

ENVIRONMENTAL ASSESSMENT  
FOR HYDROPOWER LICENSE

Central Oregon Siphon Power Project

FERC No. 3571-001

Oregon

Division of Environmental Analysis  
Office of Hydropower Licensing  
Federal Energy Regulatory Commission  
825 N. Capitol Street, NE  
Washington, D.C. 20426

September 24, 1987

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 DIVISION OF ENVIRONMENTAL ANALYSIS, OFFICE OF HYDROPOWER LICENSING  
 FEDERAL ENERGY REGULATORY COMMISSION

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I. APPLICATION

Central Oregon Irrigation District (applicant) filed on November 1, 1982, and supplemented on April 13, 1987, an application for a license for the proposed Central Oregon Siphon Power Project, a major unconstructed project of more than 5 megawatts (MW). The project would be located on the Deschutes River in Deschutes County, near the town of Bend, Oregon (figure 1). No federal lands or reservations would be affected.

II. RESOURCE DEVELOPMENT

A. Purpose

The proposed project would provide an estimated average of 28,110,000 kilowatthours (kWh) of electrical energy per year to the Pacific Power and Light Company.

B. Need for Power

Available data show that growth in the demand for electric power and energy will continue. Given load growth and an existing generating resource base, a need for additional generating resources can be projected to exist in the future for any power system. Additional resources would have to be obtained for any system at some time in order to meet projected additional load requirements with the same degree of reliability required by an existing criterion for the system. Timing of the need would vary in different systems depending upon such factors as the rates of load growth, the load characteristics, the available existing power resources and the reliability criteria established for each system. A power generating facility may, however, be added to a system before a generating resource deficit exists, if, over its operating life, the generating addition provides benefits that would not be available through operation of the system without the addition.

The proposed project is located in the Northwest Power Planning Council (NPPC) area within the Northwest Power Pool (NWPP) area of the Western Systems Coordination Council (WSCC) region. The NPPC, in the 1986 Northwest Conservation and Electric Power Plan, projects a northwest regional need for additional power resources by 1992 based on a medium-high load growth rate forecast (2.0 percent per year), and by 1996 based on a medium-low load growth rate forecast (1.3 percent per year). The Bonneville Power Administration (BPA) forecast, released in April 1986, and the Pacific Northwest Utilities Conference Committee (PNUCC) forecast,

issued in March 1986, show northwest regional energy deficits for mid-range load forecasts beginning in 1994 and 1993, respectively. Individual systems within the northwest region also indicate resource deficits will exist on their systems before northwest regional deficits occur.

Because of the small size of the proposed project in relation to the existing and projected generating capability in the NPPC area, the traditional approach of linking project development with a forecasted need for a specific project is inapplicable to assessing need for the proposed project.

The small size of the project ensures that the project power would be integrated into the existing generating resource base without the temporary overbuilding commonly associated with bringing large power projects on-line (i.e., initiating commercial operation). Moreover, in accordance with the Federal Power Act, the schedule for the project can be made to accommodate uncertain market conditions to some extent by the licensee's delaying commencement of construction as much as 4 years after the license is issued.

The power from the project would be useful in meeting a small part of the need for power projected by the NPPC for the northwest region. From the time the project goes on-line, it would be available to displace fossil-fueled power generation in the WSCC region, thereby conserving nonrenewable fossil fuels and reducing the emission of noxious byproducts caused by the combustion of fossil fuels.

### III. PROPOSED PROJECT AND ALTERNATIVES

#### A. Proposed Project

##### 1. Project Description

The proposed project would use an existing irrigation facility consisting of the following: (1) a diversion structure containing two 12-foot-wide, 8-foot-high radial gates; (2) a 5,996-foot-long, 10-foot-diameter siphon; and (3) a 1,400-foot-long, 10-foot-wide, trapezoidal-shaped canal. The proposed new project structure would consist of the following: (1) a 18-foot-high reinforced concrete side canal intake structure; (2) a 16-foot-high check structure, across the canal, containing two 6-foot-high, 7-foot-wide sluice gates; (3) two 800-foot-long, 84-inch-diameter steel penstocks; and (4) a 42-foot-wide, 82-foot-long powerhouse containing two generating units with an installed capacity of 5.5 MW. A transmission line, for which a separate license application has been filed with the Commission, would be constructed by Pacific Power and Light.

#### 2. Proposed Mitigative Measures

##### a. Soils and Water Quality

The applicant proposes to minimize the effects of project construction and operation on soil and water resources by the following methods: (1) conducting construction activities near the river during the dry season; (2) minimizing clearing of vegetation; (3) restricting construction activities to the smallest area possible; (4) smoothing and stabilizing slopes during final grading; (5) reseeding to provide permanent ground cover; (6) regrading and stabilizing roadbeds; and (7) using erosion control measures to limit sediment input to the stream.

##### b. Fisheries

To minimize the impacts to fish resources, the applicant proposes the following measures: (1) releasing a 400 cubic foot per second (cfs) minimum flow; (2) modifying the existing downstream fish bypass facility; (3) monitoring the efficiency of the downstream bypass facility; and (4) ramping flows during project startup and shutdown. To compensate for project impacts on fish resources the applicant proposes to make annual payments to the Oregon Department of Fish and Wildlife (DFW).

##### c. Botanical Resources

The applicant proposes to monitor the project's impact on riparian vegetation to determine how the riparian vegetation within the proposed bypass reach reacts to changes in flows.

##### d. Visual Resources

The applicant proposes use of existing facilities where possible. The powerhouse would be designed and built in a manner that is architecturally acceptable. The applicant has agreed to bury the penstock.

#### B. Alternatives to the Proposed Project

Because the applicant is not an electric utility, the available alternatives are to construct or not construct the project. If the license is not issued, the project would not be constructed, and the power that would have been developed from a renewable resource would be lost and eventually would have to be provided using nonrenewable fuels.

#### C. Alternative of No Action

No action would mean that the potential hydropower of the proposed project would not be produced; there would be no construction and no alteration of the existing environment.

IV. CONSULTATION AND COMPLIANCE

A. Agency Consultation

Commission regulations require prospective applicants to consult with the appropriate resource agencies before filing an application for license. This consultation constitutes an initial step in compliance with the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, the Pacific Northwest Electric Power Planning and Conservation Act (Northwest Act), and other federal statutes. Prefiling consultation must be complete and must be documented in accordance with the Commission's regulations. After the Commission accepts the application, concerned entities may submit formal comments during the public notice period. In addition, organizations and individuals may petition to intervene and to become a party to any subsequent proceedings. The Commission makes the comments of concerned entities part of the record, and the staff considers the comments during the review of the proposed project. After the Commission issued a public notice of the application on December 13, 1982, the following entities commented on the application or petitioned to intervene.

<u>Commenting entity</u>	<u>Date of letter</u>
Department of the Army, Portland District Corp of Engineers	February 2, 1983
Environmental Protection Agency	February 8, 1983
Forest Service	February 22, 1983
Department of the Interior	March 14, 1983
<u>Intervenor</u>	<u>Filing date of petition</u>
Sunrise Village Homeowners	February 18, 1983
Oregon Department of Fish and Wildlife	March 7, 1983

The applicant responded to the petitions of the Sunrise Village Homeowners and the Oregon Department of Fish and Wildlife by filings dated March 29 and April 25, 1983, respectively.

B. Water Quality Certification

Water quality certification, as required by section 401 of the Clean Water Act, was waived for the proposed project by the Oregon Department of Environmental Quality, on September 23, 1982.

C. Pacific Northwest Power Planning and Conservation Act

Under section 4(h) of the Pacific Northwest Power Planning and Conservation Act (Act), the Northwest Power Planning Council (Council) developed the Columbia River Basin Fish and Wildlife Program (Program) to protect, mitigate, and enhance fish and wildlife resources associated with development and operation of hydroelectric projects within the Columbia River Basin (Basin). Section 4(h) states that responsible federal agencies should provide equitable treatment for fish and wildlife resource's in addition to the other purposes for which hydropower is developed. Section 4(h) further states that these agencies shall take into account to the fullest extent practicable, the Program adopted under the Act.

The Program directs agencies to consult with federal and state fish and wildlife agencies, appropriate Indian Tribes, and the Council during the study, design, construction, and operation of any hydroelectric development in the Basin. At the time the application was filed, the Commission's regulations required applicants to initiate pre-filing consultation with the appropriate federal and state fish and wildlife agencies and the Tribes, and provided these groups with postfiling opportunities to review and to comment on the application. This consultation process has occurred.

The Program states that authorization for new hydroelectric projects should include conditions of development that would mitigate the impacts of the project on fish and wildlife resources. The relevant federal and state fish and wildlife agencies have reviewed and commented on the application. In addition, any license issued would provide for mitigative measures to protect fish and wildlife resources and therefore, is consistent with section 1200 of the Program. Further, a condition of any license issued would reserve to the Commission the authority to require future alterations in project structures and operation in order to take into account, to the fullest extent practicable, the applicable provisions of the Program.

D. Oregon Hydroelectric Policy Legislation

In 1985, the Oregon legislature adopted a policy permitting the siting of hydroelectric facilities, subject to standards for protecting the state's important natural resources. The policy, contained in the House Bill 2990, places the following natural resources under the following standards. An applicant must: (1) cause no mortality or injury to anadromous fish resources or losses of fish habitat, unless the applicant proposes to modify an existing facility so as to restore, enhance, or improve an anadromous fish population within the river system; (2) cause no net loss of wild gamefish or recreational opportunities; (3) maintain or enhance water quality, wildlife, scenic

and aesthetic values, and historic, cultural, and archaeological sites; (4) consolidate reviews of cumulative impacts resulting from existing and proposed projects; and (5) make the hydroelectric development consistent with the Council's Program.

House Bill 2990 directs only certain Oregon resources agencies to follow these standards when authorizing hydroelectric development. As noted earlier, the applicant, before filing, consulted with the proper federal agencies, state agencies, and Tribes, which also were given opportunities for review and comment after the application was filed and public noticed. The Oregon Department of Environmental Quality (DEQ) also waived section 401 water quality certification. In addition, any license issued for this project would contain measures to protect and maintain the natural resources identified by the legislature, as discussed in this environmental assessment, and therefore would be consistent with the standards of House Bill 2990.

#### V. ENVIRONMENTAL ANALYSIS

##### A. Proposed Project

##### 1. General Description of Locale

The proposed project area is a high lava plateau of Central Oregon. The project site is located in a canyon cut by the Deschutes River into volcanic rock. The canyon is 50 to 100 feet deep and 400 to 1,000 feet wide. The elevation is about 3,700 feet.

The climate in the project vicinity is characterized by warm, dry summers and cold, wet winters. Average annual precipitation is 12 inches and most precipitation occurs as snow.

##### 2. Geology and Soils

Affected Environment: The proposed project would be located in the high lava plateau of Central Oregon. Bedrock consists of lava basalts and welded ash flow tuffs and pumice. The proposed penstock intake site at the Central Oregon Canal and most of the penstock route would be located on a generally level terrace having gravelly to silty sand pumaceous soils. The penstock would descend a steep basalt slope. This slope has some broken rock talus, and relatively thin pumaceous sandy soils, varying amounts of gravel, and alluvial soils of very silty gravelly, fine to coarse sand containing cobbles and boulders. The pumaceous residual soils have a high potential for erosion (Central Oregon Irrigation District, 1982).

Environmental Impacts and Recommendations: The applicant's land-clearing, excavation, and other land-disturbing activities during site access, project construction, and spoil disposal would increase the potential for erosion and sediment loss, particularly in the pumaceous soils of the new powerhouse and tailrace sites. Some minor slope instability may also occur on steeper slopes and on banks of the penstock route. The applicant could minimize project-related erosion, sedimentation, and unstable slope problems by carefully planning and implementing appropriate control measures, including the applicant's general proposals for scheduling construction after consulting with the resource agencies, using cofferdams, and carefully grading and revegetating cut slopes and spoil disposal sites. The licensee, after consultation with the appropriate resource agencies, and before beginning any project related land-clearing, land-disturbing, or spoil-producing activities, should file with the Commission a site-specific comprehensive plan for controlling erosion and sediment, and for maintaining slope stability.

Unavoidable Adverse Impacts: Some minor erosion and sedimentation would be unavoidable during project construction. Some localized, minor, unstable slope conditions might also be unavoidable.

##### 3. Water Resources

Affected Environment: The Deschutes River originates in the Cascade Mountains and flows along the eastern slopes for about 250 miles north to the confluence with the Columbia River. The existing irrigation diversion is located near river mile 170 of the Deschutes River. Streamflow in the project area is controlled by three upstream storage reservoirs. Irrigation is the major consumptive water use and largely determines streamflow from late March through mid-October in the project area. Other water uses in the proposed project area include fishing and boating.

Historical flows in the Deschutes River at the proposed project site have ranged from a minimum of 363 cfs on January 27, 1962, to a maximum of 5,000 cfs on November 27, 1909. The average annual flow is 1,237 cfs. Maximum monthly flows occur during the summer irrigation season and average 2,306 cfs in July; minimum monthly flows occur in winter when upstream reservoirs store water and average 804 cfs in December.

Water quality in the Deschutes River is generally good. Monthly water samples collected 5 miles downstream of the existing diversion site from 1977 through 1981 show the following: dissolved oxygen levels are near saturation (8.8 milligrams per liter (mg/l)); water temperature ranges from 32 to 68 degrees Fahrenheit; pH ranges from 6.8 to 8.3; turbidity ranges from 1 to 10 Formazin Turbidity Units; and total hardness ranges from 15 to

24 mg/l calcium carbonate. Generally, water quality in the Deschutes River at the project site meets state standards established for the Deschutes River Basin. (Central Oregon Irrigation District, 1982).

Environmental Impacts and Recommendations:

Sedimentation and Turbidity

Ground-disturbing activities during project construction would temporarily increase the turbidity and sedimentation levels in the Deschutes River. Increases in turbidity and sedimentation, and accompanying negative effects on aquatic resources, are among the most significant construction-related effects of hydroelectric development (Rochester et al., 1984). To minimize the introduction of sediment into the Deschutes River, the applicant proposes to implement an erosion and sediment control plan and to consult with DFW and U.S. Fish and Wildlife Service (FWS) to determine the timing for construction activities.

Implementing an erosion and sedimentation control plan would minimize the amount of sediment introduced to the Deschutes River. To minimize the quantity of sediment introduced to the river, the licensee should consult with the DEQ, DFW, and FWS, on the detailed erosion and sedimentation control plan (see section on geology and soils).

Unavoidable Impacts: Minor, temporary increases in turbidity and sedimentation would be unavoidable during construction. During project operation, existing flows below the point of diversion would be reduced.

4. Fishery Resources

Affected Environment: The Deschutes River in the project area supports a coldwater fishery comprised predominately of brown trout (*Salmo trutta*) and rainbow trout (*Salmo gairdneri*). Other resident species include kokanee salmon (*Oncorhynchus nerka*), mountain whitefish (*Prosopium williamsoni*), brown bullhead (*Ictalurus nebulosus*), brook trout (*Salvelinus fontinalis*), and tui chub (*Gila bicolor*). Young brown and rainbow trout collected during surveys in 1984, indicates that natural reproduction may occur in the project area (Timberline Reclamations, Inc., 1985). Fish habitat maps of the Deschutes River prepared by DFW show limited spawning gravel locations in the project bypassed reach.

FWS believes that the proposed project would not affect federally listed threatened or endangered species (personal communication, Jim Bottoroff, Office of Endangered Species, U.S. Fish and Wildlife Service, Department of the Interior, Olympia, Washington, May 25, 1983).

Environmental Impacts and Recommendations

Sedimentation and turbidity

The increased sediment and turbidity levels resulting from construction activities would have minor, short-term adverse effects on the fish resource in the project area. Construction-induced sedimentation and turbidity may reduce visibility, disrupt spawning, and smother aquatic food organisms (Rochester, et al., 1984). Peters (1967) shows that under natural conditions, fish do not remain in areas of high turbidity. The likely response of fish in the project area to increased turbidity levels, therefore, would be temporary emigration from the affected area. Implementing appropriate measures to control erosion and sedimentation would limit the disturbance to and protect the resident fish resource (See the section on geology and soils).

Minimum Flows

Project operation would reduce streamflow in the 1.4-mile-long bypassed reach and would reduce the habitat available to the fish resources in the Deschutes River. Decreases in streamflow in many western streams affect fish resources, primarily by reducing usable habitat (Loar and Sale, 1981). The proposed project would operate all year. On an average annual basis, 55 percent of the streamflow would remain instream, 20 percent would be withdrawn for irrigation, and 25 percent would be diverted for power production (figure 2).

The applicant conducted on the Deschutes River an instream flow study in which spawning and rearing of resident trout were considered. Based on the study results and after DFW's and FWS's review of the results, the applicant proposes a 400-cfs minimum flow in the bypassed reach of the Deschutes River. DFW and FWS agree with the applicant that the 400-cfs minimum flow, in combination with the applicant's proposed mitigation agreement with DFW discussed in a following section, would protect existing fish resources.

Results of the applicants instream flow studies show that below discharges of 800 cfs, the channel margins, which contain the only substrate available for spawning in the bypassed reach, become increasingly dewatered. These studies further show that above 1000 cfs, the water depth and velocity along the channel margins becomes progressively deep and fast, respectively, and adversely impacts trout spawning habitat. Brown trout spawning in November and December would be adversely impacted as channel margins in the bypassed reach would be dewatered at the 400 cfs minimum flow release. Rainbow trout spawning habitat in the bypassed reach would be adversely impacted in April, as streamflow would be well below 800 cfs. Project diversion of water in May and June would increase the rainbow trout spawning habitat, as streamflow in the bypassed reach would be reduced to about 1000 cfs.

Diverting 25 percent of the natural flow from the Deschutes River during project operation would reduce the available fish habitat in the 1.4-mile-long bypassed reach. To protect the resident fish resources in the Deschutes River during project operation, it would be necessary to maintain suitable streamflows in the bypassed reach. The applicant's proposed 400-cfs minimum flow along with the habitat enhancement provided for in the agreement with DFW discussed below, would adequately protect the fish resources in the Deschutes River.

DFW and FWS recommend, and the applicant agrees that the 400-cfs minimum flow be released automatically to the bypassed reach and to monitor the streamflow in the bypassed reach. The automatic release and monitoring of the 400-cfs minimum flow would be essential to ensure full protection of the fish resource in the bypassed reach. Therefore, the licensee should modify the diversion structure to release the minimum flow automatically and should install appropriate stream gages in the bypassed reach of the Deschutes River to monitor the minimum flow releases.

#### Ramping Rate

Rapid alteration of streamflows during project startup would strand fish in the bypassed reach and downstream of the project tailrace when submerged areas quickly drain, because of rapid decreases in the amount of water available to maintain existing habitat. DFW and FWS recommend that the applicant consult with them to limit the maximum rate of change in river flow between the diversion and powerhouse. The applicant agrees to consult with DFW and FWS to determine an appropriate ramping rate. To protect the fish resource from rapid, project-induced flow reductions, the licensee should limit the maximum rate of change in the flow of the Deschutes River.

#### Downstream Fish Passage

Fish moving downstream during project operation would continue to be injured upon passing through the existing downstream fish passage facility, which consists of a louver fish diverter and a bypass conduit. Currently, fish emerging from the discharge pipe of the bypass conduit strike a metal deflector wall (Central Oregon Irrigation District, 1982).

DFW and FWS recommend that the applicant: (1) modify or replace the existing downstream fish passage facility to DFW specifications; (2) conduct a 1-year study to evaluate the efficiency of the modified downstream fish passage facility and to determine associated fish losses; and (3) make any additional modification to the facility that, based on the study results, are found necessary to protect the fish resource. The applicant agrees, after consulting with DFW and FWS, to modify or replace the existing downstream fish passage facility. Further, the applicant agrees to conduct

a study to determine the efficiency of the modified downstream passage facilities and to quantify the associated fish losses, and to further modify project facilities if necessary to minimize impacts to the fish resource.

Modifying the fish bypass facilities so that fish do not strike the metal deflector wall would improve downstream fish passage and would protect the fish resources during project operation. To minimize injury of downstream migrating fish, the licensee should modify the bypass conduit so that fish returning to the Deschutes River avoid striking the metal deflector wall. Further, the licensee should cooperate with DFW and FWS to monitor the efficiency of the downstream fish passage facility, to determine associated fish losses and to propose reasonable adjustments to the facilities for improving its performance. Implementation of such a program by the licensee would ensure that the downstream fish passage facilities operate properly.

#### Mitigation and Enhancement Agreement

An agreement between DFW and the applicant was developed to ensure that no net loss of fish would result from construction and operation of the proposed project. In addition to setting a 400-cfs minimum flow in the bypassed reach, the agreement provides for the licensee to make annual payments ranging from \$45,000 to \$95,000 to DFW upon commencement of construction and for the duration of any license issued. DFW would apply the payments to a mitigation program that would, among other items, provide for construction of submerged weirs to reduce water velocities and to maintain the wetted stream perimeter, placement of spawning gravels, and instream boulders, woody debris, and wing dikes for cover in the bypassed reach. DFW would also use the funds for spawning habitat improvements in the upper Deschutes River, outside the project area.

The agreement contains a provision which recommends that the agreement be made a condition of the license and that DFW would not object to issuance of the license for the Central Oregon Siphon Power Project if the signed agreement is included as a license condition.

FWS by letter to the applicant dated March 27, 1987, supports the signed mitigation and enhancement agreement between the applicant and DFW. Further, FWS requests that it be included in the consultation process of the agreement and that the agreement be made a condition of the license. Condition H of the agreement would require that all interested federal, state, and local governmental agencies be consulted in determining the appropriate scope, specifications, and location of the mitigation and enhancement work and facilities.

The provisions of the agreement would enhance trout spawning habitat in the Deschutes River and mitigate for impacts that construction and operation of the proposed project would have on resident trout spawning and rearing habitat. The agreement

between the applicant and DFW, contained as Attachment I of the Revisions to the License Application filed April 13, 1987, would provide for adequate mitigation of project impacts to the fish resources and would enhance the fish resource in the Deschutes River.

Unavoidable Adverse Impacts: Minor, short-term disruption of the fish resources would occur as a result of construction related increases in turbidity and sedimentation levels. The diversion of flow for project operation would result in minor, long-term reductions in the amount of spawning and rearing habitat available for the fish resources in the bypassed reach. Some of the fish that enter the downstream fish bypass facility would be subject to injury and mortality.

#### 5. Vegetation and Wildlife Resources

Affected Environment: The proposed project is in the ponderosa pine shrub forest vegetation type (Bailey 1980). Three vegetation communities would be affected by construction and operation of the proposed project: (1) an open ponderosa pine-shrub woodland; (2) a closed canopy ponderosa pine forest, and (3) a riparian community along the Deschutes River (Central Oregon Irrigation District, 1987).

The open ponderosa pine-shrub community on the dry bench above the river is comprised of ponderosa pine (Pinus ponderosa) with an understory of bitterbrush (Pursillia tridentator), squaw current (Ribes cereum), tall grey rabbitbrush (Chrysothamnus nauseosus), and tall green rabbitbush (C. visidiflorus). The closed canopy ponderosa pine type grows on the steep hillsides along the east side of the river. Ponderosa pine is the dominant species with a few western juniper (Juniperus occidentalis) scattered throughout the forest. Understory plants are scarce in this vegetative type and a deep litter layer has developed. The riparian community occurs in patches along the river. Mountain alder (Alnus incana) forms almost pure stands, reaching heights of 20 to 30 feet. In other areas, snowberry (Symphoricarpos albus), saskatoon berry (Amelanchier alnifolia) and Spirea sp. are mixed with the alder or occur alone. Bulrushes (Scirpus sp.), grasses, and herbaceous species occur along the edges of larger pools.

Wildlife inhabiting the general project area include mule deer (Odocoileus hemionus), coyote (Canis latrans), porcupine (Erethizon dorsatum), golden-mantled ground squirrel (Spermophilus lateralis), and a variety of songbirds and raptors. The Deschutes River and adjacent riparian areas provide habitat for many species not typically found in adjacent upland sites. Among them are otter (Lutra canadensis), mink (Mustela vison), raccoon (Procyon lotor), mallard (Anas platyrhynchos), dippers (Cinclus mexicanus) and spotted sandpipers (Actitis macularia).

The only threatened or endangered species in the project area is the bald eagle (Haliaeetus leucocephalus). It is occasionally observed along the river, but no nest sites have been identified in the area (Central Oregon Irrigation District, 1987). The U.S. Fish and Wildlife Service believes that the proposed project would not affect federally listed threatened or endangered species (personal communication, Jim Bottoroff, Office of Endangered Species, U.S. Fish and Wildlife Service, Olympia, Washington, May 25, 1983).

Environmental Impacts and Recommendations: About 1.8 acres of open ponderosa pine-shrub woodland and about 0.25 acre of closed ponderosa pine forest would be disturbed during construction of the proposed penstock. Another 0.5 acre of closed ponderosa pine forest would be disturbed during construction of the access road to the proposed powerhouse. Since the two ponderosa pine habitat types are common throughout the project area, the disturbance or loss of about 2.5 acres of this habitat would be insignificant to wildlife in the area. Construction and operation of the proposed project would have only minor impacts on riparian vegetation along the Deschutes River. During construction of the proposed powerhouse, a small area, less than 0.5 acre of ponderosa pine, alder, and bullrushes would be removed. The loss of this small amount of riparian habitat would have minimal impact on furbearers, songbirds, and other wildlife associated with the riparian zone.

Diverting river flows for project operation could affect riparian vegetation within the 1.4-mile-long bypass reach. Any adverse impacts, however, are expected to be minor because during much of the growing season flows would be greater than 1,000 cfs. Only in April would flows be expected to fall to the minimum flow of 400 cfs. The 1,000 cfs flow would be sufficient to wet the banks of the river (Central Oregon Irrigation District, 1987). The 1,000-cfs flow should provide sufficient moisture to minimize adverse effects on riparian vegetation within the bypass reach.

During the 15-month-long construction period, noise and human activity would disturb local wildlife populations. Because of the short duration and the absence of particularly sensitive species, the effect on local wildlife populations would be minor.

Unavoidable Adverse Impacts: About 2.5 acres of ponderosa pine forest would be disturbed during construction of the proposed facilities. A small area of riparian habitat would be eliminated at the site of the proposed powerhouse. Diverting flows from the river during project operation could have a minor adverse impact on riparian vegetation within the proposed bypassed reach. Wildlife on the immediate project area would be disturbed during construction.



## 6. Recreation and Other Land and Water Uses

Affected Environment: Recreational use in the project area includes fishing, whitewater rafting and kayaking, hunting, hiking, horseback riding, photography, wildlife viewing and sightseeing, camping, and picnicking. These recreational opportunities along with others in the Bend, Oregon area, notably skiing, support a tourism industry that is an important part of the local economy. Recreational facilities within 2 to 8 miles of the project community parks include two state parks and national forest lands that provide public access to the Deschutes River or its tributaries.

The project would be located within a reach of the Deschutes River that has been included on the Nationwide Rivers Inventory (NRI), maintained by the National Park Service. The NRI is a list of rivers that meet the minimum criteria for potential designation and legal protection as a National Wild and Scenic River. The outstanding, remarkable values of the Deschutes River, which justified the river's inclusion on the NRI, are survey, recreation, geology, and fishing (National Park Service, 1982).

Other land and water uses within the project vicinity include open space, single and multiple family residences, industry, and water systems for agricultural and municipal uses.

Environmental Impacts and Recommendations: The applicant proposes to provide a 6,400-foot-long fisherman foot access trail to the powerhouse area, along with providing signs and one chemical toilet. The applicant developed this recreation mitigation plan after consulting the Oregon Comprehensive Outdoor Recreation Plan. This plan indicates a need to develop fishing access to Oregon's rivers and streams.

By letters dated October 7 and October 15, 1982, the National Park Service and Bend Metro Park and Recreation District, respectively, concur with the proposed recreational development. The staff concurs with the applicant and the agencies that the proposed recreational development would meet a need of the region and thus should be developed as a requirement of any license issued. The proposed project would affect the scenic and recreational values for which the Deschutes River is listed on the NRI as a result of the diminished flows in the bypass reach, especially with respect to the existing whitewater in this 1.4-mile section of the river. The reduction in flows (less than 1,200 cfs) would create an impediment to existing whitewater boating use of this part of the river, limiting use of the resource to experienced boaters (Deschutes County, 1986). The range of recreational opportunities provided by the Deschutes River is highly valued by local residents (Deschutes County, 1986).

Although the number of boaters presently utilizing this reach of river is limited, the study conducted by Deschutes County

indicates that whitewater boating is a popular and growing activity. In addition, the commercially rafted reach of the river immediately upstream serves to introduce potential boaters to the resource. The recreational demand for use of the reach of the river affected by the project is likely to continue to grow. In order to provide for future use of the affected reach should the numbers of boaters increase significantly, the licensee should be required to develop a plan to monitor whitewater boating use in consultation with the appropriate agencies, and to recommend measures pursuant to article 17 should additional flows or other measures be needed to accommodate whitewater boating use.

To provide any potential future whitewater boating use, the licensee should be required to develop a plan to provide for whitewater boating use in the future should the need arise. The plan should consider the need for flows, put-in and take-out facilities, and include a system for monitoring the use of available boating opportunities, in order to allow adjustments in the plan after a period of operation.

## 7. Cultural Resources

Affected Environment: A cultural resources survey of the proposed project area has been conducted. No properties have been identified in the area of the project's potential environmental impact as listed on or eligible for listing on the National Register of Historic Places. The State Historic Preservation Officer (SHPO) has reviewed the results of the survey and concurs that the project would not impact National Register listed or eligible properties. The results of the survey and the SHPO's concurrence with the no effect determination are based on the proposed method of construction and operation, and especially the proposed project location, and design that are described in the application for license and any subsequent filings by the applicant.

Environmental Impacts and Recommendations: The results of the survey conducted for the proposed project area, as well as the SHPO's comments on the results of the survey and the proposed project, contemplate that the project would be constructed as described in the application without significant changes. Changes to the project, especially to the proposed location and design of a project, are occasionally found to be necessary after a license has been issued, and may require an application to amend the license. Under such circumstances, whether or not an application for amendment of license is required, the survey results nor the SHPO's comments would depict more reliably the cultural resources impacts that would result from developing the project. Therefore, before beginning land-clearing or land-disturbing activities within the project boundaries, other than those specifically authorized in the license, and previously commented on by the SHPO, the licensee should consult with the SHPO about the need to conduct additional archeological or historical surveys and to implement further avoidance or mitigative measures.

Also, land-clearing and land-disturbing activities could adversely affect archeological and historic properties that were not identified by the cultural resources survey previously conducted in the project area. Therefore, if the licensee encounters such sites or properties during the development of project works or related facilities, the licensee should stop land-clearing and land-disturbing activities in the vicinity of the sites or properties and consult with the SHPO on the eligibility of the properties and to carry out such measures as may be necessary to avoid or mitigate effects on the properties.

In either of these instances, 60 days before starting land-clearing or land-disturbing activities, associated with any changes to the project necessitated and proposed, and 60 days before resuming land-clearing and land-disturbing activities in the vicinity of the sites or properties discovered, the licensee should file a plan and a schedule for conducting the appropriate studies along with a copy of the SHPO's written comments concerning the plan and the schedule. The licensee should not start or resume land-clearing or land-disturbing activities, other than those specifically authorized in this license and commented on by the SHPO, or resume such activities in the vicinity of an archeological or historic property discovered during construction, until informed by the Commission that the requirements discussed above have been fulfilled.

Unavoidable Adverse Impacts: None.

#### 8. Visual Resources

Affected Environment: The high visual quality of the project area is due to highly scenic geological features, diverse vegetation, stream characteristics, and the limited amount of manmade development. The proposed project is within a canyon of the Deschutes River, where the canyon walls are composed of steep slopes and cliffs. The canyon varies from 50 to 100 feet deep and from 400 to 1,000 feet wide and dominates the landscape character of the area. The vegetation in the canyon is an open forest of ponderosa pine and western juniper which add both good color and textural variety. Sagebrush and grass occur beyond the riverine habitat. Stream characteristics include impressive stretches of whitewater caused by the steep gradient of the stream, large rocks and boulders, and characteristic flows averaging 1,237 cfs. The landscape character has some manmade structures which are visually subordinate to the canyon. They include an irrigation inlet structure, a ditch and a few residences along the river. Sensitivity for visual quality in the project area is low at the proposed water diversion due to inaccessibility and moderate at the powerhouse area due to the existing intervening residences and adjacent viewing locations. The local land use management zone of the project area permits construction and operation of hydroelectric generating plants as a conditional use.

Environmental Impacts and Recommendations: The proposed project facilities would contrast with the natural character of the area creating a moderate adverse visual impact. The originally proposed diversion structure would have been in extreme contrast with the visual quality of the river. However, in the revised application (Central Oregon Irrigation District, 1987), the applicant removed this structure from the proposal and replaced it with an improved intake structure in the existing canal, eliminating this impact. The powerhouse, switchyard, and equipment building would also have a significant adverse impact. They should be constructed using materials, colors, and textures which blend with the surrounding area. They should be positioned and designed to have as low a profile as possible. All project facilities should be screened and landscaped. The applicant originally proposed providing 200 cfs as the minimum flow and burial of about 500 feet of the penstocks leaving about 300 feet visible. Upon additional consultation with adjoining landowners to reach agreements that would minimize impacts to visual resources, the applicant agreed to a 400-cfs minimum flow and complete burial of the 800-foot-long penstock (Brooks Resources Corporation Agreement, 1986, and Sunrise Village Association Agreement, 1987). Adherence to the visual resource conditions of these agreements (Brooks Resources Corporation Agreement, 1986, and Sunrise Village Association Agreement, 1987) should be a requirement to ensure protection of visual quality.

Unavoidable Adverse Impacts: Additional manmade structures would contrast slightly with the natural character of the area creating a moderate adverse visual impact.

#### 9. Socioeconomic Considerations

Affected Environment: The population of Deschutes County increased from 23,100 persons in 1960 to 30,442 in 1970. During the 1970's, the number of county residents more than doubled, reaching 62,142 persons in 1980 (personal communication, Lois Klein, Statistical Information Assistant, Bureau of the Census, Suitland, Maryland, March 13, 1987). The gain of 31,700 persons during that decade resulted in part from the growth of local manufacturing employment from 2,582 workers in 1969 to 4,171 workers in 1979 (U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, Table 25 [unpublished] April 1986). Expansion of the county's tourist facilities also generated many local job opportunities. Specifically, during the 1970-80 decade, a major ski area (Mt. Bachelor) and three large resort and vacation home communities (Sun River Lodge and Resort, Inn of the Seventh Mountain, and Black Butte Resort) were developed in the county. Since 1980, population growth in Deschutes County has slowed considerably. The Bureau of the Census estimates that the county's population as of July 1, 1985, totaled 66,600 (personal communication, Lois Klein, Statistical Information Assistant, Bureau of the Census, Suitland, Maryland, March 13, 1987).

The economy of Deschutes County traditionally has been dependent upon logging and the manufacture of lumber and wood products. According to the latest (March 1984) census data, 2,562 workers are employed in the country to produce lumber, millwork, veneer, plywood, particleboard, mobile homes, and other wood products (personal communication, Andrew Pekala, Survey Statistician, Bureau of the Census, Suitland, Maryland, March 13, 1987).

Tourism and outdoor recreation generate substantial employment and income in Deschutes County. The tourism-recreation industry in Deschutes County includes a large collection of resorts, motels, campgrounds, restaurants, gift shops, gasoline service stations, and other business establishments that derive most of their revenue from the sale of goods or services to nonlocals (i.e., transients) who come to enjoy the area's dry, sunny climate; majestic, snow-capped mountains; pine forests; fishing, boating, and rafting on the Deschutes River; lakes and reservoirs; and geologic attractions.

Since 1970, the tourist sector has undergone a significant change. Before then, the county lacked a major ski area. Mt. Bachelor now attracts significant numbers of tourists during the winter and early spring, when transient accommodations in the county used to experience extremely low occupancy levels. Before 1970, the county's motel and hotel inventory consisted almost exclusively of small minimum-amenity motels. Today, three major resort and vacation home communities attract visitors. Specifically, Sun River Lodge and Inn of the Seventh Mountain offer canoeing, whitewater rafting, and fishing on the Deschutes River. In addition, Mt. Bachelor Village, a vacation-oriented condominium project, attracts visitors to the river.

A recent study of the tourism industry in Deschutes County (Ragatz Associates, 1985) concluded that in 1984: (1) a total of 376,488 nonresidents spent one or more nights in the county; (2) their average length of stay in Deschutes County was 5.6 days; (3) the resultant 2,108,333 visitor-days spent in the county generated local expenditures totaling \$87,192,000; and (4) this spending created the equivalent of 2,400 year-round jobs in the county.

Tourists, in addition to renting rooms or campsites, buying meals in restaurants, and purchasing groceries, drugs, gifts, and gasoline, spend money to acquire homesites, single-family houses, condominium apartments and townhouses, time shares in second home resorts, and memberships in recreational vehicle campgrounds. Real estate developers have constructed a considerable number of year-round subdivisions as well as recreation land and second home projects along the Deschutes River in Deschutes County. Data from the latest Census of Housing indicate that, in 1980, there were 2,845 second homes in Deschutes County, approximately

1,800 more than the number of second homes counted in 1970 (personal communication, Robert Bonnette, Statistician, U.S. Bureau of the Census, Suitland, Maryland, August 20, 1984). Although the exact number of primary and vacation homes in Deschutes County situated along or near the Deschutes River have not been determined, there probably are at least 3,000 housing units there. In general, their owners prefer to maintain the quality of the aesthetic environment.

Farming represents the third most important income generator in Deschutes County. In 1982, the 876 farms in the county received \$14,485,000 from the sale of crops, livestock, and livestock products. This amount included \$3,874,000 for cattle and calves, \$3,731,000 for horses and ponies, \$2,714,000 for dairy products, \$607,000 for nursery and greenhouse products, \$409,000 for wheat, and \$348,000 for sheep, lambs, and wool (personal communication, Janet Allen, Statistical Information Assistant, Bureau of the Census, Suitland, Maryland, March 13, 1987).

Environmental Impacts and Recommendations: During the 15-month construction period, noise, dust, and exhaust emissions produced by construction vehicles and machinery could adversely affect residential areas located near the project site. The project, however, would not displace any households or business establishments nor impact any agricultural land (Central Oregon Irrigation District, 1982).

Construction activities would require the onsite employment of an average of 35 and a maximum of 50 persons (Central Oregon Irrigation District, 1982). Most construction personnel would be county residents who would drive daily to the site. Some workers, however, would be nonlocals who would commute on a weekly basis. Because of the relatively short construction period, a maximum of three workers would relocate with their families. Consequently, the project would not have a significant impact on the demand for local housing or public services.

The estimated \$1.9 million construction payroll, and the subsequent spending by construction personnel at retail and service establishments in the county, would be a favorable local impact.

Project operation would not produce any significant direct socio-economic impacts, either favorable or unfavorable. Only one permanent job would be created, producing an annual payroll of about \$30,000 (Central Oregon Irrigation District, 1982). Because the applicant is a public entity, the completed facilities would not generate local property taxes.

Unavoidable Adverse Impacts: Noise, dust, and exhaust emissions from project-related vehicles and onsite construction machinery would disturb nearby residents.

## 10. Cumulative Environmental Analysis

The staff analyzed the potential of the three proposed hydroelectric projects in the upper Deschutes River Basin to contribute to cumulative adverse impacts on the basinwide target resources identified by the staff (recreational resources, socioeconomic resources, and wild trout spawning habitat). The staff determined that these three projects would not contribute to significant cumulative adverse impacts on the basinwide target resources (Federal Energy Regulatory Commission, 1987).

### B. Alternative of No Action

Implementing the no-action alternative would not change the existing physical or biological components of the area, but would preclude the use of the renewable water resources of the Deschutes River to generate electricity.

### C. Recommended Alternative

The proposed project is the preferred alternative, because electricity generated from a renewable resource would be sold to the Pacific Power and Light Company, thus lessening the use of existing fossil-fueled, stream-electric plants, and because the environmental effects that would result from constructing and operating the project would not be major and would be adequately mitigated.

## VI. FINDING OF NO SIGNIFICANT IMPACT

Construction of the project would cause short-term increases in erosion, sedimentation, and turbidity levels in the Deschutes River and would produce noise, dust, exhaust emissions, and additional traffic. Additional man-made structures would contrast slightly with the natural landscape character producing a long-term visual impact. Minor, short-term reductions in the quality of fish habitat would result from project construction. Operation of the project would injure fish upon passing through the bypass conduit but would only cause minor fish losses.

The project would not affect any federally listed threatened or endangered species nor any sites or structures listed on or eligible for listing on the National Register of Historic Places.

This environmental assessment was prepared in accordance with the National Environmental Policy Act of 1969. On the basis of the record and of the staff's independent environmental analysis, issuance of a license for the Central Oregon Siphon Power Project would not constitute a major federal action significantly affecting the quality of the human environment.

## VII. LITERATURE CITED

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Timberline Reclamations, Inc. 1985. Central Oregon Irrigation District; Central Oregon Siphon Project: Findings and conclusions on the existing fishery and project related impacts. Bozeman, Montana. 57 pp.

VIII. LIST OF PREPARERS

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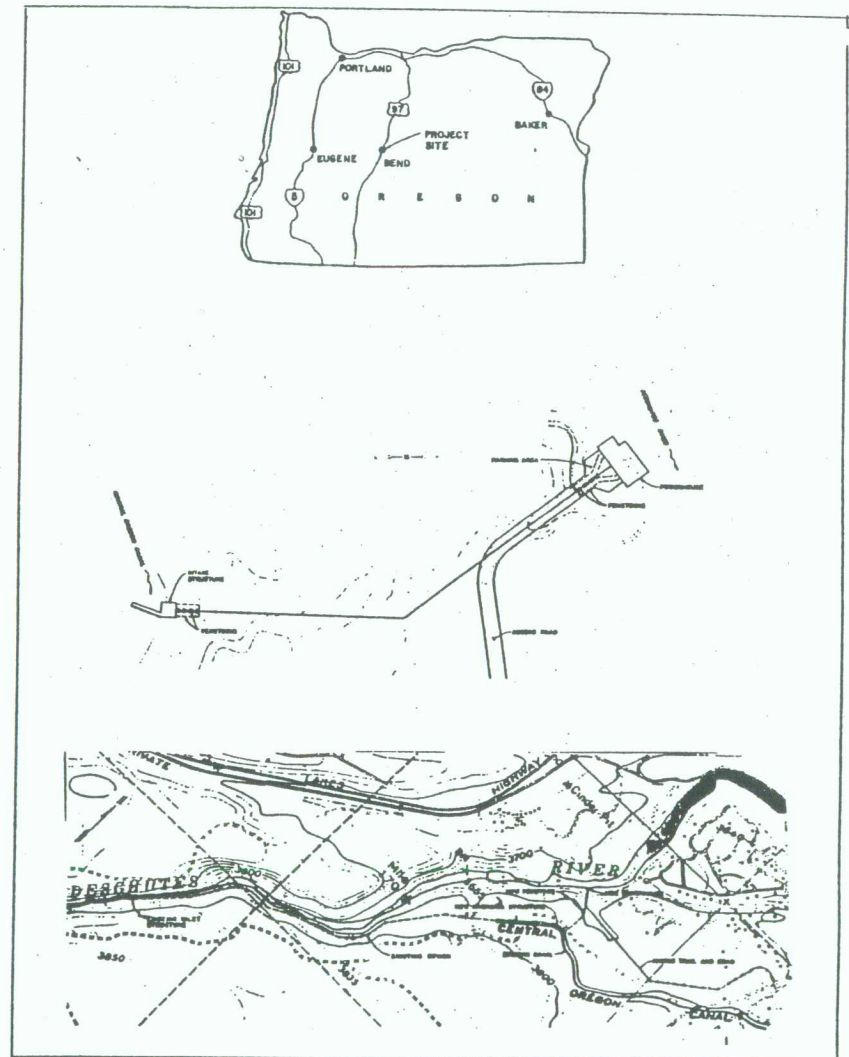


Figure 1. Project location and layout of facilities for the proposed Central Oregon Siphon Power Project, FERC No. 3571, Oregon (Source: the staff, modified from Central Oregon Irrigation District, 1987, application, exhibit G).

SAFETY AND DESIGN ASSESSMENT  
CENTRAL OREGON SIPHON POWER PROJECT  
FERC NO. 3571-002, OR

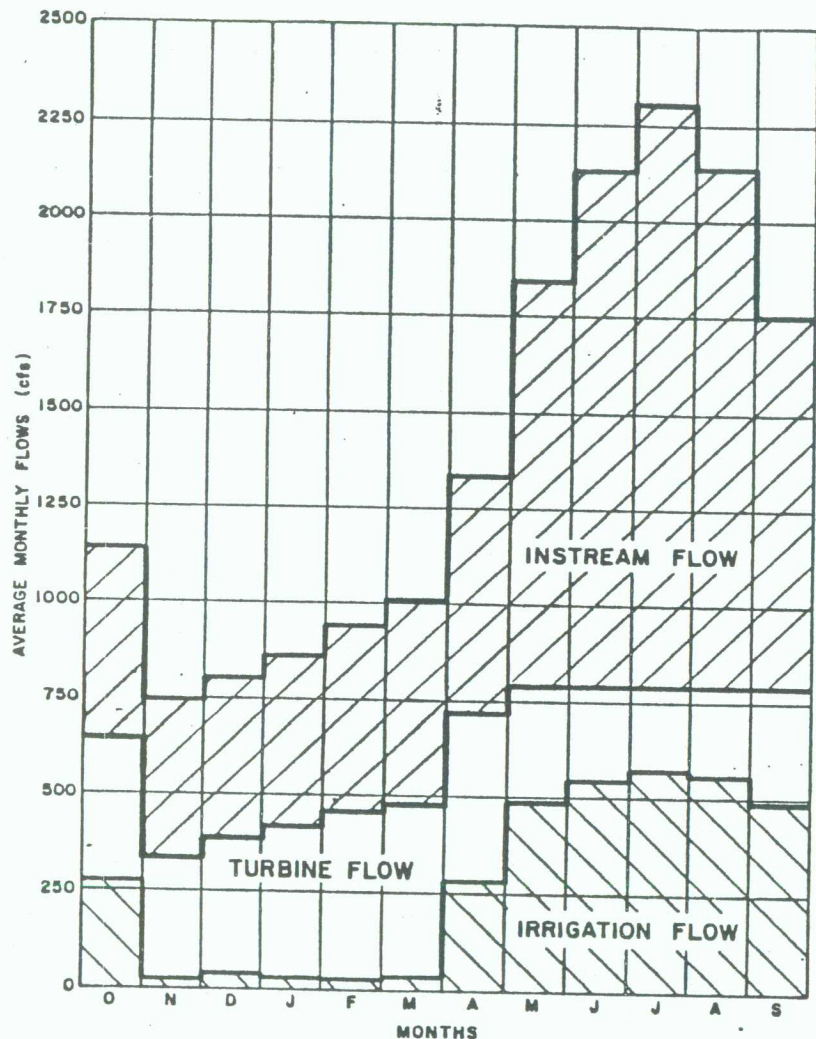


Figure 2. Average monthly flow distribution during operation of the Central Oregon Siphon Power Project (Source: Central Oregon Irrigation District, 1987).

DAM SAFETY

The proposed project would utilize an existing irrigation facility consisting of a diversion structure containing two 12-foot-wide by 8-foot-high radial gates, a 10-foot-diameter, 5,996-foot-long siphon, and the trapezoidal Central Oregon Canal. The proposed new structures would consist of an 18-foot-high, reinforced concrete side canal intake structure, a 16-foot-high check structure, across the canal, containing two 6-foot by 7-foot sluice gates to pass irrigation releases, two 84-inch-diameter, 800-foot-long steel penstocks, and a 42-foot by 82-foot powerhouse.

The proposed structures would be safe if constructed in accordance with sound engineering practices and failure of the structures would not endanger downstream life or property.

CONSIDERATION OF COUNCIL'S POWER PLAN

Staff has reviewed the Northwest Power Planning Council's (Council) 1986 Power Plan to determine if the project is consistent. The Council's Plan envisions meeting the growing regional energy requirements in the most economical manner with environmentally acceptable resources. The Plan considers any environmentally acceptable resource, that is less expensive than coal-fueled steam electric generation, as an acceptable resource for development before the development of coal-fueled power plants (the Council's planned marginal resource).

Staff has developed life-cycle costs of energy from the Council's planned generic coal plant, assumed to be needed in the year 2002 under the Council's medium-high load growth assumption, for determining if proposed hydroelectric projects are, in the long term, consistent with the Council's plan, as required by Section 10(a) 2 of the Federal Power Act.

Since the life-cycle levelized cost of the proposed project is less, as of its projected on-line date, than the levelized life-cycle cost of the least cost or marginal long term alternative, included in the Plan, the proposed project is not inconsistent with the Council's 1986 Power Plan, and is economically feasible within the long term objectives of the Plan.

WATER RESOURCE PLANNING

The proposed project would have two equal-sized Francis turbine-generating units with a total installed capacity of 5,500 kW. The powerplant would operate run-of-river under a net head of 130 feet and a total hydraulic capacity of 574 cfs. The probability of occurrence of canal flows available for power development of 574 cfs or greater would be about 0.14.

The project would make use of an existing irrigation system by diverting river flows in excess of user requirements and up to the hydraulic capacity of the siphon less the irrigation discharges.

The applicant estimates that the project would generate on the average about 28,110,000 kWh annually based on a minimum instream flow release of 400 cfs for the bypassed river reach. We find the applicant's estimate of average annual generation to be reasonable.

Our review of State and Federal agency comments indicates that the project is not in conflict with any existing or planned water resource developments in the basin. No specific comments or recommendations were made concerning flood control, water supply, or irrigation requirements for the Deschutes River.

Staff's Lower Columbia River Basin Planning Status Report includes no hydroelectric projects, either proposed or constructed on the Deschutes River that this project would impact and the project would not conflict with any pending applications for exemption, license or preliminary permit.

In summary, our analysis shows that the proposed project is properly designed to develop the hydropower potential of the Deschutes River.

ECONOMIC FEASIBILITY

A proposed project is economically feasible so long as its projected levelized cost is less than the long-term levelized cost of alternative energy to any utility in the region that can be served by the project.

Staff has calculated the projected levelized alternative energy cost in the region to be 76.3 mills/kWh. This cost is based upon the cost of a generic coal-fueled steam electric plant forecasted by the Northwest Power Planning Council in its proposed resource portfolio to come on line about the year 2002. The levelized cost of energy from the Central Oregon Siphon project is estimated to be 55.3 mills/kWh, therefore the project is economically feasible.

On November 12, 1985, the applicant obtained a power purchase agreement with the Pacific Power and Light for 70.9 mills/kWh in 1990, the projected first year of operation. Therefore, the project would be potentially financially feasible to the applicant. Any further determination of the financial feasibility must be governed by the applicant's efforts to secure project financing.

EXHIBITS

The following sections of Exhibit A and Exhibit F drawings conform to the Commission's rules and regulations, and should be included in the license:

Exhibit A - Section A.3 titled "Proposed Structures" on pages A-5 through A-10 of the application filed on April 13, 1987.

<u>Exhibit</u>	<u>FERC No.</u>	<u>Description</u>	<u>Superseding</u>
	3571-		
F-1	7	Penstock Intake - Plan and Sections	3571-1 & 4
F-2	8	Penstock Plan, Profile and Section	3571-2
F-3	9	Powerhouse Plan and Section	3571-3