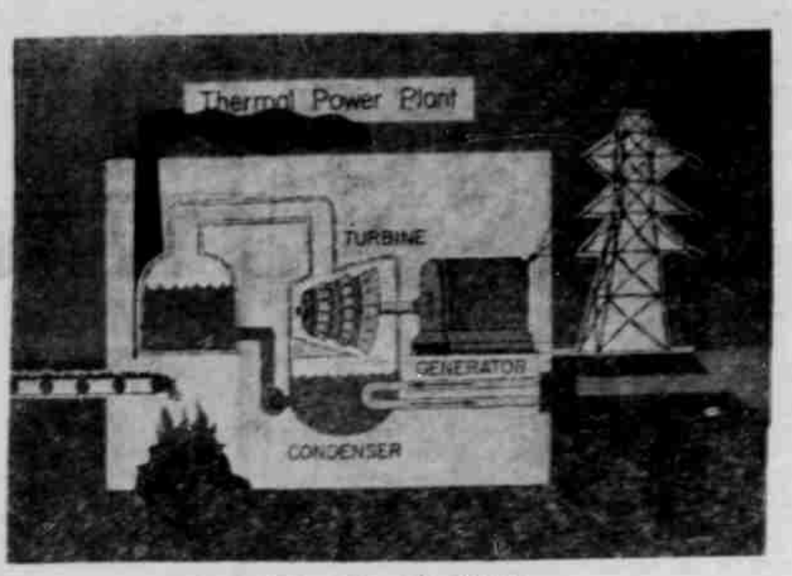
Nuclear Power Plants -- A Coming Reality In Morrow County

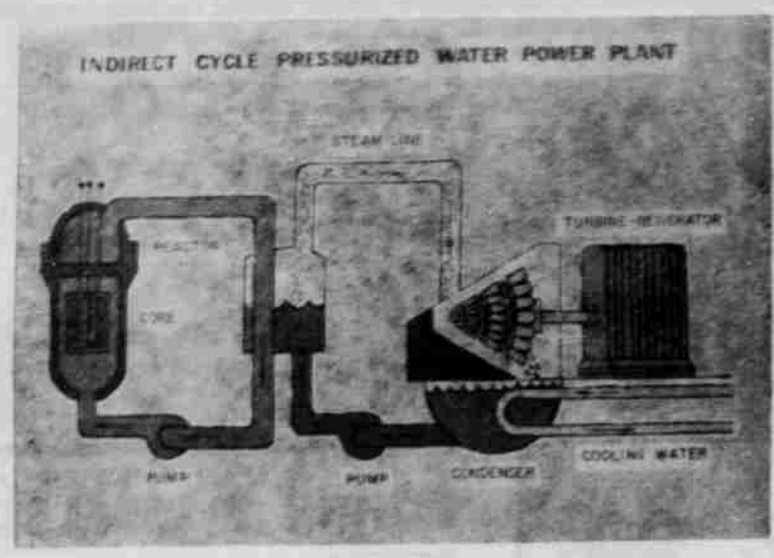


COAL—GAS—OIL—FIRED

Beginning in 1974 we will need one nuclear power plant every year until 1985 to meet our electric power needs in the northwest. For many years the Pacific Northwest has relied on hydropower supplied by dams. These dams produce electric power for about 2 mills per kilowatt hour. No thermal power plant can yet make power that cheaply. However, we have almost run out of dam sites. There are now over 100 dams on the Columbia River system. The present installed capacity of the Bonneville Power Authority is about 9,000 megawatts. This is equal to the output of nine new nuclear power plants.

The demand for electricity is doubling every ten years. Thus, by 1981, we will need twice the present installed capacity. The only way to make this power is with thermal power plants. These plants can be either fossil fuel or nuclear fuel plants. I hope that they will be nuclear because it is cheaper and cleaner. The diagram at left shows a coal fired fossil fuel plant. The heat from the burning coal is used to boil water. The steam is then passed through a turbine which turns a generator producing electric power. After the steam leaves the turbine it is condensed back to water and returned to the boiler. During the condensing process a large amount of heat is removed from the steam. This heat is then put into the cooling water and winds up as thermal pollution in the environment. Only part of the heat from the coal is converted to electricity. About 38% goes into producing electric power. The rest is rejected to the cooling water. Thus, for every 1,000 megawatts of power, nearly 2,000 megawatts of heat are put into the environment. The effect of this waste heat can be minimized by using cooling towers or ponds. (or by irrigating Morrow County's arid lands, a multiple use).

The coal fired plant has some undesirable features. It requires about 10,000 tons of coal a day for a 1,000 megawatt plant. To ship this amount would require about 300 train loads a year. Each train having 100 cars full of coal. A coal fired plant is a major contributor to air pollution. New York City reported that for the years 1967-68 over 80% of the oxides of nitrogen, sulphur dioxide, and particulate matter (three of the major air pollutants) came from the burning of fossil fuel to make electricity and heat buildings. Coal fired plants also release the small amount of radio-active material that is contained in the coal. In a study done by the Health, Education, and Welfare Department it was reported that a TVA coal fired plant gave a greater radiation dose to the environment than a pressurized water reactor (Power, April, 1970). The cost of power from a new coal fired plant is about five mills per kilowatt hour.



A Source of Irrigation Water

This diagram is of a nuclear reactor power plant. The main difference between the nuclear plant and the coal plant is that the water is boiled by using the heat from nuclear fuel. The rest of the cycle is essentially identical. As in the coal plant the steam is condensed back to water and returned to the reactor to be reheated again. The nuclear plant cycle is less efficient than the coal plant. In the nuclear power plant about 33% of the heat from the reactor is converted to electricity. The remaining 67% could be distributed in the irrigation water.

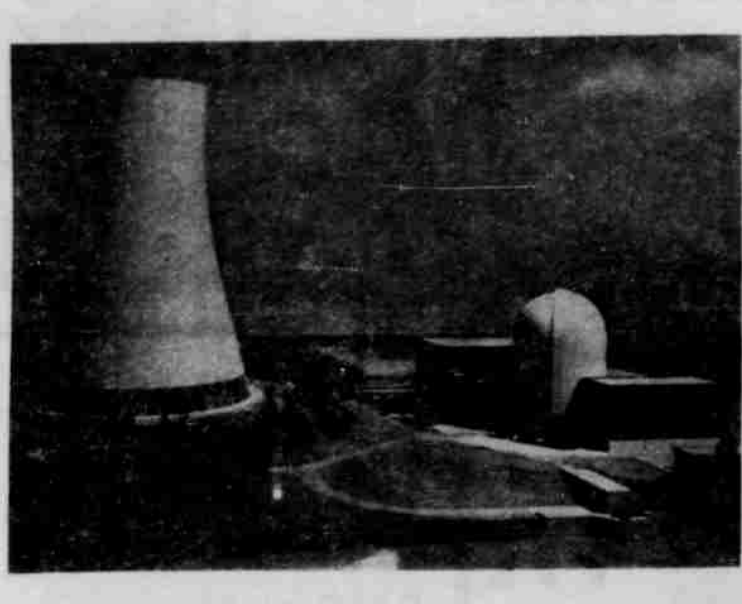
The nuclear power plant, which consumes four ounces of uranium oxide per day per megawatt, is cleaner than a coal fired plant because the nuclear plant does not give off any air pollutants. It will produce electric power for about three to four mills per kilowatt hour.

A variation of the nuclear power plant called a pressurized water reactor (PWR) is shown in this diagram. In this cycle the water in the reactor is under 2,000 psi pressure and does not boil. The water from the reactor passes through a heat exchanger (called a steam generator) and causes the water in the secondary side to boil. Steam from the heat exchanger then passes through the turbine.

The Trojan nuclear plant to be built by the Portland General Electric Company is an example of a Pressurized Water Reactor.

Cooling towers presumably would not be used in Morrow County — instead of cooling the water in this tower it would be used for irrigation.

Model of Portland General Electric Trojan Nuclear Power Plant.



The Atomic Energy Commission requires very strong, leak tight, steel and concrete structures completely enclosing the reactor; designed to contain radioactivity even if all other usual safety features were to fail due to accident, earthquake or other hazards.

All thermal power plants will release heat. About one million gallons of water per minute are required for cooling the condenser. This water is normally heated about 20 degrees F. In the future this heated water may be used to grow greenhouse crops such as lettuce and tomatoes. The most promising beneficial use of the water in the near future is for irrigation. A 1,000 megawatt plant can provide enough water to irrigate about 200,000 acres. However, when sprayed into the air the heat dissipates quickly.

In order to use the water for irrigation it will be necessary to have a pressure system and a drainage system. Another variation would be to build the reactor near a reservoir. The reactor could use the reservoir as a cooling pond and also pump water from the river to the reservoir. Irrigation water could then be taken from the reservoir but it would be limited.

In addition to the heat released in the water all nuclear power plants release small amounts of radio-active material. This material consists mostly of radio-active gases of argonne, xenon, krypton, and iodine. Also, liquids containing tritium and radio-active iron and zinc are released. The dose of radiation to people in the area is very low from the reactor plants. The average dose from plants operating today is less than 5 millirem per year. In many cases the dose is actually below one millirem per year. To put this in perspective let's compare this to other sources of radiation in the environment.

The natural radiation in the environment (called the background) is about 125 millirem per year. Over 25 times as much as a reactor might add. An average chest X-ray gives about 200 millirem. A set of four dental bite-wing X-rays gives over 800 millirem. In Denver, Colorado, the background is about 250 millirem per year.

There are many ways one can get five millirem of radiation instead of standing next to a reactor power plant. Four examples are listed below. Each of these will give you five millirem of radiation.

1. Fly by jet from Portland to New York and return at 35,000 feet. (Dose from cosmic radiation).
2. Spend ten days vacation at a mountain resort above 6,000 feet.
3. Go skiing five weekends above 6,000 feet.
4. Live across the street from the U. N. building. (Dose from the earth materials used in construction).

In summary, nuclear power is the cleanest and cheapest form of thermal power we can build. Additionally, it offers the possibilities of irrigating large areas of land.

Source of Nuclear Material/Dr. Alan H. Robinson, Associate Professor
Nuclear Engineering, Oregon State University

Morrow County
Nuclear Plant Siting Sanction Committee

Heppner, Oregon 97836

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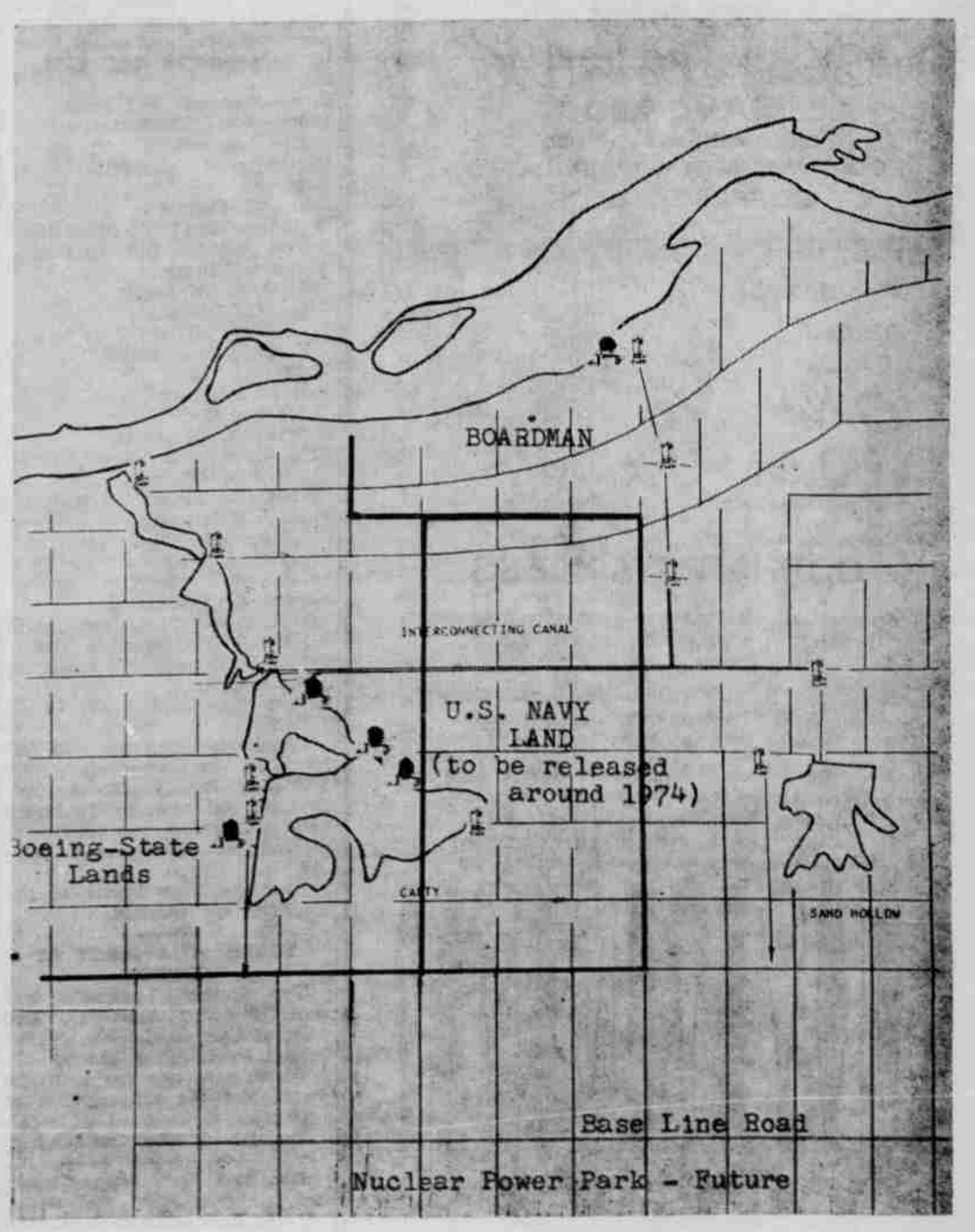
Morrow County's concepts of nuclear power plant siting with coolant water irrigation (shown below) employs many multiple uses of our natural resources. The coolant water can also be used for recreation, fish and wildlife ponds, city and industrial water, ground water recharge, fallow land recharge, greenhouses, frost control and possibly city heating.

This procedure is Oregon's best way to acquire its fair share of Columbia water sooner, and to prevent export to other states.



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