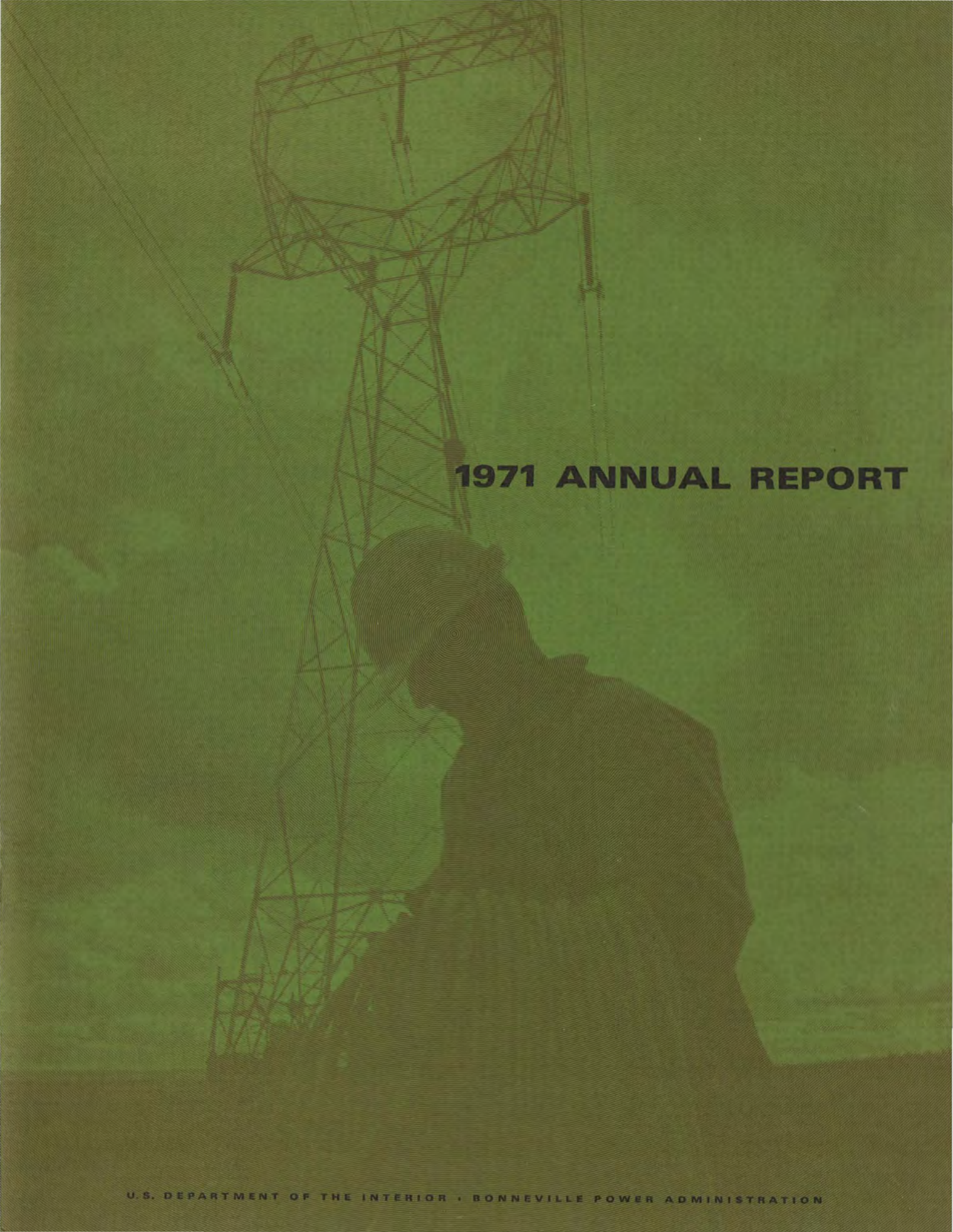
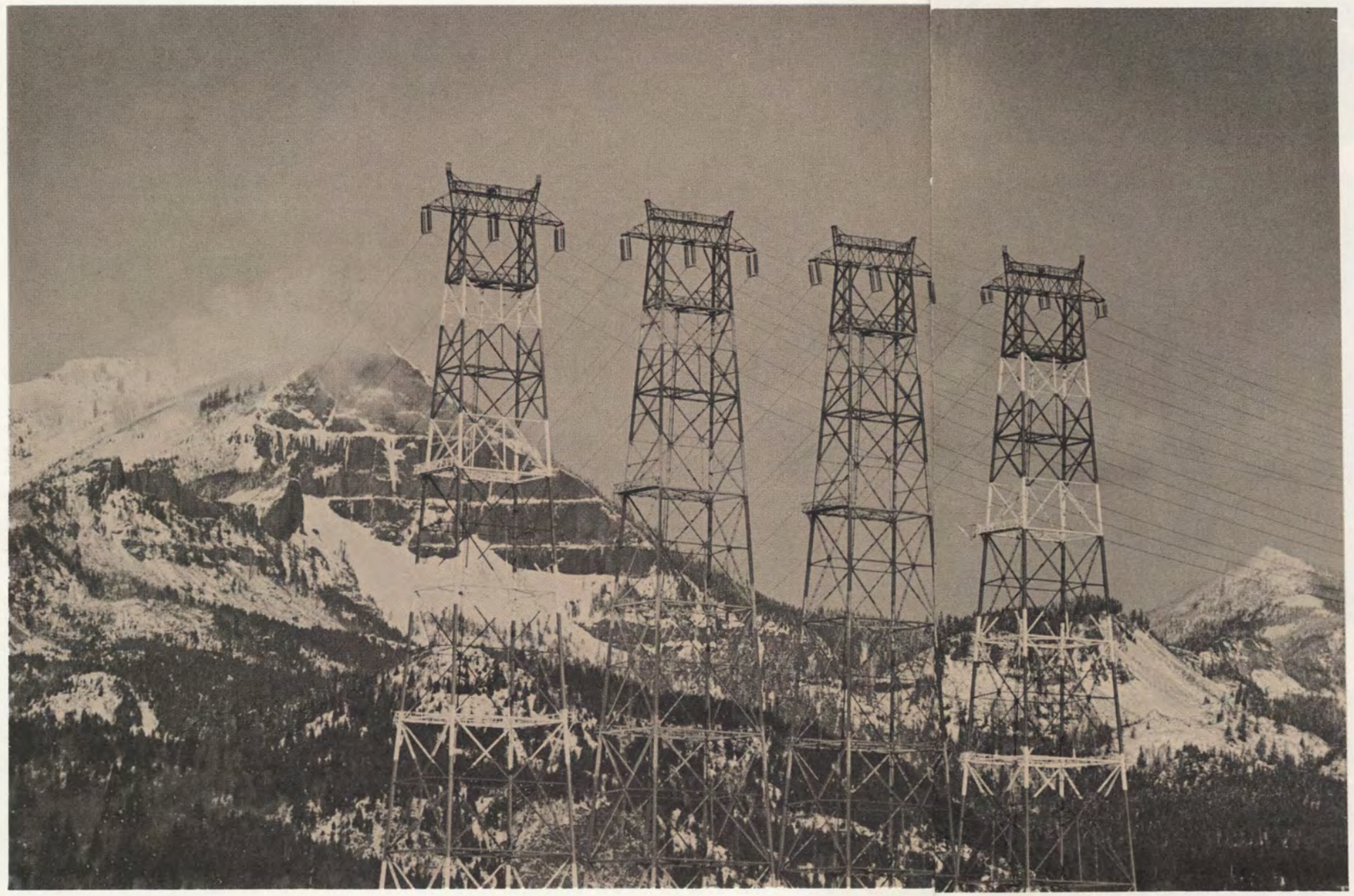


1971 ANNUAL REPORT

U.S. DEPARTMENT OF THE INTERIOR • BONNEVILLE POWER ADMINISTRATION

DECEMBER 31, 1971

FEDERAL COLUMBIA RIVER POWER SYSTEM



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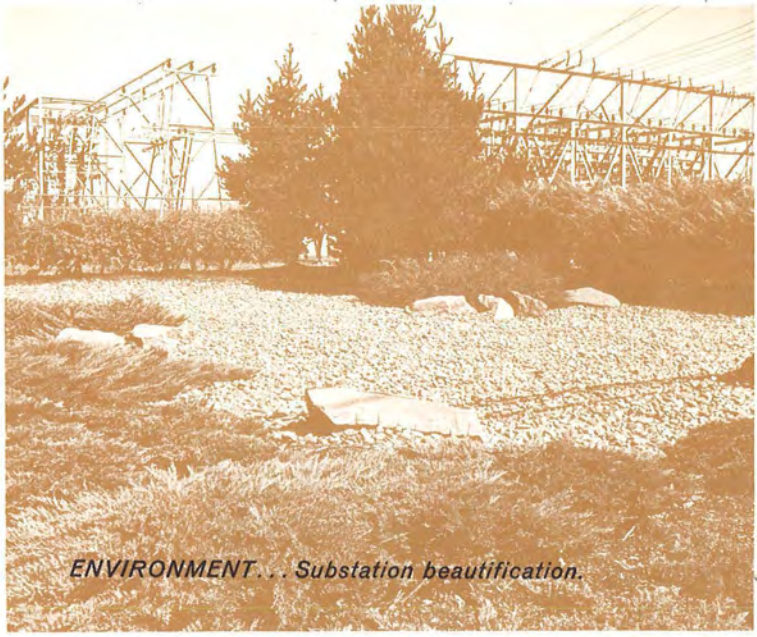
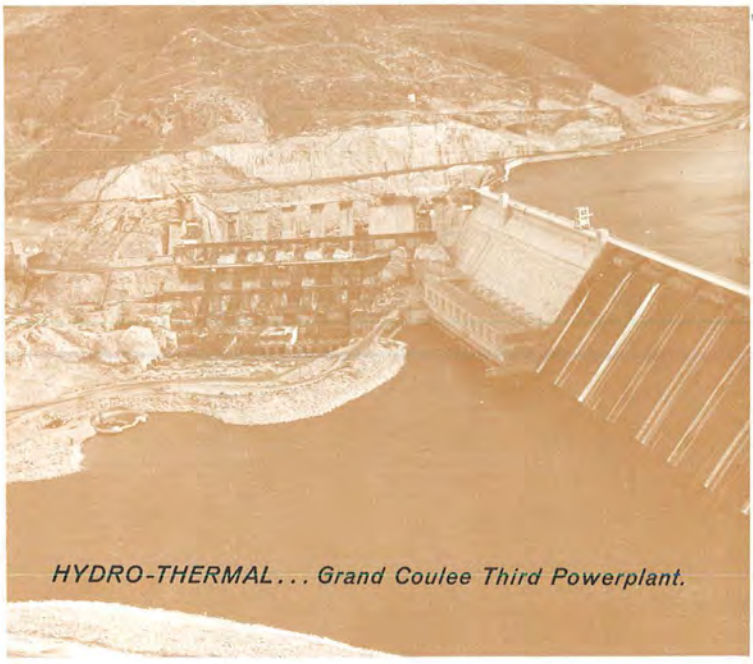
ADVERSITIES . . . Stevens Pass outage.

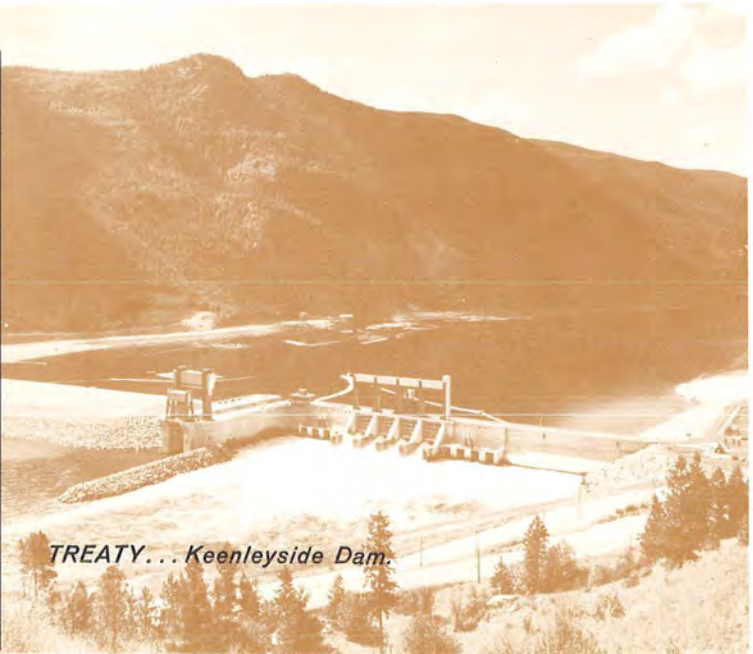


ENVIRONMENT . . . Substation beautification.

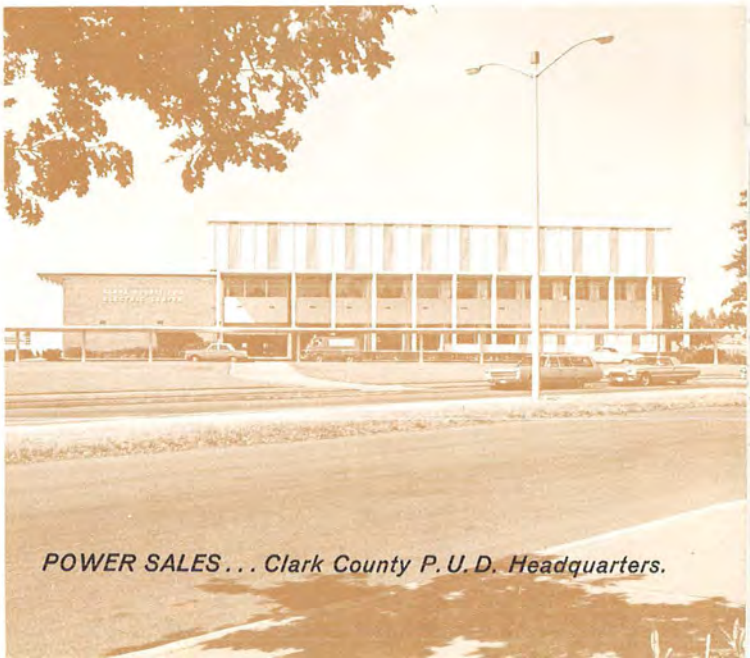
SYSTEM DEVELOPMENT . . . Dittmer Control Center.



HYDRO-THERMAL . . . Grand Coulee Third Powerplant.



TREATY . . . Keenleyside Dam.



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ENVIRONMENTAL QUALITY, PAGE 19 *Environmental Statement required by NEPA brings new approaches to planning transmission. Public appraisal grows. BPA examines new maintenance methods. Solutions sought to nitrogen supersaturation, harmful to fish.*

SYSTEM DEVELOPMENT, PAGE 23 *Paul Substation completed to integrate Centralia plant into system. More than 200 miles of 500-kv added. Total line mileage is 11,482. Contracts in force for 1,480 miles of line, three new substations, and changes at 13. Dittmer Control Center building nears completion. D.C. outage gives opportunity for more studies in technology. R & D continues in BPA labs.*

THE HYDRO-THERMAL POWER PROGRAM, PAGE 27 *Four plants are underway; three need to be identified. Siting councils established in Oregon and Washington. Slippages in hydro schedules slow resources for future. Additions at dams outlined. Transmission construction keeps pace.*

COLUMBIA RIVER TREATY, PAGE 33 *Two Canadian dams completed. Mica is on schedule. Libby reservoir to start filling next spring but power is delayed.*

POWER SALES, PAGE 35 *BPA energy sales reach 57.1 billion kilowatt-hours. Capacity sales up sevenfold. Utility sales are up, industry and AEC sales are down. D.C. Intertie outage cuts sales to California.*

FINANCIAL STATUS, PAGE 41 *Gross revenues at new high of $155.7 million, but net drops 40.8 percent to $14.6 million. Low streamflows, Intertie outage blamed for revenues below forecast. Interest expense up $8.8 million; depreciation expense up $2.9 million; purchase and exchange power costs up $1.3 million, to increase $20 million in Fiscal Year 1972.*

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"If we are to meet growing demands for electricity in the years ahead, we cannot ignore the need for many new power plants. These plants and their associated transmission lines must be located and built so as to avoid major damage to the environment, but they also must be completed on time so as to avoid power shortages." **Message on Clean Energy by President Richard M. Nixon, June 4, 1971.**

President Nixon dumps the 3,500,000th cubic yard of concrete at Libby Dam, Montana. Lending a hand are Senator Mike Mansfield, left, and Representative Richard Shoup. Phillip L. Cole, Libby Resident Engineer, directs the operation.

LETTER TO THE SECRETARY

December 31, 1971

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

Dear Mr. Secretary:

This is the Bonneville Power Administration's thirty-fourth Annual Report on the Federal Columbia River Power System. The report covers events of fiscal year 1971 and significant developments that have occurred since the fiscal year ended June 30.

POWER SALES AND FINANCIAL RESULTS

Energy sales increased 3.1 per cent during the fiscal year, reaching a new high of 57.1 billion kilowatt-hours.

Notwithstanding a number of adversities which limited the availability of energy for sale, gross revenues increased 5.4 percent to a record high of $155.7 million. Net revenues, after all expenses including depreciation and interest on the Federal investment, totaled $14.6 million. Cumulatively, total revenues to June 30, 1971, have exceeded $1.9 billion.

Approximately two weeks ago, an important benchmark event occurred—cumulative revenues reached the $2 billion mark. It took almost 26 years, from the start of BPA operations in 1938 to early 1964, for cumulative revenues to reach $1 billion; it took less than eight years to achieve the second billion.

KEY EVENTS

Fiscal year 1971 could be appropriately characterized as eventful. Five episodes in particular were troublesome. First, all-time record low streamflows were experienced in late summer and early fall of 1970.

Second, the two 500-kilovolt alternating current lines of the Pacific Northwest-Pacific Southwest Intertie were lost for over one

Don Hodel, left, Bonneville Deputy Administrator, Rogers C. B. Morton, Secretary of the Interior, and H. R. Richmond, Bonneville Administrator, in BPA Control Center.

month because huge accumulations of snow and ice on the conductors in northern California crumpled 14 transmission towers.

Third, a snowslide in Stevens Pass, Washington, severely damaged one of our double-circuit 345-kv transmission towers, knocking out of service two important trans-mountain lines to the Puget Sound area during the Northwest peakload season.

Fourth, with virtually no advance notice, the Atomic Energy Commission was obliged, for budgetary reasons, to shut down the dual-purpose Hanford N-Reactor. Investigation established that there were no assured power supply alternatives. Consequently, 5½ months after the shutdown, the N-Reactor was again made available under special arrangements which provide for continued dual-purpose operation until June 30, 1974.

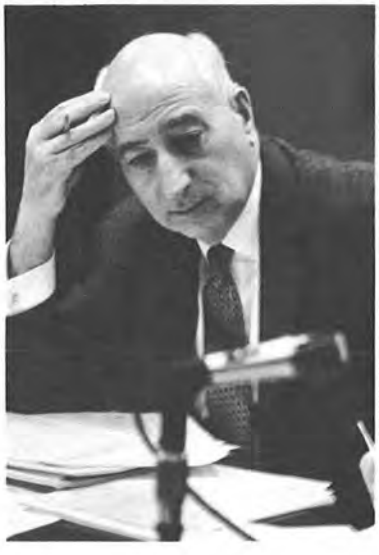
And fifth, a violent earthquake struck the Los Angeles, California, area. The epicenter was near Sylmar, California, site of the southern terminal of the 800-kv direct-current Intertie line. The terminal, owned jointly by Southern California Edison Co. and the City of Los Angeles, was severely damaged and the high-capacity d-c line has been out of service ever since.

These events, and lesser ones as well, were met and surmounted. Those BPA employees and their colleagues in the region's interconnected utilities, whose collective efforts keep the lights on in the Northwest, deserve to be saluted. It is only when an area experiences a serious blackout that the importance of an adequate and reliable power supply is appreciated. We are fortunate to have been able to avert such an unpleasant event.

People—Federal, state, public, private—working together to plan and implement the Hydro-Thermal Power Program.

COOPERATION

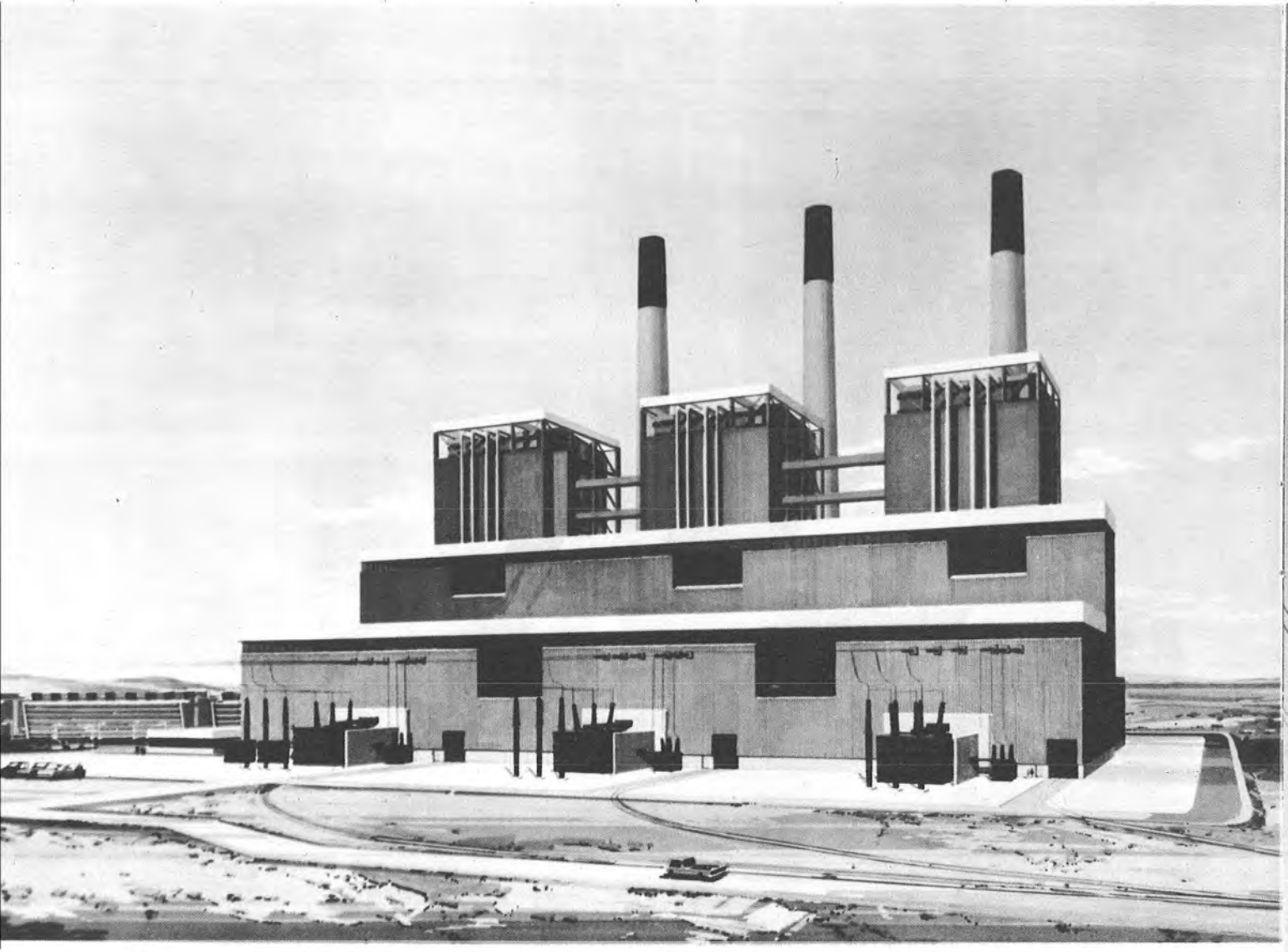
As dramatic as these episodes have been, they are overshadowed on the positive side by a more noteworthy achievement—people working together to implement the joint Hydro-Thermal Power Program. Throughout the Pacific Northwest, representatives of private utilities, municipalities, cooperatives, public utility districts and the Federal government, with the support of industry and state and local governments, are joined together in forging a coordinated power program. If implemented on schedule, it will ensure that essential power



requirements of the region are met—reliably with the most efficient use of resources, and in a way which guarantees attainment of the optimum balance between environmental and economic considerations.

HYDRO-THERMAL POWER PROGRAM

Last year I was able to report that the complex job of implementing the Hydro-Thermal Program was getting done, that the Pacific Northwest had begun to move with confidence into the hydro-thermal era. Today I can report that the Hydro-Thermal Power Program has



Artist's concept of Jim Bridger coal-fired thermal plant, plant No. 3 in Hydro-Thermal Program.

borne its first major fruit. The first of two 700,000-kilowatt generator units of the coal-fired Centralia Project, the first thermal powerplant to be constructed under the Program, went into test operation in August 1971. It is a significant milestone in the evolution of the power system in the Northwest.

Except for the Atomic Energy Commission's N-Reactor at Hanford, Washington, which provides steam to drive two 400,000

kilowatt generators, and for a number of small and relatively obsolete steamplants scattered throughout the region and used only in times of severe power shortages, the Northwest had a 100 percent hydroelectric system. Today, the virtually all-hydro system has begun to give way to a mixed hydro-thermal system. To make this important transition in a way which keeps power costs as low as practicable, consistent with minimizing adverse environmental impact, requires a high level of coordination.

The Hydro-Thermal Power Program is a plan to meet growing regional power requirements so as to extract optimum economic and environmental advantages through the integration of regional power resources—Federal and non-Federal, public and private, existing and planned.

The Program calls for the assignment of different essential responsibilities among various participants. Participants in the Program will have become quite dependent on one another. As a result, each participant must perform its accepted role in a responsible and timely fashion. That is the only way the goals of the Program can be achieved.

Because the Bonneville Power Administration played an important role in the establishment of the Joint Power Planning Council and acts as chairman of the Council, we are particularly sensitive to the possibility that the Federal government, of all the participants, may not carry out its responsibilities under the Program. There have already

been significant delays in Federal generator installation schedules. As a result, the region faces power deficits during most of this decade. To avoid more serious regional power shortages, adverse economic repercussions, and environmentally inferior development of power facilities, the 108 non-Federal partners in the Hydro-Thermal Power Program and the Federal Government must honor their commitments under the Program.

Except for delays in installation of generators at Federal hydro projects, the Hydro-Thermal Power Program is proceeding on schedule. The first four thermal powerplants are in various stages of construction and efforts are underway to determine sites and sponsors for the remaining three thermal plants which will be required by fiscal year 1981.

SYSTEM DEVELOPMENT

During fiscal year 1971, the Federal Columbia River Power System added 579,000 kilowatts of generating capacity. There are now 26 Federal hydroelectric plants in the Northwest with a combined nameplate rating of 9.6 million kilowatts. The FCRPS consists of BPA's transmission network and the Northwest hydroelectric generating plants built and operated by the U.S. Army Corps of Engineers and U.S. Bureau of Reclamation. In fiscal year 1971, the FCRPS supplied over 53 percent of the electric energy generated in the region and provided approximately 80 percent of the region's bulk power transmission capacity.

Bonneville Power Administration added over 200 miles of 500-kv transmission lines to the grid during fiscal year 1971. However, there

was a net increase in circuit miles of transmission line in the BPA system of only 104 miles because of our efforts to minimize environmental impact by more intensive use of existing rights-of-way. This is achieved by retirement of lower voltage lines and replacement with lines of higher transmission capacity.

POWER OUTLOOK

Prospects for meeting firm loads during the current operating year appear favorable. Median streamflows have prevailed for the first few months of the operating year. If streamflows continue at median levels, we should be able to meet all secondary loads the rest of the current operating year.

Under the critical water conditions which are assumed for planning purposes, the projected balance between loads and resources is unfavorable in five of the following six operating years through 1977-78. These projected peaking power deficits are largely due to the delays in commercial operation of earlier planned Federal hydro generation.

Peak Loads and Resources
West Group Area
(Thousands of Kilowatts)

	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78
Loads (incl. interruptible)	21,764	22,952	24,768	25,887	27,112	28,649
Resources	21,283	22,264	23,993	26,037	26,700	28,001
Surplus (or Deficit)	(481)	(688)	(775)	150	(412)	(648)

Old clear-cut right-of-way clearing.

Even with the elimination of interruptible loads (together with the reserves they provide), there will be firm peak deficits in four of the six years, the worst of which (608,000 kilowatts firm deficit) will occur in 1974-75.

The region will avoid power shortages in the next six years only if some of the following circumstances materialize: (1) better than critical streamflows (which increase generating capability), (2) higher than normal wintertime temperatures (which reduce loads), (3) slower load growth than anticipated, (4) unexpected sources of generation available for import from outside the region, or (5) short-run installation of less desirable generation such as gas turbines. On the other hand, a number of events could occur which would make the

New right-of-way clearing practice.

situation worse than depicted in the table: (1) forced-outage failures of major generators in excess of scheduled reserves, (2) load growth significantly in excess of expectations, (3) severe winter weather conditions, or (4) additional significant delays in the installation schedules for hydro or thermal generating units.

ENVIRONMENT

We are committed to the importance of preserving and, where possible, enhancing environmental quality. Construction and operation of electric power facilities has an impact upon the natural environment. We know, however, that transmission lines which are designed and constructed for operation at the highest feasible voltages increase the transmission capacity per acre of right-of-way. We also know that

Industrial customers meeting with BPA staff.

replacing lower voltage lines with higher capacity lines permits more effective utilization of existing transmission rights-of-way. And we know that improved planning and design together with more stringent construction standards further reduces adverse environmental impacts of transmission facilities. All of these techniques are being extensively utilized to make good on our commitment to protect the environment.

Our first Environmental Statement, required under the terms of the National Environmental Policy Act, was issued one year ago. It covered our fiscal year 1972 proposed program. A few months ago we circulated a draft of our second Environmental Statement, covering our fiscal year 1973 proposed program, to a large number of Federal, state, and local governmental agencies, and environmental organizations in the Northwest for review. We also held 18 public meetings throughout the region to inform the public of our program and to solicit comments on our 1973 Environmental Statement.

The degree of cooperation which has been achieved among the utilities of the Northwest and between them and the Federal Government is beginning to yield an important payoff. Together, BPA and the utilities have been able to formulate an optimum program for meeting regional power requirements, a program which none could have developed alone.

Success of the Program faces formidable financial, technological, scheduling and environmental problems. This is the challenge ahead.

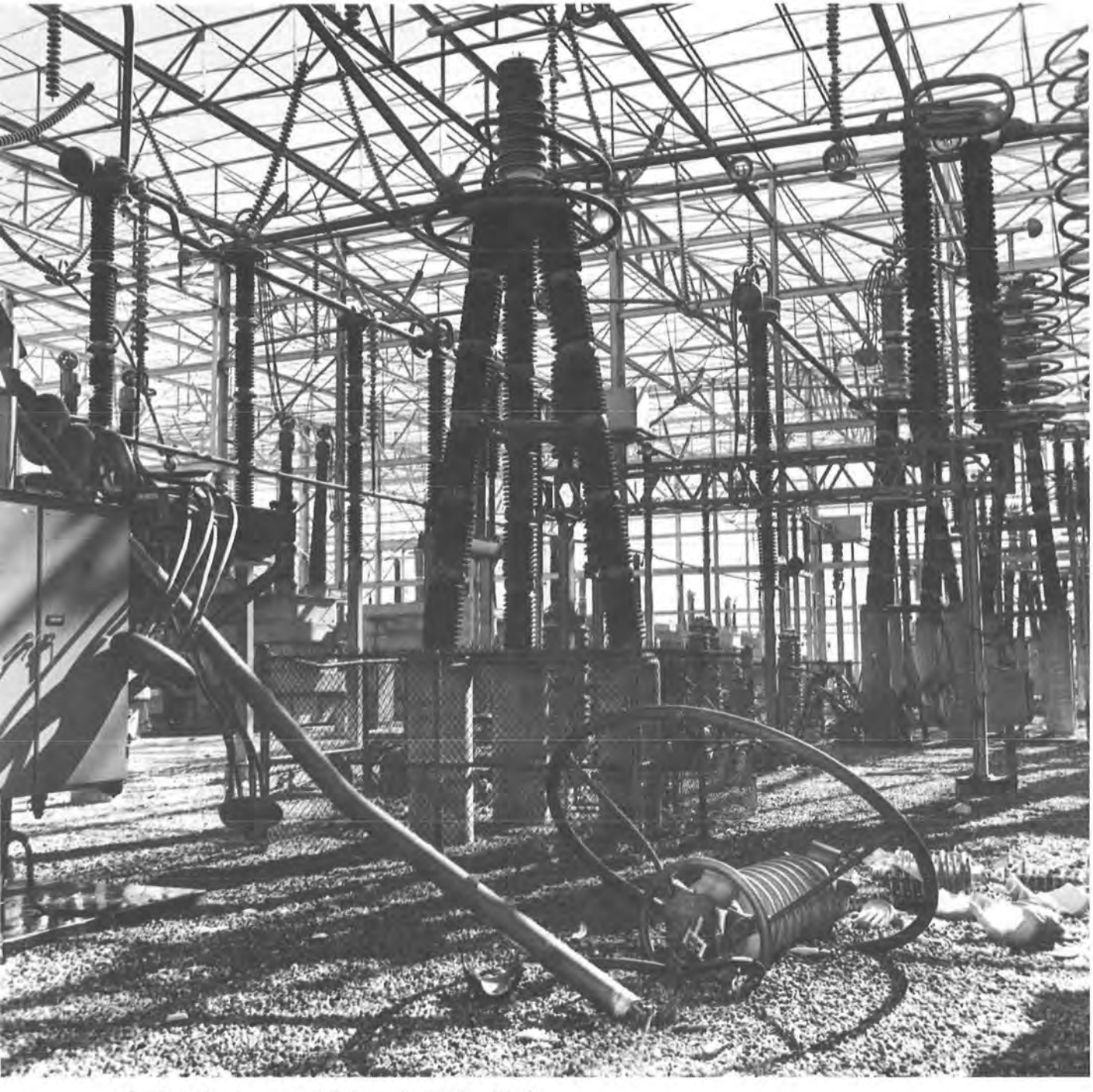
As difficult as this challenge will be, we are heartened by the demonstrated enthusiasm and dedication of people working together to solve the critical power problems of the Pacific Northwest.

With expectation of continued cooperation and broad public support, we face the future hopefully confident that the goal of adequate, reliable power and high-quality environment can be achieved.

Sincerely,

H R Richmond

Administrator



Earthquake damage at Sylmar Converter Station, Los Angeles, southern terminus of d-c Intertie.

A YEAR OF ADVERSITIES

If one single thing may be said to characterize fiscal year 1971 for the Federal Columbia River Power System, it is that it was a year of adversities—a year beset with problems—and that for the most part the problems were solved.

Fiscal year 1971 opened with extremely low flows in the Columbia River Basin during July, August and September. By mid-September, the streamflow of the Columbia River at Grand Coulee was at a level lower than had ever been recorded for that time of year. The power situation was aggravated further by an extended maintenance outage of the Hanford No. 1 Nuclear Powerplant which was returned to service about September 15, 1970, one month later than scheduled, after having been shut down since May 1970. The plant was again shut down in late September 1970 and did not return to service until near the end of October 1970.

Because of the low flow conditions and the loss of this major generation, secondary energy deliveries from the Federal System were curtailed during the period July 23-30, 1970, and August 12, 1970, through January 8, 1971. In addition to the secondary energy curtailment, it was necessary to draft Federal System reservoirs below normal operating limits to meet firm loads.

At the end of September 1970, reservoirs were more than one billion kilowatt-hours of storage energy below levels required to meet critical streamflow conditions. During the periods of secondary energy curtailment, Pacific Northwest electroprocess industries purchased high-cost replacement energy, largely by imports over the Intertie and other inter-regional connections. This energy was purchased on behalf of the industries by BPA through a trust fund financed by the industries. After restoration of secondary energy deliveries in January, no further difficulties were encountered in serving total area requirements.

During the year the Federal System was unable to utilize the full capabilities of the Pacific Northwest - Pacific Southwest Intertie for extended periods because of two major transmission outages outside the Pacific Northwest. In addition, the System suffered the loss of a major power resource.

During the early morning hours on December 17, 1970, the Malin-Round Mountain No. 1 and No. 2 500-kv lines (one owned by Bureau of Reclamation and both operated by Pacific Gas and Electric Co.) relayed out of service approximately 40 minutes apart. Subsequently, patrols located the trouble 23 miles north of Round Mountain, California, in rugged terrain. A severe snow and ice storm had caused the collapse of seven steel towers in each line.

Deep snow in the area and continuous storms made it difficult to get crews to the site. Crews had to work in snow 14 to 20 feet deep to make temporary repairs. The Malin-Round Mountain No. 2 line was returned to service on January 20, 1971, and No. 1 10 days later.

During September 1971, Pacific Gas and Electric added additional towers to the Malin-Round Mountain No. 2 line to prevent future icing damage to the line. During the summer of 1972, reinforcement of the No. 1 line will be effected in the same manner.

The second major transmission outage was that of the d-c Intertie. At 6:01 a.m., on Tuesday, February 9, 1971, a severe earthquake with its epicenter close to Sylmar, California, put the d-c Intertie out of service and severely damaged the

Sylmar Converter Station operated by Los Angeles Department of Water and Power. All 42 operating valves at Sylmar were damaged and extensive damage was also done to major electrical components both in the building and in the switchyard.

During the period of its operation from May 21, 1970, through February 9, 1971, 2,670 million kilowatt-hours had been transmitted from north to south and 338 million kilowatt-hours from south to north.

Considerable effort is being put into speedy restoration of the d-c Intertie. This includes BPA loaning necessary items from the Celilo Converter Station such as arresters, valve conditioning equipment, etc., which could not be obtained in good time from the factories. It is expected that partial operation with one-half capacity will be resumed by May 1972, involving three of the six valve groups, in what is known as "monopolar metallic return" mode. Transmission capacity thus will be at 50 percent, to be increased to 5/6 group capacity by August, 1972, and full capacity by September, 1972.

The major power resource lost during the fiscal year was the Hanford No. 1 Nuclear Steam Plant rated at 800 megawatts. On January 28, 1971, the Atomic Energy Commission informed the Washington Public Power Supply System that the New Production Reactor would no longer be operated for the production of plutonium. This had the effect of cutting off the supply of steam to the adjoining Hanford No. 1 generating plant owned by Washington Public Power Supply System. Since this generating plant is required as a vital energy source in the Pacific Northwest, a task force headed by Washington Governor Dan Evans appealed to the Atomic Energy Commission and the Office of Management and Budget to restart and operate the NPR for at least three years. In April, the principles governing reactivation were agreed to by the interested parties. The principles contemplated that WPPSS would pay the AEC $20 million per year for making the reactor available to produce steam in an amount equivalent to four billion kilowatt-hours per year.

Negotiations, in which BPA participated, resulted in an agreement between the AEC and WPPSS. The contract, which will be in effect from July 1, 1971, through June 30, 1974, provides that the NPR will remain operative for the production of plutonium. The AEC has also agreed to use its best efforts, consistent with its programs, to maintain the NPR available for the production of steam energy in an amount up to four billion kilowatt-hours per year.

Part of the arrangements for the restart of Hanford No. 1 involved agreements between BPA and 16 of its industrial customers to purchase one billion kilowatt-hours of energy per year over the three-year period. The industries will pay Bonneville a total of $15 million, of which up to $9 million will be passed on to WPPSS as industries' share in the Hanford arrangements.

In addition to the transmission outages on the Intertie system, BPA suffered an outage in its cross-mountain transmission grid serving the Puget Sound area. On Saturday, January 23, a double circuit tower on the Chief Joseph-Snohomish 345-kv lines Nos. 3 and 4 in Stevens Pass was destroyed by an avalanche.

Maintenance crews working in deep snow took the lines out of service to free them from the crumpled structure. When attempting to restore one

345-kv double circuit tower downed by Stevens Pass avalanche.

line to service, the trouble was compounded by the failure of one of the 345/230-kv transformers at Snohomish Substation, so the line had to be returned to service at a lower voltage.

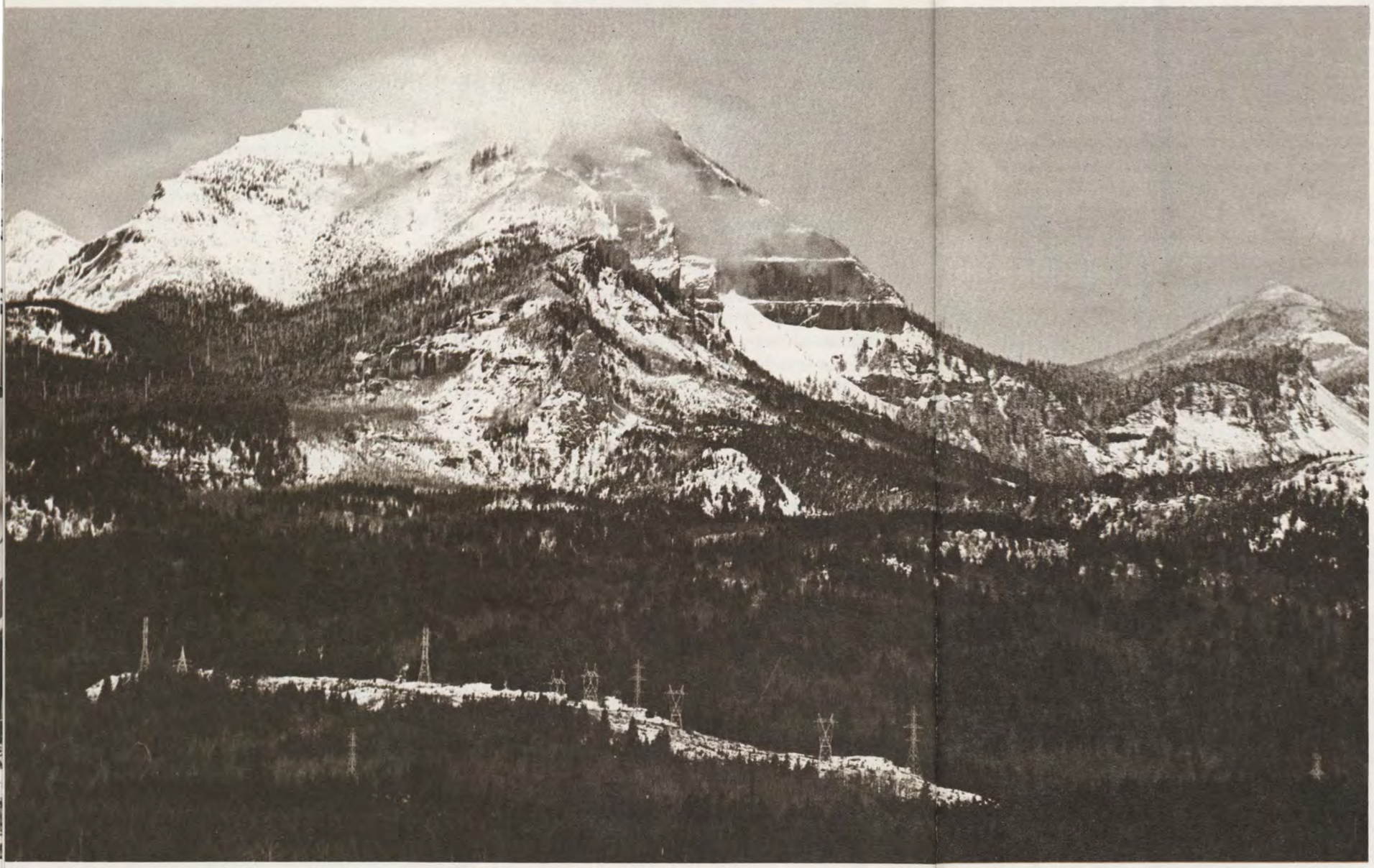
To further compound the already severe situation, another line, the temporary Chief Joseph-Sammamish 230-kv line, relayed out twice. For a period of 4 hours, 48 minutes the only BPA cross-mountain lines in service to the Puget Sound area were two 500-kv lines from the mid-Columbia River plants. Service to the Snohomish area became even more critical when Puget Sound Power and Light lost its 115-kv McKenzie-Beverly line due to a slide-damaged tower, and Seattle City Light lost both of its Diablo-Bothell 230-kv lines.

The failed 345/230-kv transformer at Snohomish Substation was replaced and both the Chief Joseph-Snohomish lines were back in service at 345-kv on January 31, minus the crumpled tower, which was replaced by maintenance crews during the summer of 1971.

During the outages, Seattle area power requirements were fortunately very low because of abnormally warm weather. Emergency power, upon occasions, was obtained from B. C. Hydro and Seattle City Light. Generation at Chief Joseph and Grand Coulee was restricted by varying amounts, but all system loads were carried.

Finally, commercial operation of the first 700 megawatt unit at the Centralia Steam Electric Project has been delayed beyond the scheduled date of September 1, 1971. Principal cause of the delay has been troubles encountered with the stack emission control facilities. Without the full output from this unit, it again became necessary to curtail secondary energy deliveries, starting on October 18. This action was necessary to assure that the BPA firm power obligations could be met for the balance of the operating year. Secondary energy requirements of utility customers remained quite small as streamflows on their hydro systems remained near average levels. By November 1, 1971, sufficient additional water had been stored in Federal reservoirs to make secondary energy again available to the public agencies, but curtailment of secondary energy deliveries to the private utilities and BPA interruptible industrial load remained in effect until November 24.

ENVIRONMENTAL QUALITY



Concern for the quality of the environment continues to be a major factor in constructing and operating the Federal Columbia River Power System.

The National Environmental Policy Act of 1969, signed by President Nixon on January 1, 1970, established a basic policy requiring Federal agencies to fully recognize and document environmental factors in reaching program decisions. Federal bureaus such as BPA are required to prepare detailed statements of the environmental impact of proposed major program actions. Such statements not only describe the environmental impact of proposed programs but identify all alternatives and their impacts. These statements accompany the program proposal through the normal budget review process. Before the end of 1970 BPA issued its first Environmental Statement. The Statement covered the proposed fiscal year 1972 program and was submitted through the Secretary of the Interior to the President's Council on Environmental Quality and the Congress.

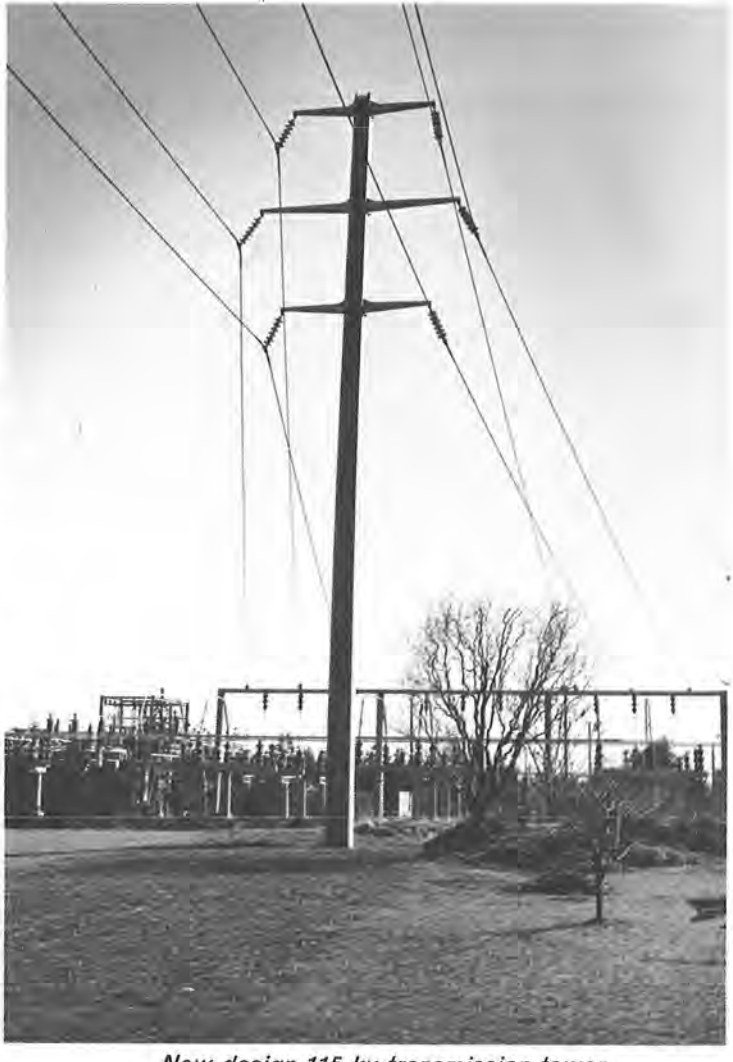
That first effort brought to light the need for new approaches and additional expertise through which the environmental factors involved in new facility planning could be brought into sharper focus. To meet this need a new resource inventory and analysis technique for use in transmission facility location is being developed. By identifying and displaying in a standardized map form such environmental resources as land use, recreation areas, and wildlife habitat, these factors can be more effectively considered in the planning and design process.

BPA's fiscal year 1973 Environmental Statement, a major planning effort of fiscal year 1971, is supplemented by resource maps of this type.

These maps graphically display and place in perspective the environmental factors considered in program proposals. A draft of this Environmental Statement was circulated for comment to 16 Federal, 43 state, and 86 local agencies in the Northwest on August 16, 1971. In preparing this Statement, BPA continued its practice initiated with the 1972 Environmental Statement of having local public meetings on the environmental aspects of the proposed program. The number of meetings was increased from the nine held in conjunction with the 1972 Environmental Statement to 18. The increase in number allowed meetings to be held near the location of the proposed facilities and the people directly involved.

This consultation process permits drawing on the environmental skills of other governmental agencies and the knowledge and concerns of local residents in planning facilities as well as in meeting the requirements of the National Environmental Policy Act. Resource data and other environmental information obtained through these contacts have been considered and incorporated into the planning process and included in the Environmental Statement.

To complement the efforts to improve facility planning and design, a number of steps have been taken to ensure that the adverse environmental impact of facility construction is reduced. Examples include reduction of the width of rights-of-way for certain types of transmission lines, and establishment of more stringent environmental standards for clearing and construction operations by BPA contractors. The use of special construction techniques such as hand cutting of vegetation, helicopter erection of towers and lines in sensitive areas, and special plantings for wildlife forage and visual screening continue to be part of the overall program.



New design 115-kv transmission tower in foreground.

BPA's concern for environmental quality also extends into the area of transmission system maintenance where new procedures are constantly evolving.

Among the maintenance activities requiring continuing environmental concern are repairs on buildings, aerial conductors and access roads, noxious weed and erosion control measures, and control of trees and brush on rights-of-way to prevent interference with operation of transmission lines. Vigilance is required in substation operation to avoid oil spills and other forms of pollution.

Slotted gate being installed at Little Goose Dam to reduce nitrogen supersaturation.

Herbicidal control of brush and trees on rights-of-way has proved the most economical method over the years. The major alternative is hand and mechanical cutting. The obvious advantage of the latter method is that it reduces the amount of herbicides introduced into the environment. A small portion of BPA right-of-way, generally near streams or in other sensitive areas, is controlled by hand cutting.

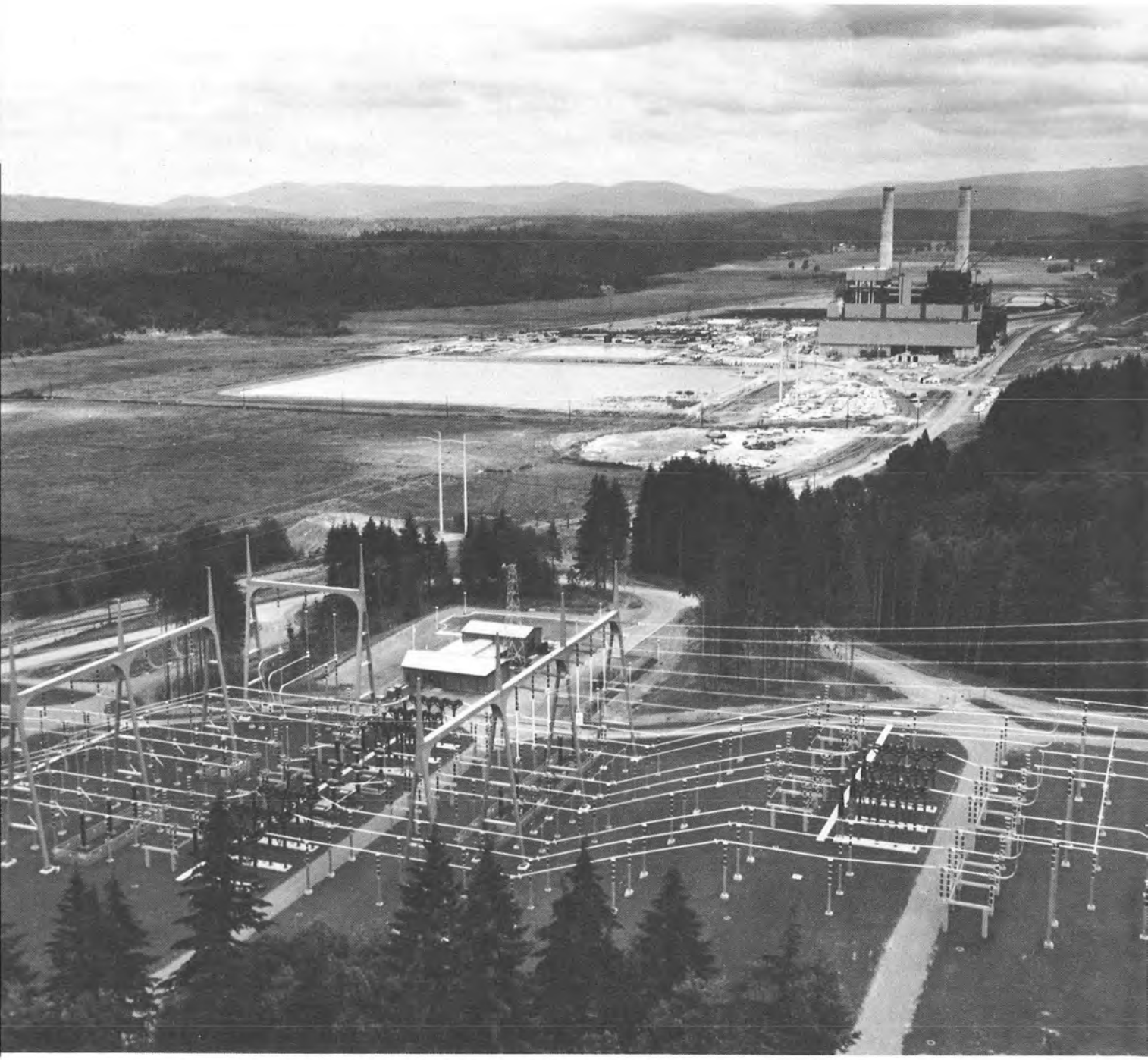
More extensive application of hand and mechanical cutting would be extremely costly and not without adverse environmental impacts of a different character. Examples of these impacts are disposal of chips, resprouting after hand cutting, air pollution from burning, and the like.

During the course of the year BPA worked closely with other power and fisheries agencies of the region in seeking a solution to an environmental problem — nitrogen supersaturation of waters of the Snake and Columbia Rivers which has a deleterious effect on fish life. The high nitrogen concentrations cause death to fish from a disease similar to "the bends" in deep-sea divers.

Although nitrogen concentrations in the lower Snake and lower Columbia Rivers have been known to be excessive for some time and efforts have been made to reduce or eliminate them, fiscal year 1971 was the first time they reached a magnitude requiring BPA cooperation in river regulation and generation to help minimize the problem. BPA and the Corps of Engineers, public agencies, private utilities, B. C. Hydro, and West Kootenay Power and Light Company, was able to assist in reducing the nitrogen concentrations especially during a short but critical period, April 26 through May 2, 1971, when more than 40 million juvenile fish were released to migrate to the sea.

During this period, generation was increased on the lower Columbia River plants, thereby reducing nitrogen producing spillway discharges at McNary, John Day, and The Dalles plants. BPA will continue to cooperate with governmental and non-governmental entities to minimize nitrogen concentration in the river through adjustments in its generating schedules whenever physically possible.

The Corps of Engineers has responded to the need for nitrogen control structures by developing slotted bulkheads to be placed in the skeleton bays built into dams for later addition of turbines and generators. A prototype tested during the spring runoff at Little Goose Dam reduced nitrogen supersaturation by permitting water to flow through the bay instead of dropping over the spillway where it entraps nitrogen. The Corps is now planning to complete the skeleton bay capability at each of the three lower Snake River dams before the freshet season of 1972.



Centralia coal-fired thermal plant with BPA C. W. Paul Substation.

TRANSMISSION CONSTRUCTION

Energization of the C. W. Paul Substation adjacent to the Centralia Steam Electric Project in western Washington during fiscal year 1971 made possible integration of power from the first thermal plant to be built under the Hydro-Thermal Power Program. Also energized or nearing completion during the year were 500-kilovolt lines, connecting the Centralia plant to major load centers west of the Cascades.

The main grid was strengthened by the energization of more than 200 miles of 500-kv transmission line bringing the total for 500-kv to 1,726 miles. The total circuit miles of transmission line of all voltages at the end of the fiscal year was 11,482 miles.

The low net increase of only 104 circuit miles during the year resulted from the BPA policy of using existing rights-of-way wherever possible by replacing lower voltage lines with ones of higher carrying capability.

An example of the re-use of right-of-way is the cross-Cascades Chief Joseph Dam to Monroe Substation 500-kv line which is nearing completion over the existing right-of-way of the Chief Joseph-Snohomish 230-kv lines No. 1 and No. 2. A major part of the Hanford-Ostrander 500-kv line from near Richland, Washington, to the vicinity of Oregon City, is under construction on the right-of-way formerly occupied by the Bonneville-Oregon City 115-kv lines No. 1 and No. 2 and the North Bonneville-Midway 230-kv line No. 2.

At the close of FY 1971 there were construction contracts in force on 1,480 miles of transmission line, on three new substations and on additions or modifications to 13 existing substations.

Major items under construction to improve service and main grid reliability in addition to those already mentioned include:

The Grand Coulee-Chief Joseph and Chief Joseph-Sickler 500-kv lines which will provide ties between generation in the mid-Columbia area and will help to integrate the Grand Coulee Third Powerhouse output into the BPA main grid.

Murray Substation near Arlington, Washington, a 230/115-kv substation providing a 115-kv point of delivery for Snohomish County PUD load in the Puget Sound area.

Monroe-Sno-King 230-kv line which will increase the BPA capacity at Sno-King Substation near Bothell to help relieve the overloading on Seattle City Light's 230-kv system in the area. The line, to be initially operated at 230-kv, is constructed for 500-kv operation.

POWER SYSTEM CONTROL PROGRAM

The W. A. Dittmer BPA System Control Center building was 80 percent complete at the end of fiscal year 1971. This $5 million structure, located at Vancouver, Washington, will house the major facilities and the personnel needed for computer assisted control of the BPA transmission system.

During 1972, delivery of most of the new Power System Control equipment will be completed. The Control Center is scheduled to be fully operational in July 1973.

Microwave systems now terminating at Portland will be relocated to Dittmer and communication equipment will be installed to provide electronic paths for gathering vast new quantities of data, sending control signals, and for some of the necessary voice communications between op-

erating and maintenance people throughout the BPA service area.

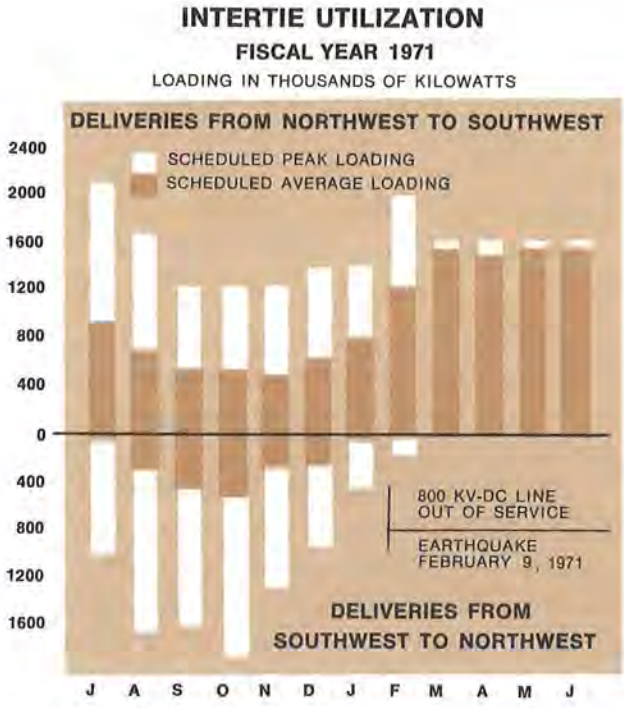
In the rapidly expanding and changing conditions of today's power systems, these advances are required in order to assure the continued reliable and efficient production and transmisison of electric power. For the years ahead these changing conditions will require even more far-reaching improvements in power system control technology.

BPA, and others in the electrical utility industry, have underway development studies to further improve the control of existing systems and to help solve the problems of controlling the power systems of the future.

DIRECT CURRENT TECHNOLOGY

The shutdown of the d-c Intertie by the California earthquake gave BPA an opportunity to carry out substantial additional testing which is now going on at Celilo Converter Station, the northern terminal, to obtain data leading to necessary modifications of valves, control, cooling equipment, filters, etc. Many improvements have resulted from this work and in particular it appears now that valve problems have been substantially solved.

Other system tests are also being made to obtain necessary data for improvements in designing of future d-c lines. Tests are also being conducted on the d-c line for other interested groups. These include tests recently carried out for Colorado School of Mines and University of Texas for measurement of very low frequency induction fields. The tests involved pulsing current through the d-c line and ground at the rate of one cycle per 10 minutes and one cycle per 20 minutes.



RESEARCH AND DEVELOPMENT

Since its inception, BPA has made every effort to advance the art of electric power transmission, a basic part of its job of designing, building, and operating one of the world's largest transmission systems. Without improvements in technology, BPA could not keep pace with the rapidly growing Northwest power demand.

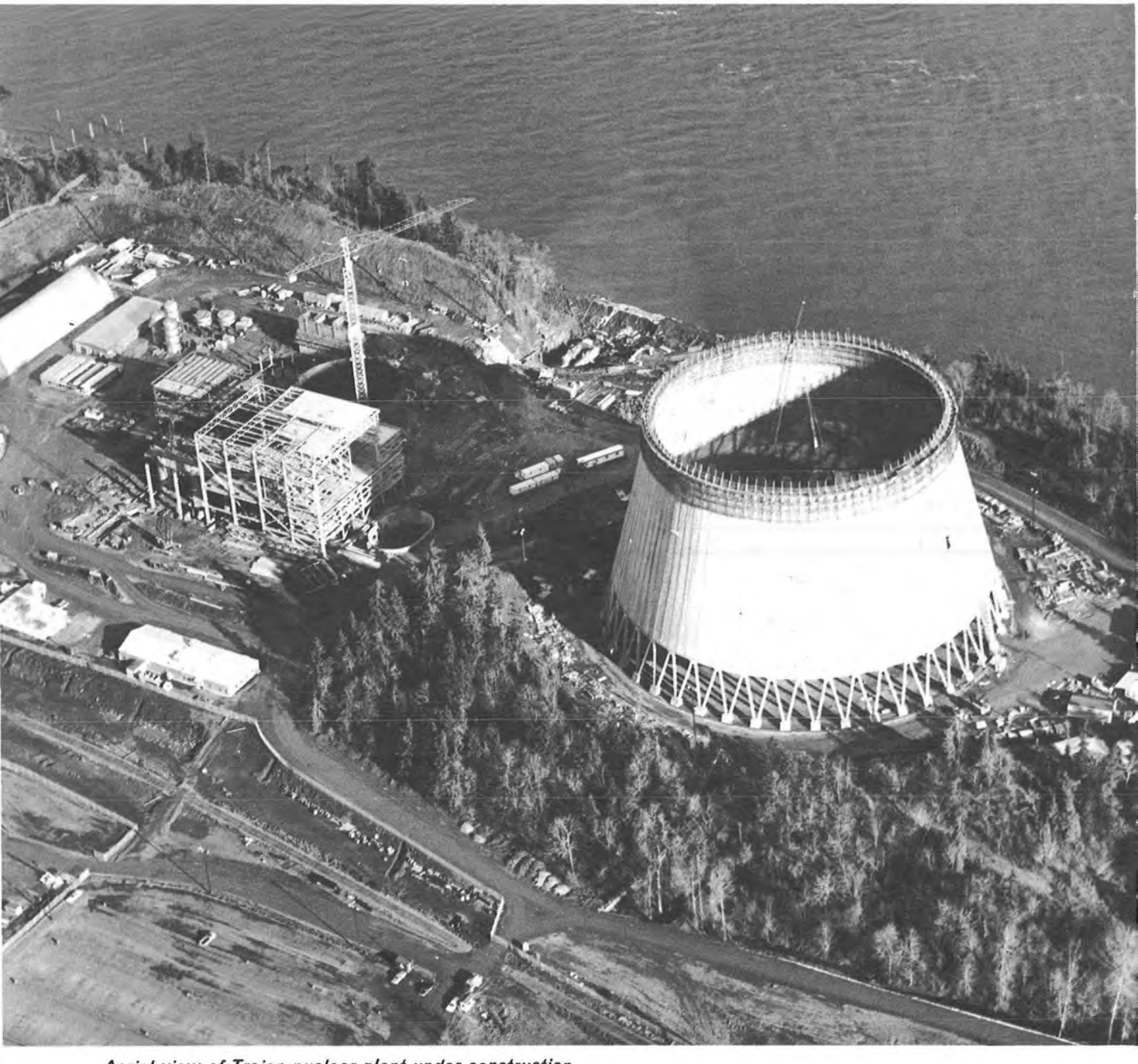
The need for technological improvements will be even more pressing during the next two decades, when the amount of power transmitted over the Federal System is expected to more than triple.

To meet the need for new technology, Bonneville conducts a program of goal-oriented technical and scientific investigations of a wide variety of aspects of electric power transmission. These are carried out through in-house investigations,

William A. Dittmer Control Center nearing completion.

single sponsor contracts with industrial firms, research corporations and educational institutions, and through cooperative investigations with other utilities, governmental institutions, and industries.

Specifically, the program is designed to (1) develop new transmission and equipment design concepts which will improve performance, (2) develop and design an ultra-high-capacity transmission system to meet near future load-carrying requirements, (3) develop and adapt new power system control techniques to meet the needs of an expanding transmission system, (4) provide basic data required to convert recent technological improvements into actual transmission system and component design, and (5) support investigation of fundamentally new fields of technology, such as superconductive transmission, which, because of their potential for revolutionizing BPA's system, require careful study.



Aerial view of Trojan nuclear plant under construction.

THE HYDRO-THERMAL POWER PROGRAM

Progress during fiscal year 1971 in implementing the Hydro-Thermal Power Program has been encouraging in the area of planning and construction of thermal plants. It was somewhat less than encouraging in the area of maintaining construction schedules for the Federal hydro projects which are an integral part of the program.

Sponsors for the first four thermal plants have been identified and work is underway. Sponsorship for three more plants needed to assure an adequate power supply through 1980-81 must be developed shortly if these plants are to be completed in time.

Siting remains the major problem in carrying out the program. Siting involves more than finding a suitably large piece of land with adequate foundation characteristics, a supply of water, transportation facilities and a location close to load centers or the main regional transmission grid. Siting also involves environmental considerations that in turn require long periods of study and evaluation before the site can be fixed.

Public acceptance is an important factor which often presents a major problem in gaining approval of sites. Although some sites are more favorable with respect to cooling water supplies and proximity to load centers, they may not be acceptable to the public. This, plus the long lead time required to bring a large thermal power plant into commercial operation, compounds the problem of maintaining generation schedules.

Although it has long been a maxim of the industry that "one stop" siting authorities were needed to assist the siting process, it was not until 1971 that the legislatures of Washington and Oregon implemented this concept.

Both legislatures enacted laws designed to control the selection of generation plant sites.

Progress to date on each of the first seven thermal plants to be placed in operation by 1981 is outlined briefly below:

PLANT 1—CENTRALIA STEAM ELECTRIC PROJECT

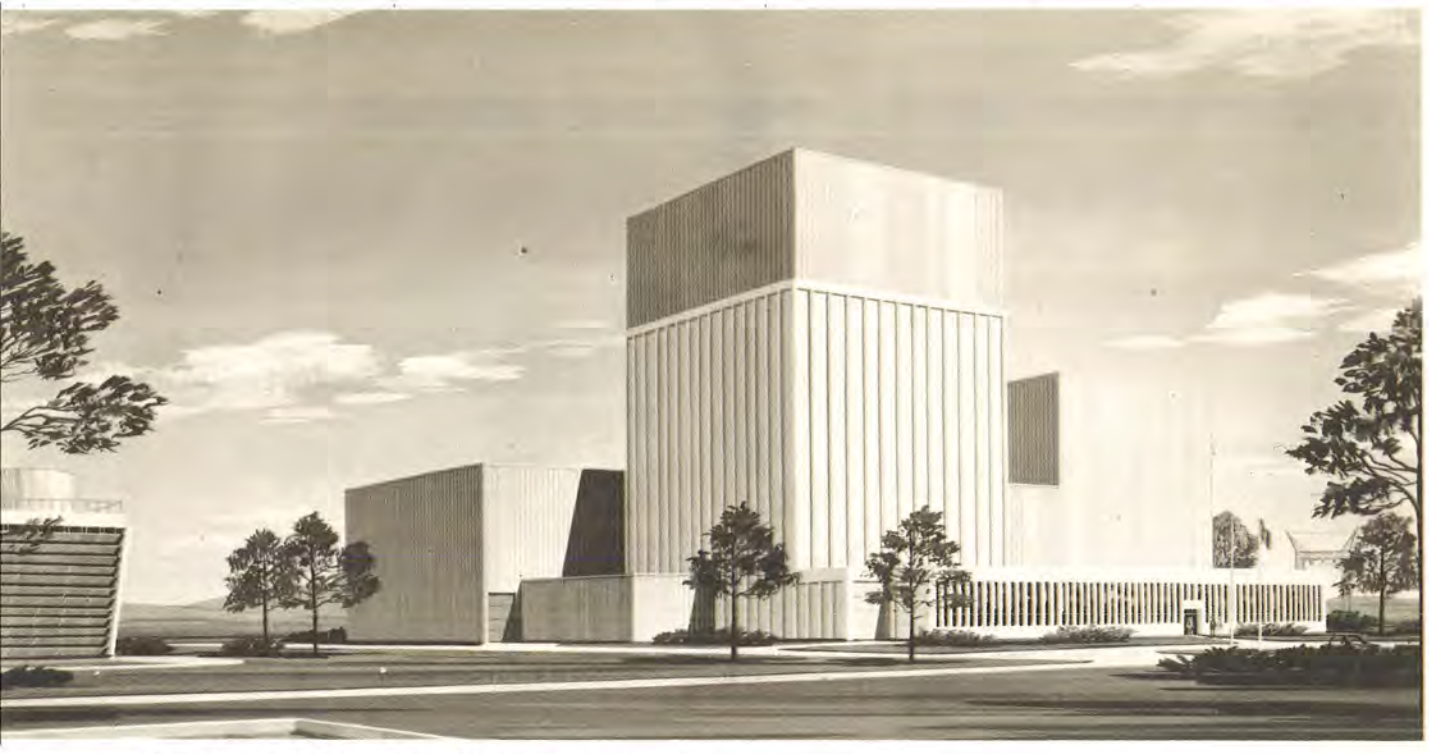
The Centralia coal-fired steam plant being built in the Hanaford Valley five miles northeast of Centralia, Washington, is sponsored and principally owned by the Pacific Power and Light Company and The Washington Water Power Company, with Puget Sound Power and Light Company, Portland General Electric Company, Seattle City Light, Tacoma City Light, Snohomish County PUD, and Grays Harbor PUD, as co-owners.

The Centralia plant consists of two 700-megawatt units, the first of which began test operation in August 1971, with the second scheduled for September 1, 1972. BPA purchases a portion of the output until March 31, 1974.

PLANT 2—TROJAN NUCLEAR PROJECT

Portland General Electric Company is sponsor of the 1,300,000-kilowatt Trojan Nuclear Project to be located on the Columbia River near Rainier, Oregon, 42 miles downstream from Portland. The project will be jointly owned by Portland General Electric Company (67½ percent), Eugene Water and Electric Board (30 percent), and Pacific Power and Light Company (2½ percent). Construction is in progress on most major components including turbine foundations, primary containment building and the cooling tower. Overall construction is 20 percent complete.

The Eugene Water and Electric Board's 30 percent ownership share of the project capa-



Artist's concept of Hanford No. 2 nuclear plant.

bility will be acquired by the Bonneville Power Administration. The Atomic Energy Commission issued a construction permit in February 1971, and the Oregon Environmental Quality Commisison issued a certificate of compliance also in February 1971. The plant is scheduled for commercial operation by September 1, 1974.

PLANT 3—JIM BRIDGER POWER DEVELOPMENT

Pacific Power and Light Company and Idaho Power Company are sponsoring the 1,500,000-kilowatt coal-fired Jim Bridger Power Development in Wyoming. Idaho Power Co. will acquire the full output from the first 500,000-kilowatt unit of the plant until the second unit begins commercial power operation in September 1975. At that time P P & L and Idaho Power Co. will each obtain half of the project output. When the third unit goes into service in September 1976, PP&L will obtain two-thirds of the project output and Idaho Power Co. will obtain one-third. PP&L's share of this project is part of the Hydro-Thermal Power Program.

Major plant equipment is under contract, basic site preparation has been completed, and construction of foundations is underway.

PLANT 4—WASHINGTON PUBLIC POWER SUPPLY SYSTEM NUCLEAR PROJECT NO. 2

The Washington Public Power Supply System is the applicant for the construction permit and facility license for the 1,100,000-kilowatt nuclear project, Hanford No. 2, which will be located within the United States Atomic Energy Commission's reservation in Benton County, Washington, approximately 12 miles north of the city of Richland. The plant will be 100 percent publicly owned with 95 public and cooperative power agencies participating. Bonneville Power Administration will acquire the entire output of the plant from the participants.

The plant is scheduled for commercial operation in September 1977. It was originally

scheduled for operation in March 1978, but was advanced to meet the gap left by the loss of the proposed Eugene Water and Electric Board plant delayed four years by Eugene voters in the spring of 1970.

Preliminary financing of $15 million in tax-exempt municipal revenue bonds for engineering and environmental studies required by state and Federal agencies was concluded on February 2, 1971.

PLANTS 5, 6 AND 7

Three other plants will be constructed by Pacific Northwest utilities for initial operation in 1978, 1979 and 1980.

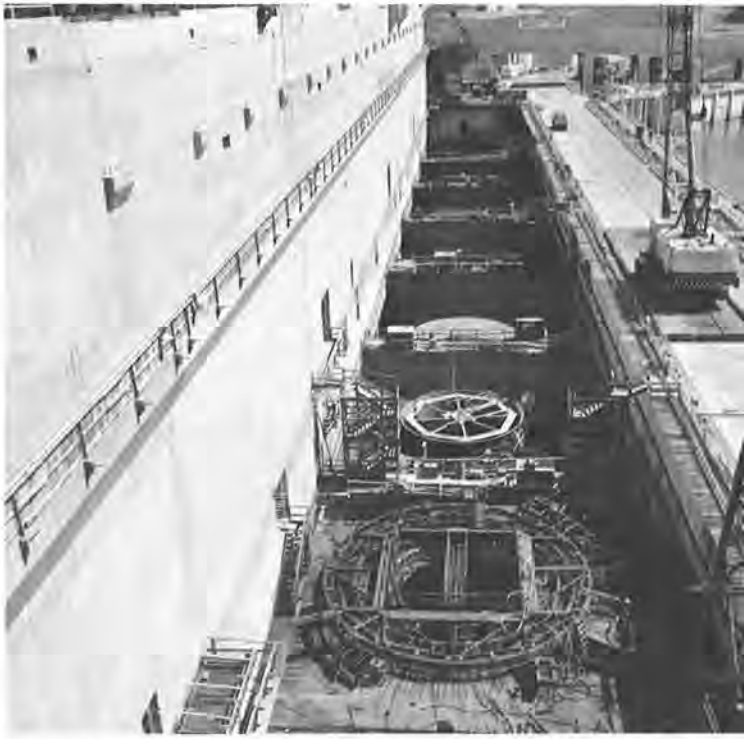
FEDERAL HYDRO PROJECTS

Slippages in Federal hydro projects schedules since 1965 have placed the region in a position where it faces power shortages in five of the next six years. Construction schedules show delays of from five months to five years in the addition of generators to four existing projects and in the construction of seven new projects. It was because of some of these delays that the joint private-public utility construction of the Centralia steam-plant was advanced about two years to help the Federal Government meet its loads.

Following is a status report on construction of Federal generation:

BONNEVILLE DAM MODIFICATIONS

At Bonneville Dam, work is 20 percent complete on the $25.8 million project to modify the dam to handle peaking discharges from upstream plants. Work now in progress involves modifying and modernizing the spillway gates and fish facilities. Recommendations have been forwarded by the Portland U.S. Army Engineer District to higher authority concerning establishment of new operating rules at the project and the construction of a second powerhouse, which would increase the project's capacity from 518,400 kilowatts to about 1,000,000 kilowatts.



Generator additions under construction at The Dalles Dam.

THE DALLES DAM ADDITIONAL UNITS

Construction of eight additional powerhouse units at The Dalles Dam is about 60 percent complete with first power on the line scheduled for August 1972 and the final generating unit scheduled for May 1974. The additions will boost the capacity at The Dalles Dam to 1,807,000 kilowatts.

JOHN DAY DAM

First power from the 16th generator at John Day Dam was transmitted 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 power producer outside the Soviet Union. With all 16 of the initial turbine-generator units operating, it can produce more

Reservoir filling behind Dworshak Dam under construction on Clearwater River, Idaho

than 2.0 million kilowatts of electric power. There is space in the powerhouse for four more generating units. When they are constructed, the project will provide 3.1 million kilowatts.

LOWER GRANITE DAM

Construction of the $247 million Lower Granite project, the last in the Columbia-Snake navigation stairway from the Pacific to Lewiston, Idaho, is 45 percent complete. A lawsuit brought by Northwest Steelheaders Council of Trout Unlimited, a sports fishermen's organization, in an effort to stop construction of the project failed to do so, and a Federal Judge on December 17, 1971, dismissed the suit. The three generators to be installed initially are presently scheduled to add 405,000 kilowatts to the Federal System in April 1975. The powerhouse will have space for three additional units of 135,000 kilowatts each.

DWORSHAK DAM

Dworshak Dam on the North Fork of the Clearwater River near Orofino, Idaho, is now more than 90 percent complete and the reservoir filling started September 27, 1971. Storage capacity of the reservoir will be about 3,500,000 acre-feet of which about 2,000,000 will be used annually for flood control and power generation.

The powerplant at Dworshak was begun in April 1970 and is 70 percent complete. The first power on the line is expected in November 1972 and the initial powerplant is scheduled for completion in the spring of 1973. Two generators will provide 90,000 kilowatts each, and a third will be rated at 220,000 kilowatts for a total installation of 400,000 kilowatts. The powerplant has space for three additional generators of 220,000 kilowatts each.

LIBBY DAM

Construction of the dam portion of the Libby Dam and Koocanusa Reservoir Project was 95 percent complete at the end of the construction season this fall. Concrete placement will resume in the spring of 1972 and is scheduled for completion in June. Award of the powerhouse contract is currently scheduled for next spring with an on-line date for the first 105,000-kilowatt unit set for July 1975. The reservoir will provide 5,000,000 acre-feet of live storage for flood control and power production on site and downstream in both the United States and Canada.

GRAND COULEE DAM THIRD POWERPLANT

Work on the Third Powerplant at Grand Coulee Dam is now about 40 percent complete and the first 600,000-kilowatt unit is currently scheduled on-line in February 1974. Also underway at Coulee is work on two reversible pump/turbine units which will provide 50,000 kilowatts each of peaking when they are completed in 1973. These units are being added to the left abutment pump-

Libby Dam, Montana, under construction

ing plant which lifts water from Roosevelt Lake to Banks Lake for the Columbia Basin Irrigation Project. The dual-purpose units will be capable of pumping during off-peak periods and generating during peak periods.

CHIEF JOSEPH ADDITIONAL UNITS

Preconstruction planning is continuing for installation of generating units Number 16 through 27 at Chief Joseph Dam, and construction can commence if construction funds are provided in fiscal year 1973. If adequate subsequent yearly funding is provided, first power on line will be November 1976 with completion scheduled for November 1978. With 27 units, the capacity of Chief Joseph will be 2,069,000 kilowatts.

ICE HARBOR ADDITIONAL UNITS

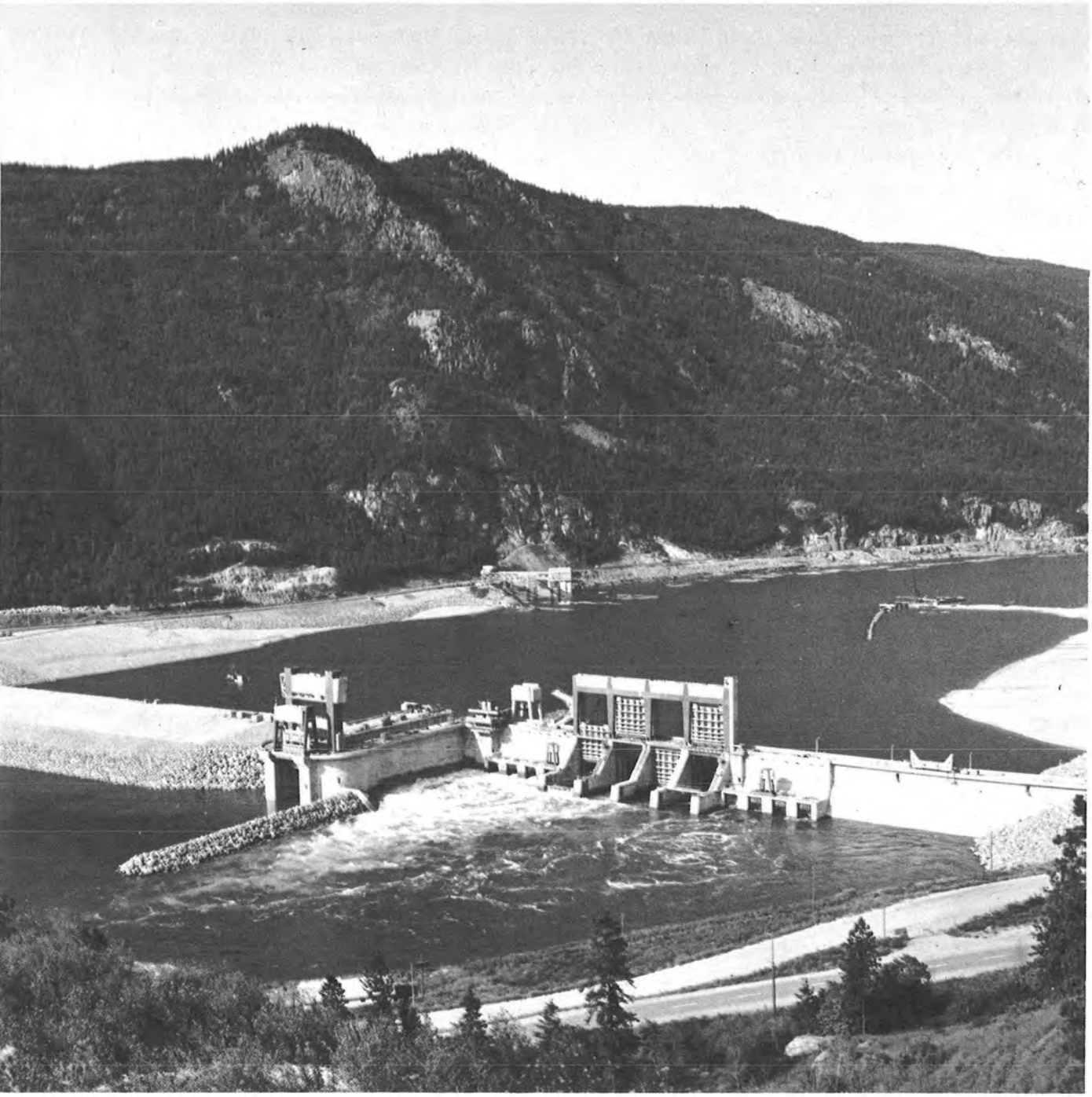
Fabrication of powerhouse equipment for additional generators at Ice Harbor Dam is underway to meet a spring 1975 power on line date. The last three of six units will increase the capacity to 602,880 kilowatts.

NON-FEDERAL GENERATION

In addition to Federal hydro-generation, the Chelan County PUD has added four units to the Rocky Reach Project on the upper Columbia. The first of these 125,400-kilowatt generators came on line in November and the fourth came on in December. They bring total installed capacity of Rocky Reach to more than 1.2 million kilowatts. Chelan County is also studying the installation of a pump storage project of one million kilowatts peaking capacity at Antilon Lake near Chelan, Washington.

FEDERAL TRANSMISSION GRID

As part of the Hydro-Thermal Power Program, much of the power generated at non-Federal thermal generating plants will be transmitted over the BPA transmission grid. On April 2, 1971, the Office of Management and Budget, part of the Executive Office of the President, advised the Secretary of the Interior that it had no objections to BPA construction of interconnecting transmission lines from non-Federal generating plants to the Federal main high-voltage system under the Hydro-Thermal Power Program as long as these lines were within BPA's service area.



Keenleyside Dam, British Columbia

COLUMBIA RIVER TREATY

Two of the three Columbia Treaty storage projects being built by Canada in British Columbia, Duncan Lake and Keenleyside (formerly Arrow), have been completed well ahead of schedule. Duncan was scheduled for completion by April 1, 1968, and was declared operational July 31, 1967. Keenleyside Dam was scheduled for completion by April 1, 1969, and was declared fully operational on October 10, 1968. These projects are now providing power and flood control benefits downstream in the United States.

In accordance with the Treaty, the benefits are being shared equally by Canada and the United States.

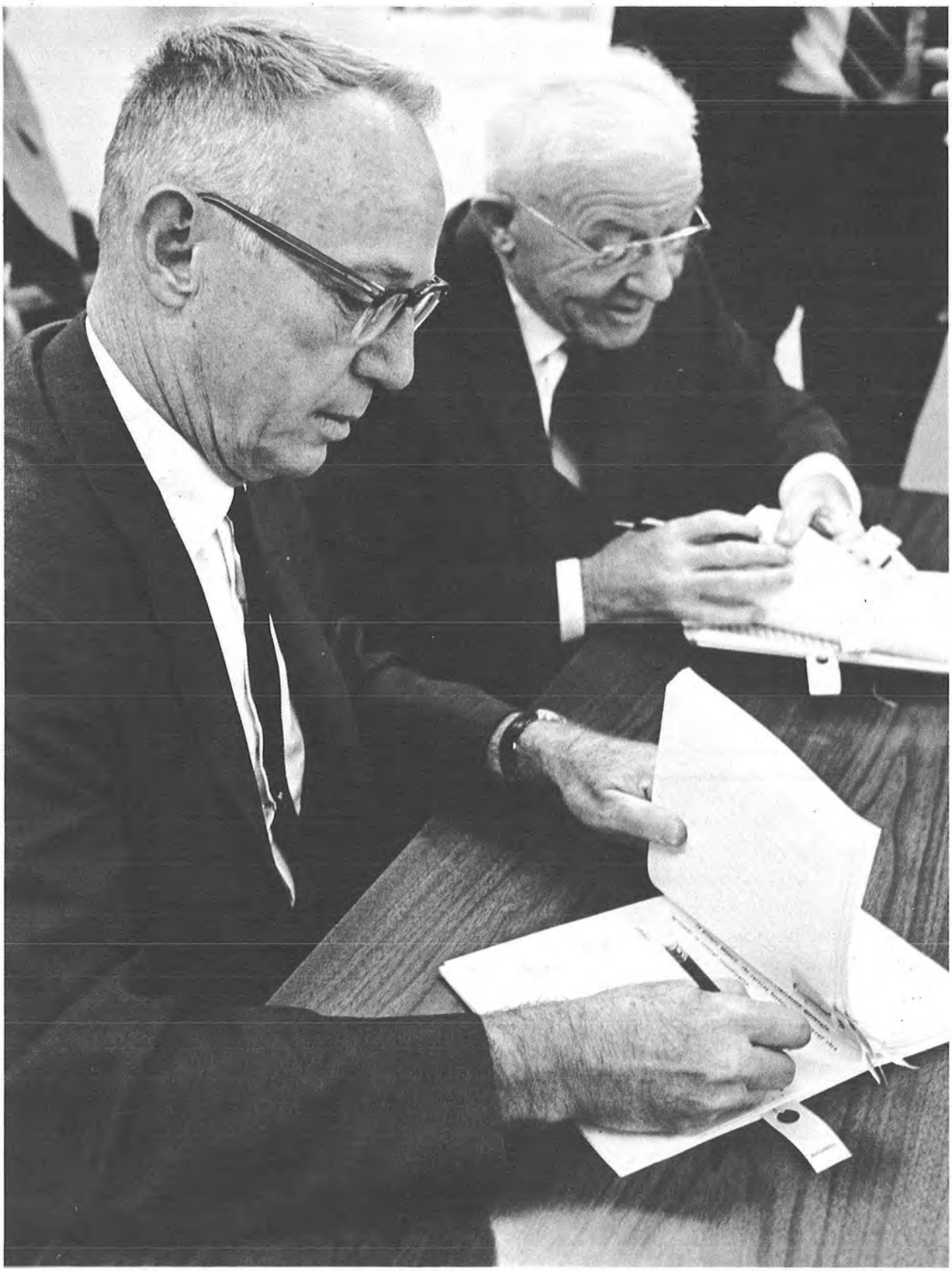
The third Treaty project, Mica Dam, scheduled for completion by April 1, 1973, is proceeding on schedule. The United States is building Libby Dam in Montana. Completion of power facilities at Libby has been delayed until fiscal year 1976.

In addition to the normal storage operation at Arrow Lakes, BPA reached agreement with B. C. Hydro for the release of an additional two feet of storage in the summer of 1970 and again in 1971. Each of these releases resulted in an increase of 186,000 megawatt-hours of energy generated at Federal plants downstream in the United States.

Studies and negotiations are now in progress to find ways of improving the possibilities of achieving full storage in Mica reservoir; that is, seven million acre-feet by September 1, 1973, and 15 million acre-feet by September 1, 1975.

Duncan Dam, British Columbia

Mica Dam under construction in British Columbia



H. R. Richmond, Bonneville Administrator, and Owen Hurd, WPPSS, Managing Director, signing Hanford No. 2 contracts.

POWER SALES

BPA energy sales reached a new high of 57.1 billion kilowatt-hours in fiscal year 1971, an increase of 3.1 percent over FY 1970 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.

Capacity sales, including exchanges, increased seven fold, largely from deliveries to the City of Los Angeles Department of Water and Power, Southern California Edison Company, and the Central Valley Project. Several Northwest investor-owned utilities also purchased additional supplemental and entitlement capacity under Canadian Entitlement agreements.

Public and Peoples Utility Districts, cooperatives, and municipal systems together purchased 21.6 billion kilowatt-hours from BPA in FY 1971. This amounted to 37.8 percent of BPA's energy sales for the fiscal year, a growth of 9.7 percent over FY 1970. The greatest single factor in this public agency growth was additional firm power purchased by Seattle City Light.

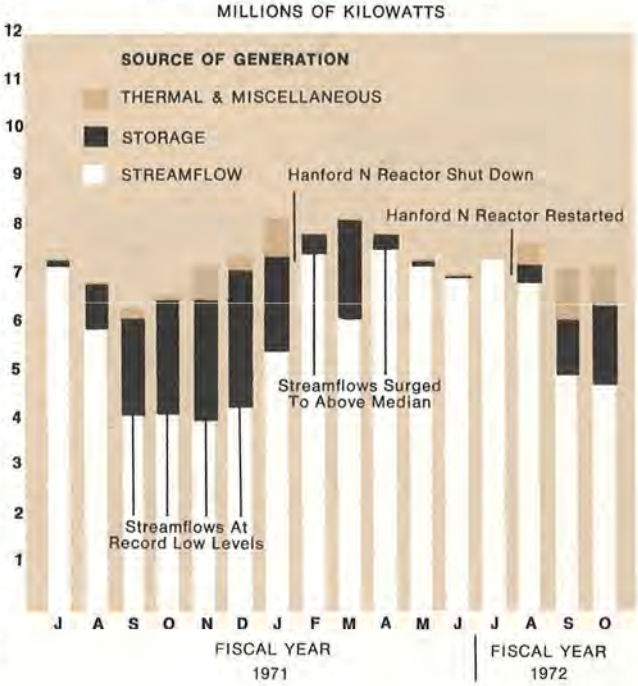
In FY 1971 Northwest investor-owned utilities purchased 10.1 billion kilowatt-hours from BPA for resale. These utilities purchased 27.6 percent more firm power from BPA in FY 1971 than in FY 1970 but required only 64.4 percent as much nonfirm energy to supplement their own nonfirm energy sources. During FY 1971 this investor-owned utility market accounted for 17.7 percent of BPA's total energy sales and, coincidentally, experienced a 17.7 percent growth over FY 1970.

Sales to *Federal agencies* declined 37.4 percent from those made in FY 1970 principally because of continued shutdowns at the Atomic Energy Commission's Hanford works. Federal Agency sales amounted to only 738 million kilowatt-hours or 1.3 percent of BPA's total energy sales.

For the first time since 1961 the *aluminum industry* purchased less energy from BPA during the fiscal year than was purchased during the preceding year, a total of 19.9 billion kilowatt-hours. Critical streamflows during much of the late summer and fall meant that BPA necessarily cut back on deliveries of interruptible power to industries with the result that FY 1971 sales of nonfirm energy to the aluminum industry declined 49.7 percent from FY 1970 sales. Partially offsetting this decline was a one percent increase in firm sales. Because firms sales are generally

FEDERAL COLUMBIA RIVER POWER SYSTEM
Average Energy Resources

JULY 1970 Through OCTOBER 1971



PACIFIC NORTHWEST POWER SYSTEM

Major Facilities Existing and Under Construction

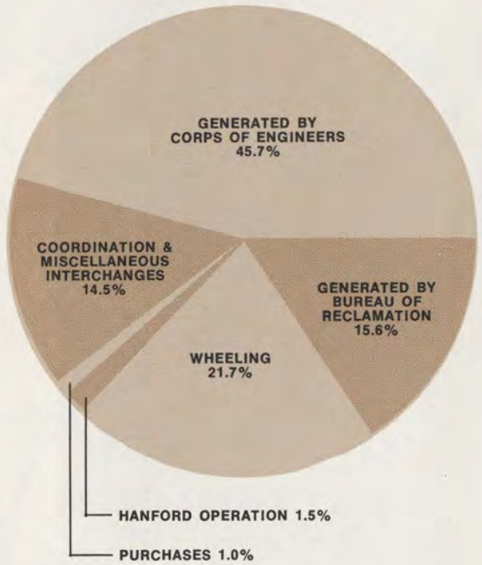
AS OF DECEMBER 31, 1971

- BPA Transmission Lines and Substations
- Non Federal Transmission Lines and Substations
- Federal Hydroelectric Project
- Non Federal Hydroelectric Project
- Nuclear Generating Plant
- Fossil Fuel Powerplant
- Treaty Dam, Canada
- Treaty Dam, United States

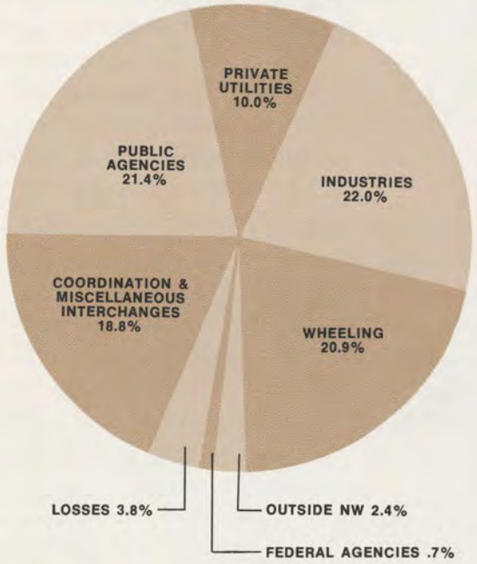
about three times the nonfirm sales, the overall decline in sales to the aluminum industry was diluted to 10 percent. The aluminum industry comprised 34.7 percent of BPA's total energy load, dropping to the second largest class of customer served, behind public agencies. Despite the cutbacks in interruptible power, the industry was able to obtain sufficient power from alternate sources to maintain desired levels of operation, although at somewhat higher cost to the companies.

Other industries than the aluminum industry also required less energy in FY 1971. They purchased nearly 2.4 billion kilowatt-hours of energy,

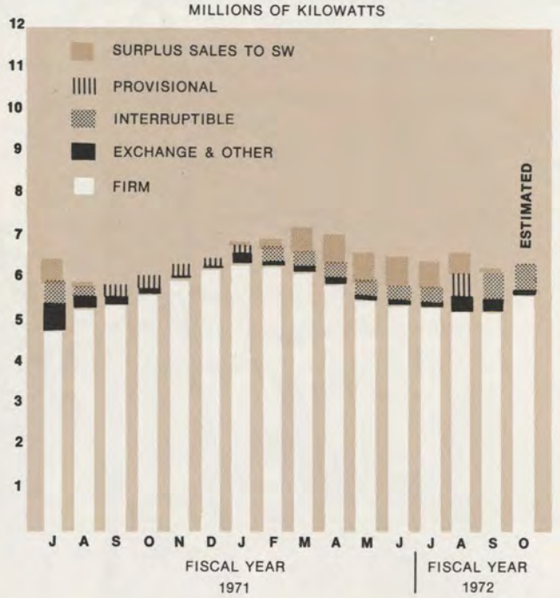
SOURCE OF ENERGY HANDLED
(101 Billion Kwh)
FISCAL YEAR 1971



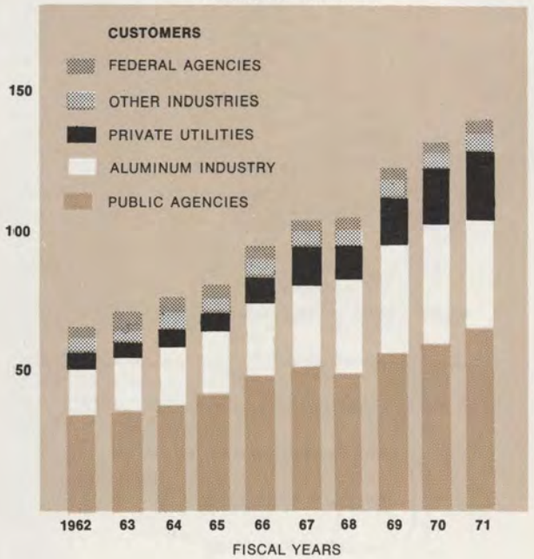
DISPOSITION OF ENERGY HANDLED
(101 Billion Kwh)
FISCAL YEAR 1971



FEDERAL COLUMBIA RIVER POWER SYSTEM
Average Energy Sales
JULY 1970 Through OCTOBER 1971
MILLIONS OF KILOWATTS



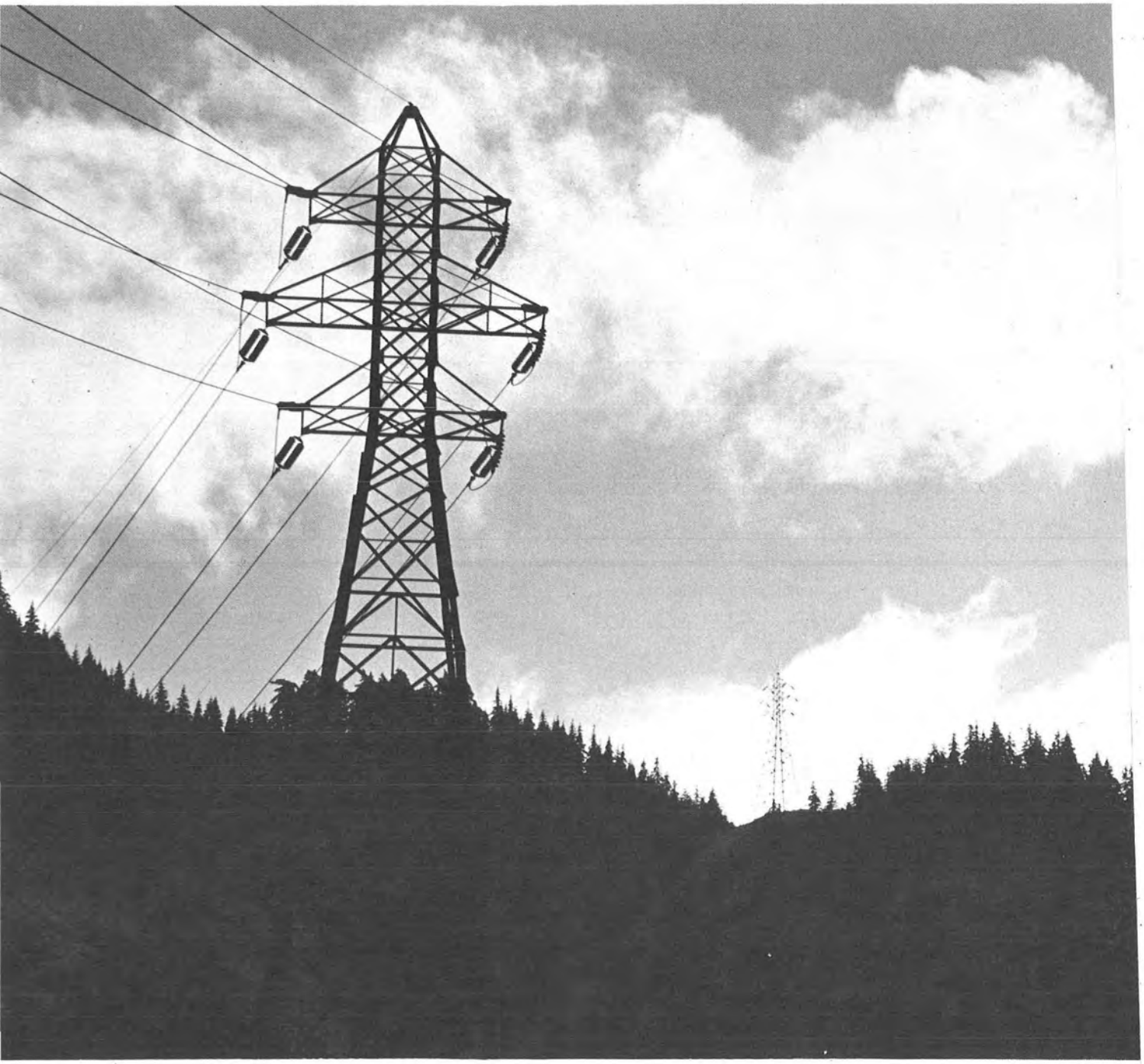
BPA SALES OF ELECTRIC ENERGY
FISCAL YEARS 1962-1971
MILLIONS OF DOLLARS



4.2 percent of BPA's total sales, but a 2.9 percent decline from FY 1970.

During months when surplus was available, nonfirm energy totaling 2.4 billion kilowatt-hours was delivered to the *Pacific Southwest*, an increase of 72 percent over FY 1970. Pacific Southwest sales accounted for 4.3 percent of total BPA sales. When the Los Angeles earthquake in February 1971 put the Sylmar terminal facility out of service and stopped all deliveries over the direct-current line, it became physically impossible to fulfill all capacity commitments. Also, expected sales of nonfirm energy were not realized.

BPA headquarters building, Portland, Oregon.



FINANCIAL STATUS

Gross revenues for the Federal Columbia River Power System reached a new record high of $155,678,000 in fiscal year 1971 but sharply rising interest and other costs, low streamflows and loss of the d-c Intertie reduced net revenues to $14.6 million.

Net revenues were $10.1 million below fiscal year 1970's $24.7 million, a decline of 40.8 percent. The rise in gross revenues was 5.4 percent over FY 1970's $147.7 million.

BASIS OF FINANCIAL REPORTING

To comply fully with all of the various financial reporting requirements specified by law, BPA prepares two sets of financial reports. These are (1) cost accounting financial statements, which measure results on the profit or loss basis used by business organizations, and which are audited by the General Accounting Office; and (2) the repayment study, which forecasts future revenues and costs, and which is required to determine the adequacy of power rate levels to repay the Federal investment in power facilities as required by Congress.

COST ACCOUNTING RESULTS

The cost accounting financial statements, together with the Comptroller General's opinion thereon, are included in this report starting on page 53.

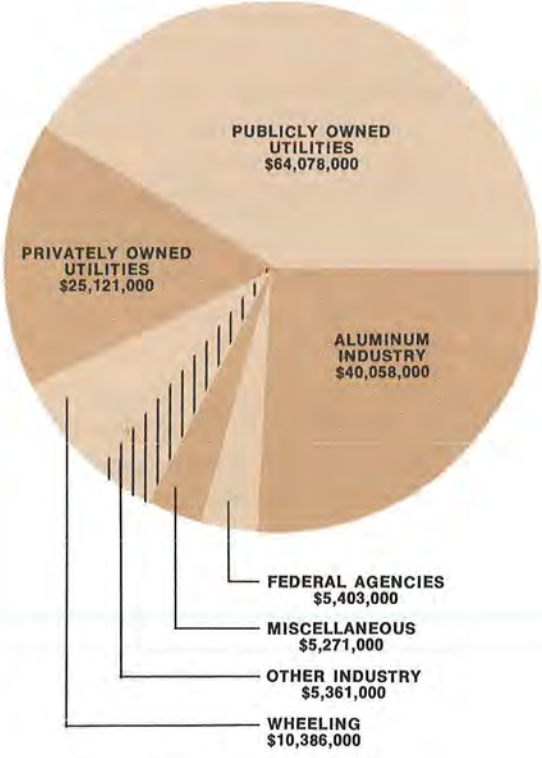
Although the cost accounting statements do not reflect the financial requirements upon which power rates are based, they do provide useful indicators of current trends in revenues and costs. Analysis of these statements, for instance, reveals that gross revenues were $155.7 million, up $8.0 million (5.4 percent) over last year. Estimates made a year ago forecast revenues at about $160 million, but the year's total was lower than expected because of two very significant factors: (1) unusually low streamflows from August through December, which resulted in curtailment of interruptible power deliveries; and (2) the California earthquake in February which put the d-c Intertie out of service and thereby caused the loss of as much as $6 million in sales to California utilities. It was ironic that water conditions improved dramatically about the time that the d-c Intertie was knocked out, which would have made much higher sales possible had the d-c Intertie been in service.

Revenues from most customer groups showed healthy increases, but revenues from industrial customers fell short of expectations in FY 1971 because of the curtailment of their interruptible power. Aluminum industry revenues dropped more than 10 percent from the level of the previous year, and they accounted for only 25.7 percent of total revenues as compared with 30.2 percent of the total last year. Revenues from public agency customers showed an increase of 9.7 percent over last year, which is consistent with their long-term growth trend. Table 6 on page 49 and the chart, "Source of the Revenue Dollar," on page 42 contain additional information on revenues by class of customer.

Of the expense groups, interest expense shows the largest dollar increase, $8.8 million, which is more than the increase in total system revenues. The interest expense is increasing because of two factors: (1) the interest base is growing because new investment is being added faster than we are amortizing the older investment, and (2) the rate of interest payable on new investment has increased sharply in the past two years because of adoption of a new interest rate policy prescribed

SOURCE OF THE REVENUE DOLLAR

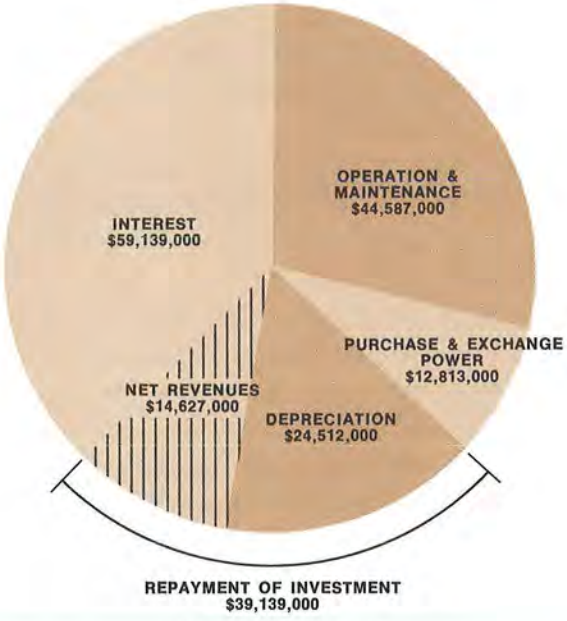
FISCAL YEAR 1971



TOTAL: $155,678,000

DISPOSITION OF THE REVENUE DOLLAR

FISCAL YEAR 1971



TOTAL: $155,678,000

by Secretarial Order No. 2929 issued on January 29, 1970. Starting at 4⅞ percent when first issued, the interest rate applicable to new construction as determined pursuant to the formula set forth in the Order is being applied at 5⅜ percent in FY 1972.

Depreciation expense also reacts to the higher base of plant investment, and depreciation charges for FY 1971 were $2.9 million (13.2 percent) higher than the previous year.

The $1.3 million (11.7 percent) increase in purchase and exchange power costs is only the start of cost increases in this category which will come as a result of the Hydro-Thermal Power Program. For example, costs will increase by about $15 million in FY 1972 because of the commitments which were made to restart the Hanford No. 1 plant on a dual-purpose (i.e., power and plutonium production) basis. Acquisition of power from the new Centralia plant will also add further to the total. Despite these additional costs, the Hydro-Thermal Power Program is the least costly alternative for meeting loads.

REPAYMENT STUDY RESULTS

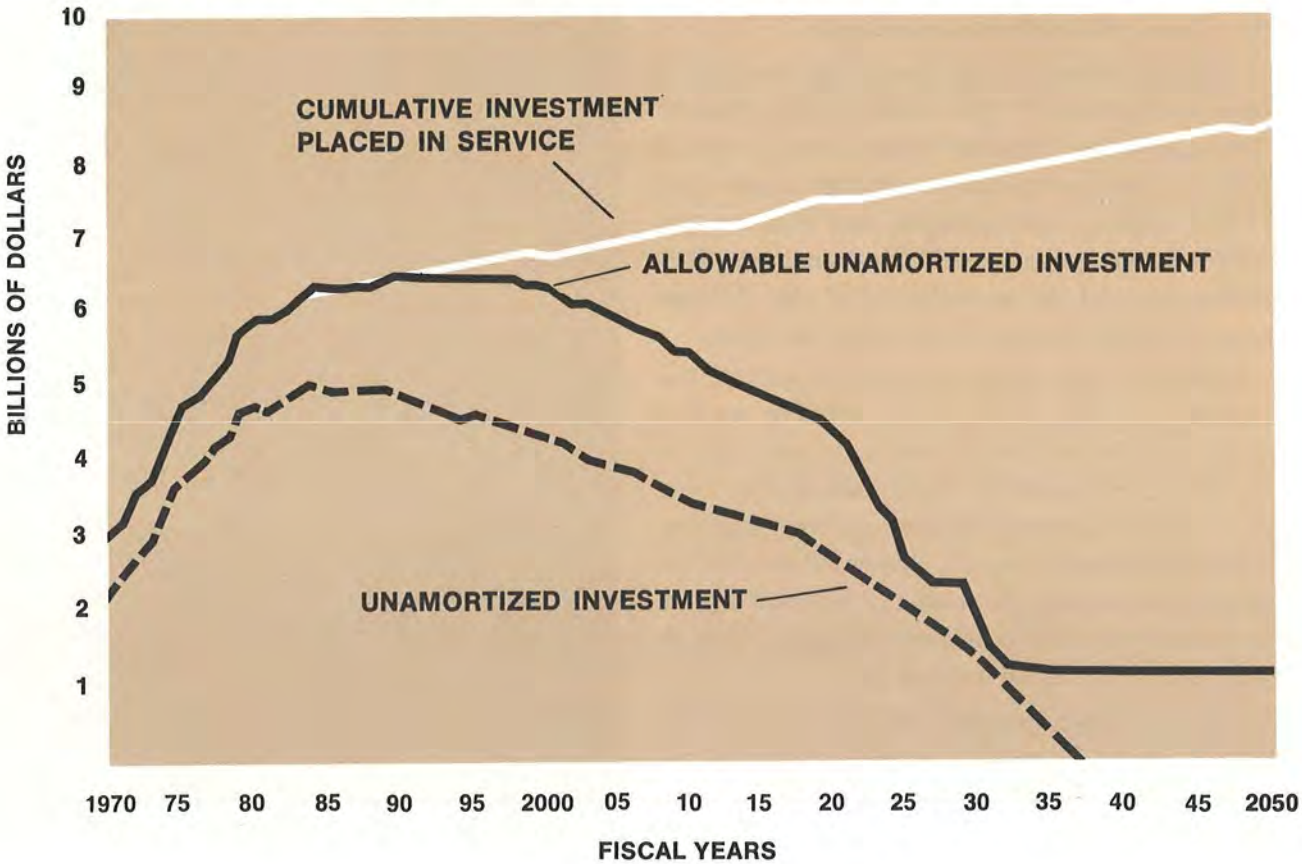
To demonstrate the adequacy of the power rate level and to determine whether and to what extent power rate increases may be necessary, BPA is required by law to prepare annually and submit to the President and Congress a consolidated financial statement on the repayment basis (see Table 7, page 50).

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 all costs 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 project.
4. Repay the capital investment allocated to commercial power at the generating projects within 50 years after each project is completed.

REPAYMENT OF PLANT INVESTMENT ALLOCATED TO COMMERCIAL POWER

FEDERAL COLUMBIA RIVER POWER SYSTEM—AUTHORIZED PROJECTS AS OF JUNE 30, 1971



5. Repay each increment of capital investment in the transmission system within the average service life of the transmission facilities (currently 45 years).
6. Repay the investment in each replacement of a facility at a generating project or on the transmission system within its service life.
7. Repay the portion of construction costs at Federal reclamation projects which is beyond the repayment ability of the water users, and which is assigned for repayment from commercial power revenues, within the same overall period available to the irrigation water users for making their payments. These periods range from 40 to 66 years with 60 years being applicable to most of the irrigation assistance.

The repayment study shows that cumulative revenues through FY 1971 totaled $1,927,348,000. These have been applied to pay interest costs of $661 million, purchase and exchange power costs of $76 million, and operation and maintenance costs of $531 million, with the remaining $659 million applied to amortization of the Government's 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 for all projects included in the Federal Columbia River Power System. The study demonstrates the adequacy of power rates by showing that with the revenues indicated, the capital investment will be amortized within the allowable period. This is graphically illustrated on page 43.

As a further source of reference, Table 6 on page 49 shows in greater detail the financial results on the repayment basis for FY 1971 as compared to FY 1970.

TABLE 1
SALES OF ELECTRIC ENERGY
FISCAL YEAR 1971

Customer	Energy Delivered for Year (000) KWH	Revenue from Sales of Energy
NORTHWEST AREA		
Publicly Owned Utilities		
Municipalities		
Albion, Idaho	2,086	$ 6,986
Bandon, Oregon	42,105	142,760
Blaine, Washington	23,077	75,360
Bonners Ferry, Idaho	17,689	79,841
Burley, Idaho	62,282	198,346
Canby, Oregon	44,457	156,806
Cascade Locks, Oregon	17,193	45,761
Centralia, Washington	41,706	218,829
Cheney, Washington	75,326	244,617
Consolidated Irrigation District, Wash.	1,105	4,288
Coulee Dam, Washington	24,665	84,395
Declo, Idaho	1,616	5,326
Drain, Oregon	24,639	84,197
Ellensburg, Washington	136,430	436,791
Eugene, Oregon	1,171,156	2,882,424
Forest Grove, Oregon	110,375	370,847
Heyburn, Idaho	58,394	174,325
Idaho Falls, Idaho	195,433	606,627[1]
McCleary, Washington	28,362	95,964
McMinnville, Oregon	183,203	665,015
Milton-Freewater, Oregon	82,431	264,060
Minidoka, Idaho	683	2,375
Monmouth, Oregon	52,194	180,425
Port Angeles, Washington	369,005	1,055,539
Richland, Washington	307,338	988,074
Rupert, Idaho	40,382	130,023
Seattle, Washington	1,219,045	2,607,806
Springfield, Oregon	201,740	625,684
Sumas, Washington	4,572	15,861
Tacoma, Washington	989,939	2,242,928
Vera Irrigation District, Wash.	77,695	248,147
Wash. Public Power Supply System	10,755	26,890
Total Municipalities (32)	5,617,078	$ 14,967,317
Public Utility Districts		
Benton County PUD No. 1	569,681	$ 1,710,724
Central Lincoln PUD	812,476	2,491,278
Chelan County PUD No. 1	339,834	746,449
Clallam County PUD No. 1	211,671	675,108
Clark County PUD No. 1	1,566,475	5,026,737
Clatskanie PUD	663,029	1,612,359
Cowlitz County PUD No. 1	1,753,713	4,458,371[1]
Douglas County PUD No. 1	285,830	785,643
Ferry County PUD No. 1	32,981	99,076
Franklin County PUD No. 1	309,170	959,114
Grant County PUD No. 2	455,508	1,404,730[1]
Grays Harbor County PUD No. 1	865,884	2,478,459
Kittitas County PUD No. 1	29,293	93,749
Klickitat County PUD No. 1	139,179	429,446
Lewis County PUD No. 1	344,207	1,066,580
Mason County PUD No. 1	30,351	96,933
Mason County PUD No. 3	252,392	791,877
Northern Wasco County PUD	56,718	184,163
Okanogan County PUD No. 1	298,701	870,151
Pacific County PUD No. 2	184,939	619,518
Pend Oreille County PUD No. 1	3,959	9,895
Skamania County PUD No. 1	65,280	221,840
Snohomish County PUD No. 1	3,157,227	9,618,243
Tillamook PUD	257,855	879,291
Wahkiakum County PUD No. 1	34,865	116,892
Whatcom County PUD No. 1	83,486	211,604
Total Public Utility Districts (26)	12,804,704	$ 37,658,230
Cooperatives		
Benton Rural Elec. Assn.	110,878	$ 326,252
Big Bend Elec. Coop.	202,653	540,190
Blachly-Lane County Coop.	83,899	283,649
Central Elec. Coop.	87,557	249,557
Clearwater Power Co.	102,202	338,503
Columbia Basin Elec. Coop.	77,180	232,612
Columbia Power Coop. Assn.	29,129	101,288
Columbia Rural Elec. Assn.	94,141	254,950
Consumers Power	184,245	601,440
Coos-Curry Elec. Coop.	206,848	702,572
Douglas Elec. Coop.	83,679	283,812
East End Mutual Elec. Coop.	4,582	15,434
Fall River Elec. Coop.	49,094	157,343
Farmers Elec. Co.	3,426	11,396
Flathead Elec. Coop.	54,403	167,465
Harney Elec. Coop.	66,127	168,552
Hood River Elec. Coop.	57,101	185,328
Idaho Co. L&P Coop. Assn.	25,164	81,564
Inland Power & Light Co.	224,677	713,781
Kootenai Elec. Coop.	58,817	189,921
Lane Co. Elec. Coop.	197,205	663,993
Lincoln Elec. Coop.—Montana	39,738	132,270
Lincoln Elec. Coop.—Washington	75,713	208,952
Lost River Elec. Coop.	19,325	55,099
Lower Valley Power & Light	91,358	298,478
Midstate Elec. Coop.	67,321	197,257
Missoula Elec. Coop.	42,196	126,690
Nespelem Valley Elec. Coop.	23,373	72,397
Northern Lights	73,979	236,002
Okanogan Co. Elec. Coop.	16,213	51,074
Orcas Power & Light Co.	59,493	198,556
Prairie Power Coop.	2,379	7,836
Raft River Elec. Coop.	93,395	241,552
Ravalli Co. Elec. Coop.	40,229	130,740
Riverside Elec. Co.	3,475	11,789
Rural Elec. Co.	31,648	103,546
Salem Electric	153,394	508,198
Salmon River Elec. Coop.	18,181	50,940
South Side Elec. Lines	9,019	28,930
Surprise Valley Elec. Corp.	40,196	125,374
Tanner Electric	9,118	30,279
Umatilla Elec. Coop. Assn.	120,967	355,676
Unity Light & Power Co.	22,928	74,258
Vigilante Elec. Coop.	36,016	106,430
Wasco Elec. Coop.	52,601	176,590
West Oregon Elec. Coop.	43,813	142,387
Total Cooperatives (46)	3,189,075	$ 9,940,902
Total Publicly Owned Utilities (104)	21,610,857	62,566,449
Federal Agencies (11)	737,514	1,867,016
Privately Owned Utilities		
California-Pacific Utilities Co.	32,586	$ 82,379
Idaho Power Co.	1,500	3,000
Montana Power Co.	843,321	1,898,268[1]
Pacific Power & Light Co.	3,928,602	8,948,928[1]
Portland General Elec. Co.	4,007,345	8,990,196[1]
Puget Sound Power & Light Co.	835,396	1,821,341
Utah Power Co.	0	0
Washington Water Power Co.	459,882	1,055,166
Total Privately Owned Utilities (8)	10,108,632	$ 22,799,278
Aluminum Industries		
Aluminum Co. of America		
Vancouver Plant	2,079,867	$ 4,307,234
Wenatchee Plant	1,393,819	2,902,570
Anaconda Aluminum Co.	2,775,520	5,220,321
Harvey Aluminum Co.	1,593,808	2,730,433
Intalco Aluminum Co.	3,144,662	6,498,747
Kaiser Aluminum & Chemical Corp.		
Spokane Reduction Plant	3,108,705	6,405,604
Spokane Rolling Mill	396,600	965,347
Tacoma Reduction Plant	1,235,866	2,546,342
Reynolds Metals Co.		
Longview Plant	2,995,831	6,183,548
Troutdale Plant	1,127,462	2,319,013
Other Industries		
Carborundum Co.	210,249	454,621
Cominco American Inc.	0	0
Crown Zellerbach Corp.		
Port Angeles Plant	5,574	13,725
Port Townsend Plant	80,262	184,710
Foote Mineral Co.	104,465	227,369
Georgia-Pacific Corp.	192,451	414,693
Hanna Nickel Smelting Co.	701,513	1,566,221
ITT Rayonier, Inc.	42,599	93,174
Oregon Metallurgical Corp.	24,769	68,276
Pacific Carbide & Alloys	54,346	123,019
Pennwalt Corporation	364,857	757,366
Stauffer Chemical Works	464,700	1,082,285
Stewart Elsner	48	293
Union Carbide Corp.	149,522	325,098
Total Industries (24)	22,247,495	$ 45,390,009
OUTSIDE NORTHWEST AREA		
British Columbia Hydro & Power Authority	1,096	$ 2,383
Burbank, Calif.	14,072	125,026[1]
Glendale, Calif.	17,334	34,668
Los Angeles, Calif.	182,210	1,543,525[1]
Pasadena, Calif.	0	7,491[1]
Sacramento, Calif.	62,960	125,920
U.S.B.R.—Central Valley Project	1,207,172	3,464,344[1]
State of California—Dept. of Natural Resources	46,152	92,304
Pacific Gas & Electric Co.	0	0
San Diego Gas & Electric Co.	92,282	184,564
Southern California Edison Co.	817,427	2,625,664[1]
Total Outside Northwest Area (11)	2,440,705	$ 8,205,889
Total Sales of Electric Energy (158)	57,145,203	140,828,641[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, 1971

				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	—	—	6	324,000	—	—	16	842,400
Grand Coulee	BR	Washington	Columbia	Sept. 1941	18	2,076,000[2]	6	3,804,000[3]	—	—	6	3,600,000	36	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	16	1,119,000[4]	8	688,000	—	—	—	—	24	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	BR	Idaho	Snake	May 1909	7	13,400	—	—	—	—	—	—	7	13,400
Boise Diversion	BR	Idaho	Boise	May 1912	3	1,500	—	—	—	—	—	—	3	1,500
Black Canyon	BR	Idaho	Payette	Dec. 1925	2	8,000	—	—	—	—	—	—	2	8,000
Anderson Ranch	BR	Idaho	S. Fk. Boise	Dec. 1950	2	27,000	—	—		—	1	13,500	3	40,500
Palisades	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	14	1,890,000	2	270,000	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	CE	Wash.-Ida.	Snake		—	—	—	—	4	540,000	—	—	4	540,000
Total installed capacity						9,614,900		6,488,880		4,993,500		5,741,500		26,838,780
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 six rewound main units.
[3] Includes an increase of 17,000 kw each for 12 units to be rewound and six 600,000 kw units being installed at the Third Powerplant.
[4] Includes 2 fishway units of 13,500 kw each.

TABLE 3

PACIFIC NORTHWEST GENERATION

Nameplate Rating of Plants Existing Under Construction, and Authorized or Licensed
Kilowatts

June 30, 1971

Ownership	Existing		Under Construction		Authorized or Licensed		Total	
	No. of Plants	Nameplate Rating	No. of Plants	Nameplate Rating	No. of Plants	Nameplate Rating	No. of Plants	Nameplate Rating
Federal Columbia River Power System								
Hydro	26	9,614,900	5	6,488,880[1]	2	4,993,500[1]	33	21,097,280
Publicly Owned Agencies								
Hydro	38	5,505,161	0	501,600[1]	3	2,095,850[1]	41	8,102,611
Thermal	16	982,591	0	731,000[2]	1	1,100,000[4]	17	2,813,591
Total Publicly Owned Agencies	54	6,487,752	0	1,232,600	4	3,195,850	58	10,916,202
Privately Owned Agencies								
Hydro	90	3,923,968	0	0	1	836,520[1]	91	4,760,488
Thermal	10	251,725	3	3,299,000[3]	0	0	13	3,550,725
Total Privately Owned Agencies	100	4,175,693	3	3,299,000	1	836,520	104	8,311,213
Pacific Northwest Agencies								
Hydro	154	19,044,029	5	6,990,480[1]	6	7,925,870[1]	165	33,960,379
Thermal	26	1,234,316	3	4,030,000	1	1,100,000[4]	30	6,364,316
Other Thermal[3]	0	0	0	0	3	3,300,000[5]	3	3,300,000
Total Pacific Northwest Agencies	180	20,278,345	8	11,020,480	10	12,325,870	198	43,624,695

[1] Includes additions to projects existing or under construction.
[2] 339,000 kw (30%) of Trojan and 392,000 kw (25%) of Centralia plants.
[3] 791,000 kw (70%) of Trojan, 1,008,000 kw (72%) of Centralia, and 1,500,000 kw of Jim Bridger plants.
[4] Hanford #2 plant—Application made for license.
[5] Three additional thermal plants planned by Pacific Northwest Joint Power Planning Council.

TABLE 4

ELECTRIC ENERGY ACCOUNT FOR FISCAL YEAR 1971

Energy Received (millions of kilowatt-hours)	
Energy Generated for BPA	
Bureau of Reclamation	15,706
Corps of Engineers	46,199
Washington Public Power Supply System	1,498
Power interchanged in	37,663
Total received	101,066
Energy Delivered (millions of kilowatt-hours)	
Sales	57,145
Power interchanged out	39,973
Used by the Administration	64
Total delivered	97,182
Energy losses in transmission and transformation	3,884
Total (millions of kilowatt-hours)	101,066
Losses in percent of total received	3.8%
Maximum demand on energy generated for BPA	9,935,000
Load factor in percent of total generated for BPA	72.9%

TABLE 5

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

Fiscal Year 1971

Utility	Kilowatt-Hours (Billions)	Of Total Generation (Percent)
Publicly Owned:		
Federal Columbia River Power System[2]	63.4	53.7
Grant County PUD	9.4	8.0
Chelan County PUD	6.6	5.6
Seattle City Light	5.4	4.6
Douglas County PUD	3.6	3.0
Tacoma City Light	2.9	2.5
Eugene Water & Electric Board	0.4	0.3
Pend Oreille County PUD	0.4	0.3
Total Publicly Owned	92.1	78.0
Privately Owned:		
Idaho Power Company	8.7	7.4
Montana Power Company	5.1	4.3
Pacific Power & Light Co.	4.8	4.0
Washington Water Power Co.	3.5	3.0
Portland General Electric Co.	2.6	2.2
Puget Sound Power & Light Co.	1.3	1.1
Total Privately Owned	26.0	22.0
Total Generation	118.1	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).

TABLE 6

FEDERAL COLUMBIA RIVER POWER SYSTEM

Operating Results on the Repayment Basis
Fiscal Years 1971 and 1970

(In thousands of dollars)

	F.Y. 1971	F.Y. 1970	Increase (Decrease) Amount	Increase (Decrease) Percent
REVENUES				
Bonneville Power Administration				
Sales of electric energy:				
Publicly owned utilities	64,078	58,420	5,658	9.7
Privately owned utilities	25,121	20,319	4,802	23.6
Federal agencies	5,403	4,090	1,313	32.1
Aluminum industry	40,058	44,614	(4,556)	(10.2)
Other industry	5,361	5,449	(88)	(1.6)
Total	140,021	132,892	7,129	5.4
Other operating revenues:				
Wheeling revenues	10,386	9,507	879	9.2
Other revenues	2,321	2,370	(49)	(2.1)
Total	12,707	11,877	830	7.0
Total Bonneville Power Administration Revenues	152,728	144,769	7,959	5.5
Associated Projects				
Other operating revenues	2,950	2,911	39	1.3
Total power system operating revenues	155,678	147,680	7,998	5.4
EXPENSES				
Purchase and exchange power	12,813	11,468	1,345	11.7
Operating expenses	29,680	26,022	3,658	14.1
Maintenance and other expenses	14,907	13,471	1,436	10.7
Total power system expenses	57,400	50,961	6,439	12.6
INTEREST				
Interest on Federal investment	67,742	57,258	10,484	18.3
Less interest charged to construction	8,603	6,896	1,707	24.8
Total power system interest	59,139	50,362	8,777	17.4
Total power system expenses and interest	116,539	101,323	15,216	15.0
BALANCE AVAILABLE FOR REPAYMENT OF POWER SYSTEM INVESTMENT	39,139	46,357	(7,218)	(15.6)

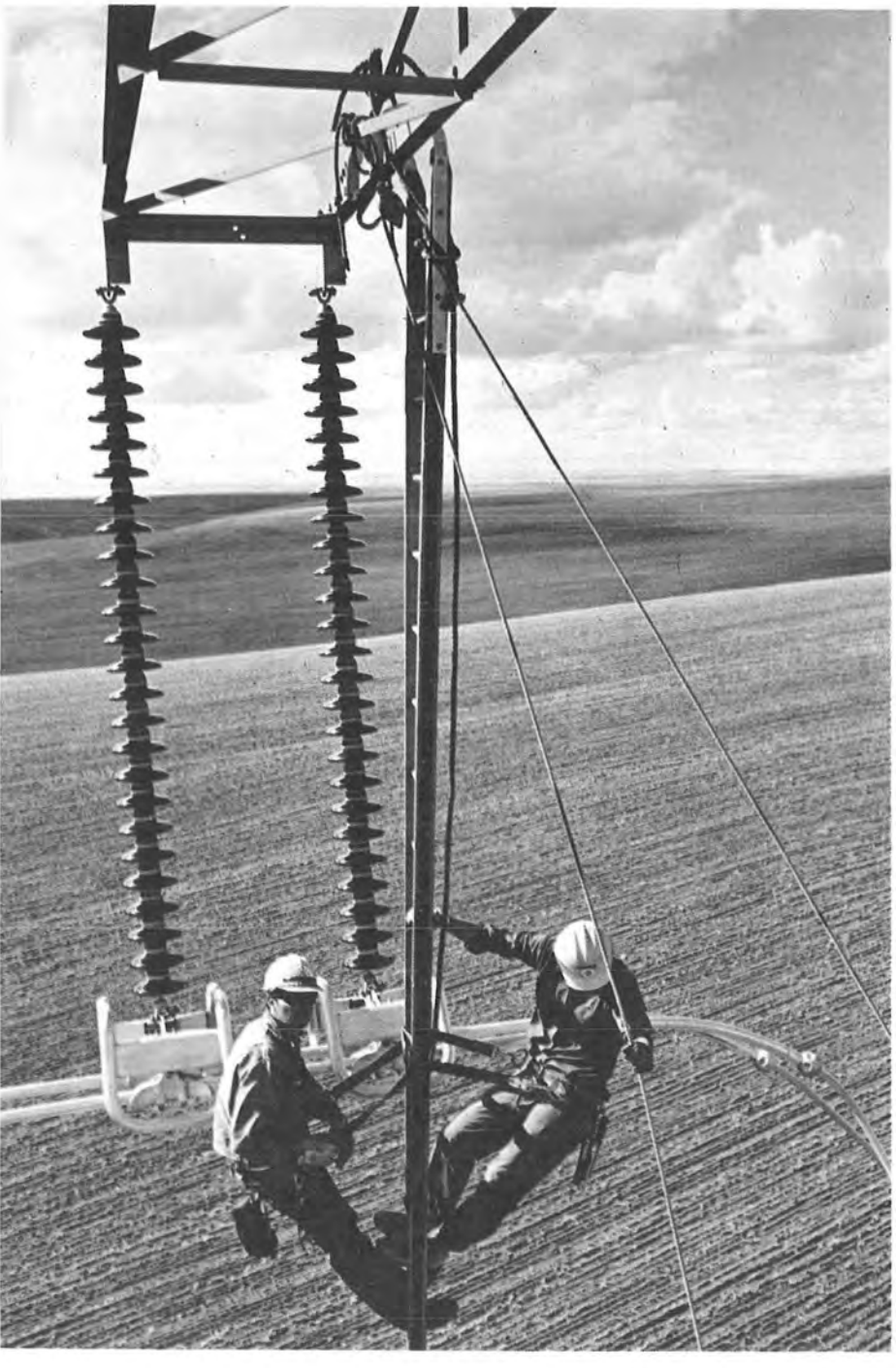
TABLE 7

FEDERAL COLUMBIA RIVER POWER SYSTEM
REPAYMENT STUDY FOR F.Y. 1971
AUTHORIZED PROJECTS
(All Amounts in $1,000)

1	2	3	4	5	6	7	8	9	10	11
								Plant Allocated to Commercial Power		
					Investment Placed in Service			Cumulative Investment Placed in Service		
Fiscal Year Ending June 30	Revenues	Operation and Maintenance Expense	Purchase and Exchange Power	Interest Expense	Initial Project	Replace-ments	Total	Initial Project	Replace-ments	Total
Cumulative to 6-30-71	1,927,348	530,981	75,744	661,252	3,003,088		3,003,088	3,003,088		3,003,088
1972	168,700	47,997	33,100	62,714	185,847	3,468	189,315	3,188,935	3,468	3,192,403
1973	186,000	49,873	62,100	70,519	401,055	3,767	404,822	3,589,990	7,235	3,597,225
1974	192,100	52,718	23,800	82,701	203,559	4,238	207,797	3,793,549	11,473	3,805,022
1975	200,800	55,202	4,500	93,772	484,849	9,486	494,335	4,278,398	20,959	4,299,357
1976	204,400	58,001	5,700	111,042	479,056	5,314	484,370	4,757,454	26,273	4,783,727
1977	220,500	59,767	5,900	124,765	93,554	7,921	101,475	4,851,008	34,194	4,885,202
1978	237,800	61,288	6,000	127,000	209,182	5,978	215,160	5,060,190	40,172	5,100,362
1979	250,200	63,193	6,000	132,372	233,778	7,998	241,776	5,293,968	48,170	5,342,138
1980	256,200	65,571	6,000	138,418	435,035	11,887	446,922	5,729,003	60,057	5,789,060
1981	268,200	67,953	6,000	150,960	128,405	8,105	136,510	5,857,408	68,162	5,925,570
1982	282,900	68,482	5,900	172,559		9,485	9,485	5,857,408	77,647	5,935,055
1983	285,200	68,865	5,900	171,630	42,715	10,530	53,245	5,900,123	88,177	5,988,300
1984	291,500	70,246	5,900	172,137	155,751	11,832	167,583	6,055,874	100,009	6,155,883
1985	306,400	71,984	6,600	176,502	118,500	12,492	130,992	6,174,374	112,501	6,286,875
1986	310,500	72,855	6,500	179,299		14,987	14,987	6,174,374	127,488	6,301,862
1987	310,800	72,855	6,500	183,584		13,609	13,609	6,174,374	141,097	6,315,471
1988	314,000	73,335	6,500	182,344	78,779	17,263	96,042	6,253,153	158,360	6,411,513
1989	322,900	74,118	6,300	183,945	9,911	15,058	24,969	6,263,064	173,418	6,436,482
1990	333,400	74,476	8,100	182,730	9,911	22,652	32,563	6,272,975	196,070	6,469,045
1991	334,400	74,476	6,800	181,443		21,999	21,999	6,272,975	218,069	6,491,044
1992	335,200	74,476	6,800	181,134		30,926	30,926	6,272,975	248,995	6,521,970
1993	335,700	74,476	6,800	179,606		21,489	21,489	6,272,975	270,484	6,543,459
1994	336,400	74,476	6,800	177,659		27,820	27,820	6,272,975	298,304	6,571,279
1995	337,100	74,476	6,800	175,847		35,542	35,542	6,272,975	333,846	6,606,821
1996	337,700	74,476	6,800	174,225		25,579	25,579	6,272,975	359,425	6,632,400
1997	338,400	74,476	6,800	172,158		31,395	31,395	6,272,975	390,820	6,663,795
1998	338,600	74,476	2,500	170,595		24,422	24,422	6,272,975	415,242	6,688,217
1999	339,400	74,476	2,500	168,164		28,403	28,403	6,272,975	443,645	6,716,620
2000	341,500	74,476	2,500	165,760		36,000	36,000	6,272,975	479,645	6,752,620
2001	341,600	74,476	2,500	163,469		27,224	27,224	6,272,975	506,869	6,779,844
2002	341,600	74,476	2,500	161,135		27,851	27,851	6,272,975	534,720	6,807,695
2003	341,700	74,476	2,500	158,374		28,395	28,395	6,272,975	563,115	6,836,090
2004	345,100	74,476	2,500	155,529		26,035	26,035	6,272,975	589,150	6,862,125
2005	345,100	74,476	2,500	152,398		33,017	33,017	6,272,975	622,167	6,895,142
2006	345,100	74,476	2,500	149,379		31,136	31,136	6,272,975	653,303	6,926,278
2007	345,100	74,476	2,500	146,181		30,919	30,919	6,272,975	684,222	6,957,197
2008	345,100	74,476	2,500	142,859		41,660	41,660	6,272,975	725,882	6,998,857
2009	345,100	74,476	2,500	139,911		37,473	37,473	6,272,975	763,355	7,036,330
2010	345,100	74,476	2,500	136,828		60,809	60,809	6,272,975	824,164	7,097,139
2011	345,100	74,476	2,500	134,255		31,482	31,482	6,272,975	855,646	7,128,621
2012	345,100	74,476	2,500	130,518		29,257	29,257	6,272,975	884,903	7,157,878
2013	345,100	74,476	2,500	126,583		49,396	49,396	6,272,975	934,299	7,207,274
2014	345,100	74,476	2,500	124,535		32,066	32,066	6,272,975	966,365	7,239,340
2015	345,100	74,476	2,500	121,846		44,726	44,726	6,272,975	1,011,091	7,284,066
2016	345,100	74,476	2,500	119,466		36,037	36,037	6,272,975	1,047,128	7,320,103
2017	345,100	74,476	2,500	117,056		31,602	31,602	6,272,975	1,078,730	7,351,705
2018	345,100	74,476	2,500	114,074		38,947	38,947	6,272,975	1,117,677	7,390,652
2019	345,100	74,476	2,500	110,571		29,648	29,648	6,272,975	1,147,325	7,420,300
2020	345,100	74,476	2,500	107,784		38,602	38,602	6,272,975	1,185,927	7,458,902
2021	345,100	74,476	2,500	104,123		28,759	28,759	6,272,975	1,214,686	7,487,661
2022	345,100	74,476	2,500	99,585		35,431	35,431	6,272,975	1,250,117	7,523,092
2023	345,100	74,476	2,500	95,130		31,458	31,458	6,272,975	1,281,575	7,554,550
2024	345,100	74,476	2,500	90,188		33,047	33,047	6,272,975	1,314,622	7,587,597
2025	345,100	74,476	2,500	85,385		38,765	38,765	6,272,975	1,353,387	7,626,362
2026	345,100	74,476	2,500	81,046		30,448	30,448	6,272,975	1,383,835	7,656,810
2027	345,100	74,476	2,500	75,894		38,231	38,231	6,272,975	1,422,066	7,695,041
2028	345,100	74,476	2,500	70,356		29,530	29,530	6,272,975	1,451,596	7,724,571
2029	345,100	74,476	2,500	64,837		36,394	36,394	6,272,975	1,487,990	7,760,965
2030	345,100	74,476	2,500	58,915		40,640	40,640	6,272,975	1,528,630	7,801,605
2031	345,100	74,476	2,500	52,762		30,445	30,445	6,272,975	1,559,075	7,832,050
2032	345,100	74,476	2,500	46,419		29,809	29,809	6,272,975	1,588,884	7,861,859
2033	345,100	74,476	2,500	39,415		28,446	28,446	6,272,975	1,617,330	7,890,305
2034	345,100	74,476	2,500	32,105		26,378	26,378	6,272,975	1,643,708	7,916,683
2035	345,100	74,476	2,500	24,453		30,767	30,767	6,272,975	1,674,475	7,947,450
2036	345,100	74,476	2,500	17,059		30,944	30,944	6,272,975	1,705,419	7,978,394
2037	345,100	74,476	2,500	10,557		32,812	32,812	6,272,975	1,738,231	8,011,206
2038	345,100	74,476	2,500	2,771		26,244	26,244	6,272,975	1,764,475	8,037,450
2039	345,100	74,476	2,500			31,100	31,100	6,272,975	1,795,575	8,068,550
2040	345,100	74,476	2,500			40,350	40,350	6,272,975	1,835,925	8,108,900
2041	345,100	74,476	2,500			28,309	28,309	6,272,975	1,864,234	8,137,209
2042	345,100	74,476	2,500			28,793	28,793	6,272,975	1,893,027	8,166,002
2043	345,100	74,476	2,500			39,636	39,636	6,272,975	1,932,663	8,205,638
2044	345,100	74,476	2,500			33,667	33,667	6,272,975	1,966,330	8,239,305
2045	345,100	74,476	2,500			54,584	54,584	6,272,975	2,020,914	8,293,889
2046	345,100	74,476	2,500			28,630	28,630	6,272,975	2,049,544	8,322,519
2047	345,100	74,476	2,500			26,854	26,854	6,272,975	2,076,398	8,349,373
2048	345,100	74,476	2,500			38,112	38,112	6,272,975	2,114,510	8,387,485
2049	345,100	74,476	2,500			26,810	26,810	6,272,975	2,141,320	8,414,295
2050	345,100	74,476	2,500			33,488	33,488	6,272,975	2,174,808	8,447,783
TOTALS	27,488,848	6,228,320	473,144	8,870,587	6,272,975	2,174,808	8,447,783			

12	13	14	15	16	17	18	19	20	21	22
						Irrigation Assistance				
		Allowable Unamortized Investment								
Amorti-zation	Unamortized Investment	Initial Project	Replace-ments	Total	Cumulative Amount in Service	Amorti-zation	Unamor-tized Amount	Allowable Unamor-tized Amount	Cumulative Surplus Revenues	Fiscal Year Ending June 30
659,371	2,343,717	3,003,088		3,003,088	401,440		401,440	401,440		
24,889	2,508,143	3,188,935	3,468	3,192,403	414,908		414,908	414,908		1972
3,508	2,909,457	3,589,990	7,235	3,597,225	414,908		414,908	414,908		1973
32,881	3,084,373	3,793,549	11,473	3,805,022	414,908		414,908	414,908		1974
47,326	3,531,382	4,278,398	20,953	4,299,351	442,167		442,167	442,167		1975
29,657	3,986,095	4,757,454	26,267	4,783,721	454,936		454,936	454,936		1976
30,068	4,057,502	4,851,008	34,188	4,885,196	466,377		466,377	466,377		1977
43,512	4,229,150	5,060,190	40,166	5,100,356	481,477		481,477	481,477		1978
48,635	4,422,291	5,293,968	48,164	5,342,132	503,500		503,500	503,500		1979
46,211	4,823,002	5,729,003	60,032	5,789,035	527,500		527,500	527,500		1980
43,287	4,916,225	5,857,408	68,126	5,925,534	543,688		543,688	543,688		1981
35,959	4,889,751	5,857,408	77,597	5,935,005	561,042		561,042	561,042		1982
38,805	4,904,191	5,900,123	88,124	5,988,247	591,534		591,534	591,534		1983
43,217	5,028,557	6,054,327	99,953	6,154,280	612,035		612,035	612,035		1984
51,314	5,108,235	6,169,143	112,378	6,281,521	646,159		646,159	646,159		1985
51,846	5,071,376	6,156,806	127,355	6,284,161	703,711		703,711	703,711		1986
47,861	5,037,124	6,146,601	140,795	6,287,396	711,801		711,801	711,801		1987
51,821	5,081,345	6,220,375	158,035	6,378,410	744,676		744,676	744,676		1988
58,537	5,047,777	6,196,680	172,881	6,369,561	772,226		772,226	772,226		1989
68,094	5,012,246	6,196,049	195,228	6,391,277	803,633		803,633	803,633		1990
71,681	4,962,564	6,189,295	217,197	6,406,492	834,707		834,707	834,707		1991
72,790	4,920,700	6,181,183	247,443	6,428,626	853,139		853,139	853,139		1992
74,818	4,867,371	6,168,517	268,859	6,437,376	869,806		869,806	869,806		1993
77,465	4,817,726	6,094,951	296,577	6,391,528	891,472		891,472	891,472		1994
79,977	4,773,291	6,060,038	331,838	6,391,876	909,307		909,307	909,307		1995
82,199	4,716,671	6,035,492	357,348	6,392,840	927,308		927,308	927,308		1996
74,231	4,673,835	6,004,336	388,421	6,392,757	936,309	10,735	925,574	925,574		1997
91,029	4,607,228	5,949,282	412,728	6,362,010	963,643		952,908	952,908		1998
94,260	4,541,371	5,904,261	440,746	6,345,007	982,976		972,241	972,241		1999
98,764	4,478,607	5,869,234	475,274	6,344,508	1,015,143		1,004,408	1,004,408		2000
91,178	4,414,653	5,828,712	501,900	6,330,612	1,039,810	9,977	1,019,098	1,019,098		2001
103,489	4,339,015	5,600,241	529,312	6,129,553	1,059,143		1,038,431	1,038,431		2002
106,350	4,261,060	5,567,948	553,543	6,121,491	1,075,810		1,055,098	1,055,098		2003
111,814	4,175,281	5,428,502	575,674	6,004,176	1,094,145	781	1,072,652	1,072,652		2004
115,726	4,092,572	5,373,759	603,308	5,977,067	1,110,812		1,089,319	1,089,319		2005
118,745	4,004,963	5,316,147	629,023	5,945,170	1,134,314		1,112,821	1,112,821		2006
121,943	3,913,939	5,022,761	654,226	5,676,987	1,157,315		1,135,822	1,135,822		2007
122,418	3,833,181	4,995,701	690,317	5,686,018	1,188,982	2,847	1,164,642	1,164,642		2008
121,937	3,748,717	4,823,762	721,423	5,545,185	1,211,315	6,276	1,180,699	1,180,699		2009
131,296	3,678,230	4,790,557	770,636	5,561,193	1,231,983		1,201,367	1,201,367		2010
133,869	3,575,843	4,574,589	794,190	5,368,779	1,251,983		1,221,367	1,221,367		2011
137,060	3,468,040	4,489,784	813,529	5,303,313	1,270,484	546	1,239,322	1,239,322		2012
105,525	3,411,911	4,261,706	854,097	5,115,803	1,289,318	36,016	1,222,140	1,222,140		2013
105,727	3,338,250	4,149,194	875,814	5,025,008	1,303,677	37,862	1,198,637	1,198,637		2014
109,940	3,273,036	3,982,303	908,491	4,890,794	1,314,534	36,338	1,173,156	1,173,156		2015
102,057	3,207,016	3,905,289	933,595	4,838,884	1,325,391	46,601	1,137,412	1,137,412		2016
113,307	3,125,311	3,716,256	953,174	4,669,430	1,336,248	37,761	1,110,508	1,110,508		2017
134,922	3,029,336	3,646,256	977,336	4,623,592	1,347,105	19,128	1,102,237	1,102,237		2018
105,989	2,952,995	3,549,256	992,104	4,541,360	1,362,499	51,564	1,066,067	1,066,067		2019
138,921	2,852,676	3,316,106	1,010,083	4,326,189	1,362,499	21,419	1,044,648	1,044,648		2020
153,089	2,728,346	3,125,825	1,019,924	4,145,749	1,362,499	10,912	1,033,736	1,033,736		2021
157,486	2,606,291	2,699,040	1,035,981	3,735,021	1,362,499	11,053	1,022,683	1,022,683		2022
166,848	2,470,901	2,320,141	1,047,461	3,367,602	1,362,499	6,146	1,016,537	1,016,537		2023
164,627	2,339,321	2,210,828	1,061,447	3,272,275	1,362,499	13,309	1,003,228	1,003,228		2024
157,648	2,220,438	1,637,149	1,074,997	2,712,146	1,362,499	25,091	978,137	978,137		2025
171,612	2,079,274	1,166,521	1,081,426	2,247,947	1,362,499	15,466	962,671	962,671		2026
189,954	1,927,551	1,166,521	1,086,849	2,253,370	1,362,499	2,276	960,395	960,395		2027
180,716	1,776,365	1,140,401	1,092,275	2,232,676	1,362,499	17,052	943,343	943,343		2028
198,657	1,614,102	741,942	1,097,109	1,839,051	1,362,499	4,630	938,713	938,713		2029
209,209	1,445,533	499,776	1,099,875	1,599,651	1,362,499		938,713	938,713		2030
204,224	1,271,754	264,567	1,103,465	1,368,032	1,362,499	11,138	927,575	927,575		2031
221,705	1,079,858	264,567	1,104,828	1,369,395	1,362,499		927,575	927,575		2032
228,709	879,595	199,852	1,105,194	1,305,046	1,362,499		927,575	927,575		2033
236,019	669,954	117,036	1,105,580	1,222,616	1,362,499		927,575	927,575		2034
233,344	467,377	37,601	1,105,653	1,143,254	1,362,499	10,327	917,248	917,248		2035
209,079	289,242	37,601	1,105,309	1,142,910	1,362,499	41,986	875,262	875,262		2036
246,126	75,928	37,601	1,105,060	1,142,661	1,362,499	11,441	863,821	863,821		2037
102,172		3,822	1,104,000	1,107,822	1,362,499	21,668	842,153	842,153	141,513	2038
31,100		3,822	1,103,839	1,107,661	1,362,499	25,260	816,893	816,893	353,277	2039
40,350		3,822	1,104,534	1,108,356	1,362,499	28,073	788,820	788,820	552,978	2040
28,309			1,103,472	1,103,472	1,362,499	19,008	769,812	769,812	773,785	2041
28,793			1,102,456	1,102,456	1,362,499	16,001	753,811	753,811	997,115	2042
39,636			1,101,513	1,101,513	1,362,499	35,966	717,845	717,845	1,189,637	2043
33,667			1,106,670	1,106,670	1,362,499	20,501	697,344	697,344	1,403,593	2044
54,584			1,099,944	1,099,944	1,362,499	34,124	663,220	663,220	1,583,009	2045
28,630			1,099,337	1,099,337	1,362,499	28,335	634,885	634,885	1,794,168	2046
26,854			1,098,884	1,098,884	1,362,499	8,090	626,795	626,795	2,027,348	2047
38,112			1,098,502	1,098,502	1,362,499	21,834	604,961	604,961	2,235,526	2048
26,810			1,098,224	1,098,224	1,362,499	22,834	582,127	582,127	2,454,006	2049
33,488			1,098,032	1,098,032	1,362,499	27,334	554,793	554,793	2,661,308	2050
8,447,783						807,706				

FINANCIAL STATEMENTS



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

December 30, 1971

B-114858

Dear Mr. Secretary:

The General Accounting Office has examined the Statement of Assets and Liabilities of the Commercial Power Program of the Federal Columbia River Power System (see note 1 to the financial statements) as of June 30, 1971, and the related Statements of Commercial Power Revenues and Expenses and Source and Application of Funds for fiscal year 1971. 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.

On February 9, 1971, the Los Angeles earthquake severely damaged the Sylmar Converter Station owned by several public and private agencies in Los Angeles, California. The damaged Sylmar facility has temporarily made inoperable Bonneville's Celilo Converter Station and 800- kilovolt direct-current line which runs to the southern Oregon border. Bonneville anticipates that its facilities, which cost $74,000,000, will resume 40-percent operation in April 1972 and 100-percent operation in September 1972.

The accompanying financial statements for the System were prepared on a cost-accounting basis which included depreciation. They 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 2 to the financial statements.)

The accounts and financial statements are subject to retroactive adjustment, because firm allocations of the cost of joint-use facilities to power and other purposes have not been made for three projects recently placed in service and for five projects under construction as of June 30, 1971. (See note 3 to the financial statements.) At these eight projects, total joint-use costs are $934,000,000, of which $731,000,000 tentatively is allocated to power. Changes in allocations sometimes have resulted in significant adjustments to plant investment allocated to power and to accumulated net revenues.

The Bonneville Power Administration, in computing interest expense on the Government's investment in the System, reduces the amount by an interest credit on System revenues collected and deposited in the U.S. Treasury. In our opinion, Bonneville's method of computing the interest credit was inappropriate and resulted in an understatement of about $2,000,000 in the interest expense for fiscal year 1971 because the interest credit was computed (1) at the rate of 4⅞ percent applicable to new investments rather than at the lower rates—some as low as 2½ percent—at which the interest expense was computed and (2) on the full amount of the revenues deposited rather than on the amount applied to reduce the Government's investment in the System.

Subject to the financial effects of future adjustments related to adoption of firm cost allocations and the resolution of the interest credit matter described above, the accompanying financial statements, in our opinion, present fairly the assets and liabilities of the Federal Columbia River Power System at June 30, 1971, the financial results of its power operations, and the source and application of its funds 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,

E. H. Morse, Jr.

Acting Comptroller General
of the United States

Enclosures

The Honorable
The Secretary of the Interior

Interior Secretary Rogers C. B. Morton at Trojan nuclear power plant construction site.

EXHIBIT 1

UNITED STATES OF AMERICA
FEDERAL COLUMBIA RIVER POWER SYSTEM

STATEMENT OF COMMERCIAL POWER REVENUES AND EXPENSES
FOR THE FISCAL YEARS ENDED JUNE 30, 1971 AND JUNE 30, 1970
(NOTES 1 AND 2)

(In thousands)

	Fiscal Year 1971	Fiscal Year 1970
OPERATING REVENUES:		
Sales of electric energy by Bonneville Power Administration:		
Publicly owned utilities	$ 64,078	$ 58,420
Privately owned utilities	25,121	20,319
Federal agencies	5,403	4,090
Aluminum industry	40,058	44,614
Other industry	5,361	5,449
Total	140,021	132,892
Other operating revenues:		
Wheeling revenues	10,386	9,507
Other revenues	5,271	5,281
Total	15,657	14,788
Total operating revenues	155,678	147,680
OPERATING EXPENSES:		
Purchase and exchange power	12,813	11,468
Operation	29,680	26,022
Maintenance	14,802	13,373
Depreciation	24,512	21,645
Total operating expenses	81,807	72,508
Net operating revenues	73,871	75,172
INTEREST AND OTHER DEDUCTIONS: (Note 4)		
Interest on Federal investment (projects in service)	67,742	57,258
Related interest charged to construction	8,603*	6,896*
Miscellaneous income deductions, net	105	98
Net interest and other deductions	59,244	50,460
NET REVENUES	$ 14,627	$ 24,712
ACCUMULATED NET REVENUES:		
Balance at beginning of year	$346,388	$322,584
Net revenues—current year	14,627	24,712
Prior years adjustments (Note 9)	9,423*	908*
Balance at end of year	$351,592	$346,388

*Denotes deduction

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

UNITED STATES OF AMERICA
FEDERAL COLUMBIA RIVER POWER SYSTEM

STATEMENT OF ASSETS AND LIABILITIES OF THE COMMERCIAL POWER PROGRAM AS OF JUNE 30, 1971 AND JUNE 30, 1970 (NOTES 1 AND 2)

(In thousands)

ASSETS

	June 30 1971	June 30 1970
FIXED ASSETS:		
Completed plant (Schedule A)	$2,927,283	$2,749,012
Retirement work in progress	20,049	28,235
	2,947,332	2,777,247
Less accumulated depreciation	253,375	235,997
	2,693,957	2,541,250
Construction work in progress (Schedule A)	826,497	673,421
Total fixed assets	3,520,454	3,214,671
CURRENT ASSETS:		
Unexpended funds	89,094	112,242
Special funds	6,500	2,202
Accounts receivable	29,182	23,897
Materials and supplies	17,056	17,582
Total current assets	141,832	155,923
DEFERRED CHARGE FOR PAYMENT OF IRRIGATION ASSISTANCE (Schedule A) (Note 6)	401,440	390,466
OTHER ASSETS AND DEFERRED CHARGES:		
Trust funds	6,218	6,099
Other assets and deferred charges	4,663	4,303
Total other assets and deferred charges	10,881	10,402
TOTAL ASSETS	$4,074,607	$3,771,462

*Denotes deduction

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

LIABILITIES

	June 30 1971	June 30 1970
INVESTMENT OF U.S. GOVERNMENT:		
Congressional appropriations	$4,181,368	$3,846,213
Revenues transferred to continuing fund	4,033	4,033
Transfers from other Federal agencies, net	27,983	27,764
Interest on Federal investment (Note 4)	857,647	776,287
Gross Federal investment	5,071,031	4,654,297
Less funds returned to U.S. Treasury	1,822,167	1,690,018
Net investment of U.S. Government	3,248,864	2,964,279
ACCUMULATED NET REVENUES:		
Balance at beginning of year	346,388	322,584
Net revenues—current year (Exhibit 1)	14,627	24,712
Prior years adjustments (Note 9)	9,423*	908*
Balance at end of year	351,592	346,388
COMMITMENTS (Note 7)		
CURRENT LIABILITIES:		
Accounts payable	57,153	55,832
Employees accrued leave (Note 5)	4,890	4,336
Total current liabilities	62,043	60,168
LIABILITY OF U.S. GOVERNMENT FOR PAYMENT OF IRRIGATION ASSISTANCE (Schedule A) (Note 6)	401,440	390,466
OTHER LIABILITIES AND DEFERRED CREDITS:		
Trust fund advances	6,218	6,099
Other deferred credits	4,450	4,062
Total other liabilities and deferred credits	10,668	10,161
TOTAL LIABILITIES	$4,074,607	$3,771,462

EXHIBIT 3

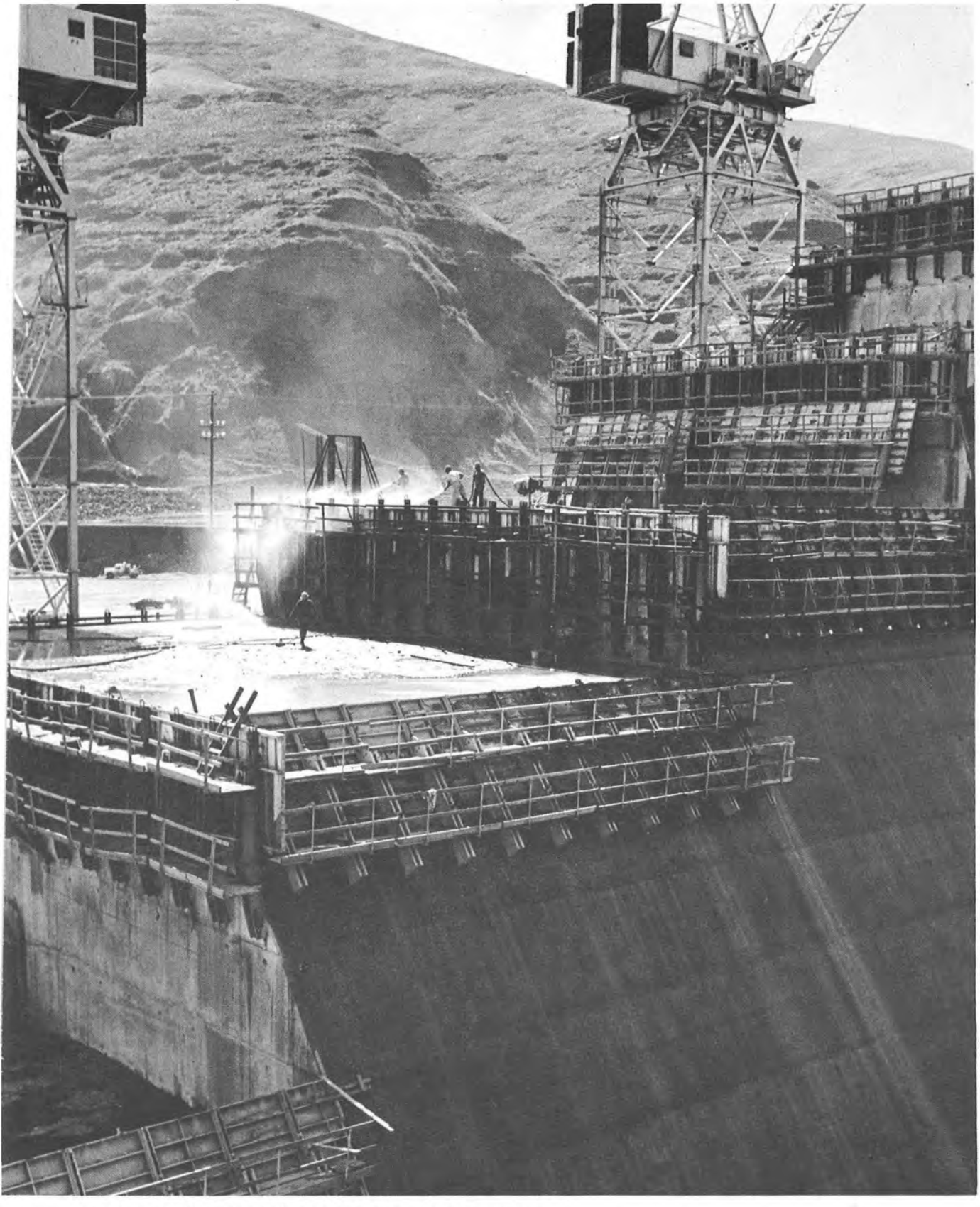
UNITED STATES OF AMERICA
FEDERAL COLUMBIA RIVER POWER SYSTEM

STATEMENT OF SOURCE AND APPLICATION OF FUNDS OF COMMERCIAL POWER PROGRAM FOR FISCAL YEAR ENDING JUNE 30, 1971 (NOTES 1 AND 2)

(In thousands)

SOURCE OF FUNDS:		
Congressional appropriations	$335,155	
Transfers from other Federal agencies	219	
Gross investment		$335,374
Revenue from sale of electric energy, including adjustment for prior year of $742	140,763	
Other operating revenue, including adjustment for prior year of $148	15,805	
Total revenues		156,568
Decrease in other assets and deferred charges, net of other liabilities and deferred credits		28
Decrease in current assets and liabilities, net		15,966
Total source of funds		$507,936
APPLICATION OF FUNDS:		
Operation and maintenance expense, purchase and exchange power, miscellaneous income deductions and adjustments for prior years of $39		$ 57,361
Investment in electric utility plant (does not include capitalized interest of $8,603 on projects in service and $12,433 on projects under construction)		318,426
Return of funds to U.S. Treasury		132,149
Total application of funds		$507,936

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



Lower Granite Dam under construction on Snake River.

UNITED STATES OF AMERICA
FEDERAL COLUMBIA RIVER POWER SYSTEM

AMOUNT AND ALLOCATION OF PLANT INVESTMENT
AS OF JUNE 30, 1971 (NOTES 1 AND 3)
PROJECTS IN SERVICE AND UNDER CONSTRUCTION

(In thousands)

		ALLOCATED TO:											
		COMMERCIAL POWER			IRRIGATION (NOTE 6)			NONREIMBURSABLE					
Project	Total	Completed Plant	Construction Work in Progress	Total	Returnable from Commercial Power Revenues	Returnable from Other Sources	Total Irrigation	Navigation	Flood Control	Fish and Wildlife	Recreation	Other	Percent of Total Returnable from Commercial Power Revenues
Projects in Service													
Transmission facilities (BPA)	$1,224,490	$1,068,807	$155,683	$1,224,490									100.0
Albeni Falls (CE)	32,882	31,903		31,903				$ 134	$ 173		$ 672		97.0
Boise (BR)	65,613	4,901	3	4,904	$ 10,722	$ 35,026	$ 45,748		14,961				23.8
Bonneville (CE)	96,028	61,687	6,064	67,751				28,121			156		70.6
Chief Joseph (CE)	157,639	154,830	1,826	156,656	765		765				218		99.9
Columbia Basin (BR)	762,600	180,357	130,908	311,265	336,158	68,033	404,191	1,000	45,605			$ 539	84.9
Cougar (CE)	57,227	17,671	5	17,676		3,082	3,082	514	35,955				30.9
Detroit-Big Cliff (CE)	66,392	40,368	5	40,373		5,029	5,029	218	20,772				60.8
Green Peter-Foster (CE)	87,062	49,030		49,030		6,056	6,056	357	29,569		380	1,670	56.3
Hills Creek (CE)	48,767	17,302	5	17,307		4,584	4,584	625	26,251				35.5
Hungry Horse (BR)	102,226	77,477	76	77,553				24,673					75.9
Ice Harbor (CE)	139,638	93,893	1,006	94,899				43,746			993		68.0
John Day (CE) (c)	487,105	333,933	26,991	360,924				81,496	13,960		4,429	26,296 (a)	74.1
Little Goose (CE) (c)	160,270	111,281	1	111,282				44,869			466	3,653 (a)	69.4
Lookout Point-Dexter (CE)	94,633	45,574	143	45,717		1,412	1,412	706	46,601		197		48.3
Lower Monumental (CE) (c)	188,051	141,150	30	141,180				45,837			1,034		75.1
McNary (CE)	308,126	256,565	71	256,636				50,721			769		83.3
Minidoka (BR)	37,047	2,583	42	2,625		34,100	34,100				28	294	7.1
Palisades (BR)	59,930	10,726	2	10,728	10,013	9,345	19,358		29,700		144		34.6
The Dalles (CE)	291,957	222,648	26,730	249,378				41,797			760	22	85.4
Yakima (BR)	63,675	4,597	12	4,609	10,235	47,679	57,914			$1,152			23.3
Projects under Construction (c)													
Dworshak (CE)	217,395		196,899	196,899				6,924	12,125		1,447		90.6
Libby (CE)	282,670		213,557	213,557					52,921			16,192 (a)	75.5
Lost Creek (CE)	14,981		1,447	1,447		268	268		6,537	2,830	2,892	1,007	9.7
Lower Granite (CE)	82,615		64,033	64,033				18,406			81	95 (a)	77.5
Teton (BR)	4,082		958	958	2,001	598	2,599		483		42		72.5
Irrigation Assistance at 11 Projects Having no Power Generation	30,687				30,687		30,687						100.0
Subtotal plant investment	5,163,788	2,927,283	826,497	3,753,780	400,581	215,212	615,793	390,144	335,613	3,982	14,708	49,768	80.5
Repayment obligation retained by Columbia Basin Project (b)	2,211	1,352		1,352	859		859						100.0
Total	$5,165,999	$2,928,635	$826,497	$3,755,132	$401,440	$215,212	$616,652	$390,144	$335,613	$3,982	$14,708	$49,768	80.5

BPA—Bonneville Power Administration
CE—Corps of Engineers
BR—Bureau of Reclamation

(a) Nonreimbursable road costs.
(b) Joint facilities transferred to Bureau of Sport Fisheries and Wildlife. Power portion is included in the Balance Sheet as a Deferred Item.
(c) Projects in service that have tentative cost allocations at June 30, 1971. Projects under construction have tentative cost allocations (Note 3).

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

UNITED STATES OF AMERICA

FEDERAL COLUMBIA RIVER POWER SYSTEM

NOTES TO THE FINANCIAL STATEMENTS

Note 1. Composition of the Federal Columbia River Power System

The Federal Columbia River Power System (FCRPS) consists of the facilities and operations of the Bonneville Power Administration (BPA) and the hydro-electric generating plants constructed and operated by the Corps of Engineers (Corps) or the Bureau of Reclamation (Bureau) for which BPA transmits and markets the power.

Although each entity is separately managed and financed, the facilities are operated as an integrated power system with the financial results consolidated under the name Federal Columbia River Power System.

Projects in service and under construction at June 30, 1971, are listed in Schedule A.

Note 2. Basis of Financial Reporting

These financial statements are prepared on the cost accounting basis and include compound interest depreciation. They do not purport to show financial results on a repayment basis either for the fiscal year or cumulatively. Wholesale power rates are based upon the repayment analysis rather than these cost based statements.

The depreciation life for fixed assets allocated to power averages about 71 years. However, in the separate FCRPS repayment analysis the repayment period is 50 years for the generating projects and 45 years for the transmission system. Since the depreciation period is longer than the repayment period, depreciation charges accumulated during the repayment periods will be much less than the plant repayment requirements, and rates set to cover repayment will be higher on the average than if rates were set to cover depreciation.

Note 3. Cost Allocations

"Cost allocation" describes the process of assigning the costs of a multi-purpose project to the individual purposes served. In this process, joint-use costs of plant and operations are allocated among the purposes served such as power, irrigation, navigation, and flood control. The portion of total project costs allocated to power is included in the FCRPS financial statements.

Cost allocations may be tentative or firm. A tentative cost allocation may be adjusted retroactively when replaced with a firm allocation, while a firm allocation may only be adjusted on a prospective basis. During fiscal year 1971 the Corps adopted a firm allocation for the Green Peter-Foster project. The firm allocation increased plant costs allocated to power about $2,026,000 and decreased Accumulated Net Revenues by about $198,000. Cost allocations at three projects recently placed in service and five projects now under construction are designated as tentative as shown on Schedule A. At the eight projects, total joint-use costs are $934,000,000 of which $731,000,000 are tentatively allocated to power.

Note 4. Interest Rates

An interest rate of 2½% is applied to the unpaid Federal investment for the projects listed in Schedule A, except for the following which use a higher rate. Bureau projects in service, all using a 3% rate, are: Boise, Columbia Basin, Hungry Horse, Minidoka, Palisades, and Yakima-Roza

Division. For Bureau projects under construction, a rate of 3⅛% is applied to the Grand Coulee Third Powerplant and 3.342% is applied to the Teton project. Corps projects and portions thereof which are under construction and which use rates higher than 2½% are:

Bonneville Second Power House and Peaking Modifications	3¼%
Chief Joseph Additional Units	3⅛%
Dworshak	2⅝%
Libby	3⅛%
Lost Creek	3⅛%
The Dalles Additional Units	3⅛%

BPA used the 2½% rate through fiscal year 1963. Subsequently, the following rates were used for each year's new investment:

Fiscal Year 1964	2⅞%
Fiscal Year 1965	3%
Fiscal Years 1966 through 1968	3⅛%
Fiscal Years 1969 and 1970	3¼%
Fiscal Year 1971	4⅞%

Interest rates for repayment of new Federal investment in power projects started after January 29, 1970 are to be set in accordance with Secretarial Order 2929. This Order directs that rates will be adjusted by not more than one-half of one percent each year until the rate equals the then current average yield rate on long-term U.S. Treasury obligations. The rate is 6⅛% at June 30, 1971.

Based upon the Order, BPA used a rate of 4⅞% for new investment in fiscal year 1971, and will use rates on new investment of 5⅜% in fiscal year 1972 and 5⅞% in fiscal year 1973. At June 30, 1971, the Corps and the Bureau were in the process of resolving implementing details.

Note 5. Variations in Practice Among Reporting Entities

The entities of FCRPS each maintain a separate accounting system designed to meet its particular requirements, and variations in reporting practices exist among the entities. However, cooperation among the entities in prior years has led to the adoption of standard practices such as use of the compound interest method of depreciation. The unresolved variations existing during fiscal year 1971 are as follows:

a. The Bureau includes in the costs of its projects, general investigation and development costs which are incurred prior to project authorization. It is the policy of the Corps not to include for FCRPS purposes such costs which are incurred prior to project authorization. The Corps has excluded about $2,123,000 of such costs at June 30, 1971.

b. The accounts of the Corps and BPA reflect the liability for accrued but unused annual leave. However, the accounts of the Bureau projects do not include an amount for annual leave, estimated to be $754,000 as of June 30, 1971.

Note 6. Repayment Responsibility for Irrigation Costs

Pursuant to legislation, revenues of the FCRPS must repay to the United States Treasury that portion of the cost of irrigation facilities in the Pacific Northwest which the Bureau has determined that benefiting water users are unable to repay. At June 30, 1971, this amount is $401,440,000.

Joint project costs of $20,431,000 for the Cougar, Detroit-Big Cliff, Hills Creek, Lookout Point-Dexter, Green Peter-Foster and Lost Creek Projects have been allocated to irrigation pursuant to project authorizations. A determination of water users' repayment ability will be made at the time the irrigation facilities are proposed for authorization and development. If water users' repayment ability is insufficient to meet the repayment requirements, irrigation assistance may be required from power revenues if authorized by Congress. These costs are not included in the accompanying statements because a final determination as to potential repayment from power revenues has not been made.

Note 7. Commitments to Exchange Power and Acquire Project Capability

a. Hanford Plant No. 1

BPA, the Washington Public Power Supply System (WPPSS), and 76 utilities have made agreements under which BPA receives the capability of this 860 megawatt plant constructed and operated by WPPSS. The agreements call for payments to WPPSS by each utility for its portion of project costs based on the Annual Operating Budget. All output from the project is delivered to BPA who in turn furnishes the utilities an amount of power equal in value, at BPA rates, to the annual costs of operating the project and retiring the bonds issued in 1963 to construct the plant. For the year ending June 30, 1971, the Annual Operating Budget was $9,395,000. At June 30, 1971, $78,145,000 of bonds were outstanding and due to be fully retired by 1996. Until 1996, BPA is required to provide power to retire the bonds even if the plant becomes inoperable. The Government may acquire ownership of the plant, subject to Congressional approval.

During fiscal year 1971, the Atomic Energy Commission (AEC) nuclear reactor which supplied steam to the WPPSS project was shut down. Since then, agreements were reached with AEC restoring the reactor to service for fiscal years 1972, 1973, and 1974 with increased payments for steam. For the year ending June 30, 1972, it is estimated that the agreements to restore the reactor to service will increase the Annual Operating Budget by $15,000,000 over the 1971 amount. According to the new agreements, BPA and WPPSS must decide, during fiscal year 1972, whether or not to continue operating the project after June 30, 1974.

b. Columbia Storage Power Exchange (CSPE)

BPA has entered into agreements with 41 utilities to exchange an agreed amount of power for their rights to the Canadian Entitlement, which is one-half of the additional power benefits realized at U.S. generating plants as a result of construction of three Canadian Treaty storage dams. The Canadian Entitlement was purchased by the utilities from CSPE, a nonprofit corporation, for a period of thirty years following scheduled completion of each dam. The transaction was handled through a $314.1 million bond issue which the utilities are repaying through CSPE.

BPA's commitment to the 41 utilities is unconditional and not contingent upon the actual extra generation realized. Two of the Canadian dams were completed ahead of schedule, and the third is on schedule for completion in 1973.

c. Centralia Coal-Fired Steam Plant

BPA has entered into an agreement with eight utilities to acquire varying portions of project capability ranging from 273 megawatts to 973 megawatts from the in-service dates scheduled for January 1, 1972, for Unit I and September 1, 1972, for Unit II to April 1, 1974. BPA's portion of total project costs for the total period is estimated at $58,110,000. After each unit is commercially operable, BPA's commitment will remain whether or not full capability can be achieved.

d. Trojan Nuclear Plant

BPA has entered into agreements to acquire, beginning approximately September 1, 1974, a share of this 1,163 megawatt project, under construction by Portland General Electric Company. BPA will acquire Eugene Water and Electric Board's 30% ownership share until at least July 1, 1984. Effective on that date, Eugene has the option to withdraw its share. For the ten year period this share of project capability will cost BPA about $103,310,000 based on estimated annual project costs. Until July 1, 1984, BPA is committed to 30% of annual costs whether or not the plant is completed, operable, or operating.

e. Hanford Plant No. 2

BPA has entered into agreements with WPPSS and 94 public agency customers to acquire the capability of this 1,100 megawatt nuclear facility, which will be constructed and operated by WPPSS. The plant is scheduled for commercial operation in 1977.

During the estimated 35 year life of the project, BPA's total costs are estimated to be $1,497,770,000. BPA is obligated under the agreements whether or not the project is completed, operable, or operating.

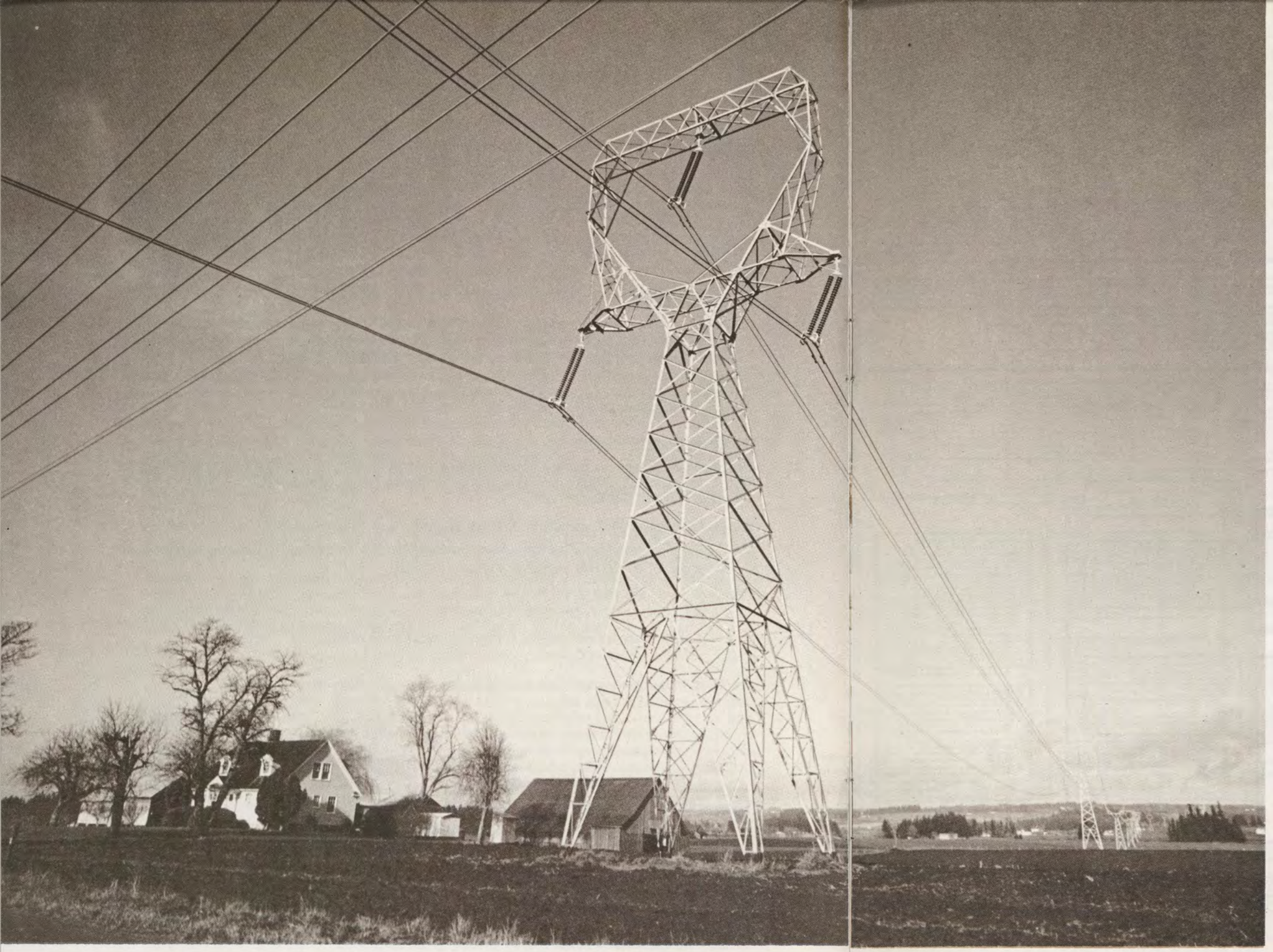
Note 8. Contingent Liabilities

Contingent liabilities applicable to commercial power at June 30, 1971, total approximately $19,196,000 of which $16,072,000 represent various contractor claims and $3,124,000 represent claims under the Federal Tort Claims Act.

Note 9. Adjustments to Accumulated Net Revenues

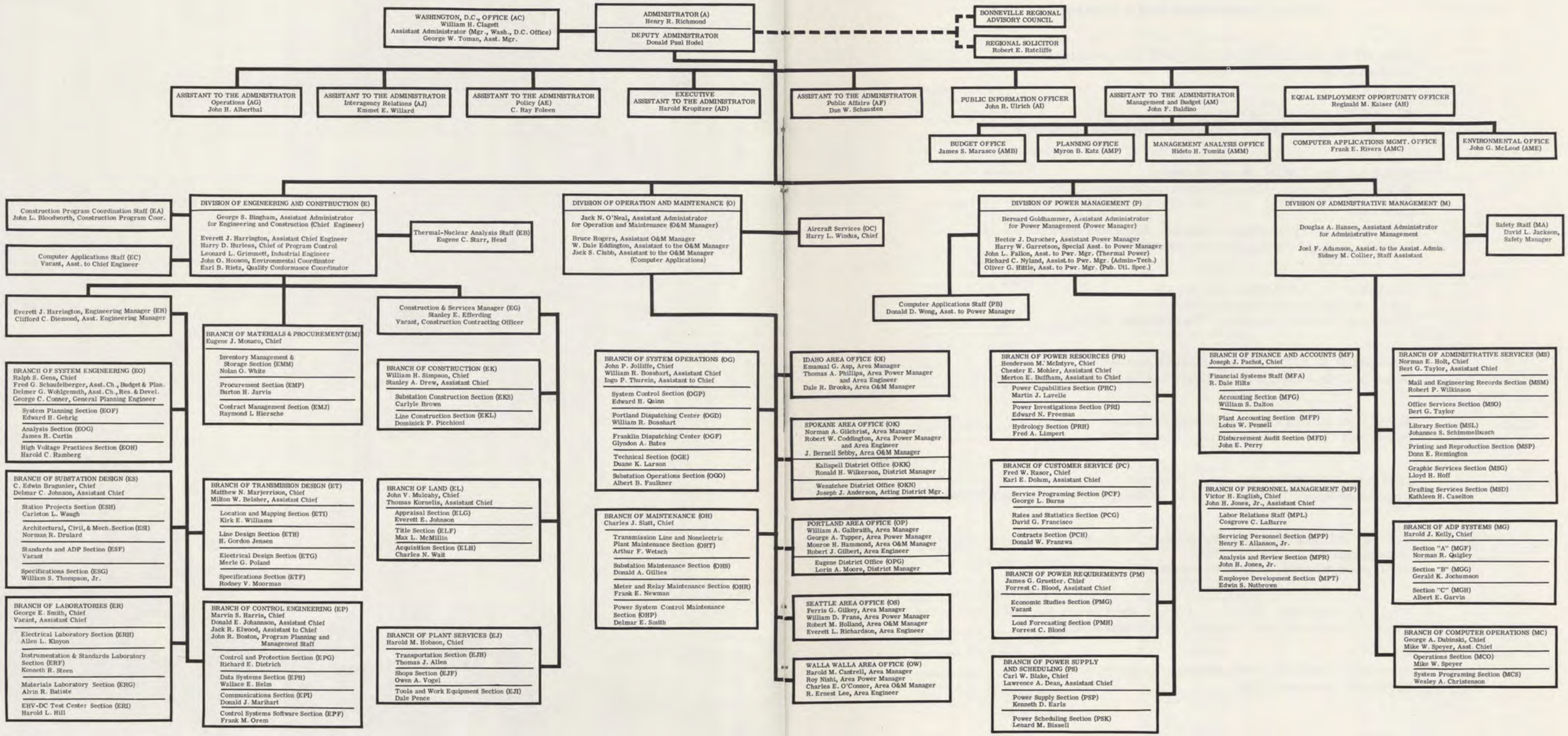
The following table explains the adjustments which have caused the net decrease in Accumulated Net Revenues of $9,423,000 shown in Exhibits 1 and 2:

	In Thousands
1. Extraordinary retirements caused by construction of Third Power Plant at Columbia Basin Project	$(5852)
2. Extraordinary retirement of special repair equipment at Columbia Basin Project	(3345)
3. Correction of Lower Monumental Project prior years interest expense	(1301)
4. Prior year revenues recognized as part of exchange account settlement	890
5. Decrease in prior years expenses for Chief Joseph Project due to adoption of sub-allocation to irrigation pumping power	366
6. Increase in prior years expenses for Green Peter-Foster Project due to adoption of firm cost allocation	(198)
7. Miscellaneous minor adjustments	17
	$(9423)



BPA MANAGEMENT & ASSOCIATED GROUPS

BPA ORGANIZATION CHART



U.S. DEPARTMENT OF THE INTERIOR
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The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a quality environment and a better United States --- now and in the future.