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Northwest Power Planning Council



Inside: Coal and Nuclear in the Northwest?

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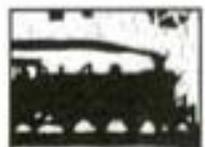
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Editor's Notes

In our last issue, we ran a story that described how power planners and others draw estimates of the coming season's runoff from measurements of snowpack in the mountains. With these estimates, they can determine the likely power production from the region's system of hydropower dams. We credited the National Weather Service with measuring snowpack and gauging the moisture content of the snow. As it turns out, the Weather Service is only one of a cooperative team that supplies such data to managers of the Northwest's hydropower system and others.

When the issue hit the desk of David Johnson, snow survey program manager at the U.S. Department of Agriculture's Soil Conservation Service, he quickly called to let us know that his agency, not the National Weather Service, actually coordinates the snow surveys, "and we're proud of what we do."

Our apologies to the Soil Conservation Service for overlooking its role in this important process.

This issue's cover illustration is by Frank Farah.

Efficiency
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Prevails
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Efficiency

by Carlotta Collette

When last year's cold snap tested the Northwest, efficient houses saved the region \$7 million in seven weeks.

Remember last year about this time? Say, mid-January? It was cold, colder than usual for winter in the Pacific Northwest. Then came the "Siberian Express," the February chill that put the Northwest's electrical power system to the test and nearly toppled it.

One major power line between the Northwest and California *was* toppled. The day before the real chill hit, one of the region's two

operating nuclear power plants went down. The region's generally reliable hydropower system had just come out of two years of record drought, and river flows were still only 60 percent of normal.

Coal, gas and oil-fired power plants that had been idled for years were fired up to meet power demands that grew daily. Treacherous cold outside prompted people to turn their heat up inside. Electrical loads jumped. Every Northwest utility, including the Bonneville Power Administration,

experienced record peaks in demand for electricity. It was a manifestation of Murphy's Law, with one exception. The region's investment in conservation paid off.

When Bonneville was most strapped for power, the 237,000 weatherized existing homes and 7,000 new, single-family houses built to meet the Northwest Power Planning Council's model conservation standards were quietly shaving nearly 200 megawatts off the top of the mountain of demand. Had Bonneville been

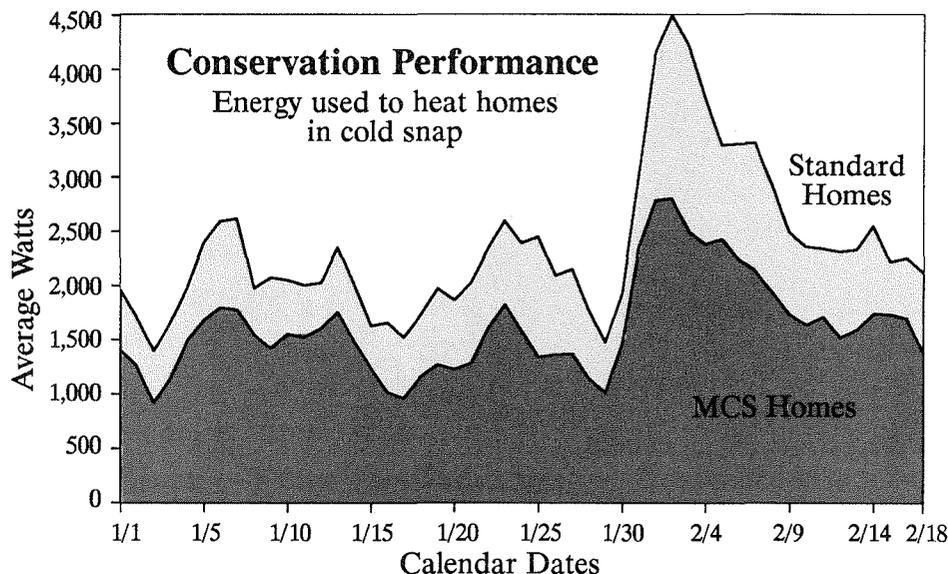
forced to purchase that electricity during the seven-week freeze, it would have cost at least \$7 million. (The \$7 million figure is based on an average kilowatt-hour cost of between 2 cents and 3 cents. The price Bonneville actually paid during the freeze varied with different markets at different times.)

There are at least three parts to this story: conservation's ability to reduce power demands during peak periods, the energy savings themselves, and the fact that Bonneville could so precisely meter those savings.

The savings illustrate the reliability of conservation as a means of holding down the region's peak, or most concentrated, energy use. The problem peaking power use poses for utilities and other power marketers is that they must have access to enough resources to meet this uppermost level of energy use, even if the demand is rare.

"The Northwest doesn't usually have a problem meeting peak electricity demands because of our enormous hydropower resource," explained Ed Sheets, executive director of the Northwest Power Planning Council, "But other region's find they have to fire up their most expensive thermal generating plants when loads are at their peak. We've known conservation saves energy. What we didn't know until now is how much conservation also reduces demand at peak times. Our energy savings during this crunch amounted to a reduction approaching the output of a new, small coal plant."

The February freeze pressed Bonneville and several of the region's utilities into delivering more electricity than at any other



time in history. That load, coupled with the untimely power line and generating plant failures, taxed the system and compelled even Bonneville to buy power to meet its requirements.

The agency paid a premium for the power it purchased. At one point during the snap, Bonneville paid up to 10 cents per kilowatt-hour. Without the energy savings, that power bill would have been considerably higher. In fact, as the weather got colder, and power use in general increased, energy *savings* in model standards houses actually increased, too.

A further finding from the cold snap monitoring was the surprising fact that the metered model standards houses were kept warmer than measured houses that did not meet the standards, even though the cooler houses required 2 kilowatts on average more each day. Indoor temperature readings in the efficient houses ranged from about 69 degrees Fahrenheit to nearly 72 degrees. The base-case houses, whose furnaces were going full bore throughout the seven-week period, only achieved indoor temperatures that ran from 66 de-

grees to just over 69 degrees. Hence, residents in those homes were paying more and still wearing thicker sweaters than their efficient neighbors.

Bonneville was able to decipher these savings because of its End-Use Load and Consumer Assessment Project's (ELCAP) task-specific metering results in a sampling of efficient and conventional houses. Since 1982, the agency has been tracking its conservation efforts to verify the programs' effectiveness. The costs of making homes more efficient have been compared with the benefits.

But last year, that monitoring, including readings from devices in new and retrofit homes, provided the region with important, new insights. Rich Gillman, whose section at Bonneville first organized the cold-snap data, said that this "was the first time we've been able to follow energy use on such a micro-level when the region was in a power crisis."

Ken Keating, manager of program evaluations at Bonneville, concurred. "When the going got rough for the power system, our investment in conservation paid even higher dividends." ■■

Will Coal Ride The Region's Resource Rails?

by Gordon Lee

Can the Northwest add more coal cars to its energy resource train?

These days, as acid rain and global warming hit the headlines almost daily, new coal-fired electric plants may be a near-taboo subject to many people in the United States.

But at the Northwest Power Planning Council, which this fall released a staff study of coal-fired generation's potential place in the region's energy picture in the next 20 years, building new coal-fired plants has become a topic of lively debate. That debate likely will color the Council's deliberations as it prepares a new regional power plan in 1990.

In suggesting one of many potential paths along which new coal-fired plants might be developed in the Pacific Northwest, the study is the latest refinement in

evaluating possible resources for the region. The study proposes that energy experts in the Northwest revise old planning approaches to coal-fired electric plants in favor of a new set of planning assumptions that might give a truer picture of the costs and issues involved in developing that resource.

Even with these new assumptions, coal remains the resource of last resort for the Pacific Northwest, according to Jim Litchfield, power planning director at the Council. As outlined in past regional power plans, Northwest utilities should be able to obtain electricity first from a host of smaller, more flexible and less expensive resources they could build much more quickly. Those plans didn't envision the region ever turning to coal-fired power

under the most likely demand conditions. Rather, the plans used coal to set the price below which other resources were economically competitive. The Council included in previous resource portfolios only resources that met or beat the price of coal. The new study suggests that the Council continue this strategy, and that coal remain an economic benchmark against which the region should measure the cost of other resources.

The new assumptions in the study could help the Council more accurately gauge that benchmark, Litchfield says. "What we want to avoid is either underestimating or overestimating the costs of coal."

The study acknowledges that developing coal-fired plants would involve increased environ-

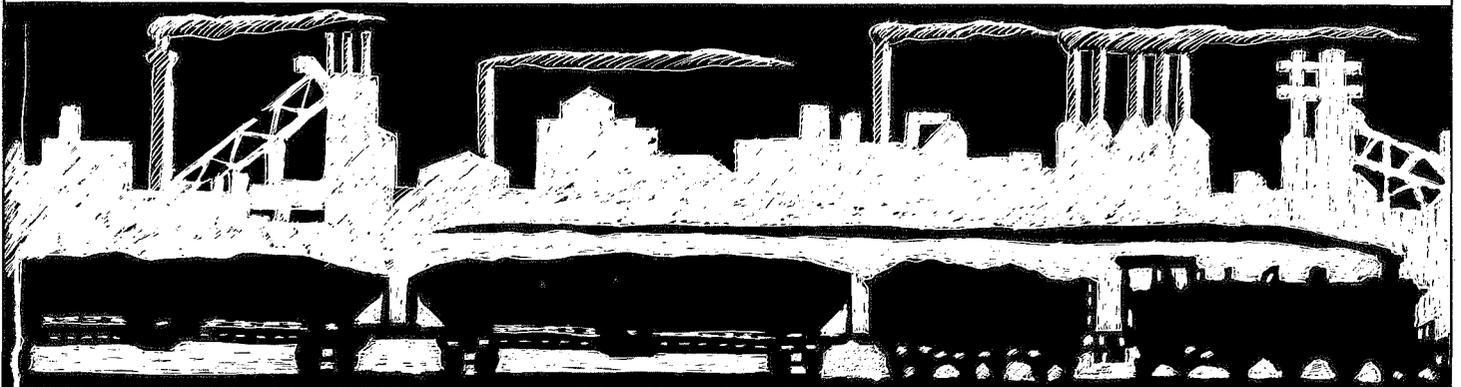


Illustration by Lyn Nance

mental and social costs over most other resources in the plan. But it also recognizes that, under certain high-demand conditions, bearing those costs may be unavoidable. In that unlikely case, coal could play a part in the region's mix of energy supplies.

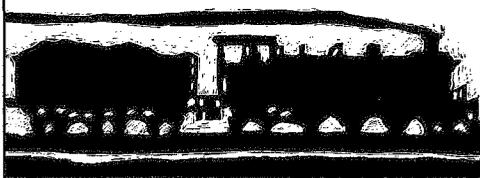
In one sense, the Council staff's finding is nothing new. The Pacific Northwest for years has looked to coal as its resource of last choice. While the four-state region is quick to boast that nearly three-quarters of its electricity is clean, inexpensive hydropower, coal also is part of its energy picture. The Northwest power system today receives some 3,150 megawatts of energy from 13 coal-fired units within and outside the region, a supply equal to about 20 percent of the region's energy demand in 1988.

If the region experiences conditions of high growth in energy demand, it would exhaust available new hydropower and other alternatives, including conservation. In that case, according to forecasts the Council used in its 1989 Supplement to the 1986 Northwest Power Plan and in previous plans, the Northwest could have to turn to coal-fired power to meet its energy needs.

But what's new in the Council staff study is the suggestion that coal's role in the region's energy picture may be changing. Gone may be the days when utilities could expect to turn to coal to supply unlimited amounts of electricity to meet high energy demand.

That especially may be the case if states or the federal government pass laws further regulating levels of pollution that power plants can emit. If such restrictions place a lid on the

The Pacific Northwest for years has looked to coal as its resource of last choice.



amount of sulfur oxides, nitrogen oxides and other products of combustion that coal plants could release, that may limit the amount of electricity from coal the region could obtain in the next 20 years. At the same time, stricter pollution rules might spur utilities to move away from traditional coal-generation technologies toward new, smaller, more efficient and cleaner methods of producing coal-fired electricity.

What this adds up to is that coal's role in meeting the region's energy needs in the first part of the next century won't be the same as energy planners assumed in the 1980s, says Litchfield. "It's clear that in the 1990s we may be approaching a point where we have to decide whether there's an alternative to coal that we can develop, or whether we have to begin building some coal-fired generation."

Coal's potentially different character results from a rapidly changing energy scene in the Pacific Northwest. The region's kilo-

watt cushion, comfortable a few years ago, has become thin. In 1986, the region had a 2,500-megawatt power surplus, enough electricity to light four cities the size of Portland, Oregon. Strong economic growth and energy demand since then have consumed a large portion of that surplus. If those economic conditions continue, that surplus could disappear altogether in the next few years, unless the region begins to make resource decisions soon.

The Council sketched the dimensions of that potential resource hole in its 1989 Supplement to the 1986 Northwest Power Plan. High energy demand could consume the region's surplus by 1992. If that demand continues, by 1996 and 1997, the region would need all the energy that two licensed but unbuilt coal sites at Creston, Washington, could produce. And by 2010, the Northwest would need a total of 12 new coal plants producing 5,400 megawatts. Even then, the region would need an additional 4,500 megawatts from resources that have yet to be identified.

Additional coal plants may never have to be built if the region finds less costly alternatives. They also may not have to be built if the Northwest develops alternative sources of energy that, while more costly, are more environmentally benign. But how fast those alternatives can enter the region's resource stream at a time of rising energy demand is an open question.

The Council's reassessment about coal also stems from changing assumptions about regional economic, technological and environmental conditions in the next two decades.

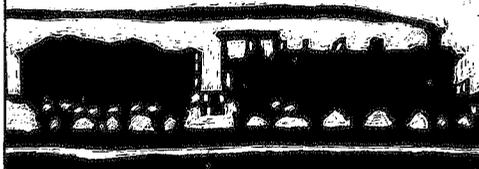
In past regional plans, the Council used an analytical approach to predict how much coal-fired generation the region might have to rely on in the next 20 years. It assumed that the Northwest would be able to plug into whatever amount of coal-fired electric generation it needed to meet high energy demand. It assumed all new coal-fired electricity for the region could come from larger, 600-megawatt plants located in Oregon and Washington. Each of those plants would employ the same generation technology, burning pulverized coal to run steam-electric plants. And the first plants to come on line would cost the same as subsequent plants.

Those assumptions may need to be revised to more accurately portray the steps the region would take if it turned to new coal-fired plants. The Council staff now proposes to move to a "scenario-based" approach, Litchfield says. "This approach tries to predict, if coal is developed, how that development will logically progress. There are lots of different ways this development can take place."

In a nutshell, the scenario-based approach employs a different set of assumptions about the progress of coal development. First, it assumes that state or federal air-quality regulations will place a ceiling on the amount of pollutants that coal-fired plants in the region can emit. That may limit the amount of new coal-fired generation the region could count on and raise plant emission control costs.

This approach assumes that coal plants likely would be developed at several sites in Oregon, Washington or Nevada or near

Stricter pollution rules might spur utilities to move away from traditional coal-generation technologies toward new, smaller, more efficient and cleaner methods of producing coal-fired electricity.



coal mines in Montana or Wyoming. It assumes there would be additional costs involved in transporting coal to some sites or connecting others with the region's electrical grid. And it assumes that the plants' developers would employ a range of generating technologies.

New technologies may mean that the region could turn to smaller, cleaner plants for some coal-fired power. For example, facilities that produce electricity through atmospheric fluidized-bed combustion, a technique that injects air to burn coarsely ground coal in a bed of limestone particles, may allow utilities to build smaller, 200-megawatt plants that produce power costing

nearly the same as power from larger conventional units.

Another generation technology, coal gasification—which converts coal to gaseous fuel and uses it to fire conventional gas-fired turbines—may be a little more expensive. But it produces fewer pollutants than conventional plants and may offer excellent opportunities for meeting more stringent environmental regulations.

"What's being proposed is a much more diverse picture," Litchfield says. "This is a much less risky strategy for the region. The Council's objective is to be as real as we can be in predicting what's going to happen 10 or 15 years from now."

It's likely that the region first will develop coal-fired facilities that cost the least, turning to more expensive units as needed.

Under the scenario examined in the staff paper, the Northwest could turn to coal in five stages, each involving different costs, locations and technologies.

By laying out this scenario, the Council staff is not advocating that particular development path or those specific generation technologies, Litchfield stresses. Rather, it is trying to paint a truer picture of how coal might be developed than it offered in past power plans.

"This isn't prescriptive," he says. "When we get to the development, we know there'll be an open competition among coal sites and technologies and alternatives. If the plants are needed, this scenario will have performed its function if the first steps in the real world cost about the same as predicted in the paper."

The stages, with their costs expressed in 1988 dollars, are:

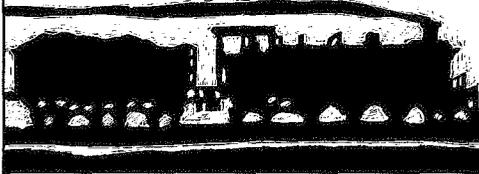
Stage I: Two 603-megawatt conventional power plants burning pulverized coal could be developed at a currently licensed site at Creston, Washington. Their coal would come via rail from fields in British Columbia. The plants would need small amounts of new transmission line and upgraded railroad track. The Council staff calculates that power from these plants would cost 8.5 cents a kilowatt-hour.¹

Stage II: Up to eight atmospheric fluidized-bed combustion plants, each producing 197 megawatts of power, could be built near coal mines in Montana and Wyoming. Some 600 miles of new high-voltage transmission lines would be needed to link those plants with the Northwest's power grid. Power from these plants would cost 8.8 cents a kilowatt-hour.

Stage III: Two more large, 603-megawatt conventional power plants burning pulverized coal could be built at Boardman, Oregon. Their coal would come via rail from fields in Wyoming. Power from these plants would cost 9.4 cents a kilowatt-hour. The sulfur dioxide and other pollutants these plants may emit would be offset by retrofitting some existing plants in the region with improved emission control equipment.

Stage IV: Power could be bought from a proposed eight-unit project near Thousand Springs, Nevada. In this stage, the region is assumed to obtain power from four 250-megawatt conventional coal plants burning pulverized coal. Coal for these plants would come via rail from

Additional coal plants may never have to be built if the region finds less costly alternatives.



fields in Utah. Some 500 miles of high-voltage transmission lines would have to be built to link these plants with the Northwest's grid. These plants could produce power at 10.8 cents a kilowatt-hour.

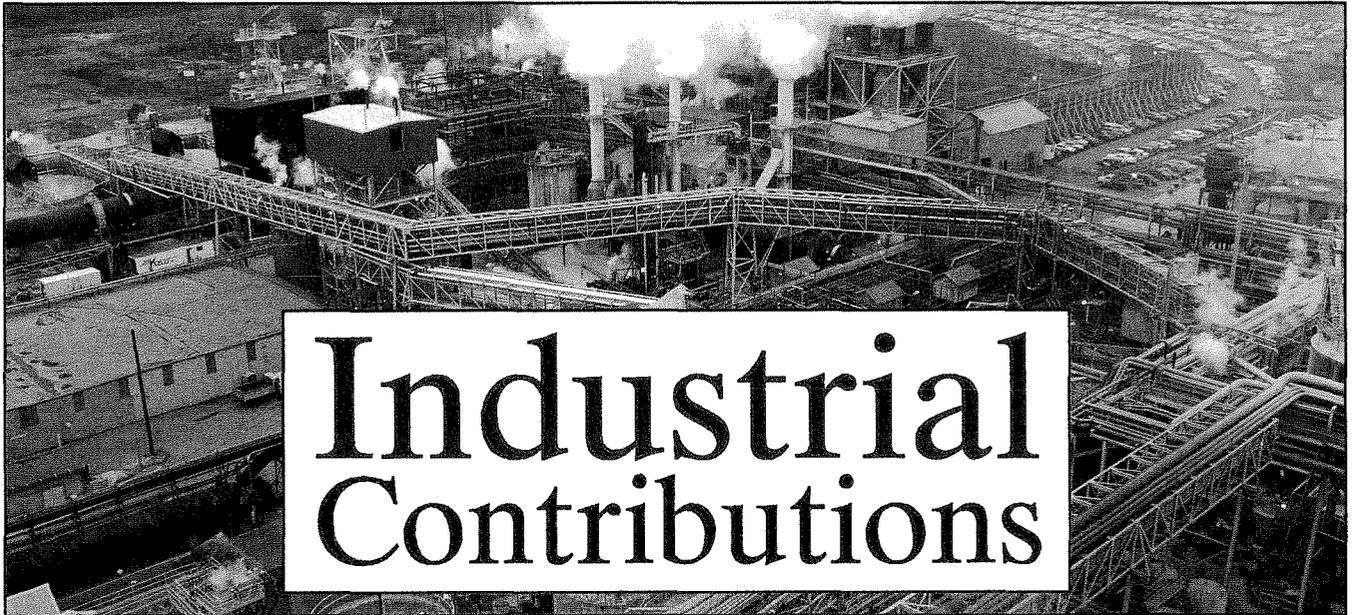
Stage V: Four 419-megawatt power plants using coal gasification technology could be built in western Oregon or Washington. Their coal would come via rail lines from fields in British Columbia, 600 miles of which would need to be upgraded. Although the sulfur dioxide emissions of gasification plants are low, enough emission offsets could be obtained by retrofitting existing plants in the region that net sulfur dioxide emissions would not exceed currently licensed levels. These plants would produce power costing 11.1 cents a kilowatt-hour.

This five-stage path is one of many that the Northwest could take, Litchfield notes. As coal-fired plants become increasingly expensive to develop at each

successive stage, more alternative sources of power become economically competitive.

"We think the costs will increase as we build more coal. That raises the likelihood that alternatives will be cost-competitive the more coal we build." ■■

1./ All resource costs in the 1990 power planning estimates appear to be roughly twice those quoted in the Council's 1986 Power Plan and 1989 supplement. This is because the Council switched from calculating costs in real terms to calculating them in nominal terms, a method that includes inflation and is more easily compared with today's retail electricity costs.



Industrial Contributions

by Carlotta Collette

Efficiency and cogeneration give Northwest industries a competitive edge.

Northwest industries purchase roughly 40 percent of all the region's electricity.

That's more than 6,000 average megawatts, or six times the energy use of Seattle.

But recent analysis by the Northwest Power Planning Council staff suggests that it would be technically possible to cut that use by as much as 530 average megawatts (not including 100 megawatts in savings already garnered from aluminum smelters). Such savings would cost about 2 cents per kilowatt-hour on average.

Even more promising, but somewhat more expensive, is the finding that big industries and other large institutions (universities, apartment and office complexes, hospitals, shopping malls

etc.) could actually generate more than 3,000 megawatts of electricity using waste heat or small increments of additional fuel to up the output of heat processes. This ability to obtain both heat and electricity from a single fuel is known as cogeneration. The cost of electricity from cogeneration will likely range between 4.5 cents and 10 cents per kilowatt-hour, depending on the price of the fuel used.

The combination of energy savings and cogenerated power projected by the Council is equal to the energy from about 14 small (250 megawatt) coal plants, at comparable or lower costs and with less environmental impact. (There is some concern, however, that broadly dispersed smaller generators of electricity will be more difficult to monitor for pollution.)

These encouraging figures are surfacing as the Council moves

forward in its review of new data affecting the regional electrical energy scene. This review will lead in 1990 to a new Northwest Power Plan to carry the region into the next century.

What's Good for Business

The energy savings and energy production potential the Council sees in the industrial sector are sure to be as good for Northwest businesses as they'll be for the region as a whole. In fact, many of the region's industries have already begun to make use of the advantage efficiency can give them. One of these is the Longview Fibre Company in southwestern Washington.

Longview, a pulp and paper mill, has held its post at the confluence of the Cowlitz and Columbia rivers since 1927. It is still a stolid, conservative company in "Webster's" sense of the word:

The combination of industrial energy savings and cogenerated power projected by the Council is equal to the energy from about 14 small coal plants.

“one who adheres to traditional, time-tested, long-standing methods, procedures, or views.” But such a staid image could be deceiving. Longview is conservative in progressive ways.

With annual pulp, paper and paper product sales of about \$650 million, Longview Fibre is certainly not the Northwest's biggest forest products company. Giants Weyerhaeuser and Georgia Pacific outproduce the smaller company by a wide margin. Weyerhaeuser, the biggest in the business, had annual sales last year topping \$10 billion. But Longview's pulp and paper mill is the sixth largest in the world, and beyond a doubt, it's one of the most efficient.

Mark Hoehne, the company's assistant vice president and materials and energy manager, compares his plant to some pork processors that “make use of everything but the oink.” Where larger companies can afford to dispose of “waste products,” Longview seems to make it a principle of good business that nothing much leaves the 350-acre facility unless someone has bought it.

Even the sludge extracted from water treatment facilities on site (the plant uses 10 times more water every day than the city of Longview) is dried out and burned to produce useful steam. This is just one of many ways the company gets the best use of the energy it requires to drive its thousands of motors.

At 110 average megawatts, the plant's electrical load is a sixth as large as the entire city of Portland, Oregon. But on-site energy recovery enables the plant to cogenerate up to 70 megawatts.

“Black liquor,” an oil-like substance left when the cellulose is boiled out of wood chips, is burned in what are called “recovery boilers” to reclaim some of the original chemicals used to separate the pulp from the wood chips. (The lignins in black liquor make up about half the composition of the original wood chips.)

In burning the liquor, Longview is able to produce heat sufficient to generate two-thirds of the steam required on the mill-site. Remaining steam needs are met with “power boilers,” which use the dried out sludge and other “waste” products for half the power needs and fossil fuels for the rest.

But the boilers' steam is under too high a pressure for the rest of the plant. Electrical generators draw off some of the pressure and, as a consequence, produce electricity before the steam is sent on to the pulp digesters, where wood chips are processed into the dark liquor and pulp mix from which the paper fiber is extracted.

Rather than just displace power purchased from the Cowlitz County Public Utility District, Longview pays the utility and the

Bonneville Power Administration a small fee to ship its cogenerated power to California, where it can get a better price.

Exactly how waste-free Longview's overall production is is difficult to tell. Like almost any manufacturer, Longview upgraded its motors to more efficient ones and replaced motor controllers, which in the past ran full bore all the time, with variable speed controls that adjust to changing needs and save considerable energy.

But managers of major enterprises rarely volunteer details about their processes or the relative energy and other resource savings they are able to muster. Such specifics are considered proprietary. They are the edge the company holds against its competitors. They are also the reason for the difficulty in estimating how much conservation is possible in this sector.

And while it's certainly true that many industries could cut their production costs with fairly off-the-shelf equipment upgrades and process controls, it is also true that each industry and even each individual plant is run in ways that make it unique among its peers. That's considered a basic tenet of free-market enterprise. It is also the fundamental reason for industrial espionage.

But Hoehne suggests that “Longview doesn't have a lot of secrets—we're not that smart.” Maybe not, but they certainly are adaptive.

Since it first began spinning out huge rolls of paper in the 1920s, the company has been upgrading its mills and processes. The first massive paper making machine on site is still in operation. But 10 newer machines have

been added over the years, and a 12th is in construction. Each one is progressively more efficient.

Hoehne was a natural to oversee the company's process refinements. Before working at Longview, he was in the business of selling wood-processing equipment. He watched the industry change and knew how to keep a company in step or ahead of its competitors.

The Competition

A lot of the impetus for tightening U.S. industrial processes came with serious competition from across the Pacific. After World War II, the United States helped Japan recover its industrial base, which was largely disabled during the war. The Japanese quickly fine-tuned U.S. know-how and claimed global economic leadership. "What most people don't think about when they praise Japan's efficient industries," explains Ken Canon, director of the trade group, In-

dustrial Customers of Northwest Utilities, "is that Japan started out with a lot of new machinery, long after U.S. manufacturers had been in operation. Our plants were already old."

U.S. industries were hobbled by their aged infrastructure. Some equipment, buildings and processes had not undergone a serious overhaul since the first switch was pulled.

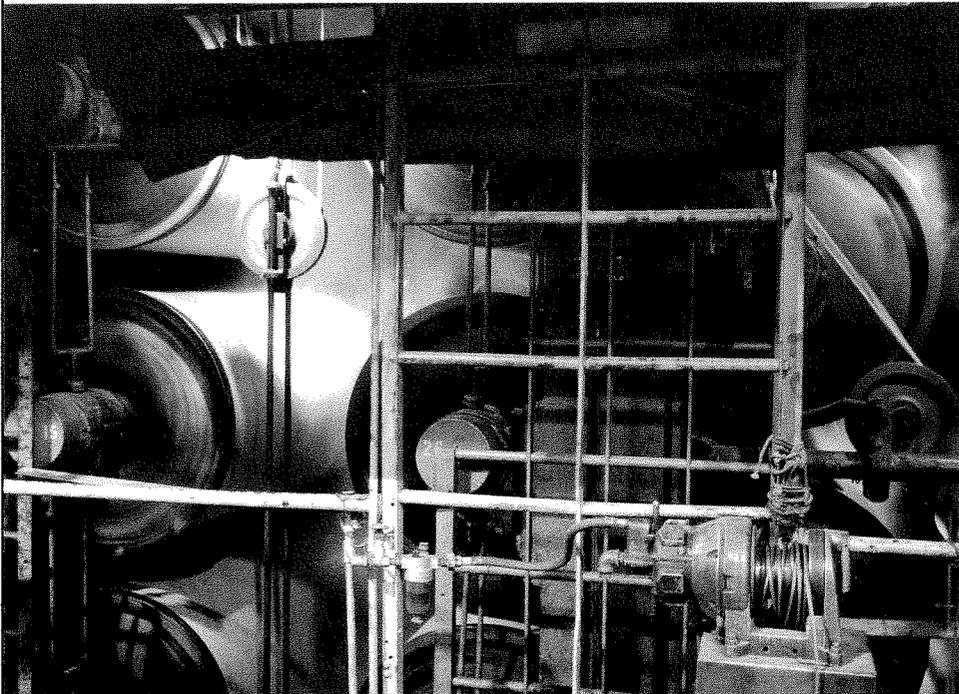
But Japanese industries had the added advantage of their government's support. When the fuel crunch hit in the early '70s, the Japanese government provided assistance for research into new, more efficient technologies and low-cost loans to help companies upgrade their equipment. It instituted a national industrial energy conservation policy. As a consequence, Japan's gross national product rose 63 percent from 1973 to 1986, while that nation's energy use only grew 6.4 percent in the same time period.

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Northwest Efficiencies

In the Pacific Northwest where major industries are either resource-based or here because of low-cost electricity, the pinch of worldwide competition coincided with an electricity wholesale cost increase of nearly 500 percent. Energy efficiency in industrial production quickly became a matter of necessity. It was also wiser for Northwest power marketers, including the Bonneville Power Administration, and state energy agencies to help the region's industries polish their processes so they could compete and stay in the region, rather than risk losing them as customers and major employers.

The Oregon Department of Energy began offering a program nine years ago to help commercial and industrial enterprises save energy. It offers a Business Energy Tax Credit. Qualifying companies apply for the credit by submitting a description of their energy saving proposal. If the proposal is accepted, they may claim a tax credit of up to 35 percent of the cost of the measures. The program covers all fuels and



Thousands of motors help transform wood chips into huge rolls of paper.

is universally applauded for its simplicity, speedy turnaround and stability over time (so companies can incorporate application procedures into their routine plant overhauls).

Since its inception, the program has helped 1,920 Oregon businesses. The state's \$159 million in tax credits are saving more than \$50 million worth of energy every year. It has already saved approximately 250 average megawatts of electricity.

The other major industrial conservation program in the Northwest is offered by Bonneville. Just over a year old, Bonneville's Energy Savings Program is much smaller (it has so far given out slightly more than half of its budgeted \$2.5 million for the fiscal year). Nonetheless, the Bonneville program has garnered 7.5 average megawatts in electricity savings. An earlier pilot demonstration for this program saved 9 megawatts in eight businesses. Longview Fibre participated in

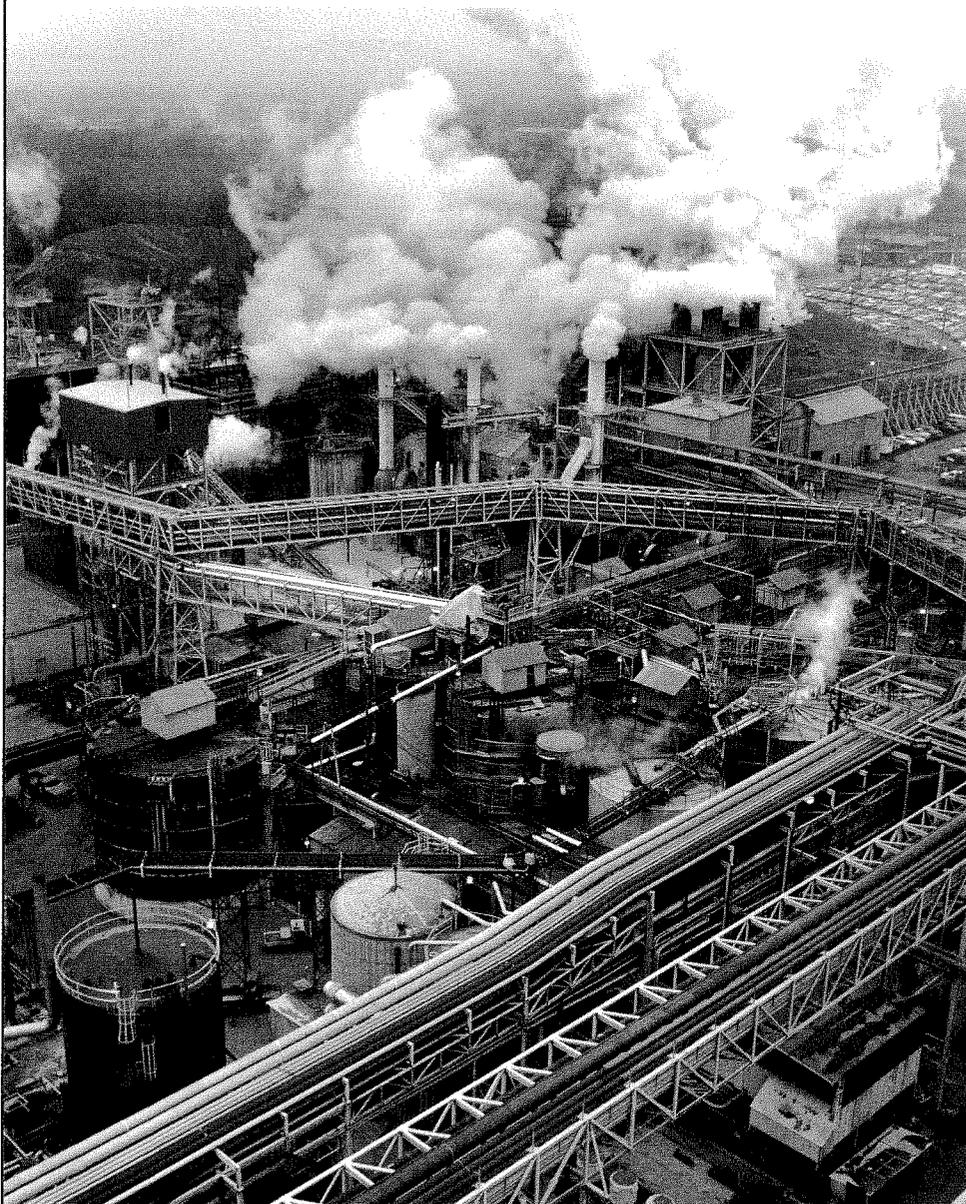
The Japanese government provided assistance for research into new, more efficient technologies and low-cost loans to help companies upgrade their equipment.

both Bonneville's pilot and the current industrial conservation programs.

Cost Comparisons

The 530 average megawatts of energy savings the region could acquire from existing industries and those likely to be added or expanded over the next 20 years would come at a maximum cost of about 10 cents. This cost limit is set at the cost of power from new coal plants, because coal is what is known as the "marginal" or most costly resource being considered. Thus, coal's price tag is the highest the Council will likely go for any resource. Electricity from new coal plants is expected to cost between 8 and 11 cents per kilowatt-hour.

The cost of cogenerated power varies widely depending on the price of the fuel used, but it is more efficient than stand-alone power plants. Although it is cost-competitive with coal-fired electricity, cogeneration as a resource



Like a giant Erector Set, the complex facilities at the Longview Fibre millsite cover nearly 350 acres.

is so capital intensive that few industrial facilities in the region have developed their full potential output.

Nonetheless, there already are about 900 megawatts of cogeneration installed in Northwest industries. Most of this is at pulp, paper, lumber and other wood products plants. Regional utilities, however, only count on about 50 megawatts of this resource. Much of the rest is either not being generated because electricity from utilities is less expensive or is used on site to offset purchases from utilities. Some, such as the power generated by Longview Fibre, is marketed out of the region.

Cogeneration was common in industries in the late 1800s and early 1900s. Roughly half the power in the United States came from cogeneration facilities in

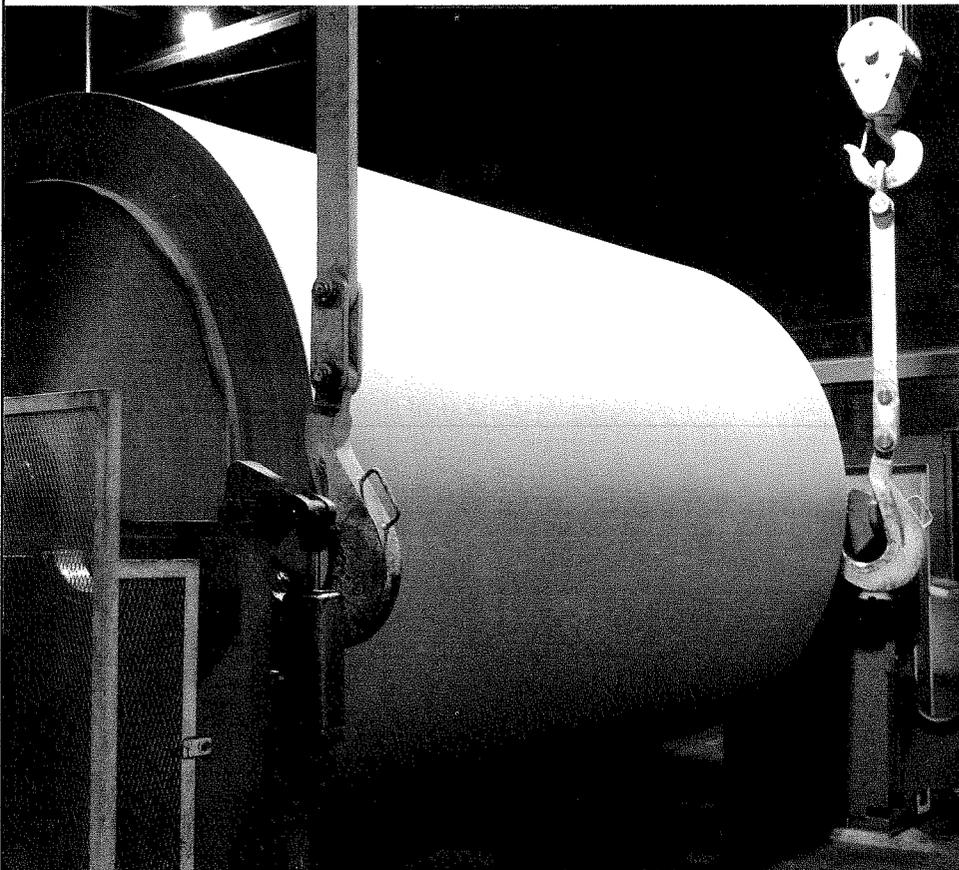
those years. In most cases, there were no utilities servicing areas where industries were located. In others, cogenerating on site was considered more reliable and cheaper than "store bought" electricity. But as utilities became larger and more reliable, and electric rates came down, cogeneration as a resource and a practice became less popular.

During the region's recent power surplus, neither discretionary energy savings nor cogenerated electricity were altogether encouraged by Northwest utilities. But as the surplus disappears, and new resources are sought out, cost-effective efficiency improvements and cogenerated power will be more welcome.

Cogeneration in particular is likely to gain stature as a preferred resource. During the

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ongoing power plan development, the Council will continue to explore ways to bring cogeneration on line in ever-increasing quantities. The region's industries could easily become major power marketers of the future. ■■



Rolls of paper bigger than cars are next made into millions of paper bags.

Nuclear Power Prospects in the Pacific Northwest

by Jeff King

What role should nuclear power play in the new Northwest Power Plan?

The fate of two unfinished nuclear power plants in Washington state was a topic of hot debate in the Pacific Northwest long before the plants were mothballed in 1982 and 1983. Proponents argue that completing the nearly finished plants would be the quickest and least expensive way the region could plug into a new power source. Opponents say that finishing the units would be costlier and riskier than obtaining power from a range of alternatives.

As it prepares a new regional power plan in 1990, the Northwest Power Planning Council has begun to review what role the two plants—Washington Public Power

Supply System Nuclear Project 1, a 1,250-megawatt nuclear facility at Hanford, and Project 3, a 1,240-megawatt unit near Satsop—should play in the region's energy picture over the next 20 years.

That review entails exploring whether assumptions and analyses the Council made about the plants in past power plans remain valid today. It also involves asking whether new or different issues could influence the Council's thinking in 1990.

The Council hasn't taken a position on whether to include the plants in its resource portfolio in 1990. That portfolio is the list of the most reliable and cost-effective resources the region could turn to over the next 20 years. To help it make that decision, Council staff members released for public comment a study that discusses issues the

region should bear in mind as it examines the plants in the coming months.



The study, "Nuclear Resources" (Issue Paper 89-43), is available from the Council's central office.

The following are highlights of that study's conclusions:

In its 1986 Power Plan, the Council concluded that several factors made the likelihood of completing and operating Plants 1 and 3 highly uncertain. Because of that uncertainty, it did not include the plants in the resource portfolio of the 1986 plan.

However, since the plants would offer significant value to the region under certain conditions, the Council recommended that they be preserved. It also recommended that the region work to overcome barriers that impeded completing the plants.

That work has been largely successful, and the principal barriers the plants faced in 1986—the inability to continue financing preservation or to finance completion of construction—now appear to have been largely resolved.

But other challenging issues remain or have arisen.

These need to be addressed before the two plants can be completed.

These issues include value, ownership, timing,

public acceptance, investment risk and selection of the lead plant.

Value

In judging whether to complete either plant, a fundamental question to ask is whether it will provide value to the region, compared with alternative resources. This value is a function of the characteristics of other resources available to meet future needs and of the inherent characteristics of Plants 1 and 3.

In the 1986 Power Plan, the Council estimated that preserving and completing the two projects, if and when they are needed, would provide an expected value to the region of \$630 million (in 1986 dollars). In these earlier analyses, the Council observed that important project-related factors affecting the value of the plants included the cost of financing, capital cost to complete, plant operating life, plant availability, and operation and maintenance costs.

While there is considerable uncertainty associated with each of these parameters, new data indicates the greatest uncertainty

seems to be associated with operating and maintenance costs. Nationwide, nuclear operat-

ing and maintenance costs have escalated rapidly for a number of years. Because construction of these plants is almost finished, operating and maintenance costs represent a large proportion of the remaining expenditures.

In light of these recent cost jumps, the Council welcomes suggestions from the public on the best ways to determine reasonable ranges of uncertainty for operating and maintenance expenses and for other cost and performance characteristics affecting economic value of the plants.

These plants have certain environmental advantages, including negligible atmospheric emission of nitrogen oxides, sulfur oxides and carbon dioxide, as well as other pollutants. They would be one generating alternative that would be available if the federal government or states implement stringent controls on emissions of carbon dioxide. Compared with coal-fired electric plants, nuclear plants would reduce land areas committed to mining (although mining of uranium ore would be required to support the nuclear plants) and would avoid the impacts associated with unit train deliveries of coal (or alternatively, long distance transmission of power). However, concerns

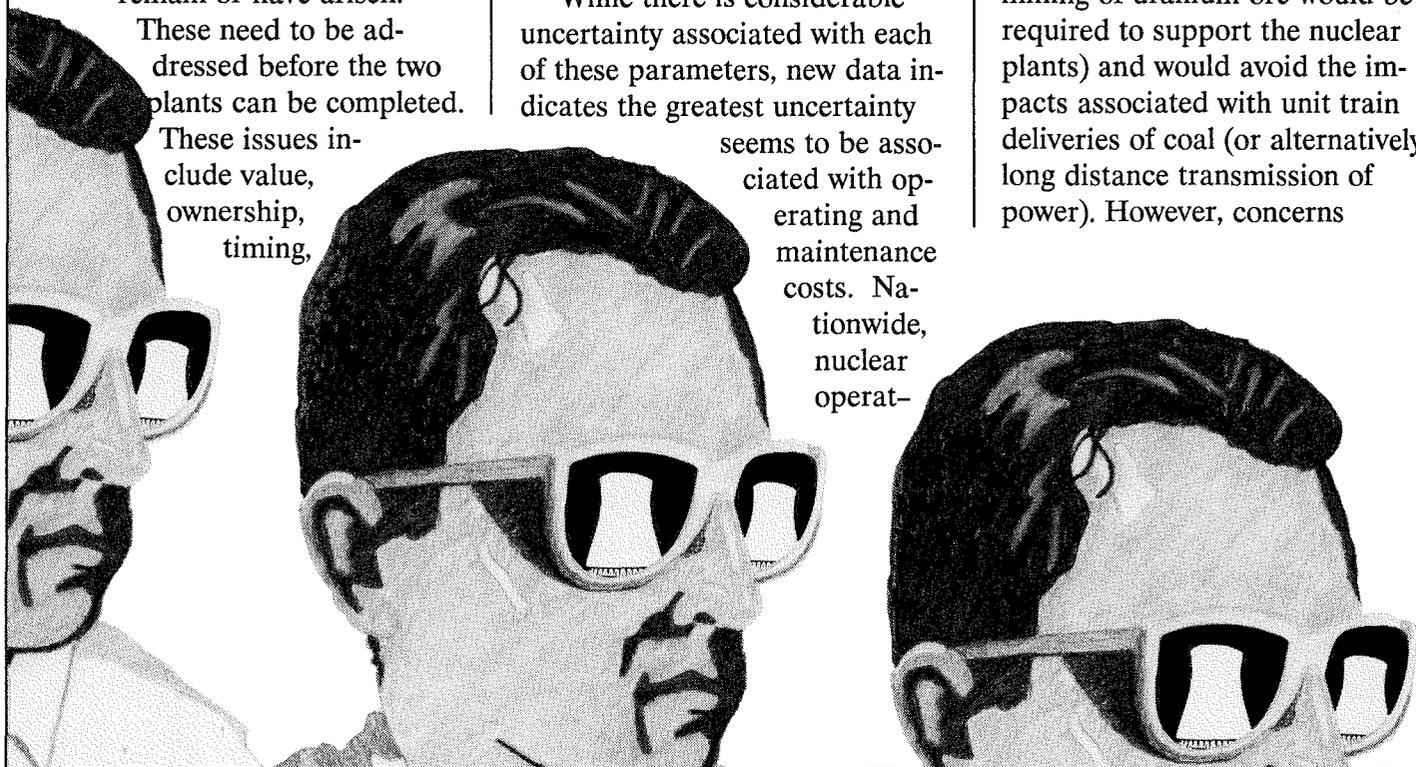


Illustration by Lyn Nance

There appears to be no specific date beyond which the plants could not physically be preserved.

regarding the plant safety and the cost and safety of waste disposal continue to plague nuclear power.

Ownership

Ownership is a second important issue affecting the preservation and completion of Plants 1 and 3. More than 100 consumer-owned (public) utilities own Plant 1. Ownership of Plant 3 is split between four investor-owned (private) and some 100 consumer-owned utilities. That fragmented ownership of the units inhibits achieving a consensus regarding their future.

This problem is compounded by the fact that electrical load growth is unevenly spread among the plants' owners. In general, most of the load growth is occurring in metropolitan areas west of the Cascade Mountains, many of which are served by investor-owned utilities. But the majority of the plants' owners are in areas east of the mountains.

A further difficulty is presented by the diverse planning philosophies exhibited among the owners and participants. When these plants were conceived in the 1960s and 1970s, the participants and owners had a relatively common vision of how future load growth would be met. Now, after years of regional surplus, severe cutbacks in earlier plans to meet load growth, emergence of new

resource options, more refined approaches to planning, and continuing controversy and turmoil regarding nuclear power, the numerous participants and owners of these projects have moved away from this common vision.

Indeed, some participants have announced their unwillingness to allow construction of these plants to be resumed at all.

Timing

Studies conducted by the Council as part of the 1986 Power Plan, and later studies done by the Bonneville Power Administration, indicated that the region would need power from the units only late in the 20-year planning period.

Only in the higher load-growth cases would power from new sources, such as the unfinished nuclear plants, be needed before the end of the century. This raises two questions. First, can the plants be physically preserved until needed, and second, will the plants be technologically obsolete when they are needed?

There appears to be no specific date beyond which the plants could not physically be preserved. While some equipment eventually would become obsolete or deteriorate or would need to be upgraded in response to new regulatory requirements, these effects could be remedied by additional capital investment when completion is undertaken. This would result in gradually escalating costs to complete.

For the next several years, the question of technical obsolescence will remain moot, since the designs of Plants 1 and 3 remain state-of-the-art certified designs in the United States. More advanced designs, the Combustion

Engineering System 80+ and the General Electric Advanced Boiling Water Reactor, are anticipated to be certified by the Nuclear Regulatory Commission between 1991 and 1993. These designs, however, will provide only incremental improvements to existing technology and do not appear to offer advantages so significant as to render Plants 1 and 3 technically obsolete.

A more significant challenge likely will arrive between 1995 and 1997, when small evolutionary advanced designs, including the Westinghouse AP-600 and the General Electric Small Boiling Water Reactor, are expected to be certified by the Nuclear Regulatory Commission. With their anticipated five-year lead time from order to commercial operation, these designs could see service at the turn of the century.

If these plants meet their design goals, they will have very attractive features at capital costs not greatly higher than the costs to complete Plants 1 or 3.

Modular advanced nuclear power plant technologies are at a more conceptual stage, commercial certification appears to be a decade away. Earliest commercial service might be about 2005, though prototype units might be in service before then. Again, though preliminary design characteristics of these plants are promising, it is too early to determine if they would render Plants 1 and 3 technically obsolete.

Public Acceptance

The nuclear power industry is fraught with controversy. It does not appear to enjoy widespread support. And it is the target of overt hostility from some of the general public. In this environ-

ment, it is unclear whether Plants 1 and 3 could be completed and operated. However, it also is not clear that current attitudes will necessarily persist, as the perception of other resources has changed from the past. In addition, absent promising alternatives, nuclear power may once again be seen as an attractive alternative to coal as a source of electric power.

Public disenchantment with nuclear power stems from at least three failings of the industry and government. First, many people are not convinced that current plant designs adequately protect the public from catastrophic releases of radioactivity.

While the industry sees the Three Mile Island accident as a vindication of the safety of U.S. designs, the public perceives the Three Mile Island situation to be a health and safety disaster (not to mention the financial disaster that all agree it was). These feelings were, of course, reinforced by the Chernobyl explosion and fire, even though that plant design is unlike any U.S. commercial plant.

A second failing of the U.S. nuclear industry was the massive construction cost and schedule overruns of the late 1970s and early 1980s. This failure to adhere to construction schedules and budgets weakened public and utility confidence in the industry and destroyed the ability of nuclear power to compete economically with coal. Rising operation and maintenance costs and lower-than-expected reliability statistics at nuclear plants continue to weaken the credibility of the industry.

Third, the industry and government have failed to establish a

system to permanently dispose of high-level radioactive waste. The industry argues, with some justification, that the problem is not technical, but primarily the problem of "not in my backyard," a symptom not only of the nuclear industry, but of other industries that deal with noxious materials. It may well require accident-free, on-site or near-site storage of spent fuel for many years to convince the public that these materials can be handled and disposed of safely.

Investment Risk

Another factor affecting the feasibility of completing Plants 1 or 3 is the investment risk associated with successfully completing and operating these plants. The plants are large and, even though mostly complete, they represent a substantial per-kilowatt level of investment. Though other resources—geothermal, cogeneration or coal—have larger per-kilowatt capital costs, these resources can be developed in far smaller increments with much less investment risk. Adding to the investment risk associated with Plants 1 and 3 are uncertainties of plant performance and operating cost.

These uncertainties are perceived to be greater than for many other resource alternatives, although nuclear power does retain the advantage of low and reasonably predictable fuel costs. In the context of investment risk, the diverse ownership of the plants presents an advantage. With so many participants and owners, the risk to any one utility is reduced.

The Lead Plant

Though the plants have been preserved for several years now, a priority plant has not been selected. That decision will have to be made if one is terminated or if one or both are scheduled for completion. Factors that will have to be considered in selecting a lead plant include:

- Expected costs to complete and operate
- Expected plant performance
- The proposed U.S. Department of Energy acquisition of Plant 1 for conversion to a tritium production facility
- Transmission proximity to load centers
- Public support

New Nuclear Technologies

Large evolutionary advanced reactor plants are expected to be certified by the Nuclear Regulatory Commission by the 1991-93 period. These plants face some of the development issues faced by Plants 1 and 3, notably cost uncertainties, public acceptance and investment risk considerations.

The small evolutionary plant designs would further address development issues associated with nuclear power. Public acceptance may be improved if the plants are built with passive safety systems. (Though public perception of plant safety might improve, it is unclear whether the absolute safety of these designs would be greater than current plant designs.)

Smaller plants, shortened construction time, simplified plant designs and more factory fabrication should lead to greater cost certainty, thereby alleviating investment risk. These plants might be available for commercial operation between 2000 and 2002.

Finally, the federal government may certify modular advanced designs for construction near the end of the century. These plants should be safer, in an absolute sense, because they are expected to incorporate better ways to contain radioactive materials and innovative system designs. They could be less expensive and there will be more certainty about their costs, because they would use extensive factory fabrication.

Commercial units of this sort probably will not see service before 2005. The Northwest possibly could host a demonstration unit using modular advanced technology. This plant could see service about the end of the century.

None of the advanced designs address the issue of high-level waste disposal. The responsibility of providing acceptable long-term, high-level waste storage, reprocessing or disposal lies with the federal government, the affected states and the public. ■■

Jeff King is the Council's senior resource analyst.

Barriers Change for Northwest Nuclear Plants

Financial and technical developments that have taken place in the past four years may influence how the Northwest Power Planning Council judges two unfinished nuclear power plants in Washington state.

Financial Changes

Several financial barriers that prevented the Council from including the two nuclear plants in the region's resource portfolio may no longer exist.

In 1986, the Council concluded that Plants 1 and 3 were cost-effective for the region. But the effects of litigation regarding defaulted bonds sold by the Supply System to complete two other projects, Plants 4 and 5, led the Council to determine that the region could not count on obtaining power from Plants 1 or 3.

The Supply System halted construction on Plant 1 at Hanford in 1982 and on Plant 3 at Satsop in 1983.

In 1986, the Council figured that money to preserve Plants 1 and 3 for an extended period would be tough to come by. The 103 utilities that owned the lion's share of the two plants were public utilities, most of whom were not expected to need power from the units over the next two decades. The Council predicted that much of the region's growing need for power would come from investor-owned utilities.

The Council urged that preservation costs be reduced as much as possible to make it easier to preserve the plants. The Supply System has reduced preservation costs from some \$80 million a year in 1985 to \$5 million to \$6 million at each plant in 1989.

At the same time, barriers blocking the Supply System from obtaining funds to finish building Plants 1 and 3 may be shrinking. Settlement in 1989 of litigation surrounding Plants 4 and 5 allowed Moody's and Standard & Poor's to restore ratings for Supply System bonds. As a result, the Supply System re-entered the bond market last September.

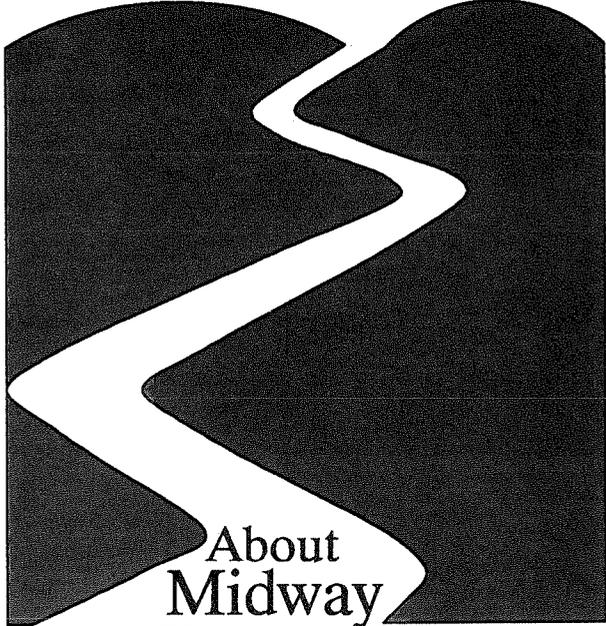
Technical and Cost Changes

Recent data analyzed by the Council staff reveals that the reliability of U.S. pressurized water nuclear reactors depends on what company designed them. Plants designed by Combustion Engineering Inc. ran at full power at least 68 percent of the time during half of all years they generated electricity. During the other half of their years in operation they ran at full power less often. Plant 3 is a Combustion Engineering unit.

The group of U.S. pressurized water nuclear plants designed by Babcock and Wilcox—a group to which Plant 1 belongs—ran at full power at least 58 percent of the time during half their years in operation. During the other half of their years in operation they ran at full power less often.

The average for all pressurized water plants in the United States during those years was 63 percent. ■■

—GL



About
Midway
Down
the
Power Plan Path

Still to come: a new Draft 1990 Power Plan in July.

For the last nine years, the Pacific Northwest has been running—at the behest of Congress—a kind of experiment in publicly reviewed, least-cost electric power system planning. That planning process has been so successful that 30 other states have adopted or are studying the Northwest's least-cost resource planning methods. U.S. Secretary of Energy James Watkins has asked the Northwest Power Planning Council for assistance in developing a national energy strategy, and representatives of a dozen foreign governments—most prominently the Soviet Union—have visited the Council to learn from its power planning experience.

“Least-cost planning,” as used by the Council, refers to a process for developing and imple-

menting an electrical power resource acquisition strategy that will enable the region to meet its electricity needs reliably and at the lowest cost. To accomplish this, the Council must account for the uncertainty of forecasts of future electrical needs and costs, environmental considerations and the compatibility of new resources with the existing power system.

The Northwest has found that a least-cost planning process carried out with considerable public involvement can provide the framework for comparing energy resources, setting priorities and evaluating critical power delivery decisions.

This detailed planning exercise results in the 20-year Northwest Power Plan. Currently, the Council is updating its 1986 Power Plan and anticipates adopting a new plan by the end of 1990.

While new power plans may provide updated information and consequently call for new actions, the basic planning process developed in the first power plan (in 1983) remains fundamentally the same. This process is based on sound principles of risk management and opportunity for public involvement at all steps.

The Forecast

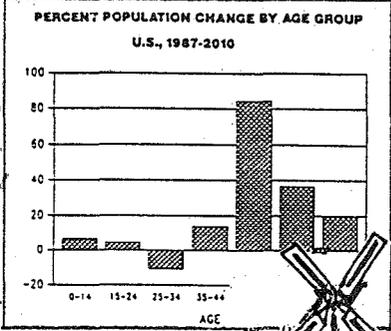
The process begins with analyzing the latest economic, demographic and fuel price data. This forms the basis for developing a forecast of electricity need over a 20-year planning horizon. The Council explicitly recognizes the uncertainty of the future and develops a plausible range forecast of electrical use, rather than a

(Continued on page 22)

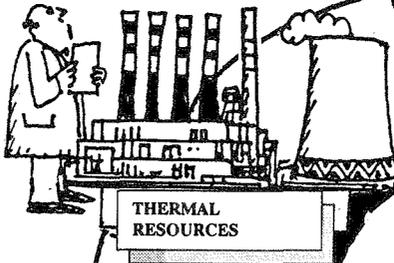
START

WORK PLAN
A plan outlining the power plan schedule is developed and circulated for review.

ADVISORY COMMITTEES
Advisory committees are set up to guide analysis of resources and economic trends. Members are selected for their expertise and representation of major interest groups.



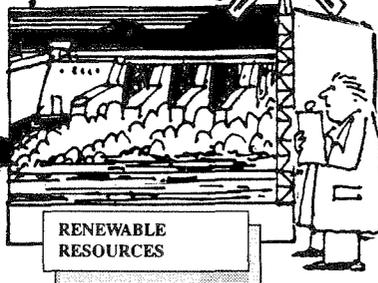
ECONOMIC ANALYSIS
Economic and demographic trends are analyzed. These, along with assumptions about future electricity consumption, are the basis for estimating future electricity needs.



THERMAL RESOURCES



PUBLIC COMMENT



RENEWABLE RESOURCES

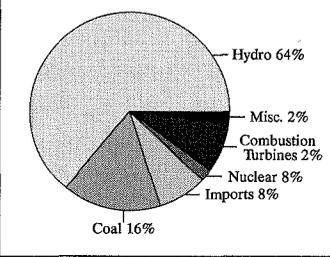


PUBLIC COMMENT



PUBLIC COMMENT

Northwest Firm (guaranteed) Power Resources

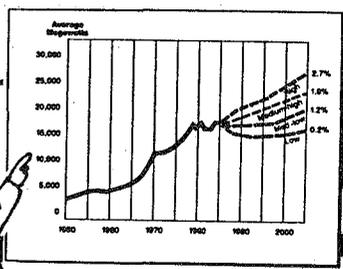
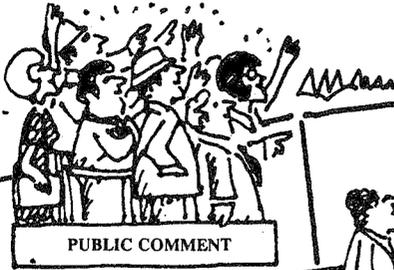
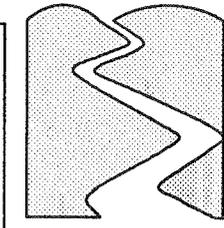


EXISTING RESOURCES
To determine new resource needs, the Council assesses the existing resource base and factors that could bring change. This includes the status of legislation, regulation, plants, programs, treaties and contracts.



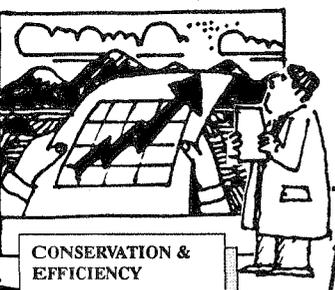
PUBLIC COMMENT

THE POWER PLAN PATH



FORECAST DEVELOPED
Because the future is uncertain, a plausible range forecast of electricity use is developed for the next 20 years, bracketed by high and low growth.

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RESOURCE EVALUATION
Individual resources are evaluated to determine availability, reliability, size, cost and environmental effects. All resource costs are leveled for equitable comparison.



ASSUMPTIONS REVIEWED
Assumptions are made and tested about the future rate of inflation, discount rates and other financial factors that can affect the cost of future resources.

RESOURCE PORTFOLIO
The Council next selects resources best suited to meet future needs. These must be compatible with the existing system and the least expensive in terms of dollars, risk and environmental impact.

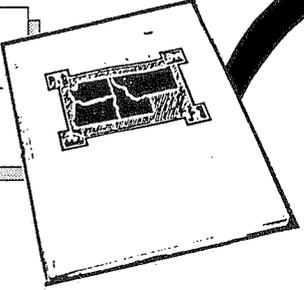
ACTION PLAN
The Council develops a list of near-term steps that are needed to ensure that the objectives of the power plan are met. This is called the Action Plan.

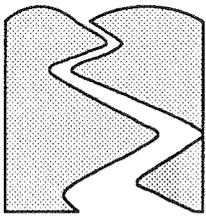
DRAFT PLAN
A draft power plan is put out for public review.



PUBLIC HEARINGS
The Council will hold hearings in each Northwest state, as well as continue to accept written comment and to meet with interested parties.

NEW POWER PLAN
After reviewing public comments, the Council adjusts the draft where necessary before adopting the final plan at its public meeting. The plan, along with a response to all comments received, will be available free to the public. Notice will be made in Council publications, to the media and in the Federal Register.





single-line forecast. The forecast indicates what amount of new

resources will be needed under four scenarios ranging from low to high growth. Within this wider range, there is a narrower range of more likely growth in electricity use, bracketed by medium-low and medium-high growth projections.

Evaluation of Resources

With the forecast in hand, the next step is information gathering and evaluation of both conservation and generating resources that may be available to meet future demand. The Council produces its best estimate of the existing resource base, including any known additions or reductions (e.g., resources nearing completion or retirement, and power contracts that expire or begin within the next 20 years). Existing resources are then subtracted from the range of future electricity demands to determine the amount of conservation and generating resources that may be needed in the future.

Environmental impacts also are assessed, and costs are included for adapting technologies to avoid or reduce to acceptable levels the impacts of each resource on the environment, fish and wildlife. These costs include all measures needed to meet federal and state regulations. The Council also developed a methodology for analyzing other non-quantifiable environmental costs and benefits.

Present-value costs for each resource are averaged out over its lifetime so that all resources can

be compared on a similar footing. The products of this analysis are "supply curves," which show how many megawatts of a resource are available at various costs per kilowatt-hour.

In analyzing resources, weight is given to certain characteristics that provide flexibility and help planners manage the risk of building too few or too many resources. These characteristics include plant size, lead time to develop, size of capital investment, interaction with other resources and environmental impacts.

The Resource Portfolio

The Council then uses computer models to analyze what combination of resources will most cost-effectively meet the region's needs over the range of future scenarios.

The results of this integrated resource analysis are displayed in what is known as a resource portfolio. The portfolio outlines which kinds of resources at what costs and in what sequence will be required to meet the four most likely load paths: low growth, medium-low growth, medium-high and high growth. Only resources that have proven costs and availability are selected for the portfolio. Non-discretionary or "lost-opportunity" resources—those that must be developed in the near term to retain their cost-effectiveness—go into the resource stack first.

The Action Plan

To make certain that the region actually achieves the goal of a least-cost energy future, the planning process concludes with

a set of actions for the Bonneville Power Administration and the Council, and

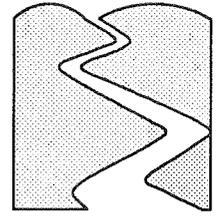
recommended actions for investor-owned utilities and utility commissions. The Action Plan establishes near-term objectives.

Actions include research and development of promising resources, development of procedures for acquiring new generating resources and operation of support programs to encourage achievement of the region's conservation potential.

Where Are We Now?

In 1989, Council staff released a series of issue papers detailing various resources and the assumptions the staff has used to determine resource costs and quantities. Public comment has been taken on these papers, and that comment is being incorporated into the staff analysis. A forecast of future electrical needs was developed jointly with the Bonneville Power Administration.

In July, the Council expects to pull together and release for public review a draft of the whole 1990 Power Plan. Comment on this draft plan will be taken over an extended period, and hearings on the plan will be held in each Northwest state (Idaho, Montana, Oregon and Washington). These final comments will then be integrated into the final plan, which is scheduled for adoption late in 1990. ■■



Dulcy Mahar Interview with

John KEYS

The Northwestern director of the Bureau of Reclamation traces his agency's transformation.

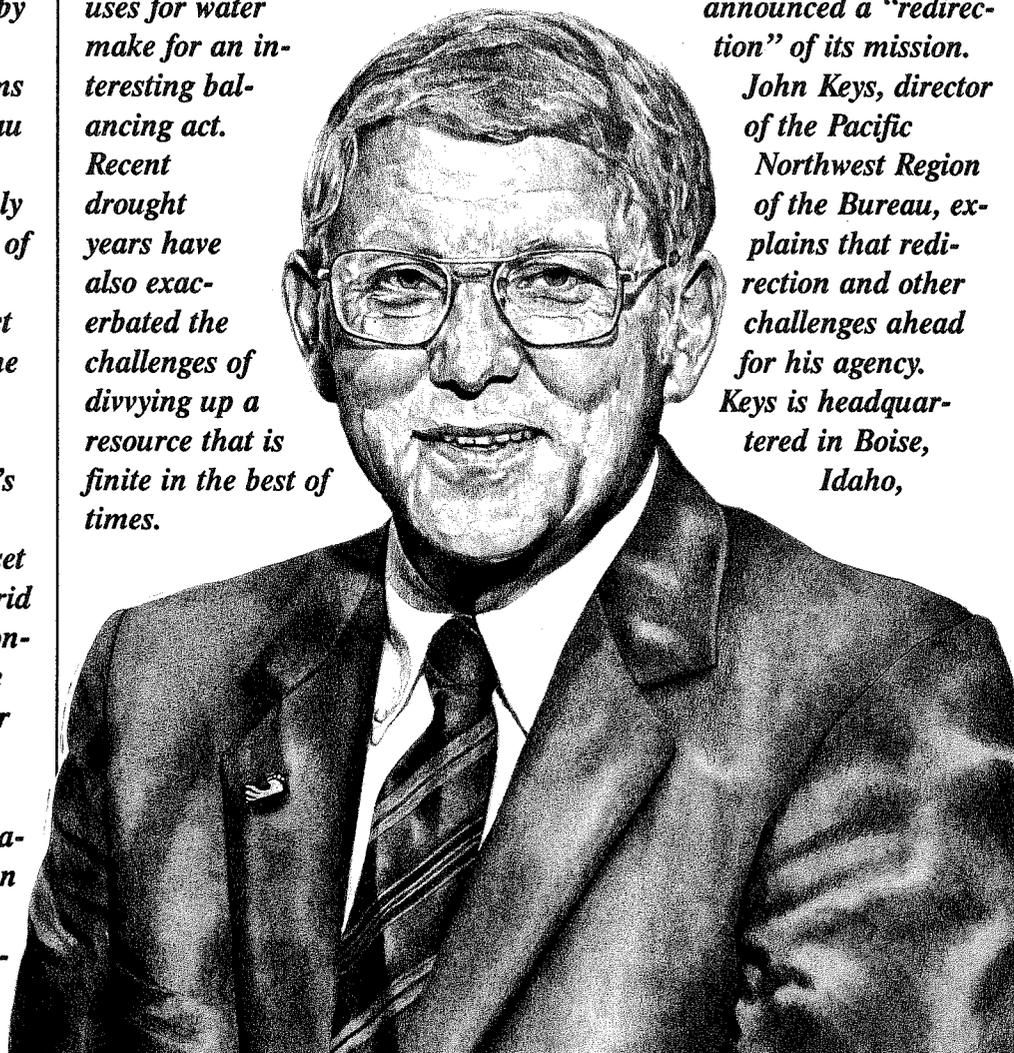
Not all the federal dams in the Columbia Basin are operated by the U.S. Army Corps of Engineers. In fact, at least 100 dams are operated by the U.S. Bureau of Reclamation. The country's biggest power producer and only Bureau dam on the mainstem of the Columbia River is Grand Coulee in Washington. The rest are on tributaries, including the Snake River. Eleven of these dams include power plants.

Water has been the Bureau's focus ever since 1902, when President Theodore Roosevelt set up the agency to irrigate the arid West. As the nation and its economy grew, the Bureau's charge broadened to include a number of other purposes: hydropower, flood control, recreation, environmental enhancement and salinity control. (The Bureau even operates Job Corps camps to train young people from the inter-mountain region.)

The competing uses for water make for an interesting balancing act. Recent drought years have also exacerbated the challenges of divvying up a resource that is finite in the best of times.

Two years ago, the Bureau announced a "redirection" of its mission.

John Keys, director of the Pacific Northwest Region of the Bureau, explains that redirection and other challenges ahead for his agency. Keys is headquartered in Boise, Idaho,



Portrait by Lynn Carson

where he supervises more than a thousand full-time Bureau employees spread throughout the region.

He has been a Bureau man for his entire career. In 1964, right after graduating from Georgia Tech with a bachelor's degree in civil engineering, he went to work for the Bureau in Utah. That gave him the opportunity to pick up a master's degree from Brigham Young University.

In the next several years, Bureau jobs took him to North Dakota, Montana and Colorado. In 1976, he became chief of the Colorado River Water Quality Office. Three years later he moved to Washington, D.C., then to Boise as assistant regional director. He became director in 1986.

He and his wife, a physician, live in Boise. Keys is an avid whitewater rafter, kayaker, angler and hunter. He is also a football referee for the Big Sky Conference.

"Somewhere," he said, "you might weave in that I am also an avid believer in participation. The days are gone when the Bureau and the Corps could stand in a closet and come out with something. We have to have participation. It's the name of the game for us."

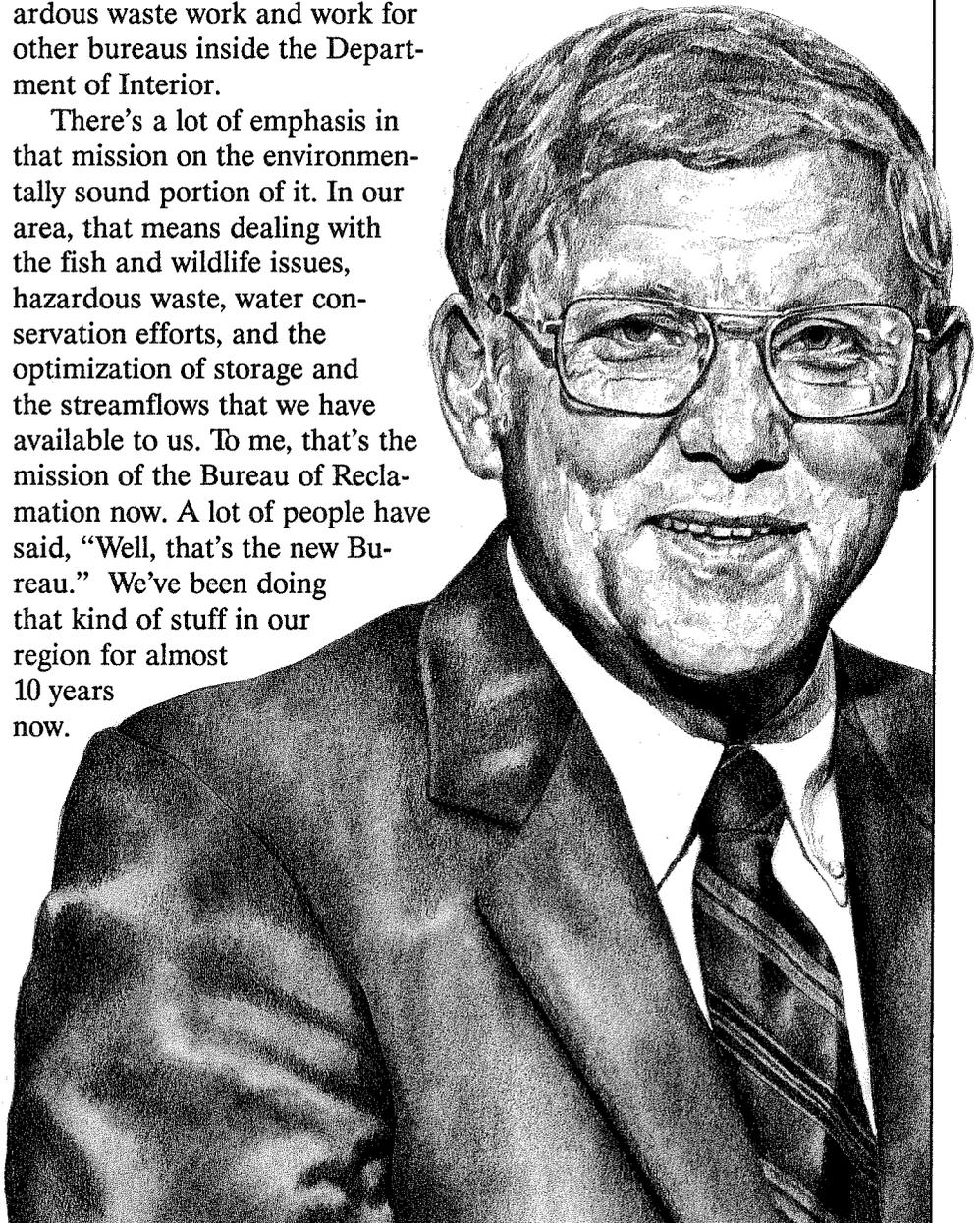
Q. I understand that the Bureau has recently adopted a new mission. What is your new role, and how are you responding to it?

I guess if you had to put that mission in one or two sentences, you could say that the mission of the Bureau of Reclamation is to provide environmentally, economically and engineeringly sound water resource development for the West. Along with that could go the service to other water resource developments throughout the United States, such as hazardous waste work and work for other bureaus inside the Department of Interior.

There's a lot of emphasis in that mission on the environmentally sound portion of it. In our area, that means dealing with the fish and wildlife issues, hazardous waste, water conservation efforts, and the optimization of storage and the streamflows that we have available to us. To me, that's the mission of the Bureau of Reclamation now. A lot of people have said, "Well, that's the new Bureau." We've been doing that kind of stuff in our region for almost 10 years now.

Q. Have there been any specific changes in the last couple of years in your direction or emphasis?

You could say that there's a change in that we are doing a lot more work in the water conservation, storage optimization area. But really, it's just an offshoot of what we were doing before. If you looked at the old traditional construction work that the Bureau did, we're still in the construction business, but construction's not our number one objective. The



way I like to characterize it is that before, we developed the resources for construction, now we use construction to develop resources and to enhance different levels of resources such as in the fish and wildlife areas.

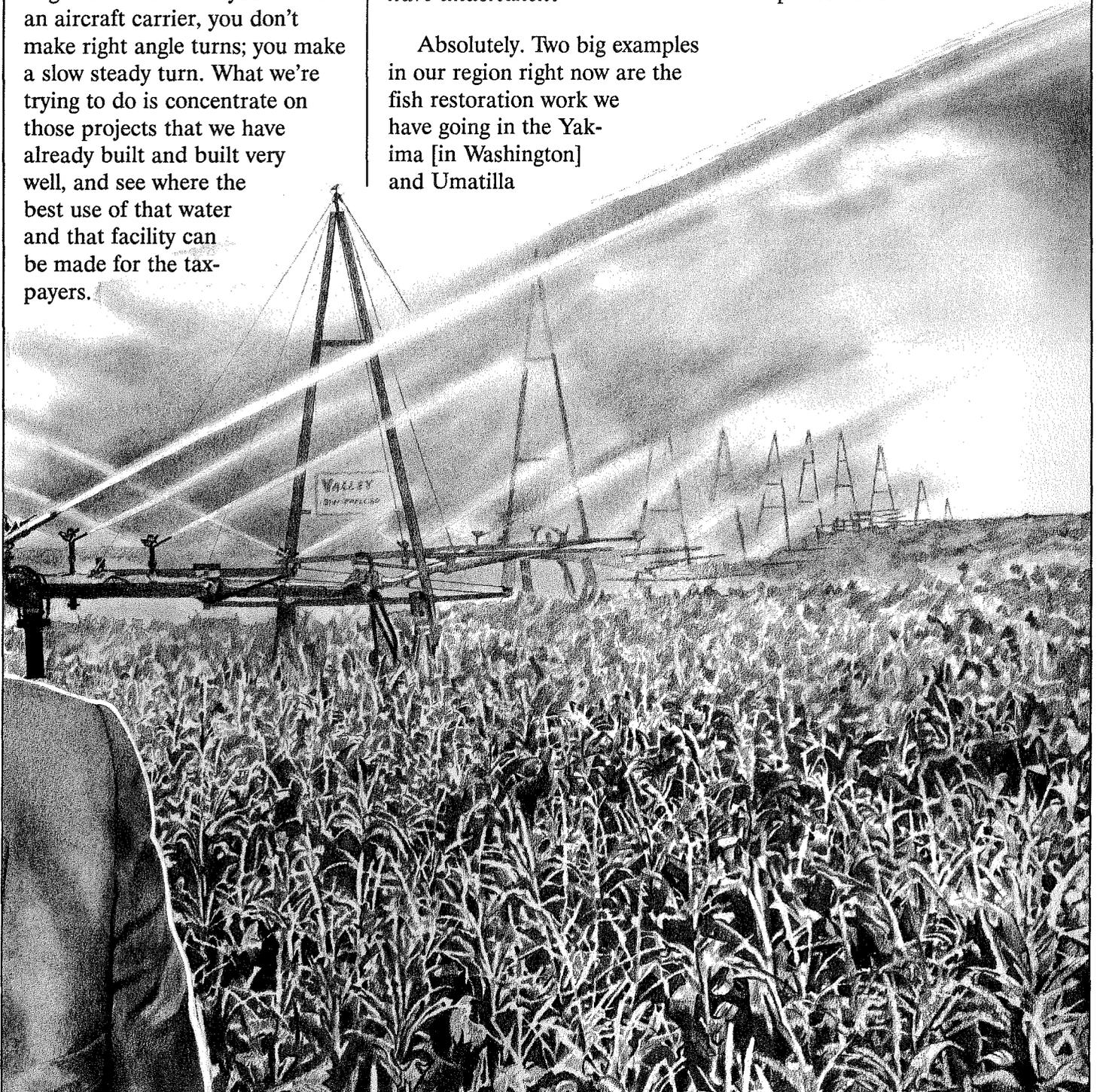
When you get to the point where all of the big projects have been built, then you start looking at what you've done and how you might do it better. If you look at an aircraft carrier, you don't make right angle turns; you make a slow steady turn. What we're trying to do is concentrate on those projects that we have already built and built very well, and see where the best use of that water and that facility can be made for the taxpayers.

If you look at the Upper Snake River Basin in Idaho, there are a number of reservoirs that have storage space for multiple purposes. We are looking at ways that we can "optimize" use of that storage to best meet today's needs.

Q. Can you give an example of the types of new projects you have undertaken?

Absolutely. Two big examples in our region right now are the fish restoration work we have going in the Yakima [in Washington] and Umatilla

[in Oregon] river basins. Ten years ago, we didn't know what a fish screen or ladder was in the terms that we see them today. A number of our projects had fish protective and passage facilities, but these were built at a time when nobody knew much about how to get fish up and down the river safely. We didn't know the best way to build a ladder or how to put screens in



so that they were not a threat to the fish themselves, that sort of thing.

You might say our engineers were reluctant to get into the fish ladder and screen development. But we went into it, and if you look at the United States right now, the Bureau of Reclamation probably has the highest level of expertise in designing and building fish ladders and screens of any other federal agency.

Q. What is the status of the activities in the Yakima and Umatilla basins?

There was a cooperative study between the Bureau and the state of Washington on the Yakima Basin authorized by Congress in 1980. That study had four main objectives. The first was to provide instream flows into the Yakima River for the enhancement of fish. The second was to provide water for the Yakima Indian Nation to develop new lands on the reservation. The third was to firm up the water supply for existing irrigation in the valley. And the fourth was to put together a water management plan to pull all of those efforts together.

The primary players cooperating with us in the whole thing are the state, the Yakima Indian Nation, fishery people, irrigators, local governments, the Power Council, the Bonneville Power Administration and other federal agencies.

Rather than being able to go immediately to building storage, we had to try to get there in a step process. The first step was to build the fish passage facilities. Those are the ladders and screens. The second step, or Phase II, deals with water conser-

vation. In other words how much water can we conserve from methods being used now? It's not the total answer, but it's part of the answer to the need for storage. Ultimately, there will have to be more storage in the basin.

The Bureau of Reclamation has played a big part in the Yakima Basin, because we got the authorizations and put the cost-share packages together to build the ladders and screens. We're working with Congressman [Sid] Morrison and the irrigators, the fish people, and the Indians in the basin, right now, to put Phase II together. And certainly it will take that cooperative effort to do Phase III, which is storage.

Q. What's happening in the Umatilla Basin?

The work that we're doing in the Umatilla Basin is actually a replacement water supply for the irrigators, so that we can leave the Umatilla River water in the river for the fish. Let me explain just a little bit more about how the Umatilla project works. The water of the Umatilla River was basically sold twice by the government. The first time, the federal government, through the Bureau of Reclamation, developed an irrigation project in the basin and wrote contracts with water users for irrigation.

The federal court system determined that there was a water supply implicit with the forming of Indian reservations. So that meant that the government had sold the water of the Umatilla River twice.

What we're trying to do now is pump water out of the Columbia River and replace that water sup-

ply for the irrigators, so that the Umatilla River water can be left in the Umatilla River for the fishery and to satisfy treaty fishery obligations to the Umatilla Tribe.

Last October, Congress authorized construction of the project. In Fiscal Year 1990, we will complete final design work on the West Extension Irrigation District portion of the project. The whole project will cost about \$44 million. The west extension portion of that is about \$7 million.

Q. The issue of holding water in a reservoir for recreational purposes has been surfacing. How much does that cost the power system? Have you looked at that, or do you have plans to look at it?

First of all, many of our reservoirs, like FDR [Franklin Delano Roosevelt, behind Grand Coulee Dam], have historically been held at fairly high levels during the summer recreation season. That's because there wasn't the power plant capacity that we see today. In fact, up until the time the third power plant was built [at Grand Coulee] in the late '70s, we usually had to spill large amounts of water each year.

We do not try to match dollar-for-dollar one purpose against another. While dollars are important, so are many other considerations. We have an obligation to meet our recreation purposes, and these people have to be heard from. We will use the public input process to get everyone's needs in there and try to meet all of them as best we can.

Q. *I understand that you're planning to start reviewing the non-power impacts on the reservoirs.*

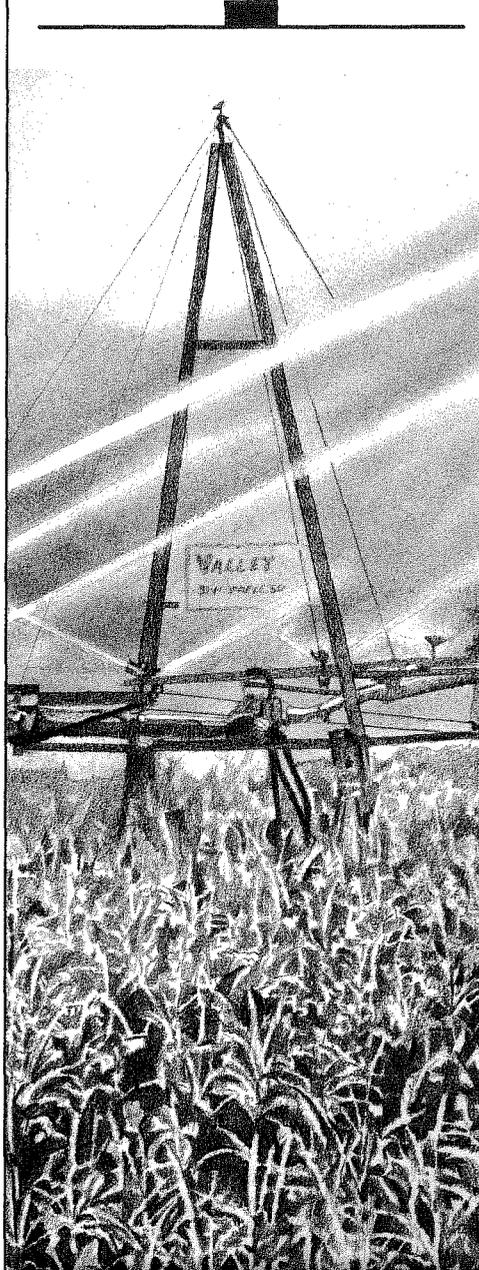
Every year we have a big meeting in February with the PNCA [Pacific Northwest Coordination Agreement] group. There are 18 members of that coordination agreement, three of which are the Bureau, the Corps and Bonneville. The other 15 are utilities that generate power. During that meeting, we try to establish non-power constraints on the system. Before we go into that meeting, we gather data to show what the effects are of our operation and to see what constraints are needed to protect those non-power uses.

A good example is the irrigation supply out of Grand Coulee. We go into that constraint meeting every year with one hard and fast figure, and that is that FDR Reservoir must be at elevation 1,240 feet by May 31 of every year. That is to guarantee our ability to pump water to the Columbia Basin Project [see sidebar]. We have been able to pump below 1,240, but it's hard on our equipment. That is one hard constraint that we put on that system. This year, I'm sure we're going to be asked to consider other constraints, and we will consider them.

Q. *What types of new constraints, if any, do you anticipate being raised?*

Well, after you come out of a three-year drought and a year when the recreation people around FDR saw their reservoir 10 to 15 feet down for the whole recreation season, I'm sure there

The water of the Umatilla River was basically sold twice by the government.



are going to be some requests for a higher level at FDR. I'm not sure that we can accommodate that. I'm sure you'll also see a request for the fishery at Hungry Horse, where we've had the water at a very low level for the past three years.

Bonneville Power has funded a study of Hungry Horse by the Montana Game and Fish Department to see what the impacts of those draw downs are on the fishery at Hungry Horse. We have a study under way to determine the effects on recreation. Data from those studies will go into the determination of non-power constraints in February.

Q. *There have been persistent concerns about the flows for the juvenile migration in the Snake River. Does the Bureau have any plans to address that?*

No, we don't have any plans for the juvenile migration. Most of the storage capacity that we have is covered by contracts. We do have a small amount of non-contracted storage space that we are trying to use now to benefit resident fisheries. I hope that it does not come down to us having to make a choice between a resident fishery and an anadromous fishery. We don't have storage water to make available to that fish flush right¹ now.

1. The Columbia River Basin Fish and Wildlife Program calls for an annual water budget—a special release of water—to help move young fish through the Columbia system of dams as quickly as possible.

Q. What is your position on the water budget?

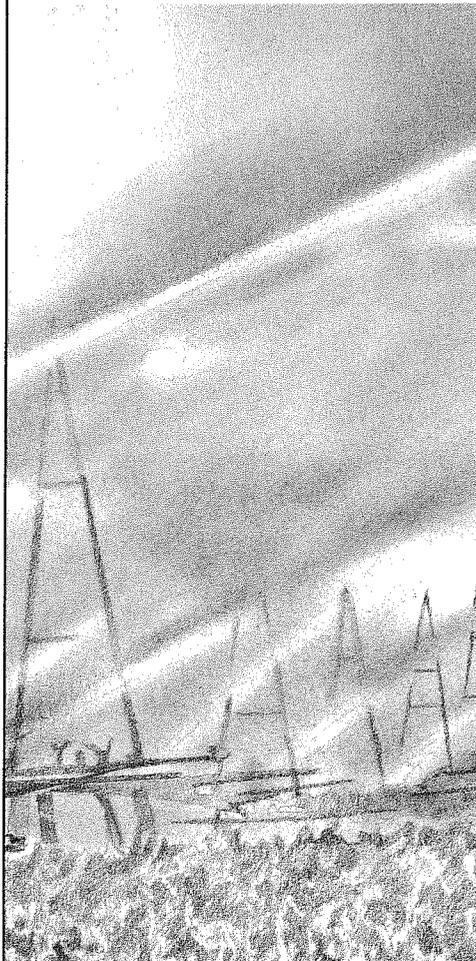
What we have said is that we will participate in the water budget on an annual basis if the water's there. That does not mean that we've signed off on the water budget. I think if you asked the Corps, they would give you the same answer. We participate when the water's there, but if we ended up in a year that was worse than last year, there might be a time when we couldn't participate in the water budget.

I do know that the state of Idaho is looking actively at building Galloway Reservoir to store that water for the water budget. We will not get into a competition with the state of Idaho on Galloway. If they can sell that to the Council or to the fish people, we would support them in that activity.

Q. Storage in places such as the Yakima Basin is a critical concern. Do we have to look at water conservation because we've exhausted storage areas, or is there a potential still left for significant storage?

All of the storage sites are not taken. There are some relatively good storage opportunities left. If you look at the mainstem Columbia, all of the good ones are gone. But the tributaries still have prospects for new storage that can be used to the benefit of all water resources. In other words, if we need more water in the Snake system for the fish, they're still looking at Galloway. In the Yakima Basin, there are some pretty good opportunities for additional storage to meet multiple needs.

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Q. Is there work going on toward the development of more storage?

In a lot of areas there is. As I said before, ultimately there's going to have to be some more storage in the Yakima River Basin if we're going to meet all those purposes, if we're going to meet instream flow requirements, if we're going to meet the demands by the Yakima Indian Nation for more land and water, if we're going to firm up the irrigation requirements in the basin. Conservation will minimize the requirement for this storage, but it's still going to take more storage.

Q. Is the Yakima your largest project?

No. The Minidoka Project in eastern Idaho contains a total of about 1.2 million acres, technically making it our largest project. However, the Minidoka Project was developed in divisions, while the Columbia Basin Project, in Washington, is actually the largest contiguous block of irrigated land in the region.

The Columbia Basin Project is a multipurpose project that serves, out of the Columbia River, water for the irrigation of just under 600,000 acres. It runs from the Tri-Cities north to Grand Coulee. On the west, it's bordered by the Columbia River; on the east, almost to Highway 395.

The project was originally authorized for irrigation of a million acres, plus several other benefits, including a large power producing capability, which was designed to pay a big share of the project costs, including a substan-

tial part of the irrigation facilities.

We have just completed a draft environmental impact statement [EIS] for the continued development of the project. That statement shows that there are more acres that can be economically irrigated. But it needs to be done in stages.

The first stage, and the preferred alternative out of that draft EIS, is for irrigation of about 87,000 acres of additional land. That could be done economically, because you're using the existing facilities, taking some bottlenecks out, serving lands that are actually being served from groundwater now, and the groundwater levels have declined dramatically over the last few years. There are some areas being served with high sodium-level water from the ground water that we would replace. Some of the land is under dry farm irrigation for wheat right now.

Q. What impacts do you estimate this will have on the salmon recovery efforts in the basin?

Well, I don't think there will be any impact on salmon recovery efforts. If you take 87,000 acres of land and the requirements of water for that land, you're looking at maybe 300,000 to 400,000 acre-feet of water out of a river that runs 110 million acre-feet of water a year.

Now if you look at the power generation, I heard in a Bonneville meeting that that was the equivalent of about 20 megawatts. I would even argue with that, because in the past few years there have been power plants put on reclamation facilities in the Columbia Basin that exceed 20

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the worst
drought
years on
record.**



megawatts. Those are not government power plants; they were put on by the irrigation districts, but net power to the basin probably went up.

Q. What's the estimated time for completion of this project?

We have not put an estimated time of completion on it. If you ask me how long it would take us to do the 87,000, it depends on Congress and the support that local people can generate, the numbers of questions that we have to answer on power impacts, on fish and wildlife impacts, and that kind of thing.

Actually, if you look at the irrigation portion of the Columbia Basin Project, it's been a big plus for wildlife in the area. You go from an area that was receiving about 6 inches of natural precipitation to those wildlife communities that have built up around the irrigated farms, and it's amazing how much is built up around there.

Q. What does the Bureau do to promote conservation in the irrigation systems?

There are four different ways. First, we have a cooperative program under way with Bonneville Power where we have been working on energy conservation that results in water conservation. We have a staff of people who work with irrigation districts and power cooperatives to conserve power. We do it by conserving water. That saves power, because they don't have to pump.

In addition, all of our repayment contracts have provisions that require the irrigation district to have a water conservation

plan. These people that work with Bonneville are also working on our own program to promote water conservation through those repayment contracts.

The third way is through the activities that came about with the 1982 Reclamation Reform Act. That requires water conservation plans from those people who benefit from irrigation water from Bureau of Reclamation facilities. So, we actively promote water conservation in those three areas.

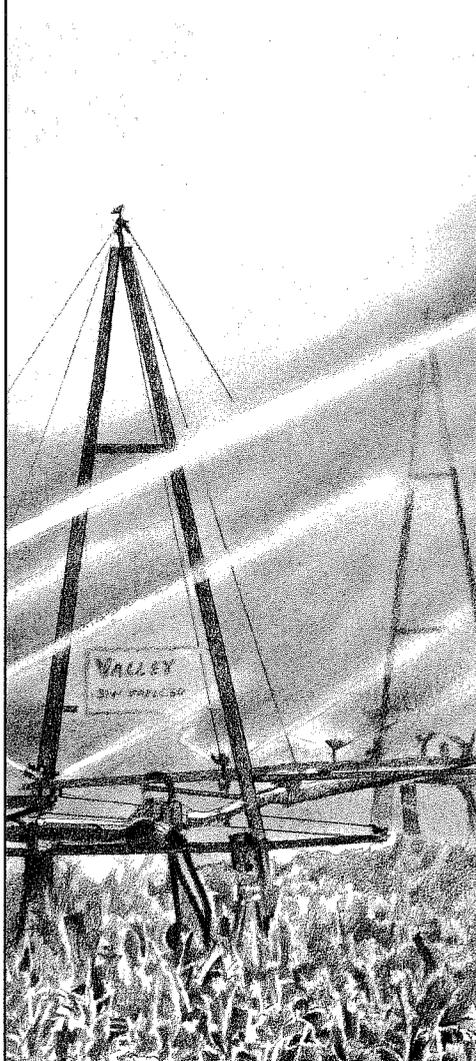
Finally, we have several planning activities under way where we are cooperating with water users in the design.

Q. We've touched a little bit on the drought from the Bureau's perspective of having to provide irrigation. Where does this fit historically? Is this one of the most serious drought situations you've faced?

If you look at the sequence of years, it's not the worst. The worst single year that we had to deal with in most parts of this region was 1977. If you look at a two-year period, '87 and '88 were probably the worst. The worst drought period, of course, was in the '30s.

Now, our irrigation projects are built to accommodate drought. Most have one or two-year carryover storage quantities built into them. It's when you get into the two-year or three-year drought that we really start hurting as far as meeting those contracts. Unfortunately, when most of those contracts were written, there were no provisions for in-stream flows or releases of water for the fish, the floaters, the recreational users and that kind of

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thing. That's where our biggest challenge lies.

Q. Do you think the Council is a useful entity in the region? And has the Bureau's activity or direction changed to any degree because of the Council's existence?

Our relationship with the Council has been excellent. We don't always agree, but I can talk with most of those members about our projects at any time. We've worked closely with Bob Saxvik and Jim Goller on our work in Idaho. We've worked closely with Norma Paulus on the Umatilla Project. We've worked with Tom Trulove and Kai Lee,² in the past, on the Yakima on a daily basis. We've worked with John Brenden on Hungry Horse levels in the past year. We have a good close working relationship with the Council people now, and with the staffers.

Now, for the second part of the question. Yes, I think the Council has been a useful addition. I think it has brought attention to the fishery issues that all of us knew were out there, but did not have a vehicle to deal with. The Council brought with it a mechanism to deal with these issues, and they brought a funding source.

2. Kai Lee served as a Council member from Washington from 1983 to 1987.

Congress, through the Council, made monies available to do some things that none of us could get done before. Now, if you have to say who's the loser out of that, Bonneville Power would probably say they were the loser, because they're having to provide a lot of that money.

I don't see it as a win-lose situation as far as the money goes. But it has helped us. If you look at the support that the Council helped us generate on the Umatilla and Yakima projects, I would say those two alone would show that the Council has been a benefit to the fishery program and to the Pacific Northwest.

The Council's fish and wildlife program in 1982 is what really got us in the fish ladder and screen business.

Q. If you could change something about the Council, what would it be? If the program was open for amendments, do you see anything the Bureau would be recommending?

There's probably two parts to that. Personally, I think the Power Council needs to decide how far it's going to go so that we all have a goal or a target to shoot at. To just say that we're going to bring back as many fish as we can to this area doesn't give us a good idea of how to get there. If we have a goal of so many fish a year or that we're going to spend so many dollars, we can do that in power assistance, we can actually do it in water supply development.

Up to now, the Council has been very limited on supporting projects to provide water supply for fish passage. It has provided the fish passage facilities like lad-

The Council's fish and wildlife program in 1982 is what really got us in the fish ladder and screen business.



ders and screens, but it has not gotten into building a reservoir for water supply. If we had a target, we could look at different ways to get to that target, rather than saying where we're not going to get off into water supply. We're just going to do fish passage and improve passage conditions. If I had one thing to do with the Council, I'd say set your target so that we know what we're shooting at. Don't leave it open ended.

Q. What do you see as the Bureau's biggest challenges ahead?

If you look at what the Bureau of Reclamation's got going now, our biggest activity is keeping those projects going that we've already built and guaranteeing the delivery of water that we have contracts for. The biggest challenge to doing that in the near term is instream flows and the provision of water to keep resident fisheries alive.

All of our projects are going to have to deal with that issue. We ran into it last year twice, at Palisades [Dam—in Idaho]. After two years of drought, our reservoir system ended up almost empty. We had to cut back to what we felt was a minimum flow below Palisades Dam [Idaho], 750 second-feet.

There are a number of people that feel that there was not adequate water to keep the resident fishery at its current level. They felt that that was a damage to that fishery—and it may have been, I don't know. We have an instream flow study under way right now to determine what the best level of flow to that river is. We were challenged in court on that, and we won the first round.

We were not required to do NEPA [National Environmental Policy Act] compliance when we cut back to that level of flow. Even though we won that court case, the basic issue of whether there was enough water in the river hasn't been answered yet. And I think that the biggest challenge to the Bureau of Reclamation in the future is meeting those in-stream flows and fishery flows below our projects.

We are also working very closely with Bonneville Power and the Corps on renegotiation of the PNCA [Pacific Northwest Coordination Agreement] and the [Columbia River] treaty³ and settling with Canada and so forth. We have an active public involvement

process under way and would certainly encourage you folks to participate in that to the limit that you can.

Q. Do you have any estimate on how negotiations will go?

I think the Canadians are going to be tougher to deal with this time than they were the last time. If you look at the whole treaty thing, I think the treaty was fair. The Canadians at first were given cash settlement. And they really needed that to develop their resources. If you took a snapshot right now, you'd say, "Well, the Canadians are getting the short end." But if you look at the treaty over the whole period of

time, I think you would have to say that it was fair.

What's going to be fair in the future? I think the Canadians are going to insist on some power back. But I don't know how much, and that's certainly the source of negotiations. But I don't think we'll come out as well off as we are right now. ■■

3. The Pacific Northwest Coordination Agreement and the Columbia River Treaty govern most of the operations and distribution of power from the system of federal and non-federal dams in the Columbia River Basin. The agreement is up for renegotiation in 2003. The Columbia Storage Power Exchange agreements, authorized by and signed in conjunction with the treaty, provide for return of approximately 500 megawatts of energy to Canada beginning in the late 1990s. The energy had been sold for 30 years to the United States.

Spreading the Waters?

When they built Grand Coulee Dam in the 1930s and '40s, engineers and planners from the Bureau of Reclamation considered it only a piece in the overall plan to irrigate more than a million acres of dry eastern Washington known as the Columbia Basin Project. Turbines at the dam, which now make it the biggest power generating hydro project in the nation, were designed to pump water for irrigation purposes. Power sales from the project were expected to offset some of the project's expenses. Other benefits, such as flood control for the lower river, were also part of the plan.

The dam remains one of the largest structures ever built. But only half the planned for acreage has been watered, and even that distribution system is a marvel.

The first half-million-acre portion reached by canals and drains was completed largely in the 1950s and 1960s. It includes nearly 6,000 miles of constructed waterways, and contributes more than \$300 million in crop value to the Washington economy each year.

While most of the second half-million acres already are under cultivation despite the lack of federal water, expanding the irrigation system would allow farmers to diversify their production. For the past 10 years, the Bureau has been contemplating this expansion and working with state agencies and others to address likely problems engendered in so enormous an undertaking.

In September, the Bureau published a draft environmental impact statement that explored the effects of completing the project. Public hearings on the draft statement were held throughout the region in November. Additional public comment was taken through December 31, 1989.

For purposes of focusing public involvement, and in response to an earlier public comment process, the Bureau offered three alternatives for its proposed completion of the huge irrigation project. These three were gleaned from a longer list that had been under review in the region since 1983.



1. Phased development of the entire remaining 538,600 acres in two increments: The first 172,900 acres would be developed by 2006; the last 365,700 acres would be irrigated by 2032. This alternative would require a new canal and ditch system on a scale comparable to the already completed half of the project. Total cost in 1988 dollars would be \$2.6 billion.
2. Development of 87,000 acres that can be readily served from existing facilities. This alternative would postpone till sometime in the future the decision to expand major canal systems. This scaled-back proposal would cost an estimated \$313 million (in 1988 dollars).
3. No action.

The Bureau is on record favoring the second alternative, which is less costly in environmental terms as well as in dollars. Nonetheless, both of the action alternatives will result in additional water being diverted from the Columbia River.

According to the draft environmental impact statement, such added diversions will trim energy production at the dams and affect flows designed to safely move young salmon and steelhead downstream from the Columbia to the ocean. These water losses come at a time when the Northwest is experiencing rapidly growing power use. Both alternatives incorporate plans to buy large tracts of land to maintain as habitat for wildlife that would be adversely affected by the expansion projects.

After comment on the draft is reviewed, the Bureau will publish a final environmental impact statement and begin negotiations for a cost-sharing agreement with the state of Washington and a repayment agreement for irrigation districts that will benefit from the project.

Congressional appropriations must also be sought. In addition, the Bureau is putting together a plan to reduce project impacts on salmon and steelhead runs. All of this pushes the date for on-the-ground activity out at least two years.

The Basins Below Bonneville



Anglers await the return of spring chinook to the Willamette River.

by Ruth L. Curtis

What's happening in subbasins below Bonneville Dam?

Fishery folks consider the lower Columbia River to extend 146 miles from the lowest major hydropower project on the river—Bonneville Dam—through the estuary where the river merges with the Pacific Ocean. Numerous smaller streams and rivers

originate in the timbered foothills of the Cascade and Coast Range mountains and drain the lands of northwestern Oregon and southwestern Washington. They flow through forests, farmlands and some urban areas before they

eventually find their way into the Columbia.

The land these streams drain and the rivers themselves make up the lower Columbia River Basin. This is an area that traditionally has been rich in salmon and

steelhead, and while some stocks are badly depleted, many runs in the tributaries are still plentiful. Annual flotillas of boats in the rivers and anglers lining the banks give a fair indication that fish are expected in these areas.

Fish runs in the lower Columbia Basin have not had to deal with the stresses imposed on salmon and steelhead by the big mainstem dams upriver. But dams on the tributaries and pressures from urban sprawl, overfishing, farming and forestry practices have taken a toll on the lower river tributaries, too. Fish do not enter these rivers in the numbers they did before white settlers arrived in the area, but they are doing better here than in many other stretches of the Columbia Basin.

In part, this is because past efforts to revive the fish runs have been concentrated below Bonneville Dam, although the runs above Bonneville were in much worse shape. As a result, the Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program has given priority to rehabilitating the runs in the upper basin.

Now, as part of its system planning effort, the Council is taking a hard look at the productivity of the lower basin. System planning is a study of 31 major subbasins in the Columbia River Basin to determine the status of fish, identify problems with fish production and describe opportunities to improve the local fisheries. Area experts who know the river, anglers, land and water managers, government and tribal

fishery specialists and others have been involved in developing the plans. The final product of all this analysis will be an integrated Columbia Basin systemwide plan to accomplish the Council's goal of doubling the size of the basin's salmon and steelhead runs.

Drafts of the upper basin plans were distributed for public scrutiny last summer and this fall. This winter, public review drafts of the lower basin subbasin plans are being distributed.

After public comments have been reviewed, the integrated plan for the Columbia River Basin system will be constructed. Speaking to fishery policy-makers this fall, Jack Donaldson, executive director of the Columbia Basin Fish and Wildlife Authority,¹ which is coordinating the planning process, said that the product will be a plan to "increase systemwide production through a selected mix of production improvements, including habitat development." The Authority is scheduled to present the plan to the Council next summer. After public review, the Council will then consider adopting the plan as part of its Columbia River Basin Fish and Wildlife Program.

The Tributaries and Their Fish

From Bonneville Dam, the first downstream river that enters the Columbia is the Sandy River, named for the sand and gravel the river sweeps off the sides of Mount Hood and deposits in bars

Annual flotillas of boats in the rivers and anglers lining the banks give a fair indication that fish are expected in these areas.

along its last few miles. The Sandy River is home to stocks of coho (although the wild late coho run is nearly extinct), winter and summer steelhead (winter steelhead is the most popular game fish in the river), fall chinook and spring chinook.

Similar stocks, with one exception, are found north of the Columbia in Washington's Washougal River Basin. The exception is spring chinook, which find the waters in the short Washougal River too warm for spawning.

1. The Columbia Basin Fish and Wildlife Authority is an umbrella group that represents state and federal fish and wildlife agencies and 13 Indian tribes.

The largest subbasin below Bonneville Dam is Oregon's Willamette River Basin. In terms of discharge, the Willamette River is the 12th largest river in the United States. Because of its size and complexity, this basin was divided for planning purposes into nine tributary subbasins and the mainstem river. The river drains the most populous area in the entire Columbia River Basin (the Northwest's most populated area—Puget Sound—is outside the Columbia River Basin) and urbanization has had a profound effect on the river, particularly the lower Willamette.

One of the Willamette's tributaries, the Tualatin River, flows through the fastest growing area in Oregon. Stream habitat along the Tualatin has felt the effects of extensive urban, residential and light industrial development. The coho salmon and winter steelhead in the river are seriously affected by the basin's severe water quality problems. Effluent from sewage treatment plants and storm-water runoff from developed areas and croplands have significantly raised the levels of ammonia-nitrogen, phosphates and silt in the water.

Over the past 15 years, the Oregon Department of Environmental Quality has reported the appearance of a number of fish toxicity problems in the Tualatin River, such as chlorine poisoning from drained swimming pools, battery acid spills and the improper application of pesticides

In 1945, the Willamette River was described as "an open sewer."

near tributary streams. The Department of Environmental Quality and the Unified Sewerage Agency are staging a major effort to reduce pollution in this drainage, and subbasin planners propose that the Council lend its support to these efforts.

Fighting pollution is a constant battle in the mainstem of the Willamette. From the 1920s to the early 1970s, the lower Willamette was extremely polluted. In 1945, the river was described as "an open sewer." Pollution reduced the level of oxygen in the water, a condition fatal to fish. Citizens and the state government mounted a vigorous campaign to clean up the river, and by 1972, the Willamette had become the second largest river in the country with secondary waste-water treatment for all known municipal and industrial sources.

But despite problems caused by development in the Willamette Valley, the lower Willamette now has the largest recreational spring chinook fishery in Oregon. Spring chinook are the only race of salmon native to the river system above Willamette Falls, 26 miles from the Columbia. In 1988, a

record number of these fish—104,000—entered the Willamette River, and 70,500 were counted at the falls—the largest number since 1953.

Currently, most of these chinook are hatchery produced, although a quarter of the population is believed to result from natural production. Wild stocks have declined as a result of dams on the upper Willamette that block fish passage to upriver spawning habitat. The general degradation of the Willamette watershed has also contributed to fish losses.

Further down the Columbia River are several smaller subbasins. These include the Lewis, the Kalama, the Cowlitz, the Elochoman and the Grays rivers. In addition to being home to the usual chinook, coho and steelhead, two other species of anadromous fish are found in some of these rivers. These are the chum salmon and the sea-run cutthroat trout.

The Columbia River Basin is near the southern edge of the chum's range. Further north toward Alaska and on the other side of the Pacific in Japan, these fish are more plentiful. However, because the Columbia is near the extreme limit of their range, these salmon are particularly sensitive to environmental changes in the river and the ocean.

The lower Columbia and its tributaries once had large runs of chum salmon. Today, the total run is reduced to less than 0.5 percent of its historic levels. Some of these rivers, such as the Grays, are considered to have small but stable populations left, while in others, such as the Lewis,

chum are now a rarity. The decline in these fish has been caused by overfishing and the destruction of habitat by urbanization, pollution, forestry, agricultural practices and other ecological changes.

In those rivers where chum runs still exist, the subbasin plans include strategies to enhance the populations. The plan for the Gray's River says that while "Columbia River chum runs contribute fairly narrowly to the overall Pacific salmon fisheries... They are a species that contributes to locally important fisheries, can be produced with little capital investment, are assumed to pose no competitive threat to other salmonids and once were produced in large numbers in the Columbia River Basin."

Sea-run cutthroat trout are another species found only in the lowest portion of the Columbia River system. These trout are anadromous fish—that is, they are hatched in a freshwater stream, and they migrate to the ocean where they mature before returning to the stream to spawn. But according to Rick Applegate, the Council's director of fish and wildlife, "Even though these are anadromous fish, they aren't salmon or steelhead, so very little attention has been paid to them in the past. This is now beginning to change." Information about these fish is sketchy, and they are not currently a priority in the fish and wildlife program.

Historically, it appears that they were abundant in some of these rivers, but their numbers have declined substantially. Some of the lower river subbasin plans contain proposals to increase their numbers.

Down near the mouth of the Columbia River in Youngs Bay, there's a unique, low-cost hatchery project mentioned in the subbasin plans as a model for increasing production in the area. Run by the Clatsop County Economic Development Committee, the Youngs Bay Fishery Project rears coho, spring chinook and fall chinook in net pens. What makes the project unusual is its funding.

Jim Hill, the project's director, reports that the commercial fishers in the Astoria area support it through a voluntary assessment matched by seafood processors. The Oregon Department of Fish and Wildlife and the Bonneville Power Administration also have contributed. Salmon produced in the net pens and rearing ponds help support the Youngs Bay gillnet fishery, and the project itself is teaching the region more about small-scale intensive salmon culture.

Although the estuary of the Columbia is a very important part of the river system, it is not dealt with in the subbasin plans. The estuary provides the young fish shelter and food while they adjust to the saltwater environment. But according to Barb Taylor of the Council's fish and wildlife staff, "the estuary is like a 'black box' that we don't know a lot about. Wetlands have been filled, dams have altered the flow of the river, and the character of the estuary has changed. Somewhere in there we could be losing a lot of young salmon and steelhead, but there is a lot we don't know."

The governors of Oregon and Washington recently proposed a joint, four-year, \$2.4 million water quality study of the estuary.

Salmon produced in net pens and rearing ponds help support the Youngs Bay gillnet fishery.

The Council will be following that study closely to guarantee that efforts to rebuild salmon and steelhead runs upriver are not undermined by excessive losses of young fish in the estuary. It is hoped that the study can answer many of the Council's questions.

This winter the Council and the Columbia Basin Fish and Wildlife Authority are asking people who know these rivers to review the subbasin plans. Meetings are being held throughout the lower basin to gather more information. To receive a copy of the subbasin plan for any of these rivers, call the Council's central office. For a schedule of meetings where the plans will be discussed or to obtain more information regarding the plans and planning process, contact the Columbia Basin Fish and Wildlife Authority at 503-326-7031. ■■

SHORTS

State, federal and regional officials dedicated a unique fish hatchery on Washington's Colville Indian Reservation last fall.

The hatchery, the first funded by the Bonneville Power Administration for an Indian reservation in that state, will be owned and operated by the Colville Confederated Tribes.

The Northwest Power Planning Council called for the hatchery in its 1987 Columbia River Basin Fish and Wildlife Program.

When in full operation in several years, the Colville Tribal Trout Hatchery, located three miles north of Bridgeport, should produce 50,000 pounds of eastern brook, rainbow and cutthroat trout a year. Those fish will replace fish trucked in today from other parts of the state to stock waters on the reservation, including Lake Roosevelt, the reservoir behind Grand Coulee Dam.

Bonneville ratepayers paid for the \$4.5 million construction cost of the hatchery and will contribute about \$200,000 a year for its maintenance. [Source: *The Wenatchee* (Washington) *World*, 10/2/89.]

The Oregon State University (OSU) Extension Service and 16 Oregon electric utilities plan to hold workshops this spring to help builders and others learn about building energy-efficient homes.

This will be the sixth year OSU's Extension Service and utilities have conducted workshops on products and construction techniques builders can use to qualify homes for the Super Good Cents program, which encourages energy efficiency in new electrically heated homes in the Pacific Northwest.

For a schedule of dates, locations and topics for the free workshops, write the OSU Extension energy office at 1530 S.W. Taylor Street, Portland, Oregon 97201; or telephone at 503-241-9172. [Source: Oregon State University Extension Service, 11/16/89.]

Alaska, Washington and Oregon—all heavily dependent on the commercial salmon industry—were home to one in three U.S. fishing ports where the value of fish caught in 1988 topped \$10 million.

Alaska accounted for seven of the top 11 U.S. fishing ports in 1988, based on the value of commercial landings. Bellingham, Washington; Newport, Oregon; Astoria, Oregon; Coos Bay/Charleston, Oregon; and Westport, Washington, each had commercial landings in excess of \$20 million in 1988.

Overall in 1988, commercial fishing boats out of Alaska caught 2.7 billion pounds of fish worth \$1.34 billion, a new state record. In terms of the value of fish caught, Washington's \$172.3-million take ranked fifth in the country. Oregon's take was \$97.7 million for the year. [Source: *Marple's Business Newsletter* (Seattle, Washington), 8/30/89.]

An agreement between the United States and the Soviet Union is in the works that ultimately may end salmon fishing on the high seas in the North Pacific.

Negotiators for the two countries agreed this autumn to replace the International North Pacific Fisheries Convention. That compact, also adhered to by Japan and Canada, has regulated North Pacific salmon fishing since the 1950s. But fisheries experts and diplomats say the compact has been unable to prevent the illegal harvest of salmon by drift-net fleets or so-called "directed" catches of salmon allowed by some countries.

The new agreement would include "significant enforcement provisions" to prevent high seas salmon fishing and would focus on increased scientific cooperation between the two countries. [Source: *The* (Vancouver, Washington) *Columbian*, 9/26/89.]

Altering the diets of salmon raised in pens may increase the amount of cholesterol-fighting oil in their bodies.

That's the conclusion of Ronald Hardy, a researcher at Seattle's Northwest Fisheries Center, who says that feeding salmon diets rich in Omega-3 fatty acids results in fish laden with oils thought by health professionals to lower the risk of heart disease in humans.

Experiments at the center found that fish in salmon farms that were given special diets wound up with about 27 percent of their fat made up of Omega-3s. That's more than the 20 percent typically found in pen-raised salmon, and even better than the 25 percent found in most wild salmon.

Those results came about by adding fish waste processed from herring, rockfish and menhaden, an abundant small marine forage fish, to meal fed to the salmon, Hardy said. [Source: *The Fishermen's News*, 9/89.]

—Compiled by Gordon Lee

CALENDAR

January 14-17 - "Ninth ASME Wind Energy Symposium" in New Orleans, Louisiana. For more information: American Society of Mechanical Engineers, 214-746-4901.

January 29 - "Fourteenth Annual Conference on Energy from Biomass and Wastes" in Lake Buena Vista, Florida. For more information: Susan Robertson, Institute of Gas Technology, 3424 E. State Street, Chicago, Illinois 60616, 312-567-3650.

February 7 - "Commercial Energy Forum on Scroll Compressor Heat Pumps" at the Mallory Hotel in Portland, Oregon. Sponsored by the Oregon State University Extension Service, the Oregon Department of Energy and the Bonneville Power Administration. For more information: Greg Wheeler, 503-737-3004, Oregon State University Extension Service, 1530 S.W. Taylor Street, Portland, Oregon 97205, 503-241-9172.

February 14-15 - Northwest Power Planning Council meeting at the Madison Hotel in Seattle, Washington.

March 1-4 - "Grassroots Strategies for Our Global Future" the 1990 Public Interest Law Conference at the University of Oregon School of Law, in Eugene, Oregon. For more information: Penny Buell or Steve Koteff, 1990 Public Interest Law Conference, c/o Land Air Water, University of Oregon School of Law, Eugene, Oregon 97403, 503-686-3823.

March 14-15 - Northwest Power Planning Council meeting at the Edgewater Village Red Lion in Missoula, Montana.

April 11-12 - Northwest Power Planning Council meeting in Oregon.

July 29-August 3 - "Indoor Air '90: The Fifth International Conference on Indoor Air Quality and Climate" in Toronto, Canada. Sponsored by the Building Owners and Managers Association International, the Center for

Indoor Air Research, U.S. Department of Energy and others. For more information: Indoor Air '90, c/o Canada Mortgage and Housing Corporation, 682 Montreal Road, Ottawa, Ontario, Canada K1A 0P7, 613-748-2714 or 748-2715.

August 26-September 1 - "ACEEE 1990 Summer Study on Energy Efficiency in Buildings" at the Asilomar Conference Center in Pacific Grove, California. Sponsored by the American Council for an Energy-Efficient Economy. For more information: Lawrence Berkeley Laboratory, ACEEE 1990 Summer Study Office, Building 90H, Berkeley, California 94720, 415-486-7478.

A more detailed calendar of Council committee meetings and consultations is carried each month in *Update!* See order form on back cover.

—Compiled by Ruth L. Curtis

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NORTHWEST
ENERGY
NEWS

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The Northwest Power Planning Council is required to develop a program to restore the Columbia fisheries and a regional electric energy plan emphasizing cost-effective conservation and renewable resources.

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COUNCIL PUBLICATIONS ORDER FORM

Please send me a copy of the following publications of the Northwest Power Planning Council. (Note: not all publications are available immediately, but they will be sent to you as soon as possible.)

Publications

- 1986 Northwest Power Plan
- 89-1 1989 Supplement to the 1986 Northwest Power Plan
- 1987 Columbia River Basin Fish and Wildlife Program
- 89-50 Executive Summary of Subbasin Plans for Areas above Bonneville Dam

Revised Draft Subbasin Plans for areas below Bonneville Dam (specify river system)

- Willamette River
- Grays River
- Kalama River
- Lewis River
- Columbia River Mainstem from Bonneville Dam to the mouth (including minor tributaries)
- Sandy River
- Elochoman River
- Washougal River
- Cowlitz River

Mailing Lists

Please add my name to the mailing lists for the following newsletters. (Note: do not check if you already are receiving them.)

- Northwest Energy News* (this bimonthly magazine)
- Update!* (monthly public involvement newsletter that contains the Council meeting agenda, deadlines for public comment and a more detailed publications list)

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(Or call Judi Hertz at the Council's central office, 503-222-5161, toll free 1-800-222-3355 in Idaho, Montana and Washington, or 1-800-452-2324 in Oregon.)