | 7,268,352 | 122,878 | 4,239,056 | 4,645,269 | 871,467 | 5,516,736 | 1,204,691 | 2,868 | 1,180,345 | 1,180,345 | | 2008 |
| 2009 | 348,300 | 77,911 | 3,700 | 141,016 | | 47,168 | 47,168 | 6,387,334 | 928,186 | 7,315,520 | 119,397 | 4,166,827 | 4,472,456 | 917,566 | 5,390,022 | 1,227,024 | 6,276 | 1,196,402 | 1,196,402 | | 2009 |
| 2010 | 348,300 | 77,911 | 3,700 | 141,014 | | 53,358 | 53,358 | 6,387,334 | 981,544 | 7,368,878 | 125,675 | 4,094,510 | 4,244,390 | 965,711 | 5,210,101 | 1,247,692 | | 1,217,070 | 1,217,070 | | 2010 |
| 2011 | 348,300 | 77,911 | 3,700 | 141,119 | | 59,062 | 59,062 | 6,387,334 | 1,040,606 | 7,427,940 | 125,570 | 4,028,002 | 4,142,131 | 1,024,196 | 5,166,327 | 1,267,692 | | 1,237,070 | 1,237,070 | | 2011 |
| 2012 | 348,300 | 77,911 | 3,700 | 137,317 | | 39,747 | 39,747 | 6,387,334 | 1,080,353 | 7,467,687 | 128,826 | 3,938,923 | 3,949,041 | 1,062,045 | 5,011,086 | 1,286,193 | 546 | 1,255,025 | 1,255,025 | | 2012 |
| 2013 | 348,300 | 77,911 | 3,700 | 135,867 | | 53,777 | 53,777 | 6,387,334 | 1,134,130 | 7,521,464 | 94,806 | 3,897,894 | 3,829,041 | 1,110,705 | 4,939,746 | 1,305,027 | 36,016 | 1,237,843 | 1,237,843 | | 2013 |
| 2014 | 348,300 | 77,911 | 3,700 | 132,807 | | 61,374 | 61,374 | 6,387,334 | 1,195,504 | 7,582,838 | 96,020 | 3,863,248 | 3,696,138 | 1,165,658 | 4,861,796 | 1,319,386 | 37,862 | 1,214,340 | 1,214,340 | | 2014 |
| 2015 | 348,300 | 77,911 | 3,700 | 130,100 | | 42,812 | 42,812 | 6,387,334 | 1,238,316 | 7,625,650 | 100,251 | 3,805,809 | 3,591,138 | 1,201,125 | 4,792,263 | 1,330,243 | 36,338 | 1,188,859 | 1,188,859 | | 2015 |
| 2016 | 348,300 | 77,911 | 3,700 | 130,365 | | 54,167 | 54,167 | 6,387,334 | 1,292,483 | 7,679,817 | 89,723 | 3,770,253 | 3,516,138 | 1,248,056 | 4,764,194 | 1,341,100 | 46,601 | 1,153,115 | 1,153,115 | | 2016 |
| 2017 | 348,300 | 77,911 | 3,700 | 130,636 | | 37,606 | 37,606 | 6,387,334 | 1,330,089 | 7,717,423 | 98,292 | 3,709,567 | 3,365,890 | 1,278,208 | 4,644,098 | 1,351,957 | 37,761 | 1,126,211 | 1,126,211 | | 2017 |
| 2018 | 348,300 | 77,911 | 3,700 | 131,053 | | 43,915 | 43,915 | 6,387,334 | 1,374,004 | 7,761,338 | 116,289 | 3,637,193 | 3,208,077 | 1,312,166 | 4,520,243 | 1,362,814 | 19,347 | 1,117,721 | 1,117,721 | | 2018 |
| 2019 | 348,300 | 77,911 | 3,700 | 132,333 | | 47,587 | 47,587 | 6,387,334 | 1,421,591 | 7,808,925 | 82,798 | 3,601,982 | 2,883,970 | 1,349,475 | 4,233,445 | 1,378,208 | 51,558 | 1,081,557 | 1,081,557 | | 2019 |
| 2020 | 348,300 | 77,911 | 3,700 | 134,576 | | 46,856 | 46,856 | 6,387,334 | 1,468,447 | 7,855,781 | 110,714 | 3,538,124 | 2,657,971 | 1,381,061 | 4,039,032 | 1,378,208 | 21,399 | 1,060,158 | 1,060,158 | | 2020 |
| 2021 | 348,300 | 77,911 | 3,700 | 136,658 | | 48,540 | 48,540 | 6,387,334 | 1,516,987 | 7,904,321 | 119,120 | 3,467,544 | 2,535,289 | 1,415,615 | 3,950,904 | 1,378,208 | 10,911 | 1,049,247 | 1,049,247 | | 2021 |
| 2022 | 348,300 | 77,911 | 3,700 | 138,210 | | 41,999 | 41,999 | 6,387,334 | 1,558,986 | 7,946,320 | 117,426 | 3,392,117 | 2,483,280 | 1,443,718 | 3,926,998 | 1,378,208 | 11,053 | 1,038,194 | 1,038,194 | | 2022 |
| 2023 | 348,300 | 77,911 | 3,700 | 140,170 | | 42,487 | 42,487 | 6,387,334 | 1,601,473 | 7,988,807 | 120,373 | 3,314,231 | 2,145,359 | 1,471,709 | 3,617,068 | 1,378,208 | 6,146 | 1,032,048 | 1,032,048 | | 2023 |
| 2024 | 348,300 | 77,911 | 3,700 | 142,670 | | 39,838 | 39,838 | 6,387,334 | 1,641,311 | 8,028,645 | 110,710 | 3,243,359 | 2,131,320 | 1,497,403 | 3,628,723 | 1,378,208 | 13,309 | 1,018,739 | 1,018,739 | | 2024 |
| 2025 | 348,300 | 77,911 | 3,700 | 145,289 | | 42,098 | 42,098 | 6,387,334 | 1,683,409 | 8,070,743 | 113,241 | 3,172,216 | 1,707,381 | 1,521,305 | 3,228,686 | 1,378,208 | 8,159 | 1,010,580 | 1,010,580 | | 2025 |
| 2026 | 348,300 | 77,911 | 3,700 | 150,218 | | 48,023 | 48,023 | 6,387,334 | 1,731,432 | 8,118,766 | 98,201 | 3,122,038 | 1,110,036 | 1,549,138 | 2,659,174 | 1,378,208 | 18,270 | 992,310 | 992,310 | | 2026 |
| 2027 | 348,300 | 77,911 | 3,700 | 154,536 | | 48,524 | 48,524 | 6,387,334 | 1,779,956 | 8,167,290 | 87,727 | 3,082,835 | 1,038,848 | 1,570,201 | 2,609,049 | 1,378,208 | 24,426 | 967,884 | 967,884 | | 2027 |
| 2028 | 348,300 | 77,911 | 3,700 | 151,333 | | 36,739 | 36,739 | 6,387,334 | 1,816,695 | 8,204,029 | 98,304 | 3,021,270 | 743,353 | 1,587,777 | 2,331,130 | 1,378,208 | 17,052 | 950,832 | 950,832 | | 2028 |
| 2029 | 348,300 | 77,911 | 3,700 | 155,788 | | 47,382 | 47,382 | 6,387,334 | 1,864,077 | 8,251,411 | 104,815 | 2,963,837 | 542,538 | 1,608,006 | 2,150,544 | 1,378,208 | 6,086 | 944,746 | 944,746 | | 2029 |
| 2030 | 348,300 | 77,911 | 3,700 | 156,998 | | 48,024 | 48,024 | 6,387,334 | 1,912,101 | 8,299,435 | 109,691 | 2,902,170 | 540,731 | 1,622,099 | 2,162,830 | 1,378,208 | | 944,746 | 944,746 | | 2030 |
| 2031 | 348,300 | 77,911 | 3,700 | 153,347 | | 38,615 | 38,615 | 6,387,334 | 1,950,716 | 8,338,050 | 103,457 | 2,837,328 | 509,375 | 1,637,204 | 2,146,579 | 1,378,208 | 9,885 | 934,861 | 934,861 | | 2031 |
| 2032 | 348,300 | 77,911 | 3,700 | 149,732 | | 36,823 | 36,823 | 6,387,334 | 1,987,539 | 8,374,873 | 116,957 | 2,757,194 | 327,233 | 1,648,620 | 1,975,853 | 1,378,208 | | 934,861 | 934,861 | | 2032 |
| 2033 | 348,300 | 77,911 | 3,700 | 145,297 | | 35,846 | 35,846 | 6,387,334 | 2,023,385 | 8,410,719 | 121,392 | 2,671,648 | 296,877 | 1,658,609 | 1,955,486 | 1,378,208 | | 934,861 | 934,861 | | 2033 |
| 2034 | 348,300 | 77,911 | 3,700 | 140,518 | | 33,157 | 33,157 | 6,387,334 | 2,056,542 | 8,443,876 | 126,171 | 2,578,634 | 292,987 | 1,667,291 | 1,960,278 | 1,378,208 | | 934,861 | 934,861 | | 2034 |
| 2035 | 348,300 | 77,911 | 3,700 | 135,532 | | 37,876 | 37,876 | 6,387,334 | 2,094,418 | 8,481,752 | 123,506 | 2,493,004 | 210,542 | 1,675,330 | 1,885,872 | 1,378,208 | 7,651 | 927,210 | 927,210 | | 2035 |
| 2036 | 348,300 | 77,911 | 3,700 | 130,840 | | 38,489 | 38,489 | 6,387,334 | 2,132,907 | 8,520,241 | 107,800 | 2,423,693 | 80,860 | 1,682,137 | 1,762,997 | 1,378,208 | 28,049 | 899,161 | 899,161 | | 2036 |
| 2037 | 348,300 | 77,911 | 3,700 | 127,072 | | 40,120 | 40,120 | 6,387,334 | 2,173,027 | 8,560,361 | 119,268 | 2,344,545 | 42,343 | 1,688,146 | 1,730,489 | 1,378,208 | 20,349 | 878,812 | 878,812 | | 2037 |
| 2038 | 348,300 | 77,911 | 3,700 | 122,524 | | 33,037 | 33,037 | 6,387,334 | 2,206,064 | 8,593,398 | 128,064 | 2,249,518 | 42,343 | 1,692,193 | 1,734,536 | 1,378,208 | 16,101 | 862,711 | 862,711 | | 2038 |
| 2039 | 348,300 | 77,911 | 3,700 | 117,438 | | 38,126 | 38,126 | 6,387,334 | 2,244,190 | 8,631,524 | 127,706 | 2,159,938 | 42,343 | 1,695,276 | 1,737,619 | 1,378,208 | 21,545 | 841,166 | 841,166 | | 2039 |
| 2040 | 348,300 | 77,911 | 3,700 | 112,768 | | 47,476 | 47,476 | 6,387,334 | 2,291,666 | 8,679,000 | 109,704 | 2,097,710 | 42,343 | 1,699,265 | 1,741,608 | 1,378,208 | 44,217 | 796,949 | 796,949 | | 2040 |
| 2041 | 348,300 | 77,911 | 3,700 | 109,015 | | 35,444 | 35,444 | 6,387,334 | 2,327,110 | 8,714,444 | 138,895 | 1,994,259 | | 1,700,882 | 1,700,882 | 1,378,208 | 18,779 | 778,170 | 778,170 | | 2041 |
| 2042 | 348,300 | 77,911 | 3,700 | 103,326 | | 35,464 | 35,464 | 6,387,334 | 2,362,574 | 8,749,908 | 143,183 | 1,886,540 | | 1,701,552 | 1,701,552 | 1,378,208 | 20,180 | 757,990 | 757,990 | | 2042 |
| 2043 | 348,300 | 77,911 | 3,700 | 97,724 | | 47,210 | 47,210 | 6,387,334 | 2,409,784 | 8,797,118 | 134,294 | 1,799,456 | | 1,701,552 | 1,701,552 | 1,378,208 | 34,671 | 723,319 | 723,319 | | 2043 |
| 2044 | 348,300 | 77,911 | 3,700 | 92,759 | | 40,838 | 40,838 | 6,387,334 | 2,450,622 | 8,837,956 | 153,429 | 1,686,865 | | 1,700,942 | 1,700,942 | 1,378,208 | 20,501 | 702,818 | 702,818 | | 2044 |
| 2045 | 348,300 | 77,911 | 3,700 | 86,679 | | 44,918 | 44,918 | 6,387,334 | 2,495,540 | 8,882,874 | 140,412 | 1,591,371 | | 1,699,774 | 1,699,774 | 1,378,208 | 39,598 | 663,220 | 663,220 | | 2045 |
| 2046 | 348,300 | 77,911 | 3,700 | 81,684 | | 54,281 | 54,281 | 6,387,334 | 2,549,821 | 8,937,155 | 156,670 | 1,488,982 | | 1,698,131 | 1,698,131 | 1,378,208 | 28,335 | 634,885 | 634,885 | | 2046 |
| 2047 | 348,300 | 77,911 | 3,700 | 75,536 | | 35,483 | 35,483 | 6,387,334 | 2,585,304 | 8,972,638 | 183,063 | 1,341,402 | | 1,696,080 | 1,696,080 | 1,378,208 | 8,090 | 626,795 | 626,795 | | 2047 |
| 2048 | 348,300 | 77,911 | 3,700 | 67,540 | | 39,892 | 39,892 | 6,387,334 | 2,625,196 | 9,012,530 | 177,315 | 1,203,979 | | 1,693,702 | 1,693,702 | 1,378,208 | 21,834 | 604,961 | 604,961 | | 2048 |
| 2049 | 348,300 | 77,911 | 3,700 | 60,360 | | 53,629 | 53,629 | 6,387,334 | 2,678,825 | 9,066,159 | 183,495 | 1,074,113 | | 1,691,051 | 1,691,051 | 1,378,208 | 22,834 | 582,127 | 582,127 | | 2049 |
| 2050 | 348,300 | 77,911 | 3,700 | 52,779 | | 37,694 | 37,694 | 6,387,334 | 2,716,519 | 9,103,853 | 186,576 | 925,231 | | 1,688,173 | 1,688,173 | 1,378,208 | 27,334 | 554,793 | 554,793 | | 2050 |
| TOTALS | 27,729,033 | 6,538,606 | 567,457 | 11,620,933 | 6,387,334 | 2,716,519 | 9,103,853 | | | | 8,178,622 | | | | | | 823,415 | | | | |

FEDERAL COLUMBIA RIVER POWER SYSTEM

CHANGES IN ACCUMULATED NET REVENUES
FOR THE FISCAL YEAR ENDED JUNE 30, 1972

(In thousands)

| | Cumulative Balance June 30, 1971 | Fiscal Year 1972 | Prior Years Adjustments (Note 9) | Cumulative Balance June 30, 1972 |
|---|---|---|---|---|
| OPERATING REVENUES | $1,927,348 | $175,985 | | $2,103,333 |
| EXPENSES: | | | | |
| Purchase and exchange power | 75,744 | 32,794 | | 108,538 |
| Operation and maintenance expense | 530,981 | 48,893 | $1,235 | 581,109 |
| Interest expense | 661,252 | 64,412 | | 725,664 |
| Total | 1,267,977 | 146,099 | 1,235 | 1,415,311 |
| NET REVENUES AVAILABLE FOR REPAYMENT | 659,371 | 29,886 | 1,235* | 688,022 |
| LESS DEPRECIATION | 307,779 | 25,788 | 300 | 333,867 |
| ACCUMULATED NET REVENUES (Exhibit 2) | $ 351,592 | $ 4,098 | $1,535* | $ 354,155 |

*Denotes deduction

"Notes to the financial statements" are an integral part of this schedule.

## FEDERAL COLUMBIA RIVER POWER SYSTEM
## NOTES TO THE FINANCIAL STATEMENTS

### Note 1. Major Accounting Considerations

The Federal Columbia River Power System (FCRPS) consists of the Bonneville Power Administration (BPA) and the generating facilities of the Corps of Engineers (Corps) and the Bureau of Reclamation (Bureau) for which BPA is the power marketing agent. Each entity is separately managed and financed but the facilities are operated as an integrated power system with the financial results consolidated under the FCRPS name.

These financial statements are prepared on a cost accounting basis including compound interest depreciation and interest on the unpaid Federal investment.

Costs of multi-purpose Corps and Bureau projects are assigned to the individual purposes through a cost allocation process. The portion of total project costs allocated to power is included in these statements.

These statements are not used to establish BPA's wholesale power rates. A separate repayment analysis is prepared for that purpose. In the accompanying statements, the depreciation life for fixed assets allocated to power averages about 64 years. However, the repayment periods used to establish power rates are 50 years for the generating projects and 40 years for the transmission system. Schedule A lists the projects included in FCRPS and the allocation of plant investment to the various purposes.

Changes in the format of the accompanying statements include revision of the Statement of Revenues and Expenses (Exhibit 1), and the Statement of Changes in Financial Position (Exhibit 3). In effecting these changes, Fiscal Year 1971 data were conformed to the new formats. Also, for the first time, a schedule of Changes in Accumulated Net Revenues (Schedule B) is included. This schedule provides a correlation between the accompanying cost based statements and cumulative totals shown in the first line of the separate repayment analysis.

### Note 2. Tentative Cost Allocations

Plant and operation and maintenance expenses based on tentative allocations between power and non-power purposes are included for eight of the projects listed in Schedule A. In the past, adjustments have been made to plant and accumulated net revenues when firm allocations were adopted. At June 30, 1972, total joint plant costs for these eight projects are about $1.5 billion of which $1.1 billion are tentatively allocated to power and subject to retroactive adjustment. The amount of adjustments that may be necessary when the allocations become firm are not determinable at this time.

### Note 3. Interest Credit

BPA's method of reducing interest expense to recognize an interest credit on current year receipts deposited with the U.S. Treasury has been questioned by the U.S. General Accounting Office (GAO). The method recommended by GAO is currently being considered by the Department of the Interior. It is not known at this time if BPA's current method will be changed. If GAO's method is adopted, interest expense for Fiscal Years 1971 and 1972 would be increased in total for the two years by about $4.1 million.

### Note 4. Repayment Responsibility for Irrigation Costs

Legislation requires that FCRPS net revenues will provide financial assistance to return to the U.S. Treasury the cost of Bureau irrigation facilities which benefiting water users are unable to repay. Investment made through June 30, 1972 results in estimated irrigation assistance of $416 million. FCRPS repayment studies show that the first payment for the assistance will be made in 1997. Congress may also authorize additional assistance of up to $20 million for investment allocated to irrigation at six Corps projects.

The method of reflecting this repayment requirement in the accompanying statements is currently under study. The GAO has questioned the current practice and BPA agrees that all ramifications of the question should be explored in depth, including classification and amortization. However, a decision has not been reached at the time of statement preparation, and efforts will be made for resolution for the June 30, 1973 statements. These efforts will consider both legal requirements and generally accepted accounting principles and will involve consideration by GAO and the Department of the Interior, including all of its power marketing entities which are involved in irrigation assistance.

Note 5. Commitments to Exchange Power and Acquire Project Capability

a. Hanford Plant No. 1

BPA has made agreements with the Washington Public Power Supply System (WPPSS) and 76 participating utilities, to provide power at BPA rates in an amount equal to the annual operating and debt service costs of the Hanford Plant No. 1, whether or not the plant is operating. In return, BPA receives the plant output. At June 30, 1972, about $73 million of bonds remain outstanding and are due to be fully retired by 1996.

b. Columbia Storage Power Exchange

BPA has entered into unconditional agreements to provide to 41 utilities amounts of power which vary annually over a 30 year period and which have a value of $314.1 million evaluated at current BPA rates. In exchange, BPA receives from the Columbia Storage Power Exchange, Canada's share of the additional power generated in the United States as a result of operating the three Canadian Treaty storage dams.

c. Centralia Coal Fired Steam Plant

BPA has entered into agreements with eight utilities to acquire a portion of the capability of the Centralia Coal Fired Steam Plant. BPA's commitment begins when the plant begins operation and continues until April 1, 1974 whether or not full capability is maintained. At June 30, 1972 the plant had not achieved full capability. BPA's commitment through April 1, 1974 is estimated at $27.8 million.

d. Trojan Nuclear Plant

BPA has entered into agreements to acquire throughout the life of the Project, beginning approximately September 1, 1974 the Eugene Water and Electric Board's 30% ownership share of Project capability of the Trojan Nuclear Plant. BPA's costs are estimated to be $12.1 million per year for a 35 year period. BPA is committed to 30% of annual costs whether or not the plant is completed, operable, or operating. By giving notice prior to July 1977, Eugene may withdraw Project capability beginning July 1, 1984 for its own use, and BPA payments would be reduced proportionally to any such withdrawal.

e. WPPSS Nuclear Project No. 2

BPA has entered into agreements to acquire the capability of the WPPSS Nuclear Project No. 2 which will be constructed and operated by WPPSS on the AEC Hanford reservation. The plant is scheduled for commercial operation beginning approximately September 1, 1977.

During the estimated 35 year life of the project, BPA's total costs are estimated to be $1.5 billion. BPA is obligated under the agreements to pay the annual costs whether or not the project is completed, operable, or operating.

Note 6. Contingent Liabilities

Contingent liabilities total approximately $64.0 million of which $61.6 million represent various contractor claims and $2.4 million represent claims under the Federal Tort Claims Act. Included in the contractor claims is $54.7 million for work at Libby Dam Project. The activities which gave rise to these claims occurred prior to June 30, 1972, but part of the claims were filed subsequent to that date.

Note 7. Interest Rates

Rates of interest applied to unpaid Federal Investment are:

Generating Projects

| | | | |
|---|---|---|---|
| Albeni Falls | 2-1/2% | Lost Creek | 3-1/8% |
| Boise | 3% | Lower Granite | 2-1/2% |
| Bonneville | 2-1/2% | Lower Monumental | 2-1/2% |
| Bonneville Second Power House and Peaking Modifications | 3-1/4% | McNary | 2-1/2% |
| Chief Joseph | 2-1/2% | Minidoka | 3% |
| Chief Joseph Additional Units | 3-1/4% | Palisades | 3% |
| Columbia Basin | 3% | Teton | 3.342% |
| Columbia Basin Third Power Plant | 3-1/8% | The Dalles | 2-1/2% |
| Cougar | 2-1/2% | The Dalles Additional Units | 3-1/8% |
| Detroit-Big Cliff | 2-1/2% | Yakima – Rosa Division | 3% |
| Dworshak | 2-5/8% | Yakima – Kennewick Division | 2-1/2% |
| Green Peter-Foster | 2-1/2% | Transmission Facilities – BPA | |
| Hills Creek | 2-1/2% | Through Fiscal Year 1963 | 2-1/2% |
| Hungry Horse | 3% | Fiscal Year 1964 | 2-7/8% |
| Ice Harbor | 2-1/2% | Fiscal Year 1965 | 3% |
| John Day | 2-1/2% | Fiscal Year 1966 through 1968 | 3-1/8% |
| Libby | 3-1/8% | Fiscal Years 1969 and 1970 | 3-1/4% |
| Little Goose | 2-1/2% | Fiscal Year 1971 | 4-7/8% |
| Lookout Point-Dexter | 2-1/2% | Fiscal Year 1972 | 5-3/8% |

Note 8. Purchase and Exchange Power

The current year increase in this expense is primarily the result of new steam purchase agreements for operation of the Hanford Plant No. 1. The new agreements apply to Fiscal Years 1972 through 1975. The amount of the increase in Fiscal Year 1972 for operation of Hanford Plant No. 1 was $14.9 million.

Note 9. Adjustments to Accumulated Net Revenues

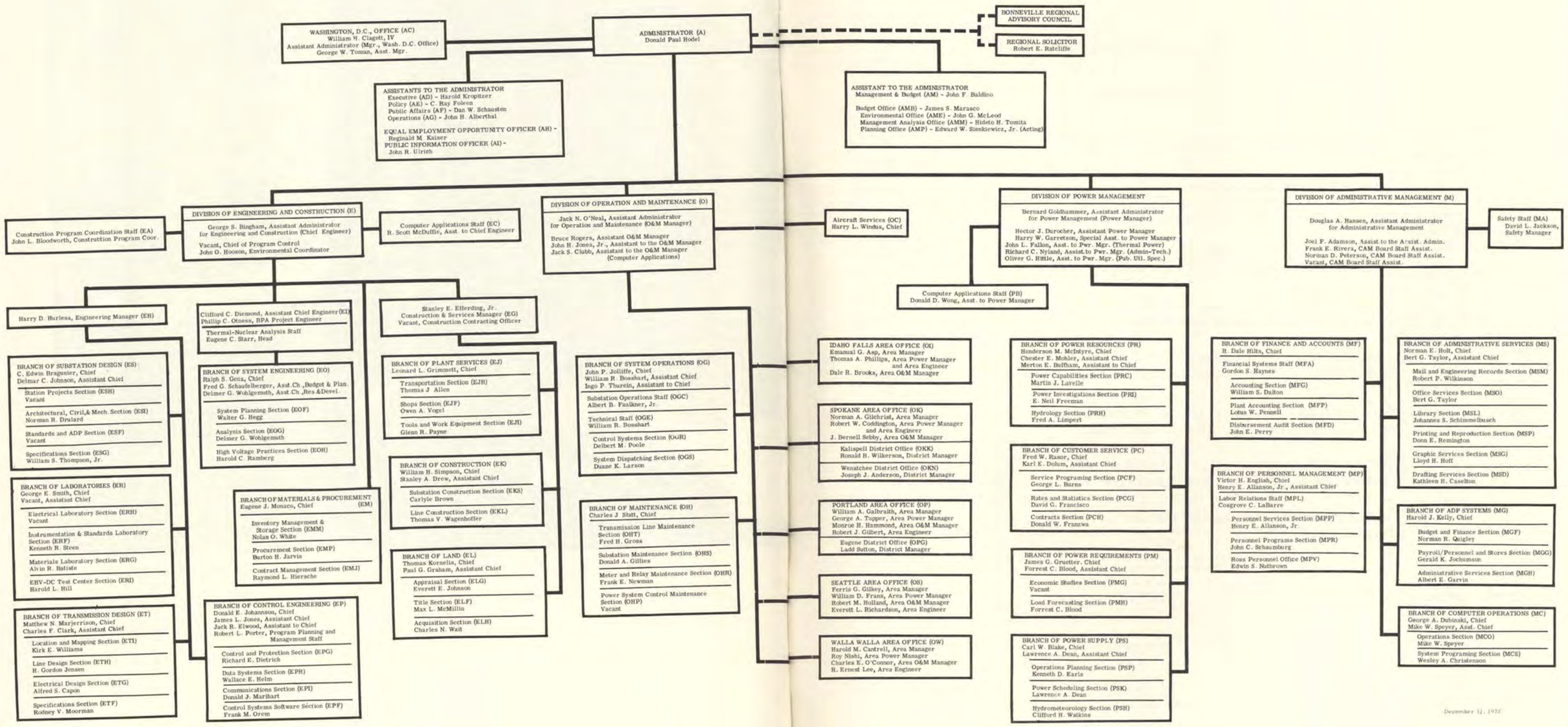
The following table lists the adjustments which have caused the net decrease in Accumulated Net Revenues of $1,535,000 shown in Exhibit 3 and Schedule B.

| | In Thousands |
|---|---|
| 1. Write-off of surplus and obsolete materials and supplies at BPA | $(1,157) |
| 2. Extraordinary retirements caused by construction of third power plant at Columbia Basin Project | (256) |
| 3. Correction of adjustment to expenses at Chief Joseph Project due to adoption of sub-allocation to irrigation pumping power | (124) |
| 4. Minor adjustment at Albeni Falls Project | 2 |
| | $(1,535) |

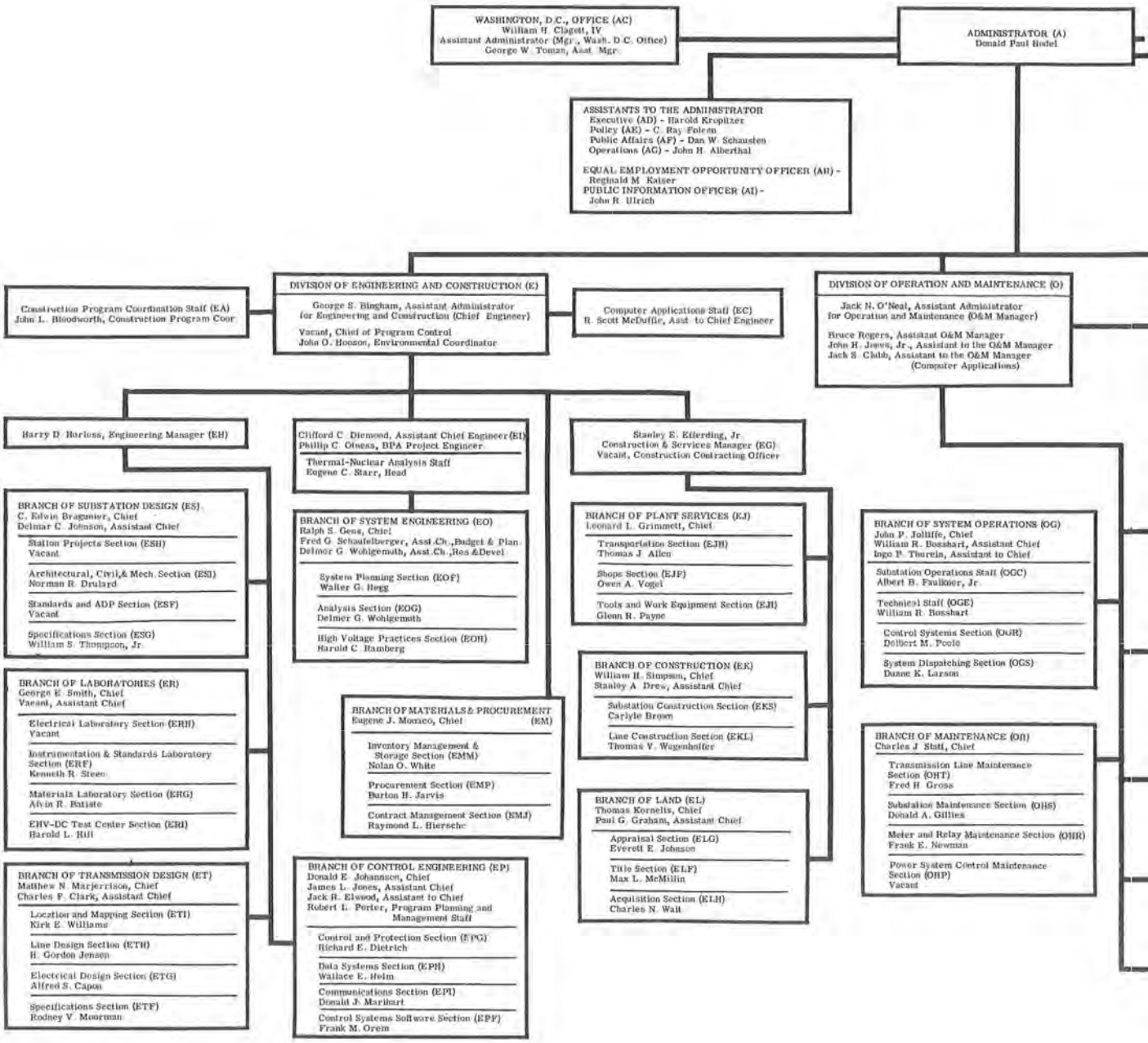
*Bonneville Regional Advisory Council in session.*

# BPA MANAGEMENT & ASSOCIATED GROUPS

# BPA ORGANIZATION CHART



# BPA ORGANIZATION CHART



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