QUICK REFERENCE NOTES

ON

WATER RESOURCES DEVELOPMENT

Twenty years ago, in 1935, the four Northwest states--Washington, Oregon, Montana and Idaho--had only 1,800,000 kw of installed capacity; today they have 7 million kw of installed capacity--a 300 percent increase.

In the 20 years--1930 to 1950--population jumped from 3.5 million to 5.1 million, a 45 percent gain.

Today, we have about 7 million kw of capacity in the Northwest, of which about 95 percent is hydro. Some 3¼ million kilowatts are owned and marketed by the Federal Government and the remainder by private and publicly-owned utilities. Some 2.9 million kw of additional capacity is under construction--nearly all of it by the Federal Government.

The consumption of electricity in the four Northwest states multiplied eight times between 1935 and 1954--from 4 billion kwh to 32 billion kwh--compared with a fivefold increase in the United States as a whole. So fast is the consumption of electricity growing in the region that loads are expected to triple in the next 20 years--by 1974. The region will then be consuming 90 billion kwh, not allowing for any new electroprocess industries.

In the 10 years since the end of World War II, we have added 3.5 million kw in the region, but the demand has consistently outgrown the supply. At times, there has been an actual shortage of power to meet the loads. When waterflow in the rivers dropped to low levels, as in the winter of 1952-53, we have had to curtail the use of electricity by industry. Another result of the power pinch has been to hamper the expansion of electroprocess plants and to discourage new industries from locating in the region.

In the next 5 years, nearly 3 million kw will come on the line from plants under construction--the equivalent of one Bonneville dam annually. Yet we face a serious power shortage in the Northwest unless new dams are started soon. By the early 60's loads, which are rising at a rate of 7 percent annually compounded, will exceed the availability of power from all the generating plants, existing and under construction.

We estimate that the Northwest will need at least 9 million additional kw over the next 20 years--or one Bonneville dam a year--to meet the growing power loads of residential, commercial and small industrial consumers. If we are to have an expansion of electroprocess industries, we will need over 12 million kw--almost twice as much as is now installed in the region.

The people of the Northwest are well aware of this situation and are making plans to meet it. Fortunately, we have ample water resources awaiting development. In fact, scarcely one-fourth of the energy that resides in the Columbia River and its tributaries has been tapped so far, although nearly all the lower cost sites have been, or are, under development.

Future projects will be largely constructed, in my opinion, on the basis of a partnership between the Federal Government and local public and private utilities. The Federal Government, however, <u>is</u> planning to build additional

multipurpose projects in the Northwest. As President Eisenhower said some days ago in his State of the Union message, "the Federal Government must shoulder its own partnership obligations by undertaking projects of such complexity and size that their success requires Federal development."

To meet our power needs, we will require an investment in the next 20 years of about $7 billion for multipurpose projects, including the $1 billion needed for completion of dams under construction. Probably no other part of the United States faces such a huge task in meeting its electric energy needs. Since the investment required is so large, the cooperation of all groups interested in power is imperative--Federal, state, private and local public enterprise.

The Federal Government must be in the picture where multipurpose projects, which produce power, flood control and navigation and irrigation benefits, are concerned. Investments in irrigation and power are paid back to the Treasury with revenues derived from the sale of electricity and water.

Although, some 40 projects are under consideration in the Northwest for immediate and future construction, with a total capacity of about 8 million kilowatts. Of course, not all of these will prove feasible, and hence we cannot say how many will be built, nor how soon. For many, sponsoring utilities have filed and received Federal Power Commission preliminary permits authorizing them to investigate the sites and determine economic feasibility. When feasibility is determined, the utility will file for a license to build the dams.

Four major private utilities have formed the Pacific Northwest Power Company. The Company has received a preliminary permit for Bruce's Eddy on the Clearwater and has filed for such a permit on the Pleasant Valley and Mountain Sheep projects on the Snake.

New projects must be started soon because it takes from five to seven years to build a multipurpose dam. Incidentally, I believe that hydroelectric power will remain the dominant source of energy in the Northwest until nuclear energy competes in cost--a development that may materialize in 10 to 15 years. Thus, we can be hopeful that the power problem will be sdved.

The people of the Northwest generally now have a higher per capita income than the nation as a whole. If power supplies are developed in the volume required by growing demands, we can look forward, I think, to employment opportunities at good wages necessary to maintain the way of life to which we have become accustomed.

(Reference - Bonneville Power)

## PERTINENT PROJECT DATA

| ITEM | UNIT | BRUCES EDDY |
|---|---|---|
| **1. GENERAL** | | |
| a. River | | North Fork Clearwater |
| d. Drainage Area | Sq. Mi. | 2440 |
| e. Average annual precipitation - | Inches | 51.0 |
| g. Floods | Ac. Ft. | 2,157,000 |
| Maximum probable | c.f.s. | 240,000 |
| Standard Project | c.f.s. | 120,000 |
| Maximum of record | c.f.s. | 100,000 |
| h. Normal Water surface elevation | m.s.l. | 970 |
| **2. RESERVOIR** | | |
| a. Gross storage | Ac. Ft. | 2,460,000 |
| b. Usable storage flood control | Ac. Ft. | 1,433,000 |
| c. Usable storage power, normal | Ac. Ft. | 1,433,000 |
| d. Usable storage, power maximum | Ac. Ft. | 1,433,000 |
| e. Dead storage | Ac. Ft. | 1,027,000 |
| f. Normal and maximum pool elevation | m.s.l. | 1540 |
| g. Minimum pool Elevation | m.s.l. | 1370 |
| h. Length at normal pool | Mi. | 49 |
| i. Area at normal pool | Acres | 10,800 |
| **3. DAM** | | |
| a. Type | | Rock fill |
| b. Crest length | Feet | 2,400 |
| c. Top of dam elevation | m.s.l. | 1,546 |
| d. Effective height | Feet | 570 |
| e. Maximum structural height | Feet | 600 |
| **7. POWER AND ENERGY** | | |
| a. Head, maximum | Ft. | 570 |
| b. Head, minimum | Ft. | 427 |
| c. Installation No. and size of units | kw | 3 - 80,000 |
| Total | kw | 240,000 |
| d. Dependable capacity at site | kw | 240,000 |
| e. Cost of dependable capacity at site | $/kw | 14.77 |
| f. Firm energy added to system at site | Billions of kwh | 1.179 |
| Downstream | per year | 0.799 |
| Total | | 1.978 |
| g. Cost of total firm energy | mills/kwh | 1.79 |

| ITEM | UNIT | BRUCES EDDY |
|---|---|---|
| 8. COSTS | | |
| a. Project cost W/O recreation | $ | 117,533,000 |
| b. Investment cost | $ | 124,879,000 |
| c. Annual cost | $ | 4,994,000 |
| 9. ANNUAL BENEFITS (Individual basis for each project) | | |
| a. Flood control | $ | 1,954,500 |
| b. Power | $ | 8,175,000 |
| c. Total | $ | 10,666,500 |
| 10. BENEFIT-TO-COST RATIO | | |
| Without recreation facilities | | 2.14 to 1 |

# BRUCE'S EDDY REPORT

Bruce's Eddy project is a part of the Army Corp of Engineers 308 Review Report. Some of the benefits are as follows:

1. Regulate stream flow, control floods, and improve and extend navigation.

2. Provide irrigation water for many thousands of new acres.

3. Generate millions of kilowatts for prime power.

4. Assure adequate supplies of water for domestic and industrial uses.

5. Reduce stream pollution, protecting water purity and benefiting fish life, and provide for recreational use of the water areas.

6. The regions agriculture, industry, trade and services will be stimulated and extended by the economic stability assured by the plan.

7. Agricultural, mining and industrial expansion will be reflected in the metropolitan areas by increased business and the ability to support larger populations.

8. Smaller communities will grow as new farms, homes, factories, offices and stores materialize out of the broad pattern of economic expansion induced by coordinated development.

9. High land transportation costs will have a competitive system of low cost water transportation to aid and develop agriculture, mining, forestry and industry.

The following notes are taken from the Army Corp of Engineers:

1. Flood damages in the Clearwater Valley, estimated on a long term basis, will average over $1,000,000 per year.

2. A reoccurrence of the 1948 flood in the Clearwater Valley, based on present conditions of development and cost, would cause estimated damages of $3,000,000.

3. A flood of standard project magnitude, which is possible of occurrence, would be unusually disasterous and would cause estimated damages of $24,000,000.

Local flood damages in Clearwater Basin would be reduced by approximately $600,000 annually by Bruce's Eddy project alone.

Bruce's Eddy project alone would provide benefits valued at about $10,800,000 annually.

(See Pertinent Project Data Sheet for Duplication)

Bruce's Eddy project will cause only minor relocation of places of habitation, schools, industry, highways and no agricultural land will be flooded.

The 1949 winter big game survey of the U. S. Forest Service and State of Idaho Game Department indicates that the Bruce's Eddy project will not adversely affect wildlife winter habitat.

SUPPLEMENTAL INFORMATION ON REVIEW REPORT RELEASED BY DISTRICT ENGINEER

CORPS OF ENGINEERS, U. S. ARMY

WALLA WALLA DISTRICT

The report was authorized by resolution of the committee on public works of the United States Senate adopted October 5, 1951, which provided that the Board of Engineers for Rivers and Harbors review the report printed and house document No. 531 - 81st Congress - Second Session and other reports of the Columbia River and tributaries with a view of determining whether any modification of the recommendations contained therein be advisable at this time.

From this brief of data on review report, the following excerpts are taken:

"Flood problems of importance exists on main Clearwater River and at some locations on its tributaries. These problems and the major flood problems on the Lower Columbia River would be importantly benefited by upstream storage in the Clearwater River Basin. The potentiality for commercial and industrial development in the Clearwater Basin cannot be realized until substantial regulation of the flows of the Clearwater River for the prevention of flood damage is affected."

"Consideration of the factors influencing water resources planning shows that of the streams of the middle Snake River, Clearwater River is the greatest contributor to flood damages. The present favorable opportunities for storage to the interest of at site and downstream power production, use of its flows as now proposed would involve no commitment of water that would be used for irrigation or other comsumptive use and blockage of the streams at the feasible dam sites would cause negligible damage to fish runs."

"Bruce's Eddy project would provide important navigation benefits, particularly all of which would come from the advantage provided transportation of logs to mills. Benefits from this source are estimated at $537,000 annually."

"The Bruce's Eddy power plant would have, at site, dependable capacity of 240,000 kilowatts. During an assumed economic life of 50 years, the Bruce's Eddy plant would generate about $1,336,000,000 kilowatt hours annually of which about 1.179 billion kilowatt hours would be firm energy in the load."

"In addition, storage releases from Bruce's Eddy reservoir would increase the firm energy at down stream generating plants by 799,000,000 kilowatt hours annually. Power benefits credited to the project would amount to $5,693,000 for at site power; $2,482,000 for incremental firm energy made available at downstream power plants resulting in total power benefits of $8,175,000 annually."

"Based on preliminary estimates, this project has a benefit cost to ratio of 2.14 to 1."