Hermiston Generating Project
Final Environmental Impact Statement

Environmental Analysis and Technical Appendices

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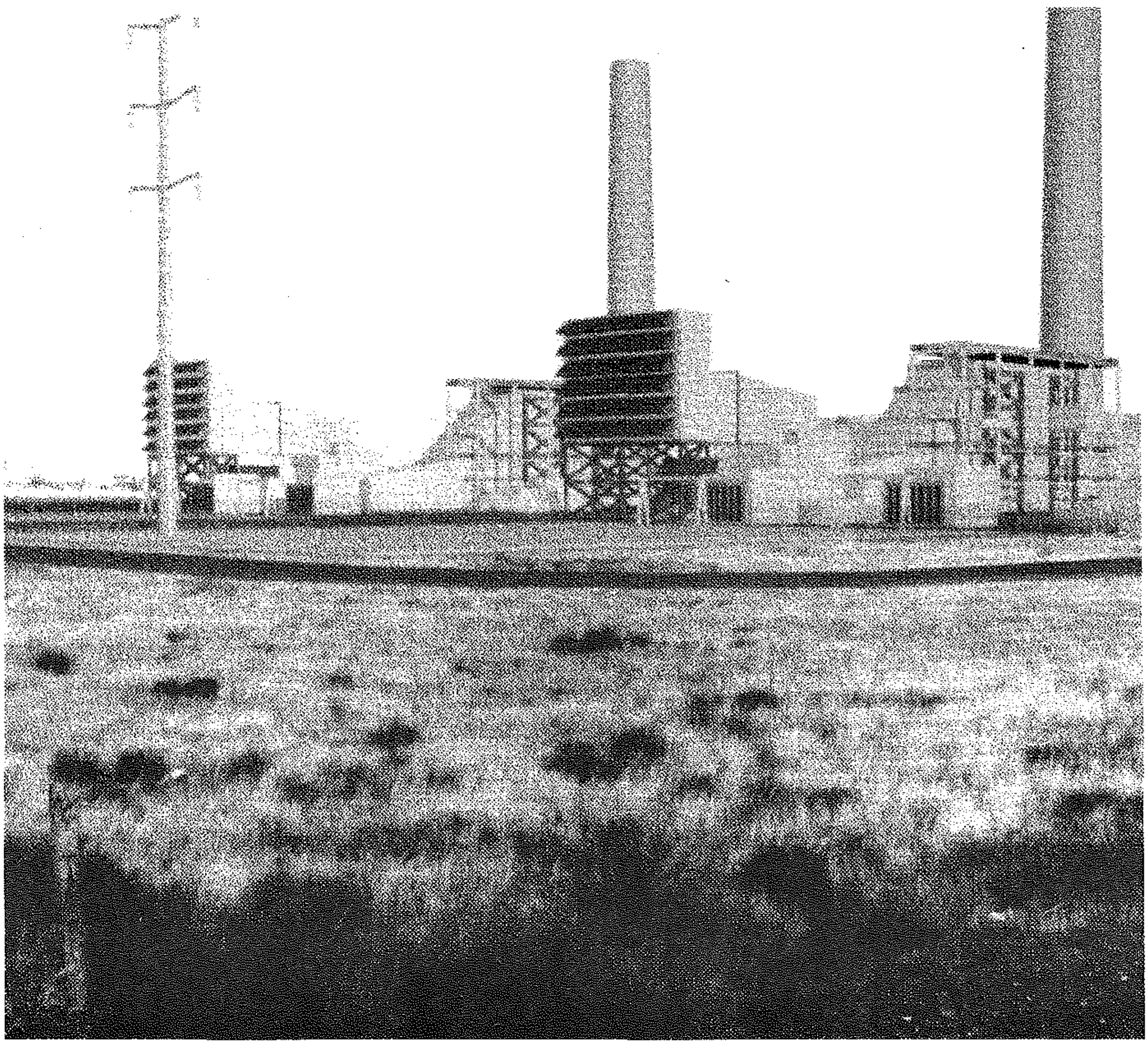

Bonneville
POWER ADMINISTRATION

DOE/EIS-0204

July 1994

Hermiston Generating Project
Environmental Impact Statement

DOE/EIS-0204

Responsible Agency:	U.S. Department of Energy, Bonneville Power Administration (BPA)
Cooperating Agency:	Rural Electrification Administration
Title of Proposed Action:	Hermiston Generating Project
State Involved:	Oregon

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Abstract:

BPA is considering whether to transfer (wheel) electrical power from a proposed privately-owned, combined-cycle combustion turbine cogeneration plant in Oregon. The plant would be fired by natural gas and would use combined-cycle technology to generate up to 474 average megawatts of energy. The plant would also supply an adjacent potato processing plant with steam at an average annual rate of 22,680 kilograms (50,000 pounds) per hour. The plant would be developed, owned, and operated by the Hermiston Generating Company, L.P., a Delaware limited partnership. The project would be built in eastern Oregon, southwest of the City of Hermiston in Umatilla County. The proposed plant would be built on a site that is zoned Light Industrial. It would be permitted as a conditional use under the Umatilla County Comprehensive Plan. The transmission line needed to connect the power plant to BPA's transmission system would be constructed primarily within an existing Umatilla Electric Cooperative Association transmission line right-of-way, and would be either a permitted or a conditional use under the Umatilla County Comprehensive Plan and the City of Umatilla Comprehensive Plan. The gas pipeline needed to connect the power plant to its natural gas

supply would be either a permitted or a conditional use under the Umatilla County Comprehensive Plan.

Key environmental concerns identified in the scoping process and in comments on the draft environmental impact statement (draft EIS) include these potential impacts: (1) air quality impacts, such as pollutant emissions and their contributions to the "greenhouse" effect; (2) health and safety impacts, such as effects of electric and magnetic fields; (3) effects of water withdrawals on other beneficial uses of the Columbia River, such as hydropower production and fish habitat; (4) noise impacts; (5) water vapor impacts on transportation; (6) employment impacts and effects on the demand for housing; (7) visual impacts; (8) consistency with local comprehensive plans; (9) traffic impacts during construction, and (1) impacts to wildlife. These and other issues are discussed in the EIS.

The proposed project includes features designed to reduce environmental impacts. Based on studies completed for the EIS, adverse environmental impacts associated with the proposed project were identified, and no evidence emerged to suggest that the proposed project is controversial.

BPA is mailing the EIS to many agencies, groups, and individuals (see Section 6). There will be a 30-day no-action period before any decisions are made and the Record of Decision is signed.

To request copies of the EIS, please contact:

BPA's toll free document request line 1-800-622-4520, or

Public Involvement Manager
Bonneville Power Administration
P.O. Box 12999
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FINAL ENVIRONMENTAL IMPACT STATEMENT

HERMISTON GENERATING PROJECT

DOE/EIS-0204

Bonneville Power Administration
U.S. Department of Energy

July 1994

Summary/Abstract

Background

The Hermiston Generating Company L.P., a Delaware limited partnership, proposes to construct a gas-fired cogeneration power plant near Hermiston, Oregon. The power plant would supply steam to the Lamb-Weston potato processing facility on an adjacent site, and electricity generated at the plant would be sold to PacifiCorp, a utility based in Portland, Oregon. The power plant would add 474 average megawatts (aMW) of capacity to the Northwest power grid, annually generating approximately 3.86 million megawatt hours of electricity.

PacifiCorp has requested a transmission (wheeling) agreement from Bonneville Power Administration to cover transmission of the power from McNary Substation at Hermiston, Oregon, to Alvey Substation near Eugene, Oregon. Before Bonneville Power Administration can execute a wheeling agreement with PacifiCorp, Bonneville Power Administration must conduct a systems analysis to ensure that the existing equipment is capable of accommodating the additional loads. The Federal action of executing the wheeling agreement triggers the requirement for the Bonneville Power Administration to conduct an environmental analysis under the National Environmental Policy Act. Bonneville Power Administration has prepared this environmental impact statement to fulfill that requirement.

Hermiston Generating Company's proposal includes a plan to upgrade an existing transmission line connecting the proposed power plant to the Bonneville Power Administration grid at McNary Substation. The existing line is owned and operated by the Umatilla Electric Cooperative Association, which requires the approval of the Rural Electrification Administration, another Federal agency, to proceed with the upgrade. The Rural Electrification Administration has therefore been named as a cooperating agency in the preparation and review of this environmental impact statement.

Related State Actions
On February 28, 1992, the Hermiston Generating Company submitted a Notice of Intent to construct an energy facility to the Oregon Department of Energy. Oregon law requires that before an energy facility can be constructed, the Energy Facility Siting Council must find that the proposed facility meets certain standards and must issue a Site Certificate specifying certain terms under which the facility will be constructed and operated. The act of filing the Notice of Intent initiated the state's environmental review process, conducted under the auspices of the Oregon Department of Energy and the Energy Facility Siting Council. Local and state agencies, Tribes, and the public were afforded an opportunity to participate in the state's environmental review process, just as they are currently invited to participate in the Federal environmental review process. The Oregon Department of Energy issued a Proposed Order on October 19, 1993, recommending approval of the project and issuance of a Site Certificate. The Energy Facility Siting Council issued an Order on March 11, 1994, approving Hermiston Generating Company's request for a site certificate. A Site Certification Agreement was executed on March 16, 1994.

A party to the Energy Facility Siting Council's proceeding has appealed the decision to the Oregon Supreme Court. There is one issue on appeal—the validity of the Energy Facility Siting Council's rule exempting the Hermiston Generating Project from proving need for power. An accelerated briefing schedule was agreed to, and the appeal was set for oral argument before the Supreme Court on June 14, 1994. The determination of the Court is forthcoming.

Scope of the Environmental Impact Statement
This environmental impact statement evaluates the environmental impacts of two alternatives: the No Action Alternative and the Proposed Action. Under the No Action Alternative, Bonneville Power Administration would decide not to execute a wheeling agreement with PacifiCorp. Without access to the Federal transmission system, the project would not be economically viable and would not be built. Environmental impacts associated with constructing and operating the power plant and related facilities would not occur.

The Proposed Action would encompass the following elements:

- Changes at McNary Substation required to accommodate a new 230-kV line;
- Construction and operation of a 474-average megawatt gas-fired cogeneration plant on a site approximately 4.8 kilometers (3 miles) southwest of Hermiston, Oregon;
- Construction and operation, primarily within an existing right-of-way, of an approximately 19-kilometer-long (12-mile-long), 230-kV transmission line connecting the power plant with McNary Substation;
- Construction and operation of an underground gas pipeline, approximately 8 kilometers long (5 miles), connecting the power plant to an existing gas supply line;
- Construction and operation of water and steam lines connecting the power plant to the adjacent Lamb-Weston potato processing facility, and minor alterations to that facility; and
- A transmission agreement between the Bonneville Power Administration and PacifiCorp.

Environmental Consequences and Mitigation

The Hermiston Generating Project, as proposed by Hermiston Generating Company and with the addition of mitigation measures outlined in this environmental impact statement, would have no significant impacts on the environment. The following paragraphs briefly summarize the factors leading to this conclusion.

Geology and Soils

Project impacts on geological resources would be negligible. There are no unique geologic features at the plant site or along the rights-of-way. Soil compaction would be limited to a very small area and only a minor amount of erosion would occur during project construction. Mitigation measures, including development and implementation of an erosion and sediment control plan, would prevent large scale erosion and sedimentation.

Project design would take into account the maximum credible earthquake in the area. This would minimize damage to the project during an earthquake of Richter magnitude 5.5 or less.

Hydrology and Water Quality

Surface water resources in the project area include the Columbia River, the Umatilla River, and Butter Creek. The power plant's water needs would be supplied by the Port of Umatilla's proposed water supply system, which would withdraw water from the Columbia River under an existing water right. Project operations would consume approximately 377 hectare-meters (3,065 acre-feet) of water per year, the equivalent of withdrawing an average 0.1 cubic meter (4.2 cubic feet) of water per second from the Columbia River. The power plant incorporates a zero discharge design, so there would be no liquid waste to dispose of offsite. The plant's water use would add slightly to cumulative withdrawals of water from the Columbia River, potentially causing a very slight decrease in other beneficial uses of the river.

As mitigation for potential impacts, Hermiston Generating Company has agreed to fund efforts to augment instream flows in the Columbia River or its tributaries.

Vegetation, Wildlife, and Fish

Vegetation in the vicinity of the proposed Hermiston Generating Project has been extensively altered by human activities, including grazing, agriculture, and rural residential development. The most significant area of native vegetation remaining in northeastern Oregon occurs just to the west of the project, on the U.S. Army's Umatilla Ordnance Depot. This area would not be affected by project construction or operation. Impacts of the Hermiston Generating Project would be limited to temporary disturbance along the transmission and gas pipeline rights-of-way and permanent loss of vegetation at the power plant site. None of these impacts would be significant.

Wildlife in the vicinity of the Hermiston Generating Project consists primarily of species that use relatively disturbed habitat and tolerate human activity. The area contains no critical habitat for Federally listed or proposed threatened and endangered species, and none were observed during site surveys. Four state-listed sensitive bird species were recorded during field surveys in 1992 and 1993. The project would have no significant direct or indirect impact on wildlife species or habitat in the project area.

The Columbia River supports steelhead trout *(Oncorhynchus mykiss)* and 3 species of salmon and represents a fishery resource of global importance. The project's use of 377 hectare-meters (3,065 acre-feet) of water per year (an average of 0.1 cubic meter [4.2 cubic feet] per second), to be withdrawn from the Columbia River by the Port of Umatilla under its existing water right, would add very slightly to the cumulative effects of competing water uses on the Columbia River fishery resource.

Air Quality

The Hermiston Generating Project plant site is located in an area currently designated as unclassified or in attainment of all state and national Ambient Air Quality Standards. The Hermiston Generating Project would produce sufficient emissions to qualify as a major emission source, and therefore falls under the Environmental Protection Agency's Prevention of Significant Deterioration rules. The Prevention of Significant Deterioration rules are designed to prevent new emission sources from having a significant adverse effect on a region's air quality. Modeling of the project's emissions indicates all would be within acceptable limits compared to state and Federal emission standards, and the project would not have a significant effect on ambient air quality.

The combustion of natural gas at the power plant would add slightly to the worldwide production of carbon dioxide, a greenhouse gas believed to contribute to global warming. Hermiston Generating Company has agreed to fund other programs and activities designed to achieve real reductions in atmospheric gases believed to contribute to global warming.

Noise

The Hermiston Generating Project would be located in a rural area that has several existing noise sources, including interstate highway traffic, a railroad line, and food processing facilities. The proposed project would generate noise above existing ambient levels during the 26-month construction period and during operation. The primary source of noise would be the power plant, which would generate fairly constant noise levels 24 hours a day, 7 days a week. Mitigation would include the use of equipment meeting specific noise standards, which would keep noise levels below the Oregon Department of Environmental Quality's allowable levels at all but two locations—a single family home and a mobile home park. Hermiston Generating Company has options to acquire properties where expected noise levels would exceed allowable limits.

Traffic and Circulation

The power plant site is accessed via a lightly traveled road (Westland Road) in an industrial/agricultural area of unincorporated Umatilla County. Traffic generated during the power plant's 26-month construction period would increase traffic on Westland Road at certain times of the day. Mitigation efforts during the construction period would reduce traffic impacts during peak traffic periods. There would be no noticeable effects on traffic once normal plant operations begin.

Visual Quality and Aesthetics

The power plant site is located next to an existing industrial facility in an area that is zoned industrial, although most of the surrounding area is devoted to agriculture. The power plant would add to the density of industrial development in the immediate area. Vegetative screening would, in time, reduce the visual impact of the power plant. Although the 57- to 65-meter-high (188- to 213-foot-high) exhaust stacks would be visible from several highways and rural roads, the overall visual impact of the powerplant on the surrounding area would not be significant. Other large industrial and agricultural facilities, such as grain elevators and water tanks, are also visible in the general vicinity.

The transmission line would be located along, or adjacent to, existing transmission line corridors. Although the new transmission line poles would be taller than the existing poles, the visual impact of the new transmission line would not be significant.

Cultural Resources

Several historic properties exist in the project vicinity, and construction of the proposed project could affect two properties potentially eligible for nomination to the National Register of Historic Places: the High Line and West Extension irrigation canals. In addition, any digging during construction could uncover archaeological resources that are currently unknown. Measures proposed to mitigate these effects include tunneling the natural gas pipeline under the canals, avoiding the placement of transmission supports in the canals, consultation with the Confederated Tribes of the Umatilla Indian Reservation, and conducting archaeological surveys. If previously unknown resources are discovered during construction, the construction will halt while the significance of the find and proper mitigation is determined. Given these procedures, the project would not have any significant effect on cultural resources.

Land Use Plans and Policies

The proposed power plant, gas pipeline, and transmission line would all comply with the County of Umatilla and the City of Hermiston comprehensive plans as either permitted or conditional uses.

Socioeconomics

The project would add about $200 to $250 million to the local tax base, and construction of the project would have a positive impact on employment in the Hermiston-Umatilla area. Incoming construction workers would have a potentially negative effect on housing. Approximately 385 local workers and 130 workers from outside of the project area would be needed during the peak construction period. Hermiston Generating Company would work with local community officials to alleviate potential housing problems associated with introducing 130 workers into a local rental housing market that has a low vacancy rate.

Public Services and Facilities

There would be no significant adverse effects on public services during construction or operation of the project. Local workers would be used to the maximum extent possible to construct and operate the project, limiting any increased demand for public services.

Public Health and Safety

The Hermiston Generating Project has been designed with careful attention to the reduction of hazards associated with its operation and meets or exceeds state and Federal standards for safety in all its components. Safety and emergency systems are included in the design and would be included during construction of the project to ensure safe and reliable operation of the facilities. Continuous monitoring of process variables and a thorough maintenance program would promote safety and reliability.

Power lines, like all electrical devices and equipment, produce electrical fields and magnetic fields. It is Bonneville Power Administration's policy to conduct a magnetic field exposure assessment anywhere that homes and commercial buildings could experience magnetic fields from a new transmission line. For this project, the maximum magnetic field at the nearest home, which is 67 meters (220 feet) from the center of the proposed transmission line right-of-way, is predicted to be 3 milligauss. There is an optional right-of-way that could be used to replace one segment of the proposed transmission line right-of-way. The maximum magnetic field at the nearest home, which is 38 meters (125 feet) from the center of the optional transmission line route, is predicted to be 14.2 milligauss. Because scientific literature relating to electromagnetic fields has not yet established a cause-and-effect relationship between electric or magnetic fields and adverse human health effects, no adverse health effects are reasonably foreseeable.

Summary of Public Comment on the Draft EIS

BPA published a draft EIS on the proposed Hermiston Generating Project in April 1994. The public comment period began on April 1, 1994, the date the EPA published the Notice of Availability in the Federal Register. The comment period ended on May 23, 1994.

Six comment letters were received. Four letters were from agencies, one was from the developer of the proposed project, and one letter was received from an individual.

The agencies that commented on the draft EIS are the Environmental Protection Agency, Rural Electrification Administration, Oregon Department of Fish and Wildlife, and the National Marine Fisheries Service. Agency concerns relate primarily to (1) effects of water withdrawals on other beneficial uses of the Columbia River, such as hydropower production and fish habitat; (2) impacts to wildlife; and (3) air quality issues.

One individual commented on the National Environmental Policy Act (NEPA)/state process, air quality issues, and the transmission line route. HGC comments included proposed design changes and minor editorial changes. All of these comments are addressed in this final EIS. The comment letters along with BPA's responses are in Technical Appendix I.

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1.0 Introduction

The Hermiston Generating Company L.P. (HGC), a Delaware limited partnership, proposes to construct a natural gas-fired cogeneration plant near Hermiston, Oregon. The power plant would supply steam to a nearby potato processing facility and would sell power to PacifiCorp, a utility based in Portland, Oregon.

To determine whether the Hermiston Generating Project may be built and operated as proposed, two Federal agencies must make decisions related to the project. First, the Bonneville Power Administration (BPA) must decide whether it will transmit the project's power across the Federal transmission system from BPA's McNary Substation in Umatilla, Oregon to BPA's Alvey Substation near Eugene, Oregon.

Additionally, the Rural Electrification Administration (REA) must decide whether it will permit installation of a new transmission line connecting BPA's McNary Substation to the power plant. This new line would be installed in an existing right-of-way of the Umatilla Electric Cooperative Association (UECA), which is regulated by the REA.

The Bureau of Reclamation and the United States Army Corps of Engineers (Corps) will also participate in the environmental review of the proposed project, and may need to grant easements for portions of the facilities.

1.1 Purpose and Need for Action

1.1.1 Bonneville Power Administration

Public Law 93-454 (Transmission System Act) requires BPA to make excess transmission capacity available to utilities requesting transmission (wheeling) service. The Energy Policy Act of 1992 also requires utilities, including BPA, to make arrangements to provide wheeling, subject to certain constraints. PacifiCorp, an investor-owned utility, has submitted to BPA a "good faith request," pursuant to the implementing regulations of the Energy Policy Act of 1992, to wheel power generated by the Hermiston Generating Project from BPA's McNary Substation near Umatilla, Oregon, to BPA's Alvey Substation near Eugene, Oregon.

Need:
BPA must respond to the need for transmission access as represented by PacifiCorp's request for wheeling services.

Purpose:
In making a decision to provide wheeling services to PacifiCorp for the power produced at the Hermiston Generating Project, BPA intends to consider the following purposes:

- Assure consistency with BPA's statutory responsibilities, including the Northwest Power Act, the Transmission System Act, and the Energy Policy Act of 1992;
- Balance environmental impacts with economic costs;
- Protect BPA's ability to serve its existing contractual obligations and to remain able to meet the needs of its customers;
- Provide electrical system reliability that meets BPA's reliability criteria; and
- Preserve transmission capability for future BPA resources.

1.1.2 Rural Electrification Administration

The REA, another Federal agency, would have to approve any actions affecting UECA facilities associated with this project. UECA would own and operate the transmission line connecting the proposed power plant to the BPA grid at McNary Substation.

1.2 National Environmental Policy Act Review

1.2.1 Bonneville Power Administration

The National Environmental Policy Act (NEPA), signed into law in 1970, requires that the environmental consequences of any proposed action by a Federal agency be evaluated before a final decision on the action can be made. In cases where the action could potentially have a significant adverse impact on the environment, an environmental impact statement (EIS) must be prepared. The Federal action of executing the wheeling agreement triggers the requirements for BPA to conduct an environmental analysis under NEPA. The Hermiston Generating Project meets these criteria, so BPA must prepare an EIS for the project before deciding whether to sign a wheeling agreement with PacifiCorp.

On November 8, 1993, BPA published in the Federal Register a Notice of Intent to prepare an EIS for the project (Appendix A). On November 22, 1993, BPA held a public scoping meeting in Hermiston to discuss the project and identify issues that should be addressed in the EIS (Appendix B). On April 26, 1994, BPA held a meeting in Hermiston to give people an opportunity to comment on the draft EIS.

1.2.2 Rural Electrification Administration

REA must also satisfy the requirements of NEPA in its action to approve UECA's participation. REA is a cooperating agency in the preparation and review of this EIS.

1.2.3 NEPA Review Process

There was a review period following publication of the draft EIS during which a public meeting on the document was held. The public was invited to comment, either at the public meeting or in writing, concerning the project and the EIS. Responses to the comments have been incorporated into this final EIS. Comment letters and BPA's response to those comments are included as Appendix I. Notice of the final EIS publication will appear in the Federal Register, starting a 30-day no action period. The Record of Decision, describing BPA's decision on the request for the wheeling agreement, will be prepared during this period. At the same time, a Mitigation Action Plan would be prepared if the wheeling were approved. The Mitigation Action Plan would describe the mitigation monitoring and enforcement program for any mitigation measures identified in the Record of Decision. After the 30-day no action period ends, the Record of Decision and the Mitigation Action Plan, if prepared, will be signed by BPA. That action will complete the NEPA process.

1.3 State of Oregon Environmental Review

BPA's Federal action, considering a wheeling agreement with PacifiCorp, triggers the requirement for BPA to conduct an environmental analysis under NEPA. The state of Oregon has a similar environmental review process that has been completed.

On February 28, 1992, Hermiston Generating Company submitted a Notice of Intent to construct an energy facility to the Oregon Department of Energy (ODOE). Oregon law requires that before an energy facility can be constructed, the Energy Facility Siting Council (EFSC) must find that the proposed facility meets certain standards and must issue a Site Certificate, ensuring compliance with Oregon Administrative Rule (OAR) Chapter 345, Division 21, Section 045. The act of filing the Notice of Intent initiated the state's environmental review process conducted under the auspices of ODOE and EFSC. ODOE also included local agencies and the public in the environmental review process.

The following steps in the EFSC process have been completed:

- A public hearing on the Notice of Intent was held in Hermiston on June 25, 1992 to receive public comment on the proposed project (Appendix B).

- A Project Order was issued on August 26, 1992 and amended by several subsequent addenda.

- HGC submitted an Application for Site Certification (ASC) to ODOE on December 29, 1992. This document contained the information needed by EFSC to decide whether to issue a Site Certificate. The ASC was submitted to the City of Umatilla, Umatilla County, the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), and all potentially involved state agencies. All of these groups evaluated the ASC to see if it contained sufficient information to complete their detailed reviews.

- In response to comments of the reviewing agencies made in writing and during several meetings, HGC submitted addenda to the ASC.

- On June 11, 1993, ODOE declared the ASC complete.

- A public hearing on the ASC was held in Hermiston on August 25, 1993 to receive public comment on the project (Appendix B).

- ODOE issued the Proposed Order on October 19, 1993 recommending approval of the project and issuance of a Site Certificate. This triggered a 30-day period during which any person could request a contested-case hearing on the project.

- Several individuals and organizations (intervenors) requested a contested-case hearing or asked to be parties to a contested-case hearing, and submitted testimony outlining their positions.

- A contested case hearing was held on January 31, 1994. Prior to the contested case hearing, minor amendments to the ASC were made, and the issues in the contested case were narrowed to the intervenor's contention that EFSC's rules pertaining to need for power are invalid.

EFSC issued an Order on March 11, 1994, approving HGC's request for a site certificate. A Site Certification Agreement was executed on March 16, 1994.

A party to EFSC's proceeding has appealed the decision to the Oregon Supreme Court. There is one issue on appeal—the validity of EFSC's rule exempting the Hermiston Generating Project from proving need for power. An accelerated briefing schedule was agreed to, and the appeal was set for oral argument before the Supreme Court on June 14, 1994. The determination of the Court is forthcoming.

1.4 Scope of the EIS

This EIS is based on several sources, including the following:

- HGC's ASC, as amended and submitted to EFSC through January 31, 1994;
- HGC's Environmental Report submitted to BPA in November 1993;
- HGC's responses to requests for additional information from BPA and its consultants; and
- evaluation and analysis prepared by BPA and its consultants.

The environmental issues raised in the EFSC scoping process and contested-case hearing are addressed in this EIS along with issues identified by BPA during its scoping process (Appendix B).

2.0 Proposed Action and Alternatives

This section contains a description of the two alternatives being considered in this EIS: the No Action Alternative and the Proposed Action. In the No Action Alternative, BPA would decide not to transmit power from the project over the Federal transmission system. In the Proposed Action, BPA would make a decision to wheel the new power from McNary Substation to Alvey Substation. The description of the Proposed Action includes all activities that would occur if BPA makes that decision, including changes to be made by BPA at McNary Substation; construction and operation of the power plant itself, the transmission line from the power plant to McNary Substation, and the gas pipeline connecting the plant with a Pacific Gas Transmission (PGT) gas pipeline; and project-related changes to be made at the Lamb-Weston potato processing facility.

Information in this section includes a description of the proposed project elements, as well as operational and performance characteristics relevant to the environmental analysis. Some details of design and operational characteristics may change slightly as the project moves through its final engineering design phase.

2.1 No Action

In the No Action Alternative, BPA would decide not to transmit the power output from the project over the Federal transmission system. Without access to the Federal transmission system, the power seller, HGC, could not get power from the plant to the power buyer, PacifiCorp, unless a new transmission line were built. The new line would need to be approximately 200 miles long. The cost of building a new 200-mile-long line would be $60 million to $80 million and would make the project financially unfeasible. Thus, the No Action Alternative means that the power plant and associated facilities would not be built, and none of the environmental impacts associated with building and operating the project would occur.

The No Action Alternative would not solve PacifiCorp's stated need for power, which is to provide electrical energy to PacifiCorp's load centers in southern Oregon and northern California. PacifiCorp would need to use some combination of conservation, power purchases from other power generators, or construction and operation of its own new generation facilities to satisfy its need for power.

2.2 Proposed Action

If BPA decides to sign a wheeling agreement with PacifiCorp, thus providing the means for transmitting power from the proposed Hermiston Generating Project to PacifiCorp, the following related actions would result:

- BPA would make changes at McNary Substation, providing an interconnection for a new 230-kilovolt (kV) transmission line.

- A new combustion turbine/combined-cycle power plant with an output of approximately 474 aMW would be built at an industrial site near an existing Lamb-Weston potato processing facility approximately 4.8 kilometers (3 miles) southwest of the city of Hermiston, Oregon.

- A new 230-kV transmission line would be constructed to connect the power plant with McNary Substation. Most of the new 19.3-kilometer (12-mile) line would consist of rebuilding an existing 115-kV transmission line to a double circuit 230-kV and 115-kV line within an existing UECA transmission line right-of-way. New right-of-way would be needed for the last 0.4-kilometer (0.25-mile) approach to McNary Substation, and an optional new right-of-way segment is being considered where the existing right-of-way crosses the Umatilla River.

- A new underground gas pipeline would be added to connect the power plant to an existing PGT gas pipeline approximately 8 kilometers (5 miles) south of the plant site.

- Underground and aboveground steam, water, and domestic wastewater lines would be added to connect the power plant to the existing Lamb-Weston facility, and minor changes would be made to the Lamb-Weston facility to accept steam and domestic wastewater from the power plant.

2.2.1 Site Location and Characteristics

The proposed Hermiston Generating Project would be located in an unincorporated area of Umatilla County, Oregon. The project area encompasses five sites and their environs (Figure 2-1): McNary Substation, the power plant site, the natural gas pipeline right-of-way, the proposed and optional transmission line rights-of-way, and the existing Lamb-Weston potato processing facility adjacent to the power plant site. Each component of the proposed project is described below.

2.2.1.1 McNary Substation

BPA and Pacificorp jointly conducted systems studies to determine how to integrate the Hermiston Generating Project with the existing transmission system (BPA/Pacificorp 1994). The systems studies were designed to consider BPA's requirements for supporting a decision to provide wheeling services to PacifiCorp, including the need to protect BPA's ability to serve its customers, provide adequate system reliability, and preserve transmission capability for future BPA resources.

To accommodate power from the Hermiston Generating Project, BPA would provide for a new 230-kV bay within the existing McNary Substation boundary (Figure 2-2). New 230-kV facilities would include one power circuit breaker, three disconnect switches, metering, and power system control facilities. BPA would also replace eight existing 230-kV power circuit breakers in the McNary Substation to maintain the required fault duty protection.

Changes at McNary Substation would take place within the existing fenced enclosure, and would not include any identifiable environmental impacts. Changes at McNary Substation are therefore not discussed further in this EIS.

2.2.1.2 Power Plant Site

The power plant would be constructed on a 5.2-hectare (12.9-acre) site, approximately 4.8 kilometers (3 miles) southwest of the city of Hermiston. The site is in the northwest quarter of Section 30, Township 4 North, Range 28 East, Willamette Meridian. It is about 1.2 kilometers (0.75 mile) north of Interstate 84 and 0.8 kilometer (0.5 mile) east of Interstate 82. The site is bounded on the north by the access road to the Lamb-Weston potato processing facility, on the west by Westland Road, and on the south by the Union Pacific Railroad. Access to the site would be from the Lamb-Weston Access Road via Westland Road. Figure 2-3 shows the site plan of the power plant. The site is essentially flat, vacant land, vegetated mostly with non-native grasses.

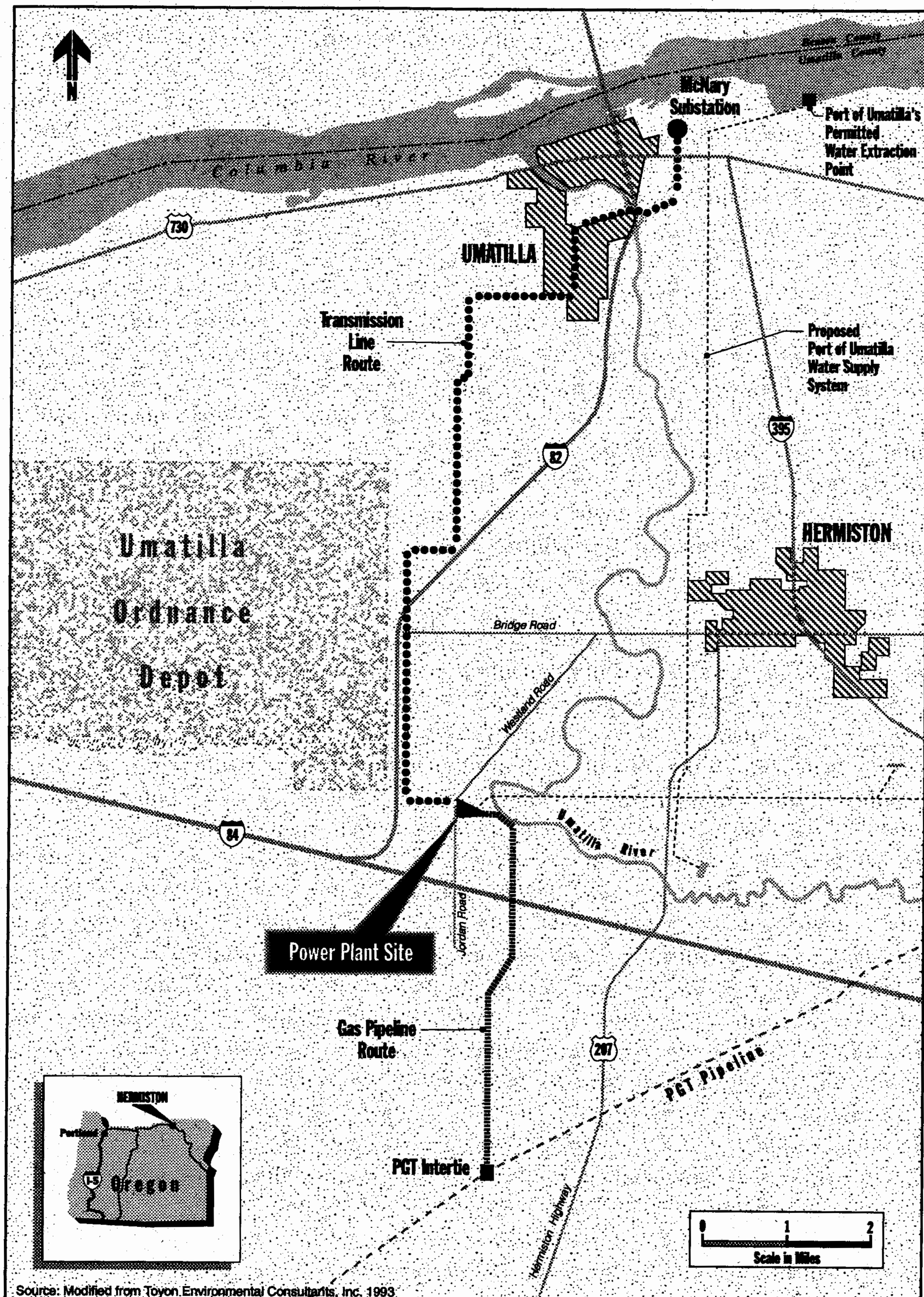


Figure 2-1 Project Location Map

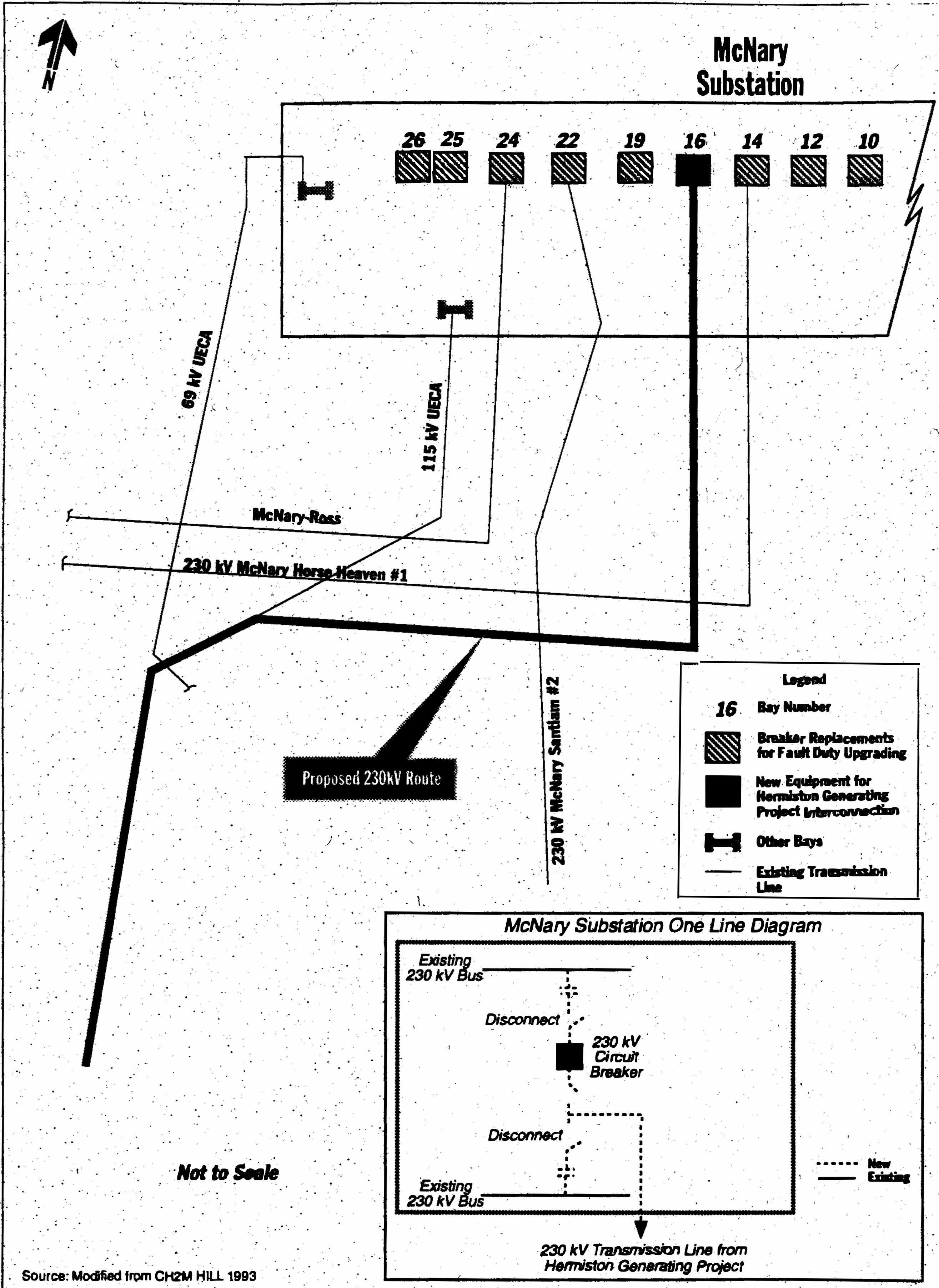


Figure 2-2 McNary Substation Interconnection

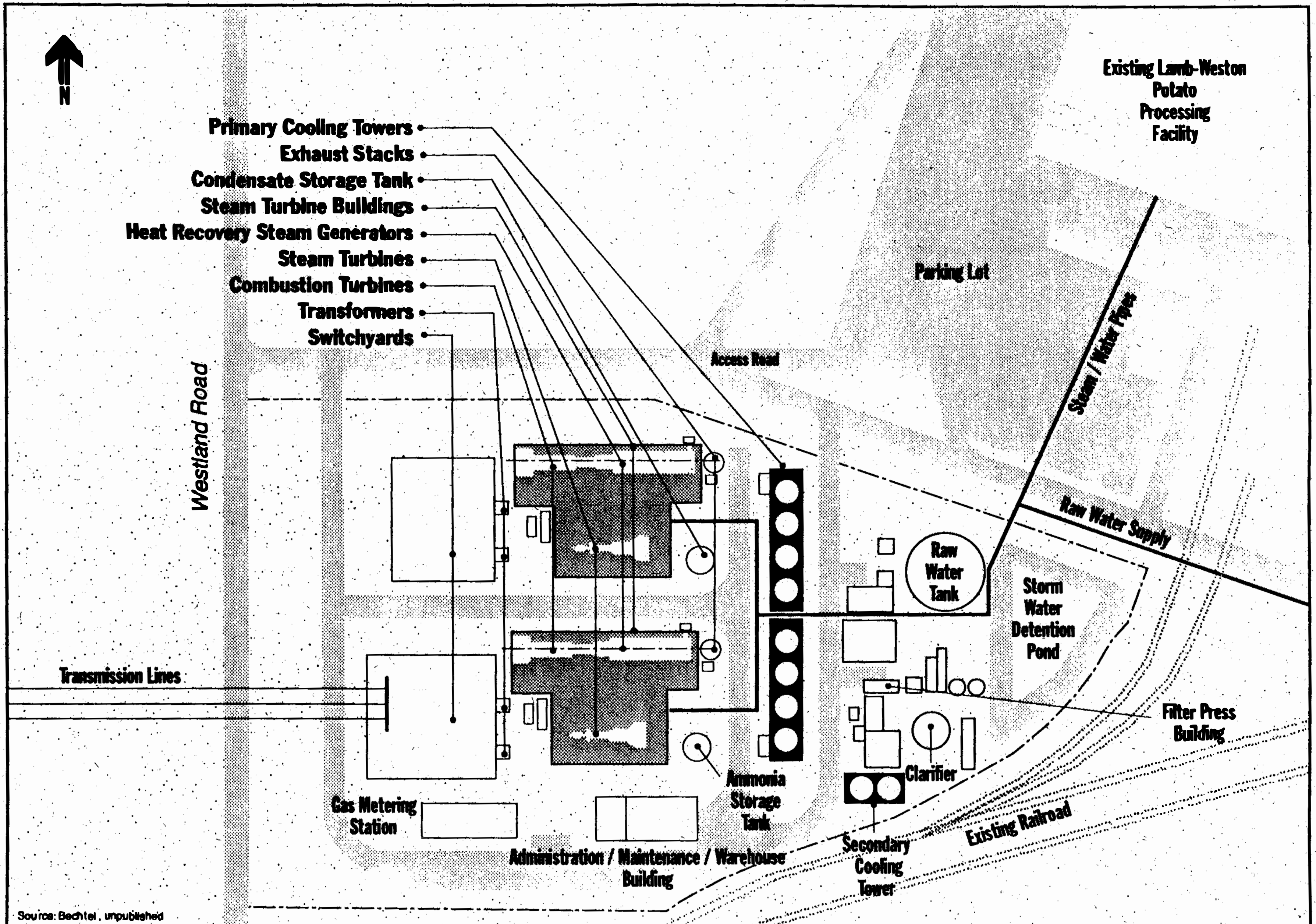


Figure 2-3 Power Plant Conceptual Site Plan

Process water for the project would be obtained from the Port of Umatilla's proposed water supply project, which will include a pipeline supplying water to municipal and industrial developments near the power plant. The Port is proceeding with design for the water supply system, which should be operational in mid-1995. The system would deliver water to the power plant at the site boundary. The power plant would purchase water from the Port; the Port would continue to hold the water right.

2.2.1.3 Gas Pipeline Right-of-Way

The gas pipeline right-of-way would be about 8 kilometers (5 miles) long, extending north from the intertie with the PGT pipeline to the power plant site. The construction right-of-way would be approximately 15.2 meters (50 feet) wide, with a total land area of approximately 12.3 hectares (30.3 acres). Figure 2-4 shows the location of the pipeline right-of-way.

The interconnecting line would tap the PGT line at a point on property owned by Madison Farms and used by PGT under an existing easement. Approximately half of the interconnecting pipeline right-of-way would also be on property owned by Madison Farms.

Between the PGT intertie point and the power plant site, the gas pipeline would cross several parcels of private property. Easement agreements would be executed with the owners of real property.

The pipeline right-of-way would also cross beneath Interstate 84, the Union Pacific Railroad, and two irrigation canals. The pipeline would be constructed, owned, and operated by Cascade Natural Gas Company (CNG). CNG would receive permission from the Oregon Department of Transportation to cross beneath Interstate 84, and would require an occupancy permit from the Union Pacific Railroad prior to installation of the gas pipeline beneath the railroad right-of-way. CNG would also execute easement agreements with the Westland Irrigation District and with the owners of real property on which the irrigation canals are located.

2.2.1.4 Transmission Line Right-of-Way

Most of the proposed transmission line route would use the existing UECA right-of-way that extends from the power plant site to McNary Substation. The property easements would be amended as necessary by UECA to perform the line upgrade. The current right-of-way generally runs due north from the power plant site, roughly following the eastern boundary of the Umatilla Ordnance Depot to the City of Umatilla, then east and north to near McNary Substation (Figure 2-4). The new transmission line would diverge from the existing route for approximately 0.4

kilometer (0.25 mile) at the north end of the route to connect with McNary Substation.

The transmission right-of-way lies primarily within Umatilla County, with a portion within the City of Umatilla. UECA would execute easement agreements with landowners to permit extension of the right-of-way to McNary Substation. The right-of-way is approximately 19.3 kilometers (12 miles) long and approximately 24.4 meters (85 feet) wide. It occupies a total land area of approximately 44.5 hectares (110 acres).

An optional route for one segment of the transmission line has also been investigated. The optional segment would involve approximately 2.4 kilometers (1.5 miles) of new right-of-way in the vicinity of the existing transmission line crossing of the Umatilla River (Figure 2-4, inset). This optional route is located just to the south of and parallel to an existing BPA transmission corridor. A list of property owners along the optional route has been obtained, and new easements would be required to construct the line on the new right-of-way.

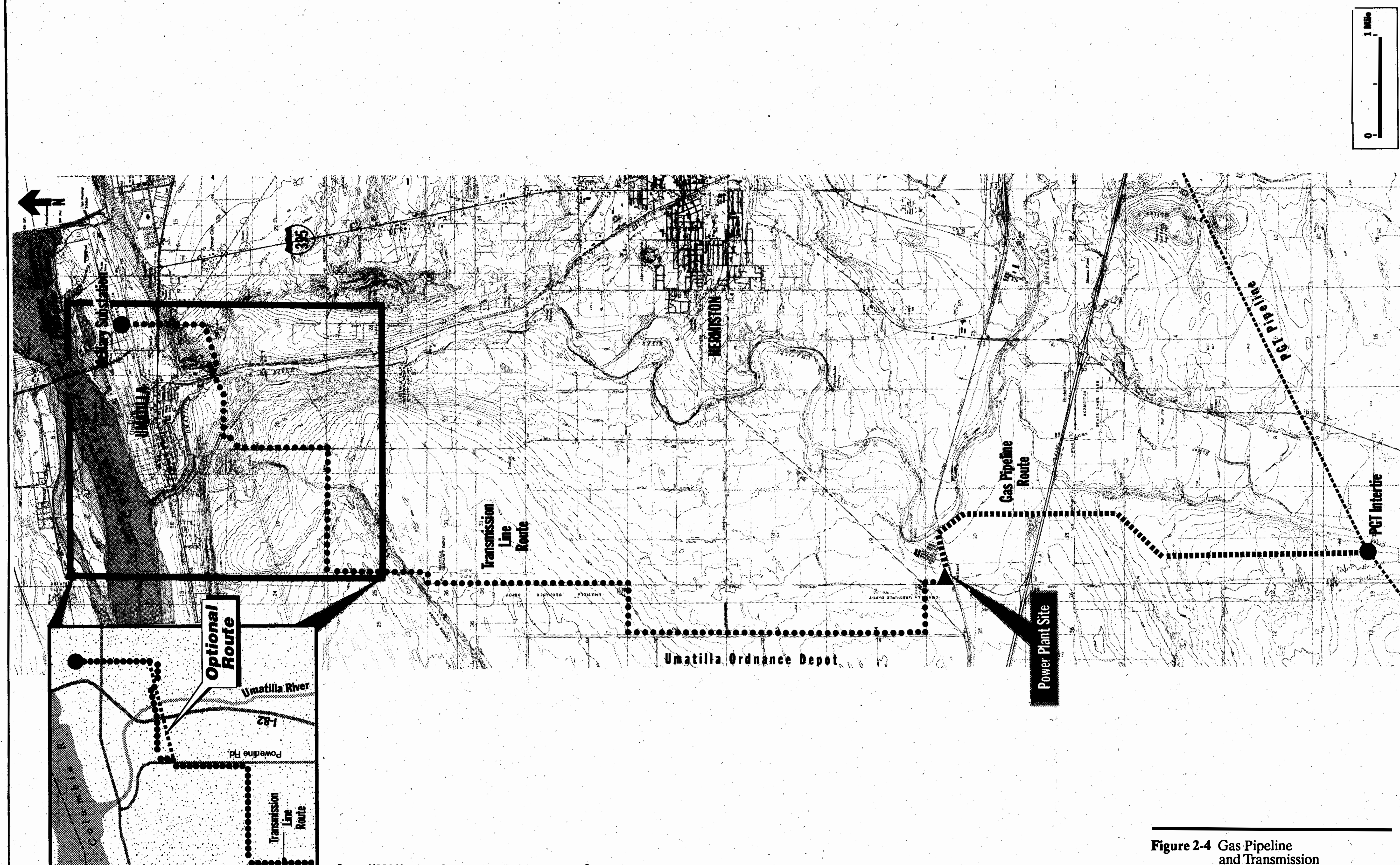
Use of the optional transmission line right-of-way would slightly reduce the overall length of the route, and would eliminate two crossings of the adjacent BPA transmission lines. Crossing adjacent lines creates a potential for one adverse event to affect two or three lines. By eliminating two crossings, the optional route would reduce this risk.

If the optional right-of-way segment were used, the UECA lines on the existing right-of-way could be moved to the new right-of-way as well, although that would be UECA's decision.

2.2.1.5 Lamb-Weston Facility

In addition to generating electric power, the power plant would supply process steam to the Lamb-Weston, Inc. potato processing facility located on property adjacent to the energy facility (Figure 2-3). Lamb-Weston, a subsidiary of ConAgra Inc., produces frozen french fries and other value-added potato products.

Due to the efficiencies of cogeneration, the power plant can generate steam at a lower cost than Lamb-Weston's conventionally fired boilers. The process steam supplied by the power plant would be used for running the processing equipment, heating, and cooking. The steam load demand is expected to remain at a constant annual average level of about 22,680 kilograms (50,000 pounds) per hour through the life of the project.



Source: USGS Hermiston, Ordnance, Umatilla, Irrigon, 1:24,000 Quadrangles

Figure 2-4 Gas Pipeline and Transmission Line Rights-of-Way

The Lamb-Weston facility would supply the power plant with water for domestic use. The water from Lamb-Weston's existing supply system would be provided through a new pipeline between the two facilities. Domestic wastewater from the power plant site would be conveyed through a new pipeline to the Lamb-Weston facility for treatment in Lamb-Weston's existing treatment system.

Modifications to the Lamb-Weston facility necessary for operation of the proposed power plant are as follows:

- An aboveground utility pipe rack supporting the 20- to 25-centimeter-diameter (8- to 10-inch-diameter) process steam line would be constructed from the power plant, across Lamb-Weston's parking lot, to the Lamb-Weston plant.

- Underground pipes would be installed to carry sanitary wastewater, potable water, and process steam makeup water.

- The pipelines would be tied into the existing systems at the Lamb-Weston facility.

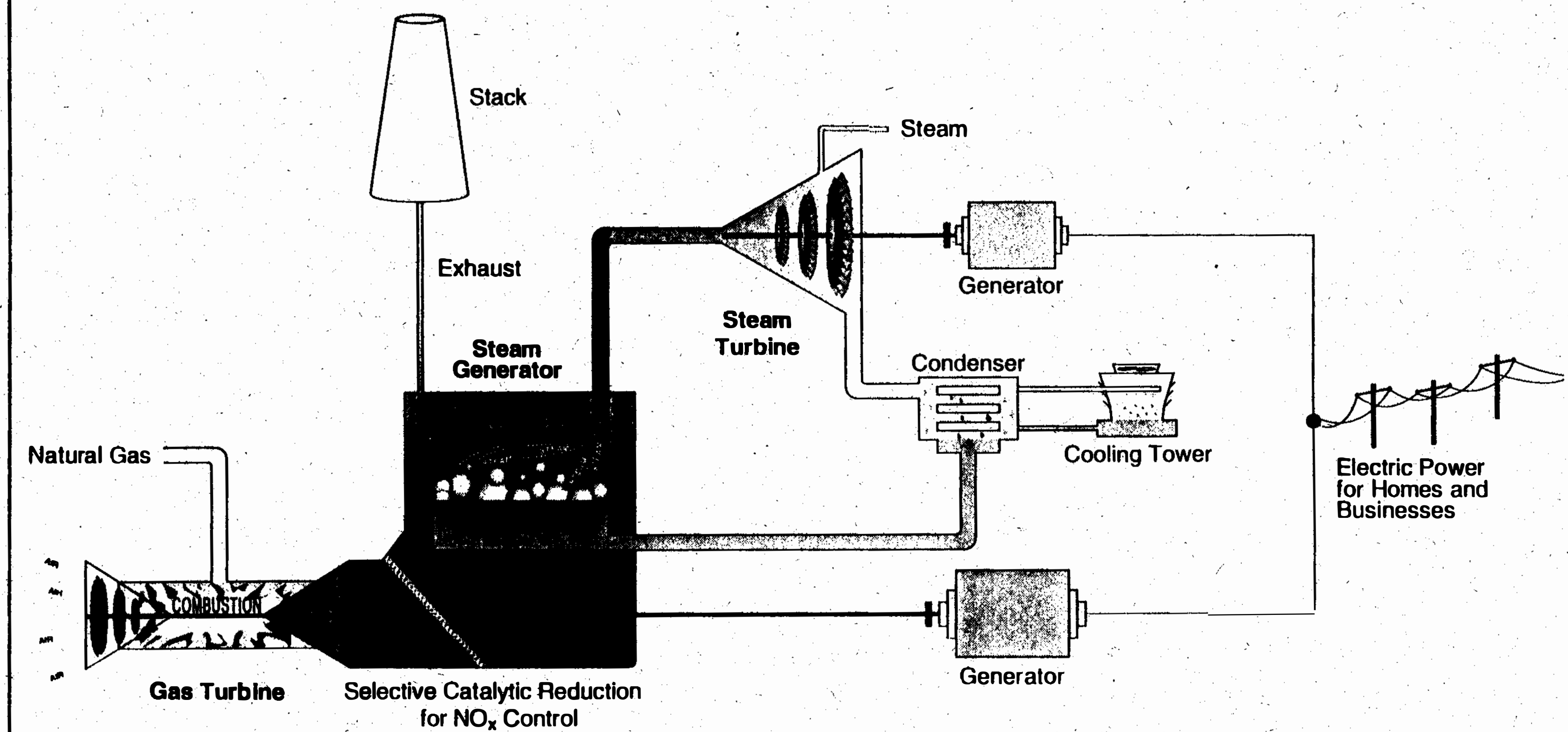
2.2.2 Facility Description

The power plant would consist of two essentially identical side-by-side combustion turbine generators, two heat recovery steam generators, and two steam turbines. The project site plan (Figure 2-3) shows the general arrangement of the buildings and structures. Figure 2-5 is a flow diagram of the combined-cycle cogeneration process. Major facility features are described below.

2.2.2.1 Power Plant Site Layout

The two individual process trains, each including a gas combustion turbine, heat recovery steam generator, steam turbine, and cooling tower, would be laid out in a west-to-east configuration. Water treatment equipment and other support equipment would generally be located to the east of the power train equipment.

A common control room and maintenance facility would be located on the south side of the facility. Connection to the electric power transmission lines would be at the west side of the south switchyard. Process steam, domestic water supply, and waste lines connecting to the Lamb-Weston facility would be on the east end of the site. A stormwater detention basin is located at the eastern property line.



Source: U.S. Generating Company and Parker Design, as cited in Toyon Environmental Consultants, Inc. 1993

Figure 2-5 Combined-Cycle Cogeneration Process Flow Diagram

The gas turbines and steam turbines would be housed in enclosures designed to protect equipment from the weather. Portions of the water treatment equipment would be housed in small buildings. The control room and maintenance/warehouse would be in a common building. The balance of the equipment and storage tanks would be designed to be free standing.

The site would be served by access roads to all major equipment blocks. Main roadways would be paved, while those less used would be paved or graveled. Access to the site is at two locations from the Lamb-Weston access road to the north.

The following buildings and structures would be located at the power plant site:

- Two combustion turbine enclosures, with an air inlet structure for each turbine. The equipment would be enclosed to the extent necessary for weather protection and sound attenuation;

- Two steam turbine enclosures, including foundations, support structures, and condensers;

- Control/office/warehouse buildings, housing control equipment, workshops, maintenance areas, and offices. This building would be approximately 725 square meters (7,800 square feet);

- Two heat recovery steam generators that would be approximately 650 square meters (7,000 square feet). These units are free standing and will not be enclosed within a structure;

- Two rectangular cooling water structures, each consisting of four cells. Each cell would have a large fan to move air over water circulated by large pumps to cool the boiler water;

- Possibly, a smaller secondary cooling tower consisting of two cells;

- Filtered water storage tank with 7.6-million-liter (2-million-gallon) capacity, if necessary;

- Water treatment equipment and structures consisting of a clarifier, filter press, evaporator, crystallizer, and chemical building;

- One aqueous ammonia storage tank with 75,708-liter (20,000-gallon) capacity;
- Two outdoor electrical switchyards, including main and auxiliary transformers;
- Electrical switch gear, motor control centers, and other electrical equipment;
- Permanent paved and gravel roads and paved parking areas, and a temporary unpaved access road during construction; and
- Various utility interconnections (natural gas pipeline, electrical transmission line, steam and process water pipelines, and domestic water and sewage pipelines).

The facility structures would be designed to visually integrate with the surrounding area. Neutral colors would be used for the exhaust stacks and site buildings, and landscape designs and architectural treatment would be incorporated into the site plan. The design objective of the proposed landscape plan would be to allow easy access to equipment, while partially screening and providing visual buffering to the facility.

Permanent on-site parking would be provided in accordance with Umatilla County requirements to accommodate all employees in addition to maintenance crews, visitors, and deliveries. Handicapped parking would be provided.

2.2.2.2 Primary Components of the Proposed Combustion Turbine/Combined-Cycle System

There are five major systems associated with power generation at the power plant: the power generation system, the cooling cycle system, the water treatment system, the control system, and the electric power system.

Power Generation System: Four components comprise the power system: the combustion turbine generator, the heat recovery steam generator, the steam turbine generator, and the stack.

Combustion Turbine Generator: The project would employ two advanced gas-fired combustion turbines. Fuel for the turbines would be natural gas. Some gas-fired power plants include a backup distillate fuel oil system to provide fuel in the event that natural gas delivery is interrupted. HGC has no plans at this time to use a backup fuel oil system. If HGC later decides to use oil as a backup fuel, HGC will have to apply for amendments to their Site Certificate and Air Contaminant

Discharge Permit. The environmental impacts of that action would be evaluated at that time.

The basic elements of the combustion turbine generator units include an inlet air filter, a compressor, a dry low-NO_x combustor, a turbine, and an electric power generator. Within the combustor, injected fuel is mixed with compressed air from the compressor and ignited (Figure 2-5). The resulting hot exhaust gases drive the turbine blades to rotate a shaft driving both the inlet air compressor and the electric generator. Some of the rotational energy of the shaft is used to compress the incoming combustion air. The greater portion of the shaft's rotational energy, however, drives the generator to produce a portion of the facility's electrical output. At full load, each combustion turbine burns approximately 1,800 gigajoules per hour (1,700 million Btus per hour [MMBtu/hr]) of fuel and produces a nominal electrical output of 158 MW for each unit. To increase the output of the combustion turbine generator during the summer, an inlet air evaporative cooling system would be provided.

The combustion turbine generator would be housed in an enclosure that would provide thermal insulation, acoustical attenuation, and a fire extinguishing system. The enclosure would allow access for routine inspections and maintenance. The inlet air filter and evaporative cooler would be mounted above the generator. The maximum height would be approximately the same as that of the heat recovery steam generator.

Heat Recovery Steam Generator: A combined-cycle plant uses hot exhaust gas from the combustion turbine to produce steam that is, in turn, expanded in a steam turbine to drive an electric power generator and produce electricity (Figure 2-5). The heat recovery steam generator reclaims waste heat from the combustion gas turbine exhaust, heating the feedwater and converting it into steam. In this process, the turbine exhaust temperature is reduced from 593°C (1,100°F) to as low as 96°C (205°F) and the feedwater temperature is raised from about 38°C (100°F) to as high as approximately 538°C (1,000°F).

To achieve a high level of efficiency of electrical generation in the steam turbine, the heat recovery steam generator accomplishes its heat transfer process in three stages or pressure levels with a reheat section; it is commonly referred to as a triple pressure reheat system. High pressure steam is generated at approximately 9.7 million pascals (1,400 pounds per square inch [psi]) pressure and 538°C (1,000°F) temperature for admission into the high pressure section of the steam turbine. Following the high pressure turbine section the steam is reheated in the heat recovery steam generator and readmitted into the steam turbine at a lower pressure.

The low pressure sections produce steam for feedwater heating and admission into the low pressure stage of the turbine.

A selective catalytic reduction (SCR) system would be installed in the heat recovery steam generator (Figure 2-5) to reduce NO_x to less than 4.5 parts per million (ppm). The SCR section would be installed in the heat recovery steam generator at a point where the temperature of the exhaust gases is ideal for NO_x reduction to take place.

Steam Turbine Generator: Each steam turbine generator is designed to produce approximately 80 MW of electricity without consuming additional fuel. The steam turbine generator is a triple admission, reheat, condensing turbine and is designed for sliding pressure operation. This means that the steam turbine inlet pressure follows the pressure set by the output of the heat recovery steam generator which is, in turn, a function of combustion turbine output. Each of the steam turbine generators would be equipped with extraction nozzles for providing process steam to Lamb-Weston (Figure 2-5). Steam, at an average rate of 22,680 kilograms per hour (50,000 pounds per hour), would be extracted for process use at approximately 2.6 million pascals (380 psi) pressure.

Stack: After going through the heat recovery steam generator, the exhaust flow would vent to an emission stack designed to Good Engineering Practice standards. This would be in accordance with the United States Environmental Protection Agency (EPA) and Oregon Department of Environmental Quality (ODEQ) guidelines. The Good Engineering Practice height eliminates the potential for aerodynamic downwash of stack emissions. Following Good Engineering Practice, the stacks would be approximately 57 to 65 meters (188 to 213 feet) tall.

Cooling Cycle System:
Steam Turbine/Condenser: After steam passes through the steam turbine it is condensed in a shell-and-tube heat exchanger (surface condenser) with cooling water from the cooling tower (Figure 2-5). Each condenser includes a shell, tubes, a water box, and hot well. The steam that expands through the turbine, less that extracted for process use, exhausts into the condenser. The condenser pressure is at a vacuum below atmospheric pressure, allowing more power to be generated than if steam were exhausted at ambient pressure. The condenser pressure is a function of the cooling water temperature and flow rate. Condensed water in the hot well is pumped back to the low pressure section of the heat recovery steam generator to begin the thermal cycle again.

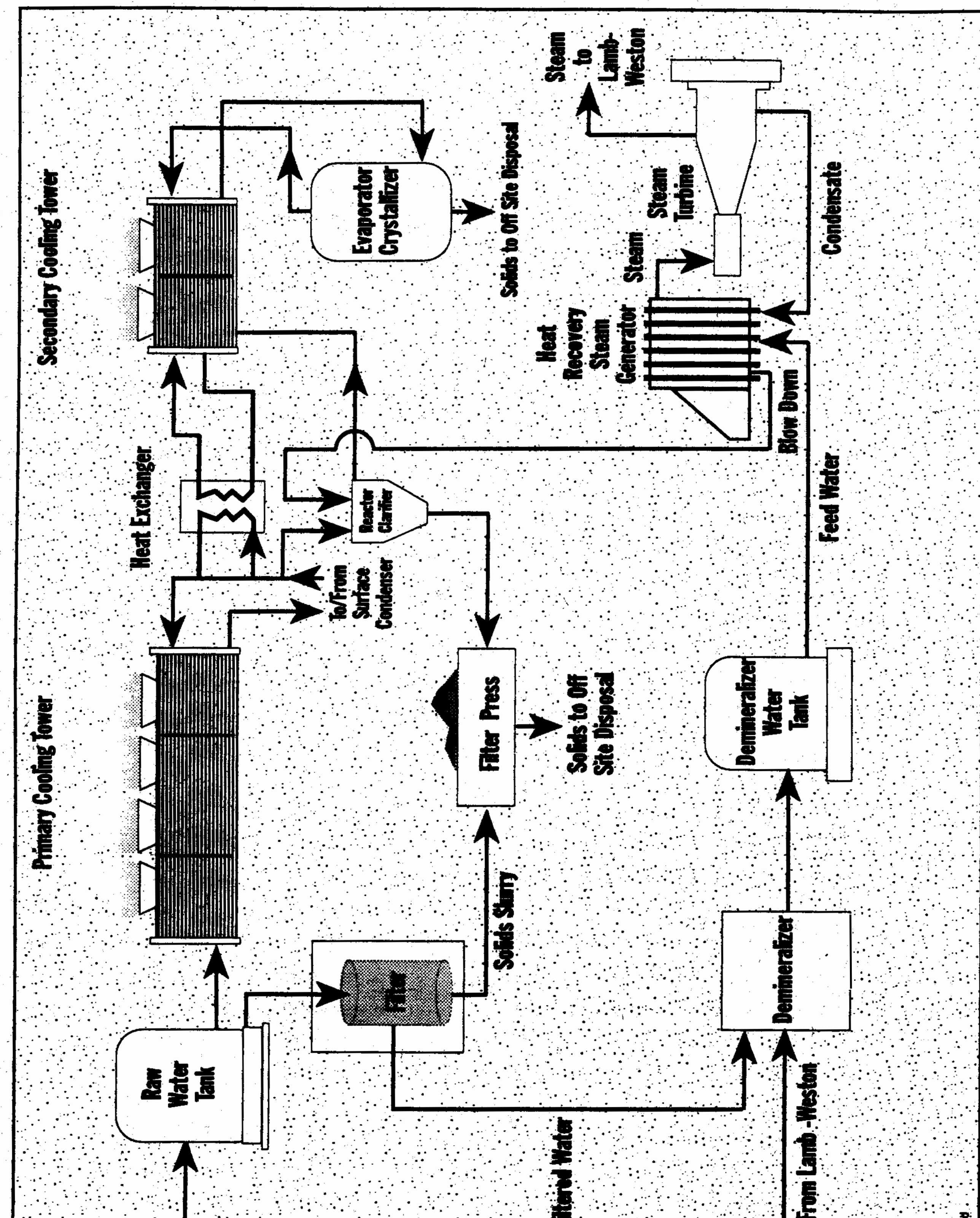
Cooling Tower: Cooling for the condenser would be evaporative (wet) cooling using two four-cell mechanical induced-draft cooling towers. The facility may also include one smaller two-cell cooling tower as part of the zero discharge system. Fans at the top of each cooling tower cell maintain a draft within the cooling tower. The water is cooled by evaporation as it falls through baffles from the top of the cooling tower to a basin at the bottom of the tower, where it is again pumped back through the condenser. Cooling tower components include the basin, fans, fan deck, drift eliminators, fill material (baffles), and other necessary components. The cooling towers also include a fire protection system (sprinklers) and fire suppression equipment.

Each of the four-cell cooling towers would be approximately 70.1 meters (230 feet) long by 16.8 meters (55 feet) wide by 15.2 meters (50 feet) high, and would include a basin holding approximately 1.9 million to 2.3 million liters (500,000 to 600,000 gallons) of water that is circulated through the condenser for cooling. Circulating water pumps move water from the cooling tower basin through the circulating water piping system to the tube side of the condenser and back to the top of the cooling tower. If a secondary cooling tower is included in the water treatment system, a heat exchanger would be included to transfer a portion of the waste heat in the circulating water to the secondary cooling tower. The cooling water system is completely separate from the steam cycle in the heat recovery steam generator with the exception of the transfer of heat.

Water Treatment System:
The water treatment system is made up of several subsystems that include the reactor/clarifier, evaporator/crystallizer, filter press, demineralizer, and filters. The system may also include a secondary cooling tower (Figure 2-6).

Incoming makeup water from the Port of Umatilla's water supply line would either be used directly in the cooling tower or a portion would be filtered for further treatment and use in the steam system. The solids slurry collected in the filter would move to the filter press where it would be dewatered and formed into a nonhazardous filter cake, which would be disposed of in a landfill.

The filtered water would be treated in the demineralizer system for steam cycle use. The demineralizer system would be a portable, leased system. Demineralized water would be stored in a 1.9 million-liter (500,000-gallon) tank.



Source: Bechtel, unpublished

Figure 2-6 Simplified Water Treatment System Flow Diagram

Treated water would be supplied to the power plant by Lamb-Weston at a rate of 378.5 liters (100 gallons) per minute to replace steam used at Lamb-Weston. The makeup water would be further treated in the power plant's demineralizer for use in the steam cycle.

Water is continually lost through evaporation in the cooling towers and must be made up with fresh or recycled water. Because of the evaporation process, dissolved solids and other scaling constituents build up in the cooling water. To maintain the solids within acceptable limits, a small portion of the cooling water is bled off to the reactor/clarifier. Through the addition of lime and other chemicals, the dissolved solids settle or precipitate out of the water. The sludge, consisting primarily of silica and calcium, is thickened in the clarifier and further dewatered in a filter press. The resulting filter cake, containing approximately 50 percent water, is a nonhazardous material suitable for off-site landfill.

Similar to the cooling tower system, a portion of the steam cycle water must be blown down from the heat recovery steam generators to limit the build up of solids and scale on the heat transfer surfaces. This blown down water would be piped to the reactor/clarifier.

Primary cooling tower and steam cycle water, along with other liquid waste treated in the reactor/clarifier, generates a concentrated brine waste. The brine would be further evaporated and concentrated in the secondary cooling tower and evaporator/crystallizer, forming nonhazardous salts that would be added to the other solids for off-site disposal.

The secondary two cell cooling tower would be approximately 14.6 meters (48 feet) long by 7.3 meters (24 feet) wide by 10.4 meters (34 feet) high. Brine from the reactor/clarifier would be circulated from the tower basin through a heat exchanger to be heated by waste heat from the primary cooling water system, to the tower and back to the sump. Due to evaporation in the tower, the brine would be further concentrated. The secondary cooling tower would operate with significantly higher solids concentrations than the primary cooling tower. The secondary cooling tower would be blown down to the evaporator/crystallizer.

The evaporator/crystallizer would be designed to evaporate the waste water brine to damp salts. The brine would be heated above the boiling point and recirculated within the evaporator/crystallizer to evaporate the liquid. The unit would be heated with steam in a heat exchanger. The damp salts would be disposed of off site.

Control System:
Each unit would have a state-of-the-art, integrated microprocessor-based control system for plant control, data acquisition, and data analysis. The plant control system would provide for startup, shutdown, and control of plant operation within limits, and for protection of equipment.

Electric Power System and Interconnection:
Electric power would be generated by the combustion turbine generators at 18 kV and the steam turbine generators at 13.8 kV. The power from each generator would pass through a step-up transformer to raise the voltage to 230 kV and then be bused (joined) together. The internal power usage at the power plant would be satisfied by a 4.16-kV system.

The project would deliver electric power to the BPA main transmission grid at McNary Substation in Umatilla, Oregon. The project would require upgrading the facilities along an existing 115-kV transmission line, operated by UECA, to accommodate the new 230-kV transmission line between the power plant and McNary Substation.

Approximately 19.3 kilometers (12 miles) of this transmission line would be upgraded between the power plant site and the interconnection with the McNary Substation. This upgrade would consist of replacing existing poles with single-shaft steel poles and adding the new 230-kV circuit to the steel poles, which would then carry both the existing 115-kV and the new 230-kV circuits, as well as a fiber optic overhead groundwire. Figure 2-7 is a diagram showing the existing and proposed poles. The proposed poles would be an average of 33.5 meters (110 feet) high, ranging from about 15.2 meters (50 feet) in some areas, such as where the line crosses under an existing line, to about 45.5 meters (150 feet) to give adequate clearance in other areas, such as where the transmission line crosses I-82 at the Umatilla River. Where changes in direction create large angles, the new construction would typically require two guyed, steel poles, one for the 230-kV circuit and one for the 115-kV circuit. An existing 12.47-kV underbuild would be retained, possibly with continued use of some of the existing wooden poles.

The upgrade would occur largely within the existing transmission line right-of-way (see Figure 2-4). Spacing between the new steel poles would vary from 152 to 305 meters (500 to 1,000 feet), depending on terrain and nearby structures. Average spacing would be 183 meters (600 feet). During installation of the poles, an area no larger than 30.5 meters by 30.5 meters (100 feet by 100 feet) would be disturbed at each pole.

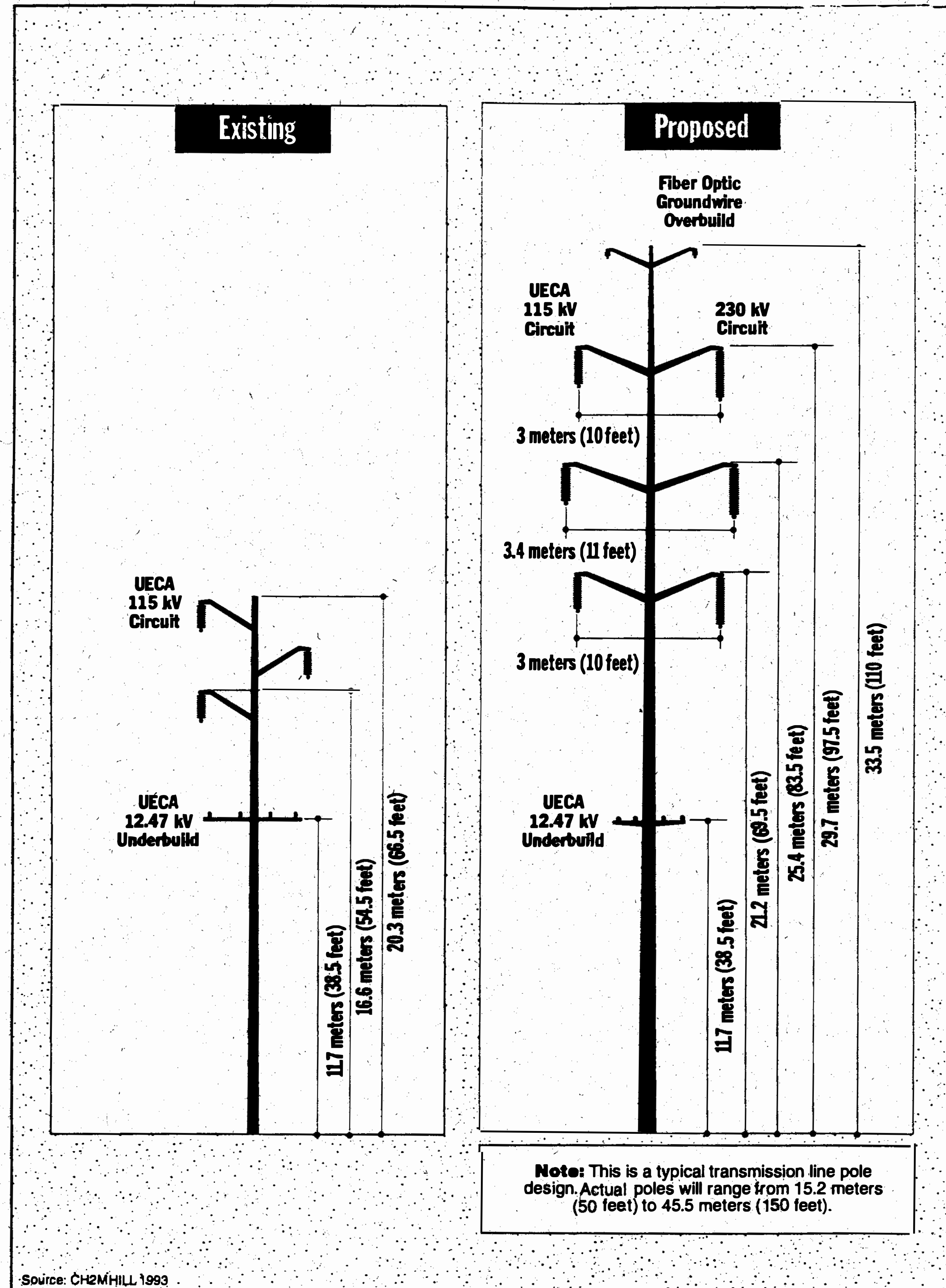


Figure 2-7 Typical Existing and Proposed Transmission Line Pole Designs

Approximately 0.4 kilometer (0.25 mile) of new 230-kV transmission line would be constructed north of Highway 730, where the line enters the McNary Substation. The design of this new section of transmission line would be similar o that of the upgraded portion of the line, except that only the 230-kV circuit would be carried on the new poles.

An optional route for a portion of the transmission line near the Umatilla River is also under consideration. This route would reduce the length of the project transmission line by approximately 762 meters (2,500 feet).

The new and existing lines would be configured to minimize electric and magnetic fields (EMFs) along the right-of-way. The electric transmission line would be designed to minimize ground-level EMF strength by constructing like phases of the 115-kV and 230-kV lines adjacentt o each other (A-phase of 115 kV adjacent to A-phase of 230 kV). Because the current in the 115-kV line and 230-kV line would be flowing in opposite directions, this design would introduce a partial canceling effect between the two lines, thereby minimizing the ground-level EMF strength.

2.2.2.3 Pipeline Facilities

Pipeline facilities for the project include a natural gas pipeline that would bring natural gas from the PGT pipeline to the power plant site. The natural gas pipeline would be between 30.5 and 40.6 centimeters (12 and 16 inches) in diameter and approximately 8 kilometers (5 miles) long (see Figure 2-4). The natural gas pipeline would terminate at the south side of the power plant at a gas metering station.

2.2.3 Air Emissions

The exhaust gases from the gas turbine engines (the by-products of natural gas combustion) include NO_x (nitrogen oxides), CO (carbon monoxide), specific hydrocarbons, CO_2 (carbon dioxide), and small quantities of particulates and toxic air contaminants. These gases and particles are known as the project's air pollutant emissions. Other byproducts of the process would include ammonia gas and SO_2 (sulfur dioxide). The following is a brief description of the technologies proposed to control and reduce these air pollutant emissions.

2.2.3.1 NO_x Emission Control

The project would use an advanced dry low-NO_x combustor design in combination with an SCR system. These technologies represent the state-of-the-art in NO_x emissions control and are considered the Best Available Control Technology (BACT) by EPA (1991). This control system would reduce the amount of NO_x in the exhaust gases to 4.5 parts per million by volume dry (ppmvd).

The SCR system uses aqueous ammonia as a reagent for control of NO_x emissions. The ammonia would be stored in an on-site storage tank and would be injected into the exhaust gas stream in the SCR system.

SCR also uses a catalyst that requires periodic replacement. The spent catalyst would be removed by the supplier for off-site recovery and/or disposal.

2.2.3.2 CO and Hydrocarbon Emissions Control

CO and hydrocarbon emissions are controlled through complete combustion of the natural gas in highly efficient combustion turbines. The advanced combustor design burns the carbon-based fuel gases to form CO_2 and leaves only a tiny fraction of the gases in the partially burned form of CO or other hydrocarbons. These combustors reduce the quantity of CO in the exhaust gases to 15 ppmvd and hydrocarbons to between 3.0 and 3.8 ppmvd. These emission levels are controlled through proper maintenance and efficient operation of the power plant. The CO control technology is considered BACT for this project.

2.2.3.3 CO_2 Emissions Control

Combustion of carbon-based fuels such as natural gas produces CO_2. CO_2 is one of the greenhouse gases that may contribute to global warming. Under current regulations, CO_2 is not considered an air pollutant and the project does not contain technologies specifically designed to control CO_2 emissions. However, the high efficiency of combined-cycle gas combustion turbines generates lower emissions of CO_2 per kilowatt of power or pound of steam generated than conventional power plants using fossil fuels. Additionally, HGC would fund a program to reduce greenhouse gas emissions elsewhere.

2.2.3.4 Particulates, Toxic Air Contaminants, and SO_2

Burning natural gas in combustion turbines produces small amounts of particulate matter and toxic air contaminants. As with the formation of CO, particulates and toxic air contaminants are formed from incomplete combustion of natural gas. The high efficiency of the combustion turbines limits the production of these emissions to very low levels. The proper maintenance and efficient operation of the combustion turbines are considered BACT for this project.

The SCR NO_x control system uses ammonia as the reducing agent. The reaction of ammonia with the nitrogen oxides in the control unit is not 100 percent, and some ammonia gas, a toxic air contaminant, would be emitted.

Natural gas contains only trace amounts of sulfur, resulting in very low emissions of SO_2. The project has a natural gas supply source with a guaranteed average sulfur content of 0.00023 percent by weight.

2.2.3.5 Continuous Emissions Monitoring System

Each heat recovery steam generator exhaust system would be equipped with a separate monitoring system for airborne pollutants. The systems monitor NO_x and CO concentrations and provide alarms when concentrations approach permitted values. The continuous emissions monitoring (CEMS) systems would provide information to the microprocessor-based control system and would meet all the requirements of the ODEQ monitoring and reporting procedures.

2.2.4 Facility Water Usage

The average total water demand for the power plant would be approximately 7,192 liters (1,900 gallons) per minute (377 hectare-meters/year [3,065 acre-feet/year]). Water for the project would be obtained from the Port of Umatilla water supply system, a municipal water system being developed to serve the City of Hermiston and several industrial users, including the Hermiston Generating Project.

Additional water for the facility would be replacement water from the Lamb-Weston facility and stormwater runoff. Stormwater would be used to make up some of the water lost to evaporation in the cooling towers. Treated water would be supplied by Lamb-Weston to the power plant to replace steam used in Lamb-Weston's heating process.

The major consumption of water for the facility would be through evaporative losses from the cooling towers and from the combustion turbine generator inlet air cooling system (process water). As part of the cooling cycle, make-up water would be added at the cooling tower basin to replace water lost through evaporation. As the cooling water is concentrated through evaporation in the cooling towers, either cooling water must be discharged from the system or scaling constituents (dissolved solids) must be removed from the cooling water, maintaining water quality levels to protect the cooling tower and condenser. The Hermiston Generating Project would use a treatment system to reduce dissolved solids in the cooling water and allow for recycling of blowdown water.

2.2.5 Wastewater Generation and Disposal

Up to three separate streams of wastewater, each requiring different handling, would be produced at the power plant: sanitary wastes, water from floor drains, and water from equipment drains. Stormwater and hazardous material spill control are addressed in later sections.

2.2.5.1 Sanitary Wastes

Wastewater would be produced from sanitary wastes and other domestic wastes. These wastes would be directed to the existing domestic wastewater treatment system at the Lamb-Weston plant. The volumes of sanitary waste would be sufficiently low that expansion of the Lamb-Weston system would not be required.

2.2.5.2 Floor Drain System

An independent floor drain system would be provided for the combustion turbine, heat recovery steam generator, steam turbine, and water treatment areas. Each drain would collect water generated by floor washdown, and would also collect any rainwater falling on the pad. The water would be directed to an oil/water separator and then would be reused in the cooling water system. Collected oils would be disposed of off-site.

2.2.5.3 Equipment Drains

When the power generation equipment requires draining for maintenance, the steam cycle water would be drained to the condensate/demineralized water storage tank. Prior to scheduled maintenance, water in the tank would be used and the water level would be allowed to drop to provide storage space. In the event of unscheduled maintenance, the steam cycle water would be drained into the cooling tower basin.

2.2.6 Stormwater Management System

Impervious surfaces would be added to the power plant site as a result of the proposed project. Rainwater would no longer soak into the ground. A stormwater management system has been designed to control resulting increases in peak runoff flows.

The roof drain system would include curbing, allowing the areas to drain into catch basins located at ground level. Catch basins and manholes would be connected by underground piping into a gravity system. The gravity system would discharge to a detention basin designed to hold runoff from at least a 100-year, 24-hour storm event. Its capacity would be approximately 2.5 million liters (650,000 gallons). Water from the detention basin would be discharged to the cooling tower basin to be used as process cooling water. Runoff from roadways and parking areas would also drain to the detention basin for use in the cooling tower system. As previously noted, runoff from process equipment areas would drain to an oil/water separator prior to use in the cooling tower.

2.2.7 Solid Waste Generation and Disposal

Construction of the project is expected to generate waste steel, other waste metals, and normal miscellaneous construction debris (consisting of wood, concrete, paper, and other refuse). Approximately 36.3 metric tons (40 tons) per year of normal domestic waste would be generated by the project. The proposed process water sidestream softener would generate approximately 2.4 metric tons (2.7 tons) per day of filter cake, or about 72.6 metric tons (80 tons) per month. This waste would be disposed of in local landfills.

2.2.7.1 Waste Minimization

Hermiston Generating proposes a waste minimization program that would focus on the reduction of non-reusable and hazardous materials during construction and operation. To accomplish this, HGC would consider viable methods of eliminating waste at the source and a salvage program for reuse of excess or discarded materials. New product purchases would be evaluated to determine if alternate recyclable or nonhazardous products could be substituted to reduce waste generation. Examples of waste minimization and reuse measures that would be considered include:

- Use of nonhazardous solvents to reduce generation of hazardous used solvent and waste rags;
- Restricted use of pressure treated lumber;
- Inventory control of paints to avoid waste due to over-purchase and expired shelf life; and
- Implementation of recycling measures described in Section 2.7.2.

Major contractors would be required to develop and submit waste minimization programs to HGC for approval prior to beginning work on the project.

2.2.7.2 Recycling

HGC would develop a recycling program that is compatible with local programs for such materials as aluminum, scrap metal, glass, paper products, wood, batteries, and used tires. Recycling stations would be established at the power plant for the collection and storage of recyclable materials. HGC would also investigate the potential for recycling measures such as:

- Deposit and return programs with local suppliers for 208.2-liter (55-gallon) drums of lubricants, coolants, and degreasers;

- Off-site reuse of paints that have exceeded technical shelf life requirements;
- Recycling of antifreeze and solvents;
- Reuse of scrap or waste lumber;
- Use of reusable tote bins for chemical storage;
- Implementation of reuse program for soiled rags; and
- Recovery of the SCR catalyst by the supplier.

2.2.7.3 Employee Training and Audits

An employee education, training, and incentive program would be developed to optimize the effectiveness of waste minimization and recycling. The program would be designed to educate employees on the need for and benefits of waste minimization and recycling and to provide training for effective implementation of the program. An incentive program would be established to encourage development of new or alternative methods of waste minimization and recycling.

HGC would conduct periodic audits to ensure compliance with and evaluate the effectiveness of the waste minimization and recycling program. The results of these audits would be used to revise or expand the program as necessary to meet the needs of the project. The program would also be evaluated and revised on a regular basis to reflect changes in waste minimization and recycling technology.

2.2.8 Storage and Handling of Hazardous Materials

2.2.8.1 Natural Gas Management

The proposed power plant would be fueled by natural gas, supplied in a pipeline from the PGT pipeline, located approximately 8 kilometers (5 miles) from the plant site. The pipeline would be 31 to 41 centimeters (12 to 16 inches) in diameter and has been designed to carry 1,699 cubic meters (60,000 cubic feet) per minute at pressures ranging from 2.6 to 4.1 million pascals (380 to 600 psi) gauge.

To ensure safe handling of the natural gas, the entire system would be installed and operated in accordance with Department of Transportation regulations as contained in Code of Federal Regulations (CFR) Title 49 Part 192 and with OAR 345-24-060.

Fuel control systems on the gas turbines would include separate fuel shut-off valves to stop all fuel flow to the units under shutdown conditions. Fuel flow would be restarted only when all permissive firing conditions had been satisfied. Each fuel shutoff valve would have a mechanical device for local manual tripping and a means for remote tripping. A vent valve would be provided on fuel gas systems to automatically vent the piping downstream of the shutoff valve when the fuel shutoff valve closes. Gas shutoff valves would be installed at the PGT pipeline connection point as well as at the power plant. Gas handling facilities would be operated according to acceptable, proven industry standards and procedures.

2.2.8.2 Aqueous Ammonia

A 75,708-liter (20,000-gallon) capacity aqueous ammonia (29 percent concentration) storage tank would be located near one of the heat recovery steam generators. Aqueous ammonia deliveries are not expected to exceed one delivery every 7 to 10 days. The tank would be located in a fully contained and diked concrete storage area. The holding capacity of the containment area would be 110 percent of the maximum tank capacity, plus the 50-year, 24-hour storm event. The diked area would have a normally closed drain valve. Any liquids collected in the containment area would be transferred to the cooling water system, or if contaminated, disposed of as required by regulations.

Vapors escaping through the tank vent would be bubbled through water in a sealed pit to absorb the vapors and prevent the release of ammonia to the atmosphere. Water in the sealed pit would be maintained at about an inch below the overflow line, to ensure a proper vapor seal. Flow from the sealed pit would be released into the demineralizer sump.

In the unlikely event of a significant release of ammonia solution from the tank, spilled liquid would be retained within the concrete containment area. A Spill Prevention Control and Countermeasure (SPCC) plan would be in place prior to the delivery of ammonia. Included in the plan would be procedures for prompt reporting to ODEQ (within 24 hours) of any spill greater than 378.5 liters (100 gallons), in accordance with Oregon regulations implementing Title III of the Superfund Act and Reauthorization Amendments (SARA). Also included would be a list of measures to mitigate such a release.

2.2.8.3 Other Hazardous Non-Fuel Substances

All other chemicals would be delivered in closed bulk containers and stored in the warehouse or water treatment building or stored outdoors with secondary containment dikes.

One 18,927-liter (5,000-gallon) sulfuric acid tank would be supported on saddles and surrounded by a secondary containment dike. The containment area would be sized to contain 110 percent of the maximum chemical capacity of the tank, plus the 50-year, 24-hour storm event. The containment area would be equipped with either a gravity drain with a normally closed drain valve or a transfer pump and piping to allow uncontaminated rainwater to be added to the cooling water system. The area enclosed by the dike would be partially filled with coarse limestone to passively neutralize any potential leakage from the tanks.

Boiler feedwater treatment chemicals would be stored in bulk storage tanks. Tanks would be provided for phosphate/polymers (5,678 liters [1,500 gallons]), oxygen scavengers (1,893 liters [500 gallons]), and neutralizing amines (1,893 liters [500 gallons]).

Sodium hypochlorite for chlorination and biological control would be required in the raw water pretreatment system. Purchased sodium hypochlorite solution would be stored in a 18,927-liter (5,000-gallon) bulk tank and pumped via metering pumps.

Chemicals used in raw water filtration and cooling tower biocides would be stored in 1,514-liter (400-gallon) totes. Bulk storage tanks would be provided for corrosion inhibitors (7,571 liters [2,000 gallons]) and, as noted above, for sulfuric acid (18,927 liters [5,000 gallons]). The sludge dewatering system would require a 1,514-liter (400-gallon) tote for polymers and the brine concentrator would require two 1,514-liter (400-gallon) totes, one each for the scale inhibitor and the antifoam agent.

The totes would provide considerable protection to the leak-proof plastic liners encasing each solution, permitting a solution to be stored in normal warehouse spaces. Injection pumps would take solution directly from these containers, so that personnel would not be exposed to the solution..

Lime, soda ash, and magnesium oxide solids would be stored in bulk for use in the sidestream softener system.

Curbs would be installed at all chemical treatment areas; the curbed areas would either be designed to contain 110 percent of the maximum chemical capacity of the tank, plus the 50-year, 24-hour storm event, or alternatively, drains would route spills along underground gravity drain lines to a chemical sump. The sump would be sized to contain the largest single container plus the runoff volume for a 50-year, 24-hour storm event from all curbed areas served by the sump. Any liquids captured within the containment areas or sump would be pumped out and either added to the cooling water system, or if contaminated, disposed of as required by regulations. All transport piping would be constructed of compatible material to prevent corrosion or deterioration by the liquid being carried.

A number of miscellaneous chemicals and equipment lubricants, in addition to spare parts and equipment, would also be stored within either the warehouse building or the powerhouse.

Compressed gases used at the facility would be stored outdoors in returnable cylinders. The gas cylinders would be stored in vertical racks with individual bottle restraints. Less than ten cylinders of each type of gas required for operation of the plant would be stored on site. The compressed gases stored on site would include nitrogen, carbon dioxide, oxygen, and acetylene. These gases would be stored outside to minimize the safety hazards associated with accidental releases. Such releases outdoors would dissipate quickly into the air. However, releases of these gases indoors could increase the risk of suffocation and fires.

2.2.9 Facility Safety Features

The facility design would incorporate many features to ensure that the HGC facility would operate safely. The design and equipment to be used at the power plant would be in accordance with good engineering practice and local regulations, and would comply with the latest editions of the regulations of all applicable governmental agencies and engineering associations. These organizations include, but are not limited to, the National Electrical Manufacturing Association, United States Department of Transportation, National Fire Protection Association, American Society of Mechanical Engineers, and the American National Standards Institute. In addition, HGC has established specific maintenance guidelines and policies to provide for safe and efficient operation of the facility.

2.2.9.1 Fire Protection System

A complete on-site fire protection system would be installed to control and extinguish fires that might occur within the buildings and yard areas. The system would be designed to conform with the Uniform Fire Code and all applicable National Fire Protection Association standards. It would include a capability to control fires by means of a fire water system, a CO_2 extinguishing system, and portable fire extinguishers.

The fire water system would include a fire water supply loop, fire hydrants, sprinkler systems, and hoses placed at key locations. An underground fire main pipeline would be constructed, and hydrants with associated hose stations at appropriate intervals would be strategically located throughout the heat recovery steam generator, turbine, and natural gas handling areas.

The combustion turbine housings, along with their associated lube oil and distillate fuel oil pumps would be protected by CO_2 fire protection systems. A sprinkler system would protect the steam turbine lube oil and hydraulic systems. The warehouse, maintenance, administration, and control room areas would be protected by a wet-pipe sprinkler system. Deluge fire-suppression systems would be provided for each cooling tower, and fire walls would be provided around the main step-up transformers.

2.2.9.2 Medical Facilities

First aid kits, eyewash stations, and drench showers would be provided throughout the facility. This would facilitate rapid medical response in an emergency situation.

2.2.10 Construction and Operational Characteristics

The project development timetable envisions financial closing by about the third quarter of 1994 and commercial operation by about mid-1996. The total construction period is estimated to be approximately 26 months. The construction work force is expected to average approximately 270 personnel over the 26-month construction period, with a peak work force of 515. The work force is expected to start at 50 construction workers during initial mobilization for clearing and rough grading.

Construction activities would include the following:

- Site preparation;
- Installation of temporary utilities (electricity, water, phone, sanitary facilities);
- Set-up and assembly of temporary office and warehouse space;
- Construction of a temporary unpaved access road at the plant site;
- Preparation of construction parking and equipment staging areas;
- Installation of erosion and sedimentation control measures;
- Disposal of wastes during construction;

- Excavation and construction of foundations; and

- Erection of permanent facility components.

2.2.10.1 Site Preparation

Site preparation would begin with initial clearing and grading. Such activities and excavation required for the construction of foundations would result in the disturbance and removal of surface soils and vegetative cover. Excavated soils on the power plant site would be used on the site to the extent feasible for necessary fill or grading.

2.2.10.2 Installation of Temporary Utilities

Temporary electrical power would be obtained through UECA. Temporary telephone service would be provided by the local phone company to the on-site construction office. Construction water would be trucked to the construction site. Bottled water would be available to the construction work force. Sanitary facilities would consist of "Porta-Johns" and/or toilet trailers with holding tanks.

2.2.10.3 Set-up of Temporary Office and Warehouse

The non-manual personnel office, craft change house, and warehouse would be temporary buildings located near the power block. These would probably be installed after initial grading and clearing.

2.2.10.4 Preparation of Staging Areas and Construction Parking

Staging and laydown areas would be established on the site or on adjacent property. These areas would be used for storage of bulk material such as structural steel, piping, mechanical equipment, electrical equipment, cable reels, heat recovery steam generators, and turbine components. In addition, some materials may be stored and transported to the site as needed by truck. Upon completion of initial grading, a fence would be installed along the power plant site perimeter. A personnel gate would be used to log craft workers into and from the work site. During the peak construction period, total traffic to and from the power plant site could be as high as 1,226 daily trips.

2.2.11 Facility Operation

The project would be designed to operate continually (24 hours per day, 7 days per week) to provide baseload power. The operational labor force would consist of approximately 25 permanent full-time employees, with the majority working the normal day shift. The remaining employees would perform shift work to maintain 24-hour operation of the power plant.

2.3 Alternatives Considered But Dismissed Without Study

In addition to the Proposed Action and the No Action Alternative, an alternative to integrate the project over a new right-of-way using 500 kV facilities was also considered. It was rejected as not satisfying the Need and Purpose stated in Section 1.1.1.

The proposed action, which includes a 230 kV transmission line connecting the power plant to BPA's McNary Substation, would transmit power over primarily non-Federal facilities using primarily existing right-of-way at a cost that would make the project feasible to the developer.

The 500 kV alternative would involve additional costs, which could cause the developer to abandon the project as economically unfeasible. The developer would derive no additional benefit from the 500 kV alternative other than a reduction in transmission line losses, which would not be sufficient to offset the increased cost. No other utility has identified a definite need for the facilities in the 500 kV alternative, therefore no other utility would find it prudent at this time to agree to cost sharing. BPA might have a future need for the facilities, but that need is speculative and does not provide a basis for BPA to share in the costs at this time.

Since the 500 kV alternative would be more costly, would require new right-of-way, and could jeopardize the cost effectiveness of this project, it has been rejected as a viable alternative.

3.0 Affected Environment and Environmental Consequences

In this chapter, the affected environment for each resource is described, followed by a discussion of impacts and mitigation measures for that resource.

Throughout this chapter, mitigation measures (actions taken or recommended to avoid, minimize, reduce, eliminate, or compensate for impacts associated with constructing and operating the plant and associated facilities) are designated in two ways. Actions listed as Measures Included as Part of the Project have been proposed by HGC in its Application for Site Certification (HGC 1993, 1994) or have been imposed as conditions in the final Site Certificate (EFSC 1994a). The evaluation described in this EIS is based on the assumption that all of these actions would be implemented if the project were built.

Actions listed as Potential Additional Mitigation Measures are recommendations for added measures that would provide a greater degree of resource protection or compensation for adverse impacts. If the Proposed Action is approved, these measures will be considered for inclusion in the Record of Decision and Mitigation Action Plan (see Section 1.2.3).

3.1 Geology, Soils, and Seismicity

Issues associated with geologic resources include 1) unique geologic sites, 2) soils impacts, and 3) impacts to the project from geologic hazards.

Overall, the project impacts on geological resources would be negligible. First, there are no unique geologic features in the project site or along the rights-of-way. Second, soils impacts would be negligible since no prime farmland would be permanently taken out of production, soil compaction would be limited to a very small area, and only a minor amount of erosion would occur during project construction. Mitigation measures, including development and implementation of an erosion and sediment control plan, would prevent large scale erosion and sedimentation.

Finally, there are no active faults at the project site and seismicity in the area is of moderate intensity. The project features would be designed taking into account the maximum credible earthquake in the area. This would minimize damage to the project during an earthquake of magnitude 5.5 or less.

3.1.1 Affected Environment

This section describes the geology, soils, and seismicity in the vicinity of the power plant site, the gas pipeline, and the electricity transmission line between the power plant and McNary Substation. The information in this section is based primarily on a technical report prepared by Riverside Technology, Inc. (1993) and the Soil Survey for Umatilla County (Soil Conservation Service 1988).

3.1.1.1 Geology

The project site is in the central portion of the Columbia Plateau physiographic province that extends across northeastern Oregon, southwestern Washington, and western Idaho. The geology of the Hermiston area is shown in Figure 3-1. The Columbia Plateau is composed of a thick sequence of flood basalts, named the Columbia River Basalt Group (CRBG), that erupted from 17 to 6 million years before present (m.y.b.p.). These flood basalts cover an area of approximately 163,170 square kilometers (63,000 square miles) and are up to 3,658 meters (12,000 feet) thick in the central portion of the plateau. The CRBG consists of hundreds of individual basalt flows that have been segregated, based on chemical composition, age, and aerial extent, into three major groups: the Saddle Mountains Basalt, the Wanapum Basalt, and the Grande Ronde Basalt (Galster and Coombs 1989). In the project area, the Saddle Mountains Basalt is exposed in nearby hills and buttes. Further subdivisions within the Saddle Mountains Basalt include, from youngest to oldest, the Umatilla Member, the Pomona Member, and the Elephant Mountain Member, all of which appear in the vicinity of the power plant site (Figure 3-1). The basalts erupted from feeder dikes injected into north-northwest oriented linear fracture zones.

The Columbia Plateau contains a complex system of folds, faults, and basins (Figure 3-2). Based on the predominant structural fabric, the Columbia Plateau has been subdivided into three informal structural subprovinces: Palouse Slope, Blue

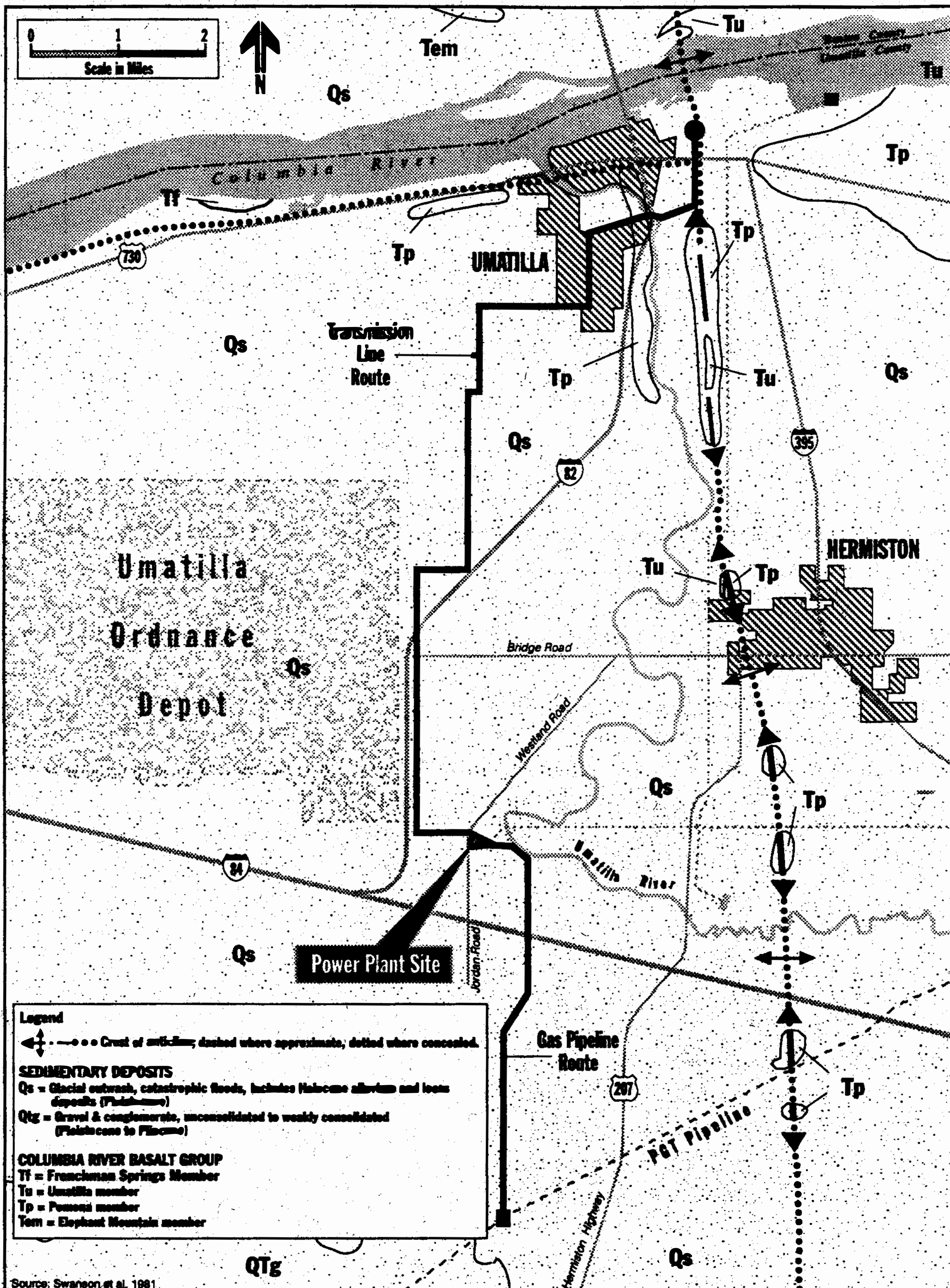


Figure 3-1 Geologic Map

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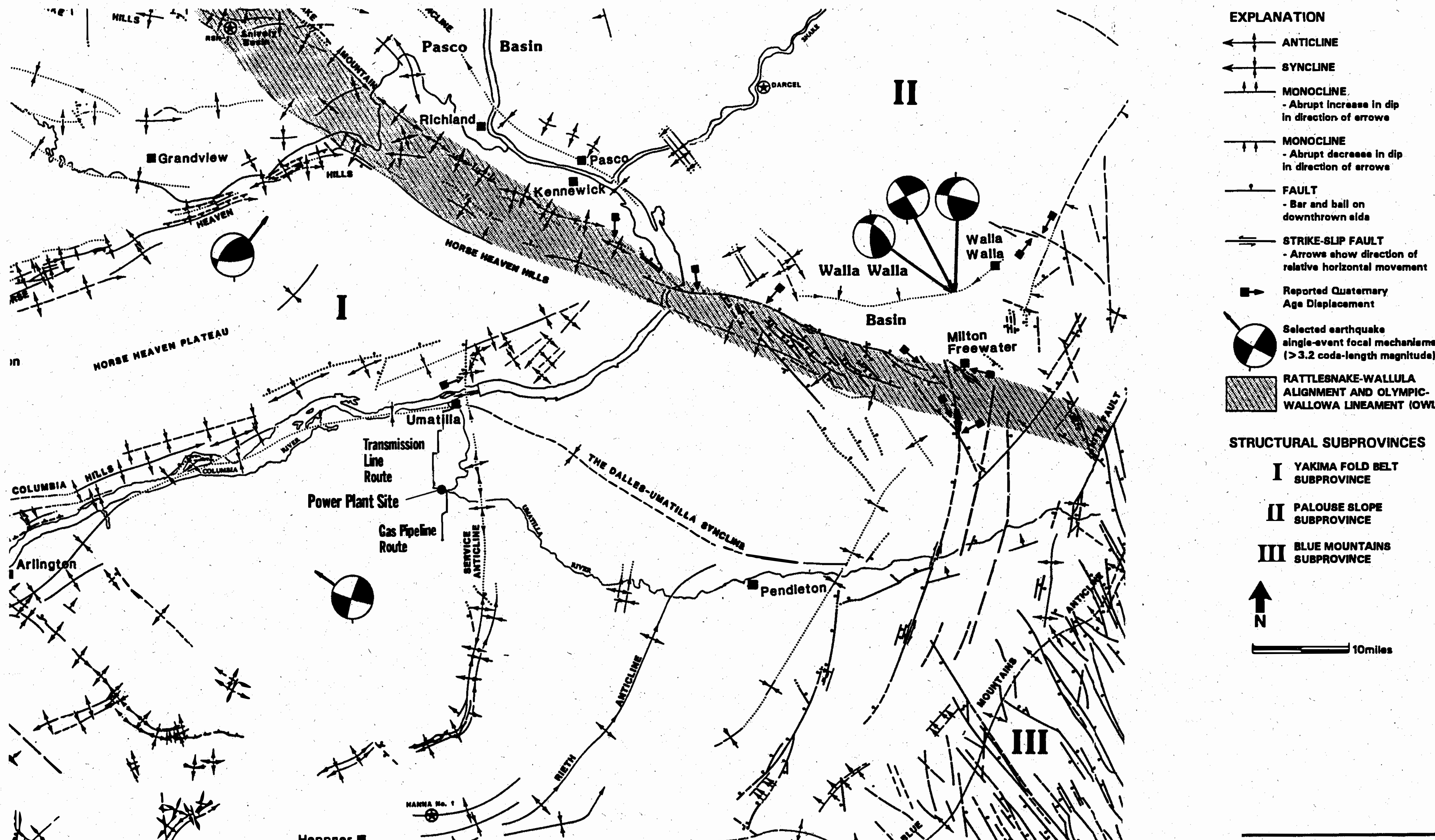


Source: Reidel and Hooper 1989

Figure 3-2 Seismic and Tectonic Features Map

Mountains, and Yakima Fold Belt. The project is situated within the Yakima Fold Belt of the Columbia Plateau, characterized by narrow, asymmetrical anticlines spaced between 4.8 to 48.3 kilometers (3 to 30 miles) apart, separated by broad, low valleys. The anticlines include the Service anticline, 6.4 kilometers (4 miles) east of the power plant site; The Dalles-Umatilla syncline, 11.2 kilometers (7 miles) north of the power plant site; and the Columbia Hills anticline, 17.7 kilometers (11 miles) north of the power plant site. The Rattlesnake-Wallula alignment, located 48.3 kilometers (30 miles) northeast of the power plant site, is a broadly defined zone of faulting and tectonic deformation. It is a segment of the larger Olympic-Wallowa Lineament (OWL) that extends from northwestern Washington to southwestern Idaho.

The Columbia Plateau includes a number of identified tectonic basins, one of which is the Umatilla Basin, where the project is located. These basins are subsidence features that developed during emplacement of the CRBG. They are associated with dramatic thickening of the basalt and overlying sedimentary deposits. Although the Umatilla Basin has not been thoroughly studied, it is similar to other basins in the region. These basins appear to have continued to subside since basaltic volcanism stopped about 6 m.y.b.p. (Reidel et al. 1989)

Local Geology and Structure: The nearly horizontal basalt flows in this area are blanketed by up to 45.7 meters (150 feet) of unconsolidated to poorly consolidated, Pleistocene (0.01 to 2 m.y.b.p.), glacial outwash, and catastrophic flood deposits (Figure 3-1, map symbol Qs; Hogenson 1964, Swanson et al. 1981). These deposits accumulated during glaciation, when major tributaries of the Columbia River were dammed by ice, forming large lakes. These ice dams eventually broke, sending catastrophic floods across the Columbia Plateau through the gorge to the Pacific Ocean. Geologic mapping of these deposits indicate that lake levels and flood crest rose to a maximum elevation of approximately 351 meters (1,150 feet) msl in the Umatilla lowlands area. The floods completely stripped any existing overburden material and scoured the surface of the CRBG, forming a scabland topography (elevated, flat-lying basalt flows, with a thin soil cover, sparse vegetation, and deep, dry channels). The flood and outwash deposits accumulated on the CRBG are crudely stratified clean sand and gravel with occasional boulders and silt lenses. The flood deposits are covered by wind-deposited silt (loess). The silt is loose and typically several feet thick.

The nearly horizontal basalt flows in this area are blanketed by up to 45.7 meters (150 feet) of unconsolidated to poorly consolidated, Pleistocene (0.01 to 2 m.y.b.p.), glacial outwash, and catastrophic flood deposits (Figure 3-1, map symbol Qs; Hogenson 1964, Swanson et al. 1981). These deposits accumulated during glaciation, when major tributaries of the Columbia River were dammed by ice, forming large lakes. These ice dams eventually broke, sending catastrophic floods across the Columbia Plateau through the gorge to the Pacific Ocean. Geologic mapping of these deposits indicate that lake levels and flood crest rose to a maximum elevation of approximately 351 meters (1,150 feet) msl in the Umatilla lowlands area. The floods completely stripped any existing overburden material and scoured the surface of the CRBG, forming a scabland topography (elevated, flat-lying basalt flows, with a thin soil cover, sparse vegetation, and deep, dry channels). The flood and outwash deposits accumulated on the CRBG are crudely stratified clean sand and gravel with occasional boulders and silt lenses. The flood deposits are covered by wind-deposited silt (loess). The silt is loose and typically several feet thick.

Subsurface Conditions: Published information about subsurface geologic conditions suggest that the general geologic conditions are similar throughout the area (Hogenson 1964, Swanson et al. 1981). The log for a well drilled on the Lamb-Weston property, approximately 457 meters (1,500 feet) east of and at a surface elevation several feet lower than the power plant site, is the closest available subsurface information for the power plant site. This well, Lamb Well #3, encountered "black broken rock" at 28.4 meters (93 feet) that presumably is basalt of the CRBG. The basalt is overlain by interbedded gravel, and sand and gravel with clay lenses. This material is interpreted as Pleistocene glacial outwash and catastrophic flood deposits. The upper couple of feet were logged as "brown surface sand" that is interpreted as Holocene loess. Two other wells drilled on the same property (Lamb Wells #1 and #2) but about 0.8 meter (0.25 mile farther from the power plant site encountered bedrock (basalt) at depths between 36.6 to 40 meters (120 to 130 feet).

3.1.1.2 Soils

Four soil types occur in the project area (Soil Conservation Service 1988). The acreage of each soil type at project features is listed in Table 3-1. If the optional transmission line route were used, the acreages and type of soils would be slightly different, as shown in Table 3-2.

Generally, these soils have low clay content, are subject to excessive wind erosion, and have high permeability and low shrink-swell potential. Each soil type is described below except for gravel pits, classified as rock outcrops; Xerofluvents, which are recent stream deposits; and Xerolic Durorthids, which are too steep for cultivation. Most soils in the project area are developed on wind- and/or water-borne deposits.

Table 3-1. Soils and Surface Disturbance in the Project Area (Proposed Transmission Line Route)

	Milepost		Soil Disturbance		Prime Farmland	Erosive Soil	Soil Type
	Start	End	Temporary	Permanent			
Power Plant Site				12.9		X	Quincy loamy fine sand
Subtotal (acres)			**0.0**	**12.9**	**0.0**	**12.9**	
Natural Gas Pipeline[1]	0.00	0.74	4.48			X	Quincy loamy fine sand
	0.74	2.12	8.36		X	X	Adkins fine sandy loam (<5% grade)
	2.12	2.23	0.67			X	Quincy fine sand
	2.23	3.01	4.73		X	X	Adkins fine sandy loam (<5% grade)
	3.01	3.62	3.70			X	Quincy loamy fine sand
	3.62	3.75	0.79				Gravel pits
	3.75	4.99	7.52			X	Quincy loamy fine sand
Subtotal (acres			**30.3**	**0.0**	**13.1**	**29.5**	
Electric Transmission Line[2]	0.00	2.31	4.67	0.005		X	Quincy loamy fine sand
	2.31	3.12	1.64	0.002		X	Burbank loamy fine sand
	3.12	3.21	0.18	0.000		X	Quincy fine sand
	3.21	4.47	2.55	0.003		X	Burbank loamy fine sand
	4.47	4.59	0.24	0.000		X	Quincy fine sand
	4.59	4.68	0.18	0.000		X	Burbank loamy fine sand
	4.68	4.80	0.24	0.000		X	Quincy fine sand
	4.80	5.03	0.46	0.000		X	Quincy loamy fine sand
	5.03	5.08	0.10	0.000		X	Quincy fine sand
	5.08	5.30	0.44	0.000		X	Burbank loamy fine sand
	5.30	5.46	0.32	0.000		X	Quincy loamy fine sand
	5.46	6.44	1.98	0.002		X	Burbank loamy fine sand
	6.44	6.48	0.08	0.000		X	Quincy loamy fine sand
	6.48	6.52	0.08	0.000			Terrace scoops
	6.52	8.89	4.79	0.005		X	Quincy loamy fine sand
	8.89	9.51	1.25	0.001		X	Burbank loamy fine sand
	9.51	10.00	0.99	0.001		X	Adkins fine sandy loam (5-25% grade)
	10.00	10.25	0.52	0.001		X	Quincy fine sand
	10.25	10.28	0.00	0.000			Water
	10.28	10.32	0.08	0.000			Xerofluvents
	10.32	10.92	1.21	0.001		X	Adkins fine sandy loam (5-25% grade)
	10.92	10.97	0.10	0.000		X	Burbank loamy fine sand
	10.97	11.13	0.32	0.000			Gravel pits
	11.13	11.41	0.57	0.001		X	Burbank loamy fine sand
	11.41	11.55	0.28	0.000			Gravel pits
	11.55	11.66	0.22	0.000		X	Quincy loamy fine sand
	11.66	11.89	0.46	0.000	X	X	Adkins fine sandy loam (<5% grade)
Subtotal (acres)			**24.0**	**0.02**	**0.000**	**23.2**	
TOTAL (acres)			**54.3**	**12.9**	**13.1**	**65.6**	

Notes:
1/ 15.2-meter (50-foot) construction right-of-way.
2/ 183-meter (600-ft) average spacing on poles; 30.5-meter by 30.5-meter (100-foot by 100-foot) disturbance for pole installation; 0.9 square meter (10 square feet) per pole permanent disturbance.
Source: Soil Conservation Service 1988.

Table 3-2. Soils and Surface Disturbance in the Project Area (Optional Transmission Line Route)

	Mile Post		Disturbance (acres)		Prime Farmland	High Wind Erosion	Soil Type
	Start	End	Temporary	Permanent			
Power Plant Site				12.9		X	Quincy loamy fine sand
Subtotal (acres)			**0.0**	**12.9**	**0.0**	**12.9**	
Natural Gas Pipeline[1]	0.00	0.74	4.48			X	Quincy loamy fine sand
	0.74	2.12	8.36		X	X	Adkins fine sandy loam (<5% grade)
	2.12	2.23	0.67			X	Quincy fine sand
	2.23	3.01	4.73		X	X	Adkins fine sandy loam (<5% grade)
	3.01	3.62	3.70			X	Quincy loamy fine sand
	3.62	3.75	0.79				Gravel pits
	3.75	4.99	7.52			X	Quincy loamy fine sand
Subtotal (acres)			**30.3**	**0.0**	**13.1**	**29.5**	
Electric Transmission Line[2]	0.00	2.31	4.67	0.005		X	Quincy loamy fine sand
	2.31	3.12	1.64	0.002		X	Burbank loamy fine sand
	3.12	3.21	0.18	0.000		X	Quincy fine sand
	3.21	4.47	2.55	0.003		X	Burbank loamy fine sand
	4.47	4.59	0.24	0.000		X	Quincy fine sand
	4.59	4.68	0.18	0.001		X	Burbank loamy fine sand
	4.68	4.80	0.24	0.001		X	Quincy fine sand
	4.80	5.03	0.46	0.000		X	Burbank loamy fine sand
	5.03	5.08	0.10	0.001		X	Quincy fine sand
	5.08	5.30	0.44	0.001		X	Burbank loamy fine sand
	5.30	5.46	0.32	0.000		X	Quincy loamy fine sand
	5.46	6.44	1.98	0.002		X	Burbank loamy fine sand
	6.44	6.48	0.08	0.000		X	Quincy loamy fine sand
	6.48	6.52	0.08	0.001			Terrace scoops
	6.52	8.89	4.79	0.005		X	Quincy loamy fine sand
	8.89	9.63	1.49	0.001		X	Burbank loamy fine sand
	9.63	9.79	1.04	0.001		X	Quincy loamy fine sand
	9.79	9.94	0.31	0.000		X	Adkins fine sandy loam (5-25% grade)
	9.94	10.10	0.33	0.000		X	Quincy fine sand
	10.10	10.13	0.00	0.000			Water
	10.13	10.25	0.25	0.001			Xerofluvents
	10.25	10.29	0.08	0.000		X	Adkins fine sandy loam (5-25% grade)
	10.29	10.47	0.38	0.000		X	Burbank loamy fine sand
	10.47	10.60	0.27	0.001			Gravel pits
	10.60	10.88	0.58	0.001		X	Burbank loamy fine sand
	10.88	11.02	0.29	0.000			Gravel pits
	11.02	11.13	0.23	0.001		X	Quincy loamy fine sand
	11.13	11.36	0.23	0.000	X	X	Adkins fine sandy loam (<5% grade)
Subtotal (acres)			**23.4**	**0.023**	**0.0**	**22.5**	
TOTAL (acres)			**53.7**	**12.9**	**13.1**	**64.7**	

Notes:
1/ 15.2-meter (50-foot) construction right-of-way.
2/ 183-meter (600-foot) average spacing on poles; 30.5-meter by 30.5-meter (100-foot by 100-foot) disturbance for pole installation; 0.9 square meters (10 square feet) per pole permanent disturbance.
Source: Soil Conservation Service 1988.

Adkins Fine Sandy Loam: Adkins fine sandy loam is typically greater than 1.5 meters (5 feet) in depth, has very high to extreme wind erosion susceptibility, and is not subject to flooding. The water table is greater than 1.8 meters (6 feet) below the surface. These soils are generally used for irrigated crops, or to a lesser extent, as rangeland. They have low shrink-swell potential and low clay content (0 to 5 percent). Adkins fine sandy loam on 0 to 5 percent slopes is considered prime farmland, a designation that indicates its suitability for growing crops. It does not necessarily mean that the area is currently producing agricultural products

Burbank Loamy Fine Sand: Burbank loamy fine sand is deep and well drained. Permeability is rapid with low water capacity, and runoff is slow. Potential for water erosion is slight, but the soil has very high potential for wind erosion. These soils have a low shrink-swell potential. These soils are mostly used for irrigated crops, but are sometimes used as rangeland or pasture. This soil caves in easily in shallow excavations.

Quincy Fine Sand: Quincy fine sand is typically greater than 1.5 meters (5 feet) in depth, has very high to extreme wind erosion susceptibility, and is not subject to flooding. The water table is greater than 1.8 meters (6 feet) below the surface. These soils are generally used for irrigated crops, or to a lesser extent as rangeland. They have low shrink-swell potential and low clay content (0 to 5 percent). This soil caves in easily in shallow excavations

Quincy Loamy Fine Sand: The power plant site and the Lamb-Weston facility are underlain by this type of soil. Quincy loamy fine sand soils are typically used for irrigated crops, have a low clay content (0 to 5 percent), have low shrink-swell potential, and are highly susceptible to wind erosion, particularly when excavated. The soils are generally greater than 1.5 meters (5 feet) in depth and groundwater is usually more than 1.8 meters (6 feet) below the surface. Data from nearby Lamb-Weston wells indicate that soil depths at the power plant site are about 2.1 meters (7 feet). This soil caves in easily in shallow excavations

3.1.1.3 Geologic hazards

Potential geologic hazards in the project area include landslides, volcanic activity, soil expansion-contraction, and seismicity.

Landslides: Landslides or other forms of mass wasting are not typical of the project site or along the rights-of-way. The power plant site is on gentle topography with slopes less than 5 percent. In addition, the water table is at least 15.2 meters (50 feet) below the surface. Under these circumstances the initiation of landslides is extremely unlikely. The gas pipeline route is also very gentle and poses no threat of landslide initiation; the gas pipeline itself would not be affected by landslides.

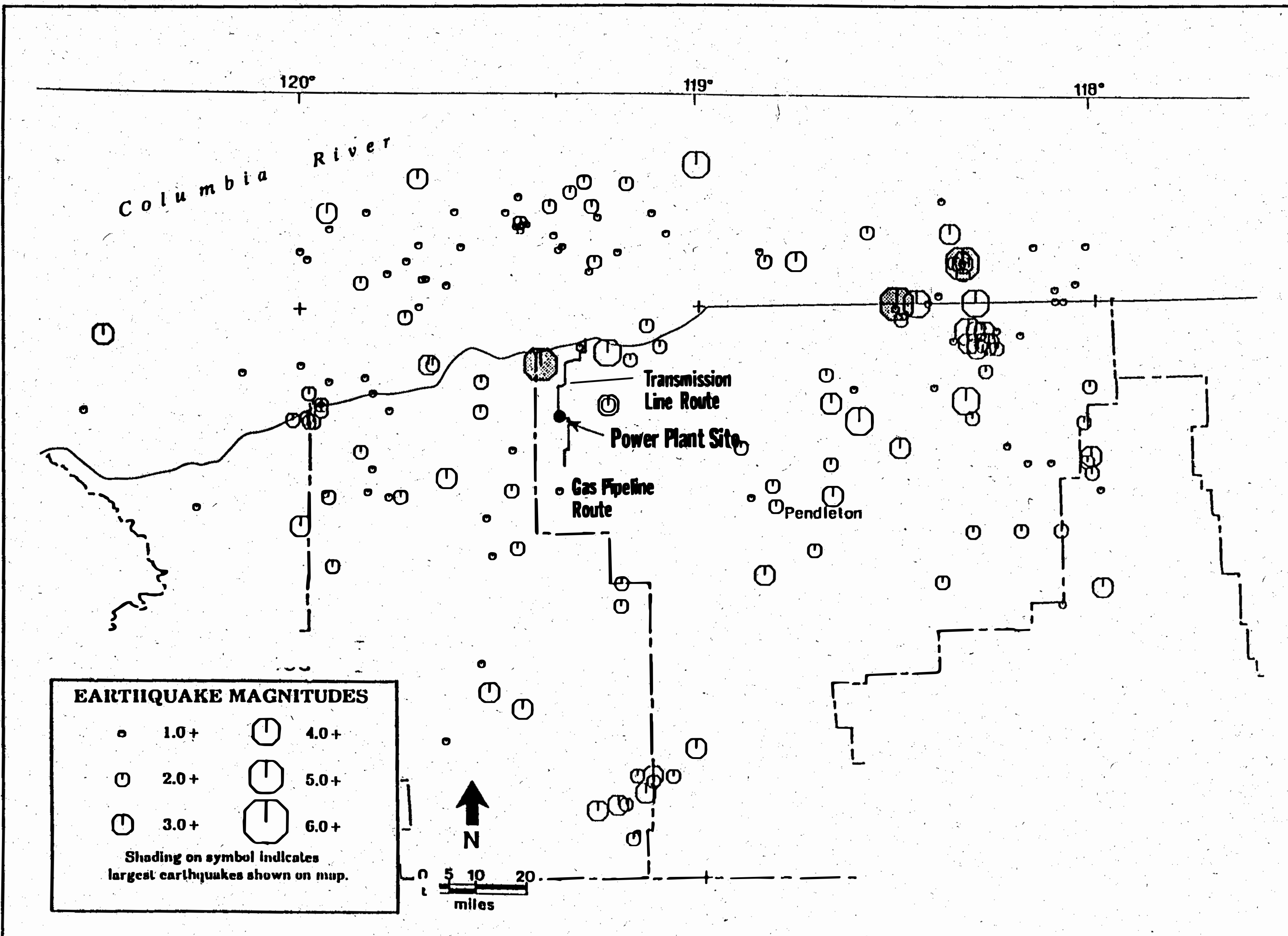
No landslides or other evidence of instability were observed along the transmission line route except in the vicinity of active rock quarries. Although no major landslides or failures were observed in these quarry areas, surface mining has resulted in potentially unstable cut slopes adjacent to some existing transmission poles and towers.

Volcanic Activity: There are no active volcanoes in the project vicinity. The last of the flood basalts that comprise the CRBG erupted 6 million years ago. There are no Quaternary lava flows or cinder cones within the project area. The High Cascade Range, located approximately 161 kilometers (100 miles) west of the project, consists of a north-south alignment of stratovolcanoes that have been active in the Quaternary. Cascade volcanoes in the region that have been active during the last few hundred years include: Mount Hood, Mount St. Helens, Mount Rainier, and Mount Baker. Numerous flows and cinder cones are present that formed within the last 10,000 years.

Soil Expansion-Contraction: All soils at the power plant site, as well as along the gas pipeline route and transmission line route, have low potential for expansion-contraction (Soil Conservation Service 1988). Soil expansion-contraction occurs when certain clay minerals are present that change in volume as they absorb or release water.

Seismicity: The faulting and seismicity of the region has been studied in detail for updating the design of dams on the Columbia River (Corps 1983) and for nuclear power plant and nuclear waste siting studies at the Hanford Site near Richland, Washington (U.S. Department of Energy 1988). More recent studies have concentrated on trenching the Wallula fault zone, a segment of the OWL, to determine the age and rate of movement along this structure (Mann and Meyer, in preparation). The project site lies within the seismically active Columbia Plateau. As illustrated on the earthquake epicenter map, Figure 3-3, numerous earthquakes have occurred within the region.

The strongest historical earthquake known to have occurred within the Columbia Plateau occurred on July 16, 1936 in the Milton-Freewater area. The estimated Richter magnitude for the Milton-Freewater event has ranged from 5.8 (Jacobson 1986) to 6.2 (personal communication, Zollweg 1992). The event had a Modified Mercalli Intensity of VII-VIII (see Table 3-3), with Intensity V in the Hermiston



Source: Jacobson 1986. Map of Oregon Seismicity 1841-1986 DOGMI GMS-49

Figure 3-3 Earthquake Epicenter Map

Table 3-3. Modified Mercalli Intensity Scale

I.	Not felt except by a very few under especially favorable circumstances.
II.	Felt only by a few persons at rest, especially on upper floors of buildings.
III.	Felt quite noticeably indoors, especially on upper floors of buildings.
IV.	During the day, felt indoors by many; outdoors by few. At night some awakened.
V.	Felt by nearly everyone; many awakened. Some dishes, windows broken; a few instances of cracked plaster; unstable objects overturned.
VI.	Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.
VII.	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures. Some chimneys broken.
VIII.	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse, great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls.
IX.	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings.
X.	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent.
XI.	Few masonry structures remain standing. Bridges destroyed.
XII.	Damage total. Lines of sight and level distorted. Objects thrown upward into the air.

Note: The Modified Mercalli Intensity Scale is used to describe the relative strength of ground shaking experienced at a particular site during an earthquake. Unlike logarithmic magnitude scales, which are related to the energy release at the earthquake source, the 12-increment intensity scale refers to the observed effects of ground shaking at individual localities. Seismologists assign intensity to specific sites on the basis of the effects of the shaking on people, damage to buildings, and changes in the landscape. The factors which determine the intensity level experienced at a given site include distance from the causative fault, direction of rupture propagation, and soil conditions beneath the site. The intensity scale outline below is a very abbreviated version of the Modified Mercalli Intensity Scale of 1931 by Harry Wood and Frank Neumann.

Source: Brewer 1993.

area. In the vicinity of the Wallula fault zone, the earthquake was associated with ground breakage and possible localized liquefaction features. The location of these features strongly suggest the earthquake was generated by movement in the Wallula fault zone.

An earthquake centered near Umatilla on March 3, 1893 had a Modified Mercalli Intensity of VII. Based on the Intensity VII, this earthquake is estimated to have a Richter magnitude of 5.7 (Jacobson 1986). However, Zollweg (personal communication, 1992) suggested that the Umatilla earthquake was a relatively small earthquake on the order of Richter magnitude 4.5 that occurred at a very shallow depth (less than 3.2 kilometers [2 miles]). This is supported by the fact that the Umatilla earthquake was felt over a very localized area. The source structure for the Umatilla earthquake has not been identified. During the summer of 1992, a 3.7 magnitude earthquake was recorded in the Hermiston-Umatilla area and a 4.2 magnitude earthquake occurred in the Milton-Freewater area (personal communication, Mann 1992).

Pertinent faults within a 100-kilometer (160-mile) radius of the project site, and their estimated maximum credible earthquakes (MCE) and corresponding peak ground accelerations (PGA), are summarized in Table 3-4.

Table 3-4. Estimated Maximum Credible Earthquakes (MCE) and Peak Ground Accelerations (PGA) for Significant Faults and Structures in the Region

Fault or Structure	Distance from Power Plant (miles)	Maximum Credible Earthquake	Estimated Peak Ground Acceleration (gravity) Corresponding to MCE	Recurrence Intervals
Service Anticline	4	5.5	0.22	N/A
Toppenish Ridge Fault	60	7.3	0.08 0.09	1,000s to 10,000s of years
Wallula-Rattlesnake Alignment	30	6.4 6.5	0.06 0.09	200 to 1,000 years
Gable Mountain	60	5.9 5.0	<0.05 <0.05	10,000 years
Umatilla Basin	0	5.5	0.25	N/A

Source: Riverside Technology, Inc. 1993

PGA is a measure of intensity of ground shaking during an earthquake. The greater the PGA, the more a given type of geologic material, such as bedrock, would move. The PGA does not account for the different responses of different geologic materials to seismicity. For example, for a given PGA, bedrock would have a smaller response (would move less) than unconsolidated sands.

The values in Table 3-4 represent the most recent quantitative estimates of seismic risk for the region. As shown in Table 3-4, the MCE for the site corresponds to a 5.5 Richter magnitude event occurring in the Umatilla Basin, conservatively estimated to occur at the project site. The estimated PGA for the site is 0.25 times gravity (g). A 5.5-Richter magnitude event at or near the site, or centered on the Service anticline 6.4 kilometers (4 miles) east of the site, would produce an estimated PGA of 0.22 g.

Groundwater levels are important in evaluating potential seismic hazards because shallow groundwater in unconsolidated, sandy material can contribute to liquefaction potential. Static water levels recorded during 1969 and 1973 for the three Lamb-Weston wells indicate that water levels fluctuate throughout the year, with the highest levels typically occurring in the winter and spring and lowest levels at the end of summer. The lowest water level recorded for the wells was 26 meters (85 feet) for Well #1, and the highest water level recorded was 9.4 meters (31 feet) in Well #3 (Riverside Technology, Inc. 1993). Similar depths to groundwater are anticipated at the power plant site.

3.1.2 Environmental Consequences and Mitigation Measures

Impacts associated with soils include the following: 1) soil compaction, 2) wind erosion, and 3) loss of soil fertility. Impacts associated with geologic hazards include: 1) slope failure, 2) ground shaking, 3) differential settlement, 4) liquefaction, 5) surface rupture, and 6) volcanic eruptions. The potential for these impacts, as well as the mitigation efforts to address them, are discussed below.

3.1.2.1 Soils

Impact—Soil Compaction: Soils in the project area are poorly consolidated and consist mostly of loose sandy material. The soils are up to 2.1 meters (7 feet) thick and could be subject to compaction from the use of heavy equipment during construction at the power plant site and along the transmission line and gas pipeline routes. Compacted soil is not as fertile due to decreased aeration, infiltration, and water holding capacity. It is more difficult for native or ornamental plants to re-establish in a compacted area.

Approximately 22 hectares (54.3 acres) of soil could be affected by construction along the gas pipeline and transmission line routes (Table 3-1). About 0.2 hectare (0.6 acre) less would be disturbed if the optional transmission line route were used (Table 3-2).

Measures Included as Part of the Project:

- Prior to start of construction, the HGC would conduct a detailed survey of the power plant site area. The survey would include core drilling sufficient to learn: (1) the overburden soil types and thicknesses under power plant structures; (2) the depth and characterization of the bedrock under the site; (3) if evidence of seismic faulting not considered in the ASC is present or if there are indications that the seismic classification of the portion of the site containing the power plant site is not correct in the ASC. The survey would also characterize ground response to potential seismic events. The survey would be peer reviewed by the Oregon Department of Geology and Mineral Industries or a private qualified registered geologist that is independent from HGC and its contractors and subcontractors. If a private geologist is used, the choice of peer reviewer shall be approved by EFSC in consultation with the Oregon Department of Geology and Mineral Industries.

- If the detailed survey reveals evidence that is not as described in the ASC, then HGC would revise the facility design parameters to comply with corresponding Uniform Building Code requirements. If pre-construction seismic analysis reveals features unique to the power plant site that justify enhanced seismic design, the HGC would design structures critical to public health or safety in consultation with the Building Codes Agency subject to approval by EFSC. Critical structures include hazardous material storage areas and control rooms.

- To offset potential impacts from soil compaction, project structures would be founded in dense materials beneath unconsolidated surface materials.

Potential Additional Mitigation Measure:

- To offset potential impacts from soil compaction, compacted areas should be scarified and aerated after construction is complete.

Impact—Soil Erosion: Soils in the project area are subject to wind erosion, which would be a temporary impact during construction. The structure development in soil horizons helps soil particles stick together during high winds. When disturbed, this fragile structure is lost, particularly during the dry season. Since much of the soil parent material is wind-blown silt, there is a high likelihood of mobilization when vegetation and soil structure are removed. Disturbed soils at construction sites at the power plant, along the pipeline construction right-of-way, and at the sites of transmission line poles would be subject to wind erosion. The total area of disturbed soils vulnerable to high wind erosion on the proposed gas pipeline and transmission line route is 38.5 hectares (95.1 acres) (Table 3-1). If the optional transmission line route were used (Table 3-2), the total area of disturbed erosive soils would be virtually the same—38.1 hectares (94.2 acres).

Measures Included as Part of the Project:

- Because of susceptibility of soils in the project area to wind erosion, precautions would be taken during construction to minimize erosion. This would include watering the power plant site and pipeline access road and/or use of dust palliatives.

- Areas disturbed by construction of the power plant, gas pipeline, and transmission line would be revegetated upon completion of construction. Revegetation would emphasize the use of native species.

The measures included in the project as proposed would be adequate to mitigate the potential impacts of wind erosion.

Impact—Loss of Soil Fertility: Disturbance of soils along the pipeline could impair soil fertility. This occurs when a fertile topsoil layer is mixed with the relatively undeveloped subsoil. Prime farmland soil is a special concern, due to the high productivity of the topsoil in these areas. Soil mixing can occur during excavation for pipelines; soil mixing does not occur during installation of above-ground transmission lines. The total area of the natural gas pipeline right-of-way that is in prime farmland is 5.3 hectares (13.1 acres) (Table 3-1).

Measure Included as Part of the Project:

- Topsoils and subsoils resulting from excavation for construction of the gas pipeline would be segregated and the topsoil restored to minimize impacts on soil fertility.

This measure would be adequate to protect soil fertility.

3.1.2.2 Geologic Hazards

Impact—Slope Failure: Placing transmission line poles near the cut slopes at the quarry east of the Umatilla River could promote slope failure or poles could be damaged if the slopes fail.

Measure Included as Part of the Project:

- Placement of electrical transmission towers would include setbacks from cut slopes associated with the quarry east of the Umatilla River along the transmission line route.

The recommended setbacks of 15.2 meters (50 feet) would result in a longer spacing between the poles, especially for the optional transmission line route, which crosses 0.64 kilometer (0.4 mile) of gravel pit. This action would be adequate to prevent slope failure.

Impact—Earthquake Damage: Differential settlement caused by groundshaking during an earthquake could damage project facilities. Also, depending on the depth to groundwater and the nature of the geologic materials, there could be a threat of liquefaction in the project area during an earthquake.

Groundshaking: The project area is subject to periodic groundshaking from earthquakes. The intensity of the shaking at a particular site depends mostly on three factors: the distance between the epicenter and the site, the magnitude of the earthquake, and the site response characteristics of the soils and bedrock beneath the site. For a major earthquake on a nearby fault, the intensity of shaking and subsequent damage for a given site are strongly dependent on the type of soils and rock beneath the site. In general, sites underlain by loose artificial fill on unconsolidated sediments tend to suffer the greatest damage, while sites underlain at shallow depth by bedrock suffer considerably less damage. For characterization of the power plant site, the MCE is estimated to be a 5.5 magnitude earthquake within the Umatilla Basin.

Differential Settlement: The several feet of loose silt to fine-grained sand that blanket the power plant site and portions of the gas pipeline and transmission line rights-of-way may be subject to differential settlement caused by earthquake-induced soil compaction. (The soil compaction from loading discussed earlier in Section 3.1.2.1 could also cause differential settlement.)

Liquefaction: Liquefaction occurs most commonly in loose, clay-free, granular sediments that have a uniform grain-sized distribution and are saturated with groundwater. Liquefaction can result in loss of bearing strength of foundation soil, lateral spreading, and landsliding.

The groundwater conditions beneath the site are not precisely known since no subsurface exploration has been conducted. However, data from the Lamb-Weston wells adjacent to the site suggest that groundwater is at least 9.1 meters (30 feet) beneath the surface and probably averages 15.2 to 24.4 meters (50 to 80 feet) beneath the surface. In addition, the Pleistocene outwash and catastrophic flood deposits, observed in exposed gravel quarries in the area, are relatively dense and therefore are not highly susceptible to liquefaction.

For static water depths of 9.1 to 15.2 meters (30 to 50 feet), it is likely that liquefaction potential is low (Tinsley et al. 1985). For water levels below 15.2 meters (50 feet), liquefaction potential is very low. Based on the estimated depth to groundwater discussed above, this information suggests that the risk of liquefaction at the power plant site is low.

Late Holocene alluvium occurs where the transmission line crosses the Umatilla River. This alluvium is restricted to a narrow ribbon that follows the river channel and adjacent flood plain. These young river deposits are saturated and are probably susceptible to liquefaction.

Surface Rupture: There are no known active or potentially active faults that traverse the power plant site. Although extremely remote, there is always the possibility that future faulting (surface rupture) may occur in any seismically active area, even where no known potentially active faults previously existed. Historically, surface displacement generally closely follows the trace of geologically young faults. Since there are no known active or potentially active faults on the site or in the site vicinity, the risk of surface faulting is very low.

Near its northern terminus, the transmission line crosses the axis of the Service anticline. Evidence of Pleistocene faulting has been reported on the north side of the Columbia River on the northern continuation of this anticline; therefore, there is some poorly defined risk of surface rupture in this area. However, the return period for surface rupture along this structure is very likely on the order of 10,000 years or greater (Corps 1983); therefore, the risk of surface rupture in this area during the life of the proposed transmission line is considered low.

Measures Included as Part of the Project:

- Prior to start of construction, the HGC would conduct a detailed survey of the power plant site area. The survey would include core drilling sufficient to learn: (1) the overburden soil types and thicknesses under power plant structures; (2) the depth and characterization of the bedrock under the site; (3) if evidence of seismic faulting not considered in the ASC is present or if there are indications that the seismic classification of the site is not correct in the ASC. The survey would also characterize ground response to potential seismic events. The survey would be peer reviewed by the Oregon Department of Geology and

Mineral Industries or a private qualified registered geologist that is independent from HGC and its contractors and subcontractors. If a private geologist is used, the choice of peer reviewer shall be approved by EFSC in consultation with the Oregon Department of Geology and Mineral Industries.

- If the detailed survey reveals evidence that is not as described in the ASC, then HGC would revise the facility design parameters to comply with corresponding Uniform Building Code requirements. If pre-construction seismic analysis reveals features unique to the power plant site that justify enhanced seismic design, HGC would design structures critical to public health or safety in consultation with the Building Codes Agency. Critical structures include hazardous material storage areas and control rooms.

- Except as noted above, HGC would design and construct the proposed power plant to be consistent with seismic zone 2B requirements, in compliance with laws and regulations administered by the Building Codes Agency.

- HGC would place transmission poles to avoid, to the greatest extent possible given the existing UECA corridor, the narrow strip of alluvium along the Umatilla River that may be subject to liquefaction. If this strip could not be avoided, the transmission poles would be constructed so as to otherwise mitigate for the risk of liquefaction.

The measures included in the project as proposed would be adequate to mitigate the potential impacts of differential settlement and liquefaction. No mitigation is necessary with regard to the very low risk of surface rupture.

Impact—Volcanic Eruptions: Eruptions from the Cascades volcanoes may produce ash, lava flows, mudflows, and pyroclastic flows. However, the sources of these eruptions are sufficiently distant from the site that they pose no threat to project facilities, with the exception of a major ashfall. Should Mount Hood, Mount St. Helens, or Mount Adams erupt, the project area could be covered in ash to a thickness dependent on the prevailing wind direction at the time of the eruption and the size of the eruption itself. During a moderate eruption, the total ashfall at the project site would be less than 5 centimeters (2 inches) (Waldron 1988). The effect of an ashfall at this distance from the source would be mostly a nuisance, and would not cause any structural damage to the project. Filters for industrial and car engines or other devices could get clogged.

Ash fall would not constitute a potentially significant impact, and no mitigation is necessary.

3.1.3 Unavoidable Adverse Impacts

Some wind and/or water erosion of soils at the construction sites would occur, although proper erosion control measures would minimize this impact. The 5.2-hectare (12.9-acre) plant site would no longer be available for other uses. Since the site is zoned for industrial use, is currently unused, and is not prime farmland, this loss does not constitute a significant impact.

3.1.4 Cumulative Impacts

Cumulative impacts on geology generally result from over-development on unstable ground. The project, however, is not expected to contribute significantly to cumulative impacts on geologic resources. The power plant would be located on a nearly flat site; the gas pipeline and electrical transmission line would be located on gentle slopes, with the exception of a short segment of the transmission line near the City of Umatilla. This segment would be located in an area of unstable cut slopes, but the area is within an active quarry and additional development in this area is not expected.

Cumulative impacts on soils can result from over-development of agricultural lands or loss of soils due to erosion. The power plant site would be located on land zoned for industrial use that would not likely be used for agriculture. The pipeline and transmission line would be located primarily in agricultural areas, but these project features would not result in permanent loss of land for agricultural use. Erosion control measures would be implemented during project construction and disturbed areas would be revegetated following construction. For these reasons, the project would not contribute to significant cumulative impacts.

3.2 Hydrology and Water Quality

Surface water resources in the project area include the Columbia River, the Umatilla River, and Butter Creek. The power plant's water needs would be supplied by the Port of Umatilla's proposed water supply system, which would withdraw water from the Columbia River under an existing water right. Project operations would consume approximately 377 hectare-meters (3,065 acre-feet) of water per year, the equivalent of withdrawing an average 0.1 cubic meter (4.2 cubic feet) of water per second from the Columbia River. The power plant incorporates a zero discharge design, so there would be no liquid waste to dispose of offsite. Withdrawal of water would add slightly to cumulative withdrawals of water from the Columbia River, causing a very slight decrease in other beneficial uses of the river.

Most of the information in this section is summarized from a hydrology technical report prepared by Grassetti Environmental Consulting (1993).

3.2.1 Affected Environment

The project is within the Umatilla Plateau, an area characterized by gentle topography that slopes gradually to the north from the Blue Mountains to the Columbia River. Slopes are generally less than 5 percent and elevations range from about 91 meters (300 feet) at the McNary Substation, about 14.5 kilometers (9 miles) north and 4.8 kilometers (3 miles) east of the power plant site, to about 213 meters (700 feet) at the PGT intertie, about 8 kilometers (5 miles) south of the power plant site. The project area is in the rain shadow of the Cascade Mountains and therefore is arid, with slightly less than 23 centimeters (9 inches) of precipitation annually. Most precipitation in the region falls between October and April.

3.2.1.1 Surface Water

Regional Hydrology: The project drainage (Figure 3-4) is part of the Columbia-Umatilla Plateau hydrologic sub-basin of the Umatilla River, a perennial river draining 7,313 square kilometers (4,545 square miles) of northeastern Oregon, south of the Columbia River. The Umatilla River meets the Columbia River at the City of Umatilla, about 12.1 kilometers (7.5 miles) north of the power plant site. The proposed power plant site is in the lower reaches of the Umatilla River drainage basin, and lies about 0.4 kilometer (0.25 mile) west of the River. The other significant natural drainage feature in the region is Butter Creek, a tributary of the lower Umatilla River. Butter Creek joins the Umatilla River about 3.2 kilometers (2 miles) upstream of the power plant site. It is an intermittent stream with greatest flows during the winter and spring. Flows diminish in the summer and can cease during the fall of dry years. A portion of Butter Creek flow is diverted into an irrigation canal that flows through the extreme southwest corner of the power plant site.

The Columbia River is the region's dominant surface water feature. The Columbia River has an average regulated flow of approximately 5,663 m^3/s (200,000 cfs) at McNary Dam. This varies from about 6,796 to 7,929 m^3/s (240,000 to 280,000 cfs) in the high flow period (April through June) to about 3,030 to 3,228 m^3/s (107,000 to 114,000 cfs) during the low flow months (August through November). Annual variations also occur, depending on precipitation in the drainage basin. Extreme flows on the Columbia River are moderated by the numerous dams and reservoirs on the river.

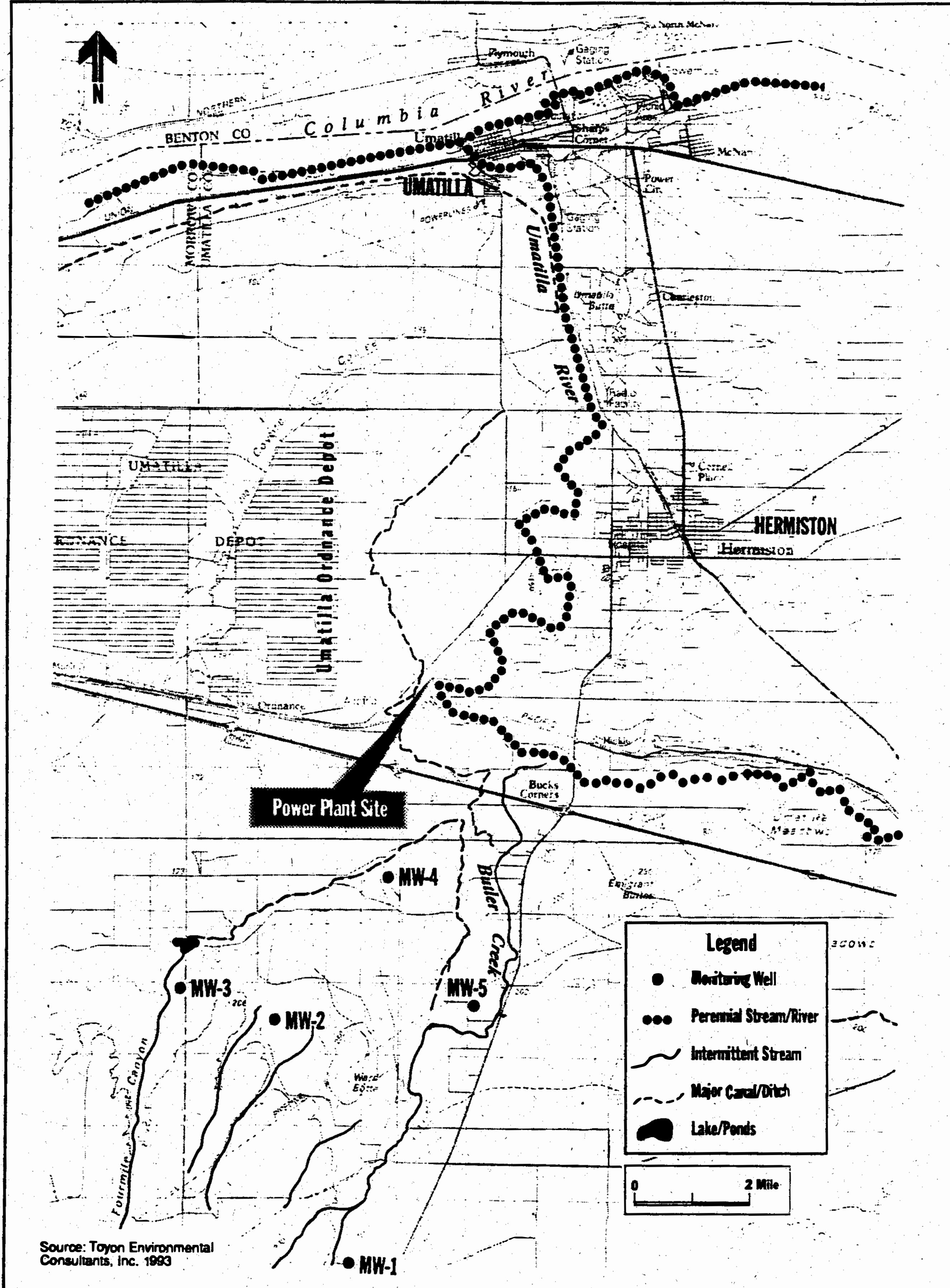


Figure 3-4 Hydrologic Features Map

Local Hydrology: The power plant site is currently undeveloped and runoff drains via overland flow toward the Umatilla River at Cottonwood Bend, about 0.4 kilometer (0.25 mile) to the east. Because of the site's relatively permeable soils, gentle slope, and undeveloped condition, runoff from the site is likely to be minimal except in major storms. In the project vicinity, the Umatilla River channel is incised about 12.2 meters (40 feet) at its western bank. The 100-year flood plain of the river is within this incised channel on the west side of the river.

Numerous canals and ditches supply water to local agricultural users. As noted above, one such ditch traverses the southwest corner of the site.

Surface Water Supply: Flows in all major rivers and creeks in the region are highly controlled and altered by dams and diversions. Surface water in the Umatilla Basin is highly appropriated and in many areas of the basin is insufficient to satisfy existing agricultural water rights, as well as new demands. Cumulative water rights on many streams in the Umatilla Basin exceed available flows in summer months.

The Umatilla River Basin Plan (State of Oregon 1988), which regulates and guides future water development in this basin, prohibits further withdrawal of water from the Umatilla River and its tributaries in the Umatilla Plateau sub-basin from June 1 through October 31 of each year (OAR Chapter 690, Division 507). Under the Umatilla River Basin Plan, the Umatilla River in the project region is designated for numerous uses excluding large-scale irrigation and power production. Butter Creek also is designated for numerous water uses excluding large-scale irrigation, municipal, industrial, and mining uses.

The Columbia River provides water for many competing uses, and withdrawal for one use is frequently at the expense of all other uses. Beneficial uses of the Columbia River include irrigation, navigation, hydropower, flood control, recreation, municipal and industrial water supply, and fish and wildlife use. Three Federal agencies, including BPA, the Corps, and the Bureau of Reclamation, are currently undertaking a major review of the river and its management in an attempt to reconcile all of the competing uses. Additionally, although existing water rights are being honored, Oregon and Washington each has a current moratorium on granting new water rights on the Columbia River except under certain limited conditions (OAR Chapter 690, Division 519; Washington Administrative Code [WAC] 173-563-015(2)).

Surface Water Quality: Except for the Columbia River, water quality in the lower Umatilla River Basin often does not meet standards for contact recreation and aquatic life. Non-point source pollution appears to be the major contributor to elevated levels of fecal coliform bacteria and suspended solids adversely affecting beneficial water uses in the Umatilla River. No water quality data are available for Butter Creek. Neither Butter Creek nor the Umatilla River would be used as a source of water for the power plant.

Water for the power plant would be purchased from the Port of Umatilla, which would draw water from the Columbia River under an existing water right. Water quality in this reach of the Columbia River is generally considered good. The State of Washington classifies this reach of the Columbia River as "Class A" (Excellent), which is the second highest rating for surface water (WAC 173-201A).

Although most of the available data support a conclusion that the quality of Columbia River water is good, some area residents have expressed concern that contaminants in the water, such as dioxins and radioactive agents, could be incorporated into the project's cooling water steam plume and be dispersed into the atmosphere (see Appendix B). Available data from various monitoring stations, however, indicate that this effect is very unlikely. Some of the relevant water quality data are summarized here, and are presented in more detail in Appendix C.

The Washington State Department of Ecology maintains an ambient monitoring station at the Umatilla Bridge, where they have monitored several water quality characteristics such as temperature, pH, and total dissolved solids (commonly referred to as conventional constituents) since 1975. They have monitored metals at the same station since 1990. The monitored values (see Appendix C) generally support the view that water quality conditions are good.

The Corps recently funded a study of sediment quality at the Walla Walla Grain Growers Terminal near the confluence of the Walla Walla and Columbia Rivers (Pinza et al. 1992). Sediment sample concentrations (see Appendix C) indicate a high value of 4,4'-DDE (a pesticide) and a detectable level of 2,3,7,8-TCDF (a furan). Neither furans nor dioxins have been detected in the Columbia River water column near the proposed supply intake. These contaminants are termed hydrophobic, because they adhere to the sediments and are not dissolved in the water column.

The best available data on radioactive agent (radionuclide) concentrations in the Columbia River downstream from Hanford come from samples taken at the Richland pumphouse where the city of Richland withdraws its drinking water supply (Appendix C). The more recent tritium concentrations measured at the Richland pumphouse are approximately 200 times lower than the EPA's screening level for tritium (20,000 pico Curies per liter), which defines a margin between safe and potentially unsafe drinking water. Similarly, the level of iodine in Columbia River water at the Richland pumphouse is approximately 10,000 times lower than the EPA's screening level for iodine-129 (1 pico Curie per liter), and concentrations of all other radionuclides measured at the Richland pumphouse are also below the EPA's drinking water screening levels (Woodruff and Hanf 1991, Jaquish and Bryce 1989).

3.2.1.2 Groundwater

The power plant site is located in the Butter Creek Ground Water Control Area as designated by the Umatilla Basin Plan. Local and regional groundwater aquifers in this area are frequently used to supplement surface water supplies for irrigation. This has led to overdrafting of groundwater aquifers. Irrigators have begun attempting to recharge shallow aquifers and increase soil moisture with surface water diverted during the winter.

The overall project area is underlain by two groundwater aquifers, a deep aquifer and a shallow aquifer. In general, groundwater elevations indicate that groundwater flow is from south to north, toward the Columbia River. Local variations in flow directions may occur in the shallow aquifer and are influenced by topography and intervening drainages. Each aquifer is described below.

Shallow Aquifer Characteristics: The shallow aquifer in the project vicinity is located in the unconsolidated and unconfined sand and gravel deposits that overlie the basalt bedrock in the region. In the project area, permeable gravel interbeds supply water to several high-yielding wells. The aquifer is 30.5 to 38.1 meters (100 to 125 feet) thick, with a saturated zone averaging 7.6 meters (25 feet) and ranging from 4.6 to 38.1 meters (15 to 125 feet) thick. Water levels in this aquifer were generally around 16.8 meters (55 feet) below the ground surface in 1975. Water levels have been dropping by about 0.5 meters (1.6 feet) per year since the mid 1960's. Recharge is provided by less than 25 percent of precipitation as well as normal irrigation and leaching in the area.

Based on the topography of the area, the shallow groundwater flow direction appears to be north/northwest, toward the Columbia River. Local variations may exist in response to topographic highs and local creeks such as Butter Creek. In some bottomland areas (i.e., along Butter Creek) clay and clayey gravel layers can confine the downward movement of water and result in perched aquifers within about 6.1 meters (20 feet) of the surface. This shallow aquifer is hydrologically connected with the creek and its level drops as creek flows diminish in the summer and fall. Groundwater resources of the shallow aquifer in the Ordnance Critical Groundwater Area, just west of the site, are closed to further appropriation.

Deep Aquifer Characteristics: Water-bearing zones of significant storage capacity are found within the interbeds of the basalt flows that lie beneath the sedimentary deposits in the region. Though poorly connected, these zones are viewed as one system because of the substantial vertical movement of water through joints in the basalt and through uncased wells drilled into the basalt. Basalt depths in the region are about 213.4 to 335.3 meters (700 to 1100 feet) below the ground surface. Static water levels in the primary water producing zones range from 61.0 to 91.4 meters (200 to 300 feet) below the surface and have declined significantly for many years because of over-pumping and slow recharge. Groundwater recharge of this aquifer occurs in the Blue Mountains to the south, while natural groundwater discharge is to the Columbia River and its tributaries. Recharge in the project area is limited by the Willow Creek monocline, a geologic feature, south of the Madison Ranches, which acts as a barrier to groundwater flow from the south. Groundwater resources in the basalt aquifer in both the Butter Creek Critical Ground Water Area and the Ordnance Critical Ground Water Area are closed to further appropriation.

Groundwater Quality: Groundwater data are available from several wells on the Madison Ranches south of the power plant site and on the Lamb-Weston potato processing facility site. Groundwater levels and quality for the Madison Ranches wells are listed in Table 3-5. Wells 1-5 are located on the south, central, west-central, north, and east-central areas of the ranches, respectively (Figure 3-4).

Table 3-5. Groundwater Quality Data Expressed in Milligrams per Liter

Well #	Total Depth (feet)	Water Level Elevation (msl)	Total Dissolved Solids (mg/l)	Chloride (mg/l)	Nitrate (mg/l)	Hardness (mg/l of $CaCO_3$)
1	17	no water in bore hole	347	7.54	3.75	194
2	172	609.7	224	6.07	0.26	87.2
3	38.5	586.1	522	99.2	2.74	573
4	61	578.1	366	12.2	0.74	344
5	17	628.6	449	17.7	4.33	525

Source: Grassetti Environmental Consulting 1993
msl - mean sea level
mg/l - milligrams per liter

ODEQ has established maximum contaminant levels (MCLs) for drinking water quality. Those levels are 250, 500, and 10 mg/l, respectively, for chloride, total dissolved solids (TDS), and nitrate. TDS levels in the groundwater on the Madison Ranches site approach or exceed the state's drinking water MCLs (Table 3-5). On the basis of well data available from the Lamb-Weston plant site, the Umatilla River Basin Plan noted that high nitrate levels have been measured at that site.

3.2.2 Environmental Consequences and Mitigation Measures

Potential impacts of the project related to surface water quantity and drainage include: (1) withdrawal of an average 0.1 cubic meter per second (m^3/s) (4.2 cubic feet per second [cfs]) from the Columbia River for the life of the project, (2) increased runoff from the power plant site, (3) temporary minor increases in runoff during gas pipeline and transmission line construction and (4) susceptibility or contribution to flooding. Potential impacts to surface water quality include: (1) erosion of disturbed soils, leading to increased sediment reaching surface waters, and (2) spilling of chemicals or other hazardous materials that could contaminate surface waters. No impacts to groundwater quantity or quality are expected.

3.2.2.1 Water Supply

Project water would be supplied by the Port of Umatilla's water project and would come from the Columbia River. The Port has a water right to withdraw up to 4.4 m^3/s (155 cfs) from the Columbia River, and is currently permitted to withdraw 1.7 m^3/s (60 cfs) at their proposed new pump station. The Port's water supply line from the McNary pool would pass the edge of the Lamb-Weston facility site. The water supply intertie would be almost entirely on the site property.

Impact—Water Consumption: The project would consume approximately 377 hectare-meters (3,065 acre-feet) of water per year. This includes recycling of about 28 hectare-meters (225 acre-feet) of blowdown water per year and use of a number of water conservation measures. The Port of Umatilla has indicated that it has more than ample capacity to supply the project through the regional water system it is developing. The water demand from the project (about 0.1 m^3/s [4.2 cfs], with a maximum daily average demand of 0.2 m^3/s [5.5 cfs] represents about 2.7 percent of the Port of Umatilla's total allocation of 4.4 m^3/s (155 cfs) and 7 percent of the Port's currently permitted withdrawal of 1.7 m^3/s (60 cfs) from the proposed new pump station.

Measures Included as Part of The Project:

- The project would incorporate a number of water conservation measures including dry NO_x control, reuse of reverse osmosis reject water, reduced cooling water drift, and recycling of cooling tower blowdown water.

- HGC would have a contract or other binding arrangement with the Port of Umatilla for a quantity of water sufficient to supply the facility prior to commencement of construction.

- HGC has agreed to provide up to $500,000 to fund efforts to augment in-stream flows in the Columbia River or its tributaries. A minimum of $200,000 is expected to be used to acquire water rights by purchase or lease, and convert them into in-stream water rights. Funds should be expended before HGC begins withdrawing water from the Columbia River for operation of the project.

- HGC would consult with ODOE and ODFW on any water withdrawal mitigation provided according to the terms of the settlement agreement with the Columbia Basin Institute.

The mitigation measures included in the project are adequate to ensure that the project water use would not, by itself, significantly affect surface water sources. The cumulative effect of this and other current and foreseeable future water withdrawals is discussed below in Section 3.2.4.

3.2.2.2 Drainage

Impact—Increased Impervious Surfaces: The project would increase impervious surfaces on the proposed power plant site. If not properly mitigated, this could increase runoff from the site.

Measures Included as Part of This Project:

- To control resulting increases in peak runoff flows anticipated from the project, a stormwater management system has been designed. The system would include individual drain systems for the turbine, heat recovery steam generator, water treatment, and service areas. Each roof system would include curbing directing runoff to catch basins on the ground. The catch basins would be connected by underground pipes to a gravity system which would discharge into a detention basin designed to handle the 100-year, 24-hour storm event. Water from the detention basin would then be discharged to the cooling tower basin for use as process cooling water.

The mitigation measures included in the project are adequate to ensure that the power plant would not increase off-site flows.

Impact—Increased Runoff: Construction of the gas pipeline and the electrical transmission line would result in minor increases in runoff immediately adjacent to those facilities.

A National Pollution Discharge Elimination System (NPDES) General Permit (No. 1200-C) was issued by ODEQ on January 11, 1993, for all project-related construction activities, including the gas pipeline and electrical transmission line. No additional mitigation is required.

3.2.2.3 Flooding

Impact—Flood Hazards: The power plant site is not within any mapped flood plain. As noted in the Affected Environment section, the Umatilla River does not overtop its western bank in the project area in the 100-year flood event. The upper portions of the project gas pipeline would parallel the west side of Butter Creek, and depending on the exact routing of the pipeline, may be subject to flood hazards on the creek. Project transmission lines would be able to span any small drainages along the route and the Umatilla River near Hermiston. Therefore these features are not likely to be subject to flood hazards.

Measures Included as Part of The Project:

- Project runoff would be detained on site and would not contribute to downstream flooding.

Potential Additional Mitigation Measures:

- All electrical transmission lines should be designed to span any water body (i.e., creek, canal, ditch, river, or pond) encountered along the transmission line route and all poles and access roads should be set back at least 15.2 meters (50 feet) from any such water features.

- The proposed gas pipeline alignment adjacent to Butter Creek should be buried at a sufficient depth to protect it from flood hazards associated with that creek. The minimum burial depth for natural gas pipelines is defined in 49 CFR Part 192 subpart 327(a). Enforcement of this Federal regulation is delegated to the Oregon Public Utilities Commission.

3.2.2.4 Surface Water Quality

Two potential impacts to surface water quality are discussed in this section. They include: (1) erosion of disturbed soils that could increase sediments in surface waters, and (2) chemicals or other materials that could spill and contaminate surface water.

Impact—Erosion and Sedimentation: Surface water quality at the power plant site and proposed gas and electrical transmission line construction areas could be adversely affected by erosion and sedimentation resulting from soil disturbance associated with project construction activities. Up to 5.2 hectares (12.9 acres) at the power plant site, 12.3 hectares (30.3 acres) of gas pipeline right-of-way, and 8.2 hectares (20.3 acres) of power line right-of-way could be affected by project construction. HGC was issued a permit to construct and operate stormwater and erosion control facilities and discharge treated stormwater. An NPDES General Permit No. 1200-C for activities related to construction on over 5 acres was issued by ODEQ on January 11, 1993.

Measures Included as Part of The Project:

- A requirement of the NPDES General Permit is the development and implementation of a stormwater control plan, which must be approved by ODEQ.

- HGC would take all reasonable steps to avoid disturbance of the West Extension Irrigation Canal during construction and operation of the transmission line by ensuring that the transmission towers/poles are placed from the canal banks, and by avoiding any disturbance at the canal crossing when electrical lines are strung.

Potential Additional Mitigation Measures: To ensure mitigation of erosion impacts, the following detailed mitigation measures are recommended:

- The stormwater control plan should indicate the drainage routes of additional runoff from the project, and include appropriate improvements and protection measures to ensure that no noticeable increase in erosion or sedimentation results from the project's stormwater runoff. The plan should include measures to control stormwater runoff and reduce erosion potential both during construction and over the long term at the plant site as well as the transmission line and gas pipeline rights-of-way. It should include the use of silt fencing, hay bale dikes, and/or vegetation buffers downslope of all construction sites and soil stockpiles; graveling or paving of all permanent access roads; application of straw mulch or other cover on exposed surfaces and soil stockpiles; and construction of sediment traps or ponds where appropriate. The plan should include provisions for preserving existing vegetation as much as possible, and should identify any areas where vegetation is proposed for removal. It also should include a comprehensive program for revegetating disturbed areas as soon as possible following construction. Revegetation should emphasize the use of native species.

- HGC should avoid impacts to High Line canal by tunneling the natural gas pipeline under the Highline canal. HGC should avoid damaging the canal with heavy equipment during construction.

- All electrical transmission lines should be designed to span any water body (i.e., creek, canal, ditch, river, or pond) encountered along the transmission line route and all poles and access roads should be set back at least 15.2 meters (50 feet) from any such water features.

Impact—Surface Water Contamination: The project would store and use a number of chemicals that, if spilled or otherwise accidentally released, could contaminate local and regional surface waters. Up to 75,708 liters (20,000 gallons) of aqueous ammonia; 18,927 liters (5,000 gallons) of sulfuric acid and sodium hypochlorite; and 1,514-liter (400-gallon) to 18,927-liter (5,000-gallon) containers of various other treatment chemicals could be stored on the power plant site at any one time.

Measures Included as Part of The Project:

- The ammonia and sulfuric acid tanks would be surrounded by dikes. These dikes would be designed to contain 110 percent of the maximum chemical capacity of the tank, plus the 50-year, 24-hour storm event. The diked area around the ammonia tank will contain a normally closed drain valve. The sulfuric acid tank may or may not have a normally closed drain valve. Upon testing, uncontaminated rainwater in the diked areas would be transferred to the cooling water system, or if contaminated, disposed of as required by regulations. The sulfuric acid storage area enclosed by the dike would be partially filled with coarse limestone to passively neutralize any leakage from the tank.

- Other chemicals stored outside in tanks would have secondary containment to control any spills.

These measures would be sufficient to prevent surface water contamination.

3.2.2.5 Groundwater Quantity

The project would not use any groundwater resources or release wastewater to groundwater. The project would increase the impervious area, and would capture stormwater for use in the cooling water system. This would result in a very small decrease in groundwater recharge, but would not significantly affect groundwater quantity.

3.2.2.6 Groundwater Quality

In the closed cooling system, the primary potential water quality contaminants in the blowdown water would be removed by use of a sidestream softener. The residuals removed by the softener would be formed into a nonhazardous filter cake and disposed of in a local landfill. Several local landfills have adequate capacity to accept the waste for the life of the project (see Section 3.14.1.5).

As noted under Surface Water Quality above, the project would use and store a number of chemicals which, if spilled, could potentially contaminate the underlying aquifers. Mitigation measures included as part of the project and recommended in this EIS for surface water protection also would serve to protect groundwater supplies from this potential impact. Because stormwater would be retained on site, there would be no impacts to groundwater quality.

3.2.3 Unavoidable Adverse Effects

An average water withdrawal of 0.1 m^3/s (4.2 cfs) from the Columbia River would very slightly reduce the quantity of water remaining in the river to support other beneficial uses. This effect is not considered significant.

3.2.4 Cumulative Impacts

Water resources are being used at an ever-increasing rate in the basin. Potential resources include water from the shallow aquifers, deep aquifers, and the Columbia River itself. Other rivers and streams in the area have restrictions on use, and additional water rights for Columbia River withdrawals are being granted by Oregon and Washington only in limited circumstances. Water resources in the Columbia River are strictly regulated to ensure sufficient quantity for the various interests along the river, including fish and wildlife populations.

Shallow aquifers in the area have been designated as critical groundwater areas due to the rapid drawdown in the Columbia Basin and due to the potential impacts on Columbia River flows since the two are hydraulically connected. Drawdown has also been observed in the deep aquifers, where use of deep groundwater has lowered levels as much as 30 meters (50 feet) in some portions of the aquifer.

The project water use would contribute incrementally to local and regional cumulative impacts associated with water withdrawals from the Columbia River. The Hermiston Generating Project would use 0.1 m^3/s (4.2 cfs) on average, or about 7,192 liters per minute (lpm) (1,900 gallons per minute [gpm]). The maximum daily-average withdrawal would be 0.2 m^3/s (5.5 cfs). Locally, two other power generation facilities are proposed. The Coyote Springs Cogeneration Project is proposed in Morrow County near the town of Boardman. The Hermiston

Power Project (referred to hereafter as Ida-West to clearly differentiate it from the Hermiston Generating Project, the subject of this EIS) is proposed for an area 3.2 kilometers (2 miles) south of Hermiston (4.8 kilometers [3 miles] east of the HGC power plant site).

The proposed Coyote Springs project would consume approximately 9,445 lpm (2,495 gpm). This equates to about 495 hectare-meters (4,024 acre-feet) per year, or about 0.2 m^3/s (5.6 cfs). This water would be supplied by Port of Morrow groundwater wells, which the Oregon Department of Water Resources has determined are hydrologically connected to Columbia River flows (EFSC 1994b). The Coyote Springs project might use water from the Columbia River through water rights secured by the Port of Morrow and the City of Boardman. The Port of Morrow is currently petitioning for additional groundwater rights.

The proposed Ida-West project would consume approximately 9,464 lpm (2,500 gpm), which would be supplied from the Port of Umatilla's Columbia River allocation. This is about 496 hectare-meters (4,030 acre-feet) per year, or about 0.2 m^3/s (5.5 cfs).

While the supporting documents for all these projects state that no additional water rights will be required, the permitted water rights are not currently being used to the maximum extent. Actual water usage will increase if the plants come on line. Also, it is clear that some permitted water rights have been awarded without careful consideration of cumulative impacts from all water rights in the area. If a number of water rights are only partially used at this time, but in the future will be fully used by providing water resources to additional facilities such as the three new generation plants, then impacts to water resources beyond current conditions may result.

Impacts on Local Water Supplies: The Port of Umatilla already holds a water right for 4.4 m^3/s (155 cfs) from the Columbia River, of which 1.7 m^3/s (60 cfs) is currently permitted for withdrawal at the proposed new pump station. The project would increase the rate at which the Port's water right becomes more fully used. The cumulative impacts to the Port of Umatilla's supply from the project's use of 0.1 m^3/s (4.2 cfs) and Ida-West's use of 0.2 m^3/s (5.5 cfs) would be about 6 percent of the Port's 4.4 m^3/s (155 cfs) total allocation and 16 percent of the Port's currently permitted 1.7 m^3/s (60 cfs) withdrawal. This would not be a significant cumulative impact on the Port's water supply.

Impacts on Columbia River Flows: Currently, approximately 90 percent of the total water withdrawn from the Columbia River system is for irrigation

(BPA 1993). Public water supply and domestic withdrawals account for about 4 percent, commercial use about 2 percent, and industrial use about 2 percent. The remaining amount is shared by livestock, mining projects, and thermal power plants. The net depletions (withdrawals minus returns) accounted for by irrigation equal approximately 1.7 million hectare-meters (13.7 million acre-feet) per year (BPA 1993). Total net depletions from all withdrawals equal approximately 1.9 million hectare-meters (15.3 million acre-feet). Together, the Hermiston, Ida-West, and Coyote Springs cogeneration projects would withdraw approximately 1,368 hectare-meters (11,119 acre-feet) per year, a small amount (less than 0.1 percent) relative to net system depletions.

On a more localized level, withdrawals for the three proposed cogeneration projects can be compared to current withdrawals from the McNary and John Day pools and with low flows in the Columbia River. Current withdrawals from the two pools are about 113 m^3/s (4,000 cfs) annually (personal communication, Ziari 1994).

The minimum recorded daily-average release from McNary Dam was 1,118 m^3/s (39,500 cfs) on July 10, 1977, which was a period of drought and low river flows. This minimum observation is substantially less than the average low flow of 3,030 to 3,228 m^3/s (107,000 to 114,000 cfs). Increasing cumulative withdrawals since 1977 have not resulted in a lower recorded flow. Therefore, the cumulative withdrawal from the John Day and McNary pools is less than the existing variability between low-flow seasons on the river. Because existing withdrawals of 113 m^3/s (4,000 cfs) are small compared to natural river variability, it is unlikely that an increased withdrawal of 4.6 m^3/s (161 cfs) for the Port of Umatilla water supply project and the three cogeneration projects (0.4 percent of the river's lowest recorded flow), or the Hermiston Cogeneration project's maximum daily supply of 0.2 m^3/s (5.5 cfs) (0.01 percent of the river's lowest recorded flow) would significantly increase impacts to the system.

Any withdrawal, even the small amounts discussed, does add to cumulative impact. However, it is not significant in terms of measurable impacts on flows and water quality.

Though the impacts to water quality and quantity would not be significant, HGC has agreed to provide up to $500,000 to fund efforts to augment instream flows in the Columbia River or its tributaries. A minimum of $200,000 is expected to be used to acquire water rights by purchase or lease, and convert them into in-stream water rights. Funds should be expended before HGC begins withdrawing water from the Columbia River for operation of the project.

Impacts to Power Generation: The Hermiston Generating Project would add 474 megawatts of capacity to the Pacific Northwest's total generating capacity. Each megawatt of capacity equals 8,760 megawatt hours per year if a plant operates 100 percent of the time. Operating at a planned capacity of 93 percent, the Hermiston Generating Project would produce approximately 3.86 million megawatt hours of electricity each year.

At the same time, the withdrawal of an average 0.1 m^3/s (4.2 cfs) for the Hermiston Generating Project would result in the loss of electrical energy generation at four downstream Columbia River Federal power projects—McNary, John Day, The Dalles, and Bonneville—particularly in the low flow months of August through January when all flow would normally be routed through the turbines at one or more of the projects. On average, the withdrawal would reduce generation by about 756 megawatt hours (MWh) annually, equaling about 0.0023 percent of the annual 32.8 million MWh output of the four hydro projects and about 0.02 percent of the power that would be generated by the Hermiston Generating Project.

The hydro generation foregone due to the withdrawal could be offset by conservation or decreases in the demand for BPA's power, or could be replaced by BPA through increased generation at other projects or increased power purchases. The replacement cost of the foregone generation would be about $51,000 annually at an avoided cost of power of 6.7 cents per kilowatt hour (kWh). The effects on BPA rates in absorbing this cost increase would be real, but imperceptible to the consumer. Similar effects would be attributable to the Ida-West and Coyote Springs projects, and other water withdrawals. Each would very slightly reduce the quantity of water remaining in the river to support other beneficial uses.

3.3 Vegetation

Vegetation in the vicinity of the proposed Hermiston Generating Project has been extensively altered by human activities, including grazing, agriculture, and rural residential development. The most significant area of native vegetation remaining in northeastern Oregon occurs just to the west of the project, on the U.S. Army's Umatilla Ordnance Depot. This area would not be affected by project construction or operation. Impacts of the Hermiston Generating Project would be limited to temporary disturbance along the transmission and gas pipeline rights-of-way and permanent loss of vegetation at the power plant site. None of these impacts would be significant.

3.3.1 Affected Environment

This section describes the botanical resources associated with the project area, including vegetation types and sensitive plant species. The project area is defined to include the following:

- Power plant site - 5.2 hectares (12.9 acres);

- Proposed transmission line right-of-way - 57.9 hectares (143 acres), based on a length of about 19.3 kilometers (12 miles) and a width of 30.5 meters (100 feet);

- Optional transmission line right-of-way - 55.9 hectares (138 acres), based on a length of about 18.3 kilometers (11.4 miles) and a width of 30.5 meters (100 feet); and

- Gas pipeline right-of-way - 12.3 hectares (30.3 acres), based on a length of about 8 kilometers (5 miles) and a width of 15.2 meters (50 feet).

In addition, the land within 152 meters (500 feet) on either side of the rights-of-way was included in surveys for sensitive plants.

3.3.1.1 Vegetation Types

The project area is within the shrub-steppe region of the Columbia Basin Province (Franklin and Dyrness 1973). Prior to the introduction of grazing and agriculture, this part of the Columbia Basin was dominated by bunchgrasses, including bluebunch wheatgrass (*Agropyron spicatum*) and Idaho fescue (*Festuca idahoensis*), and shrubs, such as big sagebrush (*Artemisia tridentata*) and bitter-brush (*Purshia tridentata*). One of the few large remaining remnants of native shrub-steppe in eastern Oregon exists inside the boundaries of the nearby Umatilla Ordnance Depot, where it has been protected from livestock grazing (Woodward-Clyde Consultants 1993).

Cultivation and urban/rural development has eliminated most of the native shrub-steppe communities from the project area. Undeveloped sites typically have a history of disturbance from grazing or cultivation and are generally dominated by cheatgrass (*Bromus tectorum*) and other weedy herbs and shrubs (Woodward-Clyde Consultants 1993). Heavy grazing tends to eliminate larger bunchgrasses, such as bluebunch wheatgrass, and results in the establishment of cheatgrass and other annual grasses (Franklin and Dyrness 1973). Abandoned fields are also usually dominated by cheatgrass (Franklin and Dyrness 1973). A stand of cheatgrass apparently has the ability to maintain itself indefinitely, even if the disturbance is removed (Daubenmire 1975).

A total of five different vegetation types occur in the project area, including wetlands and the following four upland types: (1) grassland, (2) shrub-grass, (3) cropland, and (4) pasture (Table 3-6). Each of these vegetation types is described below.

Grasslands

Grasslands are the primary vegetation type in the project area and cover the entire 5.2-hectare (12.9-acre) power plant site, about 53 percent of the gas pipeline right-of-way, and 45 percent and 48 percent of the proposed and optional transmission rights-of-way, respectively (Table 3-6). Most of these areas have been disturbed and the grasslands are dominated by cheatgrass and tarweed (*Amsinckia* spp.). Other frequently occurring forbs include tumblemustard (*Sisymbrium altissimum*), hairy golden aster (*Aster pilosus*), Russian thistle (*Salsola kali*), and lance-leaf scurf-pea (*Psoralea lanceolata*). Native grasses, primarily Sandberg's bluegrass (*Poa sandbergii*) and needle-and-thread grass (*Stipa comata*), occur in a few isolated patches along the transmission line right-of-way (Woodward-Clyde Consultants 1993).

Table 3-6. Vegetation Cover Types in the Project Area for the Hermiston Generating Project

	Power Plant Site		Optional Transmission Right-of-Way		Proposed Transmission Right-of-Way		Gas Pipeline Right-of-Way	
Cover Type	Acres	Percent	Acres[1/]	Percent	Acres[1/]	Percent	Acres	Percent
Cropland	–	–	28.6	21	28.6	20	8.0	26
Grassland	12.9	100	65.8	48	64.2	45	16.2	53
Pasture[2/]	–	–	1.2	1	3.9	3	4.4	15
Shrub/ Grassland	–	–	33.3	24	35.9	25	1.5	5
Wetland[3/]	–	–	4.7	3	3.7	3	–	–
Non-vegetated[4/]	–	–	4.1	3	6.5	4	0.2	1
Total	12.9	100	137.7	100	142.8	100	30.3	100

Source: Woodward-Clyde Consultants 1993; Enserch Environmental, unpublished data.

1/ Calculated using 30.5-meters-wide (100-foot-wide) right-of-way. Actual right-of-way width is generally 26 meters (85 feet), but area of disturbance at pole sites may be as much as 30.5 by 30.5 meters (100 by 100 feet).

2/ Includes residences.

3/ Includes 0.3 acres of riparian habitat along the Umatilla River; individual wetlands extend beyond the right-of-way boundaries.

4/ Includes highway, river, and gravel pit areas.

Shrub-Grasslands

Shrub-grasslands cover about 25 percent and 24 percent of proposed and optional transmission line rights-of-way, respectively, and only 5 percent of the gas pipeline right-of-way (Table 3-6). The primary grass/forb species in these areas are cheatgrass and tarweed, and the dominant shrub is typically gray rabbitbrush (*Chrysothamnus nauseosus*), another indicator of past grazing disturbance. There are, however, a few bitter-brush and big sagebrush. The least disturbed part of the entire project area is a shrub-grassland community traversed by both the proposed and optional transmission line rights-of-way in the northeast corner of the northwest quarter of Section 20, south and west of the Umatilla River. Along this gently sloping area, the cover of tarweed and Russian thistle is much reduced; common forbs include arrowleaf balsamroot (*Balsamorhiza sagittata*), silky lupine (*Lupinus sericeus*), long-leaf phlox (*Phlox longifolia*), and turpentine cymopterus (*Cymopterus terebinthinus*) (Woodward-Clyde Consultants 1993). The most extensive area of sagebrush lies along Butter Creek at the southern end of the gas pipeline (Woodward-Clyde Consultants 1993).

Cropland and Pasture

Croplands represent between 20 and 26 percent of the transmission line and gas pipeline rights-of-way (Table 3-6). Most croplands consist of potatoes and corn irrigated by center-pivot systems (Woodward-Clyde Consultants 1993). Irrigated pastures occur in only a few locations along the rights-of-way and are generally associated with residences. This type represents 15 percent of the gas pipeline right-of-way, but only 3 and 1 percent of the proposed and optional transmission line rights-of-way, respectively (Table 3-6).

Wetlands

Three wetlands, including two that are apparently artificially-made, occur along both transmission line rights-of-way (Figure 3-5) (Woodward-Clyde Consultants 1993). These wetlands represent about 3 percent of each transmission line right-of-way (Table 3-6). Only a portion of each wetland occurs within the rights-of-way.

- Wetland 1 represents the riparian corridor along the Umatilla River that is crossed by the transmission line rights-of-way. This corridor covers about 0.1 hectare (0.3 acre) and is best characterized as a scrub-shrub wetland, although it supports a mix of emergents and small trees as well as shrubs. Trees along the banks include box elder (*Acer negundo*), black locust (*Robinia pseudo-acacia*), and Russian olive (*Elaeagnus angustifolia*). Common shrubs are willow (*Salix* sp.), poison oak (*Rhus radicans*), and Himalayan blackberry (*Rubus discolor*). Reed canarygrass (*Phalaris arundinacea*), bulrush (*Scirpus* sp.), and cattail

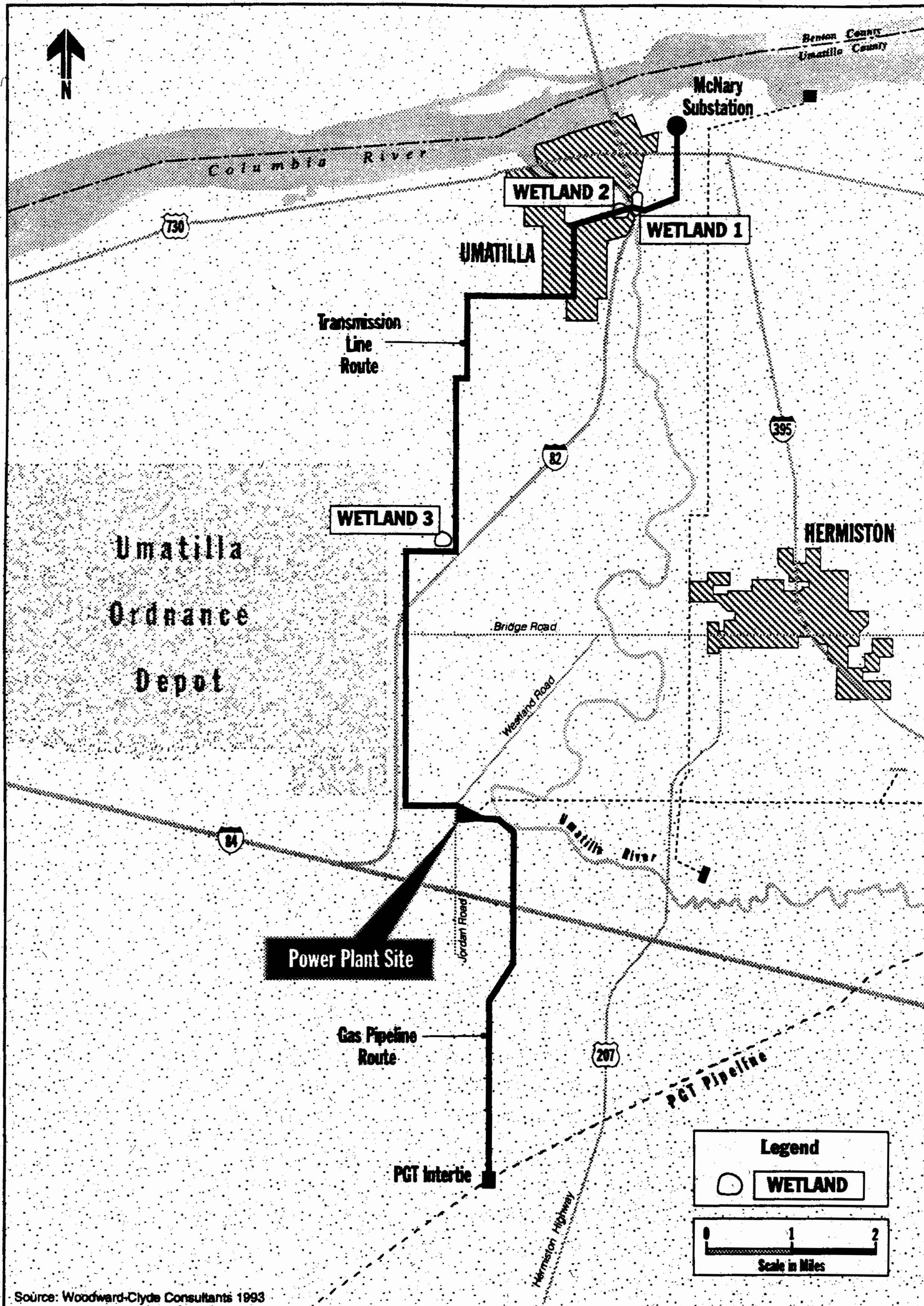


Figure 3-5 Project Vicinity Wetland Delineation Map

(*Typha* sp.) occur along the waterline and in shallow backwater areas (Woodward-Clyde Consultants 1993).

- Wetland 2 is located along the transmission line rights-of-way, at the foot of the slope between the West Extension irrigation canal and the Umatilla River. This 9.3-hectare (2.3-acre) palustrine emergent wetland appears to be artificially-made and is maintained by irrigation water. It is dominated by cattail, water speedwell (*Veronica anagallis-aquatica*), watercress (*Rorippa nasturtium-aquaticum*), and rabbitfoot polypogon (*Polypogon monspeliensis*). Willow and cottonwood (*Populus* sp.) saplings also occur (Woodward-Clyde Consultants 1993).

- Wetland 3 is approximately 10 hectares (25 acres) in size and is located at about the midpoint of the transmission line route. This artificial wetland has developed in an area used for years for land application of potato processing wastewater. Wastewater is retained in depressions and supports a dense algal community and a variety of weedy introduced species (Woodward-Clyde Consultants 1993). Because it is maintained for agriculture-related use, Wetland 3 is not considered a jurisdictional wetland [Clean Water Act, Section 404 (f)(1)(A)].

Three other wetlands were also identified in the vicinity of the transmission line and gas pipeline routes, but are outside the rights-of-way (Woodward-Clyde Consultants 1993). One of these, a 0.57-hectare (1.4-acre) palustrine emergent wetland, is located just south of Wetland 2 and the optional transmission line right-of-way.

3.3.1.2 Sensitive Plant Species

The term sensitive plants is used to refer to all plant species that are protected by state and/or Federal regulations administered by the U.S. Fish and Wildlife Service (USFWS), Bureau of Land Management (BLM), Oregon Department of Agriculture (ODA), and Oregon Natural Heritage Program (ONHP). A search of the ONHP database indicated that 10 sensitive plant species potentially occur within an 80-kilometer (50-mile) radius of the project area. In addition, one sensitive species not included on the ONHP list was discovered during surveys of the project area (Woodward-Clyde Consultants 1993). Currently, none of the 11 sensitive plants potentially occurring in the project area are Federally listed or proposed as threatened or endangered. However, four species are candidates for Federal listing as threatened or endangered, five are candidates for listing by the ODA as threatened or endangered, and eight are listed by the ONHP (Table 3-7).

Table 3-7. Sensitive Plant Species Potentially Occurring Within 80 Kilometers (50 Miles) of the Project Area

Scientific Name Common Name	Status FWS	Status ODA[1/]	Status ONHP	Habitat	Potential Habitat in Project Area	Found in Project Area
Astragalus collinus var. *laurentii* Lawrence's milkvetch	C2	CS	1	Basaltic grassland Sagebrush desert	Yes	No
Astragalus succumbens Columbia milkvetch			4	Sagebrush desert to lower foothills, especially dunes	Yes	Yes
Arenaria franklinii var. *thompsonii* Thompson's sandwort	3B	CS	1-ex	Sand dunes, scabland, sagebrush slopes along Columbia River	Yes	No
Rorippa columbiae Columbia cress	C2	CS	1	Wet sites (lake, stream or ditch edges) in clay soils	No	No
Allium robinsonii Robinson's onion			2-ex	Sand and gravel deposits along the Columbia River	No	No
Allium pleianthum Many-flowered onion			3	Lower elevations, hillsides and flats with clay soils and sparse vegetation	No	No
Cryptantha leucophaea Gray cryptantha			2-ex	Dry, sandy places or basalt talus	No	No
Lomatium watsonii Watson's desert parsley			2	Open hills, often in sagebrush	No	No
Myosurus minimus ssp *apus* var. *sessilflorus* Sessile mousetail	C2		1	Alkali flats	No	No
Silene spaldingii Spalding's campion	C2	CS	1	Undisturbed prairie on hillsides with deep loess soils	No	No
Mimulus jungermannioides Hepatic monkeyflower		CS	1	Moss mats and/or seeps on cliffs in river canyons	No	No
Balsamorhiza rosea Rosy balsamroot			2-ex	Rocky ridges at lower to mid-elevations	No	No

Notes:

1/ Status abbreviations: U.S. Fish and Wildlife Service (USFWS) ranks are: C2 = Category 2 candidate list, taxa that need additional information in order to be proposed as threatened or endangered, 3B = taxa that do not meet the USFWS definition of species; Oregon Department of Agriculture (ODA) ranks are: CS = candidate species list (August 1993); Oregon Natural Heritage Program (ONHP) ranks are: 1 = taxa threatened with extinction throughout their entire range, 2 = taxa threatened with extinction from Oregon, 3 = species for which more information is needed before status can be determined, 4 = species of concern that are rare, but secure and taxa that are declining in numbers or habitat, but are still too common to be proposed for listing, ex = species is known or thought to be extinct in Oregon.

Sources: ONHP 1993, Woodward-Clyde Consultants 1993.

Surveys conducted in 1992 and 1993 identified only one sensitive plant species. Columbia milkvetch (*Astragalus columbianus*), in the project area. This species occurs on a west-facing slope immediately east of the Umatilla River that is bisected by both the proposed and optional transmission line rights-of-way (Woodward-Clyde Consultants 1993). Columbia milkvetch is a forb in the pea family and is found only in Umatilla and Gilliam counties in Oregon and two counties in Washington (ONHP 1993). Habitats for this species include sagebrush desert, sandy barrens, and low foothills (ONHP 1993). Columbia milkvetch is on the ONHP's List 4, which includes taxa of concern that are either rare but secure, or declining in numbers or habitat but still too common to be proposed as threatened or endangered. Potential habitat for two other sensitive plants, Lawrence's milkvetch (*Astragalus collinus* var. *laurentii*) and Thompson's sandwort (*Arenaria franklinii* var. *thompsonii*), was also identified in the project area, but no individuals or populations of either of these species were found (Table 3-7) (Woodward-Clyde Consultants 1993).

3.3.2 Environmental Consequences and Mitigation Measures

Potential impacts of construction and operation of the Hermiston Generating Plant on vegetation include the following: (1) permanent loss of vegetation at the power plant site; (2) temporary removal of vegetation during construction of the power plant, pipeline, and transmission line upgrade; and (3) damage to vegetation from cooling tower drift. These potential impacts and any corresponding mitigation measures are discussed below.

3.3.2.1 Impact—Permanent Vegetation Loss

Construction of the power plant site would result in the permanent removal of about 5.2 hectares (12.9 acres) of disturbed grasslands dominated by cheatgrass and tarweed. No sensitive plant species were observed at the power plant site and given the level of disturbance in this area, it is unlikely that any occur. No mitigation is recommended.

3.3.2.2 Impact—Temporary Loss of Vegetation

Upgrading the existing UECA transmission line to carry power from the Hermiston Generating Project to the McNary Substation would result in temporary vegetation removal during pole replacement. Vegetation would also be affected by construction of 0.4 kilometer (0.25 mile) of new transmission line from Highway 730 to the McNary Substation. Based on a proposed transmission line length of 19.3 kilometers (12 miles), an average distance of 183 meters (600 feet) between poles, and an average disturbance area of 30.5 meters by 30.5 meters (100 feet by 100 feet) during pole installation, about 9.7 hectares (24 acres) of vegetation would be temporarily removed. Affected vegetation types include shrub-grassland, croplands, and grasslands. No transmission line poles would be placed in any of the three wetland areas along the proposed right-of-way. Thus, no Section 404 permit would be required from the Corps.

Construction activities along the portion of the proposed right-of-way just east of the Umatilla River may disturb or destroy habitat for Columbia milkvetch, a sensitive plant species.

Construction along the optional transmission line alignment would temporarily remove fewer acres of vegetation than the proposed alignment because it is slightly shorter and would involve placement of about four fewer poles, based on an average spacing of 183 meters (600 feet). No poles would be placed in wetlands and impacts on Columbia milkvetch would be similar to those of the proposed route.

About 12.3 hectares (30.3 acres) of vegetation, including grasslands, croplands, and pasture, would be temporarily removed by construction of the gas pipeline. Nearly all of the grasslands that would be affected are dominated by cheatgrass and tarweed although a few patches of native grasses, mostly indian ricegrass and needle-and-thread, exist at the south end of the gas pipeline right-of-way.

Measures Included as Part of the Project:

- Areas disturbed by construction of the power plant, gas pipeline, and transmission line would be revegetated upon completion of construction. Revegetation would emphasize the use of native species.

- Topsoils and subsoils resulting from excavation for the gas pipeline would be segregated and the topsoil restored to minimize impacts on soil fertility.

- The transmission line would either span or otherwise avoid wetland areas. Poles would be set back from the Umatilla River as much as possible.

- If construction of the transmission line occurs during the spring growing season for Columbia milkvetch, any population of the plant within 15.2 meters (50 feet) of the proposed transmission line poles would be flagged and avoided by construction activities.

3.3.2.3 Impact—Cooling Tower Drift

This section on cooling tower drift is a summary of the analysis presented in Appendix D. The components in the circulating cooling water for the Hermiston Generating Plant, in decreasing order of concentration, would be: sulfate, sodium, calcium, chloride, carbonate, silica, potassium, magnesium, and strontium. Modeling of drift deposition indicates that the highest rate of salt deposition, using a droplet size distribution supplied by the manufacturer and a drift rate of 0.001 percent for the primary tower and 0.0005 percent for the secondary tower, would be 20 to 23 kilograms per hectare-month (kg/ha-mo) (18 to 21 pounds per acre-month [lb/ac-mo]) at points 100 to 200 meters (358 to 656 feet) due east of the power plant site. Projected depositions drop off sharply away from the area of highest deposition. Adjacent points 100 meters (358 feet) or less distant are projected to receive 2 to 10 kg/ha-mo (1.8 to 9 lb/ac-mo). If only the primary towers are considered, maximum depositions are 15 to 20 kg/ha-mo (13.5 to 18 lb/ac-mo) at the two stations 100 and 200 meters (358 to 656 feet) east of the power plant, and depositions at adjacent points are projected at 1.6 to 5.4 kg/ha-mo (1.4 to 4.9 lb/ac-mo).

Short-term impacts of cooling tower drift to vegetation are caused by the interaction of drift droplets with vegetation, where dissolved solids contained in the drift are taken up by plant leaves and interact physiologically with the plant. Unless the dissolved solids are particularly toxic (e.g., boron), the overall quantity of dissolved solids rather than the composition determines the degree of impact from foliar deposition. Studies of effects of deposition rates of sodium chloride on crop yields of corn, a relatively sensitive crop, showed a 10 percent reduction of yield when deposition rates were 16.8 kg/ha-mo (18 lb/ac-mo). In other experiments, injury to soybeans, tomatoes, and peppers occurred at a similar level of application.

The area of maximum salt deposition would be a fallow area bounded and criss-crossed by railroad tracks. Vegetation in this area would be likely to experience damage from cooling tower drift; however, it is weedy vegetation of no ecological or agricultural significance. The adjacent agricultural lands immediately to the south of the project site are projected to receive less than 10 kg/ha-mo (9 lb/ac-mo). However, due to the proximity of the cooling towers, sensitive crop plants growing in those portions of the field nearest the cooling towers could receive salt deposition near the threshold for plant damage under unfavorable weather conditions. Small areas along the edge of the field may experience minor damage or loss of yield. This effect is expected to be less than significant.

Long-term impacts result from the accumulation of dissolved solids in soils. Here the composition of salts is important because of their differences in plant nutrition and health. Of the nine components listed above, four (sulfate, calcium, magnesium, and potassium) are essential nutrients to plants and would be beneficial at the projected deposition rates. The others are ubiquitous in soils and irrigation waters. At the projected deposition rates, the accumulation of these salts from drift would be insignificant.

Measures Included as Part of the Project:

- HGC would design the cooling towers to limit drift to one-thousandth of 1 percent of the circulating water.

- HGC would operate the cooling tower circulating water system, the cooling towers, and the circulating water cleanup systems to maintain the total dissolved solids in the circulating water at less than 5,200 ppm.

- If a secondary cooling tower is included as part of the project, the total dissolved solids in the circulating water for the secondary cooling tower would be maintained at 100,000 ppm or less on an annual average basis. The drift rate of the primary cooling towers would be 0.001 percent or less of the circulating water volume and the drift rate of the secondary cooling tower will be 0.0005 percent of less of the circulating water volume.

- HGC would perform tests during the initial operational period to ensure that the actual drift rate does not exceed the manufacturer's guaranteed drift rate.

- HGC would conduct periodic sampling to ensure that the total dissolved solids in the circulating water are within the design parameters.

The measures included in the project would be adequate to address this impact.

3.3.3 Unavoidable Adverse Impacts

With the mitigation measures included as part of the project and potential additional measures, the only unavoidable impact of the Hermiston Generating Project on vegetation is the permanent loss of 5.2 hectares (12.9 acres) of grasslands. This impact is not significant.

3.3.4 Cumulative Impacts

In the project area, the major impact to native vegetation is the conversion of shrub-grasslands and grasslands to irrigated cropland. Because the power plant site is already disturbed and other components as proposed would result in only temporary disturbance, the direct contribution of the Hermiston Generating Project to regional cumulative impacts on vegetation would be negligible.

This project, and the two other cogeneration projects currently proposed, would contribute marginally to the continued growth and development in the

Hermiston/Umatilla area and subsequent loss of additional native plant communities.

3.4 Wildlife

Wildlife in the vicinity of the Hermiston Generating Project consists primarily of species that use relatively disturbed habitat and tolerate human activity. The area contains no critical habitat for Federally listed or proposed threatened and endangered species, and none were observed during site surveys. Four state-listed sensitive bird species were recorded during field surveys in 1992 and 1993. The project would have no significant direct or indirect impact on wildlife species or habitat in the project area.

3.4.1 Affected Environment

Most of the wildlife species found in the project vicinity are ubiquitous throughout the Columbia Basin in Oregon and Washington. Elimination of the native shrub-steppe community throughout much of the area has resulted in a decline or loss of the wildlife species that depend on this habitat. In addition, habitat fragmentation and proximity to development tends to favor generalist species that can use a variety of relatively disturbed habitats and are tolerant of human activity.

3.4.1.1 Wildlife Habitat

Five vegetation types were identified within the project area, including grasslands, shrub-grasslands, croplands, pastures, and wetlands. Each of these types provide habitat for a variety of species, although some may be used on only a seasonal basis or provide the habitat needed for only one life requisite, for example, forage but not cover. Field surveys indicate that wide-ranging wildlife species such as the coyote (*Canis latrans*), badger (*Taxidea taxus*), blacktail jackrabbit (*Lepus californicus*), red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), and black-billed magpie (*Pica*) occur in all or nearly all of the five vegetation types in the project area. Wildlife species associated with each of these types is described below.

Grasslands: Grasslands are the predominant cover type in the project area. In general, the grasslands on the power plant site are more disturbed than those found along the rights-of-way and probably provide relatively low-quality habitat for wildlife. Species observed in the grasslands in the project area include the western meadowlark (*Sturnella neglecta*), long-billed curlew (*Numenius americanus*), ring-necked pheasant (*Phasianus colchicus*), and horned lark (*Eremophila alpestris*) (Woodward-Clyde Consultants 1993). All of these species breed on the ground in grasslands (Cody 1985, Schroeder and Sousa 1982, Allen 1980) and it is likely that these habitats in the project area are used for nesting as well as foraging. Field surveys also located a short-eared owl nest in grassland habitat along the northern portion of the gas pipeline line right-of-way (Woodward-Clyde Consultants 1993).

Shrub-Grasslands: Shrub-grasslands in the project area occur in four locations along the transmission line right-of-way and two along the gas pipeline right-of-way. Species most commonly observed in this habitat were ground-nesting birds, including the western meadowlark, long-billed curlew, ring-necked pheasant, and horned lark (Woodward-Clyde Consultants 1993). Shrub-grasslands typically support higher densities of small mammals than do grasslands dominated by cheatgrass (Gano and Rickard 1982). Consequently, the shrub-grasslands in the project area are likely used for foraging by raptors and other carnivores.

Croplands and Pasture: Croplands do not provide year round habitat for wildlife, but several species use them during the spring, notably long-billed curlews and ring-necked pheasants (Woodward-Clyde Consultants 1993). Irrigated croplands provide important foraging habitat for curlews and possibly their young (Pampush and Anthony 1993, Allen 1980). Pheasants typically use corn fields in the fall for forage and cover. Croplands and pastures both support small mammals that are prey for raptors but tall, dense crops such as corn make capture difficult (Postovit and Postovit 1987).

Irrigated pastures often contain standing water and are frequently used by shorebirds, song birds, and waterfowl. Species observed in pastures in the project area include long-billed curlews, American avocets (*Recurvirostra americana*), mallards (*Anas platyrhynchos*), green-winged teal (*Anas crecca*), red-winged blackbirds (*Agelaius phoeniceus*), Brewer's blackbirds (*Euphagus cyanocephalus*), and killdeer (*Charadrius vociferus*) (Woodward-Clyde Consultants 1993).

Wetlands: Wildlife species observed in the riparian wetland area along the Umatilla River included Canada geese (*Branta canadensis*), Forster's terns (*Sterna forsteri*), and mallards (Woodward-Clyde Consultants 1993). It is possible that the scrub-shrub component of this habitat also provides nesting habitat for several species of song birds such as yellow warblers (*Dendroica petechia*) and song sparrows (*Melospiza melodia*).

Species observed in the emergent wetlands in the project area include long-billed curlews, American avocets, mallards, green-winged teal, red-winged blackbirds, Brewer's blackbirds, and killdeer. California quail (*Callipepla californica*) and brown-headed cowbirds (*Molothrus ater*) were observed in the vicinity of emergent wetlands.

3.4.1.2 Sensitive Wildlife Species

The term sensitive wildlife is used to refer to all wildlife species that are protected by state and/or Federal regulations administered by the USFWS, BLM, ODFW, and ONHP. A search of the ONHP and USFWS databases indicated that 12 sensitive wildlife species potentially occur in the project vicinity or within a 24-kilometer (15-mile) radius of the project area (Table 3-8). Three additional sensitive species, the grasshopper sparrow, Swainson's hawk (*Buteo swainsonii*), and bank swallow (*Riparia riparia*), were not in state or Federal records for the project vicinity but were discovered during field surveys (Table 3-8) (Woodward-Clyde Consultants 1993). Currently, only one of the 15 sensitive wildlife species known to occur or potentially occurring in the project area is Federally listed as threatened; six are candidates for Federal listing. In addition, 13 species are designated by the ODFW as threatened, critical, vulnerable, or sensitive, and 14 are listed by the ONHP (Table 3-8).

Federally Listed or Proposed Wildlife Species: No Federally listed or proposed threatened or endangered wildlife species were observed during field surveys and there is no critical habitat for these species in the project area (Woodward-Clyde Consultants 1993). The bald eagle (*Haliaeetus leucocephalus*) is the only Federally listed wildlife species documented in the project vicinity (personal communication, Peterson 1994). The bald eagle, which is listed as threatened by the USFWS and ODFW, is known to winter along the Columbia River near its confluence with the Umatilla River. There are no records of bald eagles along the Umatilla River near the project area. Winter use of this area by bald eagles is most likely limited by the lack of cottonwoods or other large trees as perch sites. Additional information on bald eagle use of the project vicinity is provided in the Biological Assessment in Appendix E.

Federal Candidate Wildlife Species: No Federal candidate species were observed during field surveys. Habitat for most of these species in the project area is limited or non-existent. Information on the six Federal candidate species potentially occurring in the project area, their habitat requirements, and distribution is provided below.

- Ferruginous hawk (*Buteo regalis*) - The ferruginous hawk has been documented in Umatilla and Morrow counties (ONHP 1993) and is known to occur near Boardman (Janes 1985). This species typically nests on the ground on the sides or summits of low hills, in juniper trees (Weston 1969),

Table 3-8. Sensitive Wildlife Species Potentially Occurring in the Project Area

Common Name	Scientific Name	Status[1/]	Observed in Project Area
Painted turtle	*Chrysemys picta*	SC, ONHP 3	No
American white pelican	*Pelecanus erythrorhynchos*	SV	No
Long-billed curlew	*Numenius americanus*	FC3, ONHP 4	Yes
Northern bald eagle	*Haliaeetus leucocephalus*	ST, FT, ONHP 1	No
Swainson's hawk	*Buteo swainsonii*	SV, 3C, ONHP 3	Yes
Ferruginous hawk	*Buteo regalis*	FC2, SC, ONHP 3	No
Mountain quail	*Oreortyx pictus*	FC2, ONHP 4	No
Yellow-billed cuckoo	*Coccyzus americanus*	F3B, SC, ONHP 2	No
Bank swallow	*Riparia riparia*	SU, ONHP 3	Yes
Loggerhead shrike	*Lanius ludovicianus*	FC2, SU, ONHP 3	No
Grasshopper sparrow	*Ammodramus savannarum*	SU, ONHP 3	Yes
Tri-colored blackbird	*Agelaius tricolor*	FC2, SP, ONHP 2	No
Pacific western big-eared bat	*Plecotus townsendii townsendii*	FC2, SC, ONHP 2	No
Washington ground squirrel	*Spermophilus washingtonii*	SC, ONHP 2	No
Pygmy rabbit	*Brachylagus idahoensis*	FC2, SV, ONHP 2	No

1/ Status: Oregon Department of Fish and Wildlife (ODFW): SE = designated as an endangered species by ODFW. ST = designated as a threatened species by the ODFW. SC = State Critical, listing for threatened or endangered status is pending, or listing may be appropriate if conservation actions are not taken, or species that are peripheral but at risk throughout their range, or disjunct populations. SV = State Vulnerable, listing as threatened or endangered is not believed imminent; listing could or is being avoided through continued or expanded use of protective measures and monitoring. SU = State Sensitive Undetermined, species status is unclear; they may be susceptible to population decline of sufficient magnitude that they could qualify for endangered, threatened, critical or vulnerable status, but scientific study will be required before a judgment can be made. SP = State Peripheral, species that are naturally rare in Oregon or peripheral species whose Oregon populations are on the edge of their range.

U.S. Fish and Wildlife Service (USFWS): FE = designated as an endangered species by the Federal government. FT = designated as a threatened species by the Federal government. FC2 = Category 2 candidate list, taxa that need additional information to be proposed or listed as threatened or endangered. F3B = No longer listed as a Candidate species by the USFWS; the name on the basis of current taxonomic understanding does not represent taxa meeting the Endangered Species Act's definition of "species." FC3 = No longer listed as a candidate species; proven to be more abundant or widespread than previously believed and/or not subject to any identifiable threats.

Oregon Natural Heritage Program (ONHP): ONHP 1 = List 1, threatened with extinction throughout its range, needing active protection measures. ONHP 2 = List 2, threatened with extirpation or presumed extirpated from the state, often peripheral or disjunct. ONHP 3 = List 3, additional information is needed for a determination of status in Oregon. ONHP 4 = List 4, of concern but not currently threatened or endangered; includes taxa rare but currently secure, as well as taxa declining in abundance or habitat, but still too common to be proposed as threatened or endangered.

Sources: Woodward-Clyde Consultants 1993; ONHP 1993; personal communication, Peterson 1994.

or on rock pinnacles (Ramakka and Woyewodzic 1993). Ferruginous hawks prefer shrublands and native grasslands and avoid croplands and areas with high densities of perches (Janes 1985). Because of the high proportion of cropland and disturbed grassland, the project area does not provide suitable habitat for this species.

- Mountain quail (*Oreortyx pictus*) - There are no records of mountain quail in Umatilla or Morrow counties, although it is known to occur in the nearby Blue Mountains (ONHP 1993). This species is typically associated with brushy sites, such as old clearcuts or burned areas that are surrounded by forests or woodlands (Ehrlich et al. 1988). The project area does not contain habitats suitable for mountain quail.

- Loggerhead shrike (*Lanis ludovicianus*) - The loggerhead shrike has been documented in Umatilla and Morrow counties (ONHP 1993). This species is typically observed in open fields with scattered trees, and open woodlands and shrublands (Ehrlich et al. 1988). The project area contains suitable habitat for this species. It is likely that the species occurs in the project area, but it was not observed during field studies.

- Tri-colored blackbird (*Agelaius tricolor*) - Tri-colored blackbirds are found primarily in California (National Geographic Society 1987), but there are a few records in Oregon, including one about 1.8 kilometers (3 miles) east of the project area (personal communication, Peterson 1994). This species typically occurs in large marshes and feeds in adjacent agricultural areas (Ehrlich et al. 1988). Wetlands in the project area would be too small to support tri-colored blackbirds and this species is considered peripheral or naturally rare in Oregon (ONHP 1993).

- Pacific western big-eared bat (*Plecotus townsendii townsendii*) - The Pacific western big-eared bat has been documented in Umatilla County (ONHP 1993) and forages in a wide variety of habitats, including grasslands and shrublands (Thomas 1979). This species, however, requires caves for breeding and generally roosts in caves, burrows, and crevasses in cliffs (Thomas 1979), and the undersides of bridges. The project area contains forage and roosting habitat for the big-eared bat. It is possible that the species occurs in the project area, but it was not observed during field surveys.

- Pygmy rabbit (*Brachylagus idahoensis*) - The current distribution of the pygmy rabbit is concentrated in southeastern Oregon (Washington Department of Wildlife 1993), and none have been documented in Umatilla or Morrow counties (ONHP 1993). This species is uniquely dependent on sagebrush, which composes 99 percent of its diet (Washington Department of Wildlife 1993). The project area lacks sagebrush and does not provide suitable habitat for the pygmy rabbit.

State-listed Wildlife Species: Four state-listed sensitive species, the long-billed curlew, Swainson's hawk, grasshopper sparrow (*Ammodramus savannarum*), and bank swallow, were recorded in the project area during field surveys in 1992 and 1993 (Woodward-Clyde Consultants 1993).

- Long-billed curlew - Field surveys indicate that the long-billed curlew is fairly common in the project area. Approximately 10 to 15 pairs were seen along the proposed transmission line right-of-way in 1992; 6 of these pairs appeared to have young (Woodward-Clyde Consultants 1993). Four pairs were seen along the gas pipeline route in 1993 (Woodward-Clyde Consultants 1993). In eastern Oregon, curlews typically nest in grasslands, particularly those dominated by cheatgrass, and forage on invertebrates in nearby irrigated croplands (Pampush and Anthony 1993).

  The long-billed curlew is on the ONHP's List 4, which includes taxa of concern that are either rare but secure, or declining in numbers or habitat but still too common to be proposed as threatened or endangered. This species was formerly a candidate for Federal listing, but has proven to be more abundant than previously believed and/or not subject to any identifiable threats.

- Grasshopper sparrow - During field surveys of the project area, grasshopper sparrows were observed in Section 20 (T5N, R28E) along the proposed transmission line right-of-way and near the southern end of the gas pipeline right-of-way (Woodward-Clyde Consultants 1993). Surveys in 1993 indicate that this species appeared to be nesting along the gas pipeline right-of-way (Woodward-Clyde Consultants 1993). Habitats for the grasshopper sparrow include grasslands, pastures, and cultivated fields (Ehrlich et al. 1988).

  Grasshopper sparrows are listed by the ODFW as state sensitive, undetermined status, indicating that the species may be susceptible to population declines that would result in designation as endangered, threatened, critical or vulnerable, but additional study is required. This species is also in the ONHP's List 3, which includes species that require additional information for determination of status in Oregon.

- Swainson's hawk - Swainson's hawks were observed just south of the power plant site during field surveys in 1992 and 1993. The 1993 observations indicated that this species may have nested in trees growing in the riparian corridor along the Umatilla River, east of the power plant site (Woodward-Clyde Consultants 1993). Swainson's hawks nest almost exclusively in trees (Janes 1985), which, in eastern Washington and Oregon are generally limited to riparian areas and abandoned farms. Swainson's hawks prefer areas of low topographic relief with widespread perches (Janes 1985). Forage habitats include grasslands, shrub-grasslands, and croplands.

  The Swainson's hawk is designated by the ODFW as state vulnerable, indicating that listing as threatened or endangered is not imminent and could be avoided through continued or expanded use of protective measures or monitoring. It is also on ONHP's List 3.

- Bank swallow - Field surveys located a bank swallow colony along the northern portion of the route for both the proposed and optional transmission line rights-of-way. This colony was in a sandy bank created by past quarry operations (Woodward-Clyde Consultants 1993). The bank swallow typically nests in burrows near water and forages on insects (Ehrlich et al. 1988). This species is designated by ODFW as state sensitive, undetermined status and is on the ONHP's List 3.

The Washington ground squirrel (*Spermophilus washingtonii*), listed by the ODFW as critical, had been recorded near the gas pipeline right-of-way in 1990 (Betts 1990). This site is now irrigated cropland and no Washington ground squirrels were observed during field surveys in 1992 or 1993 (Woodward-Clyde Consultants 1993). A nearby colony, also recorded by Betts (1990) and located just to the south of the PGT pipeline, appeared to have been abandoned by late 1992, according to 1993 spring surveys.

Habitat for the other three sensitive species potentially occurring in the project area, the American white pelican (*Pelecanus erythrorhynchos*), yellow-bellied cuckoo (*Coccyzus americanus*), and painted turtle (*Chrysemys picta*), is limited to non-existent at the power plant site or along the rights-of-way (Woodward-Clyde Consultants 1993). No burrowing owls (*Athene cunicularia*), a sensitive species known to occur on the nearby Umatilla Ordnance Depot, were observed in the project area (Woodward-Clyde Consultants 1993).

3.4.2 Environmental Consequences and Mitigation Measures

Potential impacts of construction and operation of the Hermiston Generating Project on wildlife include the following: (1) permanent loss of habitat at the power plant site; (2) temporary loss of habitat during construction of the power plant, pipeline, and transmission line upgrade; and (3) disturbance from increased traffic and noise. In addition, power lines pose collision and electrocution hazards to birds. The project would not affect bald eagles or any other Federally listed species (see Appendix E for the bald eagle Biological Assessment). Potential impacts to wildlife species and any corresponding mitigation measures are discussed below.

3.4.2.1 Impact—Permanent Habitat Loss

Construction of the power plant would result in the permanent loss of about 5.2 hectares (12.9 acres) of grasslands that provide habitat for western meadowlarks, ring-necked pheasants, and horned larks. Although breeding by any of these species was not observed during field surveys, construction during the spring may result in nest destruction. Because of the degraded nature of this habitat, and its proximity to industrial development and major roads, it is unlikely that the project will result in population decreases for grassland birds. No long-billed curlews, a sensitive species, were observed at the power plant site and, given the level of disturbance in this area, it is unlikely that any occur.

In general, the grasslands at the power plant site represent habitat of low value to wildlife. The ODFW's mitigation goal for this type of habitat is to minimize loss of habitat value, or to conserve or enhance habitat (OAR 635-415-030 (1)).

Because permanent impacts to wildlife habitat would be minor, no mitigation is recommended.

3.4.2.2 Impact—Temporary Habitat Loss

Construction of the gas pipeline and either the proposed or the optional transmission line upgrade would temporarily eliminate about 21.9 hectares (54 acres) of habitat, including grasslands, shrub-grasslands, and croplands. Construction in grasslands and/or shrub-grassland during the spring and summer may result in loss of breeding habitat and possible nest destruction for the grasshopper sparrow and long-billed curlew, both sensitive species, as well as the western meadowlark, ring-necked pheasant, and horned lark. Grasslands would also be unavailable as forage habitat for these species for at least one year; restoration of shrub-grasslands would take longer, probably at least five to seven years. In addition, construction in croplands would temporarily preclude the use of these areas for foraging by curlews and Swainson's hawks, both sensitive species. However, given the amount of adjacent habitat, the degree of existing disturbance to habitats in the project area, and the short timeframe of construction, no decreases in the populations of any wildlife species dependent on grasslands or croplands are expected from temporary habitat losses associated with the gas pipeline or the transmission line.

Construction activities are not expected to affect habitat for either the bank swallow or the Swainson's hawk. The bank swallow colony is on the opposite side of an access road to the gravel quarry, outside of the area that would be affected by transmission line construction (Woodward-Clyde Consultants 1993). Trees used by the Swainson's hawk for nesting would not be affected by construction.

Measure Included as Part of the Project:

- If feasible, HGC would schedule the construction of the gas pipeline and transmission line to occur outside the nesting season for the state sensitive species identified in this report (mid-April to August 1). If HGC cannot schedule construction activities outside the nesting season, pre-construction biological surveys would be conducted at the power plant site and along the affected portion of the transmission line or pipeline rights-of-way to identify location of nest sites. If the surveys do not locate any nest sites of the state-listed sensitive species identified above, construction could proceed. If the surveys were to locate nest sites, HGC would submit to EFSC mitigation plans acceptable to EFSC in consultation with ODFW. HGC would not commence construction in the area of the identified nest sites until EFSC, in consultation with ODFW, had approved the mitigation plan. EFSC would make every reasonable effort to review the plans, consult with ODFW, and revise or approve the plans as quickly as possible.

This measure would provide adequate protection to wildlife during construction.

3.4.2.3 Impact—Disturbance from Noise and Human Activity

Noise and human activity associated with construction and operation of the Hermiston Generating Project would result in increased disturbance to wildlife in the project vicinity. General disturbance would be greatest during the construction period due to the use of heavy equipment, traffic, and increased human activity. Noise-related disturbances would be greatest during power plant operation.

Wide-ranging species would be expected to avoid areas disturbed by construction activities. Consequently, wildlife use of habitats adjacent to the power plant site, transmission line right-of-way, and gas pipeline right-of-way is likely to temporarily decline during construction. Construction during the summer would result in greater disturbance because habitats in the project vicinity are used more during this time of year. Increased traffic related to construction may also result in wildlife mortality due to collisions.

Because the power plant site is currently located near a freeway, railroad tracks, and industrial development, wildlife use of this general vicinity is low. Most of the area nearby consists of croplands and disturbed grasslands, which also receive relatively low use. Although impulse noise, such as blasting and sonic booms, has been shown to disturb some wildlife species (Institute for Raptor Studies 1981), the typical response to constant noise is either habituation or avoidance. Overall, noise from operations is unlikely to have a significant effect on populations of the few wildlife species in the vicinity, and no mitigation is necessary.

3.4.2.4 Impact—Power Line Hazards

Electrocution is the primary hazard power lines pose to birds of prey, commonly referred to as raptors (Postovit and Postovit 1987). Electrocution occurs when a bird simultaneously touches two power lines or a line and a grounded object. Raptors are particularly susceptible to electrocution because of their size and wing spread (Olendorff et al. 1981). In general, a 1.5-meter (5-foot) minimum separation of lines will prevent raptor electrocution (Olendorff et al. 1981). Consequently, most raptor electrocutions involve distribution lines, particularly those carrying less than 69 kV (Olendorff et al. 1981). The spacing of transmission line conductors is usually wide enough to preclude simultaneous contact of 2 conductors by even the largest raptors (Olendorff et al. 1981). As proposed, conductors for the new 230 kV transmission line for the Hermiston Generating Project would be separated by 4.3 meters (14 feet) vertically and at least 3 meters (10 feet) horizontally. Consequently, the new upgraded power lines for the project are not expected to increase raptor mortality.

Raptors do not appear to be susceptible to collisions with transmission lines, most likely because of their keen eyesight, nonflocking behavior, and flight maneuverability (Williams and Colson 1988). However, transmission lines do present a collision hazard to other birds, primarily waterfowl (Anderson 1978). BPA studies indicate that most collisions are with overhead ground wires (Beaulaurier 1981). Collision potential can be reduced by a variety of techniques, including: (1) locating transmission lines away from major flyways and water; (2) orienting lines parallel to predominant flight paths; and (3) improving visibility by clustering lines or marking them with colored objects (Williams and Colson 1988).

The average height of the new steel transmission poles would be approximately 33.5 meters (110 feet), nearly twice the size of the existing wood poles. In addition, the new 230 kV line would have two overhead groundwires and would be clustered with other lines for only 2.5 kilometers (1.5 miles) over a distance of nearly 20 kilometers (12 miles). Consequently, the project transmission lines present a greater collision hazard to birds than the existing lines. However, the actual number of bird collisions is expected to be small because: (1) two groundwires should be easier for birds to see than a single wire; and (2) the right-of-way does not bisect a flyway. Most waterfowl in the area are flying to or from the Columbia River and therefore travel parallel to the right-of-way, except for the 2.5 kilometers (1.5 miles) where the right-of-way runs east-west and crosses the Umatilla River (personal communication, Hall 1994) The new lines in this area, however, would be clustered with an existing 500 kV line and two 230 kV lines, resulting in greater visibility.

Measure Included as Part of the Project:

- To avoid the potential electrocution hazard to bald eagles and other raptors, a raptor-proof design for the new transmission line would be developed. Raptor protection measures would be employed following the methods described by Olendorff et al. (1981). A detailed design would be submitted to ODFW for review during the design phase of the project.

The measures proposed in the project description are adequate to protect raptors from electrocution hazards.

3.4.3 Unavoidable Adverse Impacts

With mitigation measures included as part of the project and potential additional measures, there should be no major unavoidable adverse impacts on wildlife or their habitats from the Hermiston Generating Project.

3.4.4 Cumulative Impacts

In the project area, the major impact to wildlife is the conversion of shrub-grassland habitat to irrigated cropland. The amount of habitat available to wildlife decreases and is fragmented, resulting in smaller populations and isolated gene pools. Because the power plant site is already disturbed and other components as proposed would result in only temporary disturbance, the direct contribution of the Hermiston Generating Project to regional cumulative impacts on wildlife habitat would be negligible.

This project, and two other cogeneration projects currently proposed, would contribute marginally to the continued growth and development in the Hermiston/Umatilla area and subsequent loss of additional wildlife habitat.

3.5 Fish

The Columbia River supports steelhead trout *(Oncorhynchus mykiss)* and three species of salmon and represents a fishery resource of global importance. The project's use of 377 hectare-meters (3,065 acre-feet) of water per year (an average of 0.1 m^3/s [4.2 cfs]), to be withdrawn from the Columbia River by the Port of Umatilla under its existing water right, would add very slightly to the cumulative effects of competing water uses on the Columbia River fishery resource.

3.5.1 Affected Environment

Anadromous fish species in the Umatilla River include several species of salmon and steelhead trout. Of these, steelhead are the only surviving native wild fishery (Woodward-Clyde Consultants 1993). Hatchery-derived runs of both chinook salmon (*Oncorhynchus tshawytcha*) and coho salmon (*Oncorhynchus kisutch*) are being encouraged to naturally re-populate the basin. Millions of smolt are placed in the Umatilla River, but low flows from irrigation withdrawals often prevent smolt from reaching the Columbia River in the spring, and adults are sometimes prevented from moving up river to spawn when flows are low. A project known as the Umatilla River Basin Plan has been developed to improve low flows so that fish can move upstream and downstream more readily (Woodward-Clyde Consultants 1993).

Anadromous fish that pass through the Columbia River by McNary Dam at Umatilla include steelhead and three species of salmon: chinook, coho, and sockeye (*Oncorhynchus nerka*). Spring, summer, and fall runs of chinook and summer and winter steelhead are present during appropriate times of the year when adults and smolt migrate to and from spawning areas (Woodward-Clyde Consultants 1993).

The National Marine Fisheries Service in 1991 and 1992 listed spring/summer and fall chinook runs in the Snake River as threatened and the Snake River sockeye as endangered. Both species were noted by the USFWS as occurring in the project vicinity (personal communication, Peterson 1994).

3.5.2 Environmental Consequences and Mitigation Measures

Construction and operation of the Hermiston Generating Project would not involve water withdrawals from the Umatilla River and, consequently, would not affect fish in the river. Construction of the transmission line upgrade would include a crossing at the Umatilla River but would not affect fish.

The 0.1 m^3/s (4.2 cfs) of water needed to operate the Hermiston Generating Project would be obtained from the Port of Umatilla's regional water project, under an existing water right to the Columbia River. No additional water right is needed for this project, although the project would increase the rate at which the Port's water right is exercised.

Impact—Water Withdrawal: A withdrawal of 0.1 m^3/s (4.2 cfs) represents 0.002 percent of the average annual flow of 5,664 m^3/s (200,000 cfs) at McNary Dam and 0.004 percent of the average low flow of 3,030 m^3/s (107,000 cfs). While it is generally accepted that higher flows in the Columbia River system increase salmon and steelhead smolt survival, the range of benefit estimates vary considerably and some data even indicate that higher flows reduce smolt survival (Cada et al. 1993). Some studies have derived regression equations to estimate the effects of flow changes on fish survival, including migrating steelhead and spring chinook (for example, see McConnaha 1990, cited by Cada et al. 1993). All of the studies in the lower Columbia have examined the effects of flow over a range of at least 2,832 m^3/s (100,000 cfs); estimates of the benefits of even a 283 to 566 m^3/s (10,000 to 20,000 cfs) change in flow are very small. The impact on fish of withdrawing 0.1 m^3/s (4.2 cfs) in this region of the river would be so small as to be unmeasurable. It would not constitute a significant impact on the important salmon and steelhead resources. Consequently, a biological assessment was not prepared for chinook salmon or Snake River sockeye salmon.

3.5.3 Unavoidable Adverse Impacts

The withdrawal of 0.1 m^3/s (4.2 cfs) of water from the Columbia River would slightly reduce the quantity of water in the river, but would not have a significant impact on fish.

3.5.4 Cumulative Impacts

The Hermiston Generating Project is one of three cogeneration projects currently proposed for development in the area. The proposed Ida-West project would also purchase water from the Port of Umatilla's water supply system, at the rate of approximately 0.2 m^3/s (5.5 cfs). The third proposed project, the Coyote Springs project in Morrow County, would require approximately 0.2 m^3/s (5.6 cfs).

The Port of Umatilla water right, if fully developed, would constitute a withdrawal of 4.4 m^3/s (155 cfs), which could supply the Hermiston Generating Project, Ida-West project, and 4.1 m^3/s (145.3 cfs) of other uses. The Coyote Springs project would withdraw an additional 0.2 m^3/s (5.6 cfs). This cumulative withdrawal would add slightly to the existing competition for water on the Columbia River.

3.6 Air Quality

The Hermiston Generating Project plant site is located in an area currently designated as unclassified or in attainment of all state and national Ambient Air Quality Standards (AAQS). The Hermiston Generating Project would produce sufficient emissions to qualify as a major emission source, and therefore falls under EPA's Prevention of Significant Deterioration (PSD) rules. The PSD rules are designed to prevent new emission sources from having a significant adverse effect on a region's air quality. Modeling of the project's emissions indicates all would be within acceptable limits compared to state and Federal emission standards, and the project would not have a significant effect on ambient air quality. The combustion of natural gas at the power plant would add slightly to the worldwide production of carbon dioxide, a greenhouse gas believed to contribute to global warming.

3.6.1 Affected Environment

3.6.1.1 Regulatory Procedure for Evaluating Air Quality Impacts from a Proposed Project

The goal of the air quality analysis is to demonstrate that a proposed project will not significantly deteriorate air quality and that the new emissions, when added to existing sources, will not cause ambient pollution levels to exceed established standards for health and safety. To establish that a new project will comply with the state and Federal regulations, a project developer must follow a series of steps designed to screen out insignificant sources in order to identify and study those emissions with the potential to cause a significant impact. This process is known as ODEQ's New Source Review (NSR) Program. A flow chart of the NSR process is presented in Figure 3-6. The process consists of: (1) determining if the project qualifies as a major source and if the *quantity* of emissions is significant; (2) performing a screening analysis to determine if the *impacts* of emissions are significant; and, if necessary, (3) performing detailed modeling of background sources and the significant proposed impacts and comparing them to the standards. This process is followed for each regulated pollutant. After the process has been completed and the project has demonstrated that it meets ODEQ standards and that the best available control technology (BACT) has been included in the design, an

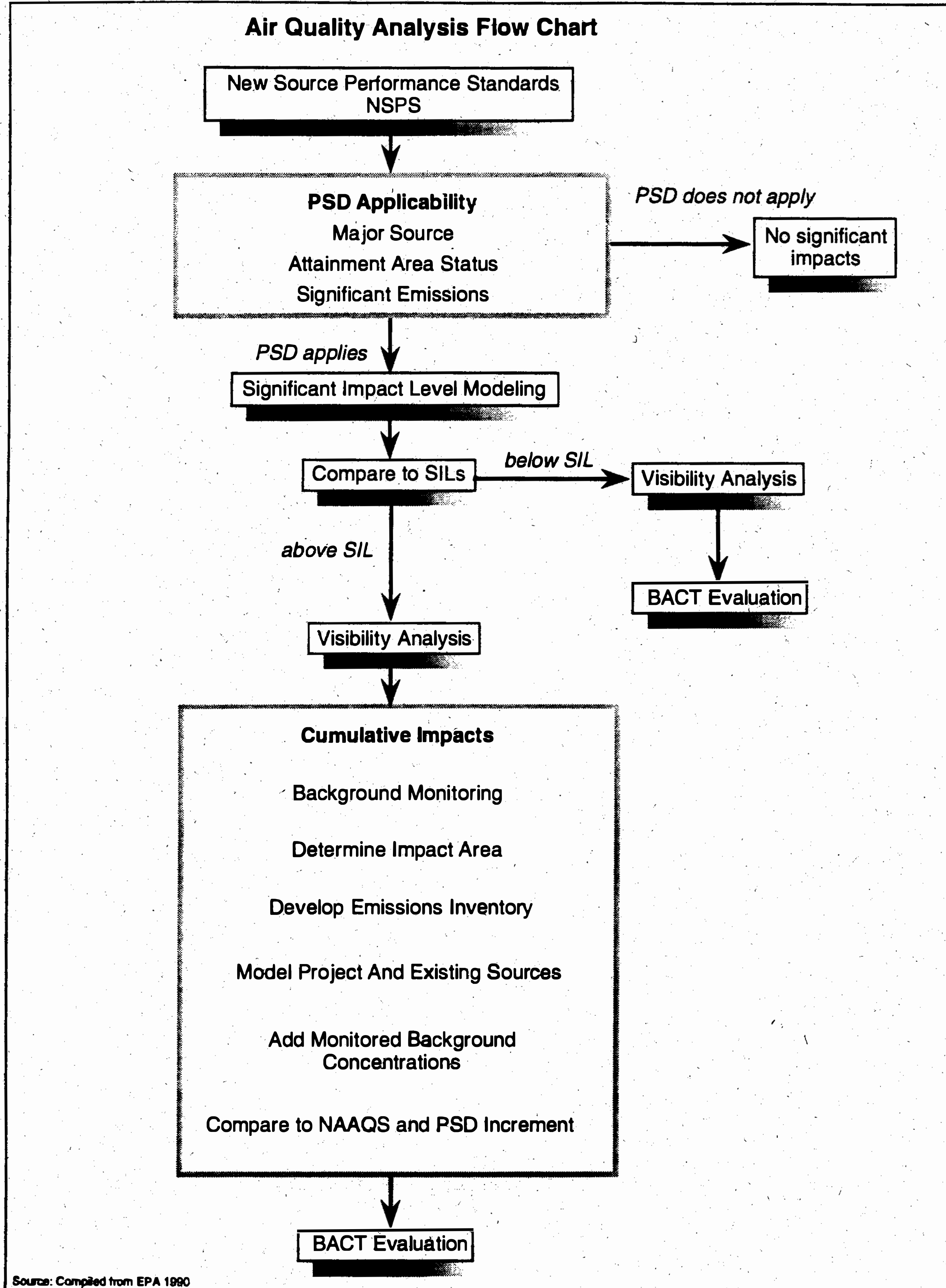


Figure 3-6 New Source Review Process

Air Contaminant Discharge Permit can be issued, allowing the project to be constructed.

Air quality impacts of a new source of emissions are determined by four interrelated factors: 1) climate and meteorology; 2) existing air pollution sources and current air quality in the area; 3) the site configuration and surrounding terrain; and 4) the source. ODEQ has developed a set of procedures that determines a project's air quality impacts, demonstrates compliance with all regulations, and is protective of human health and the environment.

The Hermiston Generating Project, as a major new source of air emissions, would be subject to NSR and must develop and submit a PSD application to ODEQ. The PSD application must demonstrate that emissions from the facility would result in ambient concentrations of air pollutants that are less than state and Federal AAQS for criteria and toxic air pollutants. Furthermore, the facility would not be allowed to contribute to ambient air quality concentrations that result in total concentrations greater than the AAQS. Concentrations resulting from project emissions must not exceed the allowable PSD increments. The PSD application for the project is currently under development.

3.6.1.2 Air Quality Factors in the Existing Environment

Climate and Meteorology: Eastern Oregon has a dry continental climate (low humidity), with large variations in temperature from winter to summer. Daily temperatures in January average a little over 0°C (32°F), and a typical winter includes only a few days with minimum temperatures below -18°C (0°F). July temperatures average around 21°C (70°F), and a typical summer has only a few days with maximum temperatures in excess of 38°C (100°F). Very little precipitation falls in the area. Annual precipitation in the project area is slightly less than 23 centimeters (9 inches). Most of this precipitation is due to winter storms crossing the region. Consequently, the peak precipitation months are November, December, and January. Average annual snowfall is about 25 centimeters (10 inches), with over 75 percent of this amount occurring from December through March. There is very little rain during the summer months. Summer rain is usually associated with a thunderstorm and can be heavy for short periods.

There are two predominant wind directions in the immediate vicinity of the project. The most common wind direction tends to be aligned along the Columbia River Valley, which has a channeling effect on the flow of air near the river. This river valley effect combines with prevailing westerly flow in the region to produce prevailing winds from the west-southwest. Winds are also frequent from the west and southwest directions. The second most common wind direction is caused by cold air flowing down the river valley during the night and early morning hours, producing winds from the east-northeast.

Existing Air Pollution Sources and Current Air Quality: Air quality in an area is defined as the ambient ground-level concentrations of specific pollutants. Acceptable air quality exists when the pollutant concentrations are below the Federal and state standards. The air quality in an area can be determined either by direct measurement or by modeling. Since current monitoring data are often unavailable, modeling is commonly used as an acceptable and accurate method for estimating air quality.

Ambient Air Quality Standards: The Clean Air Act of 1970 mandated that the EPA establish ambient ceilings for certain pollutants based on the identifiable effects that pollutants may have on the public health and welfare. Subsequently, EPA promulgated regulations that establish national AAQS for a number of pollutants. These pollutants, called criteria pollutants, include sulfur dioxide (SO_2), particulate matter less than 10 microns in diameter (PM_{10}), nitrogen dioxide (NO_2), carbon monoxide (CO), photochemical oxidants such as ozone (O_3), and lead (Pb). The Federal PM_{10} standard replaces an earlier standard for total suspended particulates (TSP); however, ODEQ has retained the TSP standard. The national and Oregon AAQS are shown in Table 3-9.

Attainment Status: Section 107 of the 1977 Clean Air Act Amendments required both the EPA and individual states to evaluate the attainment of the national AAQS. Areas not meeting the national AAQS are designated as nonattainment areas. Areas that lack sufficient data to be used in the determination of attainment status are unclassified, but are treated as attainment areas until designated otherwise. The classification of an area is made on a pollutant-specific basis. The Hermiston Generating Project plant site is located in Umatilla County; air quality throughout the nearby area is currently designated as unclassifiable or in attainment of each state and national AAQS. Portions of Yakima County, Washington, approximately 60 kilometers (37 miles) northwest of Hermiston, and the Wallula area, approximately 40 kilometers (25 miles) northeast of Hermiston, are designated as PM_{10} nonattainment areas. These represent the closest nonattainment areas to the project site.

Toxic Air Pollutants: In addition to criteria pollutants, ODEQ also regulates emissions of toxic air contaminants. No data exist on the ambient concentrations of air toxics in the project area.

Table 3-9. National and State Ambient Air Quality Standards and Prevention of Significant Deterioration (PSD) Increments

Pollutant	Averaging Period[2/]	National AAQS[1/] Primary	National AAQS[1/] Secondary	Oregon AAQS[1/]	PSD Increment[1/] Class I	PSD Increment[1/] Class II
Sulfur Dioxide	Annual Average	80	3/	53	2	20
	24-hour Average	365	3/	260	5	91
	3-hour Average	3/	1,300	1,300	25	512
Total Suspended Particulates	Annual Geometric Mean	3/	3/	60	3/	3/
	24-hour Average	3/	3/	150	3/	3/
PM_{10}	Annual Geometric Mean	50	50	50	4	17
	24-hour Average	150	150	150	8	30
Carbon Monoxide	8-hour Average	10,000	10,000	10,000	3/	3/
	1-hour Average	40,000	40,000	40,000	3/	3/
Ozone	1-hour Average	235	235	235	3/	3/
Nitrogen Dioxide	Annual Average	100	100	100	2.5	25
Lead	Quarterly Average	1.5	1.5	1.5	3/	3/

1/ All standards in this table are expressed in micrograms per cubic meter ($\mu g/m^3$).
2/ Short-term ambient standards may be exceeded once per year, annual standards may never be exceeded. Ozone standard is attained when the expected number of days of an exceedance is equal to or less than one.
3/ No ambient standard for this pollutant and/or averaging period.
Source: OAR 340

Site Configuration and Surrounding Terrain: The configuration of nearby buildings and facilities and the topography of the land within about a 16.1-kilometer (10-mile) radius of an emission source can influence the dispersion of exhaust plumes and affect ground-level pollutant concentrations. The terrain immediately surrounding the plant site is generally level. Foothills rise above the site elevation in all directions after 3.2 to 14.5 kilometers (2 to 9 miles). Hills or mountains higher than the stacks are important in the air quality analysis because the exhaust plume can affect the elevated terrain before the plume has had a chance to disperse. Therefore, the topography is explicitly accounted for in air quality modeling.

Buildings near a stack can create wind turbulence. If power plant exhaust gases are emitted into this turbulence, the plume can become mixed with ground-level air within a very short distance of the stack, resulting in high pollutant concentrations. This condition is called "downwash" and occurs only when the stack height is too short for the plant configuration (Schulman and Hanna 1986, Schulman et al. 1985). The Hermiston Generating Project has taken the size of the nearby buildings into account in the design of the stacks by following Good Engineering Practice in calculating the height of the stack (EPA 1985). For the Hermiston Generating Project, this gives a stack height of 65 meters (213 feet). Extensive engineering experience and observation have shown that a stack built to Good Engineering Practice guidelines will not cause downwash.

3.6.2 Environmental Consequences and Mitigation Measures

Potential impacts on air quality associated with construction and operation of the project include: (1) emissions of pollutants into the atmosphere as a byproduct of natural gas combustion; (2) emissions of very low levels of pollutants in steam resulting from pollutants in cooling water; (3) production of a visible steam plume from the cooling towers; (4) fog and ice on local roadways and railroads caused by steam from the cooling towers; (5) contributions to the world's production of greenhouse gases that may cause global warming; and (6) production of construction machinery exhaust emissions and fugitive particulate matter during construction.

3.6.2.1 The Source: Emissions from the Power Plant

Each combustion turbine in the power plant would produce extremely hot exhaust gases from the combustion of natural gas. Much of the heat in these gases would be used to produce steam in the heat recovery steam generator for additional power generation and for the Lamb-Weston facility. The heat recovery steam generators reduce the exhaust gas temperature to about 96°C (205°F). The exhaust gas from each combustion turbine and heat recovery steam generator then flows to a separate stack. The chemical composition and physical parameters (i.e., temperature and volumetric flow) of the exhaust gas vary with the ambient temperature and load conditions. This is because the ambient temperature affects the fuel usage, power output, and combustion conditions.

In order to determine the maximum potential emissions, the power plant has been analyzed for a number of operating modes and ambient temperatures: Base-load (100 percent) and part-load (75 percent), and -18, 10, and 27°C (0, 50, and 80°F). The important physical emission parameters are given in Table 3-10. The physical characteristics of the exhaust gases influence how the exhaust plume rises and disperses in the atmosphere.

Table 3-10. Combustion Turbine Stack Parameters for Determining Worst-Case Modeling Scenarios, Hermiston Generating Project

Scenario	Stack Height (ft)	Stack Diameter (ft)	Exit Temperature (°F)	Exit Velocity (ft/sec)[1/]
Base load @ 0°F	213.0	18.0	203.0	70.2
Base load @ 50°F	213.0	18.0	206.0	64.5
Base load @ 80°F	213.0	18.0	210.0	60.9
75 Percent load @ 0°F	213.0	18.0	200.0	53.9
75 Percent load @ 50°F	213.0	18.0	201.0	51.6
75 Percent load @ 80°F	213.0	18.0	205.0	49.5

Source: Appendix F2.
1/ Based on one combustion turbine firing natural gas.

The regulated pollutants that would be emitted from the combustion turbines are listed in Table 3-11. The emission rates of two of these pollutants (NO_x and CO) vary with ambient temperature. The emission rates for the other pollutants may also vary with ambient temperature; however, temperature-specific data are not available for the other pollutants. Therefore, the maximum expected emission rate for each pollutant is used for all temperatures. Two emission rates for SO_2 are given; the maximum short-term emission rate and the annual average emission rate. These emission rates were derived from measured variations of hydrogen sulfide concentrations in the natural gas fuel.

Emission controls included in the Hermiston Generating Project design are described in Section 2.2.3. All emission rates presented in Table 3-11 represent emissions after controls. As described previously, the project includes a CEMS for each unit. CEMS will be provided for NO_x and CO. The CEMS allows operators to ensure that pollutant emission rates do not exceed the permitted rates. Additionally, each CEMS is equipped with alarms to alert the operators and

Table 3-11. Hermiston Generating Project Emission Rates and Significant Emission Rates[1/]

Pollutant	Hermiston Generating Project: 100% Output (lb/hr)[2/, 3/]	Hermiston Generating Project: Tons per year[4/]	Significant Emission Rate (Tons per Year)	Emissions Significant? (Y/N)
Criteria Pollutants				
Nitrogen Oxides	31	272	40	Y
Carbon Monoxide	51	447	100	Y
TSP/PM_{10}	14.6	64	25	Y
Sulfur Dioxide	0.324[5/]	2.8	40	N
	0.953[6/]			
VOC (Total)	3.8	34	40	N
Air Toxics[7/, 8/]		(lbs/yr)	Oregon Significant Emission Rate (lbs/yr)[9/]	
Ammonia	21	336[10/]	31[10/]	Y
Benzene	0.0028	49	3,100	N
Formaldehyde[11/]	3.7	64,824	2,000	Y
Pentane	0.0032	0.050[10/]	3,300[10/]	N
N-Pentane	0.0032	0.050[10/]	3,300[10/]	N
N-Butane	0.032	0.51[10/]	3,500[10/]	N
Mercury[12/]	0.00012	0.0019	0.09[10/]	N

1/ Source: Appendix F2.
2/ Based on firing one combustion turbine, except for TSP/PM_{10} which is based on firing two CTs.
3/ All emission rate scenarios were included in the air dispersion modeling. However, only maximum emission rates are listed here.
4/ Based on 100% load for 2 combustion turbines for 8,760 hrs/yr.
5/ Annual emission rate based on annual average hydrogen sulfide content in natural gas of 0.00023 percent.
6/ Maximum short-term emission rate. Based on maximum daily hydrogen sulfide content in natural gas of 0.00023 percent.
7/ Source: CARB 1991.
8/ Based on VOC emission rate of 3.5 lb/hr/combustion turbine firing natural gas only. Ammonia is a vendor-guaranteed emission rate.
9/ Source: ODEQ 1991.
10/ lbs/8-hr.
11/ Expected formaldehyde emission per General Electric (1/94).
12/ Mercury emissions were estimated from the mercury content of natural gas (2×10^{-12} lb/ft^3 gas).

regulators when emission rates approach the permitted limits. Most importantly, the CEMS provides the operator with valuable information on the performance of the power plant so that the plant efficiency is optimized and the pollutant emissions are minimized.

The air quality analysis that has been performed follows.

New Source Performance Standards: The EPA has promulgated a set of national emission standards that apply to specific categories of new sources. The New Source Performance Standards (NSPS) for gas turbines with heat input greater than 10.7 gigajoules/hr (10 MMBtu/hr) (40 CFR 60, Subpart GG) set forth maximum allowable emissions for NO_x and SO_2.

- The NO_x emission standard applicable to each of the proposed turbines is 90 parts per million by volume (ppmv) corrected to 15 percent oxygen on a dry basis. The Hermiston Generating Project's estimated NO_x emissions of 4.5 ppmv are well below the NSPS of 90 ppmv.

- For SO_2, the NSPS limits the sulfur content of the fuel to 0.8 percent (weight basis). The natural gas proposed for the Hermiston Generating Project has a sulfur content of 0.00023 percent by weight on an annual average, with a maximum daily concentration of 0.00062 percent. Both of these concentrations are far below the NSPS of 0.8 percent.

Applicability Determination: There are three basic criteria in determining whether PSD rules apply to a project. The first and primary criterion is whether the proposed source's emissions would be great enough to be a "major" source. The second criterion is whether the new source would be located in an area that has been classified attainment or nonattainment. The third criterion is whether the pollutants would be emitted in "significant" amounts.

A source can also be subject to PSD review if it is located within 10 kilometers (6.2 miles) of a Class I area and if emissions of any regulated pollutant result in a 24-hour average ground-level concentration of 1.0 micrograms per cubic meters ($\mu g/m^3$) or greater [OAR 340-20-25c]. Specific areas such as National Parks and Wilderness Areas have been designated as PSD Class I by the EPA. Increases in pollutant concentrations in Class I areas are severely limited to prevent deterioration of air quality and visibility. The proposed plant site would not be located within 10 kilometers (6.2 miles) of any Class I areas. The closest PSD Class I area would be the Eagle Cap Wilderness Area, located about 140 kilometers (87 miles) east of Hermiston.

Major Source: A new source is major if it has the potential to emit any regulated pollutant in amounts equal to or exceeding specified major source thresholds (91 metric tons [100 tons] per year for gas turbine generators over 268 gigajoules [250 MMBtu]). The Hermiston Generating Project meets this criterion for NO_x and CO.

Attainment Status of Air Quality Control Region: New projects located in nonattainment areas must apply for a Nonattainment Area permit. Those in attainment areas complete a PSD review. Since the Hermiston area is considered attainment for criteria pollutants, the project meets the second criterion for PSD review.

Significant Emissions: Significant emissions are defined as those that equal or exceed the Oregon Significant Emission Rates. To determine if the Hermiston Generating Project has significant emissions, the hourly emission rates in Table 3-11 are converted to tons per year assuming base-load conditions for 8,760 hours per year and are compared to the significant emission rates for each pollutant (Table 3-11). The Hermiston Generating Project exceeds significant emission rates for two toxic air pollutants, formaldehyde and ammonia, and for three criteria pollutants: NO_x, CO, and TSP/PM_{10}.

Significant Impact Level Modeling Analysis: The Hermiston Generating Project meets the criteria for PSD review. Therefore, air quality modeling is required to determine maximum ground-level concentrations and compare emissions concentrations to standards. The air quality modeling calculates ground-level concentrations of project emissions. The modeling simulates the behavior of the exhaust plumes from the stacks. The plume would initially rise before leveling off and drifting downwind, because it is hotter than the atmosphere (Briggs 1971).

ODEQ requires the use of EPA-approved ISCST2 and COMPLEX-1 atmospheric dispersion models to evaluate the impacts of proposed projects on air quality. The ISCST2 is used to evaluate impacts at receptors below stack height (simple terrain) and the COMPLEX-1 model is used to evaluate impacts at receptors above stack height (complex or elevated terrain). The models can use hourly meteorological data from the site; however, these data were not available. Therefore, highly conservative screening meteorology was used to represent worst-case conditions (EPA 1987).

The ODEQ modeling methodology stipulates that the screening meteorology be used to calculate the maximum 1-hour average concentrations for each of the various ambient temperatures and operating conditions. Therefore, a total of six different computer simulations (modeling scenarios) were performed. The combination of pollutant emission rate and modeling scenario resulting in the highest concentration of all the receptors is designated as the maximum 1-hour concentration. Annual average and 24-hour concentrations are derived from the 1-hour maximum by multiplying by 0.4 for a 24-hour average and by 0.8 for an annual average. The resulting maximum concentrations of appropriate averaging times and the associated Significant Impact Level (SIL)[1/] are given in Table 3-12. The maximum concentrations resulting from the Hermiston Generating Project are below the SILs or Acceptable Ambient Levels (AALs)[2/] for all regulated pollutants.

Table 3-12. Significant Impact Level Modeling Analysis

Pollutant	Averaging Period	Maximum Predicted Impacts ($\mu g/m^3$)[1/] Combustion Turbines Base Load (100%)	Part Load (75%)	SIL/AAL
Criteria Pollutants				
TSP	24-hour[2/]	0.77	0.96	1
	Annual[3/]	0.13	0.16	0.2
NO_x	Annual[3/]	0.50	0.51	1
CO	1-hour[2/]	11.38	11.58	2,000
	8-hour[2/]	7.96	8.06	500
Air Toxics				
Ammonia	Annual	0.008		0.77
Formaldehyde	Annual	0.6		360

Source: Appendix F2

1/ All impacts are based on two combustion turbines operating for 8,760 hours per year.

2/ Maximum impacts for short-term averaging periods occurred in the 27°C (80°F) temperature scenario.

3/ Annual average concentrations were calculated using the 10°C (50°F) emissions scenario. The annual average temperature in Hermiston, Oregon is 10°C (50°F).

Although emissions at 100 percent load would be about 18 percent higher than the 75 percent load case, Table 3-12 indicates that the concentrations resulting from the 75 percent load case would be higher than the concentrations for the 100 percent load case. That is because, at reduced load, the temperature and velocity of the

[1/] SILs are increases in ambient pollutant concentrations due to a proposed source that represent significant impacts. An increase in a pollutant concentration greater than the SIL requires a cumulative impact analysis to ensure that national AAQS will not be violated

[2/] No SILs have been promulgated for pollutants classified as air toxics, such as formaldehyde and ammonia. Predicted concentrations of air toxics are compared to AALs instead of SILs.

flow leaving the stack would be reduced, resulting in poorer dispersion conditions and, therefore, larger ground-level concentrations.

Impact—Emission of Criteria Pollutants: Emissions to the atmosphere of criteria pollutants would occur from the combustion of natural gas in the combustion turbines at the proposed power plant. Because the maximum concentrations are below significant levels for all criteria pollutants and air toxic emissions, the project is not expected to have a significant impact on air quality in the project area. Although some areas as near as about 40 kilometers (25 miles) from the project site are designated nonattainment for PM_{10}, the project will not have a significant impact on this area because particulate impacts from the project are below SILs.

Measures Included as Part of the Project:
BACT has been incorporated into the design of the power plant to reduce emissions of criteria pollutants. Table 3-13 explains the BACT evaluation process, as it applies to the proposed project. The BACT assessment performed for the Hermiston Generating Project is included as Appendix F1.

Air quality modeling indicates that the measures included in the project as proposed would be adequate to mitigate the potential impacts of emissions.

Backup Fuel Oil: HGC may decide to investigate the use of low sulfur fuel oil as a backup to the natural gas fuel, although there are no plans to use oil as a backup at this time. If oil is later determined to be a viable backup fuel source, HGC will have to apply for an amended Site Certificate and Air Contaminant Discharge Permit. A full investigation of the air quality impacts would be conducted at that time. The analysis procedure for fuel oil would be similar to the procedure described here for natural gas. The project must demonstrate that any other fuel meets all the state and Federal standards and that the project does not cause or contribute to any exceedances of the air quality standards.

3.6.2.2 Impact—Emissions in Steam from the Cooling Towers

As noted in Section 3.2.1.1, water used in the power plant's operation would have small quantities of impurities that would enter the system. Some of these impurities—including radionuclides such as isotopes of carbon, phosphorus, iron, cobalt, cesium, strontium, and uranium—would be distilled out and left behind as the water turned to steam. The steam would carry away only those radionuclides—including tritium and iodine-129—that are not separated from the cooling water when it is vaporized. However, given the extremely low levels of

Table 3-13. Best Available Control Technology Evaluation Process

ODEQ requires that a BACT evaluation be performed for pollutants emitted in significant amounts for new major sources in attainment areas. A comprehensive BACT evaluation has been conducted for the Hermiston Generating Project and submitted to ODEQ as part of the Air Contaminant Discharge permit application.

The purpose of the BACT evaluation is to ensure that new projects use the best "available " control technology to limit emissions, *in addition* to complying with the state and Federal air quality standards. Therefore, it is not sufficient to merely demonstrate that the project has no significant impacts. The project must also show that it has incorporated the best available control technology in its design.

Project design uses a top-down approach that involves determining the most stringent control technology available (Lowest Achievable Emission Rate - LAER) for a similar or identical emission source. If it can be shown that the LAER level of control is technically, environmentally, or economically infeasible for a particular source, the technology is not "available" and the next most stringent level of control is determined and similarly evaluated. The process continues until a control level is determined that cannot be eliminated by any technical, environmental, or economic objections.

Results of BACT Evaluation for the Hermiston Generating Project

NO_x Emission Control

The project will use the most advanced dry, low-NO_x combustor design in combination with a SCR system. These technologies represent the state-of-the-art in NO_x emissions control for combustion turbines. This control system will reduce the amount of NO_x emissions in the exhaust gases to 4.5 ppmvd.

CO and Hydrocarbon Emissions Control

CO and hydrocarbon emissions are controlled through complete combustion of the natural gas in highly efficient combustion turbines. The advanced combustor design burns the carbon-based fuel gases to form CO_2 and leaves only a tiny fraction of the gases in the partially burned form of CO or other hydrocarbons. These combustors reduce the quantity of CO in the exhaust gases to 15 ppmvd and hydrocarbons to between 3.0 and 3.8 ppmvd. These emission levels are controlled through proper maintenance and economical operation of the power plant. The CO control technology is considered BACT for this project.

Particulate, Toxic Air Contaminants, and SO_2

The burning of natural gas in combustion turbines produces small amounts of particulate matter and toxic air contaminants. As with the emission of CO, particulates, and toxic contaminants are formed from incomplete combustion of the natural gas. The high efficiency of the combustion turbines limits the production of these emissions to very low levels. The proper maintenance and efficient operation of the combustion turbines are considered BACT for this project.

Natural gas contains only trace amounts of sulfur, resulting in negligible emissions of SO_2. The project has a natural gas supply source with a guaranteed average sulfur content of 0.00023 percent by weight. Low sulfur natural gas is considered BACT for gas-fired combustion turbines.

Source: EPA 1990.

these constituents in the water, doses of tritium and iodine-129 that could appear in the steam are likewise extremely small, and would not pose a health risk to humans.

Water for the cooling system would also contain trace amounts of dioxins, furans, and other contaminants. These compounds tend to adhere to solid particles in the water—they do not like to dissolve. When the water evaporates, most of these compounds would be left behind with other solids. However, some dioxins and furans would evaporate with the water into the air. The amount that would be in the steam would be very small, and would pose no risk to human health.

3.6.2.3 Impact—Fogging and Icing

Cooling towers remove unusable excess heat from the powerplant by evaporating water in cooling towers. The moist air emitted from the cooling towers often condenses to form a visible white plume of steam. Generally, the steam plumes disappear by evaporating in a short distance. However, the steam plume can remain visible for long distances under certain meteorological conditions.

Occasionally, the steam plume will settle down to the ground near the plant site. This is known as cooling tower-induced fogging. When conditions are right for fogging and the temperature is below freezing, icing can occur. Potential occurrences of cooling tower-induced fogging and icing were modeled using a standard model and 5 years of surface meteorological data from Pendleton, Oregon. Based on the initial modeling results, the orientation of the cooling towers was adjusted to minimize fogging and icing.

Icing Impact: Based on the modeling, there are no predicted occurrences of cooling tower-induced icing on nearby roadways. If the project design includes only the two main cooling towers, icing on the railroad tracks to the south-southeast of the site is predicted to occur in only 1 year out of 5 years modeled, at a maximum frequency of 1.5 hours per year. If the secondary cooling tower is included in the design, icing is predicted to occur up to 3.8 hours each year. These predicted occurrences of induced icing are not expected to present a significant hazard to rail traffic.

Fogging Impact: If the project design includes only the two main cooling towers, fogging is predicted to occur along the local access road that runs approximately east-west along the northern property line at a maximum frequency of 18.5 hours per year. Fogging is also predicted on Westland Road for 6 minutes per year and on Walker Road for one 6-minute period in 5 years.

If the secondary cooling tower is included in the project design, fogging is predicted to occur along Westland Road during two of five years for a maximum of 1.0 hour per year, along Walker Road during one of five years for a maximum of 0.4 hours per year, along the Lamb-Weston access road during five of five years for a maximum of 1.1 hours per year, and along the railroad during five of five years for a maximum of 3.8 hours per year.

Measures Included as Part of the Project:
- The orientation of the cooling towers was adjusted during the design process to minimize the impacts of fogging and icing.

The potential impacts of fogging and icing are not significant and no additional mitigation measures are needed.

3.6.2.4 Impact—Effects of Emissions on Visibility
The visibility impacts of the project's emissions on PSD Class I areas must be assessed to ensure that the pristine vistas in wilderness areas and national parks are not deteriorated by pollutants in the air. The EPA-approved VISCREEN model was used to perform the plume visual impact analysis. The three Class I areas that were analyzed are:

- The Eagle Cap Wilderness Area, located 140 kilometers (87 miles) east of the project site,

- The Strawberry Mountain Wilderness Area, located approximately 170 kilometers (106 miles) southeast of Hermiston, and

- The Columbia River Gorge National Scenic Area, located approximately 180 kilometers (112 miles) west of Hermiston.

The model provides very conservative estimates of the visual impacts by assuming meteorological conditions that allow for minimal dispersion (very stable and calm conditions lasting for 12 hours). Additionally, the observer in the Class I area is assumed to look through the center of the plume where the concentrations of pollutants are highest. The analysis indicates that the project would not cause visibility impacts to any Class I areas (see Appendix F2).

3.6.2.5 Impact—Global Warming
The proposed project would emit CO_2 during both the construction and operation phases. If increased atmospheric CO_2 is leading to a global warming effect, then the project would contribute to CO_2 emissions and to global warming.

Although CO_2 emissions are not currently regulated by any ambient concentration or emission standard, HGC is developing a voluntary greenhouse gas emission reduction and offset program. The first element of the program includes optimizing energy efficiency in project design to minimize greenhouse gas emissions. The combined-cycle design of the power plant is the most efficient available today and produces less CO_2 per megawatt hour than other types of thermal generating resources. The second element of the program is to work toward offsetting project-related greenhouse gas emissions by reducing greenhouse gas emissions elsewhere.

Measure Included as Part of the Project:

- HGC has agreed to provide $1.5 million, to be administered under a trust agreement, to fund programs and activities intended to achieve real reductions in atmospheric gases believed to contribute to global warming. Types of programs contemplated include retirement of old refrigerators and wood stoves, encouraging alternatives to single-occupancy automobile transportation, and creation of a revolving fund to encourage conservation and use of renewable resources. HGC would monitor proposed expenditures.

No additional mitigation measures are needed.

3.6.2.6 Impact—Combustion and Particulate Pollutant Increase During Construction

The two biggest sources of air pollution during the construction phase of the project are equipment exhaust emissions, such as from construction vehicles, and fugitive particulate matter emissions. Construction-related exhaust emissions would result from operation of heavy equipment and from construction worker's vehicles used to travel to and from the construction site. Fugitive emissions are generated by actions such as grading, vehicle travel on disturbed ground, and wind erosion. Site excavation and grading activities would disturb on-site soils and would result in loose dirt and silt which could become airborne when subject to a moderate or strong wind and/or when moved during construction-related activities. Some of these airborne particles (typically less than 40 μm in diameter) might be carried off the project site.

Since vehicular exhaust and fugitive emissions are emitted at or close to ground-level, maximum impacts due to these emissions typically occur within or very close to the property line, with rapidly decreasing impacts beyond this point.

Measures Included as Part of the Project:

- To reduce fugitive dust emissions caused by construction activities, HGC would take all reasonable precautions to minimize dust.

- To reduce combustion pollutants, idling construction equipment would be shut down, where feasible, and low NO_x emission tune-ups on equipment operating on site for more than 60 days would be performed.

Potential Additional Mitigation Measures:

- Unpaved construction areas should be watered a minimum of twice daily during construction in dry weather. Trucks hauling dirt should be covered or wet down. Frequency of watering exposed soil surfaces should be increased when blowing dust is visible.

- Stored construction materials that could be a source of dust should be covered.

- Vehicle speeds on unpaved project areas should be limited to 32 kilometers (20 miles) per hour.

3.6.3 Unavoidable Adverse Impacts

Application of BACT would reduce, but not eliminate, emissions of pollutants, including the criteria pollutants and greenhouse gases. Cooling tower-induced fogging and icing would also occur. Impacts remaining after mitigation would not be significant.

3.6.4 Cumulative Impacts

A cumulative impacts analysis addresses whether the effects of all the existing and planned sources combined with the contribution from the proposed project result in unacceptable overall impacts. Specifically, the cumulative impact analysis for air quality estimates the maximum pollutant concentrations resulting from all sources—past, present, and reasonably foreseeable future actions—and compares them to the regulatory standards. In addition to satisfying specific local regulatory standards (AAQS and PSD increments), the cumulative analysis addresses global impacts. In the case of CO_2 emissions, local concentrations are never considered significant as far as public health is concerned. However, CO_2 is a "greenhouse" gas and may contribute to global climate effects such as global warming.

Oregon regulations require project developers to mathematically model and evaluate cumulative impacts only when a pollutant is modeled to have a significant impact. Since all pollutant concentrations from the Hermiston Generating Project are below the SILs and AALs, ODEQ does not require this analysis. In fact, the SILs were selected specifically to ensure that pollutant contributions below the SILs would not cause a region with acceptable air quality (in attainment) to become unacceptable (nonattainment). However, as part of a thorough review of the environmental consequences of the Hermiston Generating Project, the cumulative impact analysis for one pollutant—NO_x—is included here.

3.6.4.1 Cumulative Impacts for NO_x

The procedure for determining cumulative impacts is presented in Figure 3-6. The data and modeling for the NO_x cumulative analysis were originally prepared as part of the Coyote Springs power development project located near Boardman, Washington. The Coyote Springs analysis (BPA 1994) included the Hermiston Generating Project along with 36 other sources of NO_x that might impact the same area.

ODEQ provided background monitoring data for NO_x to be used in lieu of additional monitoring at the site. These data give an annual average background concentration of 30 $\mu g/m^3$ (Appendix F1). This background concentration represents the impacts of the NO_x emitting sources existing in the early 1980s. Since this is a measured ambient concentration, it includes the effects of cars and trucks on the interstates and local roads as well as the stationary industrial and residential sources. Sources constructed and planned since the early 1980s are accounted for in the dispersion modeling.

Cumulative impacts are calculated within an area where the proposed project is predicted to have significant impacts. The Coyote Springs project had modeled significant impacts of NO_x (greater than 1 $\mu g/m^3$ annual average) extending out 21 kilometers (12.6 miles) from the site. Therefore, the cumulative impacts were calculated for sources with a potential to impact the air quality in the circle of radius 21 kilometers (12.6 miles) around the Coyote Springs facility. The Hermiston Generating Facility lies at the edge of this area.

The Coyote Springs project identified 37 sources of NO_x with the potential to impact the area described above. These sources and their associated emissions data are presented in Table 3-14. Since all combinations of temperature and load conditions could not be modeled for 37 sources, the most conservative estimates of expected operating conditions were chosen for each source. This list includes one source, the auxiliary boiler for the Hermiston Generating Project, which is no longer under consideration for construction. Those sources that consume PSD increment are marked with an asterisk.

Table 3-14. Background NO_x Emissions Data in the Vicinity of the Proposed Coyote Springs Project

Source	Base Elevation (m)	Stack Height (m)	Stack Temperature (K)	Stack Exit Velocity (m/sec)	Stack Diameter (m)	NO_x Emission Rate[1] (g/s)
Unocal Chemical No. 2	305	26.20	433	19.70	0.91	3.46
Misc. Unocal sources-comb.	305	22.0	460	13.60	1.00	6.61
DOE boiler stack	61	6.10	350	5.60	0.91	0.92
Misc. DOE sources-comb.	61	45.70	591	8.00	2.77	6.68
Boise Cascade wood boiler	732	9.14	422	3.60	0.60	0.75
Boise Cascade lime kilns*	152	22.90	347	9.10	1.37	4.73
Boise Cascade # 2 furnace*	152	53.5	448	10.30	2.74	2.16
Boise Cascade #3 boiler	152	53.50	443	13.90	3.96	7.67
Misc. Boise Cascade boilers	152	33.80	438	18.80	1.87	4.61
Boise Cascade hog fuel*	152	25.90	338	10.90	2.38	7.55
Pacific Gas Trans. (Walla Walla)-comb.*	305	10.00	668	40.50	2.30	23.4
Bleyhl Farm Service	183	13.70	289	20.10	0.46	0.03
Translate Asphalt plant	117	9.10	324	3.40	2.20	0.03
Kinzua Corp.	596	24.40	442	15.00	1.80	3.67
PGE Boardman-coal fired	220	200	441	30.30	6.90	510.9
Pacific Gas Trans. (Ione)-comb.	418	9.75	761	21.50	2.60	17.14
Oregon Potato boilers (gas)	83.8	9.75	433	14.00	0.60	0.92
Oregon Potato boilers (oil)	83.8	9.75	433	13.80	0.60	0.024
Lamb-Weston/Boardman #1	83.8	11.00	521	11.00	1.10	0.81
Lamb-Weston/Boardman #2	83.8	23.50	433	13.00	1.50	2.22
Lamb-Weston/Boardman dryers	83.8	13.50	422	8.20	0.80	0.005
Celpril Industrial Inc.	152	5.20	300	17.80	0.60	0.003
Lamb-Weston/Hermiston	166	12.50	577	11.00	1.20	2.56
J.R. Simplot	188	12.50	422	10.50	1.50	8.31
Louisiana Pacific Co.	499	40.00	529	6.20	1.00	1.29
Blue Mt. Forest Products	326	15.20	380	7.30	0.80	0.78
Blue Mountain Asphalt	170	15.00	322	4.00	1.00	0.02
Pioneer Asphalt Inc.	335	9.10	312	4.10	2.10	0.003
Proposed Herm. Cogen stk#1*	171	57.30	370.9	18.90	5.49	3.28
Proposed Herm. Cogen stk#2*	171	57.30	370.9	18.90	5.49	3.28
Proposed Herm. Cogen aux blr*	171	57.30	438.7	23.40	1.04	0.44
Northwest Pipeline/Roosevelt*	335	12.20	775	37.80	1.22	2.04
Northwest Pipeline/Goldendale*	732	12.20	775	30.80	1.22	1.53
Columbia Power stack #1 (gas)*	152	28.90	474	17.90	4.90	2.62
Columbia Power stack #1 (oil)*	152	28.90	474	18.50	4.90	0.095
Columbia Power stack #2 (gas)*	152	28.90	474	17.90	4.90	2.62
Columbia Power stack #2 (oil)*	152	28.90	474	18.50	4.90	0.095
Coyote Springs Turbine 1						7.48
Coyote Springs Turbine 2						7.48
Coyote Springs Auxiliary boiler						4.46

Source: BPA 1994

1/ Based on conversion of annual allowable emission rates to g/s (i.e. [X tons/yr] x [2,000 lb/ton] x [454 g/lb] x $[3.1536\times10^{7}\ sec/yr]^{-1}$).

* Consumes PSD increment

PSD increments are the maximum allowable increases in pollutant concentrations that are permitted to occur above a baseline concentration for each criteria pollutant. Each pollutant has a unique baseline concentration. Generally, the baseline concentration is defined as the ambient pollutant concentration that existed at the time the first completed PSD permit application affecting the area was submitted to the regulatory agency. Significant deterioration is believed to occur when the amount of new pollution (from the construction of new facilities) exceeds the applicable PSD increment.

The 37 sources were modeled simultaneously using the ISCST2 and COMPLEX 1 computer models with conservative screening meteorology. The model calculated the annual average ground-level NO_x concentrations for an array of receptors within the designated impact area. The maximum predicted NO_x concentration was 31.9 mg/m^3. Of this total, approximately 0.63 mg/m^3, or 1.9 percent, is attributable to the Hermiston Generating Project. The cumulative impact on the area is the sum of the modeled concentration (31.9 μg/m^3) and the background concentration (30 μg/m^3). The cumulative impact of 61.9 μg/m^3 represents a conservatively high estimate of the maximum annual NO_x concentrations resulting from all industrial and vehicular activity in the area. All other locations in the area have a lower concentration.

The cumulative annual average NO_x concentration of 61.9 μg/m^3 is well below the national AAQS for NO_x of 100 μg/m^3. This allows a large margin for future development in the area without endangering public health or the environment. Measured against the background of existing and other planned sources in the area, the Hermiston Generating Project would not be a significant contributor (1.0 percent) to the area's pollution levels.

PSD increments are established for Class I and Class II areas (Table 3-9). The Eastern Oregon Intrastate Air Quality Control Region is a Class II area. Each project undergoing cumulative analysis for NO_x must demonstrate that the maximum annual NO_x concentrations from the project and other new sources proposed or built after a given baseline date do not exceed the PSD increment. The sources meeting this criterion are marked with an asterisk in Table 3-14. The cumulative impact due to these 16 sources is 3.41 μg/m^3. This concentration consumes only 13.6 percent of the PSD Class II increment (25 μg/m^3). Therefore, the projects do not contribute to a cumulative impact which approaches either the national AAQS or PSD increment for NO_x.

3.6.4.2 Global Warming

The Hermiston Generating Project along with the other proposed and existing power plants in the area (e.g., the existing Portland General Electric Boardman Plant and proposed Coyote Springs and Ida-West cogeneration plants) would cumulatively emit the greenhouse gases CO_2 and methane. The burning of natural gas produces CO_2 as the primary combustion product. The new cogeneration plants would also emit some methane[1/] as unburned fuel.

Combined-cycle power plants burning natural gas, like the one proposed for the Hermiston Generating Project, emit less CO_2 per kilowatt of power generated than any other power generation method using fossil fuel. There are four main reasons for this. First, combustion turbines are the most efficient means of producing power from fossil fuels. For each Btu of fuel input, a combustion turbine can produce more kilowatts of power output than any other type of fossil fuel-fired power plant. Second, the carbon content of natural gas is 40 percent lower than coal and 25 percent lower than oil per Btu. This means that burning natural gas produces less CO_2 than burning an equivalent amount of either coal or oil. Third, the heat recovery steam generator produces power from the exhaust steam of the combustion turbine without the need to burn additional fuel. This greatly increases the amount of power generation per unit of fuel burned compared to a simple-cycle power plant. Fourth, the steam generated for companion facilities such as Lamb-Weston can reduce the need of these facilities to produce their own steam in boilers that are less efficient than the proposed project. From a global warming perspective, cogeneration plants like the Hermiston Generating Project are the best method of power generation using fossil fuels.

Nonetheless, any fossil fuel use emits more CO_2 than non-fossil fuel alternatives such as hydroelectric power, wind energy, or conservation. These alternatives have other economic and environmental consequences that are generally weighed against the effects of burning fossil fuels to develop the best overall strategy for reducing the demand for energy and satisfying remaining demand.

HGC has agreed to provide $1.5 million, to be administered under a trust agreement, to fund programs and activities intended to achieve real reductions in atmospheric gases believed to contribute to global warming. Types of programs contemplated include retirement of old refrigerators and wood stoves, encouraging alternatives to single-occupancy automobile transportation, and creation of a revolving fund to encourage conservation and use of renewable resources. HGC would monitor proposed expenditures.

[1/] Methane makes up the largest fraction of compounds in natural gas.

3.7 Noise

The Hermiston Generating Project would be located in a rural area that has several existing noise sources, including interstate highway traffic, a railroad line, and food processing facilities. The proposed project would generate noise above existing ambient levels during the 26-month construction period and during operation. The primary source of noise would be the power plant, which would generate fairly constant noise levels 24 hours a day, 7 days a week. Mitigation for some of the noise effects on the surrounding project area would include the use of noise shielding or noise dampening techniques, which would keep noise levels below ODEQ allowable levels for all but two sensitive receptors. HGC has options to acquire properties where expected noise levels would exceed ODEQ limits.

3.7.1 Affected Environment

3.7.1.1 Noise Measurement and Terminology

Noise is commonly defined as unwanted sound that disrupts normal human activities or diminishes the quality of the human environment. Ambient noise consists of all noise generated in the vicinity of a chosen location by typical noise sources, such as local traffic, wind blowing in trees, neighboring industries, and aircraft. The total noise level as measured with a sound level meter is comprised of a typical mix of all sources, both distant and nearby, which constitutes the *ambient* noise environment at the measurement location.

Noise is measured as a sound pressure level exerted on the microphone of a sound meter. The magnitude of audible sound levels, decibels (dB), has a very wide range. Decibel measurement scales are based upon the logarithm, which is not linear, and consequently sound pressure levels from different noise sources cannot be added arithmetically. For example, a 70 dB sound added to another of equal magnitude will equal a sound of 73 dB.

The apparent loudness of sound is not directly related only to the decibel level as detected by the microphone since the human ear is more sensitive to higher frequency (or higher pitched) sound. Sound levels are adjusted (or weighted) by the sound meter for the variation in ear sensitivity and are reported as A-weighted decibels (dBA).

Noise levels also change with time. The following methods of averaging noise are commonly used to describe the noise environment and time-varying noise levels:

- *Maximum sound pressure level* (L_{max})— the highest sound pressure level observed during a measurement, either from the ambient noise or from a particular noise source.

- *Statistical noise level* (L_{10}, L_{50}, etc.)— for time-varying noise sources, the statistical sound levels describe how often a given sound level is exceeded during the period of the measurement. For example, L_{10} is the noise level exceeded 10 percent of the time. The L_{90} noise level would be exceeded 90 percent of the time, and would represent the *background noise level* or lowest ambient noise levels of the noise environment. Particular, identifiable noise sources are added to the background noise, forming the total noise environment.

Typical ambient noise levels are shown in Table 3-15.

- *Equivalent sound pressure level* (L_{eq})—the sound level of a steady, non-time varying noise which is equivalent, in total acoustic energy, to the noise level of time-varying noise. The L_{eq} is measured over a specified period of time, usually one hour, and represents an average acoustic energy for that time period.

Table 3-15. Typical Sound Levels (Daytime Residual Level Exceeded 90 Percent of the Time, L_{90})

Descriptor	Typical Range (dBA)	Average
Very Quiet Rural Area	25 to 35 inclusive	33
Quiet Suburban Residential	36 to 40 inclusive	38
Normal Suburban Residential	41 to 45 inclusive	43
Urban Residential	46 to 50 inclusive	48
Noisy Urban Residential	51 to 55 inclusive	53
Very Noisy Urban Residential	56 to 60 inclusive	58

Source: Hessler Associates, Inc. 1994.

3.7.1.2 Regulatory Authority

The project area lies within the jurisdiction of Umatilla County. However, Umatilla County does not have an existing noise ordinance governing noise emissions in the project area. OAR 340-35 does apply to the project. These rules are intended to "protect the health, safety, and welfare of Oregon citizens from the hazards and deterioration of the quality of life imposed by excessive noise emissions."

These rules are implemented by ODEQ; however, ODEQ funding for enforcement of the provisions of OAR 340-35 has been discontinued. Because the Hermiston Generating Project is a power plant, ODOE intends to provide enforcement of the provisions of OAR 340-35 for this project, as well as other energy projects in the state of Oregon, through Site Certificate conditions.

Noise regulations that directly pertain to the Hermiston Generating Project are found under OAR 340-35-035, Noise Control Regulations for Industry and Commerce. These regulations prohibit a new industrial or commercial source from causing an increase in ambient statistical noise levels (L_{10} or L_{50}) by more than 10 dBA or exceeding the levels shown in Table 3-16.

Table 3-16. Allowable Statistical Noise Levels in Any One Hour

Statistical Noise Level	Measurement Period: 7 AM to 10 PM	Measurement Period: 10 PM to 7 AM
L_{50}	55 dBA	50 dBA
L_{10}	60 dBA	55 dBA
L_1	75 dBA	60 dBA

Source: OAR, Chapter 340, Division 35, Section 035

OAR 340-35-035 also limits impulse sound and sound pressure levels for various octave bands. Temporary, daytime construction activities are exempt from regulation under OAR 340-35-035. Under OAR 340-35-035, sound measurement procedures must conform to those requirements set forth in ODEQ's Sound Measurement Procedures Manual (NPCS-1).

3.7.1.3 Sensitive Receptors

Land uses within the project vicinity include agricultural lands, industrial facilities, and single-family detached residences. Of these, only the residences are considered sensitive receptors because people live in them. The sensitive receptors in the project area (see Figure 3-7 for those with identified monitoring positions) are:

- A mobile home park approximately 0.4 kilometer (0.25 mile) south of the power plant site, with approximately eight mobile homes (Position 1);

- A two-story residence surrounded by trees, approximately 0.1 kilometer (340 feet) north of Lamb-Weston Road along the north side of the power plant site (Position 2);

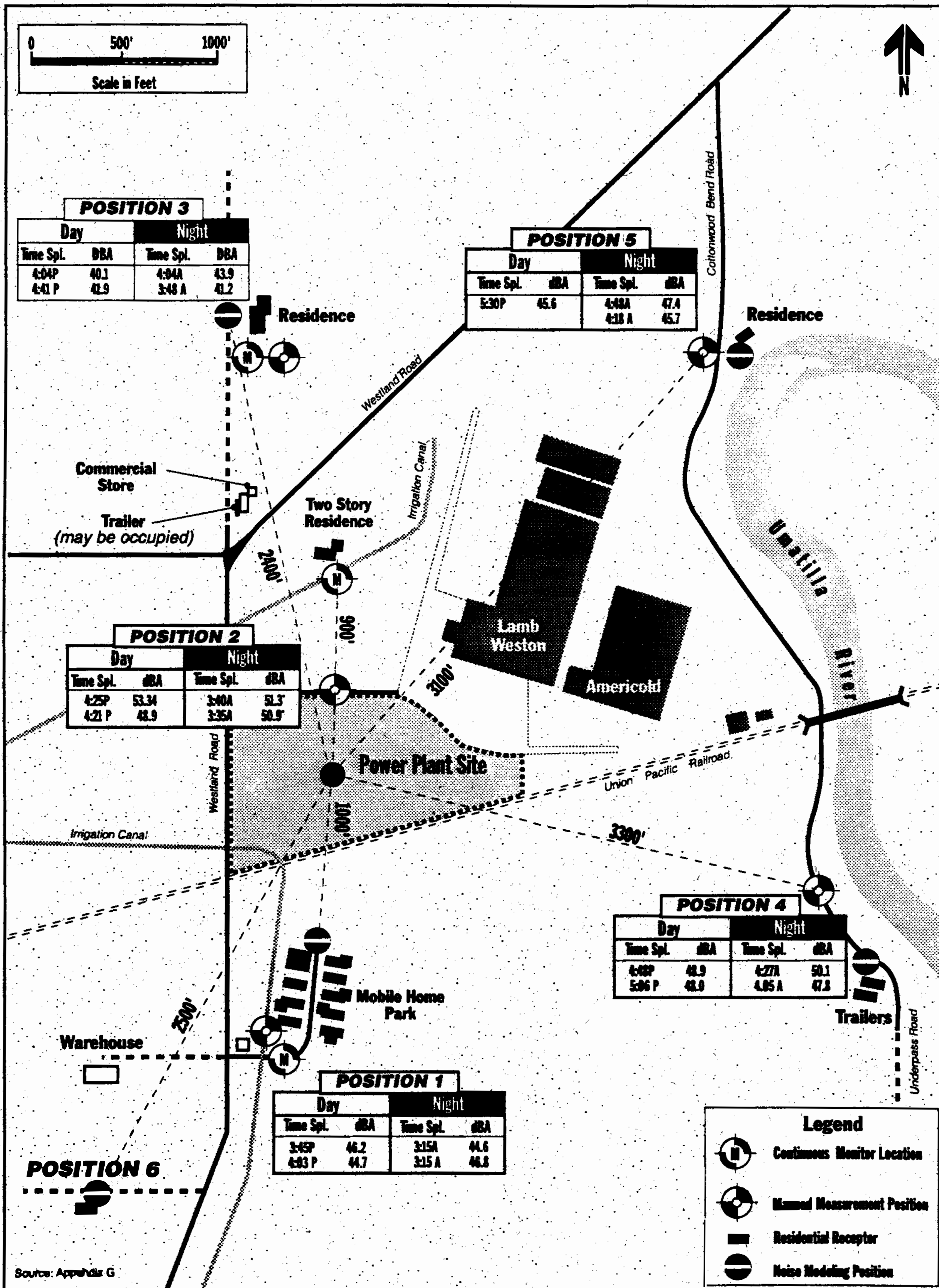


Figure 3-7 Locations of Sensitive Receptors, Noise Monitoring Stations, and Ambient Noise Levels

- A residence adjacent to the Westland Furniture Store 0.4 kilometer (0.25 mile) north of the northern boundary of the plant site (between Positions 2 and 3);

- A single residence on Walker Road (Position 3);

- Several residences, including mobile homes, about 1 kilometer (0.6 mile) southeast of the power plant site (Position 4);

- A residence approximately 61 meters (200 feet) northeast of the Lamb-Weston facility (approximately 0.4 kilometer [0.25 mile] northeast of the nearest boundary of the power plant site) and adjacent to the Umatilla River (Position 5); and

- Several residences about 0.4 to 0.8 kilometer (0.25 to 0.50 mile) northeast of the power plant site, across the Umatilla River.

HGC has options to purchase the two-story residence north of the site (Position 2) and the mobile home park to the south (Position 1). HGC would purchase these properties prior to beginning project operation.

3.7.1.4 Ambient Noise Measurements

Ambient noise was measured in the vicinity of the power plant site between June 9 and June 11, 1993. Three continuous noise monitors were installed near the residences most likely to be affected, as shown in Figure 3-7. To corroborate the data collected by the continuous monitoring and to observe ambient noise sources, short-term measurements were taken at various periods during the day and night. Ambient measurements at nearby residences are also shown in Figure 3-7. Ambient L_{50} noise levels, even under the quietest conditions, are 40 dBA or greater, primarily due to traffic on Interstate Highways 82 and 84. Other ambient noise sources in the project area include the Union Pacific Railroad line, traffic from and operations at nearby industrial facilities, and to a lesser extent, local traffic.

Community noise environments can also be described by the daytime residual level, L_{90}. The measured daytime residual sound level for the 2-day survey at the five residential locations near the power plant site was 43 dBA, $\pm$ 3 dBA. Comparing this sound level to those in Table 3-15 indicates a quiet-to-normal residential noise environment.

3.7.2 Environmental Consequences and Mitigation Measures

Potential noise impacts from construction and operation of the Hermiston Generating Project include the following: (1) temporary noise during the construction period at the plant site and transmission and gas pipeline rights-of-way, and (2) constant noise levels 24 hours a day, 7 days a week from the power plant. These potential impacts and any corresponding mitigation measures are discussed below.

3.7.2.1 Impact—Construction Noise

The project would generate noise above existing ambient levels during project construction and operation of the power plant, gas pipeline, and transmission line. Construction would occur over approximately 26 months. Because the area is sparsely populated and construction activities would be conducted primarily during daylight hours, these activities are not expected to have a significant impact on local residents.

Measures Included as Part of the Project:

- During construction and operation of the facility, HGC would make available to the public any information in its possession about the noise levels generated by the facility. In selecting sensitive receptors for the noise surveys and analysis, HGC would comply with applicable ODEQ rules and consider all noise sensitive properties within 0.8 kilometer (0.5 mile) of the power plant.

- HGC would consult with Umatilla County and with neighbors of the plant site to minimize the impacts of construction noise.

3.7.2.2 Impact—Noise During Project Operation

The expected operational life of the project is approximately 30 years. During operation of the project, the transmission line and gas pipeline would not be significant sources of noise, except possibly during maintenance operations or emergency response conditions. During facility operation, the power plant would generate fairly constant noise levels 24 hours a day, 7 days a week.

As stated earlier, plant operations must not cause an increase in ambient noise levels of more than 10 dBA or contribute noise levels (L_{50}) greater than 50 dBA between the hours of 10 PM and 7 AM at sensitive receptors. As described below, expected noise levels from project operations would exceed those levels without implementing noise control measures.

Predicted noise levels at each of the sensitive receptors due to the project were modeled using a computer noise model designed specifically for power plants. The noise model, "Environmental Noise Model, Version 3.0—ENM 3.0," uses the latest available acoustical literature sources and published American and International standards for calculating noise levels. Input data for the model include:

- The manufacturer's guaranteed noise levels emitted from each piece of sound generating equipment;
- The location of each source;
- Temperature and humidity; and
- Vegetative cover.

The noise model was used to define, for each major plant source, a far field design noise level that would limit the overall plant noise to a maximum of 50 dBA at all of the receptor points. Each of these final requirements was submitted to prospective equipment vendors so that each specific element could be designed so that it would not exceed the maximum acoustic design level. In every case, the ultimate supplier was able to guarantee the required level. As a result of these written guarantees, it would be the responsibility of each supplier to ensure, through their own engineering and at their own expense, that the installed equipment would not contribute more than the specified quantity of noise to the environs of the plant.

Noise calculations incorporating the vendor noise guarantees indicate ambient plus project noise levels would be within ODEQ permitted levels for all but two sensitive receptors in the project area. Noise levels at the residence located approximately 104 meters (340 feet) north of Lamb-Weston Road (Position 2) and the mobile home park south of the site (Position 1) would exceed permitted levels during power plant operations, as shown in Table 3-17.

Measures Included as Part of the Project:

- HGC would design, select, locate and/or orient components of the power plant, or use shielding, noise dampening, or other techniques necessary to ensure that the operation of the power plant complies with OAR 340-35-035.
- HGC would perform noise surveys in accordance with the requirements of OAR 340-35-035 within 2 months of: (a) the date the first unit commences operation; (b) the date the first unit is operating at full rated capacity; (c) the date the second unit commences operation; and (d) the date both units are

Table 3-17. Noise Levels with Power Plant in Operation

Location	Noise Levels (L_{50})
Position 1	59.0 dBA
Position 2	59.8 dBA
Position 3	49.9 dBA
Position 4	47.5 dBA
Position 5	46.8 dBA
Position 6	49.9 dBA

Source: Hessler Associates, Inc. 1994.

operating at full rated capacity. The unit operating conditions would be documented when measurements are taken in accordance with subparts (a) and (c) above. When taking the measurements required by (b) above, HGC would conduct the surveys with the operating unit operating at within 10 percent of rated power. When taking the measurements required by (d) above, HGC would conduct the surveys with both units operating at within 10 percent of rated power.

- During construction and operation of the facility, HGC would make available to the public any information in its possession about the noise levels generated by the facility. In selecting sensitive receptors for the noise surveys and analysis, HGC would comply with applicable ODEQ rules and consider all noise sensitive properties within 0.08 kilometer (0.5 mile) of the power plant.

- HGC would consult with Umatilla County and the City of Umatilla and with neighbors to the power plant site to minimize the impacts of construction noise.

- HGC would purchase the identified properties (Position 1 and Position 2) where noise levels would exceed allowable limits.

The measures included in the project as proposed would be adequate to mitigate the potential impacts of operational noise levels.

3.7.3 Unavoidable Adverse Impacts

The proposed project would increase the continuous noise levels at nearby residences. The noise modeling determined that L_{50} noise levels would exceed the project's regulatory limit of 50 dBA for the two closest receptors. Intermittent noise sources such as steam releases would be abated to meet regulatory limits.

3.7.4 Cumulative Impacts

The proposed power plant in combination with existing and future noise sources in the project area would result in increased noise levels in the area. Existing noise sources include traffic noise from Interstates 82 and 84, traffic on local roads, operations associated with the Lamb-Weston potato processing facility, Americold cold storage, and the railroad. Future noise sources that can be expected in the area are primarily commercial and industrial uses. These sources would result in slightly higher noise levels at nearby residences.

Although the area is sparsely populated and sensitive receptors are limited, other commercial and industrial developments in the area would likely have an effect similar to that of the Hermiston Generating Project; that is, residents of some rural homes would need to relocate. Homeowners and landowners would be compensated for their property, and residents of mobile homes would be given advance notice of the need to relocate.

The project area is zoned for industrial, commercial, and agricultural use, and future development of noise sensitive land uses should be minimal. As a result of limited sensitive receptors, existing high ambient noise levels in the area, and state limits on noise generation from new sources, cumulative noise impacts from the project are expected to be small and would not be significant.

There would be little or no operational noise from the gas pipeline and electrical transmission line, which would not contribute to cumulative impacts.

3.8 Traffic and Circulation

The power plant site is accessed via a lightly traveled road (Westland Road) in an industrial/agricultural area of unincorporated Umatilla County, Oregon. Traffic generated during the power plant's 26-month construction period would increase traffic on Westland Road at certain times of the day. Mitigation efforts during the construction period would reduce traffic impacts during the peak traffic periods. There would be no noticeable effects on traffic once normal plant operations begin.

The transportation and circulation section of this EIS is based on a transportation and circulation report prepared by Wilbur Smith Associates (1993), with revisions made in February 1994 to reflect an increase in the estimated peak construction workforce. Data for this project were collected during July 1993. Other data used in this report were supplied by the City of Hermiston, Umatilla County Department of Roads, and the Oregon Department of Transportation.

3.8.1 Affected Environment

3.8.1.1 Roadway Network

The proposed power plant site is located approximately 4.8 kilometers (3 miles) southwest of the City of Hermiston. Regional access to the project site is provided by a network of highways and local streets. Figure 3-8 illustrates the area roadway system. Regional and local roadways are described below. Values for average daily traffic on these roads are presented in Table 3-18.

Interstate 84: I-84 is the primary east-west route from Portland, Oregon, to Boise, Idaho. This freeway is located approximately 1.6 kilometers (1 mile) south of the project site and provides four travel lanes (two in each direction).

Interstate 82: I-82 is a north-south freeway originating at I-84 and traveling north to the Tri-Cities area and Yakima, Washington. I-82 provides four travel lanes (two in each direction) and is located 0.8 kilometer (0.5 mile) west of the project site.

U.S. Highway 730: The Columbia River Highway provides two lanes of travel between Boardman, Oregon, at I-84 and the Oregon/Washington border. This two-lane highway runs parallel to the Columbia River providing an interchange with I-82, and continuing north to the city of Pasco, Washington.

U.S. Highway 395: Highway 395 is a principal north-south through highway in the area. This two-lane facility provides access to the states of Washington to the north and California and Nevada to the south. Highway 395 merges with I-82 at the Oregon/Washington border for a short distance before branching off and continuing as 730 toward Spokane, Washington.

State Highway 207: The Hermiston Highway (State Highway 207) is a north-south two-lane facility which bisects the City of Hermiston. Highway 207 connects Mitchell, Oregon, (south) with the Columbia Highway near Cold Springs Junction to the north.

Westland Road: Westland Road is a two-lane facility with a northeast-southwest direction of travel. This road provides access to the existing Lamb-Weston potato processing plant and to the site of the proposed project. Westland Road provides access to I-84 less than 1.6 kilometers (1 mile) south of the project site and to I-82 via Lamb Road. Westland Road terminates at Bridge Road to the west of Hermiston.

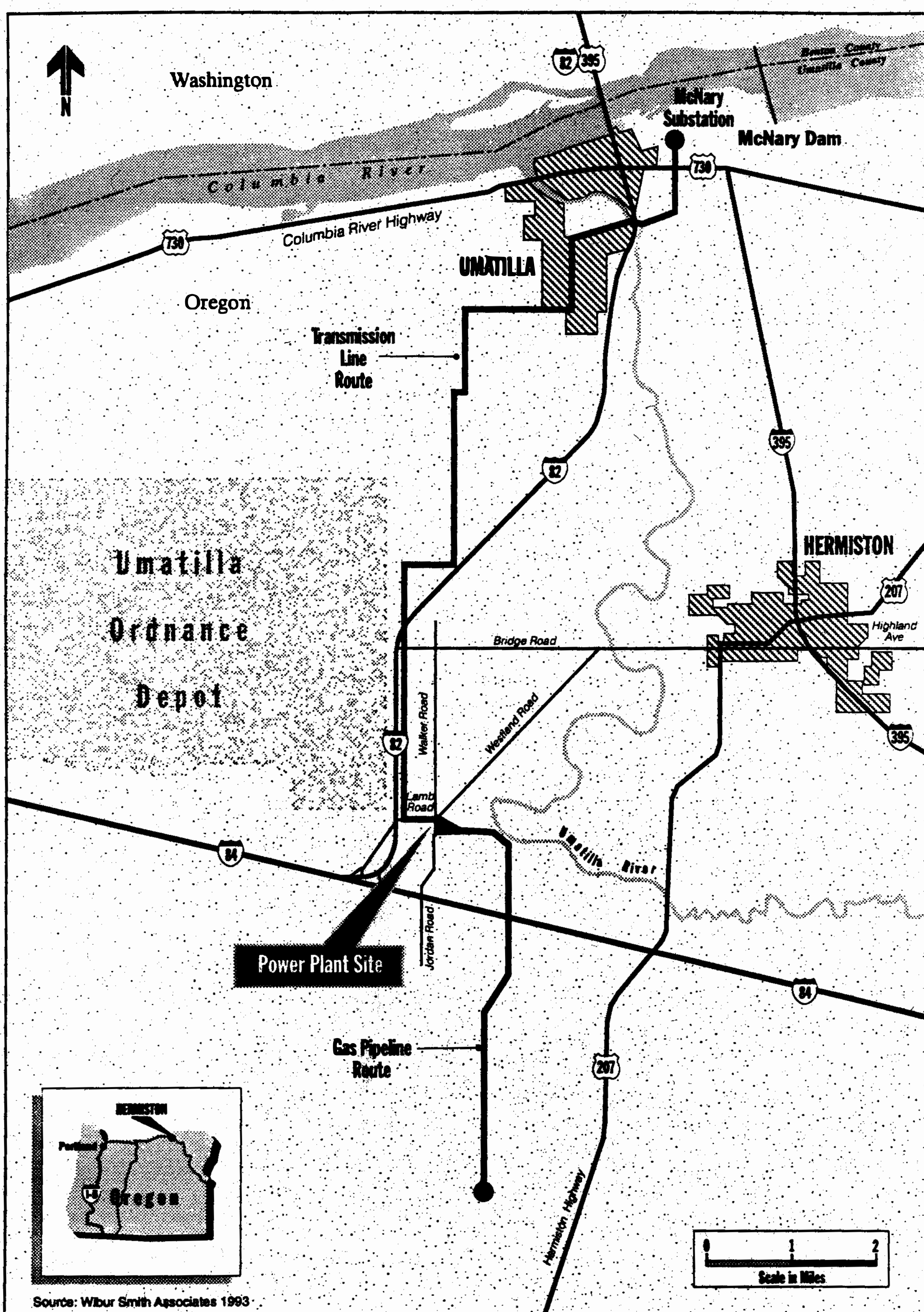


Figure 3-8 Project Area Roadway Map

Table 3-18. Average Daily Traffic (ADT) on Area Roads

Highway	Location	ADT
I-84[1/]	East of I-82	10,900
	West of Hermiston	5,200
	East of Highway 395	9,800
I-82[1/]	North of I-84	5,600
	South of U.S. Highway 730	4,600
	One mile from Washington	10,300
US Highway 730[1/]	West of I-82	8,700
	East of I-82	8,200
US Highway 395[1/]	North of I-84	6,300
	South of Hermiston	6,400
	North of Hermiston	8,200
State Highway 207[1/]	South of I-84	1,400
	North of I-84	3,350
	At SW Hermiston boundary	7,100
	At NE Hermiston boundary	5,100
	South of U.S. Highway 730	1,950
Westland Road[1/]	Just south of Lamb-Weston	1,100
Access Road[2/]	Lamb-Weston Access Road	1,299

Sources:
1/ Oregon Department of Transportation, cited in Wilbur Smith Associates 1993
2/ Wilbur Smith Associates 1993

3.8.1.2 Traffic Data Collection

Vehicle turn movement counts were conducted by Wilbur Smith Associates during the morning (6:30 to 7:30 AM) peak hour and the afternoon (2:30 to 3:30 PM) peak hour on Wednesday, July 21, 1993 at two intersections: Westland Road/Lamb-Weston Access Road and Westland Road/Lamb Road. In addition, twenty-four hour machine volume counts were conducted (July 21 to 22, 1993) at the following four locations: Westland Road, 45.7 meters (50 yards) south of the Lamb-Weston Access Road; Westland Road, 45.7 meters (50 yards) north of the Lamb-Weston Access Road; the Lamb-Weston Access Road (inbound/outbound); and the truck scale access road (one-way inbound). These data, along with field observations, were used to prepare baseline traffic analysis and to identify traffic and circulation patterns within the study area.

3.8.1.3 Level of Service Analysis

Based on turn movement counts, traffic operations were analyzed during the morning and afternoon peak hours at two intersections within the study area. The intersections, located at Westland Road/Lamb-Weston Access Road and Westland Road/Lamb Road are both unsignalized T-intersections. Although Walker Road forms an offset fourth leg (southbound approach) to the Westland Road/Lamb Road intersection, traffic was not observed on this road during morning and afternoon peak period counts. Because of the lack of vehicle activity and the offset approach angle of Walker Road, the Westland/Lamb intersection was analyzed as a T-intersection rather than a four-way intersection.

A level of service analysis done for the unsignalized T-intersections provides a general indication of peak hour operations. There are six levels of service, A through F, representing the best to worst conditions, respectively (Table 3-19). Levels of service A, B, and C represent relatively uncongested conditions. Level of service D is the point where intermediate congestion and delays occur. Level of service E represents the range where traffic flows approach the capacity of the intersection, and level of service F represents extremely congested conditions.

Table 3-19. Reserve Capacity, Level of Service, and Delay

Reserve Capacity	Level of Service	Expected Traffic Delay
400 or more	A	Little or no delay
300 - 399	B	Short traffic delays
200 - 299	C	Average traffic delays
100 - 199	D	Long traffic delays
0 - 99	E	Very long traffic delays
Less than 0	F	Extreme delays

Source: Transportation Research Board, *Highway Capacity Manual Special Report*, cited in Wilbur Smith Associates 1993

Table 3-19 shows the qualitative relationship among reserve capacity, level of service, and delay. Reserve capacity is the estimate of unused capacity of a given approach lane. Reserve capacity is presented in units of passenger cars per hour. The higher the reserve capacity, the greater the carrying capacity of the approach lane. This methodology applies to unsignalized intersections with stop or yield-sign control on the minor street approach(es) and no control on the major street traffic flow, as is the case at both of the study area intersections. The analysis yields a level of service for the minor street turn movements and for the left-turn movement from the major street, based on the degree of delay experienced by drivers waiting for an acceptable gap in the conflicting flow of traffic.

3.8.1.4 Existing Intersection Levels of Service

The existing peak hour level of service results for both intersections for an average month show that both study area intersections are operating at level of service A, uncongested conditions (Wilbur Smith Associates 1993).

3.8.1.5 Existing Site Operations

Existing operations near the proposed plant site include the Lamb-Weston potato processing plant and the Americold storage plant. Both of these facilities will remain on the site during and after construction of the project. Lamb-Weston and Americold experience an increase in truck activity during the harvest period (September through October). For this reason existing site operations are discussed in terms of average and peak (harvest) months. The proposed project would share the Lamb-Weston Access Road with the existing site facilities. Figure 3-9 provides a diagram of the site location and access roads.

3.8.1.6 Average Month Operations

Lamb-Weston Facility: This facility is a 24-hour operation with 480 employees. The manpower allocation per shift during average month operations is as follows:

Shift	Employees	Time
Day	225	7AM-3PM
Swing	158	3PM-11PM
Night	97	11PM-7AM
Total	480	

Source: Wilbur Smith Associates 1993

Truck Activity: Based on Lamb-Weston truck scale records, an average of 70 trucks per day use the on-site scale during average month operations. Trucks using the scale enter the site via a one-way driveway located north of the Lamb-Weston Access Road (see Figure 3-9) off Westland Road.

The routine for an inbound Lamb-Weston truck is to weigh in at the scale and proceed to an on-site storage area for unloading. Once unloaded, the truck exits the site via the Lamb-Weston Access Road and travels to a designated location for another load. A single Lamb-Weston truck will repeat this procedure throughout

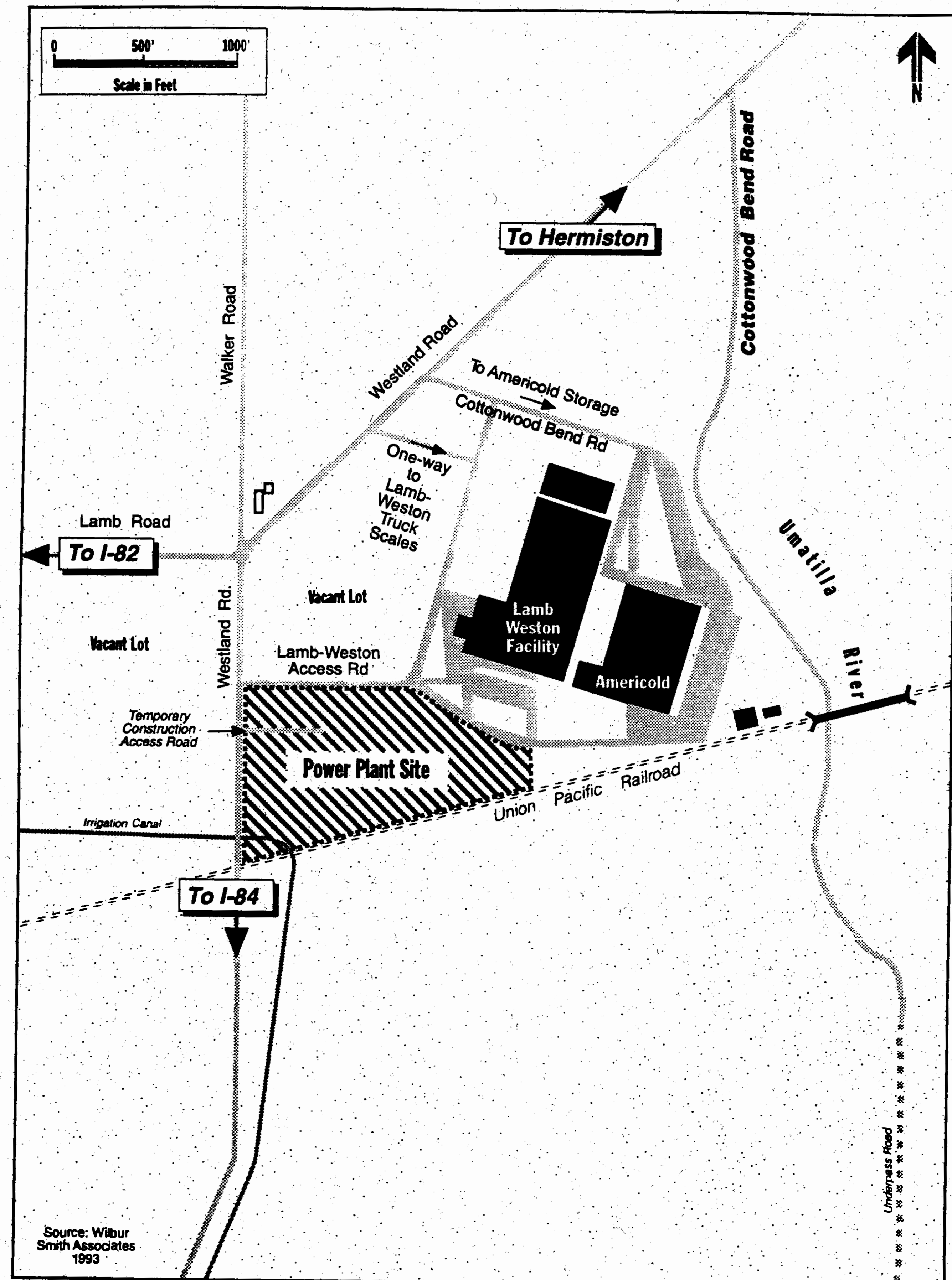


Figure 3-9 Power Plant Site and Access Roads Diagram

the day. Trucks operated by independent contractors also deliver to the site and follow the same procedures as Lamb-Weston trucks. The average on-site duration for a truck from arrival at the scale, to exiting, ranges between 30 and 90 minutes, depending on the level of activity.

The Lamb-Weston operation accounts for 55 of the 70 daily trucks weighed at the scale. The additional 15 trucks are related to Americold operations. Other daily truck activity generated by the Lamb-Weston facility includes five to seven waste removal truck runs. The waste removal trucks use the Lamb-Weston Access Road but do not use the scale.

Americold Storage: This facility is a 24-hour operation with 39 employees. The manpower allocation per shift during average month operations is as follows:

Shift	Employees	Time
Day	25	7AM-3PM
Swing	8	3PM-11PM
Night	6	11PM-7AM
Total	39	

Source: Wilbur Smith Associates 1993

Truck Activity: The Americold storage facility generates an estimated 40 inbound and 40 outbound truck trips daily. The majority of these trucks enter and exit the site via Cottonwood Bend Road off of Westland Road (see Figure 3-9). As noted, an estimated 15 Americold trucks use the Lamb-Weston scale daily. These trucks exit the site via the Lamb-Weston Access Road immediately after weighing out.

Existing Trip Generation: The average month trip generation estimates are based on adjusted 24-hour volume counts, Lamb-Weston truck scale records, and interviews with management personnel at both facilities (personal communication, Walker 1993).

During an average month the Lamb-Weston and Americold operations generate an estimated 1,638 daily vehicle trips (819 inbound, 819 outbound). Figure 3-10 illustrates the site access distribution for daily inbound and outbound trips. As indicated on Figure 3-10, the truck scale entrance is used by some Lamb-Weston employees (passenger vehicles) to enter the site. Morning peak hour (6:30 to 7:30 AM) site trip generation is 216 vehicles (120 inbound and 96 outbound) and afternoon peak hour (2:30 to 3:30 PM) trip generation is 238 vehicles (107 inbound and 131 outbound).

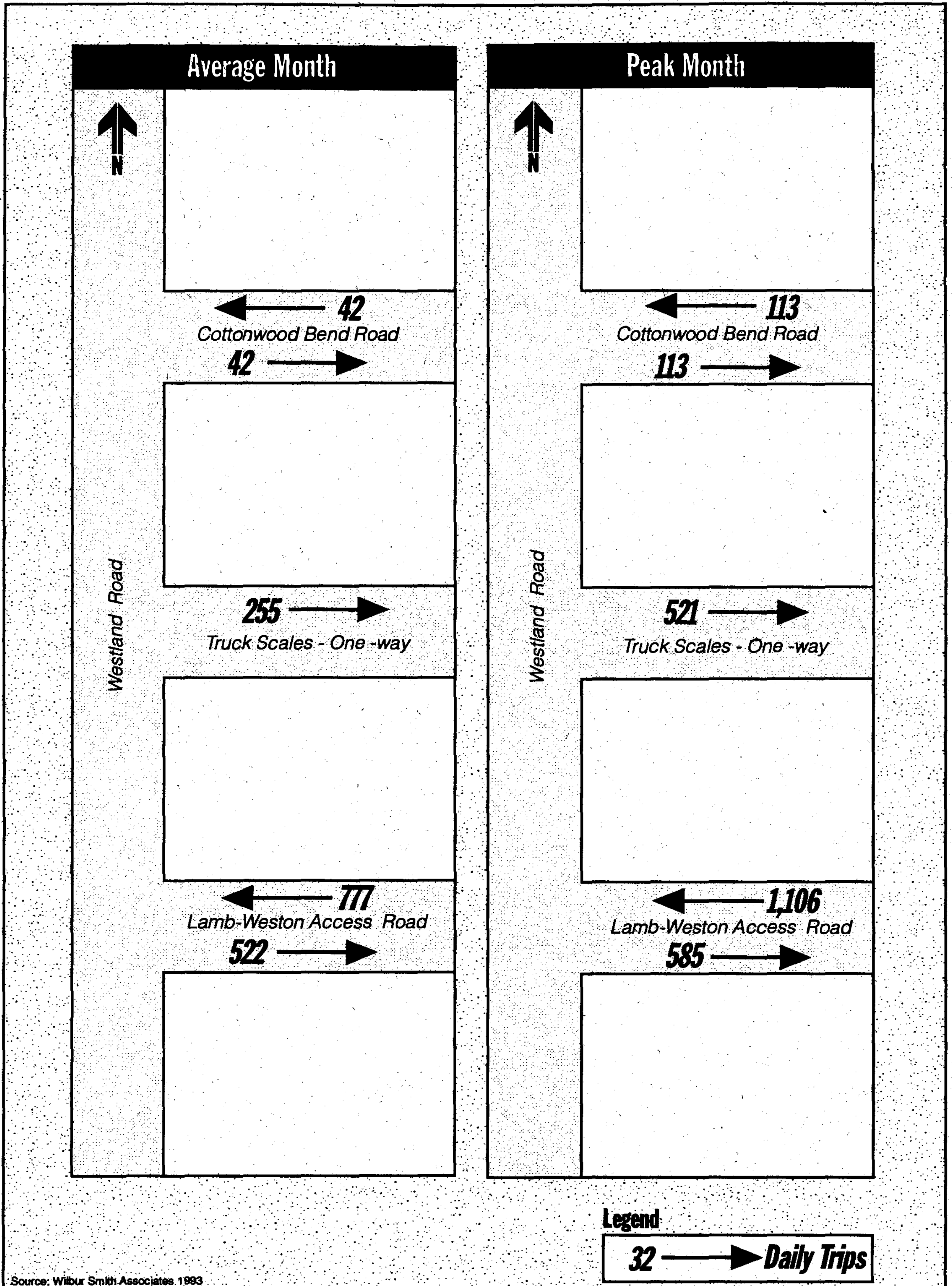


Figure 3-10 Average and Peak Month Daily Trip Generation/Distribution

3.8.1.7 Peak Month Operations

Lamb-Weston Facility: During peak month operations (September to October) an estimated 100 additional workers are on the site to assist in product loading and storage. The additional workforce allocation is split between the day and swing shifts with 50 workers assigned to each.

Truck Activity: Based on 1992 truck scale records, peak month activity is 300 trucks per day. This represents an increase of 245 trucks over average month activity.

Americold Facility: Although Americold experiences an increase of activity during the harvest season, the manpower levels remain unchanged from average month operations. The additional requirements of peak month activity are covered by overtime hours rather than more workers.

Truck Activity: Truck activity increases to 80 trucks per day during the harvest season. This represents an increase of 40 trucks over average month operations. During the months of September and October Americold trucks do not use the on-site scale due to the increased demand by Lamb-Weston trucks.

Peak Month Intersection Levels of Service: The additional peak hour employee vehicle trips for existing conditions during the peak month were calculated using an occupancy rate of 1.2 employees per vehicle (100 employees/1.2 = 84 vehicles). The 1.2 vehicle occupancy rate is an estimate based on field observations made during the morning and afternoon peak hour turn movement counts at the Westland Road/Lamb-Weston Access Road intersection (Wilbur Smith Associates 1993). Lamb-Weston peak hour truck trips were based on 1992 scale records that provided weigh-in times for all inbound trucks. Outbound truck trips were based on the number of arrivals one hour prior to the peak hour. For purposes of this analysis a turnaround time of one hour per truck was assumed. The additional peak month trips were distributed to the study intersections based on existing traffic patterns.

The peak month, peak hour level of service results for both intersections indicate that both intersections continue to operate at level of service A, uncongested conditions. Peak month trips reduce the reserve capacity at both intersections by relatively small amounts (Wilbur Smith Associates 1993).

3.8.1.8 Proposed Roadway Improvements

There are currently no funded or planned roadway improvements in the project area.

3.8.2 Environmental Consequences and Mitigation Measures

The project's primary impact to local traffic would occur during the construction period, when during the afternoon peak traffic hour, the Level of Service (LOS) at the intersection of Westland and Lamb Roads would drop from A (little or no delay) to C (average traffic delay). After construction, there would be no negative effects from the project on local traffic. Mitigation during the construction period would include using rail deliveries as much as possible, traffic control measures at the intersection of Westland and Lamb Roads (including flaggers), and an adjacent parking area/busing program for construction workers.

3.8.2.1 Project Trip Generation After Operations Begin

The project would be designed to operate continually (24 hours a day, seven days per week) with a work force of approximately 25 full-time employees. The workforce allocation per shift as proposed by HGC is as follows:

Shift	Employees	Time
Day	15	8AM-4PM
Swing	5	4PM-12AM
Night	5	12AM-8AM
Total	25	

Source: Wilbur Smith Associates 1993

The daily and peak hour trip generation for the project is based on the assumption that each employee would drive alone to work, a conservative or "worst case" scenario. It was estimated that the project would generate 10 daily vehicle trips in addition to employee-generated trips. The additional trips would include facility-related service vehicles, delivery trucks, and site visitors.

In total, the project would generate approximately 70 daily vehicle trips (35 inbound and 35 outbound). Morning peak hour generation would be 20 employee vehicle trips (15 inbound and 5 outbound) and 20 employee vehicle trips during the afternoon peak hour (15 outbound and 5 inbound). The morning peak hour of project traffic would occur from 7:30 and 8:30 AM, and from 3:30 and 4:30 PM in the afternoon. In both cases the project peak hour would be one hour later than the existing site peak hour. Project-generated vehicle trips would not impose significant impacts at the site access road, at either of the study intersections, or on the surrounding roadway network.

Average Month Level of Service: The effects of project-generated traffic on the level of service at intersections in the study area would be imperceptible, due to the small number of peak hour trips and the offset peak hours of the project and the other facilities on site.

Peak Month Level of Service: The project would not experience seasonal increases in workforce levels. Therefore, project trip generation during the harvest months would remain at 20 employee vehicle trips (15 inbound and 5 outbound) during the morning peak hour and 20 employee vehicle trips during the afternoon peak hour (15 outbound and 5 inbound). The small number of project- generated trips, coupled with the offset peak hours for the project and the existing site operations (Lamb-Weston and Americold), would result in no measurable impact to the study area intersections during peak month operations.

To provide a worst case level of service analysis, project peak hour trips were added to peak month, peak hour, Lamb-Weston, and Americold vehicle trips. The combined peak hour volumes were analyzed at the study intersections. The study area intersections continue to operate at level of service A, uncongested conditions, during the morning and afternoon peak hours (Wilbur Smith Associates 1993).

Parking: The on-site parking supply must be adequate to meet the peak hour of parking demand, which would occur at the start of the day shift, assuming all employees drive alone to work. A supply of 20 on-site spaces, including one designated handicapped space, would likely meet peak hour demand. Twenty parking spaces would allow for adequate supply during the day/night shift change overlap period (approximately 15 minutes prior to and after the day shift starts). Following the night/day shift overlap period, a minimum of five spaces would be available for visitor and delivery vehicle use.

There are no significant parking impacts associated with the proposed project. Peak hour parking demand would be met on the site and would be in compliance with Umatilla County code requirements.

3.8.2.2 Project Trip Generation During Construction

The greatest impact to existing traffic operations would occur during the construction phase of the project. Construction of the project would begin in late 1994 and continue for about 26 months. The construction work force would average approximately 270 personnel. During the mobilization stage, only a small work force of around 50 people would be needed. However, the work force would increase substantially during the peak period of construction, when the construction work force is expected to reach 515 people. Work shifts are expected to vary based on the time of year and stage of construction. In spring and summer, shifts may be lengthened to correspond with the extended period of daylight. Access to the construction area would be provided via the Lamb-Weston Access Road.

For the purposes of this EIS, peak period construction traffic was overlaid on existing peak season traffic. This provides a worst-case scenario for assessing construction-related impacts. Other assumptions used in developing the project construction scenario are provided in the following paragraphs.

Daily Trips: It is assumed that some carpooling would occur among the construction work force. Based on data from other similar construction projects, this carpooling would equate to a vehicle occupancy rate (VOR) of 1.2. Given the 1.2 VOR and the fact that the 515 member work force would enter and exit the site once each day, the daily workforce traffic would amount to 858 daily trips. Daily truck trips are estimated to be as high as 30 percent of total trips. Therefore, during peak construction, there would be as many as 368 daily truck trips.

Peak Hour Trips: For the purposes of this analysis, it is assumed that a portion of the peak construction period would occur during the fall, which is also the peak harvest season for the Lamb-Weston Plant. Because of the shortened daylight hours, it is likely that construction work shifts would overlap with the shifts at the Lamb-Weston Plant. During the morning peak period, it is assumed that the worker overlap would be 100 percent. During the afternoon peak period, it is assumed that there would be a 50 percent worker overlap. Table 3-20 shows the construction trip generation breakdown for the AM and PM peak periods.

As shown in the table, morning peak hour construction traffic would amount to a total of 498 inbound and 37 outbound trips. During the afternoon peak, construction traffic would amount to 83 inbound and 255 outbound trips. Of the 535 total morning peak hour trips, 108 are truck trips. Of the 338 afternoon peak hour trips, 63 are truck trips. In addition to showing the actual number of truck trips, the table also shows truck trips in the form of passenger car equivalents (PCEs). The PCEs are used in the intersection analyses to account for the slow acceleration rates of heavy vehicles as compared to those of passenger cars. In this case, a PCE of 2.0 was applied to the truck traffic.

No significant circulation impacts would be created by the construction of the project; however, the construction traffic could lower the LOS at two study area intersections. Construction traffic would cause operations at the Lamb-Weston Access Road to drop from LOS A to LOS B during the morning peak hour and LOS D during the evening peak hour, depending on the use of the temporary construction access road. Operation levels would also drop at the intersection of

Table 3-20. Trip Generation During Peak Period Construction

Morning AM Peak Hour Trip Generation	Actual Trips	PCE[1/] Trips
Assumptions:		
100% of all AM worker trips	429	429
60% of AM truck trips (176)	106	212
	In/Out	In/Out
429 Total Worker Trips	408/21	95%/15%
212 Truck PCEs	180/32	85%/15%
	In	Out
Total Trips	498	37
Total Passenger Car Equivalent Trips	588	53
Afternoon Peak Hour Trip Generation	Actual Trips	PCE[1/] Trips
Assumptions:		
50% of all PM worker trips (429)	214	214
70% of all PM truck trips (176)	123	246
	In/Out	In/Out
214 Total Worker Trips	21/193	10%/90%
246 Truck PCEs	123/123	50%/50%
	In	Out
Total Trips	83	255
Total Passenger Car Equivalent Trips	144	316

Source: Wilbur Smith Associates 1993, Revised February 1994
1/ PCE is passenger car equivalents.

Lamb Road and Westland Road where the LOS is expected to fall from A to B. Table 3-21 shows the level of service for the project peak month construction scenario (Wilbur Smith Associates 1993).

Impact—Construction-Related Traffic: Construction-related vehicles would significantly affect traffic and circulation if adequate parking and construction laydown areas cannot be accommodated on the project site.

Measures Included as Part of the Project:

- Rail delivery would be used to the extent practicable to minimize heavy-haul truck trips during construction.

Table 3-21. Comparative Level of Service Analysis Expressed in Vehicles per Hour

		AM Peak Hour		PM Peak Hour	
Scenario	Intersections[1/]	Reserve Capacity	Level of Service	Reserve Capacity	Level of Service
<u>Existing Conditions</u>					
Average Month	Westland/Lamb-Weston				
	WB Shared	851	A	813	A
	SB Left	907	A	927	A
	Westland/Lamb				
	EB Shared	728	A	593	A
	NB Left	965	A	970	A
Peak Month	Westland/Lamb-Weston				
	WB Shared	794	A	708	A
	SB Left	864	A	880	A
	Westland/Lamb				
	EB Shared	686	A	508	A
	NB Left	948	A	949	A
<u>Project-Related Conditions</u>					
Construction Peak Month[2/]	Westland/Lamb-Weston				
	WB Shared	351	B	199	D
	SB Left	435	A	795	A
	Westland/Lamb				
	EB Shared	483	A	366	B
	NB Left	735	A	894	A
Operations Peak Month	Westland/Lamb-Weston				
	WB Shared	765	A	690	A
	SB Left	836	A	876	A
	Westland/Lamb				
	EB Shared	676	A	497	A
	NB Left	946	A	946	A
<u>Cumulative Conditions</u>					
Cumulative Peak Month with Project	Westland/Lamb-Weston				
	WB Shared	765	A	689	A
	SB Left	836	A	876	A
	Westland/Lamb				
	EB Shared	669	A	490	A
	NB Left	945	A	945	A
Cumulative Peak Month without Project	Westland/Lamb-Weston				
	WB Shared	793	A	708	A
	SB Left	864	A	880	A
	Westland/Lamb				
	EB Shared	680	A	501	A
	NB Left	948	A	948	A

Source: Wilbur Smith Associates 1993; Revised February 1994

1/ WB = westbound, EB = eastbound, SB = southbound, NB = northbound

2/ Estimate does not account for traffic that would access the project site via the temporary construction access road.

- Construction-related traffic would use a temporary construction access road, which would reduce congestion at the intersection of Lamb-Weston Road and Westland Road.

- Traffic control measures would be used during construction to reduce the impact of traffic on Westland Road.

Potential Additional Mitigation Measures:

- To reduce construction traffic impacts to less than significant status, an adjacent parking area and/or busing of the construction workers to the project site should be provided.

- To ensure smooth circulation during the peak construction period, flaggers should be provided as necessary at the intersection of the Lamb-Weston Access Road and Westland Road, and to the intersection of the temporary construction access road and Westland Road at make movement to and from parking areas and the site operate more efficiently and safely.

3.8.3 Unavoidable Adverse Impacts

During the peak month of construction at the peak traffic hours, the level of service at the intersection of Westland and Lamb Roads would drop from LOS A (little or no delays) to LOS B (short traffic delays) during the morning peak hour and LOS D (long traffic delays) during the evening peak hour. Mitigation efforts (primarily flaggers) and the temporary construction access road would help the traffic move more smoothly and safely during periods of heavy traffic. During normal plant operations, there would be no significant adverse impact to traffic.

3.8.4 Cumulative Impacts

There are currently no approved or proposed projects in the study area vicinity that would contribute traffic to the local roadway network. Umatilla County has zoned areas near the project site along Westland Road for light industrial and tourist commercial uses. Given these land use designations, it is reasonable to assume some development and, hence, future increases in traffic volumes in the area.

The population of Umatilla County has remained relatively stable over the last decade. Over the past 11 years Umatilla County has experienced a 3.5 percent increase in population growth. In order to analyze the effects of cumulative traffic in the study area, a growth rate of 4 percent has been assumed to the year 2005. Table 3-21 shows the comparative levels of service for all project and cumulative scenarios.

As shown in Table 3-21, both study area intersections continue to operate at level of service A, uncongested conditions, under cumulative and cumulative plus project conditions (Wilbur Smith Associates 1993).

The proposed project would not impose significant impacts on traffic operations under cumulative conditions in the area. There would be no direct or indirect significant adverse traffic or circulation impacts as a result of this project under cumulative conditions. Mitigation is not necessary.

3.9 Visual Quality and Aesthetics

The power plant site is located next to an existing industrial facility in an area that is zoned industrial, although most of the surrounding area is devoted to agriculture. The power plant would add to the density of industrial development in the immediate area. Vegetative screening would, in time, reduce the visual impact of the power plant. Although the 57- to 65-meter-high (188- to 213-foot-high) exhaust stacks would be visible from several travel routes, the overall visual impact of the power plant on the surrounding area would not be significant. Other large industrial and agricultural facilities, such as grain elevators and water tanks, are also visible in the general vicinity.

The transmission line would be located along, or adjacent to, existing transmission line corridors. Although the new transmission line poles would be taller than existing poles, the visual impact of the new transmission line would not be significant.

3.9.1 Affected Environment

The project site is located on the Umatilla Plain lowland, which is characterized by relatively flat to moderately rolling terrain, with elevations ranging from about 91 to 213 meters (300 to 700 feet) above mean sea level (msl). The Columbia River, located about 12.1 kilometers (7.5 miles) north of the power plant, defines the northerly boundary of the Umatilla Plain. The Columbia River area is characterized by broad expansive views up and down the river, both at the water level and from the Umatilla Plain. Moving southward, the elevations of the Umatilla Plain gradually increase from 213 meters (700 feet) to about 366 meters (1,200 feet) at the foot of the Blue Mountains, which defines the southerly edge of the Plain. The Blue Mountain range is located about 29 kilometers (18 miles) south of the power plant.

A review of the USGS 1:250,000 scale map and a field reconnaissance of the project area indicate that the power plant would be visible primarily from locations within about an 8-kilometer (5-mile) radius. At distances greater than 8 kilometers (5 miles), the power plant would generally not be visible because of intervening structures, vegetation, and topography, and at times, dust, haze, and fog.

3.9.1.1 Visual Characteristics of the Project Vicinity

Within this 8-kilometer (5-mile) radius, the area consists of open agricultural lands used for grazing and crops. More intense development is concentrated north of Interstate 84 along Highway 395, and includes primarily one- to two-story residential and commercial buildings, storage yards, stockyards, agricultural buildings, light industrial buildings, streets and parking lots, commercial signage, power lines, and railroad tracks. Interstate 84, Interstate 82, and Highway 395 are the major roadways traversing the 8-kilometer (5-mile) radius. These highways offer the primary vantage points from which the public could see the project site.

South of Interstate 84, the area is characterized predominantly by agricultural lands used for grazing and crops. Development is very limited and consists primarily of residences and farm buildings.

The dominant visual elements in the vicinity of the power plant site on the landscape include two processing facilities, Lamb-Weston and Simplot, and two industrial stacks from other businesses. Lamb-Weston and Simplot facilities each consists of a complex of buildings and storage yards. The Lamb-Weston facility is located on Westland Road adjacent to the power plant site. The Lamb-Weston facility is visible from Interstate 84 and Interstate 82, and its plume can be seen from Highway 207. The Simplot facility is located off Highway 207 and north of Interstate 84. The Simplot plant facility and its plume are visible from Highway 207, and the plume is visible from Highway 395 and Interstate 84. The two industrial stacks are located east of Highway 395, near Stanfield, and are visible, along with their plumes, from Interstate 84 and Highway 395.

Other strong vertical elements in the impact area include grain silos, other storage structures used for agricultural purposes, power lines, water towers, and stands of trees interspersed throughout the area.

3.9.1.2 Visual Resources in the Project Vicinity

Within the 8-kilometer (5-mile) radius of the plant site, the Umatilla County Scenic-Historic Road is the only identified visual resource from which the project might be visible. The Umatilla County Scenic-Historic Road now comprises a collection of county roads, city streets, and state highways that follow the general course of early wagon roads between Umatilla and the Blue Mountains. At its nearest point, the road is located approximately 6.4 kilometers (4 miles) east of the power plant site.

3.9.1.3 Visual Characteristics of the Project Site

The project site consists of four geographic areas described below.

Power Plant Site: The power plant site, at an elevation of about 171 meters (560 feet), is a flat, open, and undeveloped area. Figure 3-11 shows the power plant site. Vegetation on site consists primarily of non-native grasses. The adjacent Lamb-Weston facility forms a backdrop of industrial buildings (see Figure 3-11). Railroad tracks bound the southerly edge of the property and a power line traverses the southeast portion of the site. Farther south of the site is a stand of trees. Agricultural fields are located west and northwest of the project site across Westland Road. The predominant visual element in the immediate vicinity of the power plant is the Lamb-Weston plant.

Gas Pipeline Right-of-Way: The right-of-way comprises primarily grazing lands and croplands. County Road 1237 is within the right-of-way, and several residences are located along the road. The terrain is relatively flat with an elevation of about 171 meters (560 feet) at the power plant site to approximately 213 meters (700 feet) at the interconnecting point with the PGT pipeline.

Transmission Line Right-of-Way: The right-of-way for the 19.3-kilometer-long (12-mile-long) transmission line is characterized by relatively flat terrain, with elevations ranging from about 171 meters (560 feet) at the site of the power plant to about 91 meters (300 feet) at McNary Substation. The right-of-way passes through primarily agricultural, undeveloped, or rural residential lands.

From the power plant, the line would cross over to the north side of Lamb Road and follow it to Interstate 82 (see Figure 2-3). The existing line parallels the east side of Interstate 82 for approximately 3.2 kilometers (2 miles), crosses Interstate 82, and continues north and away from Interstate 82 past the Umatilla Ordnance Depot. As the transmission line continues north and east, it crosses over Interstate 82 again near the Umatilla River in the City of Umatilla. Approximately one mile east of the center of the City of Umatilla, and 0.8 kilometer (0.5 mile) south of McNary Substation, the transmission line crosses Highway 730.

Optional Transmission Line Right-of-Way Segment: The 2.4-kilometer (1.5-mile) optional transmission line segment would parallel an existing BPA line east from Power Line Road, across the Umatilla River and Interstate 82, to a location

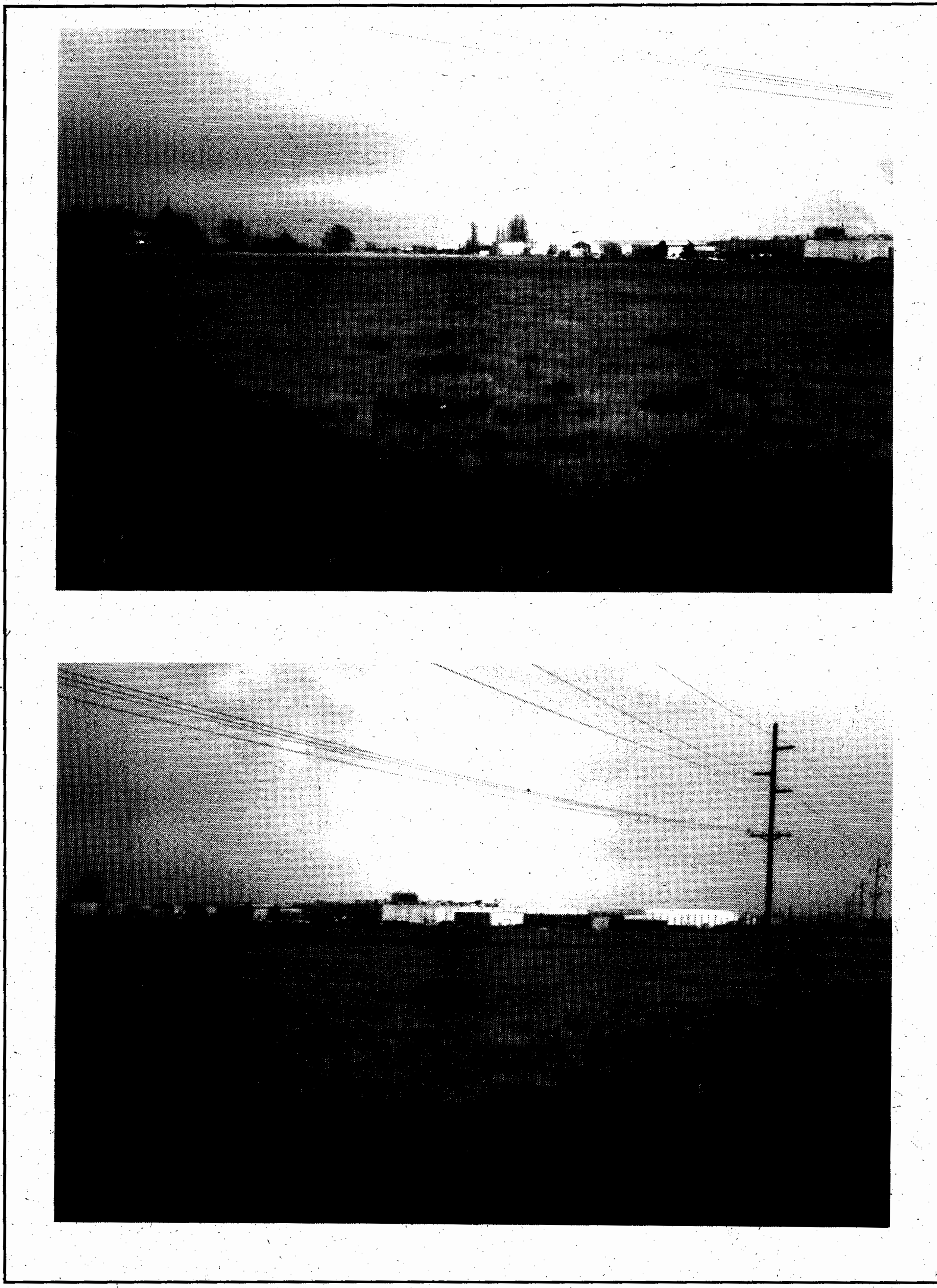


Figure 3-11 Views of Power Plant Site

approximately 0.8 kilometer (0.5 mile) east of the Umatilla River (see Figure 2-3). From there it would again follow the existing route. The line would pass over primarily undeveloped and agricultural land.

3.9.2 Environmental Consequences and Mitigation Measures

The primary visual impact of the proposed project would be the presence of the power plant in the landscape. The power plant would be visible to viewers from nearby roads until a vegetative screen became large enough to block views of the plant. The 57- to 65-meter-high (188- to 213-foot-high) exhaust stacks would be visible beyond the screen and from nearby highways. However, due to several mitigation efforts, and because the power plant would be located in an industrial area with visible industrial and agricultural facilities nearby, the visual impact of the power plant on the surrounding area would not be significant.

Project transmission lines (and poles 13.2 meters [43.5 feet] higher than the existing 20.3-meter [66.5-foot-high] poles) would be located along or adjacent to existing transmission line routes. As a result, there would be no significant visual effects associated with the transmission line. The underground pipeline would result in temporary construction impacts but would not be visible during operation.

3.9.2.1 Power Plant

The power plant would include two exhaust stacks that would be from 57 to 65 meters (188 to 213 feet) high; numerous buildings and structures ranging in height from 6.1 to 24.4 meters (20 to 80 feet); storage yards; and a parking lot. The site would be landscaped and the plant structures painted in neutral colors. The dominant visual feature of the project would be the two 57- to 65-meter-high (188- to 213-foot-high) exhaust stacks and cooling tower steam plumes. The stacks would be visible from the major roadways within the project area and from nearby residences. Other power plant structures would primarily be visible from Westland Road.

A viewshed analysis method was used to assess the visual impact of the project. Viewshed analysis defines sensitive viewpoint locations within a viewshed and assesses the visibility of the project from selected locations. A study area with an 8-kilometer (5-mile) radius was identified for purposes of the visual assessment. Representative viewpoints were chosen to clearly show the project from those locations where it could be seen by a large number of people.

Generally, viewpoints where any portion of the proposed power plant would be seen, with the exception of the stacks, were limited because of intervening topography, structures, and trees. The primary vantage points from which the public could see the power plant are located along major roadways, including Interstate 84, Interstate 82, Highway 207, and Westland Road. Because of the high speeds at which motorists are traveling along the freeways and highway, views of the power plant would be short in duration. The plant would be seen as part of the panoramic view of the landscape, and would be visually similar to nearby industrial facilities such as grain silos and water tanks that periodically stand out against the horizon when viewed from the freeways and highway. Views of the project along Westland Road would be longer in duration, and would be seen at closer distances. The plant would represent a greater visual intrusion to viewers on Westland Road compared to viewers on the freeways and highway.

As mentioned above, the Umatilla County Scenic-Historic Road is within the 8-kilometer (5-mile) impact area. Although the project site is not visible from this road, it is possible that the upper portions of the project exhaust stacks could be visible from the road. If visible, the project stacks would be seen in combination with other industrial and agricultural structures and would represent a small visual intrusion into views from the scenic-historic road. The project would not result in significant adverse visual impacts to the Umatilla County Scenic-Historic Road.

Generally, in most views, the proposed project would not result in significant adverse visual impacts. The project would be constructed within an area that is currently characterized by industrial buildings and agricultural activities. Lands located in the immediate vicinity of the project site are primarily designated for industrial, commercial, and agribusiness uses. Therefore, when the area builds out, its visual character as an industrial area will further intensify. The proposed project would be visually compatible with the existing appearance of the area as well as with future land uses developed in the area. The project would not result in the obstruction or degradation of any scenic viewsheds.

Figure 3-12 shows the location of the five viewpoints from which photographs of the plant site were taken. All views were taken within the 8-kilometer (5-mile) radius of the proposed power plant, at distances ranging from less than 0.4 kilometer (0.25 mile) to about 3.2 kilometers (2 miles). At distances greater than 3.2 kilometers (2 miles), the power plant would be too small to constitute a significant visual intrusion. Figures 3-13, 3-14, and 3-15 illustrate views from the five viewpoints looking at the power plant site. The following describes the five viewpoints and the potential visual impacts associated with the proposed project.

Viewpoint #1 - Westland Road: Located at the intersection of Westland Road and Lamb Road, looking south along Westland Road (see Figure 3-13). The viewpoint is located about 305 meters (1,000 feet) northwest of the power plant site. The site

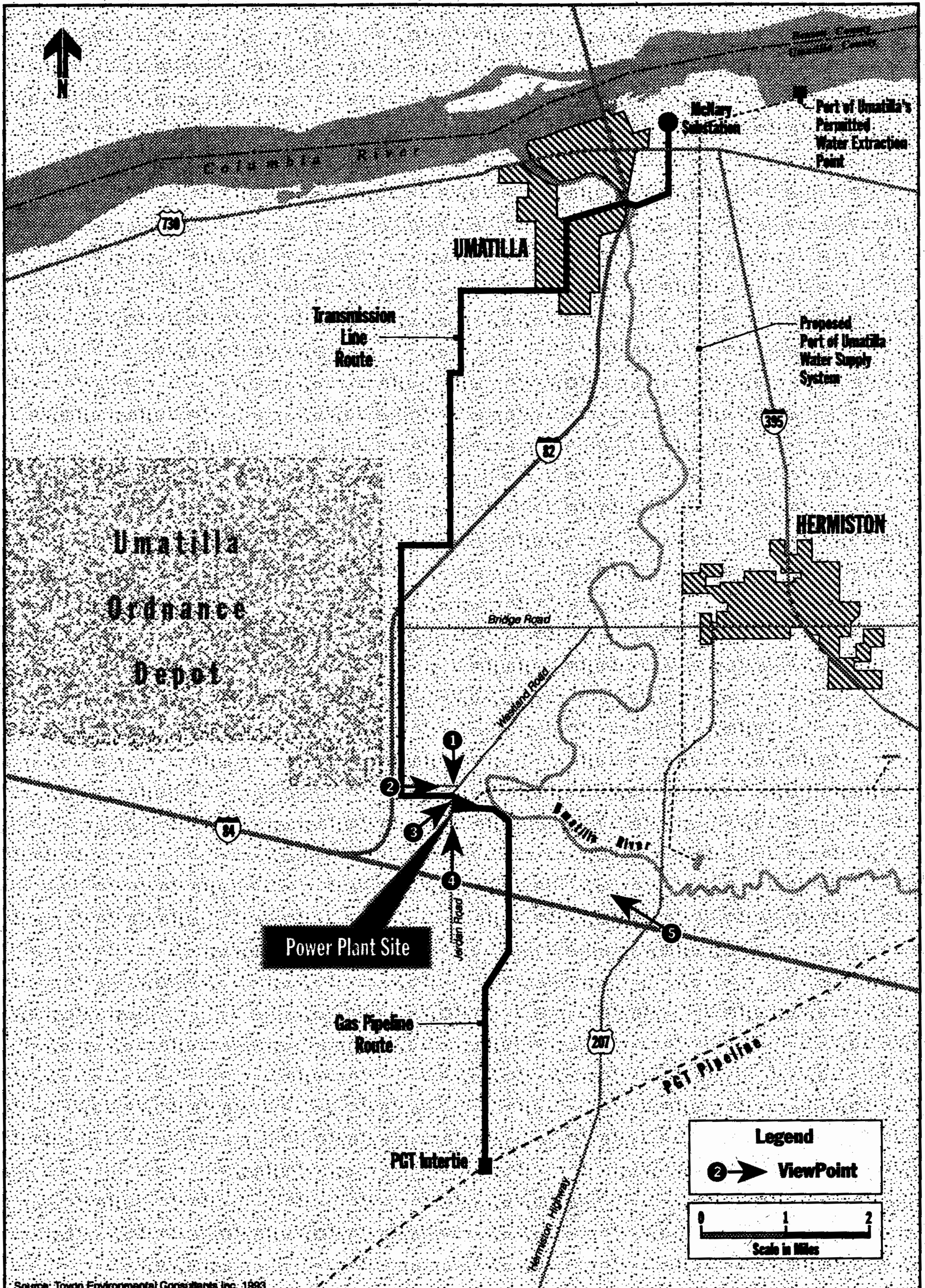
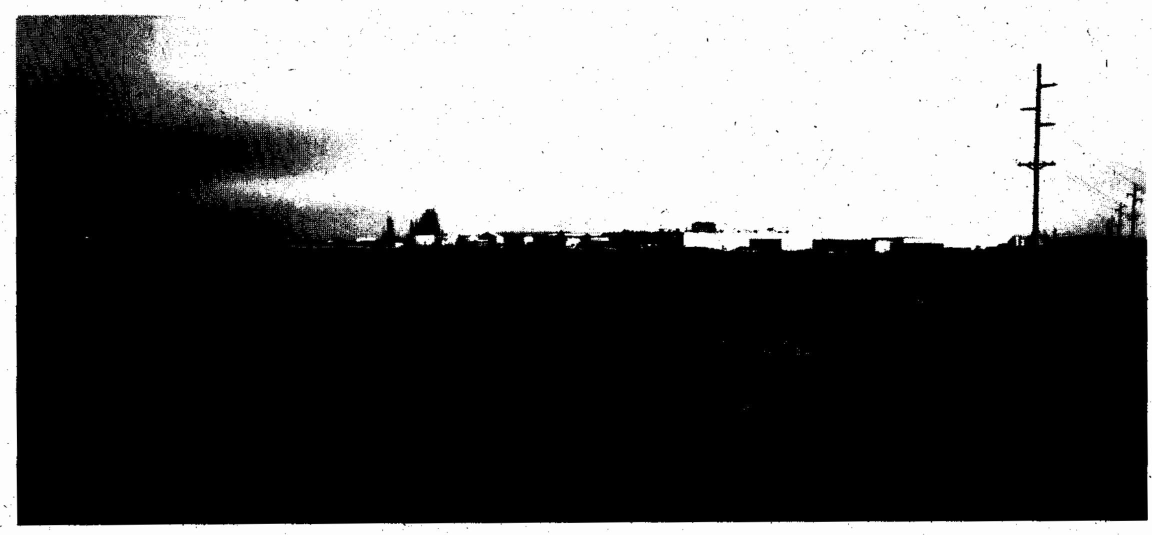


Figure 3-12 Viewpoint Locations

Viewpoint #1 - Westland Road Looking South

Viewpoint #2 - Interstate 82 Overpass Looking East

Figure 3-13 Photos of Viewpoint #1 and #2



Viewpoint #3 - Westland Road Looking Northwest

Viewpoint #4 - Interstate 84 Overpass Looking North

Figure 3-14 Photos of Viewpoint #3 and #4

Viewpoint #5 - Interstate 84 / Highway 207 Overpass Looking Northwest

Figure 3-15 Photo of Viewpoint #5

is very visible from the intersection. Also visible in the background, beyond the site, is a stand of trees (the Northwest Livestock Commission buildings are behind these trees), the Umatilla-Morrow Coop buildings, and power poles that are located along the west side of Westland Road.

The power plant would represent a significant visual element to viewers from this viewpoint; it would represent the first point when traveling south along Westland Road where the viewer would see full views of the plant. Landscaping would eventually (upon nearing maturity) screen the power plant (except for the stacks), and reduce the visual impact of the project. Existing views of the open fields at the plant site would be replaced with views of the plant. The project would increase the number of industrial buildings along Westland Road and further contribute to an industrial scene.

Viewpoint #2 - Interstate 82 Overpass: Located at the Interstate 82 overpass to Lamb Road, looking east along the overpass (see Figure 3-13). The viewpoint is located about 1.2 kilometers (0.75 of a mile) west of the power plant site. Interstate 82 is seen in foreground views. The upper portions of the Lamb-Weston buildings and plume are visible in the background.

The viewers traveling east across the overpass and down Lamb Road would have views of agricultural lands and the Umatilla-Morrow Coop facilities in the foreground and middleground, and the power plant site and Lamb-Weston facility in the background. Partial views of industrial facilities would be visible beyond the Lamb-Weston plant.

Only the upper portions of the project stacks would be visible from this viewpoint. The stacks would be seen with the Lamb-Weston facility and would not obstruct or degrade scenic views or vistas. The project stacks would be viewed as one of several industrial stacks and other industrial and agricultural structures visible in the background. From this viewpoint, the project is not considered a significant adverse visual impact.

Continuing east across the overpass, the viewer would see full views of the power plant. It would appear as a cluster of industrial structures in the middleground, with the Lamb-Weston facility and other industrial and agricultural facilities visible in the background. The project would appear within the context of an industrial area surrounded by agricultural activities. Although fully visible, the project would not result in significant adverse visual impacts to the area.

Viewpoint #3 - Westland Road: Located on Westland Road just north of the Union Pacific railroad lines looking northeast (see Figure 3-14). The viewpoint is located on the southwest corner of the site, approximately 244 meters (800 feet) from the power plant. The entire site can be viewed from this point, as can most of the Lamb-Weston facility.

The power plant would be a significant visual element to viewers traveling past the site on Westland and Jordan Roads. The existing views of the undeveloped site and the Lamb-Weston facility beyond the site would be replaced with the power plant and its related facilities.

Figure 3-16 shows a computer simulation of the power plant as viewed from Viewpoint #3. As the simulation illustrates, the plant would intensify the industrial character of the area near the project.

Viewpoint #4 - Interstate 84 Overpass: Located at the Interstate 84 overpass to Westland Road, looking north along the overpass (see Figure 3-14). The viewpoint is located about 1.6 kilometers (1 mile) south of the project site. Interstate 84 is visible in the foreground, the Northwest Livestock Commission is visible in the middleground, and the power plant site and Lamb-Weston plant site are partially

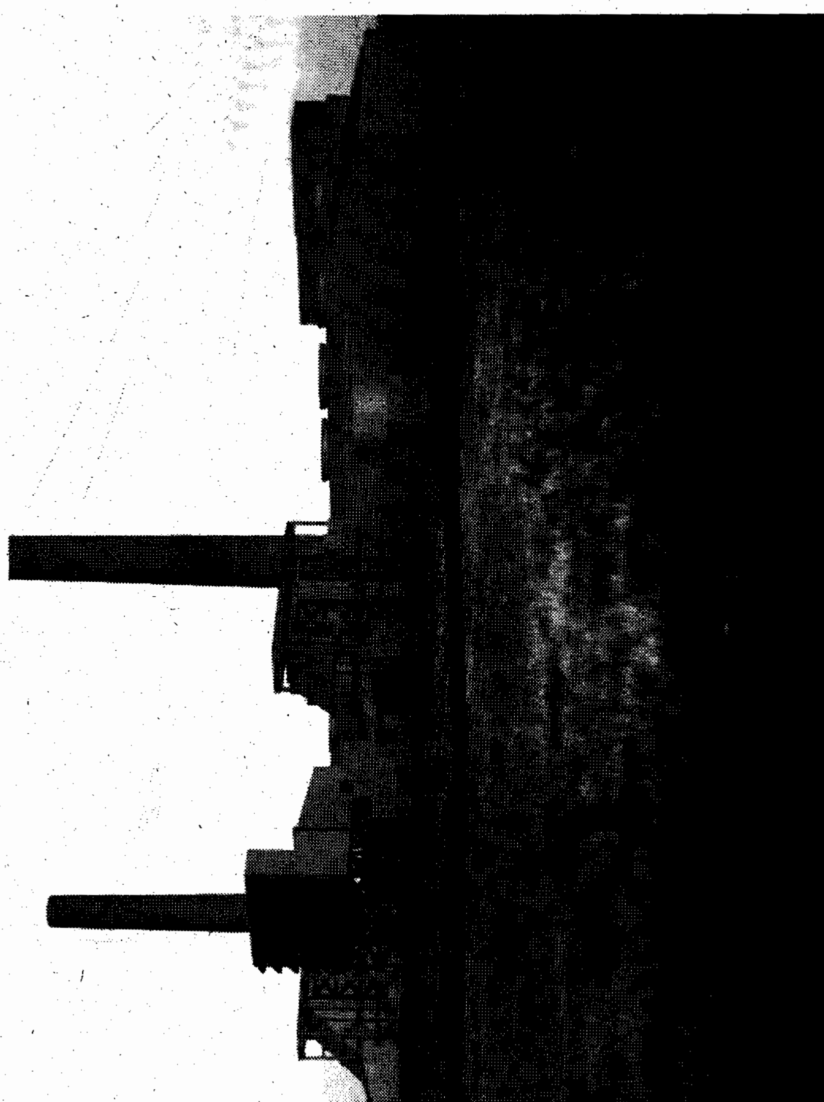


Figure 3-16 Computer Simulation of Power Plant as Seen from Viewpoint #3

visible in the background. Power poles are visible in foreground and middleground views.

The upper portions of the stacks and the Lamb-Weston stack would be visible from this viewpoint above intervening structures and vegetation. Although existing vegetation and structures would obstruct views of most of the power plant, it is possible that portions of the plant may be visible through the trees. The visibility of the project stacks in background views available from this viewpoint would represent a small visual intrusion. The stacks would not obstruct or degrade any scenic views or vistas.

Viewpoint #5 - Interstate 84/Highway 207 Overpass: Located at the Interstate 84 overpass to Highway 207 looking northwest along Highway 207 (see Figure 3-15). The viewpoint is located about 3.2 kilometers (2 miles) southeast of the power plant site. Interstate 84 is in the foreground, and residences, trees, and agricultural lands are visible in the middleground. The power plant site is obscured by intervening trees and structures, although the Lamb-Weston plume is visible in the background.

From this viewpoint, only the upper portions of the stacks would be visible and they would be seen along with the existing Lamb-Weston stack. As with Viewpoint #4, intervening vegetation and structures would obstruct views of the other components of the power plant. The project would not degrade or obstruct any scenic views or vistas and would not be a significant adverse visual impact.

Impact—Visibility of the Power Plant: The power plant, including the stacks, would be visible from local roads and highways.

Measures Included as Part of the Project:

- To minimize visual intrusion caused by the stacks, the stacks would be painted in a matte-finished neutral color to minimize the potential for glare caused by reflective surfaces. Colors would be chosen to blend with the surrounding area.

- Landscaping would be used to screen the power plant from the nearest residence and roadways to the extent reasonably feasible. Shrubbery and trees planted along the perimeter of the power plant site and other landscaping would be well-maintained and include low-maintenanee and indigenous plants.

- To minimize project visibility at night, outdoor lighting would be limited to the extent necessary to maintain safety conditions. It would consist of downward directional lights. Stair lighting would be manually engaged, so that when not in use, the stairs could remain unlighted.

These measures would provide adequate mitigation for visual impacts, and no additional measures are necessary.

3.9.2.2 Gas Pipeline Right-of-Way

During operation the pipeline would not be visible. While under construction, the pipeline would result in temporary visual impacts, consisting of vegetation removal and excavation activities along the right-of-way. Views of the construction activity would be limited to adjacent lands fronting the right-of-way; at greater distances construction would be obscured by intervening topography, vegetation, and structures. Upon completion of construction activities, scarring would be visible until the lands are returned to agricultural production and vacant lands are revegetated. Visual impacts associated with construction of the pipeline would be temporary and are not considered significant.

3.9.2.3 Transmission Line Visual Impacts

Approximately every other existing 20.3-meter (66.6-foot) high wood pole used to support the UECA transmission line would be replaced with metal poles averaging approximately 33.5 meters (110 feet) high. Some poles would be as much as 45.5 meters (150 feet) high. The additional 13.2 meters (43.5 feet) of average pole height, the increased "mass" of the poles (see Figure 2-7), and three additional conductors would make the transmission facilities more visible than the existing ones. However, because most of the 19.3-kilometer (12-mile) route is not visible to many viewers or is visible only in the distance, the increased size would not be significant visually.

Despite the fact that the new poles and extra lines would be more visible than the existing ones, two other factors would contribute to reducing visual impacts. The first factor is that the new facilities would follow an existing route. Most local viewers would already be used to seeing transmission line facilities along the right-of-way, so the introduction of new, larger facilities would likely not be objectionable to most viewers.

The second factor that would minimize the impact of the new facilities is the presence of numerous other transmission line facilities in the project area. Because of the proximity of the McNary Substation, many transmission facilities are located in the general project area. The increase in size of one facility would not create a significant visual impact in the project area, particularly when viewed from nearby freeways and highways. Where the line would be located near the city of Umatilla, it would be located adjacent to existing BPA transmission lines.

3.9.2.4 Optional Transmission Line Segment Visual Impacts

The 2.4-kilometer-long (1.5-mile-long) optional transmission line route would parallel existing BPA transmission lines that cross Power Line Road and the Umatilla River. The optional transmission line segment would not create a significant visual impact. If the existing UECA lines are moved from their existing location north of the BPA right-of-way near a residential area, it would slightly improve the visual quality of the area for those residents.

3.9.3 Unavoidable Adverse Impacts

Screening the power plant with tall vegetation would eventually lessen the visual impact of the power plant on views from the surrounding area. However, until the vegetation grew sufficiently large, it would not be effective in screening the power plant.

Despite mitigation efforts such as painting the exhaust stacks in neutral colors, the 57- to 65-meter-high (188- to 213-foot-high) stacks would be visible beyond the project area. Vegetative screening would not alter distant views of the exhaust stacks.

3.9.4 Cumulative Impacts

The project would intensify the industrial appearance of the project area by replacing an undeveloped site with a power plant. This would result in the incremental loss of undeveloped land in the project area. The plant site area currently contains industrial development and is identified by the Umatilla County Comprehensive Plan as an area planned for future industrial and commercial development. The plant's appearance would be compatible with existing and future development in the project area. Similarly, the taller transmission line poles would add to the visibility of lines in the area, but would be compatible with the existing structures and adjacent land uses. The project would not encroach into scenic views or vistas. Cumulative development, including the proposed project, would not result in a significant cumulative impact to the visual quality of the area.

3.10 Cultural Resources

Cultural resources, also called heritage resources or historic properties, include resources significant in American history, architecture, archaeology, engineering, and traditional culture. Historic properties can be archaeological sites, historic architecture and engineering, or resources of heritage significance to Native Americans and other cultural groups. Historic properties may be districts, sites, buildings, structures, or objects.

The significance of historic and cultural properties lies both in their heritage and scientific value. Historic sites and historic architecture and engineering are embodiments of a technological and historical heritage. Archaeological sites are the raw material from which scientists reconstruct specific events and general trends of prehistory, and therefore have scientific value. Traditional cultural properties embody significant patterns of culture.

Several historic properties exist in the project vicinity, and construction of the proposed project could affect two properties potentially eligible for nomination to the National Register of Historic Places: the High Line and West Extension irrigation canals. In addition, trenching could affect archaeological resources that are currently unknown. Measures proposed to mitigate these effects include tunneling natural gas pipelines under the canals, avoiding the placement of transmission supports in the canals, and conducting archaeological surveys.

3.10.1 Affected Environment

3.10.1.1 Cultural History

Native Americans occupied the project area for approximately 11,500 years prior to the arrival of European Americans in the early 19th century. They settled at favorable salmon fishing sites along the Columbia and lower Umatilla Rivers and also made use of upland areas on the Columbia Plateau and in the Blue Mountains for gathering food. Archaeological resources in the project area include the remains of riverside base settlements as well as residential and short-term occupation sites in upland areas.

The aboriginal inhabitants of the project area were the Umatilla dialect group of the Sahaptin linguistic and cultural entity. The Umatilla occupied both sides of the Columbia River and the lower Umatilla River Basin. The Sahaptin-speaking peoples occupied the central Columbia and lower Snake River Basins. Umatilla economy depended on the harvesting of anadromous fish, the hunting of large and small mammals, and the gathering of starchy roots and berries for storage. The Umatilla signed a treaty in 1855 ceding their traditional territory to the United States government in exchange for reservation lands located approximately 48.3 kilometers (30 miles) east of Hermiston.

Historic era exploration of the project area began with the Lewis and Clark Expedition of 1805 to 1806. A few years later, the Pacific Fur Company and its successors, including the Northwest and Hudson's Bay companies, began sending trading parties up and down the Columbia River from forts at Astoria, Vancouver, Nez Perce, Okanogan, and Spokane.

The European American settlement of the Pacific Northwest began with the first use of the Oregon Trail by emigrants in 1844. The earliest sustained European American settlement in the project area occurred when the town of Umatilla was founded in the 1860s to serve as a shipping point on the Columbia River to supply the Clearwater gold rush in northern Idaho (Brawley 1991). The construction of the transcontinental railroad in 1884 improved access to agricultural markets and stimulated emigration. Local area farmers began building irrigation works as a series of small diversions in the Umatilla River bottoms during this period. In 1905, Congress authorized the Umatilla Project, which included the Cold Springs and McKay storage dams and a network of irrigation canals. The town of Hermiston grew significantly as a result of the Umatilla Project.

3.10.1.2 Known Historic Resources

Several historic properties are known in the project vicinity. These include the following:

35-Um-1, the Old Town Umatilla Site, is a large prehistoric archaeological site that is the remains of a historically known Umatilla Indian village located at the mouth of the Umatilla River. This site is about 1.6 kilometers (1 mile) north and west of the electrical transmission line route, underlying the town of Umatilla at the confluence of the Umatilla and Columbia Rivers.

35-Um-58 is a prehistoric archaeological site located on the Columbia River at the south end of the Interstate 82 bridge, about 1.1 kilometer (0.7 mile) northwest of the northern end of the electrical transmission line.

35-Um-9 is a section of an old irrigation canal surrounded by a scatter of historic artifacts. This site is about 0.8 kilometer (0.5 mile) west of the gas pipeline, at the point where the line crosses Old Stanfield Road, south of Interstate 84.

The Oregon Trail is the wagon road from St. Louis, Missouri, to the Willamette Valley of Oregon by which European American settlers entered the Pacific Northwest between the 1840s and 1870s. It runs 2.4 kilometers (1.5 miles) south of the proposed gas pipeline intertie with the PGT pipeline. Much of the Oregon Trail has been destroyed by agricultural activities and other development.

3.10.1.3 Site Inventory Results

Archaeologists conducted an intensive historic properties survey of the power plant site and gas and electrical transmission line rights-of-way (Heritage Research Associates, Inc. 1992, 1994). The inventories totaled 138.5 hectares (342.2 acres), including 33.5 kilometers (20.8 miles) of linear features.

The inventories resulted in discovery and recording of two historic properties that are potentially eligible for nomination to the National Register of Historic Places. One is located along the gas pipeline route, and the other is located along the proposed and optional transmission line routes. No sites were located at the plant site.

Gas Pipeline Right-of-Way: The High Line Canal, also called the Westland B Canal, is an irrigation canal that serves as a lateral to the Hunt Ditch. This canal is part of the U.S. Bureau of Reclamation's Umatilla Project, which was constructed between 1907 and 1916. It consists of an earthen ditch 1.5 meters (5 feet) deep and 4.6 meters (15 feet) wide. The Oregon State Historic Preservation Officer (SHPO) has determined portions of the Umatilla Project eligible for National Register nomination because of this project's role in regional agricultural development and because it is a well-preserved example of an early twentieth century irrigation system (Hamrick 1990). The natural gas transmission line would cross the High Line Canal.

Transmission Line Rights-of-Way: The West Extension irrigation canal was constructed in 1914 as part of the U.S. Bureau of Reclamation's Umatilla Project. This canal extends northwest from the Three Mile Falls Diversion Dam, and crosses both the proposed and optional transmission line rights-of-way 1.6 kilometers (1 mile) south of the town of Umatilla. The Three Mile Falls Dam and associated canals such as the West Extension canal opened the area west of Umatilla and east of Boardman to irrigated agriculture. The Oregon SHPO has determined portions of the Umatilla Project eligible for National Register nomination, including the Cold Springs Dam and associated features. The West Extension Canal is not part of this system, but is rather a system that serves a similar and parallel function, and so may also be eligible for National Register nomination.

3.10.2 Environmental Consequences and Mitigation Measures

Construction and operation of the Hermiston Generating Project could affect the following cultural resources: (1) High Line Canal, (2) West Extension Canal, and (3) other archaeological properties. These potential impacts and any corresponding mitigation measures are discussed below.

3.10.2.1 Impact—Effects on Known Historic Resources

Construction of project features, including the electrical transmission line and natural gas pipeline, could affect the High Line and West Extension irrigation canals, which are potentially eligible for National Register nomination.

Measures Included as Part of the Project:

- HGC would take all reasonable steps to avoid disturbance of the West Extension Irrigation Canal during construction and operation of the transmission line by ensuring that the transmission towers/poles are placed away from the canal banks, and by avoiding any disturbance at the canal crossing when electrical lines are strung.

- HGC would consult with the irrigation district in which the canal is located before construction or the upgrading of the transmission line in the area of the canal in order to learn whether there are any applicable restrictions.

Potential Additional Mitigation Measure:

- HGC should avoid impacts to the High Line canal by tunneling the natural gas pipeline under the canal. HGC should avoid damaging the canal with heavy equipment during construction.

3.10.2.2 Impact—Disturbance of Traditional Cultural Properties and Unknown Historic Resources

The possibility exists that properties of cultural significance to Native Americans could be disturbed during construction. Additionally, during excavation for construction, subsurface resources or resources covered by vegetation that could not be seen during field surveys could be discovered.

Measures Included as Part of the Project:

- HGC would consult with the CTUIR before construction. HGC would provide the CTUIR with an opportunity to conduct a review of the oral history of the tribes. The purpose of the consultation and review would be to identify areas having a high potential for cultural resources within the impact area. If deemed necessary by the CTUIR based on the oral history review, HGC would conduct additional preconstruction field surveys in cooperation with the CTUIR.

- HGC would notify the CTUIR before starting construction and would provide the opportunity for a CTUIR representative, knowledgeable in cultural resources of the area, to be available for on-site monitoring during construction activities.

- If cultural resources were discovered during project construction or construction-related activities, HGC would stop all work in the immediate area of the find. HGC would consult with the CTUIR and the SHPO. HGC would not restart work in the affected area until CTUIR or the SHPO had concurred that HGC had identified actions to minimize or avoid further impacts.

These measures would be adequate to protect cultural resources, and no further mitigation measures would be required.

3.10.3 Unavoidable Adverse Impacts

With implementation of the mitigation measures proposed as part of the project and identified in this document, there would be no unavoidable adverse impacts to cultural resources.

3.10.4 Cumulative Impacts

The project would not cause significant adverse cumulative impacts to cultural resources because the project would avoid identified impacts to cultural resources.

3.11 Land Use, Plans, and Policies

The proposed power plant, gas pipeline, transmission line, and optional transmission line route would all comply with the County of Umatilla and the City of Hermiston comprehensive plans as either permitted or conditional uses.

3.11.1 Affected Environment

3.11.1.1 Land Use Characteristics of Project Site and Vicinity

The proposed project is located in the northwest portion of Umatilla County. Combined, the natural gas pipeline and transmission line rights-of-way span approximately 27.3 kilometers (17 miles) running in a north-south direction (see Figure 2-1). The power plant site is located about 4.8 kilometers (3 miles) southwest of the City of Hermiston and 12 kilometers (7.5 miles) south of the City of Umatilla. The gas pipeline right-of-way runs south from the power plant site to connect with the PGT gas line. The transmission right-of-way runs north from the power plant site to McNary Substation located along the Columbia River. Generally, the area is characterized by its relatively flat terrain and agricultural land use activities. An area 0.8 kilometer (0.5 mile) wide along the right-of-way was used to identify potential land use impacts.

Power Plant Site: The power plant site is an undeveloped field approximately 5.2 hectares (12.9 acres) in size. The site is bounded by the Lamb-Weston Access Road to the north, Westland Road to the west, and the Union Pacific Railroad track to the south.

Existing land uses within a 0.8-kilometer (0.5-mile) radius of the power plant site include the following:

- The Lamb-Weston potato processing facility, immediately northeast of the project site;
- A residence surrounded by trees and located approximately 0.1 kilometer (340 feet) north of Lamb-Weston Road along the north side of the project site;
- A mobile home park surrounded by trees approximately 0.4 kilometer (0.25 mile) south of the power plant site, with approximately eight mobile homes.
- Several residences, including mobile homes, about 1 kilometer (3,300 feet) southeast of the project site;
- A mobile home about 61 meters (200 feet) northeast of the Lamb-Weston facility and adjacent to the Umatilla River;
- Several residences about 0.4 to 0.8 kilometer (0.25 to 0.5 mile) northeast of the project site and across the Umatilla River;
- The Northwest Livestock Commission about 1.1 kilometers (0.7 mile) southwest of the project site;
- A mobile home situated near the Northwest Livestock Commission property;
- The Umatilla-Morrow Growers Coop about 0.4 kilometer (0.25 mile) southwest of the site along Westland Road;
- An open field located west of Westland Road and across from the project site;
- Westland Furniture store and a mobile home about 0.4 kilometer (0.25 mile) north of the project site at the intersection of Westland Road and Walker Road;
- A single residence on Walker Road north of Westland Furniture store; and

- The Umatilla Ordnance Depot west of Interstate 82, about 1.2 kilometers (0.75 mile) from the project site.

Agricultural and agribusiness uses are the predominant land use beyond the 0.8-kilometer (0.5-mile) site radius.

Gas Pipeline Right-of-Way: The right-of-way is approximately 8 kilometers (5 miles) long. Beginning at the PGT pipeline, the new pipeline would cross lands principally in agricultural use. Then the right-of-way generally parallels County Road No. 1327 north for about 3.2 kilometers (2 miles) to the power plant site.

Land uses within 0.8 kilometer (0.5 mile) of the pipeline right-of-way include agriculture, agribusiness, and residences.

Transmission Line Right-of-Way: The right-of-way consists of a 19.3-kilometer (12-mile) section of the existing power line right-of-way. An additional 0.4 kilometer (0.25 mile) of the new right-of-way would be acquired to connect the transmission line into the McNary Substation. This right-of-way crosses predominantly agricultural lands, in addition to urban lands within the city of Umatilla.

Land uses within 0.8 kilometer (0.5 mile) of the transmission right-of-way include agriculture and agribusiness, the Umatilla Ordnance Depot, and urban uses such as residential, commercial, and industrial uses.

Optional Transmission Line Right-of-Way Segment: The optional right-of-way is located in the vicinity of the Umatilla River (Figure 2-4). The approximately 2.4-kilometer-long (1.5-mile-long) route would start just south of where the existing UECA route (and Powerline Road) currently intersects an existing BPA transmission line corridor. The line would continue east across the Umatilla River for approximately 1.6 kilometers (1 mile), where it would again follow the existing route. The entire optional transmission line route would be located between 152 and 304 meters (500 and 1,000 feet) south of, and more or less parallel to, the existing UECA route. The right-of-way would be up to 30.5 meters (100 feet) wide and would be immediately adjacent to and south of an existing BPA transmission line corridor.

Most of the optional transmission line right-of-way segment between Power Road and the Umatilla River would be located in undeveloped shrub-grasslands. The right-of-way would pass within approximately 107 meters (350 feet) of an existing church, which might also be a residence, located approximately 0.4 kilometer (0.25 mile) east of Powerline Road. East of the Umatilla River, the transmission line right-of-way would pass through an area of irrigated pasture land north of the right-of-way, and non-irrigated pasture south of the right-of-way (personal communication, Sharp 1994). Beyond the pastures, the right-of-way would pass through and near undeveloped shrub-grasslands and a gravel quarry.

3.11.1.2 Local Comprehensive Plan Land Use Designation and Zoning

The project site is within two local jurisdictions: Umatilla County and the City of Umatilla. Described below are the comprehensive plan land use designations and zoning for each of the project components.

Power Plant Site: The power plant site is located within the jurisdiction of Umatilla County. The Umatilla Comprehensive Plan West County Land Use Map designates the site for Industrial use. Figure 3-17 shows the Comprehensive Plan land use designations and zoning for the power plant site and vicinity. The site is zoned Light Industrial (LI) which permits industrial uses such as warehouses, manufacturing of processed materials, machine shops, bottling works, food processing facilities, nurseries and greenhouses, grain elevators, flour mills, and other uses listed in Section 3.182, Light Industrial, of the Umatilla County Development Ordinance (UCDO).

The proposed power plant would be permitted as a conditional use. A conditional use is a use that may locate in certain zoning districts provided it will not be detrimental to public health and safety and will not impair the integrity of the zoned district. Conditional uses allowed in the LI zone include energy facilities (Section 3.184 of the UCDO). The proposed power plant would be subject to conditional use criteria outlined in the UCDO [Sections 3.185, 7.050 and 7.060 (55)].

Gas Pipeline Right-of-Way: The entire gas pipeline right-of-way is within Umatilla County's jurisdiction. A small portion of the pipeline right-of-way, closest to the power plant, would be on land with a comprehensive plan designation of Industrial and zoned LI. The remainder of the right-of-way would be on land with a comprehensive plan designation of North and South County Agricultural Exclusive Farm Use (EFU). The pipeline would be considered a conditional use in the LI zone [UCDO Section 3.011.4 and Section 3.184(16)] and it would be a permitted use in the EFU zone. Figure 3-17 shows the land use designations and zoning for the gas pipeline route.

Transmission Line Right-of-Way: Most of the existing transmission line right-of-way and all of the 0.4 kilometer (0.25 mile) of needed new transmission line right-

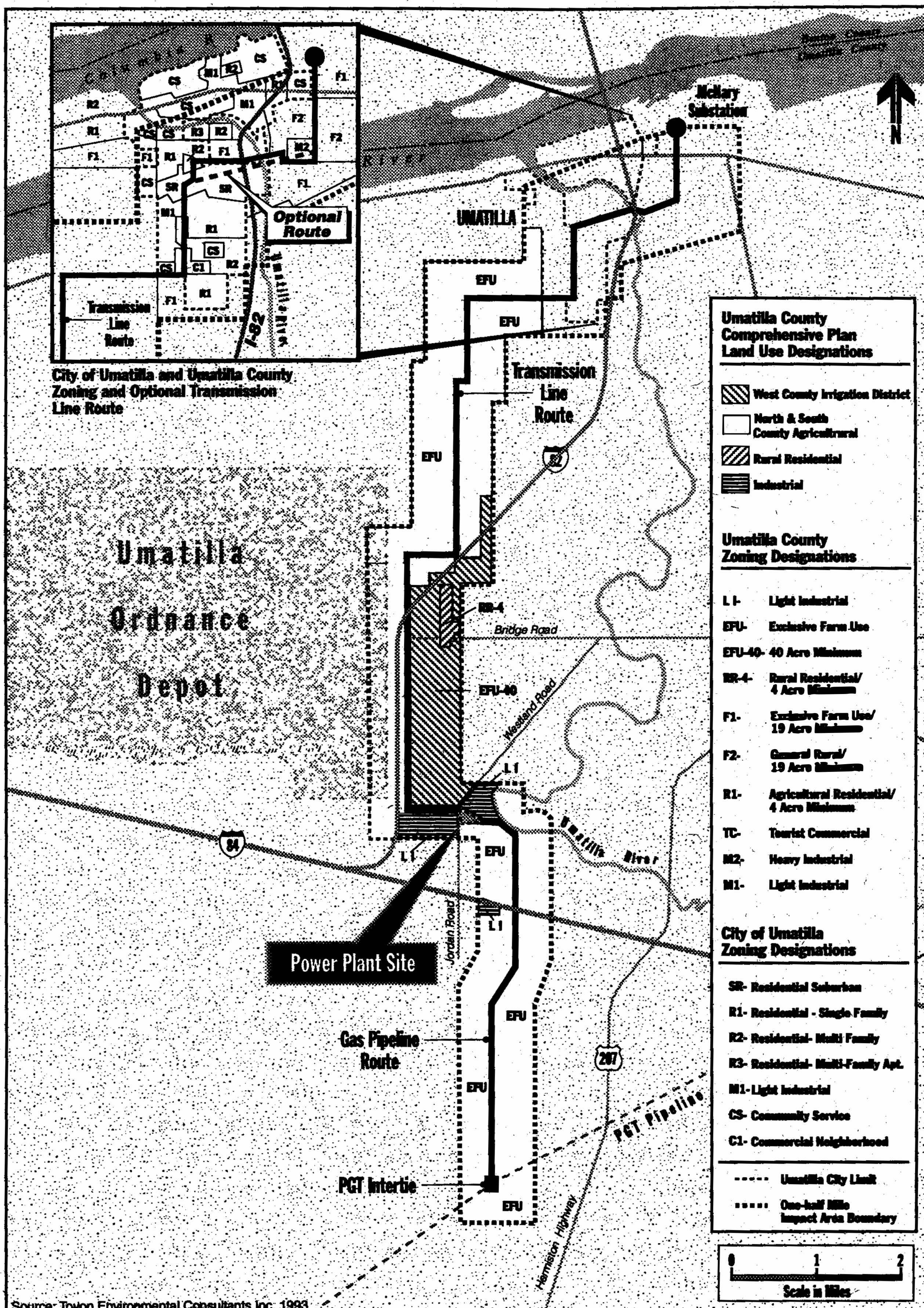


Figure 3-17 Comprehensive Plan Land Use Designations

of-way near McNary Substation is within the jurisdiction of Umatilla County. From the power plant site, approximately the first mile of the transmission line is designated Industrial, and is zoned LI. The transmission line proceeds north along the boundary of the Umatilla Ordnance Depot. For 4 kilometers (2.5 miles), the line is on land zoned EFU-40 with a comprehensive plan designation of West County Irrigation District. The right-of-way continues north and east to the urban growth boundary (UGB) of the City of Umatilla on land zoned EFU with a comprehensive plan designation of North and South County Agricultural. Figure 3-17 shows the land use designations and zoning for the transmission line and vicinity.

Within most of the zoning districts, the upgrade of the existing transmission line would be a use permitted outright. Within the LI zone, the transmission line would be a conditional use.

Land inside the UGB but outside the city limits (i.e., in the designated urban growth area) is under county jurisdiction. However, under the Urban Growth Area Joint Management Agreement between the county and the City of Umatilla, the county has agreed to incorporate into the Umatilla County Comprehensive Plan, that portion of the City of Umatilla Comprehensive Plan that addresses the urban growth area. Thus, in the urban growth area, county zoning designations apply, while the city's comprehensive plan designations apply.

Approximately 0.4 kilometer (0.25 mile) of existing right-of-way is within the urban growth area, and has a county zoning of F1 (Exclusive Farm Use, 7.7-hectare [19-acre] minimum) and a City of Umatilla comprehensive plan designation of SR (Suburban Residential). The transmission line then enters the city limits and passes through several zones including C1 (Commercial Neighborhood), R2 (Residential Multi-family), R1 (Residential Single-family), and SR (Residential Suburban). The city allows transmission lines as a conditional use under a "Community Service" designation, which can be applied in any city zoning district.

After leaving the city, the remainder of the existing transmission line right-of-way is within the urban growth area, and has a county zoning of F1 (Exclusive Farm Use, 7.7-hectare [19-acre] minimum), F2 (General Rural, 7.7-hectare [19-acre] minimum) and R1 (Agricultural Residential, 1.6-hectare [4-acre] minimum). Although these zones predate the current Umatilla County Development Ordinance and are not part of that ordinance, these zones are still in effect. The City of Umatilla comprehensive plan designations are R1 (Residential, Single-family); FP (Flood Plain) where the transmission line crosses the Umatilla River; NR (Natural Resource); SR (Suburban Residential); and PF (Public Facilities).

The portion of the transmission line requiring new right-of-way near McNary Substation would be within the urban growth area, on land zoned F1, with city comprehensive plan designations of PF (Public Facilities) and R-O/S (Recreation-Open Space).

A conditional use permit would be required for a portion of the existing transmission line crossing the urban growth area. County-zoned lands within the urban growth area include F1, F2, and R1. The upgrade and new electrical transmission line would be a permitted use within the F1 zoning [Section 3.012(p) prior Umatilla Zoning Ordinance)]. In the F2 and R1 zones, the upgrade would be a conditional use. Within county lands zoned EFU and EFU-40, upgrade of the existing transmission line is a permitted use.

Land uses within a 0.8-kilometer (0.5-mile) distance of the transmission right-of-way include agriculture and agribusiness; the Umatilla Ordnance Depot; and urban uses, including residential, commercial, and industrial uses.

Optional Transmission Line Right-of-Way Segment: The optional transmission line segment would be located on land under the jurisdiction of both the City of Umatilla and Umatilla County. The section west of the Umatilla River is within the City of Umatilla. The portion of the 30.5-meter-wide (100-foot-wide) right-of-way that would be located within the city limits is located on land designated as SR (Residential Suburban). Transmission lines are permitted as a conditional use on SR lands. Within the City of Umatilla, utility towers and lines are permitted as a Community Service use.

The section of the optional transmission line route that would be located east of the Umatilla River is on land that is within the Umatilla Urban Growth Boundary and is administered by Umatilla County. The optional transmission line right-of-way would pass through county-administered land zoned F2 (General Rural, 7.7-hectare [19-acre] minimum), and M2 (Heavy Industrial). The existing line passes through land zoned F2, but not M2. Both zoning designations allow utility facilities as conditional uses.

3.11.1.3 Plans and Policies

Two adopted local comprehensive plans govern development within the project area: the Umatilla County Comprehensive Plan (Umatilla County 1987) and the City of Umatilla Comprehensive Plan (Umatilla City 1977).

The proposed power plant and portions of the transmission line are considered conditional uses and therefore subject to review under both comprehensive plans; that is, they must be determined to be consistent with the two plans. The portion of the gas pipeline located in county-administered lands included within the LI zone would be a conditional use and would be subject to review under the Umatilla County Comprehensive Plan. The gas pipeline would be a permitted use within county lands zoned EFU.

The portion of the transmission line that passes through districts inside the city limits of the City of Umatilla would be allowed as a conditional use. It would be subject to review under the City of Umatilla Comprehensive Plan.

3.11.2 Environmental Consequences and Mitigation Measures
The proposed power plant, gas pipeline, and transmission line (and optional route) would all comply with the County of Umatilla and City of Hermiston comprehensive plans as either permitted or conditional uses.

3.11.2.1 Land Use Changes
The proposed project would involve constructing a power plant on a 5.2-hectare (12.9-acre) project site. Construction of an 8-kilometer (5-mile) natural gas pipeline south of the plant site would temporarily disturb about 12.3 hectares (30.3 acres) of mostly agricultural land. A new transmission line would be installed within a 19.3-kilometer-long (12-mile-long) corridor and would replace the existing power poles and lines with new steel poles and additional power lines. Approximately 38.6 hectares (24 acres) of mostly agricultural land would be disturbed during the upgrade of the transmission line.

3.11.2.2 Land Use Compatibility
Construction of the power plant on the existing undeveloped site would introduce another industrial facility within an area that currently contains a potato processing plant, cold storage plant, railroad tracks, warehouses, animal stockyards, agricultural activities, and several rural residences. Generally, the project would result in the intensification of industrial activity in an area that is designated for that use. During construction, the project would result in minor inconveniences caused by increases in noise, dust, and traffic; however, these effects are not considered significant (see Sections 3.6 Air Quality, 3.7 Noise, and 3.8 Traffic and Circulation). During operation, the plant, with mitigation, is not expected to result in land use incompatibilities. It would not cause significant land use conflicts with nearby uses nor would it be adversely affected by the operations associated with these uses. The potential land use impacts of each project component are discussed below.

Power Plant: Impacts from the power plant would be different during operation and construction.

Operation: The power plant would be constructed adjacent to a potato processing plant that represents the major industrial use in the project vicinity. Once operational, the power plant would be a low intensity use. It would employ about 25 workers over a 24-hour period with the greatest number of employees (15) working during the nine to five shift.

The power plant would not generate significant increases in dust or vibrations that could adversely affect nearby land uses. The project would increase noise above permitted levels and residents of nearby homes would be adversely affected by project operational noise. HGC has included noise abatement measures in the design of the plant, and also plans to acquire lands where residents would be significantly affected by the project. This action would mitigate significant adverse noise impacts to affected residents. The nearest remaining residences would be at distances great enough that operational noises and plant activities would not create a significant nuisance. Additionally, the project would be buffered by the Lamb-Weston facility and would not be clearly visible from these rural residences. Access to the project site would be via the existing Lamb-Weston Access Road, which is in compliance with county standards. Project access is not expected to cause safety hazards. Project operation would not result in significant land use conflicts with nearby uses.

Construction: During construction, the project would result in up to 515 construction workers present on the project site. Construction activities associated with building the power plant would temporarily increase noise, dust, and traffic at the plant site. Standard construction management practices developed to minimize dust and noise would be implemented to minimize potential nuisances to nearby land uses. Construction impacts are not expected to result in significant land use impacts.

Gas Pipeline Right-of-Way: The gas pipeline would have impacts to land use only during construction. During that period, there would be increases in noise, dust, and traffic. Agricultural lands would temporarily be removed from their present use. However, negotiations would have been conducted with farmers prior to the start of construction and planting and/or construction schedules would be adjusted to account for this temporary disturbance. Construction management practices developed to minimize dust and noise would be implemented to reduce potential nuisances to nearby land uses. Standard construction of the pipeline would not adversely affect nearby land uses nor would it affect the overall land use pattern of the area. Construction of the pipeline would not result in significant land use impacts.

Transmission Line Right-of-Way: The transmission line would have operational impacts very different from construction impacts.

Operation: Except for the approximately 0.4 kilometer (0.25 mile) of new 230-kV line near McNary Substation, the proposed transmission line could replace an existing line. The existing line corridor would remain in use for power lines. Electromagnetic fields would be minimized through transmission line configuration. See Section 3.14 for a discussion of EMF.

Construction: During construction, noise, dust, and traffic would temporarily increase as the new power line is installed along the 19.3-kilometer (12-mile) corridor. Adjacent lands are primarily used for agricultural purposes. This is not expected to cause significant land use impacts because there would be very little surface disturbance and construction would occur during daylight hours.

Optional Transmission Line Right-of-Way Segment: The optional transmission right-of-way would have operational impacts that would be different from construction impacts.

Operation: The optional transmission line segment could replace approximately 2.4 kilometers (1.5 miles) of the existing UBCA line. By locating the new line between 152 and 305 meters (500 and 1,000 feet) south of and parallel to an existing BPA line, the optional line would be located about 305 meters (1,000 feet) farther away from a residential neighborhood than the existing line. However, the optional transmission line segment is located within 305 meters (1,000 feet) of two other existing residences located south of the existing BPA transmission line.

The new 30.5-meter-wide (100-foot-wide), 2.4-kilometer-long (1.5-mile-long), optional transmission line right-of-way segment would include approximately 3.6 hectares (9 acres) in the City of Umatilla designated as SR. In addition, there would be 1.0 hectare (2.5 acres) of F2, and 1.5 hectares (3.7 acres) of M2 administered by the county that would be included in the right-of-way. The transmission line would be permitted as a conditional use in all four zones.

Existing agricultural uses (grazing on non-irrigated and irrigated pasture) would be allowed to continue in the right-of-way.

Construction: Construction of the alternative transmission line would create construction impacts similar to those associated with the rest of the line. Grazing activities along parts of the right-of-way could be limited for short periods of time by construction activities.

3.11.2.3 Consistency with Local Comprehensive Plan Land Use Designation and Zoning

The proposed project components would be consistent with the Umatilla County and City of Umatilla Comprehensive Plan land use designations for all components of the project. The project would require a conditional use permit for the construction of a power plant, gas pipeline, and transmission line. HGC has not yet applied for the conditional use permit, but would do so in advance of the planned construction start date. The application would have to be considered and the permit approved before construction could begin.

Prior to granting the conditional use permit, county staff must make findings that the proposed project is in compliance with the "Limitations on Conditional Uses" as specified in the applicable zoning classifications of the Umatilla County Development Ordinance. As presented under Section 3.11.2.2 Land Use Compatibility above, the project components would not result in significant land use incompatibilities with nearby land uses.

Power Plant: Construction of the power plant would be in conformance with all applicable conditional use criteria.

Gas Pipeline Right-of-Way: Construction of the short segment of the pipeline in the LI zone would be in conformance with applicable conditional use criteria. Otherwise, the pipeline would be a permitted use.

Transmission Line Right-of-Way: Replacement of the transmission line would be in conformance with applicable use criteria where the line is not a permitted use.

Optional Transmission Line Right-of-Way Segment: Establishment of the optional transmission line segment would be considered either a permitted or conditional use by both the city and county in all of the zones it would pass through.

3.11.2.4 Conformance with Plans and Policies

There are three planning documents that apply to the project area.

Umatilla County Comprehensive Plan: The county of Umatilla has determined that construction of the project would be in conformance with the Umatilla County Comprehensive Plan (Appendix G).

Power Plant: Construction of the power plant would occur on land that is currently designated for industrial use. It would not encroach into lands currently designated for agricultural use and would be consistent with the county's policy to preserve and maintain agricultural lands and to promote industrial uses.

Gas Pipeline Right-of-Way: The pipeline would temporarily remove about 12.3 hectares (30.3 acres) of land from agricultural use. This land would be contained within a 15.2-meter-wide (50-foot-wide) by 8-kilometer-long (5-mile-long) corridor. Once installed, the pipe would be covered and topsoil replaced. Although construction would temporarily affect agricultural lands, these lands would be returned to agricultural production upon completion of the pipeline construction. The project would not permanently remove agricultural lands from production and would be in conformance with the Umatilla County Comprehensive Plan.

Transmission Line Right-of-Way: Replacement of the existing power poles and lines along the 19.3-kilometer (12-mile) transmission line would occur in an existing transmission line corridor. It would not result in the removal of agricultural lands from production and is considered to be in conformance with the Umatilla County Comprehensive Plan.

Optional Transmission Line Right-of-Way Segment: Establishment of the 2.4-kilometer-long (1.5-mile-long) optional transmission line segment would occur adjacent to an existing BPA transmission line corridor. The new line would be in compliance with the comprehensive plans of both the city and county.

City of Umatilla Comprehensive Plan: Only a portion of the transmission line right-of-way is under the jurisdiction of the City of Umatilla. The City of Umatilla has determined that the upgrade of the electric transmission line would be in conformance with the City of Umatilla Comprehensive Plan (Appendix G).

Replacement of the existing power poles and lines within the City of Umatilla would occur in an existing utility corridor. There are no sensitive land uses that would be adversely affected by upgrading the transmission line. The project would be in conformance with the City of Umatilla Comprehensive Plan.

State Guidelines for the Siting of Power Plants: The project would be sited in an area designated for the construction of fossil-fueled thermal power plants and would be constructed to local, state, and Federal standards. The project would be in conformance with these guidelines.

Impact: The proposed project would be in compliance with both the Umatilla County and City of Umatilla Comprehensive Plans (see Appendix G).

The project would not result in significant adverse land use conflicts and no mitigation is required.

3.11.3 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to land use as a result of constructing and operating the project.

3.11.4 Cumulative Impacts

The project would develop a vacant site zoned for industrial use, resulting in the intensification of industrial land use activity in the project area. The existing transmission line route would continue to be used as a transmission line route after upgrading. The 0.4 kilometer (0.25 mile) of new transmission line and new power poles would have no effect on land use. The 2.4-kilometer-long (1.5-mile) optional transmission line route would be in place of or in addition to the existing UECA transmission line, depending on UECA's decision on whether to move their existing line. Building the power plant would further intensify the development of the Umatilla County LI zone surrounding the site.

3.12 Socioeconomics

The project would add approximately $200 to $250 million to the local tax base, and construction of the project would have a positive impact on employment in the Hermiston-Umatilla area. Incoming construction workers would have a potentially negative effect on housing. Approximately 385 local workers and 130 workers from outside of the project area would be needed during the peak construction period. HGC would work with local community officials to alleviate potential housing problems associated with introducing 130 workers into a local rental housing market that has a low vacancy rate.

3.12.1 Affected Environment

A relatively large area around the power plant was identified as the study area to assess potential socioeconomic impacts. The study area encompasses portions of Umatilla and Morrow Counties and includes the communities of Hermiston, Umatilla, Stanfield, Pendleton, Echo, Irrigon, and Boardman.

3.12.1.1 Population

The Morrow-Umatilla region grew more rapidly than the state from 1976 through 1988. The area's population in 1984 was 68,100 people. Between 1984 and 1988, the two-county population declined by 2,700 to 65,700. Since 1988, the region has experienced moderate growth, with a total population of 71,450 people in 1993. According to 1993 state population data, the total Umatilla County population was 63,000. Five cities are located within the study area in Umatilla County: Hermiston, Umatilla, Stanfield, Pendleton, and Echo, with populations of 10,215, 3,110, 1,590, 15,520, and 515 respectively (personal communication, Ordaz 1994).

In 1992, Morrow County had a total population of 8,450. The cities located within the project area include Irrigon and Boardman; they had populations of 875 and 2,000 respectively (personal communication, Ordaz 1994).

3.12.1.2 Employment

During the late 1970s, employment in Morrow and Umatilla Counties expanded rapidly. In the 1980s, this growth slowed down, leveled off, and declined. The labor force grew rapidly in the 1970s to keep pace with the new jobs. Labor force growth continued during the early 1980s even though employment opportunities were diminishing. In 1981, employment peaked at 31,360 jobs while the labor force did not peak until 1986 at 34,900 people. Total 1990 employment was 30,640 jobs while the labor force consisted of 33,440 people. Since 1981, Morrow-Umatilla has been a high unemployment area (ODHR 1992).

Although employment has been flat in the two counties since 1985, state employment overall has been growing. Rural areas have not shared in the employment growth underway in urban areas. The gap in employment trends between Morrow-Umatilla and the state is continuing to widen. In addition, per capita income in the two-county area is declining relative to the state. Oregon's per capita income has remained at about 90 percent to 91 percent of the United States average over the last several years. However, Morrow-Umatilla's per capita income is declining as a percent of the state. In 1989, it was 88 percent of the Oregon per capita income (ODHR 1992).

Agriculture is the largest private sector industry in the area. Government is also a large employer in the Morrow-Umatilla area. Other major industries include services and lumber and wood production.

3.12.1.3 Housing

The permanent housing supply in the project area is very limited. Within the project area, housing demand exceeds the supply, resulting in low vacancy rates and long waiting lists for persons looking for housing. Current vacancy rates are less than 0.5 percent (personal communication, Fife 1992). Rental housing, when it becomes available, is rented immediately. New housing construction within the area is limited because the average income levels, generally, cannot support the costs associated with constructing new housing for owner occupants (personal communication, Culley 1992).

In Hermiston, about 20 or 30 new multi-family housing units may be constructed within 1 to 2 years. If demand is high, an additional 60 or 80 units may be constructed (personal communication, Fife 1992).

Transient housing accommodations are provided by hotels, motels, some bed and breakfast establishments, and recreational vehicle (RV) parks. The total number of hotel, motel, and bed and breakfast rooms in the immediate project area is approximately 485 units. Of this total, 193 units are available in Hermiston, 181 units are available in Umatilla, and 111 units are available in Boardman (Hermiston Chamber of Commerce 1994). An additional 433 units are available in Pendleton (Oregon Lodging Association 1992). The Tri-Cities of Pasco, Kennewick, and Richland have approximately 2,500 similar rooms available, according to the Tri-City Visitor and Convention Bureau.

RV accommodations in Echo and Pendleton have a total of 39 spaces. Seven spaces are located in Echo, and 32 spaces are in Pendleton (Oregon Lodging Association 1992). A new RV park with between 50 and 100 spaces is proposed for the Hermiston area (personal communication, Woodward 1992). Three of the four RV parks listed by the Tri-Cities Convention and Visitors' Bureau have a total of approximately 250 spaces. Vacancy rates are generally very low. In January of 1994, there were approximately ten vacancies among the three RV parks (personal communication, Ramsey 1994).

3.12.1.4 Tax Base

Umatilla County is a basically agricultural area. The current county tax base is approximately $1.2 billion, while the Hermiston School District tax base is approximately $500 million (Brookshier 1994a). The school district recently lost a portion of its tax base due to Oregon's tax reduction Measure 5, which limits funding for local school districts to a maximum of $5 per $1,000 of valuation for tax year 1995/96 and beyond.

3.12.2 Environmental Consequences and Mitigation Measures

An average of 270 workers (with a maximum of 515 workers) would be required for the approximately 26-month construction period. To help reduce demands on housing and public services, approximately 385 workers from the local area would be hired. HGC would work with the local community and local businesses to find housing for the 130 workers who would come from outside the project area. Upon completion of the project, 25 workers would be responsible for operating the facility. Payrolls and taxes paid during construction and operation of the project would have positive effects on socioeconomic conditions.

3.12.2.1. Population

Limited in-migration is expected to occur as a result of the proposed project. The HGC expects to fill most of the full-time plant operations jobs with local residents. Because new employees would be largely existing residents of the local communities, the project would result in minimal direct population increases.

During construction of the proposed project, up to 515 construction workers and related personnel would be required over the 26-month construction period. Of this, about 25 percent, or about 130 construction workers and managers would relocate to the project area while they worked on the project. The remaining 75 percent of the work force, or 385 workers, are expected to be local residents. It is not anticipated that imported construction workers would bring their families with them because most would remain on the job site for only a matter of months. The in-migration of this number of temporary construction workers could result in an adverse impact to housing accommodations in the impact area, on a temporary basis (see discussion under housing below).

3.12.2.2 Employment

The proposed project would result in the creation of approximately 25 permanent jobs, including 15 employees during the 8 AM to 5 PM shift. Five employees would cover each of the evening and nighttime shifts. According to HGC, most of these jobs would be filled by existing residents within the project area.

The moderate number of new permanent jobs created as a result of the project would not result in significant changes to the local economy and work force. Payrolls associated with the new jobs created by the proposed project would have a positive impact on the local economy.

Construction of the power plant, pipeline, and transmission line would, at its peak, provide employment for approximately 385 workers drawn from the local regional labor pool. The remaining 130 workers would come from outside the region and would relocate to the project area for the duration of their work.

The temporary construction jobs would benefit the local economy when local workers and outside workers temporarily living in the project area purchased local goods and services. Some construction materials would also be purchased locally.

The relatively high wage construction jobs created by the project might create a temporary employee shortage for some local small businesses. Employees could conceivably leave their current jobs for better paying project-related jobs, and create a temporary shortage of workers for some local businesses during construction of the project.

Impact—Local Employment: Additional employment opportunities associated with the project would potentially have a beneficial effect on local employment.

Measures Included as Part of the Project:

- HGC shall make a good faith effort to hire most or all permanent workers for the project from the local areas.

- HGC shall make a good faith effort to hire as many construction workers from the local area as is feasible, including the Tri-Cities area.

Measures proposed as part of the project would be adequate to capture the potential benefits associated with increased local employment. No other measures are necessary.

3.12.2.3 Housing

Permanent Housing: During plant operation, the project is not expected to increase demand for housing in the project area because plant employees would be hired from the local community and would already have housing.

Some residents living near the plant would be affected by project-related noise. The project would generate noise sufficiently loud that, despite noise control measures included in the plant design, plant noise would exceed the state standard at two sites—a two-story residence and a mobile home park consisting of eight mobile homes—located within 0.4 kilometer (0.25 mile) of the plant site. To mitigate for this impact, HGC would exercise options to purchase both properties.

If the properties are purchased, the residents would move and nine units of housing would be potentially removed from the local housing supply. However, because eight of the units are mobile homes and could be relocated, there is a strong likelihood that only the two-story residence would be permanently lost to the local housing supply.

HGC would comply with Oregon law regarding the purchase of property containing mobile homes and the termination of mobile home rental agreements. HGC would give notice to tenants of termination at least 365 days in advance of the date of termination. Alternatively, HGC would give at least 180 days notice prior to termination, and identify a replacement site for each mobile home tenant. In addition, HGC would provide for up to $3,500 per tenant for moving expenses.

Temporary Housing: Temporary housing accommodations for the construction work force may not be adequate to house the workers within the impact area. Vacancy rates for these accommodations tend to be low throughout much of the year. Because of the expense associated with a long stay at a motel, it is assumed that the majority of construction workers would seek accommodations at nearby RV parks or in rental housing. As stated above, there are approximately 290 RV spaces in the general project area, with the possibility of up to 100 additional spaces being developed before project construction begins. Assuming 75 percent of the peak-period imported construction work force of 130 workers would reside in RV parks, this would represent a demand for up to 98 RV spaces during the peak construction period. Because of low vacancy rates, the existing supply of RV spaces would likely not accommodate this demand. This would result in increased competition for the limited number of spaces between the project construction work force and others such as tourists, hunters, and other recreationists. Inadequate RV park accommodations within the impact area would result in the construction work force seeking such accommodations at greater distances from the project construction site.

It is assumed the remaining 25 percent of the imported construction work force would stay in motels or rental housing. This would represent a demand for approximately 30 housing units during the peak construction period. Motels in the project area could accommodate this demand. Because of the low vacancy rates in the project area, rental housing may not be available.

Impact—Temporary Housing: Temporary housing, particularly RV spaces, may be inadequate to accommodate the construction work force.

Measures Proposed as Part of the Project:

- HGC would consult with local officials to provide assistance to construction workers in need of housing and to minimize the impact on housing in the area.

Potential Additional Mitigation Measures:

- HGC's advance work with the community should include holding meetings with the community to seek help in locating housing such as rooms in homes, trailer hook-up spaces, apartments, and motel rooms for construction workers.

3.12.2.4 Impact—Increase in Tax Base

Property taxes generated by the project would be primarily earmarked for the Hermiston School District. The project (which is located within the Hermiston School District) would add between $200 and $250 million to the district's existing $500 million tax base (Brookshier 1994b). Because the district's student population is growing, and existing facilities are crowded, the additional tax base would be an important benefit to the district. A larger tax base would allow the district to increase the dollar amount of general obligation bonds it could issue by approximately 50 percent. General obligation bonds allow the district to fund physical improvements to school facilities and to build new facilities.

3.12.3 Unavoidable Adverse Impacts

One or more homes would be permanently lost in the plant vicinity as mitigation for adverse noise impacts. With pre-planning by HGC and communication with local citizens and business people, the potential negative impact on the local rental housing market should be minimized or eliminated.

3.12.4 Cumulative Impacts

The project could result in a small, incremental increase in population in the project vicinity as a result of the in-migration of skilled workers. Umatilla County has experienced a moderate 3.5-percent growth rate over the past 10 years and population growth is expected to continue at a moderate rate. Population increases resulting from construction or operation of this project alone would not significantly affect the projected growth rate for Umatilla County and would not contribute to significant cumulative socioeconomic impacts in the study area.

If two or more of the three cogeneration plants proposed for the Morrow-Umatilla region (the Hermiston Generating Plant in Hermiston, the Hermiston Power Partnership (Ida-West) plant in Hermiston, and the Portland General Electric Coyote Springs plant in Morrow County) were built at the same time, there could be cumulative socioeconomic impacts to the local communities. Building more than one project at the same time would increase the demand for local workers. There could be temporary labor shortages for local businesses if their employees left for better paying construction jobs. Additionally, the projects could possibly fall short of their goals for hiring local workers, because the local labor supply would be insufficient to meet their needs. Outside workers would also have to be brought in to work on the projects. The outside workers associated with all three projects would increase the demand for rental housing in the project area, which currently has low vacancy rates.

3.13 Public Services and Utilities

There would be no significant adverse effects on public services during construction or operation of the project. Local workers would be used to the maximum extent possible to construct and operate the project, minimizing any negative effects on public services.

3.13.1 Affected Environment

Public services and utilities are provided by Umatilla and Morrow Counties, and by the communities of Hermiston, Umatilla, Stanfield, Pendleton, Echo, Irrigon (in Umatilla County), and Boardman (in Morrow County).

3.13.1.1 Utilities

Sewer and Sewage Treatment: The City of Hermiston has a sewage treatment facility that was constructed approximately 12 years ago and has a treatment capacity of 11 million liters per day (MLD) (2.9 million gallons per day [MGD]). Currently, the facility is operating at about 33-percent capacity. During peak flows, the facility is treating about 4.9 to 5.3 MLD (1.3 to 1.4 MGD) which represents less than 50 percent of total capacity (personal communication, Schiffner 1992).

The other cities and towns within the project vicinity have sewage treatment systems that provide service to their communities.

Water Supply: The city of Hermiston's municipal water system consists of two deep wells and one surface well. The city is currently exploring the possibility of purchasing water from the Port of Umatilla's water project to meet future water needs. The city is currently providing about 3,407 million liters (900 million gallons) of water a year to residents of the community (personal communication, Woodward 1992).

The other cities and towns within the project area obtain water from groundwater wells.

Stormwater: No governmental entity within the project vicinity provides stormwater disposal as a governmental service except through the municipal sewer facilities described above.

Solid Waste: There are two primary landfills in Umatilla County that accommodate solid waste: the Hermiston Landfill, which has a projected capacity of 22,680 to 27,215 metric tons (25,000 to 30,000 tons) per year for 40 years, and the Pendleton Landfill, which has a projected capacity of 18,144 metric tons (20,000 tons) per year for 40 years. Several smaller landfills also operate in the county including one located on the Umatilla Reservation and others in Milton-Freewater, Pilot Rock, and Athena. Landfills in Umatilla County are operating below capacity and there are no plans to site any new landfills in the immediate future (Corps 1991).

The largest landfill in Morrow County is the Finley Buttes Waste Disposal Company's new regional landfill in Boardman. The landfill is designed to handle 907.2 metric tons (1,000 tons) of garbage per day for 50 years. The landfill has over 202.3 hectares (500 acres) of land available for current use and an additional 404.9 hectares (1,000 acres) on which to expand. The Columbia Ridge Landfill, also located in Morrow County, has in excess of 50-years' capacity.

3.13.1.2 Police and Fire Protection

This section discusses the level of police and fire protection for each of the communities within the project area. The discussion is summarized in Table 3-22.

State of Oregon: The Oregon State Police (OSP) has an office in the McNary District of the City of Umatilla. Twenty officers are currently stationed there. OSP would, along with the County Sheriff's Department, provide police service for the project area.

Umatilla County: The power plant site is in the jurisdiction of the Umatilla County Sheriff's Department. Police protection services would be provided by the Department's West County station, which has a total of three deputies patrolling a service area of about 388.5 square kilometers (150 square miles) (personal communication, Cameron 1992).

Hermiston: The Hermiston Police Department provides police protection services within the city limits. The department maintains a staff of 16 police officers and

Table 3-22. Police and Fire Services

Jurisdiction	Police Staffing	Services in Project Area	Fire Staffing	Services in Project Area
Umatilla County (West City Station)	3 Deputies	Primary Response	N/A	N/A
Hermiston	16 Officers 7 Dispatchers	Mutual Aid	13 Full-time 40 Volunteers	Primary Response
Umatilla	6 Officers	Mutual Aid	30 Volunteers	Mutual Aid
Stanfield	3 Officers	None	16 Full-time	Mutual Aid
Echo	N/A	N/A	25 Volunteers	Mutual Aid
Pendleton	22 Officers 6 Dispatchers	None	24 Full-time 20 Volunteers Paramedics	Mutual Aid
Irrigon	N/A	N/A	20 Volunteers	Mutual Aid
Boardman	2 Officers	None	N/A	Mutual Aid

Source: Toyon Environmental Consultants, Inc. 1993
N/A: Not applicable.

seven dispatchers. The Hermiston Police Department would provide second response capabilities for the power plant through its mutual aid agreement with the Sheriff's Department. The department coordinates 911 emergency response through the Hermiston Safety Center (personal communication, Asher 1992).

The power plant site is located within the Hermiston Rural Fire Protection District, and fire protection services to the site are provided by the Hermiston Fire Department. The department has a total of 13 full-time personnel and 40 volunteer firefighters. The department is equipped to handle fire and medical emergencies and hazardous material spills (personal communication, Stearns 1992).

Umatilla: Police protection services are provided by the Umatilla Police Department, which has a staff of 6 police officers. Emergency 911 response is dispatched through the Hermiston Safety Center. The department maintains mutual aid and intergovernmental agreements with nearby police departments, the Umatilla County Sheriff's Department, and the Oregon State Police (personal communication, Olson 1992).

The Umatilla Fire Department is a volunteer department with 30 volunteers. The department maintains mutual aid agreements with other fire departments (personal communication, Roxbury 1992).

Stanfield: Police protection is provided by the Stanfield Police Department, which has a staff of three police officers. Emergency 911 response is provided by the Hermiston Safety Center (personal communication, Wainwright 1992).

Fire protection services are provided by the Stanfield Fire Department. Total personnel include 16 full-time firefighters. The Stanfield Fire Department has a mutual aid agreement with the Hermiston Fire Department and other departments in the area (personal communication, Whelan 1992).

Echo: Police protection services are provided by the Umatilla County Sheriff's Department through a mutual aid agreement (personal communication, Berry 1992). Emergency 911 response is provided by the Hermiston Safety Center.

Echo is located in the Rural Fire Protection District and fire protection is provided by the Echo Volunteer Fire Department, which has a total of 25 volunteer fire fighters (personal communication, Berry 1992).

Pendleton: The Pendleton Police Department provides police protection services to the residents of Pendleton. The department maintains a staff of 22 officers and 6 emergency dispatchers. In addition to the city's 911 emergency response capabilities, Umatilla County maintains a 911 dispatch center in Pendleton. The city and county departments have an agreement to provide back-up assistance to each other as needed (personal communication, Ward 1992).

Fire protection services are provided by the Pendleton Fire Department. The department has 24 full-time and 20 volunteer personnel, including paramedic units. The Pendleton Fire Department has a mutual aid agreement with Hermiston Fire Department and other departments in the area (personal communication, Reynolds 1992).

Irrigon: Police protection is provided by the Umatilla County Sheriff's Department through a mutual aid agreement (personal communication, Winters 1992).

Fire protection is provided by the Irrigon Fire Department, which is a volunteer department. There are a total of 20 volunteers. The department maintains mutual aid agreements with Hermiston Fire Department and other departments in the area (personal communication, Buchanan 1992).

Boardman: The Boardman Police Department provides police protection services to the community. The department maintains a total of 2 police officers (personal communication, Muir 1992).

Fire protection is provided by the Boardman Fire Department.

3.13.1.3 Health Care

Hospitals located in the project area include the Good Shepherd Community Hospital in Hermiston and St. Anthony Hospital in Pendleton. The Hermiston Community Health Clinic provides outpatient care, laboratory, pharmacy, outreach, and social services. The project would be served by the Good Shepherd Community Hospital, which is a fully equipped hospital including a helicopter pad for air evacuation. Good Shepherd Community Hospital has arrangements with hospitals in Pendleton, The Dalles, and the Tri-Cities area to handle overloads in the event of an emergency situation (e.g., failure of primary and backup power supplies).

3.13.1.4 Libraries

Libraries are available in the communities of Hermiston, Umatilla, Stanfield, Pendleton, Echo, and Boardman. The community of Irrigon does not have a library.

3.13.1.5 Schools

This section discusses the enrollment and capacity of the schools within the project area. There are six school districts within the 48.3-kilometer (30-mile) project area: Hermiston, Umatilla, Stanfield, Echo, Pendleton, Irrigon, and Boardman. There are 25 schools located within the six school districts. Table 3-23 summarizes the number of students currently enrolled in each school and the current level of capacity.

3.13.2 Environmental Consequences and Mitigation Measures

There would be no significant adverse effects on public services during the construction or operation of the project. Hiring mostly local personnel to operate the project would minimize any additional demands on public services.

3.13.2.1 Utilities

Sewer and Sewage Treatment: During operation, the project would divert its domestic sewage to the Lamb-Weston treatment facility adjacent to the power plant site. Industrial wastewater generated by plant operations would be directed to an oil/water separator and then to a neutralization tank. This waste stream would then be reused in the cooling water system. There would be zero discharge of industrial

Table 3-23. School Enrollment and Capacity for 1992

School	Enrollment	Percent Capacity
Hermiston		
Hermiston H.S.	1065	80
Hermiston J.H.S.	634	97
Highland Hills E.S.	549	105
Rocky Heights E.S.	531	105
Sunset E.S.	506	96
West Park E.S.	490	95
Umatilla		
Umatilla H.S.	250	At Capacity
Clara Brownell M.S.	250	At Capacity
McNary Heights E.S.	500	125
Stanfield		
Stanfield H.S.	155	At Capacity
Stanfield M.S.	280	At Capacity
West E.S.	150	At Capacity
Echo		
Echo Public School	205	46
Pendleton		
Pendleton H.S.	715	At Capacity
Pendleton J.H.S.	788	At Capacity
Hawthorne E.S.	386	At Capacity
McKay E.S.	363	At Capacity
Lincoln E.S.	209	At Capacity
Washington E.S.	391	At Capacity
West Hills E.S.	173	At Capacity
Sherwood E.S.	467	At Capacity
Irrigon		
Columbia J.H.S.	209	Over Capacity
A.C. Houghton E.S.	400	At Capacity
Boardman		
Riverside H.S.	368	105
Boardman E.S.	376	107

Source: Toyon Environmental Consultants, Inc. 1993
E.S. = Elementary School
J.H.S. = Junior High School
H.S. = High School

wastewater. The project would not be hooked up with the Hermiston sewage system. However, if sewer service were needed, the existing city system would have adequate capacity to accommodate the project's domestic wastewater requirements.

Stormwater would be collected in an on-site collection basin and used as process cooling water.

During construction, bottled water would be provided to the construction work force. Construction activities would not result in significant adverse impacts to the domestic water supply. Water needed for construction would be trucked to the job site.

Solid Waste: The solid waste generated from plant operations would be approximately 36.3 metric tons (40 tons) per year. A recycling and waste minimization program has been developed for the facility that establishes guidelines for conservation and recycling of materials. Approximately 2.4 metric tons (2.7 tons) per day of filter cake would be generated by the wastewater treatment system. Project-generated solid waste could be accommodated by local landfills and would not result in adverse impacts to landfill capacities over the short or long term.

3.13.2.2 Police and Fire Protection

The power plant site would be fenced. The power plant would operate 24 hours a day with personnel on site at all times. This would minimize opportunities for theft and vandalism at the facility. Police protection would be provided by the Umatilla County Sheriff's Department. According to the Sheriff's Department, the project is not expected to result in significant adverse effects to the department or its capability to provide adequate service to the area (personal communication, Cameron 1992). Second response calls for emergency services would be provided by the Hermiston Police Department through its mutual aid agreement with the Sheriff's Department. The Hermiston Police Department anticipates no problems providing police services to the power plant (personal communication, Asher 1992).

The project is not expected to significantly increase the number of households within the impact area because most plant employees would be drawn from the local community. Therefore, the project would not cause a significant increase in demand for police services as a result of new residents moving to the area.

The plant facility would be constructed with full hydrants and a sprinkler and deluge system. Plant employees would be trained in emergency first aid procedures. According to the Hermiston Fire Department, if the project provides all fire protection equipment and facilities in accordance with the Oregon Fire Code, the project would not be expected to result in significant adverse impacts to the department's existing capabilities (personal communication, Stearns 1992).

3.13.2.3 Health Care

The project is not expected to adversely affect medical services in the impact area. Employees would be trained to provide emergency first aid treatment. Medical emergencies at the plant could be accommodated by the nearby hospital facilities.

3.13.2.4 Libraries

The project would not adversely affect libraries in the project area.

3.13.2.5 Schools

The project would not result in a significant increase in the number of households because most plant employees would be hired from within the 48.3-kilometer (30-mile) project area. There would be minimal in-migration of new families as a result of the proposed project, and consequently, minimal increases in the student population. The project would not adversely affect the local schools.

As previously discussed, the construction work force would not generally include families. Temporary increases in the local population caused by the in-migration of up to 130 construction workers would not result in significant increases in the student population and there would be no impacts to schools within the project area.

The proposed project would not result in adverse impacts on public services and facilities; therefore, no mitigation is required.

3.13.3 Unavoidable Adverse Impacts

There would be no unavoidable adverse effects on public services during construction or operation of the project.

3.13.4 Cumulative Impacts

The project would result in a small incremental increase in demand for police and fire protection services in the project vicinity. The project could result in a slight increase in school-age children attending schools in the study area if there is an in-migration of skilled workers with families. The project, in combination with cumulative development, would not result in significant cumulative impacts on public services and facilities.

3.14 Health and Safety

The Hermiston Generating Project has been designed with careful attention to the reduction of hazards associated with its operation and meets or exceeds state and Federal standards for safety in all its components. Safety and emergency systems are included in the design and would be included during construction of the project to ensure safe and reliable operation of the facilities. Continuous monitoring of process variables and a thorough maintenance program would promote safety and reliability.

Power lines, like all electrical devices and equipment, produce EMF. It is BPA's policy to conduct a magnetic field exposure assessment anywhere that homes and commercial buildings could experience magnetic fields from a new transmission line. For this project, the maximum magnetic field predicted at the nearest home (67 meters [220 feet] from the center of the proposed transmission line right-of-way) is predicted to be 3 milligauss. For the optional transmission line route, the maximum magnetic field at the nearest building (38 meters [125 feet] from the center of the right-of-way) is expected to increase from approximately 7 milligauss to 14 milligauss. A milligauss is a unit of magnetic field strength equal to 0.001 of a gauss. The earth's magnetic field strength, by comparison, is about 500 milligauss. Because the scientific literature relating to EMF has not yet established a cause-and-effect relationship between electric or magnetic fields and adverse human health effects, no adverse health effects are reasonably foreseeable.

There are several issues discussed in this section relating to public health and safety: occupational safety and health; power plant fuel management; use, handling, and storage of hazardous non-fuel substances; fire protection; solid and liquid waste disposal; electric shock hazard; and EMF. Additional safety issues are discussed in Section 3.2, Hydrology and Water Quality; Section 3.6, Air Quality; and Section 3.8, Traffic and Circulation.

3.14.1 Power Plant Construction and Operation

3.14.1.1 Occupational Safety and Health

HGC proposes to implement a comprehensive occupational safety and health program to protect facility workers during all phases of construction and operation of the power plant. The program would meet or exceed all Federal, state, and local requirements.

Construction Safety Program: A construction safety program would be implemented by Bechtel as the prime contractor, based on HGC's safety program and industry standards for accident prevention. At a minimum, the construction safety program would comply with all existing Federal, state, and local health and safety regulations. All contractors involved with the project would be required by their contract terms to comply with the construction safety program. Key elements of the plan would include:

- Responsibilities of construction team and subcontractors;
- Job site rules and regulations;
- Emergency response procedures;
- Safety inspections and audits;
- Medical services and first aid;
- Safety meetings, employee training, and communication, including the hazard communications program and a review of procedures when performing high risk tasks;
- Personal protective equipment;
- Standard construction procedures; and
- Accident investigation and reporting.

The only hazardous materials likely to be on the construction sites are equipment fuels (gasoline and diesel), lubricants, solvents, and paints. These would be handled according to standard safety precautions, described in the Construction Safety Program, such as no smoking in refueling areas, storing materials in original containers, and proper disposal of empty containers.

Safety During Plant Operations: An employee safety program for plant operations would be implemented. It would include regular employee education and training in safe working practices for general work practices and for particular tasks; communication of hazards in accordance with state and Federal standards; accident incident evaluations; administrative safety procedures; emergency response; fire protection and fire response; and maintenance of safety performance data. All operations personnel would be provided with written safety guidance similar to that used at other U.S. Generating Company facilities.

A first aid station containing basic first aid equipment would be established near the control room. First aid training would be offered to all operators.

The project as proposed would provide adequate safety measures for workers, so that no significant impacts are identified.

3.14.1.2 Power Plant Fuel Management

Natural gas would fuel the power plant except in rare cases of interruptions of natural gas supplies. If the optional backup fuel were used, a supply would be kept at the power plant site as described in Section 3.8.

Natural Gas Management: The proposed power plant would be fueled by natural gas supplied by a pipeline connected to the PGT pipeline approximately 8 kilometers (5 miles) from the plant site.

Impact—Risk of Natural Gas Leakage: Natural gas could leak, posing a risk of fire.

Measures Included as Part of the Project:

- The pipeline would be constructed in accordance with the requirements of the U.S. Department of Transportation as set forth in 49 CFR and OAR 345-24-060.

- Fuel control systems on the gas turbines would include separate fuel shut-off valves to stop all fuel flow to the units under shutdown conditions. Fuel flow would be restarted only when all permissive firing conditions have been satisfied. Each fuel shut-off valve would have a mechanical device for local manual tripping, and a means for remote tripping. A vent valve would be provided on fuel gas systems downstream of the pipeline, to automatically vent the piping downstream of the shut-off valve when that valve closes.

- Isolation valves would be installed on the gas pipeline at the PGT pipeline connection point and at the power plant. Gas handling facilities would be operated in accordance with accepted, proven industry standards and procedures.

These measures would be adequate to ensure safe handling of fuels.

3.14.1.3 Hazardous Non-Fuel Substances

Several hazardous materials would be used at the power plant. The following list summarizes typical chemicals currently planned for use at the facility. The chemicals and quantities may change as the plant design is refined.

- Aqueous ammonia used as a reagent in the control of NO_x;
- Lubricating oils, insulating oils, hydraulic fluids, and other hydrocarbons used to operate and maintain plant equipment;
- Battery acid used in all batteries;
- Sodium hypochlorite used as a disinfectant and biocide in cooling tower water;
- Sulfuric acid for corrosion control in cooling tower water and to neutralize the pH of cooling tower water; and
- Calcium hydroxide, magnesium oxide, and soda ash for use in the process water sidestream softener.

Impact—Aqueous Ammonia Spills: The design of the aqueous ammonia storage and handling subsystem was done with careful attention to the goal of eliminating hazards associated with the use of ammonia. Nonetheless, ammonia could spill and/or ammonia vapor could be released to the atmosphere.

Measures Included as Part of the Project: Features specifically included in the design of the project to reduce hazards from ammonia include the following:

- The Hermiston Generating Project would use a 29-percent concentration of aqueous ammonia rather than using anhydrous (full-strength) ammonia. This greatly reduces the rate of evaporation for any spilled ammonia.
- The ammonia would be located in a fully contained and diked concrete storage area with a holding capacity that is 110 percent of the maximum tank capacity, plus the 50-year, 24-hour storm event.
- The tank would be vented through water in a sealed pit to absorb vapors and prevent the release of ammonia.

- Piping would be located so that spills would be collected and drained to the sump.

Potential Additional Mitigation Measures: An SPCC Plan should be developed and implemented prior to the arrival of any hazardous materials at the project site. The SPCC should address issues regarding storage and the proper response in the unlikely event of a release or other incident. The SPCC Plan should be prepared in accordance with 40 CFR 112. In addition, all applicable reporting requirements mandated under SARA Title III should be met, including the notification of Local Emergency Planning Committees of the quantities and types of chemicals used at the facility.

All hazardous materials should be stored in structures that meet the requirements of the Uniform Fire Code, Article 80. In addition, a Hazardous Materials Inventory Statement and a Hazardous Materials Management Plan should be written and filed with the Hermiston Fire Department. These plans should be in accordance with the Uniform Fire Code, Article 80, Appendix II-E.

These measures would be adequate to mitigate the potential impacts of ammonia spills.

Impact—Spills of Other Hazardous Non-Fuel Substances: Measures to protect equipment and workers from harmful exposure to chemicals such as sulfuric acid and caustic would be implemented. Training, including periodic refresher courses, would be provided to all workers who would handle hazardous materials. Areas in which these chemicals would be stored or used would have containment areas so that spills and wastes would be collected, treated, and monitored in accordance with regulatory requirements. Foundations and slabs for equipment containing lubricating oil, insulating oil, or hydraulic fluid would be designed to contain any spill. Neutralizers and/or absorbers would be kept on the site in case a spill were to occur. Suitable garment coverings would be provided for all personnel handling sulfuric acid. All storage areas for chemicals would provide storage for a volume equal to at least 110 percent of the maximum chemical volume plus the 50-year, 24-hour rainfall event. Because these materials would be confined to the plant site in the event of a spill or leak, the affected environment consists of the power plant site. Spills of these liquids could occur during delivery or use or when containers are damaged. The measures described below would reduce the risk of accidental release of hazardous materials and, if a spill occurred, reduce the extent of the spill and protect people in the vicinity of the spill.

Nonetheless, hazardous non-fuel substances could spill, with the potential to harm people in the plant and in the surrounding area.

Measures Included as Part of the Project:

- Management of hazardous substances would be conducted in accordance with all applicable Federal, state, and local regulatory standards for public and occupational safety and health protection. Training would be provided to appropriate workers in materials handling and disposal. The storage and conveyance systems for liquid hazardous chemicals have been designed to prevent and contain spills through pumping and storage controls and secondary containment for tanks. Pumping and storage tank controls would include:

    - Dry disconnect transfer hose and piping connections;
    - Automatic pump shut-off on tank high-level indicators;
    - Redundant tank level indicators and alarms;
    - Daily inspections; and
    - Supervised unloading and transfer operations.

- The power plant would incorporate an on-site fire suppression system and would be constructed from fire retardant materials to the extent reasonably feasible. The power plant design would incorporate spill prevention and containment designs for the storage of all hazardous materials. Compliance with all applicable fire suppression and hazardous material safety requirements would be established in consultation with the Hermiston Fire Department, the State Fire Marshall, and the Building Codes Agency.

- Prior to commencing construction, the HGC would submit a plan acceptable to EFSC, in consultation with Umatilla County, for responding to an emergency at the Umatilla Army Depot. The plan would be developed in consultation with the Umatilla County Chemical Stockpile Emergency Preparedness Program.

- HGC would conduct an Accidental Release Assessment for the project. The assessment would provide the basis for the Emergency Response Plan that will be in place before operations commence.

Potential Additional Mitigation Measures: As noted above in the discussion of aqueous ammonia, HGC should prepare an SPCC Plan regarding storage, handling, and spill response for hazardous materials. Preparation and implementation of the plan would be adequate to mitigate the potential impacts of other non-fuel hazardous material spills.

3.14.1.4 Fire Protection

The Hermiston Generating Project site is located in an industrial area, adjacent to the Lamb-Weston potato processing facility and with agricultural land nearby. Fire control would be provided by personnel from the power plant for incipient firefighting only. Primary firefighting would be provided by nearby fire departments identified in Section 3.13, Public Services and Utilities.

Impact—Fire Potential: Fire could occur, posing a threat to workers and nearby people and structures.

Measures Included as Part of the Project: The U.S. Generating Company proposes a comprehensive on-site fire protection system, designed to control and extinguish fires within buildings and yard areas. The system, described in more detail in Section 2.2.9.1, would conform with the Uniform Fire Code and all applicable fire protection standards.

- The power plant would incorporate an on-site fire suppression system and would be constructed from fire retardant materials to the extent reasonably feasible. The power plant design would incorporate spill prevention and containment designs for the storage of all hazardous materials. Compliance with all applicable fire suppression and hazardous material safety requirements would be established in consultation with the Hermiston Fire Department, the State Fire Marshall, and the Building Codes Agency.

- The fire protection system would include a capability to control fires by means of a fire water system, a dry chemical extinguishing system, a CO_2 extinguishing system, and portable fire extinguishers. Appropriate response to the range of potential fire situations at the facility would be possible.

The measures included in the project as proposed would be adequate to mitigate the potential impacts of fire at the power plant.

3.14.1.5 Solid and Liquid Waste Disposal

Nonhazardous and hazardous wastes (both solid and liquid) would be generated during construction and operation. These materials could include waste metals, miscellaneous construction debris (consisting of wood, concrete, paper, and other refuse), aluminum cans, glass, waste oils, lubricants, solvents, antifreeze, soiled rags, aerosol cans, tires, paints, welding rod stub, lead-acid batteries, spent SCR catalyst, and filter cake from the sidestream softener system.

Construction debris would be stored in on-site dumpsters and hauled by a private contractor to a properly licensed disposal facility. Sewage generated during construction would be stored in tanks or portable toilets and periodically removed from the site by a sewage disposal vendor. Flushing oils and other wastes would be stored in barrels or tanks prior to disposal by an appropriate vendor licensed for waste disposal.

Spent SCR catalyst would removed by the supplier for off-site recovery and/or disposal.

The project would generate approximately 36.3 metric tons (40 tons) per year of normal domestic waste that would be disposed of by a private contractor. Approximately 72.6 metric tons (80 tons) of filter cake per month would be generated by the sidestream softener process. The filter cake would be stored on the site in bins and periodically removed for off-site disposal at local landfills. Two local landfills are available to accept the filter cake: the Finley Buttes Landfill and the Columbia Ridge Landfill. Both facilities are relatively new, large capacity landfills. The Columbia Ridge Landfill has in excess of 50-years' capacity.

The power plant would be operated to minimize the volume of hazardous waste that would require disposal. To the extent possible, materials would be consumed, recycled, or neutralized. Small quantities of hazardous waste, primarily hydrocarbons, would be produced and hauled off the site by a licensed disposer.

Impact—Waste Generation: Waste generated during construction and operation of the project would require disposal.

Measures Included as Part of the Project:

- During all phases of construction and operation, HGC proposes to implement waste minimization and recycling programs to the greatest extent possible. Construction material and office recycling programs would be implemented to the greatest extent practicable to reduce waste.

Because of the recycling and waste minimization programs that would be implemented at the Hermiston Generating Project, no additional mitigation measures are necessary.

3.14.1.6 Electrical Shock Hazard

Power lines can cause serious electric shocks if they are not constructed to minimize the shock hazard. Also, high-voltage transmission lines can induce a voltage on nearby ungrounded metal objects, such as wire fencing mounted on wooden fence posts that keep the induced charge from discharging into the ground. This problem is solved by providing grounding for the charged object.

Impact—Electrical Shocks: High-voltage transmission lines can cause electrical shocks directly and from induced charges.

Measures Included as Part of the Project:

- The transmission line would be designed, constructed, and operated in a manner consistent with the National Electrical Safety Code, Section C2, 1993 edition (American National Standards Institute), as well as REA standards, where applicable.

- The transmission line would be designed so that alternating current (ac) electrical fields would not exceed 9 kV per meter at 1 meter (3.4 feet) above the ground surface in areas accessible to the public.

- The transmission line would be designed so that induced currents resulting from the transmission line and related facilities would be as low as reasonably achievable. HGC would agree to a program, or ensure that the entity responsible for the transmission line agrees to a program, that would provide reasonable assurances that all fences, gates, cattle guards, trailers, or other permanent objects or structures that could become inadvertently charged with electricity would be grounded through the life of the line.

The measures included in the project as proposed would be adequate to mitigate shock hazards from the transmission line.

3.14.2 Gas Pipeline Construction and Operation

The gas pipeline right-of-way would be about 8 kilometers (5 miles) long, extending from the intertie with the PGT pipeline north to the power plant site. The construction right-of-way would be approximately 15.2 meters (50 feet) wide, with a total land area of approximately 12.3 hectares (30.3 acres).

Impact—Risk of Hazardous Substance Spill: Hazardous substances such as fuel and automotive oil could spill, with the potential of affecting the immediate area.

Potential Additional Mitigation Measures: A Stormwater Control Plan will be written prior to starting construction. The plan should address issues regarding storage and the proper response in the unlikely event of a spill. Development and implementation of the plan would be sufficient to control adverse impacts from spills during construction and operation of the gas pipeline.

3.14.3 Electric and Magnetic Fields

3.14.3.1 Typical Electric and Magnetic Field Strengths

Power lines, like all electrical devices and equipment, produce EMFs. Current (movement of electrons in a wire) produces the magnetic field. Voltage (the force that drives the current) is the source of the electric field. The strength of these fields also depends on the design of the line and on distance from the line. Field strength decreases rapidly with this distance.

Electric and magnetic fields are found around any electrical wiring, including household wiring and electrical appliances and equipment. Throughout a home, the electric field strength from wiring and appliances is typically less than 0.01 kilovolts per meter (kV/m). However, fields of 0.1 kV/m and higher can be found very close to electrical appliances. Typical electric and magnetic field strengths for some common electrical appliances are given in Table 3-24.

Table 3-24. Typical Electric and Magnetic Field Strengths from Common Appliances[1/]

Appliance	Electric Field (kV/m)	Magnetic Field[2/] (mG)
Coffee Maker	.030	1 to 1.5
Electric Range	.004	4 to 40
Hair Dryer	.040	0.1 to 70
Television	.030	0.4 to 20
Vacuum Cleaner	.016	20 to 200
Electric Blanket[3/]	.01 to 1.0	15 to 100

1/ Values are calculated using a distance of 30.5 centimeters (1 foot) from appliance.
2/ By 1 to 1.5 meters (3 to 5 feet), the magnetic field from appliances is usually decreased to less than 1 mG.
3/ Values are for distances from a blanket in normal use, not 1 foot away.
Source: Miller 1974, Gauger 1985
Notes: kV/m = kilovolts per meter
mG = milligauss

Average magnetic field strength in most homes (away from electrical appliances and home wiring, etc.) is typically less than 2 milligauss. Very close to appliances carrying high current, fields of tens to hundreds of milligauss are present (Table 3-24).

Unlike electric fields, magnetic fields from outside power lines are not reduced in strength by trees and building material. So, power lines can be a major source of magnetic field exposure throughout a home located close to the line. Typical electric and magnetic field strengths for some BPA transmission lines are given in Table 3-25.

Table 3-25. Typical Electric and Magnetic Field Strengths from BPA Transmission Lines

Transmission Lines	Electric Fields (kV/m)	Magnetic Field (mG)	
		Maximum 1/	Average 2/
115-kV			
Maximum on Right-of-way	1.0	63	30
Edge of Right-of-way	0.5	14	7
60 meters (200 feet) from Center	0.01	1	0.4
230-kV			
Maximum on Right-of-way	2.0	118	58
Edge of Right-of-way	1.5	40	20
60 meters (200 feet) from Center	0.05	4	2
500-kV			
Maximum on Right-of-way	7.0	183	87
Edge of Right-of-way	3.0	62	30
60 meters (200 feet) from Center	0.3	7	3

1/ Under annual peak load conditions (occurs less than 1 percent of the time)
2/ Under annual average loading conditions

Notes: Above information obtained from BPA study to characterize nearly 400 transmission lines located in the Pacific Northwest.
kV/m = kilovolt per meter
mG = milligauss

3.14.3.2 Studies of Health Risk Associated with Electric and Magnetic Fields

There are no national standards for electric or magnetic fields, although some states have established electric or magnetic field standards. The State of Oregon has an electric field strength standard of 9 kV/m maximum on the right-of-way. The transmission line associated with the Hermiston Generating Project would meet this electric field standard.

Both electric and magnetic ac fields induce currents in conducting objects, including people and animals. These currents, even from the largest power lines, are too weak to be felt. However, some scientists believe that these currents might be potentially harmful and that long-term exposure should be minimized. Hundreds of studies on electric and magnetic fields have been conducted in the United States and other countries. Studies of laboratory animals generally show that these fields have no obvious harmful effects. However, various subtle effects of unknown biological significance have been reported in some laboratory studies (Frey 1993).

Much attention at present is focused on several recent reports suggesting that workers in certain electrical occupations and people living close to power lines have an increased risk of leukemia and other cancers (Sagan 1991, NRPB 1992, ORAU Panel 1992, Stone 1992). Most scientific reviews, however, find that the overall evidence is too weak to establish a cause-and-effect relationship between electric or magnetic fields and cancer. A review of some of the studies relating to EMF and possible biological and health effects is included in Appendix H.

3.14.3.3 Magnetic Field Analysis and Exposure Assessments

Because the state of the scientific evidence relating to EMF has not yet established a cause-and-effect relationship between electric or magnetic fields and adverse health effects, it is impossible to predict specific health risks, or a specific potential level of disease related to exposure to EMF. However, it is possible to conduct exposure assessments of magnetic fields from transmission lines. Exposure assessments are estimates of the field levels to which people are potentially exposed.

Today, most of the scientific concern focuses on exposure to magnetic fields. People are not shielded from magnetic fields by trees, houses, and other objects. Therefore, this exposure assessment focuses on magnetic field levels.

A magnetic field exposure assessment is done by first estimating what future magnetic field levels would be without the new project. This analysis serves as a baseline measurement. Engineers then estimate the possible change in field levels assuming the proposed project is in place. An increase in public exposure is defined as a situation where field levels with the new project will increase and buildings are located nearby.

In designing the magnetic field exposure assessment for this project, BPA determined that the affected region encompasses buildings along the transmission corridor where people spend significant portions of each day. This includes homes and businesses. Magnetic field calculations were made by CH2M HILL (1993) for the transmission corridor anywhere homes and commercial buildings exist that could experience magnetic field levels from the transmission lines (see Appendix H).

The magnetic field exposure levels are only indicators of how this proposed project may affect the magnetic field environment. Because of the reasons stated above, they do not represent measures of risk or impacts on health.

Proposed Transmission Line: The proposed project includes rebuilding an existing 115-kV transmission line to a double-circuit transmission line with one side operated at 230 kV and the other side operated at 115 kV. There are a few residences and one commercial building close enough to the transmission corridor to experience a potential increase in magnetic field exposure. These are identified as Areas 1, 2, 3, and 4 in Table 3-26 and Figure 3-18.

Table 3-26. Potential Increases in Magnetic Field Environment—Proposed Transmission Line Route

Buildings	Direction from Centerline	Distance from Centerline (approximate)	Magnetic Field Strength Before Project (approximate)	Maximum Peak Magnetic Field Strength with Project (approximate)
Area 1	East (right)	79 m (260 ft)	less than 1 mG	3 mG
Area 2	East (right)	67 m (220 ft)	less than 1 mG	3 mG
Area 3	West (left)	70 m (230 ft)	less than 1 mG	2.5 mG
Area 4	North (left)	70 m (230 ft)	less than 1 mG	2.5 mG

mG = milligauss
Source: Appendix H2.

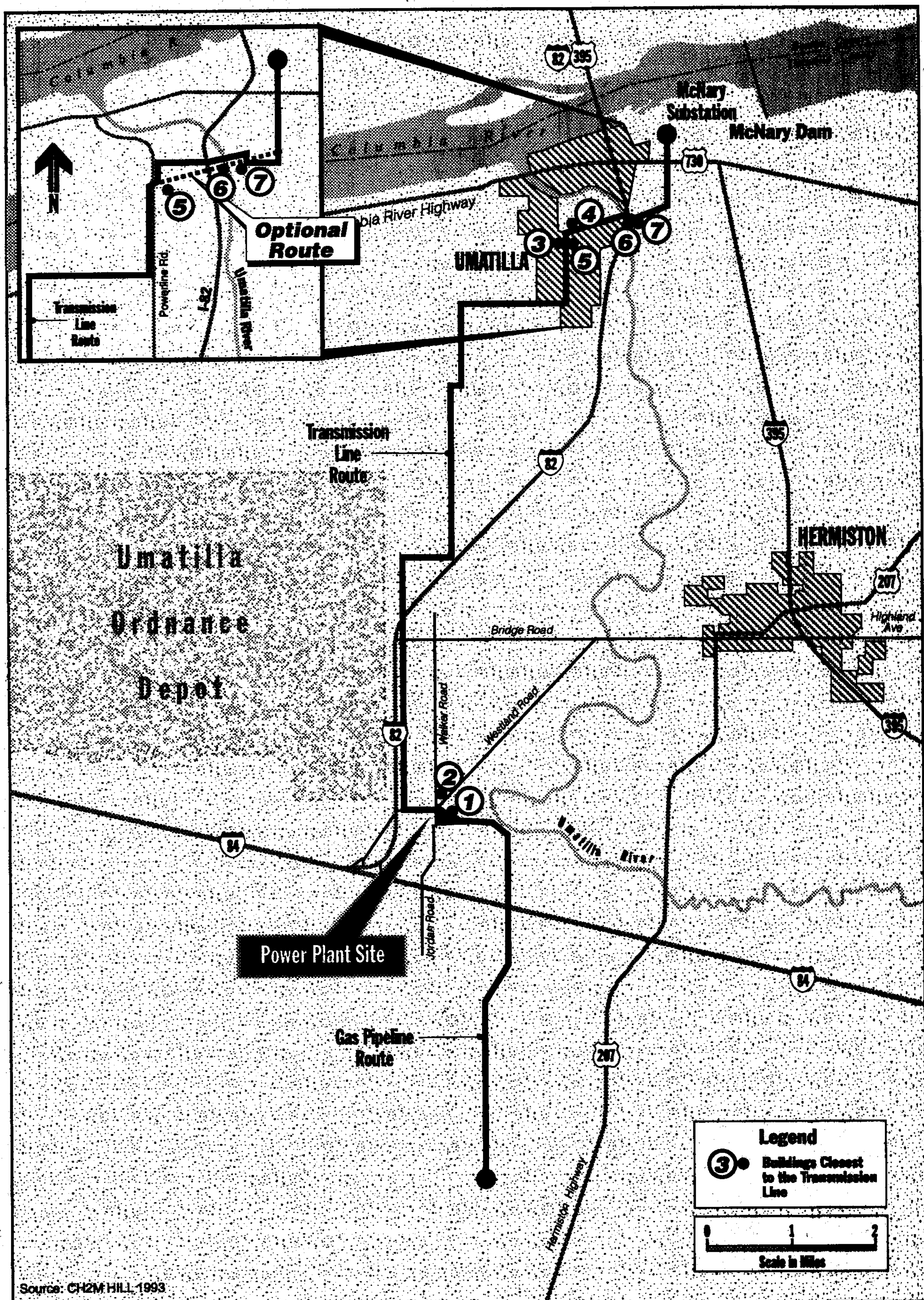


Figure 3-18 Building Proximity to Proposed Transmission Line

These four areas are briefly described below:

- Area 1 includes a two-story residence located just north of the Lamb-Weston facility and approximately 79.2 meters (260 feet) east of the transmission line. At this location, the transmission line would be built jointly with the UECA 115-kV line and a 12.47-kV distribution line.

- Area 2 consists of a trailer and a furniture store on the northeast corner of Westland and Walker Roads. The trailer is the closest structure and lies approximately 67 meters (220 feet) northeast of the 90-degree angle structure on the northwest corner of the intersection.

- Area 3 includes three frame residences located on the west side of Powerline Road approximately 70 meters (230 feet) from the 90-degree angle pole where the transmission line turns east. At this location, a three-phase, four-wire, 12.47-kV Pacific Power distribution line stands between the homes and the UECA transmission line.

- Area 4 includes residences located approximately 0.4 kilometer (0.25 mile) east of Area 3 and approximately 70 meters (230 feet) north of the UECA transmission line. At this location, the proposed double-circuit transmission line would be underbuilt with a UECA 12.47-kV distribution circuit.

Optional Transmission Line Segment: An optional routing alternative would place the new line parallel to, but 152 meters (500 feet) south of an existing BPA corridor (see Figure 2-4).

There are two buildings and one church close enough to the optional route to experience a potential increase in magnetic field exposure. These are identified as Areas 5, 6, and 7 in Table 3-27 and on Figure 3-18.

Area 5 includes a church (which may also be a residence) south of the BPA corridor. Area 6 includes one residence south of the BPA corridor. Area 7 includes one residence south of the BPA corridor.

Impact—Increase in EMF: The maximum peak magnetic field at the nearest home or business (67 meters [220 feet] from the center of the right-of-way) for the proposed transmission line route is predicted to increase from less than 1 milligauss to 3 milligauss (Table 3-26). The field at other identified buildings would increase to 3 milligauss or less.

Table 3-27. Potential Increases in Magnetic Field Environment—Optional Transmission Line Route

Buildings	Direction from Centerline	Distance from Centerline (approximate)	Magnetic Field Strength Before Project (approximate)	Maximum Peak Magnetic Field Strength with Project (approximate)
Area 5	South	58 m (190 ft)	4.6 mG	7.3 mG
Area 6	South	38 m (125 ft)	7.0 mG	14.2 mG
Area 7	South	62 m (205 ft)	6.6 mG	4.2 mG

mG = milligauss
Source: Appendix H2.

The maximum peak magnetic field at the nearest building (38 meters [125 feet] from the center of the right-of-way) for the optional transmission line segment is predicted to increase from approximately 7 milligauss to 14 milligauss (Table 3-27).

Measures Included as Part of the Project:

- With the exception of the optional alignment described in HGC's amendment to the application for site certification (dated December 24, 1993) and the 0.4-kilometer (0.25-mile) section of new right-of-way required immediately south of McNary substation, the transmission line upgrade would be constructed substantially along the route of the existing UECA right-of-way to avoid populated areas to the extent practicable. The HGC would configure the transmission lines to minimize EMF. Upon certification and throughout the construction and operation of the facility, the HGC would provide on request by the public, any information in its possession, or information publicly available that pertains to EMF levels associated with the power plant and related transmission lines.

Impact—Exposure to Workers: Any electrical generation plant produces some level of electric and magnetic fields within the plant. Workers in such a plant are exposed to these fields while performing their jobs. Currently, the levels and duration of exposure to those that would be working at the Hermiston Generating Project are unknown.

3.14.4 Cumulative Impacts

Public health and safety issues associated with the project that could contribute to cumulative impacts include EMF impacts from the transmission line, storage and handling of hazardous materials, and traffic impacts.

Upgrading the electrical transmission line in combination with existing and future transmission lines can result in increased electrical and magnetic fields, particularly at the northern end of the transmission line where several existing transmission lines are present. However, residences and other buildings in this area are located at sufficient distances from the proposed line.

Because the proposed power plant site is located in an industrial area, storage and handling of hazardous material at the proposed facility will add to similar activities in the area. The power plant would implement a wide variety of safety measures to minimize the potential for releases of hazardous materials. Additionally, the project area is not densely populated. Therefore, the potential for health and safety impacts from storage and handling of hazardous materials would not be significant.

4.0 Environmental Consultation, Review, and Permit Requirements

A number of Federal environmental laws and administrative requirements must be satisfied by the proposed project. This chapter provides a summary of these requirements and discusses their applicability to the project. Requirements of the State of Oregon must be satisfied; they are not described in detail in this chapter, but are listed in the final section.

4.1 National Environmental Policy Act

This document contains information necessary for preparation of the EIS that BPA will prepare pursuant to regulations implementing the National Environmental Policy Act (42 USC 4321 et seq.), which requires Federal agencies to assess the impacts that their actions may have on the environment. BPA's potential transmission of power from the Hermiston Generating Project requires that BPA assess the potential environmental effects of the proposed project and describe them in an EIS. Decisions will be based on an understanding of the proposed project's potential environmental consequences and actions will be taken to protect, restore, and enhance the environment.

REA, which regulates activities affecting UECA's transmission lines, will be a cooperating agency in the NEPA process.

4.2 Endangered and Threatened Species and Critical Habitat

The Endangered Species Act of 1973, as amended, (16 USC 1536) requires Federal agencies to ensure that their actions do not jeopardize endangered or threatened species or their critical habitats. Sources of information for the potential occurrence of sensitive species in an area include both Federal and state lists.

A letter was sent to USFWS requesting a list of threatened and endangered species in the vicinity of the proposed project. In its response, the USFWS noted that three Federally listed species have been recorded in the project vicinity: the bald eagle, the spring/summer and fall chinook salmon of the Snake River, and the Snake River sockeye salmon (personal communication, Peterson 1994). Potential impacts of the proposed project on listed species are discussed in Sections 3.4 and 3.5. A biological assessment for the bald eagle is included as Appendix E. The impact of project-related water withdrawal on salmon would be negligible. Thus, a biological assessment was not prepared for chinook or sockeye salmon.

4.3 Fish and Wildlife Conservation

The Fish and Wildlife Conservation Act of 1980 (16 USC 2901 et seq.) encourages Federal agencies to conserve and promote conservation of non-game fish and wildlife species and their habitats. The Fish and Wildlife Coordination Act (16 USC 661 et seq.) requires Federal agencies undertaking projects affecting water resources to consult with the USFWS and the state agency responsible for fish and wildlife resources to conserve or improve wildlife resources. Water resources that promote fish and wildlife habitat have not been identified at the Hermiston Generating project site.

4.4 Heritage Conservation

The National Historic Preservation Act of 1966 as amended (16 USC 470) requires Federal agencies with land management or permitting authority to take into account the potential effects of their undertakings on properties that are eligible for nomination to the National Register of Historic Places. The agency must consult with the SHPO regarding the inventory and evaluation of properties potentially eligible for National Register nomination and to determine whether the undertaking would adversely affect them.

The Hermiston Generating Project would involve a permit or agreement with a Federal agency and is therefore a Federal agency undertaking. The archival search and field survey described in Section 3.13 identified two historic properties that are potentially eligible for National Register nomination. A copy of the cultural resources survey has been sent to the Oregon SHPO for review.

The Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 (25 USC 3001 et seq.) assigns ownership of Native American graves found on Federal land to Native Americans. It requires the Federal agency managing land on which the grave was found to consult with the most likely descendant of the buried person or with a culturally related person regarding the disposition of the remains.

The Hermiston Generating Project includes 0.4 kilometer (0.25 mile) of new transmission route that is located on Federal land. Any Native American graves found in this segment would be subject to the NAGPRA.

4.5 State, Areawide, and Local Plan and Program Consistency

4.5.1 Land Use

The project would be located in two jurisdictions: Umatilla County and the City of Umatilla. The Umatilla County Comprehensive Plan and the City of Umatilla Comprehensive Plan govern development in the project area. The proposed Hermiston Generating project would alter land use at the energy facility site from vacant to industrial use; and the site is zoned for light industrial use. The transmission line route would consist of the upgrade of an existing electric transmission line right-of-way. The natural gas pipeline would be constructed below the surface of lands zoned for agricultural use.

Umatilla County and the City of Umatilla have stated that the Hermiston Generating Project is in conformance with their respective comprehensive plans. Copies of these letters are included in Appendix G.

4.5.2 Pacific Northwest Electric Power Planning and Conservation Act

The Pacific Northwest Electric Power Planning and Conservation Act (USC 839 et seq.) contains provisions intended to protect, mitigate, and enhance the fish and wildlife (including spawning grounds and habitat) of the Columbia River and its tributaries. Most provisions of the Act are not relevant to BPA's action in this case, because BPA is not acquiring the output of the Hermiston Generating Project.

4.5.3 Notice to the Federal Aviation Administration (FAA)
Construction of any facility 61 meters (200 feet) or taller above ground level requires that notice be given to the FAA. The stacks proposed at the Hermiston Generating Project would be up to 65 meters (213 feet) tall, requiring notification of FAA.

Additionally, proximity of a proposed facility to an airport requires that notice be given to the FAA. The closest airport to the power plant site is located approximately 1.6 kilometers (1 mile) west of the site. Another airport is located approximately 9.7 kilometers (6 miles) northeast of the power plant site.

4.5.4 Construction-related Permits
Grading, building, and related permits would be required from Umatilla County. The County Department of Public Works regulates development activities. The Umatilla County Board of Commissioners, in addition to requiring the proper building permits, also requires developers to complete the following activities before starting of construction:

- Obtain land use approvals from Umatilla County and the City of Umatilla;

- File a landscaping plan with the County prior to issuance of a building permit;

- Establish fire suppression and hazardous material safety designs in consultation with the Hermiston Fire Department and the State Fire Marshal;

- File a site plan with the County prior to issuance of building permits;

- Submit a plan, acceptable to EFSC, for responding to an emergency at the Umatilla Army Depot; and

- Have the power plant facility design reviewed by the Oregon Building Codes Agency for compliance with the building codes. Issuance of building permits, electrical permits, and other plant operational permits will be coordinated through the Salem Office of the Building Codes Agency. The local office in Pendleton will be responsible for construction inspection of the project during and upon completion of construction.

4.6 Coastal Zone Management Program Consistency

The proposed project is not in the coastal zone, nor would it directly affect the coastal zone.

4.7 Floodplains

The upper portion of the gas pipeline would parallel the west side of Butter Creek, and is the only project feature occurring within a floodplain or possibly susceptible to flooding. As noted in Section 3.2.2.3, the pipeline should be buried at a sufficient depth to protect it from flood damage. The buried line would not affect the floodplain or contribute to flooding elsewhere.

4.8 Wetlands

A review of National Wetlands Inventory maps and a field survey for the potential presence of jurisdictional wetlands resulted in identifying no wetlands at the power plant site or along the pipeline route. Wetlands along the transmission line right-of-way would not be disturbed by placement of the new towers or transmission line. Thus, construction of the Hermiston Generating Project would not require permits for the alteration of wetlands under Section 404 of the Clean Water Act.

4.9 Farmlands

The Farmland Protection Policy Act (7 USC 4201 et seq.) directs Federal agencies to identify and quantify adverse impacts of Federal programs on farmlands. The Act's purpose is to minimize the number of Federal programs that contribute to the unnecessary and irreversible conversion of agricultural land to non-agricultural uses.

The power plant site is currently vacant and zoned for light industrial use. The Soil Conservation Service soil survey for the area indicates that the site is not prime or unique farmland. The construction right-of-way for the natural gas pipeline is zoned for agricultural use. Construction of the pipeline would result in temporary disturbance to these agricultural lands, about half of which are prime farmland.

The electric transmission upgrade would occur primarily within an existing right-of-way that crosses agricultural lands. Approximately 0.4 kilometer (0.2 mile) of the proposed transmission line, and the same amount of the optional transmission line route, crosses prime farm lands. Agricultural use of the prime farmland could continue under the transmission lines in the rights-of-way.

4.10 Recreation Resources

No public recreation occurs at the proposed power plant site, a privately owned area zoned for light industrial use. The natural gas pipeline and electric transmission line rights-of-way are located primarily on privately owned lands. It is unlikely that the proposed project would interfere with the present use of any recreation resource in the vicinity.

4.11 Global Warming

A discussion of CO_2 and its contribution to global warming is presented in Sections 3.6.2.5 and 3.6.4.2. The project would produce only relatively negligible amounts of other greenhouse gases, such as methane or NO_x.

4.12 Permit for Structures in Navigable Waters

The proposed project does not include work or structures that are in or on any navigable waters of the United States as defined in the Rivers and Harbors Act of 1899 (33 USC 403). The upgraded transmission line would cross over the Umatilla River at Interstate 82, which may require a permit under Section 10 of the Rivers and Harbors Act.

4.13 Permit for Discharges into Waters of the United States

Discharge of dredged or fill material into waters of the United States is regulated by the Army Corps of Engineers pursuant to Section 404 of the Clean Water Act. The proposed project site is located in an upland area. Although the transmission line would pass over waters of the United States, it would not affect these features. There is no proposed discharge of dredged or fill materials into waters of the United States.

4.14 Permit for Right-of-Way on Public Lands

The power plant and the gas pipeline for the Hermiston Generating Project would be constructed on private property. Sections of the transmission line and gas pipeline would cross irrigation canals, which would require consultation with the Bureau of Reclamation, but no right-of-way permit. At its approach to McNary Substation, the transmission line would cross land formerly administered by the BLM, but which has been transferred to BPA. Therefore, no right-of-way permit would be required from the BLM. The Corps would be kept informed of actions involving the upgrade of the transmission line located along the eastern border of the Umatilla Ordnance Depot, because a portion of the right-of-way is on Ordnance Depot land.

4.15 Energy Conservation at Federal Facilities

The proposed project does not include the operation, maintenance, or retrofit of an existing Federal building, or the construction or lease of a new Federal building.

4.16 Pollution Control

Several pollution control acts would apply to the project, including:

- Clean Air Act
- Clean Water Act
- Resource Conservation and Recovery Act

- Toxic Substance Control Act
- Federal Insecticide, Fungicide, and Rodenticide Act.

4.16.1 Air

Emissions produced by the proposed project must meet standards established by the Environmental Protection Agency. The Clean Air Act is the principal Federal law governing air pollution control. It was most recently amended in 1990. In the project area, authority for ensuring compliance with the provisions of the Clean Air Act is delegated to the ODEQ. The Hermiston Generating Project would comply with all applicable standards as described in Section 3.6.

4.16.2 Water

The Clean Water Act of 1977, as amended, is the principal Federal law governing water pollution control. The Act is currently undergoing review and is expected to be formally amended in 1994. The Clean Water Act authorizes Federal and state regulations of discharges into waters of the United States and municipal sewer systems. The NPDES is the primary instrument for implementing the Act. ODEQ is authorized to administer the NPDES program within the state. ODEQ has determined that a Stormwater Discharge Permit is not required for plant operation because stormwater would not discharge to surface water at a point source. However, a General Stormwater Discharge Permit Number 1200-C was issued by ODEQ on January 11, 1993 to address erosion control for construction activities associated with the proposed project.

4.16.3 Solid and Hazardous Waste

Solid waste generated at the proposed project site would consist mostly of packing crates, wastes from maintenance, wastes from normal employee activities, and filter cake from water treatment facilities. Solid wastes would be collected by a local contractor for disposal at a nearby landfill. The project would comply with all Federal and state regulations dealing with the use, storage, and disposal of hazardous materials and hazardous wastes including those covered under Division V of the 1991 Uniform Fire Code, entitled "Stationary Tank Storage, Aboveground, Outside of Buildings."

4.16.4 Safe Drinking Water

The proposed project would receive its drinking water from Lamb-Weston's domestic water system, which is obligated to comply with the provisions of the Safe Drinking Act.

The proposed project would comply with Federal, state, and local regulations regarding contamination prevention of surface water and groundwater.

4.16.5 Noise

The proposed project is subject to maximum allowable levels of noise by the State of Oregon (OAR 340-35-035). Regular operation of the project with mitigation as proposed would comply with noise standards for nearby sensitive receptors. Potential noise-related impacts of project construction and suggested mitigation measures are discussed in Section 3.7.

4.16.6 Pesticides and Asbestos

The proposed project would not use or produce pesticides and would not distribute, use, or dispose of polychlorinated biphenyls (PCBs). Asbestos would not be used in the facilities.

4.16.7 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

The following is a summary of the findings of the environmental site assessment conducted at the power plant site:

- Waste and debris piles were not observed on the subject property.
- Stained soils were not observed on the subject property.
- No obvious hazardous substance use, storage, or disposal was observed on the subject property at the time of the site visit.
- There were no buildings or evidence of foundations in the aerial photographs or identified during the site visit on the subject property.
- The aerial photographs and unmaintained irrigation structures indicated past agricultural use on the subject property.
- No uses of aboveground or underground tanks were indicated in the regulatory databases or observed at the subject property.
- No indications of groundwater or petroleum wells were identified during the site visit on the subject property.

- The subject property was not listed in any regulatory databases checked.

- Two sites within 0.8 kilometer (0.5 mile) of the subject property were listed in the regulatory databases that were checked.

4.16.8 Radon

There is no evidence to suggest that the proposed project area is affected by regulations concerning radon gas, or would be affected by the Radon Gas and Indoor Air Quality Research Act of 1986 (42 USC 7401).

4.17 Permits

Permits would be obtained from a number of agencies before power plant construction and operation could begin. The following state and local permits would be required:

- Site Certificate from Oregon EFSC;

- Hazardous Waste Generator Registration (ODEQ);

- Air Contaminant Discharge Permit (ODEQ);

- General Stormwater Discharge Permit for Construction Activities (ODEQ);

- Building Codes Agency Permits: Plumbing, Structural/Mechanical, Energy, Elevator, Fire Marshall, Electrical, Pressure Vessel (Boiler);

- Permit for Performing Miscellaneous Operations on a State Highway (Oregon Department of Transportation);

- Access Permit (Oregon Department of Transportation);

- Conditional Use Permit (Umatilla County);

- Zoning Permit (Umatilla County);

- Utility Permit (Umatilla County);

- Access Permit (Umatilla County);

- Type II Land Division (Umatilla County); and

- Conditional Use Permit (City of Umatilla).

5.0 List of Preparers

The Hermiston Generating Project EIS is being prepared by BPA with the technical assistance of Enserch Environmental (formerly Ebasco Environmental Division), a consulting firm under contract to BPA. Individuals responsible for preparing the draft EIS are listed below.

BPA EIS Team

Boorse, Dawn. EIS Project Manager.

French, Jon. Engineering and Transmission Issues.

Leonard, Ran. Engineering Coordinator.

Seiffert, Randy. Environmental Issues.

Spiering, Colleen. Electric and Magnetic Field Effects.

Enserch Environmental EIS Team

Hall, Ellen. Task Manager. Twenty years of experience in energy and natural resource planning and permitting, economic analysis, socioeconomic impact assessment, and environmental analysis. Education: B.A., History/Economics; M.Ag., Agricultural Economics; Ph.D., Resource Economics.

Avery, Kristin. Technical Writer/Editor. Four years of experience including technical writing and editing, document design and production, community education and public relations, and cultural resource literature searches. Education: B.A. (pending), English-Writing Arts/Philosophy.

Carpenter, Alan. Air Quality Specialist. Fifteen years of experience in environmental consulting and government pollution control, air quality permitting, regulatory analyses, planning, and environmental audits. Education: B.A., Physics/Mathematics; M.S., Nuclear Physics; M.S.E., Air Resources Management. Registered Professional Engineer, Washington.

Davy, Douglas. Historical and Archaeological Resources Specialist. Fourteen years of experience in cultural resources management including historic and prehistoric archaeology, historic architectural and engineering assessment, and Native American consultation. Education: B.A., Anthropology; M.A., Ethnology; Ph.D., Archaeology.

Graham, Bryan. Hazardous Materials Specialist. Five years of experience in environmental science, geology, and analytical chemistry related to hazardous waste site assessments, decommissioning, and remediation. Education: B.A., Geology.

Greenig, Mark. Landscape Resource Planner. Thirteen years of experience in environmental impact assessment, recreation planning, visual resource analysis, site planning, and land use analysis. Education: B.S., Landscape Architecture; M.U.P., Master of Urban Planning.

Jackson, Garrett. Geologist. Five years of experience in applied geomorphology, mapping of stream channels and fluvial deposits, and geologic hazard evaluations. Education: B.S., Geosciences; M.S., Geosciences.

Jones, Tom. Electrical Engineer. Seventeen years of experience in electrical and control systems engineering design, field work, and management of electrical utilities and heavy industry. Education: B.S., Electrical Engineering. Registered Professional Engineer, Washington, California, and Alaska.

Maas, Carl. Mechanical Engineer. Fifteen years of experience in mechanical and project engineering for industry, public utilities, and governmental agencies. Education: B.S., Mechanical Engineering; M.S., Mechanical Engineering. Registered Professional Engineer, Washington and Idaho.

McShane, M. Colleen. Terrestrial Biologist. Fifteen years of experience in environmental research and consulting including wildlife and vegetation surveys, habitat evaluation, wetlands modeling, impact assessments and mitigation planning. Education: B.A., Biology; M.S., Plant Ecology; M.B.A., Project Management.

Richards, Tim. Graphic Designer. Eighteen years of experience in graphic design, illustration, mapping, and report presentation.

Tucker, Scott. Air Quality Specialist. Six years of experience in air quality permitting, air monitoring and modeling, and meteorology. Education: B.A., Physics/Geology; M.S., Atmospheric Sciences.

Walton, Ray. Water Resources Engineer. Over fifteen years experience managing and directing water resources studies, developing and applying numerical models to simulate all aspects of surface water flows and water quality, and groundwater contaminant migration. Education: B.S., Mathematics; M.S., Engineering Hydrology; Ph.D., Hydraulics.

6.0 List of Agencies, Organizations, and Persons to Whom Copies of the EIS are Sent

Federal Agencies

U.S. Department of Interior	-Bureau of Land Management -Fish and Wildlife Service -Bureau of Reclamation -National Park Service -Bureau of Indian Affairs
U.S. Army Corps of Engineers	
U.S. Department of Agriculture	-Rural Electrification Administration -Soil Conservation -Forest Service Region 1 -Mount Hood National Forest -Umatilla National Forest
U.S. Department of Energy	-Federal Energy Regulatory Commission
U.S. Department of Transportation	-Federal Highway Administration -Federal Aviation Administration
U.S. Department of Commerce	-National Oceanic and Atmospheric Administration -National Marine Fisheries Service

State Agencies

Oregon

Department of Energy
Department of Fish and Wildlife
Department of Transportation
Department of Environmental Quality
Department of Land Conservation and Development
Department of State Parks and Recreation
Executive Office
Public Utility Commission

Washington

Energy Facility Site Evaluation Council
Office of Energy
Wildlife Commission
Department of Community Development
Department of Ecology

Other Agencies and Local Government Organizations

Columbia River Gorge Commission
Columbia River Intertribal Fish Commission
Mid Columbia Council of Governments
Affiliated Tribes of Northwest Indians
Confederated Tribes of the Umatilla Indian Reservation
City of Boardman
Port of Umatilla
City of Irrigon
City of Umatilla
City of Hermiston
City of Stanfield
City of Pendleton

City of Echo
County of Umatilla
County of Morrow
Northwest Power Planning Council

Interest Groups

Audubon Society of Portland
Common Cause
Columbia Basin Institute
Columbia Improvement District
Don't Waste Oregon
Friends of the Earth
Industrial Customers of Northwest Utilities
Izaak Walton League
League of Women Voters
League of Oregon Cities
Association of Oregon Counties
Association of Washington Cities
National Wildlife Federation
Nature Conservancy
Northwest Conservation Act Coalition
Northwest Environmental Defense Center
Oregon Hay Producers
Oregon Natural Desert Association
Oregon Natural Resources Council
Oregon People's Utility District
Oregon Rivers Council
Oregon Rural Electric Coop Association
Oregon Shores Conservation Coalition
Oregon State Grange
Oregon Wilderness Society
Salmon for All
Sierra Club

Depository Libraries

State of Oregon Library Building, Salem, OR
Walter M. Pierce Library, Eastern Oregon State College, La Grande, OR
Blue Mountain Community College Library, Pendleton, OR
Central Oregon Community College, Bend, OR
Aubrey R. Watzek Library, Lewis and Clark College, Portland, OR
Bonneville Power Administration Library, Portland, OR
Daniel J. Evans Library, Evergreen State College, Olympia, WA
Washington State Library, Olympia, WA
Penrose Memorial Library, Walla Walla, WA
Boise Public Library, Boise, ID
Government Documents Library, Boise State University, Boise, ID
Regional Depository Millar Library, Portland State University, Portland, OR
U.S. Department of Energy Reading Room, Forrestal Building, Washington, D.C.
Hermiston Public Library, Hermiston, OR
Umatilla Public Library, Umatilla, OR

Others

Many businesses and individuals also are included in the mailing list. Their number is too extensive to list.

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8.0 Glossary of Terms and Acronyms

A-weighted decibel (dBA)	Sound measurements made on the A scale.
AAL	Acceptable ambient level.
AAQS	Ambient Air Quality Standards.
ac	Alternating current.
Acre-foot	The volume of water that will cover an area of one acre to a depth of one foot.
ADT	Average daily traffic.
Alluvial deposits	Material such as sand or silt, deposited on land by streams.
Alluvium	Unconsolidated deposits of transported particles.
Ambient	Air surrounding a particular spot, such as a power plant. Ambient air, for example, is the existing air quality; ambient noise is the existing noise level of the area.
aMW	Average megawatt.

Anadromous fish	Fish, such as salmon or steelhead trout, that hatch in freshwater, migrate to and mature in the ocean, and return to freshwater as adults to spawn.
Anticline	A fold in stratified rock units that is concave downward.
Aquifer	A geologic formation or structure that contains and transmits water in sufficient quantity to supply the needs for water development. Aquifers are usually saturated sands, gravel, or fractured rock.
Artesian	Water that is naturally under pressure; flows from the ground.
ASC	Application for Site Certificate.
Attainment area	A geographic area where the concentration of specific air pollutants does not exceed Federal standards.
Average megawatt (aMW)	The number of megawatts that could be produced by a power plant multiplied by the percent of time the power plant would normally be in operation over a specific period of time, usually 1 year.
BACT	Best Available Control Technology.
Basalts	Lava flows.
Best Available Control Technology (BACT)	An emission limitation based on the maximum degree of reduction of each pollutant subject to regulation and emitted from, or which results from, any major emitting facility.

BLM	Bureau of Land Management.
BPA	Bonneville Power Administration.
British Thermal Unit (Btu)	A quantity of heat required to raise the temperature of 0.45 Kg (1 pound) of water one degree Fahrenheit.
C	Celsius.
C1	Commercial neighborhood.
CEMS	Continuous Emission Monitoring System.
Centimeter (cm)	A unit of measurement (in the metric system) equivalent to 0.3937 inches.
CFC	Chlorofluorocarbon.
CFR	Code of Federal Regulations.
cfs	Cubic feet per second.
Circuit breakers	A switching device that is capable of closing or interrupting an electrical circuit under over-load or short-circuit conditions as well as under normal load conditions.
Class I Area	Area designated for the most stringent degree of protection from future degradation of air quality.
Class II Area	Any area cleaner than the Federal air quality standard designated for a moderate degree of protection from future air quality degradation. Moderate increases in new pollution may be permitted in a Class II Area.

Clastic dikes	Planar to subplanar structures composed of fine-grained sedimentary particles which cut across sedimentary rock layers.
CNG	Cascade Natural Gas.
CO	The chemical formula for carbon monoxide. Carbon monoxide is a colorless, odorless, and poisonous gas formed by incomplete combustion of carbon or a carbonaceous material, such as gasoline and natural gas.
CO_2	The chemical formula for carbon dioxide. Carbon dioxide is a colorless, odorless, incombustible gas formed during respiration, combustion, and organic decomposition, and commonly used in food refrigeration, carbonated beverages, inert atmospheres, fire extinguishers, and other aerosols.
Cogeneration	The technology of producing electrical energy together with useful thermal or mechanical energy for industrial or commercial purposes, using waste heat from one process to fuel the other.
Combined-cycle	The use of waste heat from a gas turbine topping cycle for the generation of electricity in a steam turbine generator system, thereby increasing the efficiency of heat use.
Combustion turbine	An integral part of cogeneration facilities operating on fuels that are capable of converting heat energy into electrical energy.

Containment dike	A berm designed to contain a potential release.
Cooling tower drift	Dissolved solids in cooling tower emissions that are then deposited on soils and vegetation.
Corps	United States Army Corps of Engineers.
CRBG	Columbia River Basalt Group.
Criteria pollutant	An air pollution substance for which the Environmental Protection Agency has established environmental significance thresholds. If emissions will exceed threshold criteria, added requirements such as pollution offsets are imposed.
CTUIR	Confederated Tribes of the Umatilla Indian Reservation.
Cubic feet per second (cfs)	A unit of measurement pertaining to flow or discharge of water. One cfs is equal to 449 gallons per minute.
Cultural resources	The nonrenewable evidence of human occupation or activity as seen in any district, site, building, structure, artifact, ruin, object, work of art, architecture, or natural feature that was important in human history at the national, state, or local level.
Cumulative impact	The impact on the environment that results from an action when added to other past, present, and reasonable foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time.

dB	Decibel.
dBA	A-weighted decibel.
Decibel (dB)	A decibel is a unit for expressing relative difference in power, usually between acoustic signals, equal to 10 times the common logarithm of the ratio of two levels.
EFSC	Energy Facility Siting Council.
EFU Zoning	Exclusive farm use.
EIS	Environmental Impact Statement.
Electric and magnetic fields (EMF)	The two types of fields of force that are produced by electricity i.e., those that are produced by voltage (electric fields) and those that are produced by current (magnetic fields). Electric fields are produced by the force that causes current to flow through a conductor (voltage) and are measured by kilovolts per meter (kV/m). Magnetic fields are produced by the force that causes electrons to move in a conductor (current) and are measured in milligauss (mG).
Electric field	An energy field produced by voltage, measured in kilovolts per meter.
Emergent	As used here, a plant that is rooted and has parts extending above a water surface.
EMF	Electric and magnetic fields.

Emissions	Substances discharged into the environment as waste material, such as discharge into the air from cooling towers or discharges into the water from waste streams.
Endangered species	A plant or animal that is in danger of extinction throughout all or a significant portion of its range because its habitat is threatened with destruction, drastic modification, or severe curtailment, or because of overexploitation, disease, predation, or other factors; Federally listed endangered species are officially designated by the U.S. Fish and Wildlife Service.
Energy	The ability to produce electrical power over a period of time, expressed in kilowatt hours.
Environmental Impact Statement (EIS)	A document defined at 40 CFR 1508.11 and prepared in accordance with the requirements of section 102(c) of NEPA, the Council on Environmental Quality Regulations, and DOE NEPA Guidelines.
Eolian	Wind-deposited.
F	Fahrenheit.
F1	Exclusive farm use, 7.7-hectare (19-acre) minimum.
F2	General rural, 7.7-hectare (19-acre) minimum.
FAA	Federal Aviation Administration.

Fecal coliform bacteria	Tiny organisms associated with the intestines of warm-blooded animals that are commonly used to indicate the presence of fecal material and the potential presence of organisms capable of causing human disease.
Feeder dikes	Linear openings from which lava flows erupt.
Filter cake	Solids removed from process water are made into nonhazardous filter cakes and disposed of in a landfill.
Flood basalts	Lava flows characterized by very low viscosity and wide aerial extent.
Fluvial	Deposited by water.
FP	Flood plain.
g	Acceleration of gravity.
Geologic hazard	A geologic condition, either natural or artificial, that poses a potential danger to life and property, e.g., landslides.
Glacial outwash	Sediment deposits as a result of meltwater outflow from glaciers or ice sheets.
Global warming	The phenomenon of gradually increasing average temperatures in the earth's atmosphere due primarily to accumulation of carbon dioxide. Carbon dioxide comes from the burning of fossil fuels and removal of forests and vegetation that take carbon dioxide out of the air.
gpm	Gallons per minute.

Greenhouse gas	A gas that contributes to global warming.
Groundwater	The supply of fresh water under the earth's surface in an aquifer or soil.
Habitat	The environment occupied by individuals of a particular species, population, or community.
Hazardous materials	Substances which, if released in an uncontrolled manner, can be harmful to the environment.
Hectare (ha)	An area equivalent to 10,000 square meters or 2.471 acres.
Hectare-meter (ha-m)	The volume of water that will cover an area of one hectare to a depth of one meter.
HGC	Hermiston Generating Company.
Holocene	Period of geologic time extending from about 10,000 years ago to the present.
Hydric (soil)	A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic (able to grow in saturated areas) vegetation.
Impact	Positive or negative environmental consequences of a proposed action.
Infiltration	Seepage of water into the ground.

Jurisdictional wetland	Wetlands that are subject to Section 404 of the Clean Water Act and to the Swampbuster provision of the Flood Security Act.
kg/ha-mo	Kilogram per hectare-month.
Kilogram per hectare-month (kg/ha-mo)	A unit used to measure the amount of a substance deposited over a hectare in one month.
Kilometer (km)	One thousand meters.
Kilovolt (kV)	One thousand volts.
Kilowatt (kW)	An electrical unit of power equal to 1,000 watts.
Kilowatt hour (kWh)	A basic unit of electric energy equal to one kilowatt for the period of one hour.
km	Kilometer
kV	Kilovolt.
kV/m	Kilovolt per meter.
kWh	Kilowatt hour.
L_{50}	A symbol that represents the maximum permitted noise level a project may create 50 percent of the time in an hour.
LAER	Lowest achievable emission rate.
lb/ac-mo	Pounds per acre-month.
L_{eq}	A symbol that represents the logarithmically weighted average noise level.

LI	Light industrial.
Lineament	Structure or series of structures or features that have the same alignment.
Liquefaction	Liquid-like behavior of a solid material.
Liter (L)	A unit of volume equivalent to 0.2642 gallons.
L_{MAX}	A symbol that represents the maximum permitted noise level (measured in decibels).
LOS	Level of service.
lpm	Liters per minute.
M2	Heavy industrial.
m^3	Cubic meter. Equal to 1,000 liters or 263 gallons.
m^3/s	Cubic meters per second.
Magnetic field	An energy field produced by the movement of electrons in a wire (current), measured in milligauss (mG).
MCE	Maximum credible earthquake.
MCL	Maximum Contaminant Level.
Megawatt hour (MWh)	A basic unit of electrical energy equal to one megawatt for the period of one hour.
Megawatt (MW)	One thousand kilowatts (kW) or one million watts (W).
Meter (m)	Unit of length equal to 3.28 feet.

mG	Milligauss.
MGD	Million gallons per day.
Milligauss	Unit of magnetic field strength equal to 0.001 of a gauss.
Mitigation	Actions to avoid, minimize, reduce, eliminate, or compensate for the impact of a proposed activity or management practice.
MLD	Million liters per day.
MMBtu/hr	Million British thermal units per hour
msl	Mean sea level.
MWh	Megawatt-hour.
NAGPRA	Native American Graves Protection and Repatriation Act.
Natural gas	A mixture of hydrocarbon gases that occurs with petroleum deposits, chiefly methane, together with varying quantities of ethane, butane, propane, and other gases. In addition to its use as a fuel, it is commonly used in the manufacture of organic compounds.
NEPA	National Environmental Policy Act. Major Federal legislation passed by Congress in 1969 that requires that environmental impacts of major Federal actions be identified in a detailed statement of environmental impact, along with reasonable alternatives to the proposed actions. Furthermore, environmental impacts must be made

NEPA (cont.)	known to the public and to the decisionmaker, prior to a decision being made on the project.
NO_2	The chemical formula for nitrogen dioxide. Nitrogen dioxide is a mildly poisonous brown gas often found in exhaust fumes and smog. It is synthesized for use as a catalyst and oxidizing or nitrating agent.
Nonattainment	An area which does not meet air quality standards set by the Clean Air Act for specified localities and time periods.
NO_x	Oxides of nitrogen.
NPDES	National Pollution Discharge Elimination System. Federal water quality program administered by the State agency responsible for water quality.
NR	Natural resource.
NSPS	New Source Performance Standards.
NSR	New Source Review.
O_3	Ozone.
OAR	Oregon Administrative Rule.
ODA	Oregon Department of Agriculture.
ODEQ	Oregon Department of Environmental Quality.
ODFW	Oregon Department of Fish and Wildlife.
ODOE	Oregon Department of Energy.

ONHP	Oregon Natural Heritage Program.
OWL	Olympic-Wallowa Lineament.
Palustrine	General freshwater wetlands classification associated with partially saturated areas not part of a surface water system.
Parent material	The unconsolidated material from which soil develops.
Particulate matter	Fine solid particles that remain individually dispersed in stack emissions.
Pb	Lead.
PCB	Polychlorinated biphenyl.
PCE	Passenger car equivalents.
Permeability (soil)	The quality of soil that enables water to move downward through the profile, measured as the number of centimeters (inches) per hour that water moves downward.
PF	Public facilities.
PGA	Peak ground acceleration.
PGT	Pacific Gas Transmission.
Physiographic province	A region of similar structure and climate that has a unified geomorphic (pertaining to surface form) history.
Pleistocene	Period of geologic time extending from about 1.8 million years ago to about 10,000 years ago.

PM_{10}	Particulate matter less than 10 microns (μ) in diameter.
Pound per acre-month (lb/ac-mo)	A unit used to measure the amount of a substance deposited over an acre in one month.
ppm	Parts per million.
ppmvd	Parts per million by volume dry.
Profile (soil)	A vertical section of the soil extending through different layers (horizons).
PSD	Prevention of Significant Deterioration.
psi	Pounds per square inch.
Pyroclastic flows	Rock material formed by a volcanic explosion.
R-O/S	Recreation-open space.
R1	Residential single-family in City of Umatilla Comprehensive Plan. Agricultural residential, 1.6-hectare (4-acre) minimum, in Umatilla County plan.
R2	Residential multi-family.
REA	Rural Electrification Administration.
Record of Decision	A document prepared in accordance with the requirements of 40 CFR 1505.2, that provides a concise public record of the agency's decision on a proposed action for which an EIS was prepared, and identifies alternatives considered before reaching the decision, the environmentally preferred alternative(s),

Record of Decision (cont.)	factors balanced by the agency making the decision, and whether all practical means to avoid or minimize environmental harm have been adopted and if not, why.
Right-of-way	An easement for a certain purpose over the land of another, such as a strip of land used for a transmission line, roadway, or pipeline.
Runoff	Water from precipitation or irrigation that flows over the ground surface and returns to streams or other water bodies. It can collect pollutants from the air or land and carry them to the receiving waters.
RV	Recreational vehicle.
Scarify	To scrape or churn up soil.
SCR	Selective catalytic reduction.
Selective catalytic reduction (SCR)	An air pollution control technology that reduces NO_x to nitrogen and water when combined with a reducing agent, such as ammonia.
Sensitive receptors	Hospitals, residences, sensitive vegetation and wildlife, or any other receptor that may be particularly sensitive to certain adverse effects, such as from noise or air pollution.
Shear zones	Localized deformation areas characterized by crushed and/or smeared rock material.
SHPO	State Historic Preservation Officer.

Shrink-swell	The potential of a soil to expand or contract due to the presence of water-absorbing clay minerals.
Shrub-steppe	A community of low drought-tolerant shrubs and bunch grasses.
Significant Emissions Rate	Annual rate of emissions for specific pollutant that identifies a "major" air pollution source in ODEQ regulations.
SIL	Significant impact level.
SO_2	The chemical formula for sulfur dioxide. Sulfur dioxide can be found in either a gaseous or liquid state. It is commonly used in the manufacture of sulfuric acid.
SR	Suburban residential.
Stratovolcano	Type of volcano formed by explosive eruptions. Characterized by extreme height and steep flanks.
Surface water	Any water, temporary or permanent, which is above the ground surface, observable with the unaided eye.
Syncline	A fold in stratified rock units that is concave upward.
TDS	Total dissolved solids.
Tectonic basins	A basin formed by the movement of geologic plates.
Tectonic	Related to the interaction of geologic plates.

Threatened species	Those species officially designated by the U.S. Government that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.
Total Suspended Particulates (TSP)	The total volume of small particles suspended in a water column, expressed in percent.
Transmission line	The structures, insulators, conductors, and other equipment used to transfer electrical power from one point to another.
TSP	Total suspended particulates.
$\mu g/m^3$	Unit of measurement commonly used to measure pollutants in air, specifically the number of micrograms per cubic meter.
UCDO	Umatilla County Development Ordinance.
UECA	Umatilla Electric Cooperative Association.
UGB	Urban growth boundary.
USFWS	United States Fish and Wildlife Service.
Volt	The unit of voltage or potential difference. It is the electromotive force which, if steadily applied to a circuit having a resistance of one ohm, will produce a current of one ampere.
VOR	Vehicle occupancy rate.

Wastewater	Water that carries wastes from buildings, institutions, and industrial establishments.
Water table	The upper limit of the soil or underlying rock material that is wholly saturated with water.
Watershed	The area drained by a single river system.
Watt	The electrical unit of power or rate of doing work. The rate of energy transfer equivalent to one ampere flowing under the pressure of one volt.
Wetlands	An area where the soil experiences anaerobic conditions because of the inundation of water during a portion of any given year. Indicators of a wetland include types of plants, solid characteristics, and hydrology of the area.
Wheeling	Use of transmission facilities of one utility system to transmit power to another utility system or between customer facilities within a single utility system.
Xerofluvents	Soils of the entisol order that are developed on water-laid deposits in a Mediterranean-type climate.
Xerollic durorthids	Soils having a duripan (dense, compact soil horizon) within 100 cm of the surface and found in a cool Mediterranean climate bordering on arid.

9.0 Index

Appendix A

Notice of Intent to Prepare an Environmental Impact Statement

POLICIES AND PRACTICES FOR STORING, RETRIEVING, ACCESSING, RETAINING, AND DISPOSING OF RECORDS IN THE SYSTEM:

STORAGE:

Computer printouts, paper records, index cards, magnetic tape, punched cards, microfilm, and disc.

RETRIEVABILITY:

By name, alphanumeric code, and social security number.

SAFEGUARDS:

Records are maintained in locked file cabinets, locked safes, guarded areas, and secured buildings with access on a need-to-know basis.

RETENTION AND DISPOSAL:

Records retention and disposal authorities are contained in Department of Energy Order 1324.2, "Records Disposition." Records within the Department are rendered illegible and destroyed by shredding, maceration, or burning, as appropriate.

SYSTEM MANAGER(S) AND ADDRESS:

Headquarters: U.S. Department of Energy, Deputy Assistant Secretary for Health, EH–40 (270 CC), Washington, DC 20585.

Field Offices: The managers and directors of field locations 3, 4, and 6 through 18 in appendix A of the **Federal Register**, volume 47, page 14284, dated April 2, 1982, and the additional locations listed above under System Location are the system managers for their respective portions of this system.

NOTIFICATION PROCEDURES:

a. Requests by an individual to determine if a system of records contains information about him/her should be directed to the Chief, Freedom of Information and Privacy Acts Branch, Department of Energy (Headquarters), or the Privacy Act Officer at the appropriate address identified as items 1, 3, 4, and 6 through 18 in appendix A of the **Federal Register**, volume 47, page 14284, dated April 2, 1982, in accordance with the Department's Privacy Act regulations (title 10, Code of Federal Regulations, part 1008 (**Federal Register**, volume 45, page 61576, dated September 16, 1980)).

b. Required identifying information: Complete name and geographic location(s) and organization(s) where requester believes such record may be located, date of birth, and time period for which information is requested.

RECORDS ACCESS PROCEDURES:

Same as Notification Procedures above.

CONTESTING RECORD PROCEDURES:

Same as Notification Procedures above.

RECORD SOURCE CATEGORIES:

The subject individual, accident-incident investigations, film badges, dosimetry records, and previous employee records.

SYSTEM EXEMPTED FROM CERTAIN PROVISIONS OF THE ACT:

None.

[FR Doc. 93–27412 Filed 11–5–93; 8:45 am]

BILLING CODE 6450-01-P

Bonneville Power Administration

Notice of Intent To Prepare an Environmental Impact Statement for the Hermiston Generating Project

AGENCY: Bonneville Power Administration (BPA), DOE.

ACTION: Notice of intent to prepare an Environmental Impact Statement (EIS) under section 102(2)(c) of the National Environmental Policy Act (NEPA) (42 U.S.C. 4321).

SUMMARY: BPA intends to prepare an EIS on transmission services requested by PacifiCorp to integrate and transmit its purchase of electrical power from the Hermiston Generating Project. PacifiCorp has asked BPA to integrate PacifiCorp's power purchase from the Hermiston Generating Project with the Federal transmission grid. BPA then would wheel the power purchased by PacifiCorp to BPA's Alvey Substation near Eugene, Oregon, where PacifiCorp would take delivery of the power. The EIS will consider BPA's proposed action of entering into a wheeling (transmission) agreement with PacifiCorp, along with any accompanying modifications to the transmission system needed to perform this wheeling service.

DATES: BPA has established a 30-day scoping period November 8, 1993 during which affected landowners, concerned citizens, special interest groups, local governments, and any other interested parties are invited to comment on the scope of the proposed EIS. Scoping will help BPA ensure that a full range of issues related to this proposal is addressed in the EIS, and also will identify significant or potentially significant impacts that may result from the proposed project. Written comments should be sent to the address below.

Comments may also be made at an EIS scoping meeting to be held at Hermiston High School in Hermiston, Oregon, on November 22, 1993, from 7–9 p.m. At the informal meeting, the developer will make a presentation on the project. Written information also will be available, and BPA staff will answer questions and accept oral and written comments.

The draft EIS (DEIS) will be circulated for review and comment, and BPA will hold a public comment meeting for the DEIS. BPA will consider and respond to comments received on the DEIS in the final EIS.

ADDRESSES: BPA invites comments and suggestions on the proposed scope of the DEIS. Send comment letters, requests to be placed on the project mailing list, and/or requests for more information to the Public Involvement Manager, P.O. Box 12999, Portland, Oregon 97212.

FOR FURTHER INFORMATION ON THIS PROJECT CONTACT: Ms. Dawn Boorse at (503) 230–5678, or BPA's Public Involvement Office at (503) 230–3478 in Portland; toll-free (800) 622–4519 outside of Portland for questions and (800) 622–4520 for documents. Information may also be obtained from Mr. Robert A. (Joe) Rogers, Snake River Area Power Manager, 1520 Kelly Place, Walla Walla, WA 99362, (509) 522–6211.

FOR FURTHER INFORMATION ON GENERAL DOE ENVIRONMENTAL REVIEW REQUIREMENTS, CONTACT: Ms. Carol M. Borgstrom, Director, Office of NEPA Oversight, EH–25, U.S. Department of Energy, 1000 Independence Avenue SW., Washington, DC 20585, (202) 586–4600 or (800) 472–2756.

SUPPLEMENTARY INFORMATION: The project that is the subject of the EIS consists of several components, including the proposed cogeneration plant, a transmission line upgrade, and a natural gas pipeline. The Hermiston Generating Project, an electric power generating plant, is proposed by Hermiston Generating Company, an independent power producer.

The Hermiston Generating Company would develop, construct, and operate the power plant and would build the new transmission line and interconnection required. Umatilla Electric Cooperative Association would own and operate the transmission line and interconnection. Cascade Natural Gas Company would build a natural gas pipeline spur to the plant site. The purchaser, PacifiCorp, is an investor-owned utility based in Portland, Oregon.

A. Proposed Action

The Hermiston Generating Company proposes to build the Hermiston

Generating Project on a site adjacent to the Lamb-Weston potato processing plant. The Hermiston Generating Project would have two combined-cycle combustion turbines with a total electrical output of approximately 464 megawatts. The plant would also supply approximately 23,000 kilograms (50,000 pounds) of steam per hour to the nearby Lamb-Weston Potato Processing Plant. A natural gas pipeline spur less than 8 km (5 miles) in length would be built by Cascade Natural Gas Company from a point on the existing Pacific Gas Transmission Company (PGT) pipeline, north to the plant site.

To interconnect the plant with the nearby BPA McNary-Slatt transmission line, an existing 19 kilometer (12-mile) transmission line would be upgraded to 230 kilovolts (kV), .4 kilometer (1/4 mile) of new 230 kV transmission line would be built, and modifications would be made to the McNary Substation. The transmission line and interconnection would be built by Hermiston Generating Company, and owned and operated by Umatilla Electric Cooperative Association. Associated facilities that would also be installed at the plant site include an electrical substation, cooling towers, and administrative offices.

When the project is complete, the integration of the Hermiston Generating Project into the BPA system would occur at the McNary Substation. From this substation, power would be transmitted over the BPA transmission system to the Alvey Substation. BPA proposes to enter into a long-term firm transmission services agreement with PacifiCorp to provide transmission integration services for the output of the Hermiston Generating Project from McNary Substation to Alvey Substation. McNary Substation would be modified to accept a new point of interconnection with Umatilla Electric Cooperative Association. BPA also would install communication facilities to connect the Hermiston Generating Project with BPA's existing operations network.

All proposed facilities are located within Umatilla County, Oregon.

B. Process to Date

BPA has assumed the role of lead agency for the project EIS. The State of Oregon Energy Facility Siting Council (EFSC) is currently evaluating Hermiston Generating Company's "Application for a Site Certificate for the Hermiston Generating Project." Oregon's site evaluation process, like NEPA, provides opportunity for public participation, and the Oregon Department of Energy (ODOE), acting as EFSC's staff, held two public information meetings for the Hermiston Generating Project on June 25, 1992, and August 25, 1993. At the time of those meetings, PacifiCorp had not yet decided to purchase the electrical output from the power plant and had not requested a wheeling agreement with BPA. Therefore, BPA was not yet involved and no Federal public involvement process was necessary. Now BPA would include the ODOE public testimony in its scoping process.

On September 15, 1993, ODOE issued the final Staff Report on the project, including findings of fact and proposed conditions of certification. The Staff Report recommends that EFSC issue a site certificate for the project, as it complies with all economic, environmental, and socioeconomic standards under the EFSC's jurisdiction. The recommendation follows an intensive review by numerous State and local agencies, as well as the Confederated Tribes of the Umatilla Indian Reservation.

In addition to the State's siting review, the Oregon Department of Environmental Quality (DEQ) is reviewing Air Contaminant Discharge Permit and Prevention of Significant Deterioration applications for the power plant. DEQ is currently preparing findings for the draft permit, with permit issuance targeted for early 1994.

C. Alternatives Proposed for Consideration

Alternatives thus far identified for evaluation in the EIS are: (1) the proposed action; and (2) no action (the consequences of not providing transfer services to PacifiCorp). Other alternatives may be identified through the scoping process.

D. Identification of Environmental Issues

BPA plans to prepare an EIS addressing both Hermiston Generating Company's generating plant and the associated transmission facilities. This decision is the result of two factors: (1) PacifiCorp would depend on BPA's transmission grid to deliver electricity from the Hermiston Generating Project to PacifiCorp's system; and (2) no other Federal or State agency is currently preparing an EIS on the Hermiston Generating Project. In the absence of another EIS, BPA intends to scope its EIS so that the impacts both of transmission elements and the Hermiston Generating Project are addressed.

The principal issues identified thus far for consideration in the DEIS fall within two categories as follows: *Hermiston Generating Project's cogeneration plant:* (1) Air quality impacts; (2) noise impacts from plant operation; (3) aesthetic impacts; (4) socioeconomic impacts created by an influx of construction workers in a sparsely populated area; and (5) impacts to nearby wildlife areas. *Transmission Facilities:* (1) potential effects of transmission line tower construction on wetlands; (2) potential effects of transmission line tower construction on wildlife; (3) concern over possible health effects from exposure to electromagnetic fields, such as those produced by high-voltage transmission lines, and what those effects might be; (4) aesthetic effects of an upgraded transmission line as viewed from Interstate Highway 84; and (5) potential impacts on cultural resources.

These, together with any additional issues identified through the scoping process, would be examined in the EIS.

Issued in Portland, Oregon, on November 2, 1993.

Randall W. Hardy,

Administrator.

[FR Doc. 93–27594 Filed 11–5–93; 8:45 am]

BILLING CODE 6450-01-P

Federal Energy Regulatory Commission

[Project No. 2375–001 Virginia]

Appalachian Power Co.; Availability of Draft Environmental Assessment

November 2, 1993.

In accordance with the National Environmental Policy Act of 1969 and the Federal Energy Regulatory Commission's (Commission's) regulations, 18 CFR part 380 (Order No. 486, 52 FR 47897), the Office of Hydropower Licensing has reviewed the application for a new major license for the existing Reusens Project, located on the James River in Amherst and Bedford Counties, Virginia, near the city of Lynchburg, and has prepared a Draft Environmental Assessment (DEA) for the project. In the DEA, the Commission's staff has analyzed the potential environmental impacts of the existing project and has concluded that approval of the project, with appropriate mitigation or enhancement measures, would not constitute a major federal action significantly affecting the quality of the human environment.

Copies of the DEA are available for review in the Public Reference Branch, room 3104, of the Commission's offices at 941 North Capitol Street NE., Washington, DC 20426.

Any comments should be filed within 30 days from the date of this notice and

Appendix B

Scoping Summary

Scoping Summary

Solicitation of Public Comments
Both the Bonneville Power Administration (BPA) and the Oregon Energy Facility Siting Council (EFSC) have solicited scoping comments and held public meetings to encourage public comment on the proposed Hermiston Generating Project.

The Hermiston Generating Company L.P. (HGC) filed a Notice of Intent to construct an energy facility on February 28, 1992. As a part of their review process, EFSC held public hearings in Hermiston on June 25, 1992 and August 25, 1993 to receive public comment on the proposed project.

BPA held an official public scoping period from November 8, 1993 to December 7, 1993. A Notice of Intent to prepare an Environmental Impact Statement (EIS) was published in the Federal Register on November 8, 1993 to formally announce the scoping period (see Appendix A). To facilitate public comment during the scoping period, a public meeting was held at Hermiston High School in Hermiston, Oregon, on November 22, 1993 from 7:00 to 9:00 PM. When the meeting had officially adjourned, team members remained to discuss the project and answer additional questions.

To inform the general public of the BPA scoping meeting, paid public announcements were placed in local newspapers—the *Pendleton East Oregonian* and the *Hermiston Herald*—in editions published approximately 1 week prior to the meeting. The public was also invited to submit written comments regarding the project during the official comment period.

Scoping Results
Thirty different individuals commented on the project during the official public comment periods of EFSC and BPA. Of this total, 27 respondents offered only verbal comment; 2 submitted only written comments; and 1 respondent offered both verbal and written comment.

Comments and concerns voiced by meeting attendees and received as written input were reviewed and classified according to general categories of common subject matter. The comments were grouped into 13 general categories, arranged alphabetically:

- Aesthetics
- Air Quality
- Cultural Resources
- Facility and Project Design
- Fish and Wildlife
- Geology and Soils
- Land Use
- NEPA/State Process
- Noise
- Public Health and Safety
- Socioeconomics
- Vegetation/Floodplains/Wetlands
- Water Quality and Quantity

Aesthetics
There were no comments addressing aesthetics.

Air Quality
Two respondents raised issues related to air quality. Specific comments and questions include the following:

- One speaker expressed concern about increased CO_2 emissions.
- Two respondents asked if cumulative air quality impacts from current and new projects will be considered (written comment from Hermiston).

Cultural Resources
There were no comments addressing cultural resources.

Facility and Project Design
Four respondents raised issues related to plant design. Specific questions include the following:

- One speaker inquired about the difference in energy production between the gas turbine and the steam turbine.
- One speaker wondered how much energy will be saved by supplying steam to Lamb-Weston, since they will no longer have to burn fossil fuel for heat.
- One speaker asked what the heat production efficiency of the plant will be and how that compares with other plants like Trojan or coal-fired facilities.
- One speaker asked if there would be a power sales agreement before construction starts.

Fish and Wildlife

Two respondents raised issues related to fish and wildlife. Specific comments and questions include the following:

- One respondent inquired about what the impacts of water withdrawal from the Columbia River will be on anadromous fish (verbal and written comment from Portland).
- One respondent stated that the impacts to fish are from poor water quality and loss of habitat on the Snake River.

Geology and Soils

There were no comments addressing geology and soils.

Land Use

Two respondents commented on land use. Specific comments follow:

- One respondent expressed concern about the impact and possibility of a new power line on his property.
- One respondent stated that the project is compatible with community development plans.

NEPA/State Process

Three respondents raised issues related to the NEPA and state regulatory/permitting processes regarding plant construction and operation. Specific questions include the following:

- One speaker asked if this project will be required to go through the NEPA process.
- One respondent asked if Oregon's siting process (regarding EFSC's involvement) is typical of other states.
- One speaker asked who will review these comments.

Noise

There were no comments addressing noise.

Public Health and Safety

Four respondents raised issues related to public health and safety. Specific questions include the following:

- One speaker inquired about the effects of electromagnetic fields (EMF).

- Two respondents asked if the transmission lines will cause EMFs and what mitigation will be in place if they do (written comment from Hermiston).
- Two respondents stated that the Columbia River water is contaminated with radioactive substances from Hanford and wondered if the potential health effects of radioactive steam will be assessed (written comment from Hermiston).
- Two respondents asked if the health effects of dioxin in steam would be assessed, since the Columbia River is contaminated with dioxin (written comment from Hermiston).

Socioeconomics

Three respondents raised issues related to socioeconomics. Specific comments and questions include the following:

- One speaker noted that this project will have a positive impact on local schools because it will have a low student impact and a high impact in terms of assessed taxation.
- One speaker asked what the impact of water withdrawal from the Columbia River will be on hydropower production and who will pay the cost for lost energy production due to that withdrawal—industry or rate payers (verbal and written comment from Portland).
- One speaker stated that the lost generation capacity will be negligible—less than 1 MW.

Vegetation/Floodplains/Wetlands

There were no comments addressing vegetation, floodplains, or wetlands.

Water Quality and Quantity

Six respondents commented on issues related to water quality and quantity. Specific comments and questions include the following:

- One speaker asked where the wastewater will go.
- Two respondents stated that US Generating Company is helping to build a water system that is vital not only to their project, but also to the area as a whole.
- One farmer stated that he uses Lamb-Weston's nitrogen-rich wastewater for irrigation and that it saves a significant amount of nitrogen fertilizer.
- Two speakers stated that the project is zero discharge (does not release water pollutants).
- One respondent expressed concern about the cumulative impacts of the many projects planning to or currently withdrawing water from the Columbia River

(three combustion turbine plants, Umatilla Basin project, regional water supply system).

- One speaker stated that during the peak month withdrawal from the Columbia River is less than 0.7 percent of the total flow.
- One respondent stated that the permit to withdraw water from the Columbia River was issued a long time ago.

Other Issues

In addition to the above comments organized by subject matter, several additional comments/questions were raised that do not fall into any of the above categories. Some of these were questions that were answered at the meetings; others raised more general issues that are addressed in the draft EIS; and others were considered out of the scope of this project. These comments are summarized below.

- One speaker stated he is aware of a cogeneration plant in Eugene and wanted to know about the experience with that plant.
- One speaker asked what three plants are being planned for development near Hermiston now.
- Numerous respondents stated that they support the project.
- One speaker stated that we need to focus on conservation of power.
- One respondent said that cogeneration is the cleanest source of power next to hydro, and that the region should encourage cheap, clean power when they can.
- One speaker asked if any of this power will be sold outside Oregon (in California).

These additional comments and questions will be addressed as appropriate in the EIS.

Appendix C

Columbia River Water Quality Data,
prepared by Enserch Environmental

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Columbia River Water Quality Data

Water for the Hermiston Generating Project would be purchased from the Port of Umatilla, which would draw water from the Columbia River above McNary Dam under an existing water right. Water quality in this reach of the Columbia River is generally considered good; the State of Washington classifies this reach as "Class A" (Excellent), which is the second highest rating for surface water (WAC 173-201A). Although most of the available data support a conclusion that the quality of Columbia River water is good, some area residents have expressed (see Appendix B) concern that contaminants in the water, such as dioxins and radioactive agents, could be incorporated into the project's cooling water steam plume and be dispersed into the atmosphere. This Appendix C presents relevant information concerning water quality in this reach of the Columbia River.

Conventional Constituents, Metals, and Organics: The Washington State Department of Ecology maintains an ambient monitoring station at the Umatilla Bridge, where they have monitored several water quality characteristics such as temperature, pH, and total dissolved solids (commonly referred to as conventional constituents) since 1975. They have monitored metals at the same station since 1990. Table C-1 summarizes these observations, and Figure C-1 shows time histories of various nutrients and metals. The values shown in Figure C-1 show occasional elevated nutrients, but generally support the view that water quality conditions are good. In addition, the U.S. Army Corps of Engineers (Corps) has sampled the McNary pool for conventional constituents since 1975, and found measurements in the same general range.

Table C-1. Summary of Water Column Measurements Made by the Washington State Department of Ecology at Umatilla.

Parameter	Geometric Mean
Conventional Constituent	
Temperature	9.06°C
Conductivity	161.19 µmhos[1/]
Dissolved oxygen	11.36 ppt[2/]
pH	7.99
Suspended solids	8.44 mg/l[3/]
Ammonia-N	0.02 mg/l
Total phosphorous	0.03 mg/l
Hardness	66.34 mg/l as $CaCO_3$
Turbidity	1.97 turbidity units
Fecal coliforms	6.09 colonies/100 ml
Alkalinity	63.13 mg/l
Nitrite-Nitrate	0.11 mg/l
Dissolved nitrite	0.01 mg/l
Metals	
Chromium	0.43 µg/l[4/]
Copper	2.39 µg/l
Lead	1.00 µg/l
Zinc	5.99 µg/l
Cadmium	0.12 µg/l
Mercury	0.06 µg/l

Source: Washington Department of Ecology Ambient Monitoring Program, Umatilla Bridge Station.

1/ µmhos - unit of conductivity; reciprocal of µohms

2/ ppt - parts per trillion

3/ mg/l - milligrams per liter

4/ µg/l - micrograms per liter

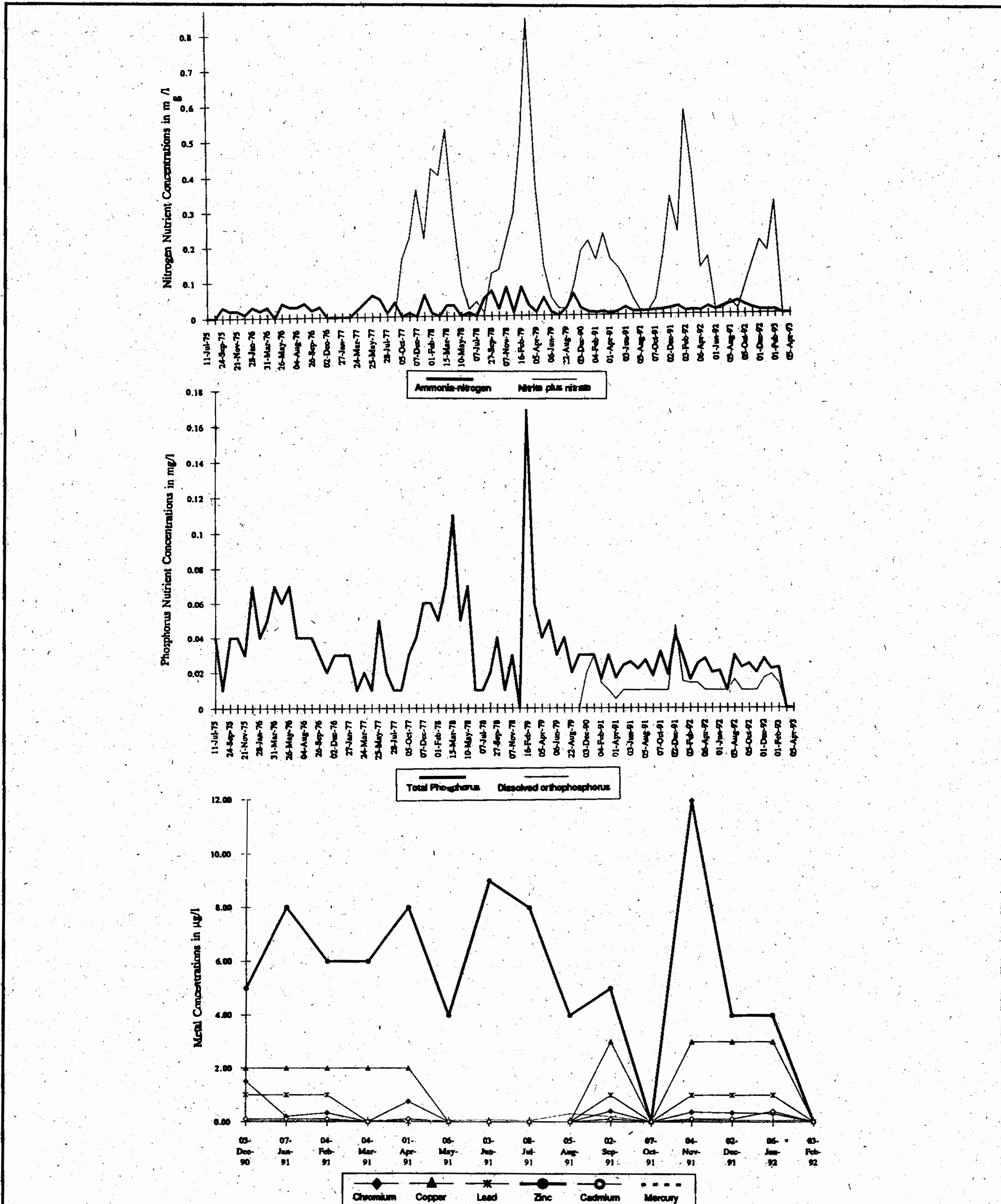

Figure C-1 Time Histories of Nutrients and Metals at Washington State Department of Ecology Station at Umatilla

Other data were collected on July 1, 1993 as part of an investigation for the intake to the proposed Port of Umatilla water supply system (Table C-2). Most of these observations meet U.S. Environmental Protection Agency (EPA), Oregon, and Washington water quality standards, although the copper measurement indicates a possible exceedance of acute and chronic standards. These data, from a single sampling event, are insufficient to draw any firm conclusions regarding water quality.

Table C-2. Columbia River Water Analysis in Vicinity of Proposed Intake for Port of Umatilla Water Supply System, for Water Samples Taken July 1, 1993.

Constituent (ppm except as noted)	Umatilla	McNary
M-Alkalinity, as $CaCO_3$	44	50
Total Phosphate, as PO_4	<0.4	<0.4
Sulfate and Sulfite, as SO_4	8.8	8.5
Calcium, Total, as $CaCO_3$	34.7	34.3
Magnesium, Total, as $CaCO_3$	14.4	14.2
Sodium, as Na	5.3	5.5
Total Organic Carbon, as C	2.7	2.8
Conductivity, µmhos	140	143
pH	8.0	7.5
Silica, as SiO_2, Total	8.9	8.7
Zinc, as Zn	0.04	0.03
Manganese, as Mn	<0.01	<0.01
Nickel, Ni	<0.03	<0.03
Strontium, as Sr	0.75	0.75
Aluminum, as Al	<0.10	<0.10
Barium, as Ba	0.016	0.016
Zirconium, as Zr	<0.01	<0.01
Copper, as Cu	0.028	0.013
Chromium, as Cr	<0.02	<0.02
Boron, as B	<0.04	<0.04
Iron, as Fe	0.016	0.01
Molybdate, as MoO_4	<0.02	<0.02
Lead, as Pb	<0.04	<0.04
Titanium, as Ti	<0.01	<0.01
Potassium, as K	--	--
Cobalt, as Co	<0.01	<0.01
Vanadium, as V	<0.01	<0.01
Tin, as Sn	<0.03	<0.03

Source: Betz Industrial, unpublished data.

As noted above, most of the available data support a conclusion that the quality of Columbia River water is good. There are, however, some indications that water quality problems may exist. An EPA review of water quality problems (both known and suspected) in the Columbia/Snake system warned about dioxins, furans, chlorinated pesticides, polychlorinated biphenyls (PCBs), and metals in the reach from Bonneville to Priest Rapids (Kelly et al. 1992). This finding was based on limited data and the professional opinions of scientists working in the various regions. Most of the contaminants noted in the EPA report bind with sediment, and are thus more closely related to sediment quality than quality of the water.

The Corps recently funded a study of sediment quality at the Walla Walla Grain Growers Terminal near the confluence of the Walla Walla and Columbia Rivers (Battelle 1992). Table C-3 summarizes these sediment sample concentrations, and indicates a high value of 4,4'-DDE (a pesticide) and a detectable level of 2,3,7,8-TCDF (a furan). These contaminants are termed hydrophobic, because they adhere to the sediments and are not dissolved in the water column. Neither furans nor dioxins have been detected in the Columbia River water column near the Port of Umatilla's proposed supply intake.

Given the preponderance of data indicating only very low levels of contaminants in the Columbia River, the water quality is deemed more than acceptable for use as cooling water at the Hermiston Generating Project. The project's water filtering system would remove many of the remaining contaminants from the water.

Radionuclides in the Columbia River: The Department of Energy's Hanford facility has a history of releasing radionuclides (radioactive agents) into the Columbia River. Radionuclides released from Hanford into the Columbia River include tritium (radioactive hydrogen), iodine-129, and isotopes of carbon, phosphorus, iron, cobalt, cesium, strontium, and uranium.

Any or all of these radionuclides may occur in Columbia River water downstream from Hanford, but their concentrations in recent years have been well below standards set by the EPA to protect human health. The Port of Umatilla water supply would draw its water from the Columbia near the McNary Dam, which is downstream from the Yakima, Snake, and Walla Walla River confluences, and each of these rivers enters the Columbia downstream from Hanford. As such, a very substantial dilution of radioactive releases from Hanford occurs before the Columbia reaches the lower McNary pool.

Table C-3. Summary of Conventional Constituents, Oil and Grease, Metals, and Organics in the Sediment Near the Walla Walla Grain Terminal.

Parameter	Value
Conventional Constituents	
Grain Size (% fine)	41
Total organic carbon (%)	0.55
Ammonia (mgN/kg)	12.6
Total phosphate (mgP/kg)	0.07
Sulfide (mg/kg)	5.3
Oil and grease	28
Metals (mg/kg)	
Arsenic	3.1
Cadmium	0.2
Chromium	14.3
Copper	15.5
Lead	7.7
Zinc	62.6
Organics	
Acenaphthene	12U
Fluorene	12U
Anthracene	12U
Fluoranthene	12U
Pyrene	12U
Benzo(a)anthracene	12U
Chrysene	12U
Benzo(k)fluoranthene	12U
Benzo(a)pyrene	1.1U
Araclor 1260	5.6J
4,4'-DDD	0.7J
4,4'-DDE	2.4
4,4'-DDT	2.0U
2,3,7,8-TCDD (pptr)	0.30
2,3,7,8-TCDF (pptr)	7.72

Source: Pinza et al. 1992.

Notes: U = Undetected (below given detection limit).
J = Estimated value below the method detection limit.

The best available data on radionuclide concentrations in the Columbia River downstream from Hanford come from samples taken at the Richland pumphouse where the city of Richland withdraws its drinking water supply:

- Concentrations of iodine-129 measured from 1985 through 1990 are around 0.0001 pico Curie per liter (Woodruff and Hanf 1991, Jaquish and Bryce 1988). Concentrations of tritium measured from 1985 through 1990 range from 110 to 150 pico Curies per liter, and these concentrations tend to decrease with each passing year (Woodruff and Hanf 1991). The more recent tritium concentrations measured at the Richland pumphouse are approximately 200 times lower than the EPA's screening level for tritium (20,000 pico Curies per liter), which defines a margin between safe and potentially unsafe drinking water.

- Concentrations of iodine-129 measured from 1985 through 1990 are around 0.0001 pico Curie per liter (Woodruff and Hanf 1991, Jaquish and Bryce 1988). This level of iodine in Columbia River water at the Richland pumphouse is approximately 10,000 times lower than the EPA's screening level for iodine-129 (1 pico Curie per liter).

- Concentrations of all other radionuclides measured at the Richland pumphouse are also below the EPA's drinking water screening levels (Woodruff and Hanf 1991, Jaquish and Bryce 1988).

Cooling water for the Hermiston Generating Project would be drawn from the river approximately 80.5 river km (50 river miles) downstream from the Richland pumphouse. Considering the low levels of radionuclides measured in recent years at the Richland pumphouse, as well as the dilution of these levels by inflows from three adjoining rivers, the concentrations of these radionuclides in the lower McNary pool are expected to be extremely low. The project's water filtering system would remove many of the remaining contaminants from the water.

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Appendix D

Assessment of Cooling Tower Drift on Vegetation,
Hermiston Cogeneration Project, Hermiston, Oregon
prepared by Barbara Mallock Leitner

ASSESSMENT OF COOLING TOWER DRIFT ON VEGETATION
HERMISTON COGENERATION PROJECT, HERMISTON, OREGON

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INTRODUCTION

Design criteria have been developed for the proposed Hermiston cogeneration power plant project, including circulating water composition, cooling tower drift rate, and location of towers. Using meteorological data from a nearby station, deposition rates for salt drift have been projected. The purpose of this study is to assess whether the cooling tower drift from the power plant will have an adverse effect on nearby vegetation.

PROJECT PARAMETERS

The project may include two sets of cooling towers. The larger, primary cooling towers consist of a pair of four-cell, linear, mechanical draft towers with a manufacturer's guaranteed drift rate of 0.001 percent of the cooling water volume. The primary towers may be combined with a smaller, secondary (waste) tower consisting of two cells with a manufacturer's guaranteed drift rate of 0.0005 percent of the cooling tower volume. Both sets of towers are located on the eastern half of the project site, with the secondary tower located approximately 50 m to the east of the primary towers (John Prebula, Bechtel Engineering, fax dated December 10, 1993).

Water will be obtained from the Columbia River. Water will be concentrated in the primary towers up to a maximum of 40 cycles, or 0.0052 g salt/g solution (5200 ppm). The secondary tower will further concentrate blowdown from the primary tower, and is projected to maintain dissolved solids at about 0.1 g salt/g solution (100,000 ppm). The components of the circulating water expected to occur above the limits of detection are, in decreasing order of concentration: sulfate, sodium, calcium, chloride, carbonate, silica, potassium, magnesium, and strontium.

ENSR Consulting and Engineering has developed tables projecting the deposition of salts from cooling tower drift by direction and distance from cooling towers using the Seasonal and Annual Cooling Tower Impacts (SACTI) model developed by the Electric Power Research Institute (EPRI) (ENSR 1994). Inputs included five years (1988-92) of Pendleton, Oregon weather station data (wind speed and direction, temperature, relative humidity, and dew point); cooling tower location and orientation; drift rate; and a droplet size distribution supplied by the manufacturer. The cooling towers are assumed to operate at full capacity.

ENVIRONMENTAL SETTING

The Hermiston project site is located in an agricultural region where a wide variety of crops are or can be grown, including corn, beans, peas, alfalfa, potatoes, watermelons, and tomatoes. The adjacent lands to the south and southeast of the power plant site are in agriculture; to the west is fallow land, and to the north and northeast is a potato processing facility. The nearest principal area of native vegetation is a riparian zone along the Umatilla River about 400 m (0.25 mi) east of the site.

SCOPE OF THIS STUDY

This assessment of impact has two parts, short-term and long-term. Short-term impacts are caused by the interaction of drift droplets with vegetation, where dissolved solids contained in the drift are taken up by plant leaves and interact physiologically with the plant. Long-term impacts are related to the accumulation of dissolved solids in the soils. In general, short-term impacts are apparent more quickly and at lower deposition rates and concentrations of dissolved solids than are long-term effects.

METHODS

The recent literature was reviewed to ascertain whether circulating water components might cause adverse effects to vegetation when applied as drift. Information was gathered on threshold levels for toxic effects from dissolved salts in general and, where available, for specific drift components. This information was compared with the expected drift deposition rates supplied by project engineers. Next, preliminary results were discussed with Dr. Charles Mulchi of the University of Maryland Department of Agriculture, an authority on cooling tower drift effects on vegetation. Finally, an assessment was made as to the effect of cooling tower drift deposition on surrounding vegetation, both agricultural and natural.

RESULTS

Deposition Rates

The SACTI model projects drift deposition for 320 points, 20 points spaced 100 m apart along each of 16 compass directions, for a total distance of 2,000 m from the center point of the primary towers. The model predicts that by far the greatest deposition will take place at less than 200 m from the cooling towers, and that the deposition is concentrated directly to the east. Four stations were projected to receive more than 10 kg/ha-mo (9 lb/ac-mo) in at least one of the five years modeled. These stations were located in a NNW direction at 100 m, E of the towers at 100 and 200 m, and in the ESE direction at 100 m. Maximum deposition at these stations was up to 10.8 kg/ha-mo (9.7 lb/ac-mo) in the NNW direction, 23 kg/ha-mo (21 lb/ac-mo) in the E direction, and 10.2 kg/ha-mo (9 lb/ac-mo) in the ESE direction. Deposition rates drop off sharply away from the cooling towers; the adjacent points at 200 m in the ESE and ENE directions are projected to receive less than 6 kg/ha-mo (5.4 lb/ac-mo), and the station at 300 m in the E direction is projected to receive less than 2 kg/ha-mo (1.8 lb/ac-mo).

Short-term Effects on Vegetation: Agriculture

Vegetation is damaged by foliar application of dissolved solids when a droplet deposited on a leaf surface contains high dissolved solids. The salts may kill the cells below, causing a necrotic (dead) lesion. Such lesions may damage only a small percentage of the leaf area, but young leaves damaged by many such lesions are prevented from full expansion. The result is a reduction in overall photosynthetic capacity. Chronic exposure to excessive foliar deposition of salts results in decreased productivity and measurable loss of yield in agricultural crops.

In general, the quantity of dissolved solids rather than the chemical composition determines the impact from foliar deposition of salts. Field studies of agricultural crops on the East Coast have shown that the threshold for significant (10 percent) reduction of yield in sensitive species such as corn can occur at sodium chloride deposition rates of about 20 kg/ha-mo (18 lb/ac-mo) (Mulchi and Armbruster 1981). In the same study, soybeans receiving sodium chloride deposition rates of 8.6 kg/ha-mo (7.8 lb/ac-mo) had no loss of productivity compared to controls, but began to experience loss of yield at higher depositions. Therefore, crop species differ substantially in their threshold for loss of yield.

Climate plays an important role in determining the threshold for plant damage from salt drift. In a dry climate, evaporation concentrates drift droplets to toxic levels faster than would occur in a humid climate. Therefore, the threshold for significant loss of yield in crops is lower at a dry site such as Hermiston than on the East Coast. Drift deposition below 10 kg/ha-mo (9 lb/ac-mo) at the Hermiston site would be unlikely to cause significant adverse impacts to sensitive agricultural crops (Dr. Charles Mulchi, University of Maryland, pers. comm., October 7, 1993). Therefore, we have considered deposition rates below this level as safe for agricultural vegetation.

Primary and secondary towers combined. The SACTI model projects deposition in excess of 10 kg/ha-mo (9 lb/ac-mo) in two places: around one station 100 m to the NNW of the cooling towers and an area including three stations at 100 and 200 m in the E and ESE directions from the proposed cooling tower locations. The NNW station is located in the Lamb-Weston potato processing facility parking lot and is not a sensitive area with respect to vegetation. The three stations to the E and ESE and an assumed 10 kg/ha-mo isopleth (estimated by interpolating between stations) lie in a fallow area due east of the project north of the railroad tracks in an area zoned industrial. The points within the agricultural area south and southeast of the project site are all projected to receive 5.2 kg/ha-mo (4.7 lb/ac-mo) or less of salt deposition.

Data from the SACTI model, therefore, project that all deposition above the assumed threshold for crop damage of 10 kg/ha-mo (9 lb/ac-mo) would occur in the fallow area east of the power plant site. This area is unlikely ever to be put into agricultural production because it is criss-crossed with railroad tracks. The agricultural lands to the south and southeast are projected to receive salt depositions well below the threshold. However, due to the very close proximity of the cooling towers and the farmland, sensitive crops nearest the cooling towers in the field adjacent could exhibit some foliar damage under periods of unfavorable weather. This effect is expected to be restricted to a small area and no significant loss of production is predicted. Planting crops such as legumes, tomatoes or potatoes on the adjacent field would further reduce the chance of foliar damage, since these crops are less sensitive to salt deposition than is corn.

Primary towers alone. Because of their small size and lower drift rate, the secondary towers contribute relatively little to salt deposition at distances beyond 100 m from the center of the towers. In the south to eastern directions, the reduction in salt deposition from the primary towers alone would be 6-7 kg/ha-mo (5.4-6.3 lb/ac-mo) at 100 m and about 0.3 kg/ha-mo (0.3 lb/ac-mo) at 200 m. Since sensitive vegetation receptors are more than 100 m distant, the expected effects of the primary towers alone are similar to those of the primary and secondary towers combined.

Long-term Effects on Vegetation: Agriculture

Vegetation may be affected by long-term accumulation of salts in the soil, if they are deposited in quantities that cannot be removed through leaching, or through uptake by plants. In considering the accumulation of salts, chemical composition is important, since some may be beneficial to plants and some neutral or adverse.

Of the nine components of the circulating water present in concentrations above the limits of detection, four (sulfate, calcium, magnesium, and potassium) are essential macronutrients for plants (Ishizuka 1971, Lepp 1979). The annual deposition of these elements from cooling tower drift will be far below that of typical agricultural applications of these elements. The remainder, silica, sodium, chloride, carbonate and strontium, are either minor plant nutrients or are ubiquitous in the environment and can be tolerated in moderate amounts under typical agricultural conditions. The deposition of these elements from salt drift will be less than amounts added to the soil through irrigation with moderately good quality water. Consequently, no adverse effects to agriculture are expected to result from the accumulation in soil of salts from cooling tower drift.

Effects of Drift on Nearby Native Vegetation: Short- and Long-term

At the Hermiston project site, the nearest significant stand of natural vegetation is a riparian area along the Umatilla River about 400 m (0.25 mi) to the east. This area is reported as supporting shrubby thickets of vegetation with an incomplete canopy of trees (Roy Skinner, pers. comm., October 18, 1993). Maximum projected deposition in this area is projected to be 0.3 kg/ha-mo (0.3 lb/ac-mo), far below the threshold level for impacts to agricultural crops.

Agricultural crops typically are more sensitive than most natural vegetation to environmental stresses, since crops are selected for large leaf area, rapid growth, and high yield. However, understory plants growing in shade may be more sensitive than other types of natural vegetation. Under these circumstances, there may be subtle shifts in plant species composition toward more salt-tolerant native species. However, since the deposition rates in the vicinity of the Umatilla River are quite low, it is unlikely that there will be any detectable changes in the vegetation there.

RECOMMENDATIONS

It is recommended that tests be performed on the cooling towers during the initial operational period to assure that the actual drift rate does not exceed the manufacturer's guaranteed drift rate, and that periodic sampling be carried out to assure that the total dissolved solids in the circulating water are within the design parameters.

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Appendix E

Biological Assessment,
prepared by Enserch Environmental

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Biological Assessment

1.0 Introduction

The Hermiston Generating Company L.P. proposes to construct a gas-fired cogeneration power plant near Hermiston, Oregon. The power plant would supply steam to the Lamb-Weston potato processing facility on an adjacent site and electricity generated at the plant would be sold to PacifiCorp, a utility based in Portland, Oregon. The power plant's output at annual average ambient conditions would be 474 average megawatts.

PacifiCorp, an investor-owned utility, has requested a wheeling agreement from Bonneville Power Administration (BPA) to cover transmission of the power generated by the Hermiston Generating Project from BPA's McNary Substation near Umatilla, Oregon, to BPA's Alvey Substation near Eugene, Oregon. Public Law 93-454 (Transmission System Act) requires that BPA make excess transmission capacity available to utilities requesting wheeling service.

All projects involving the BPA, a Federal agency, are subject to the requirements of the Endangered Species Act. Section 7 of the Endangered Species Act (1973) requires an assessment of the effects of any Federal project on listed or proposed threatened or endangered species. The U.S. Fish and Wildlife Service (USFWS) has documented one Federally listed threatened species, the bald eagle (*Haliaeetus leucocephalus*), potentially occurring in the vicinity of the Hermiston Generating Project. In compliance with the Endangered Species Act, the objective of this Biological Assessment is to: (1) provide information on the bald eagle in the vicinity of the Hermiston Generating Project; (2) evaluate the potential effects of the proposed project on the bald eagle; (3) describe any conservation measures necessary to reduce or eliminate adverse effects; and (4) provide a determination of effect (beneficial, none, not likely adverse, or likely adverse) for the bald eagle.

2.0 Project Description

If BPA decides to sign a wheeling agreement with PacifiCorp, the Hermiston Generating Project would be constructed. This project would be located in an unincorporated area of Umatilla County, Oregon, (Figure E-1) and would consist of the following features:

- A combustion turbine/combined cycle power plant. This plant would be constructed on a 5.2-hectare (12.9-acre) site about 4.8 kilometers (3 miles) southwest of the city of Hermiston, Oregon. The triangular-shaped site is about 0.8 kilometer (0.5 mile) west of the Umatilla River and is bounded on the north by the access road to the Lamb-Weston potato processing facility, on the west by Westland Road, and on the southeast by the Union Pacific Railroad. The site appears to be an abandoned field or pasture, vegetated primarily with cheatgrass (*Bromus tectorum*) and non-native forbs.

- A new 230-kV transmission line that would connect the power plant with McNary Substation. Most of the new 19.3-kilometer (12-mile) line would be added within an existing Umatilla Electric Cooperative Association (UECA) transmission line right-of-way. New right-of-way would be needed for the last 0.4-kilometer (0.25-mile) approach to the substation and an optional new right-of-way segment is being considered where the existing right-of-way crosses the Umatilla River. The existing, new, and optional rights-of-way consist primarily of disturbed grasslands, shrub/grasslands, and croplands.

- A new underground gas pipeline that would connect the power plant to an existing PGT gas pipeline approximately 8.0 kilometers (5 miles) south of the plant site. The gas pipeline right-of-way crosses disturbed grasslands and croplands. One area of shrub/grassland exists at the southern end of the right-of-way.

- Underground and aboveground steam, water, and domestic wastewater lines that would connect the power plant to the existing Lamb-Weston facility. These lines would cross an area that is currently a parking lot.

- Modifications to the existing McNary Substation that would interconnect with the new 230-kV transmission line.

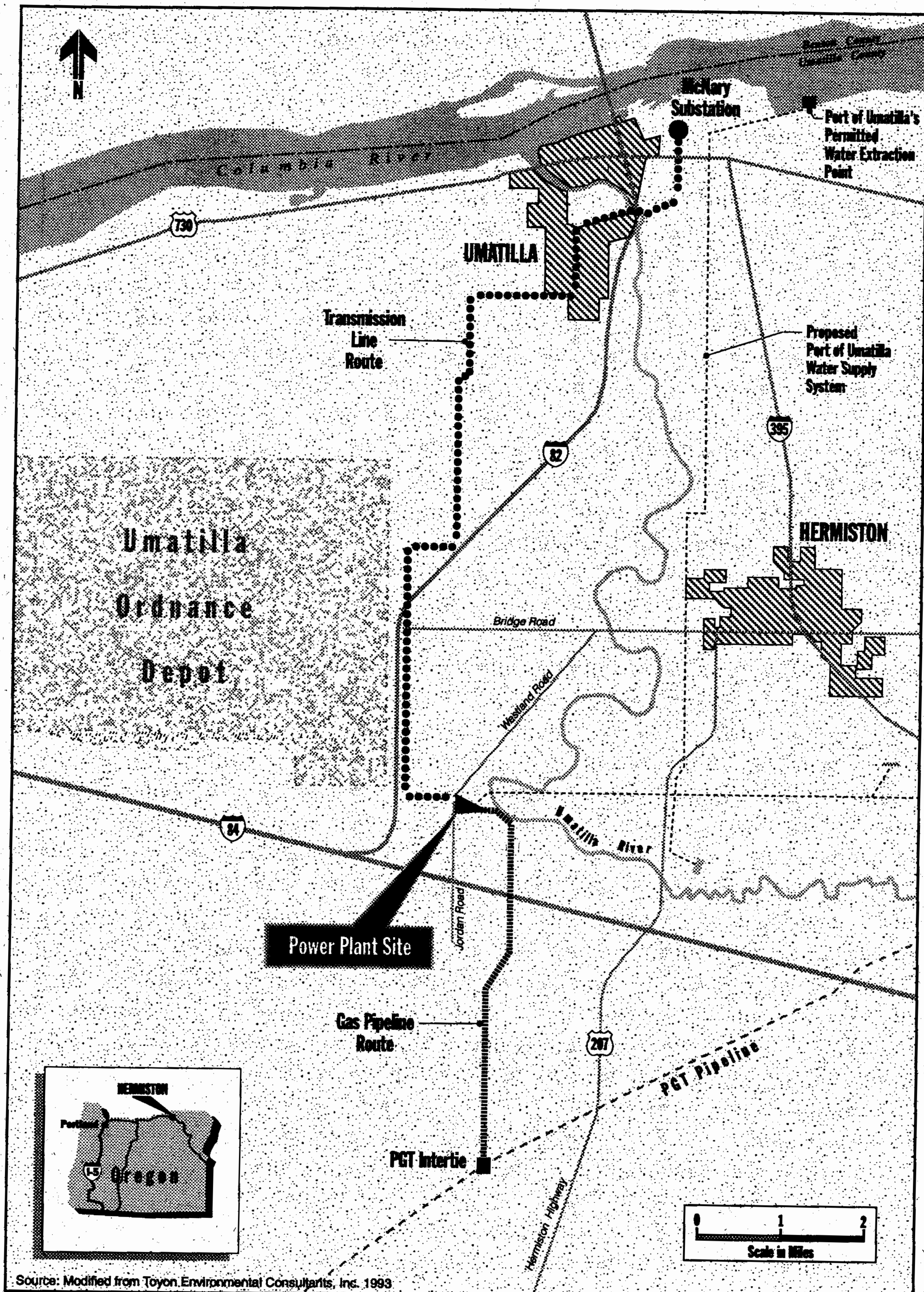

Figure E-1 Project Location Map

3.0 Bald Eagle Distribution and Habitat Requirements

The bald eagle is one of the largest birds of prey in the United States. Historically, this species was found along freshwater and marine shorelines throughout the country, including eastern Oregon (Green 1985). Bald eagle populations declined dramatically between 1947 and 1970 largely due to the intake of organochloride pesticides (USFWS 1986). In 1978, the species was listed as endangered in the lower 48 states with the exception of Washington, Oregon, Wisconsin, Michigan, and Minnesota, where it was classified as threatened. The following section presents information on the distribution and habitat requirements of bald eagles in the Pacific Northwest and general habitat requirements.

3.1 Distribution

In the Pacific Northwest, resident bald eagle populations occur primarily near large bodies of water west of the Cascade Mountains. In Oregon, bald eagle nest sites are concentrated in 3 regions: (1) the Klamath Basin, (2) the Cascade lakes, and (3) the coast and lower Columbia River (Isaacs et al. 1983). In 1982, there were 100 occupied bald eagle nest sites in Oregon (Isaacs et al. 1983); by 1993, there were 237 breeding territories in Oregon (Isaacs and Anthony 1993).

Primary wintering areas for bald eagles in Oregon include the Klamath Basin, Harney Basin, the coast, and the lower Columbia River. Other winter areas with significant use are the Willamette Valley, Snake River reservoirs, and the Umatilla National Wildlife Refuge (NWR), which is located northwest of the project area on the Columbia River. In 1993, 622 bald eagles were counted in Oregon during the mid-winter surveys conducted annually throughout the state in the first half of January (Isaacs 1993). From 1989 through 1993, an average of 602 bald eagles were counted during mid-winter surveys, a 7.6 percent increase over the previous 5-year period (Isaacs 1993).

3.2 Habitat Requirements

Bald eagles have different habitat requirements for foraging, nesting, and wintering, as discussed below.

3.2.1 Forage Habitat

Bald eagles require large expanses of open water or land for foraging and feeding (Stalmaster 1987). They will eat virtually anything with food value (Stalmaster 1987); their diet is highly varied and influenced by seasonal changes in prey availability and weather conditions (McClelland et al. 1982, Isaacs and Anthony 1987, Keister et al. 1987). Over 70 percent of the diet for bald eagles wintering along the mid-Columbia River consists of coots (*Fulica americana*), mallards (*Anas platyrhynchos*), and chukars (*Alectoris chukar*) (Fielder 1982). The low occurrence of fish in the diets of these eagles probably reflects the relatively low abundance of fish in the Columbia River between Wells and Grand Coulee dams (Fielder 1982). Bald eagles wintering in the Harney Basin in southeastern Oregon forage primarily on waterfowl from November to December, on mammal carrion from December to February, and again on waterfowl from February to April (Isaacs and Anthony 1987). Similarly, bald eagles wintering on the Umatilla National Wildlife Refuge (NWR) feed primarily on waterfowl (personal communication, Annear 1994).

3.2.2 Nesting Habitat

The nesting season for bald eagles in the Pacific Northwest generally extends from mid-February through August (Isaacs et al. 1983). The availability of a suitable nest tree, invariably located near water, is critical to bald eagle breeding populations (USFWS 1986, Stalmaster 1987). Nest trees in eastern Oregon and Washington are primarily ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), or black cottonwood (*Populus trichocarpa*). Typically, the tallest tree in the stand is selected for nest placement (Anthony et al. 1982, USFWS 1986) and most are located within 1.7 kilometers (1 mile) of large waterbodies with adequate food supplies (Anthony et al. 1982).

3.2.3 Perching Habitat

Perch sites are used by bald eagles for diurnal resting and as hunting platforms. Preferred perch trees typically provide an unobstructed view of a nearby prey concentration area and have little or no foliage (Stalmaster et al. 1979). Eagles in the Pacific Northwest use a variety of tree species for perching, depending upon tree availability and proximity to food sources. Along the Columbia River in eastern Washington, eagles primarily use ponderosa pines, cottonwoods, and snags for perching (Fielder and Starkey 1986).

3.2.4 Wintering Habitat

The wintering period for bald eagles in the Pacific Northwest is generally recognized as occurring between November 1 and March 31. The primary characteristics of winter habitat include an abundant, readily available food source and the presence of trees that are suitable for night roosting. Wintering areas are typically associated with open water where bald eagles feed on fish and waterfowl, often dead or injured individuals (Green 1985).

Night roost sites are usually the oldest and tallest trees in a stand and most have stout, horizontal limbs and an open branching pattern that allows easy entry and exit (Green 1985). These roosts are typically used from year to year, usually by 2 or more eagles (Green 1985, Anthony et al. 1982). Because roost sites are used for overnighting and for protection from inclement weather (Hansen 1977, Keister 1981, Keister and Anthony 1983), they generally occur in dense stands of conifer with some degree of old-growth structure (Anthony et al. 1982). Conifer trees provide a more thermally favorable microenvironment than dead or deciduous trees during the winter months. However, factors other than weather, such as social behavior and/or food distribution, appear to affect the selection and use of roost sites (Isaacs and Anthony 1987). In the Harney Basin one-half of the communal roosts were single or small groups of deciduous trees, including cottonwood, willow (*Salix* spp.), or European white poplar (*Populus alba*) located near the principal feeding areas. Use of roosts in deciduous trees was highest during the most severe part of the winter and lowest during the period of peak eagle numbers (Isaacs and Anthony 1987). In eastern Washington, bald eagles have been observed roosting in mixed stands of Douglas-fir and ponderosa pine, as well as stands of black locust (*Robinia pseudoacacia*) and black cottonwood (USFWS 1986).

4.0 Response to Disturbance

Effects of human disturbance on nesting bald eagles vary with nesting phenology and the amount of screening vegetation. Disturbances early in the nesting season are more severe than those occurring at later times (Mathisen 1968). Eagles that incubate eggs without disruption are more likely to fledge young than are birds that are subjected to disturbance (Fraser 1981). Productivity is also lower for eagle nests that are near major roads or recently logged areas than those in undisturbed locations (Anthony and Isaacs 1981). In Washington, unproductive nests average 73 meters (240 feet) from permanent human activity while productive nests averaged 119 meters (390 feet) (Grubb 1980).

Effects of human disturbance on foraging, roosting, or perching bald eagles depend on the amount of screening vegetation and type of disturbance. For example, wintering eagles are more tolerant of human disturbance at feeding sites than at loafing or roosting areas (Stalmaster and Newman 1978). Automobile traffic seems to be one of the least disturbing human activities in wintering habitat (Stalmaster 1976), and low-flying (30 to 91 meters [100 to 300 feet]) aircraft rarely disturb wintering birds (Krauss 1977). However, motor boats, drift boats, and anglers appear to be especially disturbing to wintering bald eagles (Stalmaster 1976).

The U.S. Forest Service and USFWS have jointly proposed guidelines to protect eagle nests, perches, and foraging and wintering areas. Adherence to these guidelines is also recommended by the Pacific Northwest Bald Eagle Recovery Team (USFWS 1986). All human activity is precluded within 0.4 kilometer (1/4 mile) of nest sites that are screened by vegetation; where bald eagles have line-of-sight vision, activity is prohibited within 0.8 kilometer (1/2 mile). A buffer zone of 76 to 100 meters (250 to 330 feet) is recommended around perch and roost trees in wintering areas (Stalmaster and Newman 1978).

5.0 Bald Eagle Use of the Project Vicinity

There are no records of bald eagle occurrence at the power plant site for the Hermiston Generating Project or along the transmission or gas pipeline rights-of-way. Similarly, there is no documented bald eagle use of the Umatilla River where it is near the power plant site or portions of the gas pipeline and transmission line rights-of-way. The Umatilla River in this area is relatively narrow and lacks suitable perch, nest, or roost trees for bald eagles.

The Cold Springs NWR and Umatilla NWR, located 16 and 23 kilometers (9.6 and 13.8 miles), respectively, from the power plant site, are the nearest known bald eagle wintering areas. The McNary Substation is about 11 kilometers (6.5 miles) from the Cold Springs NWR and 22 kilometers (13 miles) from the Umatilla NWR. There are no bald eagle nest sites in Umatilla County or any of the surrounding counties (Isaacs and Anthony 1993). The nearest suitable nesting habitat to the project area is along the Columbia River, over 14.5 kilometers (9 miles) away.

Bald eagle use of the Umatilla NWR is concentrated on a number of islands in the Columbia River about 20 to 23 kilometers (12 to 14 miles) downstream of the town of Umatilla, Oregon. Between 1989 and 1994, the number of bald eagles recorded on the Umatilla NWR during midwinter surveys ranged from 5 to 40 (Isaacs 1993; personal communication, Annear 1994). These surveys, conducted annually in mid-January throughout Oregon, represent more of an index of use than actual numbers of eagles wintering in any one location. According to refuge staff, about 34 bald eagles typically winter on the Umatilla NWR; during years of minimum use about 16 birds are present. Over the last 10 years, the maximum number of bald eagles observed on one day was 96 (personal communication, Annear 1994).

Bald eagle use of the Cold Springs NWR is lower than use of the Umatilla NWR. A maximum of 5 bald eagles have been observed on the Cold Springs NWR during mid-winter surveys conducted from 1989 through 1994. Most observations have been made at the Cold Springs reservoir (Isaacs 1993; personal communication, Annear 1994).

6.0 Project Effects

Potential effects of power plants on bald eagles typically include habitat loss, disturbance, and power line hazards. None of these potential effects, however, are expected from the Hermiston Generating Project because: (1) lack of suitable wintering or breeding habitat in or near the project site or rights-of-way precludes use of these areas by bald eagles; (2) the nearest population of wintering bald eagles is more than 14 kilometers (9 miles) from the project site, too far to be disturbed by the increased noise and human presence associated with construction and/or operation; (3) the conductors of the new transmission lines would be separated by 4.3 meters (14 feet) vertically and 3 meters (10 feet) horizontally, a distance that will preclude electrocution of bald eagles; and (4) in general, raptors, including bald eagles, do not appear to be susceptible to collision with transmission lines, most likely because of their keen eyesight, nonflocking behavior, and flight maneuverability (Williams and Colson 1988). Consequently, the Hermiston Generating Project would have no effect on bald eagles.

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Appendix F1

Best Available Control Technology (BACT) Analysis for the Hermiston Generating Project, prepared by ENSR Consulting and Engineering[1/]

1/ Minor design changes in the proposed project have occurred since this appendix report was prepared in May 1993. Emission rates and other parameters included here may not precisely match those reported in Chapter 3 of the EIS. The differences are minor and do not affect conclusions.

Hermiston Generating Company, L.P.

Hermiston, Oregon

Best Available Control Technology (BACT) Analysis for the Hermiston Generating Project [1/]

ENSR Consulting and Engineering

May 1993

Document Number 5402-038-300

1/ Minor design changes in the proposed project have occurred since this appendix report was prepared in May 1993. Emission rates and other parameters included here may not precisely match those reported in Chapter 3 of the EIS. The differences are minor and do not affect conclusions.

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(Cont'd)

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1.0 INTRODUCTION

Hermiston Generating Company, L.P., proposes to construct, own, and operate a natural gas-fired combined-cycle cogeneration facility located in a light industrial zone of Umatilla County near Hermiston, Oregon. This facility is designed to supply steam to the Lamb-Weston facility, a potato processing plant, and electric power to the regional power grid at Bonneville Power Administration - McNary Substation, at Umatilla, Oregon. The nominal generating capacity of the facility is 477 megawatts (MW). The proposed Hermiston Generating Project is scheduled to be completed and in operation in early 1996.

As part of the project, Hermiston Generating Company, L.P. is proposing to install power and steam production equipment consisting of two General Electric Frame 7FA combustion gas turbines (GTs), two unfired heat recovery steam generators (HRSGs), and one 143.3-MMBtu/hr auxiliary boiler for standby service. The gas turbines and the auxiliary boiler will burn natural gas. NO_x emissions from each gas turbine will be 4.5 ppm, based on the use of selective catalytic reduction (SCR) in combination with dry low NO_x combustors. Annual emissions from the Hermiston Generating Project are shown in Table 1-1 and hourly emission rates are shown in Table 1-2.

The Oregon Department of Environmental Quality (DEQ) requires that a Best Available Control Technology (BACT) evaluation be performed for pollutants emitted in significant amounts as part of the New Source Review (NSR) for new or modified major stationary sources of air emissions in attainment areas. The purpose of this document is to demonstrate that BACT will be applied to the proposed Hermiston cogeneration facility gas turbines and the auxiliary boiler. The BACT analysis includes control technology evaluations for nitrogen oxides (NO_x), volatile organic compounds (VOCs), particulate matter (PM_{10}), carbon monoxide (CO), and toxic compounds.

The Hermiston Generating Project is further described in Section 2.0. The BACT analysis is presented in Section 3.0. Conclusions of the BACT analysis are summarized in Section 4.0.

TABLE 1-1

Annual Emissions From the Hermiston Cogeneration Facility After Application of BACT

Source	Annual Operating Hours	Emissions (Tons/Year)					
		NOx(1)	SO2(2)	PM	CO	VOCs(3)	H2SO4(2)
Natural Gas Firing							
Gas Turbine #1	8760	122.6	NIL	35.0	201.5	15.3	NIL
Gas Turbine #2	8760	122.6	NIL	35.0	201.5	15.3	NIL
Auxiliary Boiler	4320	30.9	0.4	3.0	24.8	3.0	NIL
Total Emissions		**276.1**	**0.4**	**73.0**	**427.8**	**33.6**	**NIL**

(1) The NOx emissions are presented at 15 % oxygen and 60 F.
(2) The gas turbines burning natural gas emits only trace amounts of sulfur dioxide and sulfuric acid mist.
(3) For the gas turbines the VOCs are reported as methane, while the VOCs for the auxiliary boiler are reported as unburned hydrocarbons.

TABLE 1-2

Hourly Emissions from the Hermiston Cogeneration Facility after Application of BACT

Source	NO_x	SO_2	PM	CO	VOCs
Natural Gas Firing					
Gas Turbine #1[1]	4.5 ppmvd/28.0 lb/hr	Trace	8.0 lb/hr	15 ppmvd/46 lb/hr	3.5 lb/hr
Gas Turbine #2[1]	4.5 ppmvd/28.0 lb/hr	Trace	8.0 lb/hr	15 ppmvd/46 lb/hr	3.5 lb/hr
Auxiliary Boiler[2]	0.10 lb/MMBtu/ 14.3 lb/hr	0.0014 lb/MMBtu/ 0.2 lb/hr	0.01 lb/MMBtu/ 1.4 lb/hr	0.08 lb/MMBtu/ 11.5 lb/hr	0.01 lb/MMBtu/ 1.4 lb/hr

1 - Emissions for the gas turbines are based on levels presently being offered as guaranteed levels by General Electric for the type 7FA gas turbine (@15% oxygen).
2 - Emissions for the auxiliary boiler were obtained from those provided for a permitted cogeneration facility in Ferndale, Washington.

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2.0 PROJECT DESCRIPTION

2.1 Cogeneration Facility

The Hermiston Generating Project is a gas-fired combined-cycle cogeneration facility. Steam produced will be supplied to the Lamb-Weston, Inc. potato processing facility in Hermiston, Oregon. Lamb-Weston, a subsidiary of ConAgra, Inc., is a nationwide leader in the production and sale of frozen potato products and a technological leader in the formulation of value-added potato products. Electric power from the cogeneration facility will be delivered to the regional power grid at Bonneville Power Administration-McNary Substation at Umatilla, Oregon. The power plant is designed to have a nominal generating capacity of 477 MW. Commercial operation is scheduled to commence early 1996.

The Hermiston cogeneration facility will include two natural gas-fired General Electric Frame 7FA gas turbines operating in combined-cycle mode with two heat recovery steam generators (HRSGs) and two steam turbines. The HRSGs are of unfired, natural circulation, three-pressure, reheat design. Each HRSG will produce high pressure steam at 1,400 pounds per square inch (psi) for admission to the steam turbine, intermediate pressure steam at 300 psi, and saturated steam at 50 psi.

The Hermiston facility will also have one natural gas-fired auxiliary boiler rated at 143.3 MMBtu/hr (100,000 lb/hr steam). The auxiliary boiler will be used to supplement and provide process steam to Lamb-Weston during outages of the combined-cycle cogeneration facility, and will operate no more than 180 days per year (4,320 hours/year).

2.2 Facility Site Description

The project site location and the specific location of major equipment within the cogeneration facility can be found in Figures 2-2 and 2-3 in the PSD analysis (ENSR, May 1993). The project site covers approximately 15 acres of area zoned for light-industrial use. Current land use in the immediate project area includes primarily agricultural and some industrial development (e.g., Lamb-Weston). The project site is in close proximity to the Pacific Gas Transmission Pipeline that will supply natural gas from Canada to the facility.

2.3 Major Facility Components

The air emission sources at the Hermiston cogeneration facility are the gas turbines and the auxiliary boiler. A brief description of the major components of the facility is provided in the following sections.

2.3.1 Gas Turbines

Hermiston Generating Company, L.P., proposes to install two General Electric Frame 7FA gas turbines in combined-cycle mode with HRSGs and steam turbine generator units as part of this project. The fuel will be natural gas. Each gas turbine generator unit will consist of an air compressor, fuel combustion system, power turbine, and a 60-Hz, 18-kV generator unit. Each gas turbine generator set is designed to produce approximately 158 MW of electrical power.

The gas turbines are the heart of a combined-cycle cogeneration plant. First, air is filtered, compressed, and then mixed with natural gas and combusted in the turbine combustion chamber. Exhaust gas from the combustion chamber is expelled through a power turbine which drives both the air compressor and an electric power generator. Exhaust gas exiting the power turbine at approximately 1,100°F is sent to an unfired boiler commonly known as a heat recovery steam generator (HRSG) where steam is produced to generate additional electricity in the steam turbine generator.

2.3.2 Heat Recovery Steam Generators (HRSGs)

An unfired, horizontal, natural circulation, three-pressure HRSG system will extract heat from the exhaust of each of the two gas turbines. Exhaust gas entering the HRSG at approximately 1,100°F will be cooled to approximately 206°F by the time it leaves the HRSG exhaust stack. The heat recovered is used for steam generation and feedwater heating. Each HRSG will include a high-pressure superheater, a high-pressure evaporator, a high-pressure economizer, an intermediate-pressure superheater, a low-pressure superheater, an intermediate-pressure evaporator, an intermediate-pressure economizer, a low-pressure evaporator, and a condensate/feedwater preheater. Each HRSG will produce high-pressure steam, intermediate-pressure steam, and low-pressure saturated steam for power generation and steam export to Lamb-Weston. Each HRSG will be fitted with a SCR grid for control of NO_x emissions to 4.5 ppm.

2.3.3 Steam Turbines

The Hermiston Generating Project will include two triple-admission, reheat, condensing turbines designed for variable pressure operation. The high-pressure portion of the steam turbines receives high-pressure super-heated steam from the HRSG, and subsequently, the high-pressure turbine exhaust steam is directed to the reheat section of the HRSG system. The steam from the reheat section of the HRSG system is supplied to the intermediate-pressure turbine, which exhausts to the low-pressure turbine. The low pressure turbine also receives low-pressure superheated steam from the HRSG system and exhausts to the condenser unit. Each steam turbine set is designed to produce approximately 80 MW of electrical power without additional fuel consumption.

2.3.4 Auxiliary Boiler

Hermiston Generating Company, L.P., will include one natural gas fired auxiliary boiler to provide 100,000-lb/hr uninterrupted steam to the Lamb-Weston facility. The auxiliary boiler is anticipated to operate as a back-up to the cogeneration facility, no more than 4,320 hours per year.

2.4 Applicable Regulations

2.4.1 Oregon Department of Environmental Quality

The Oregon Department of Environmental Quality's (DEQ) New Source Review (NSR) Program applies to many new or modified facilities which would cause significant increases in air pollutant emissions. The objectives of the NSR are to show that air emissions from the new source will not significantly impact ambient air quality in the vicinity of the facility site and to ascertain that state-of-the-art control of air pollutant emissions is applied to the source(s). The Oregon permit issued, after the applicant has satisfactorily shown that the source will not significantly impact air quality and that best available controls are applied, is an Air Contaminant Discharge Permit.

New Source Review is required if any air pollutants are emitted above significant emission rates. The "significant emission rates" for criteria and non-criteria pollutants are identified in the Oregon Administrative Rules (OAR) Chapter 340, Division 20, Table 1. If the source is among the sources listed in OAR 340-20-245(3)(B) and has emissions of any one criteria pollutant above 100 tons per year, or if the source is not on the source list but has emissions of any one criteria pollutant above 250 tons per year, New Source Review is required.

For sources in a nonattainment area, the most stringent control technology must be applied to demonstrate lowest achievable emission rate (LAER) of pollutants from the source. Offsets are required. For sources in an attainment area, the NSR includes a Prevention of Significant Deterioration (PSD) of air quality analysis, a Best Available Control Technology (BACT) analysis, and a visibility analysis. As described in Section 3.1.1, the BACT analysis is conducted using the "top-down" methodology.

If any criteria air pollutant is emitted above the significant emission rate, the applicant must also identify toxic emissions from the source. Significant emission rates for toxic emissions are contained in Tables 1 and 2 of the DEQ Hazardous Air Pollutant Interim Program Manual. If any criteria and/or toxic pollutant is above the significant emission rate, control must be applied to the source or air quality modeling performed to show that the air quality impact is not significant. The required air quality modeling is contained in the PSD analysis (ENSR, May 1993). The toxic emissions BACT is identified in Section 3.6.

The emission limit for particulate matter from fuel-burning equipment (except internal combustion engines) is contained in OAR 340-31. Visible air pollutant limitations are contained in OAR 340-21. These limitations are summarized in Table 2-1.

Compliance with ambient air quality standards is demonstrated in the PSD analysis.

2.4.2 New Source Performance Standards (NSPS)

The new source performance standards (NSPS) constitute a set of national emission standards which apply to specific categories of new sources. EPA promulgated the NSPS for stationary gas turbines in September 1979 (40-CFR 60, Subpart GG). DEQ has adopted the federal NSPS. The NSPS applicable to the gas turbines in this analysis are summarized in Table 2-1. These standards impose maximum allowable emissions for nitrogen oxides and sulfur dioxide from turbines with a heat input at peak load greater than 10 MMBtu/hr. The NO_x emission standard applicable to the proposed gas turbines is 90 ppmvd corrected to 15 percent oxygen. The proposed BACT NO_x emission rate of 4.5 ppmvd is well below the NSPS of 90 ppmvd. For sulfur dioxide, the NSPS requires either an SO_2 emission limitation of 150 ppmvd or a maximum fuel sulfur content of 0.8 weight percent. The SO_2 emission level will be well below 150 ppmvd, and the sulfur content of the natural gas fuel to be used is well below the NSPS level of 0.8 Weight percent.

2.5 Previous BACT/LAER Determinations for Cogeneration Facilities

A review of previous BACT/LAER determinations for cogeneration facilities is presented in Appendix A. The summary includes determinations for NO_x, VOCs, CO, and PM_{10}. The EPA's BACT/LAER Clearinghouse keeps a current listing of BACT and LAER determinations by governmental agencies for all types of air emission sources. The determinations are available in hard copy or through a computerized database. The BACT/LAER Clearinghouse covers information from the past 10 to 12 years and includes determinations throughout the United States.

TABLE 2-1

Summary of Emission Standards and Other Limitations

Source	Pollutant	Emission or Other Limit	Regulatory Citation
Combustion Turbines	NO_x	90 ppmvd at 15 percent	40 CFR 60.322 (9)(1), NSPS; Stationary Gas Turbines, Subpart GG
	SO_2	150 ppmvd 0.8% by weight sulfur fuel	40 CFR 60.332, NSPS; Stationary Gas Turbines, Subpart GG
Auxiliary Boiler	Particulate Matter	0.1 gr/scf(1)	OAR340-021-020(1)(b); Fuel burning equipment; new source; except internal combustion engines
	Sulfur content of No. 2 fuel oil	0.5% by weight	OAR 340-22-015(2)
	Visible emissions	20% opacity	OAR 340-21

(1) gr/scf = grains per standard cubic foot

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3.0 CONTROL TECHNOLOGY EVALUATION

3.1 Introduction

The DEQ requires the application of BACT for the control of each regulated pollutant emitted from a new or modified major stationary source located in an attainment area. The proposed Hermiston cogeneration facility gas turbines and auxiliary boiler are subject to BACT with respect to nitrogen oxides (NO_x), carbon monoxide (CO), particulate matter (PM_{10}), and volatile organic compounds (VOCs). Emissions of SO_2 and sulfuric acid mist will not be greater than the significant emission rate, thus BACT is not required for these pollutants. BACT for toxic emissions is discussed in Section 3.6.

Emissions data on the gas turbines were provided by General Electric for a similar combined-cycle cogeneration facility permitted in Rotterdam, New York (ENSR, April 1992). Emissions quoted for the gas turbines in this report are based on levels presently being offered as guaranteed by General Electric for the type 7FA gas turbine. Emissions data for the auxiliary boiler were provided by John Zink Company for a similar auxiliary boiler.

3.1.1 Top-Down BACT Approach

The BACT requirements are intended to ensure that a proposed facility will incorporate control systems that reflect the latest techniques used in a particular industry, allow for future growth in the vicinity of the proposed facility, and do not result in the exceedance of a National Ambient Air Quality Standard (NAAQS) or other standards imposed on the State level. The BACT evaluation requires the documentation of performance levels achievable for each air pollution control technology applicable to a natural gas fired cogeneration facility.

EPA and DEQ (Oregon Department of Environmental Quality, July 1991) guidance states that a "top-down" approach is to be taken when evaluating available air pollution controls. This approach to the BACT process involves determining the most stringent control technique available (LAER) for a similar or identical emission source. If it can be shown that the LAER level of control is technically, environmentally, or economically infeasible for the particular source, then the next most stringent level of control is determined and similarly evaluated. The process continues until a control level is determined which cannot be eliminated by any technical, environmental, or economic objections. The "top-down" approach has been used in this document to evaluate available pollution controls for the Hermiston cogeneration facility.

3.1.2 Cost Determination Methodology

For certain alternatives, an economic analysis is performed which compares capital and annual costs in terms of cost-effectiveness (i.e., dollars per ton of pollutant removed). Capital costs include the initial cost of components intrinsic to the complete control system (reactors, piping, rotating equipment, instrumentation, monitoring equipment, and supports) and installation costs. Annual operating costs consist of the financial requirements to operate the control system on an annual basis and include overhead, maintenance, labor, raw materials, and utilities.

Capital Costs

A number of methods with varying degrees of accuracy are available for estimating capital costs. The estimating technique used in this analysis is based on a factored method of determining direct and indirect installation costs. This technique is a modified version of the "Lang Method," whereby installation costs are expressed as a function of known equipment costs. This method is consistent with the latest EPA guidance manual on estimating control technology costs (OAQPS 1990b). The estimation factors used to calculate total capital costs are shown in Table 3-1.

Purchased equipment costs represent the delivered cost of the control equipment, auxiliary equipment, and instrumentation. Auxiliary equipment consists of all structural, mechanical, and electrical components required for efficient operation of the device. These include such items as fuel storage and supply piping, and exhaust gas ductwork. Auxiliary equipment costs are taken as a straight percentage of the basic equipment cost, the percentage being based on the average requirements of typical systems and their auxiliary equipment (OAQPS 1990b). In this BACT evaluation, basic equipment costs were obtained directly from vendors or were scaled from similar pieces of equipment. Instrumentation, usually not included in the basic equipment cost, is typically 10 to 15 percent of the basic equipment cost depending on the specific application.

Direct installation costs consist of the direct expenditures for materials and labor for site preparation, foundations, structural steel, erection, piping, electrical, painting, and facilities. Indirect installation costs include engineering and supervision of contractors, construction and field expenses, construction fees, and contingencies. Direct installation costs are expressed as a function of the purchased equipment cost, based on average installation requirements of typical systems. Indirect installation costs are designated as a percentage of the total direct cost

TABLE 3-1

Capital Cost Estimation Factors

Direct Costs:	
1. Purchased Equipment	
a. Basic Equipment Cost Data	(1a)
b. Auxiliary Equipment	0.35 x (1a)
c. Instrumentation	0.10 x (1a)
d. Structural Support	0.10 x (1a)
e. Tax and Freight	0.08 x (1a +1b +1c +1d)
2. Direct Installation Cost	0.30 x (1a +1b +1c +1d + 1e)
Total Direct Cost (TDC)	1 + 2
Indirect Costs:	
3. Indirect Installation Cost	
a. Engineering and Supervision	0.10 x (TDC)
b. Construction and Field Expenses	0.10 x (TDC)
c. Construction Fee	0.05 x (TDC)
d. Contingencies	0.03 x (TDC)
4. Other Indirect Costs	
a. Startup and Testing	0.01 x (TDC)
b. Working Capital	30 days O&M Costs
Total Indirect Costs (TIC)	3 + 4
Total Capital Costs (TCC)	**TDC + TIC**

Source: OAQPS (1990b).

(purchased equipment cost plus the direct installation cost) of the system. The factors are based on the assumption that the installation is performed by an outside contractor and not by plant personnel. Other indirect costs include equipment startup and performance testing, working capital, and interest during construction.

Annualized Costs

Annualized costs are comprised of direct and indirect operating costs. Direct costs include labor, maintenance, replacement parts, raw materials, utilities, and waste disposal. Indirect operating costs include plant overhead, taxes, insurance, general administration, and capital charges. Annualized cost factors used to estimate total annualized cost are listed in Table 3-2. Annualized cost factors were obtained from the latest EPA guidance manual on estimating control technology costs (OAQPS, January 1990).

Direct operating labor costs vary according to the system operating mode and operating time. Labor supervision is estimated as 15 percent of operating labor. Maintenance costs are calculated as 3 percent of total direct cost (TDC). Replacement part costs, such as the cost to replace spent catalyst, have been included where required. Raw material and utility costs are based upon estimated annual consumption and the unit costs are summarized in Table 3-2. Typically, catalyst (for a catalytic oxidation or reduction technology) replacement costs are estimated at 20 percent of purchased equipment costs per annum. This corresponds to a 3-year life, assuming catalyst replacement represents about 65 percent of the basic equipment cost.

With the exception of overhead, indirect operating costs are calculated as a percentage of the total capital cost. The indirect capital costs are based on the capital recovery factor (CRF), defined as:

$$CRF = \frac{i(1+i)^n}{(1+i)^n - 1}$$

where i is the annual interest rate and n is the equipment economic life (years). A control systems economic life typically varies from 10 to 20 years (OAQPS, January 1990). In this analysis, a 10-year equipment economic life of each available control technology is used. The average interest rate is assumed to be 10 percent (OAQPS, January 1990). CRF is calculated to be 0.163.

TABLE 3-2

Annualized Cost Factors

Direct Operating Costs:	
1. Operating Labor	$25 per man-hour
2. Labor Supervision	15% of operating labor
3. Maintenance (annual)	3% of Total Direct Costs (TDC)
4. Replacement Parts (annual)	Catalyst 0.65 x basic equipment cost Other 0.10 x basic equipment cost
5. Ammonia	$250/Ton
6. Utilities a. Electricity b. Water c. Fuel	 $0.05/kWh (U.S. Generating, November 1992) $2.65/1,000 gal (U.S. Generating, November 1992 $1.77/MMBtu (U.S. Generating, November 1992)
Indirect Operating Costs:	
7. Overhead	0.30 x (cost 1 + cost 2) + (0.12 x cost 3)
8. Property Tax	0.01 x Total Capital Cost (TCC)
9. Insurance	0.01 x TCC
10. Administration	0.02 x TCC
11. Capital Recovery	CRF X TCC (0.163 x TCC)
Total Annualized Cost:	Total of Costs 1 through 11
Source of Cost Factors: OAQPS (1990 b)	

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Cost-Effectiveness

The cost-effectiveness of an available control technology is based on the annualized cost of the available control technology and its annual pollutant emission reduction. Cost-effectiveness is calculated by dividing the annualized cost of the available control technology by the tons of pollutant removed by that control technology each year. The basis for determining the uncontrolled emissions, controlled emissions, energy and environmental impacts, and control technology cost-effectiveness of each BACT candidate are summarized in the following subsections.

3.2 Nitrogen Oxides (NO_x)

3.2.1 Formation

NO_x is formed through combustion processes in two ways: 1) the combination of elemental nitrogen and oxygen in the combustion air within the high temperature environment of the combustor (thermal NO_x); and 2) the oxidation of nitrogen contained in the fuel (fuel NO_x). Natural gas does not contain a significant amount of nitrogen. Therefore, the bulk of the NO_x emissions will originate as thermal NO_x.

The rate of formation of thermal NO_x is a function of the residence time, free oxygen, and peak flame temperature. "Front-end" NO_x control techniques are aimed at controlling one or more of these variables. Other control methods, known as "back-end" controls, remove NO_x from the exhaust gas stream once NO_x has been formed.

3.2.2 Gas Turbines

The lowest NO_x emission listed in EPA's BACT/LAER Clearinghouse (Appendix A) is 4.5 ppmv for Kern Front Ltd. in California, achieved with water injection and selective catalytic reduction (SCR). The Salinas River Cogeneration Project in California is listed at 6 ppmv with Dry Low-NO_x combustors and SCR. The Sumas Project in Washington is listed at 6 ppmv with SCR. General Electric has guaranteed NO_x control at 4.5 ppmv for the Frame 7FA gas turbines with SCR in combination with dry low NO_x combustors. Additionally, Hermiston Generating Co., L.P. is aware of several projects permitted at similar emission levels which are not listed in the BACT/LAER Clearinghouse; for instance, NO_x levels of 4.5 ppmv were recently permitted for a combined cycle project in Rotterdam, New York and the Sithe Energy Project, also in New York, using SCR in combination with low NO_x combustors. It is therefore concluded that the lowest achievable emission rate for a combined cycle cogeneration project firing natural gas, such as the Hermiston Generating Project, is 4.5 ppmv using SCR in combination with dry low NO_x combustors.

A review of EPA's BACT/LAER Clearinghouse indicates several levels of NO_x control which may be achieved with various combinations of control technology. Emission levels and control technologies for natural gas fired turbines have been identified and ranked as follows:

4.5 to 6 ppm	SCR plus low NO_x combustors
4.5 to 9 ppmv	SCR plus water/steam injection
15 ppmv	Low NO_x burners, or aggressive water injection
25 ppmv	Water/steam injection or low NO_x combustors
42 ppmv	Water/steam injection, liquid fuel firing

These levels of control are evaluated in terms of best available control technology in the following sections.

3.2.2.1 LAER - 4.5 ppmv with Selective Catalytic Reduction

Technical Analysis

Selective catalytic reduction (SCR) is a process which involves post-combustion removal of NO_x from the flue gas with a catalytic reactor. In the SCR process, ammonia injected into the gas turbine exhaust gas reacts with nitrogen oxides and oxygen in the exhaust gas to form nitrogen and water. The chemical reactions are:

$$4\ NO + 4NH_3 + O_2 \rightarrow 4N_2 + 6\ H_2O$$

and

$$6\ NO_2 + 8\ NH_3 \rightarrow 7N_2 + 12\ H_2O$$

The reactions take place on the surface of a catalyst. The function of the catalyst is to effectively lower the activation energy of the NO_x decomposition reaction. Technical factors related to this technology include the catalyst reactor design, optimum operating temperature, sulfur content of the fuel, and design of the NH_3 injection system.

Three types of catalyst bed configurations have been successfully applied to commercial sources: the moving bed reactor, the parallel flow reactor, and the fixed bed reactor. The fixed bed reactor is applicable to sources with little or no particulate present in the flue gas, such as would be the case for the proposed gas turbines. In this reactor design, the catalyst bed is oriented perpendicular to the flue gas flow, and transport of the reactants to the active catalyst sites takes place through a combination of diffusion and convection mechanisms.

Reduction catalysts are divided into two groups, platinum and base metal (primarily vanadium or titanium). Both groups exhibit advantages and disadvantages in terms of operating temperature, reducing agent/NO_x ratio, and optimum oxygen concentration. A disadvantage common to both platinum and base metal catalysts is the narrow range of temperatures in which the reactions will proceed. Platinum group catalysts have the advantage of requiring lower ignition temperature, but have been shown to also have a lower maximum operating temperature. Operating above the maximum temperature results in oxidation of NH_3 to either nitrogen oxides (thereby actually increasing the NO_x emissions) or ammonium nitrate. Combined- cycle cogeneration systems with HRSGs allow placement of the catalyst so as to operate below the required maximum operating temperature.

Optimum operating temperature for a vanadium-titanium catalyst system has been shown to be in the range of 550 to 800°F (Rodgers, November 1992). In cogeneration applications, where heat recovery steam generation is used, SCR catalyst and ammonia injection grids are typically installed between tube bundles within the HRSG where the flue gas temperature remains within the required temperature range.

The SCR process is also subject to catalyst deactivation over time. Catalyst deactivation occurs through two primary mechanisms: physical deactivation and chemical poisoning. Physical deactivation is generally the result either of prolonged exposure to excessive temperatures or masking of the catalyst due to entrainment of particulate. Chemical poisoning is caused by the irreversible reaction of the catalyst with a contaminant in the gas stream and is a permanent condition.

SCR manufacturers typically estimate less than 10 ppm of unreacted ammonia emissions (ammonia slip) when operating at the efficiency levels proposed. To achieve high NO_x reduction rates (greater than 60 percent), SCR vendors suggest a higher ammonia injection rate than stoichiometrically required, which necessarily results in ammonia slip. Thus an emissions trade-off between NO_x and ammonia occurs in high NO_x reduction applications.

Environmental Impacts

There are several potential environmental impacts associated with the use of SCR. These are summarized below:

- Unreacted ammonia will be emitted to the atmosphere (ammonia slip).
- Transportation, handling, and storage of ammonia represent potential accidental releases of a toxic substance.

The magnitude of adverse environmental impacts due to the use of ammonia will be minimized by the design and operation of the SCR control and storage systems. The use of SCR technology would result in guaranteed ammonia emissions of not to exceed 10 ppm on a volume basis, due to unreacted ammonia leaving the SCR unit. The total emissions of ammonia from the two gas turbines would amount to approximately 166 tons per year. Safety features will be incorporated into the design of the ammonia storage systems to minimize the risk of accidental release. The SCR system will use aqueous ammonia, which is less toxic and volatile than anhydrous ammonia.

Economic Impacts

While the capital and annualized cost of utilizing SCR to control NO_x emissions are greater than the cost associated with lower levels of control, when considering the annual reduction in emissions, the cost effectiveness of achieving 4.5 ppm using SCR is considered justifiable.

3.2.2.2 Best Available NO_x Control Technology for the Gas Turbines

As demonstrated by the review of the control technology determinations reported in the BACT/ LAER Clearinghouse, as well as a review of other permitted facilities not contained in the Clearinghouse, the most stringent control level for NO_x from gas turbines is concluded to be 4.5 ppm based on the use of selective catalytic reduction in combination with low NO_x combustors.

Although the use of this alternative in this case results in increased capital and operating costs compared to the use of other alternatives which would emit higher levels of NO_x, these additional costs are not considered unreasonable nor significant enough to disqualify the application of SCR as BACT. Similarly, the use of SCR may result in adverse environmental impacts (ammonia slip emissions, potential for accidental releases of ammonia) that may not be incurred if an alternative with a lesser degree of NO_x control were utilized. However, the magnitude of these adverse impacts will be minimized by the design and operation of the SCR control system and design and safety features of the ammonia storage systems. Consequently, these potential adverse impacts are not considered significant enough to disqualify SCR as BACT.

Therefore, the use of SCR in combination with low NO_x combustors is concluded to be representative of BACT for control of NO_x emissions from the gas turbines in this case.

3.2.3 Auxiliary Boiler

A review of the BACT/LAER Clearinghouse indicates several levels of NO_x control which may be achieved with various combinations of control technology. Emission levels and control technologies for natural gas fired boilers have been identified and ranked as follows:

0.02-0.03 lb/MMBtu	Low NO_x burner plus SCR
0.05 lb/MMBtu	Low NO_x burner plus Selective Non-Catalytic Reduction (SNCR), or low NO_x burner with flue gas recirculation
0.1 lb/MMBtu	Low NO_x burner

These levels of control are evaluated in terms of best available control technology in the following sections.

3.2.3.1 LAER - 0.02-0.03 lb NO/MMBtu with SCR

Using SCR to achieve an emission rate of 0.02 to 0.03 lb NO_x/MMBtu is considered the most stringent NO_x control technique technically applicable to the auxiliary boiler. SCR is not generally applied to boilers in this capacity range, due to significant capital and operating expense. The environmental disadvantages of SCR are previously described in Section 3.2.2.1. Therefore, only the economic impacts will be assessed here.

Capital costs associated with operating an SCR system on the auxiliary boiler are shown in Table 3-3. SCR capital equipment includes the basic equipment, auxiliary equipment, instrumentation, catalyst, and structural support. The basic equipment cost is estimated at $426,800 based on vendor quotes for a boiler of the same size, (ENSR, June 1991). With other direct and indirect installation and start-up costs, the total capital cost for installing an SCR system is estimated at $1,207,740.

Annualized costs for the auxiliary boiler SCR system are summarized in Table 3-4. The total annualized cost of the SCR system is estimated at $519,150/yr. The maximum potential amount of NO_x which could be removed annually (based on 4320 hrs/yr operation of the auxiliary boiler) compared to the use of low NO_x burners is 24.8 tons/yr. Thus the minimum overall cost effectiveness of applying SCR to the auxiliary boiler is greater than $20,900/ton controlled. This is considered not cost-effective and, therefore, not representative of BACT.

TABLE 3-3

AUXILIARY BOILER - CAPITAL COSTS OF SELECTIVE CATALYTIC REDUCTION FOR NOx CONTROL

Item	Cost
DIRECT COSTS	
(1) Purchased Equipment	
(a) Basic Equipment (A)	$426,800
(b) Auxiliary Equipment (0.35 A)	$149,380
(c) Instrumentation (0.10 A)	$42,680
(d) Structural Support (0.10 A)	$42,680
(e) Taxes & Freight (0.08 (a + b))	$46,100
Total Purchased Equipment Cost (B)	$707,640
(2) Direct Installation (0.30 B)	$212,300
TOTAL DIRECT COST (TDC) (1) + (2)	$919,940
INDIRECT COSTS	
(3) Indirect Installation Cost	
(a) Engineering and Supervision (0.10 TDC)	$92,000
(b) Construction and Field Expenses (0.10 TDC)	$92,000
(c) Construction Fee (0.05 TDC)	$46,000
(d) Contingencies (0.03 TDC)	$27,600
(4) Other Indirect Costs	
(a) Startup and Testing (0.01 TDC)	$9,200
(b) Working Capital (30 days O&M cost)	$21,000
TOTAL INDIRECT COST (TIC):	$287,800
TOTAL CAPITAL COST (TCC)	**$1,207,740**

TABLE 3-4

AUXILIARY BOILER - ANNUALIZED COSTS OF SELECTIVE CATALYTIC REDUCTION FOR NOx CONTROL

Item	Cost
DIRECT OPERATING COSTS:	
(a) Operating Labor (C) ($25/man-hr)	$54,750
(b) Supervisory Labor (0.15 C)	$8,200
(c) Maintenance (0.03 TDC)	$27,600
(d) Replacement Parts	
a) Catalyst (3 year life) (0.65A/3)	$92,500
b) Other (0.1 A)	$42,700
(e) Utilities	
a) Water	$0
b) Fuel Penalty	$15,700
(f) Ammonia Cost ($250/ton)	$10,200
(g) Disposal Costs	included in catalyst replacement cost
INDIRECT OPERATING COSTS	
(h) Overhead (0.3 (a+b) + 0.12 (c))	$22,200
(i) Property Tax (0.01 TCC)	$12,100
(j) Insurance (0.01 TCC)	$12,100
(k) Administration (0.02 TCC)	$24,200
(l) Capital Recovery (0.163 TCC)	$196,900
ANNUALIZED COST, $/yr	$519,150
NOx CONTROLLED, ton/yr	24.8
COST EFFECTIVENESS, $/ton	$20,900

3.2.3.2 Next Level of Control - 0.05 lb NO_x/MMBtu with Selective Non-Catalytic Reduction or Low NO_x Burner/Flue Gas Recirculation

Selective Non-Catalytic Reduction (Thermal DeNO$_x$● and NO$_x$OUT●)

The second most stringent NO_x control technique is selective non-catalytic reduction (SNCR), which for certain applications may be capable of removing 50 percent of NO_x. SNCR involves the non-catalytic decomposition of NO_x in the flue gas to nitrogen and water using ammonia as a reducing agent. Two commercially available SNCR processes applied to boilers include Thermal DeNO$_x$●, which uses aqueous or anhydrous ammonia as the reducing agent, and NO$_x$OUT●, which uses aqueous urea as a reducing agent.

Both Thermal DeNO$_x$● and NO$_x$OUT● processes are based on a gas phase reaction between the reducing agent and NO_x within a specific temperature range (1,600 to 2,200°F). Although the chemical mechanism of either process is quite complex involving many chemical reactions, the control technology hardware for either process is relatively simple. Hardware consists of storage and handling equipment for the reducing agent, a series of injection nozzles within the boiler, and instrumentation.

Achieving the required reaction temperature range represents the primary design criterion for the Thermal DeNO$_x$● and NO$_x$OUT● processes in any individual application. The necessary temperature range is found in different areas of a boiler depending on its design and operating load. Size constraints imposed in a particular application are also a significant design factor. Size constraints are primarily related to the size of the combustion chamber and the difficulty of locating the injection nozzles to provide the necessary time/temperature relationship.

Examples of the use of SNCR to control NO_x emissions on auxiliary boilers operating as backup units for cogeneration applications are rare, as can be seen from the BACT/LAER Clearinghouse. Since these units are generally operated significantly fewer that 8760 hours/yr, applying this alternative is generally not cost effective. However, for the purpose of this analysis, SNCR is estimated to be capable of reducing NO_x by 50% from the level obtainable with low NO_x burners, or 0.05 lb/MMBtu.

Estimated capital costs to apply SNCR in this case are shown in Table 3-5. With a basic equipment cost of $279,000, this alternative is estimated to have a total capital investment of $683,600. Estimated annualized costs of SNCR are shown in Table 3-6. Additional costs associated with SNCR include additional operating labor, additional maintenance, ammonia, additional electrical power to vaporize ammonia, steam as ammonia carrier, as well as increased administration and overhead. Total annualized costs of SNCR, compared to the use of Low NO_x burners, is estimated at $301,550/yr.

Compared to Low NO_x burners, SNCR would have the maximum potential (based on 4,320 hours/yr operation) of reducing NO_x emissions from the auxiliary boiler of 15.5 tons/year. Thus the minimum overall cost effectiveness of this alternative exceeds $19,500/ton.

Low-NOx Burner and Flue Gas Recirculation

The 0.05 lb/MMBtu level of NO_x control may also be achieved through the use of a low-NO_x burner (LNB) in combination with an external flue gas recirculation (FGR) system.

Technical Analysis: LNB

There are two types of low-NO_x burners: staged fuel and staged air. Both types are designed to split the combustion flame into two zones, thereby decreasing NO_x formation. Staged fuel is used for gas firing only, whereas staged air is the most effective technique for controlling NO_x when firing fuel oil.

The staged air burner splits the combustion flame by diverting a portion of the combustion air downstream of the primary fuel injection point, whereas the staged fuel burner splits the combustion flame by dividing the fuel flow into two zones.

NO_x formation is suppressed in the staged air burner by the promotion of a fuel-rich primary combustion zone, followed by complete combustion in the secondary combustion zone. The lack of excess air in the primary zone limits NO_x formation. Incomplete combustion products formed in this primary zone act as reducing agents in the secondary combustion zone. The staged fuel burner zoned combustion approach seeks to lower NO_x formation by lowering the peak flame temperature in the fuel-lean primary zone. Complete combustion is then accomplished in the secondary zone. Combustion products from the primary zone act to lower the local oxygen concentration in the secondary, thereby suppressing NO_x formation in this zone as well.

AUXILIARY BOILER - CAPITAL COSTS OF SELECTIVE NON-CATALYTIC REDUCTION FOR NOx CONTROL

Item	Cost
DIRECT COSTS	
(1) Purchased Equipment	
(a) Basic Equipment (A)	$279,000
(b) Auxiliary Equipment (0.35 A)	included
(c) Instrumentation (0.10 A)	$27,900
(d) Structural Support (0.10 A)	$27,900
(e) Taxes & Freight (0.08 (a + b))	$22,300
Total Purchased Equipment Cost (B)	$357,100
(2) Direct Installation (0.30 B)	$107,100
TOTAL DIRECT COST (TDC) (1) + (2)	$464,200
INDIRECT COSTS	
(3) Indirect Installation Cost	
(a) Engineering and Supervision (0.10 TDC)	$46,400
(b) Construction and Field Expenses (0.10 TDC)	$46,400
(c) Construction Fee (0.05 TDC)	$23,200
(d) Contingencies (0.03 TDC)	$13,900
(4) Other Indirect Costs	
(a) Startup and Testing (0.01 TDC)	$4,600
(b) Working Capital (30 days O&M cost)	$11,900
(c) License Fee	$73,000
TOTAL INDIRECT COST (TIC):	$219,400
TOTAL CAPITAL COST (TCC)	$683,600

TABLE 3-6

AUXILIARY BOILER - ANNUALIZED COSTS OF SELECTIVE NON-CATALYTIC REDUCTION FOR NOx CONTROL

Item	Cost
DIRECT OPERATING COSTS:	
(a) Operating Labor (C) ($25/man-hr)	$54,750
(b) Supervisory Labor (0.15 C)	$8,200
(c) Maintenance (0.03 TDC)	$13,900
(d) Replacement Parts	$28,000
(e) Utilities	
a) Steam	$17,000
b) Electricity	$15,700
(f) Ammonia Cost ($250/ton)	$4,700
INDIRECT OPERATING COSTS	
(h) Overhead (0.3 (a+b) + 0.12 (c))	$20,600
(i) Property Tax (0.01 TCC)	$6,800
(j) Insurance (0.01 TCC)	$6,800
(k) Administration (0.02 TCC)	$13,700
(l) Capital Recovery (0.163 TCC)	$111,400
ANNUALIZED COST, $/yr	$301,550
NOx CONTROLLED, ton/yr	15.5
COST EFFECTIVENESS, $/ton	$19,500

Technical Analysis: FGR

Flue gas recirculation (FGR) involves extracting a portion of the auxiliary boiler flue gas and returning it to the boiler furnace through the burner or windbox. The primary effect of this technique is a reduction of the peak flame temperature in the burner through absorption of the combustion heat by the relatively inert flue gas. Furthermore, the addition of the flue gas reduces the oxygen concentration in the combustion air, effecting a reduction in thermal NO_x formation by decreasing oxygen availability.

The effectiveness of this control method on NO_x removal depends to a large degree on the fuel being fired. Since FGR reduces NO_x formation by targeting peak flame temperature, it has little effect on fuel NO_x formation. FGR is thus less effective on fuels with a high nitrogen content.

Generally, NO_x reduction efficiency is directly related to the flue gas recirculation rate. Typically an increase in the recirculation rate results in a corresponding decrease in thermally generated NO_x. Beyond 20 percent FGR, effectiveness begins to diminish. At recirculation rates greater than 25 percent, flame instability becomes a problem.

Implementation of FGR requires an additional capital expense associated with the required additional ductwork and fan capacity. The forced draft fan, which supplies both fresh combustion air and recirculated flue gas to the windbox, must be designed to operate in a high temperature environment, requiring the use of expensive materials of construction.

Economic Analysis

The basic equipment cost for a single LNB for the boiler is $40,000. The basic equipment cost of a single LNB, fan, piping, fan motor, and controls, is $90,000 (Born Environmental, November 1992).

Since the auxiliary boiler is assumed to be equipped with a LNB, the incremental cost of adding FGR is evaluated. The addition of FGR can provide a NO_x emission rate of 0.05 lb/MMBtu, which represents a maximum potential removal of 15.5 tons of NO_x annually (50 percent of removal of NO_x) (Born Environmental, November 1992) based on 4,320 hrs/yr operation.

The incremental basic equipment cost to incorporate FGR to the auxiliary boiler is $50,000. The total capital cost of adding the FGR system is $145,800, as shown in Table 3-7.
Annualized costs for the use of FGR are shown in Table 3-8, and consist of the additional electricity associated with the forced draft fan, as well as the operating labor costs (1 hour per

shift). The additional annual increase in electrical cost to run the 125-hp fan is estimated at $40,900. The total annual cost for FGR is estimated at $120,100. This results in an incremental cost of $7,700 per ton of NO_x removed. FGR, in addition to the LNB, is not considered cost-effective or representative of BACT for the auxiliary boiler.

3.2.3.3 Third Best Level of Control - 0.1 lb NO_x/MMBtu with Low-NO_x Burner

A level of 0.1 lb NO_x/MMBtu can be achieved by using a LNB. The cost of a low-NO_x burner does not differ from a "standard" burner (0.2 lb NO_x/MMBtu) (Born Environmental, November 1992). In addition, there are no energy or environmental impacts associated with use of a LNB. Therefore, the LNB providing a NO_x level of 0.1 lb/MMBtu is concluded to represent BACT for the auxiliary boiler.

3.2.3.4 Best Available NO_x Control Technology For The Auxiliary Boiler

The auxiliary boiler will be equipped with a LNB with a NO_x emission rate of 0.10 lb/MMBtu for natural gas firing. The incremental costs of adding SCR, SNCR, and FGR to the auxiliary boiler were evaluated and those costs are summarized in Tables 3-3 through 3-8. It was concluded that the incremental cost of adding these alternatives are cost-prohibitive. Therefore, the BACT for the auxiliary boiler is concluded to be represented by the low-NO_x burner alternative. A summary of this BACT analysis is presented in Table 3-9.

AUXILIARY BOILER - CAPITAL COSTS OF FGR FOR NOx CONTROL

Item	Cost
DIRECT COSTS	
(1) Purchased Equipment	
(a) Basic Equipment (A)	$50,000
(b) Auxiliary Equipment (0.35 A)	$17,500
(c) Instrumentation (0.10 A)	$5,000
(d) Structural Support (0.10 A)	$5,000
(e) Taxes & Freight (0.08 (a + b))	$5,400
Total Purchased Equipment Cost (B)	$82,900
(2) Direct Installation (0.30 B)	$24,900
TOTAL DIRECT COST (TDC) (1) + (2)	$107,800
INDIRECT COSTS	
(3) Indirect Installation Cost	
(a) Engineering and Supervision (0.10 TDC)	$10,800
(b) Construction and Field Expenses (0.10 TDC)	$10,800
(c) Construction Fee (0.05 TDC)	$5,400
(d) Contingencies (0.03 TDC)	$3,200
(4) Other Indirect Costs	
(a) Startup and Testing (0.01 TDC)	$1,100
(b) Working Capital (30 days O&M cost)	$6,700
TOTAL INDIRECT COST (TIC):	$38,000
TOTAL CAPITAL COST (TCC)	$145,800

TABLE 3-8

AUXILIARY BOILER - ANNUALIZED COSTS OF FGR FOR NOx CONTROL

Item	Cost
DIRECT OPERATING COSTS:	
(a) Operating Labor (C) ($25/man-hr)	$27,400
(b) Supervisory Labor (0.15 C)	$4,100
(c) Maintenance (0.03 TDC)	$3,200
(d) Replacement Parts	
b) Other (0.1 A)	$5,000
(e) Utilities	
b) Electricity	$40,900
INDIRECT OPERATING COSTS	
(h) Overhead (0.3 (a+b) + 0.12 (c))	$9,800
(i) Property Tax (0.01 TCC)	$1,500
(j) Insurance (0.01 TCC)	$1,500
(k) Administration (0.02 TCC)	$2,900
(l) Capital Recovery (0.163 TCC)	$23,800
ANNUALIZED COST, $/yr	$120,100
NOx CONTROLLED, ton/yr	15.5
COST EFFECTIVENESS, $/ton	$7,700

TABLE 3-9

Summary of NO_x BACT for the Auxillary Boiler

Control Technique	NO_x Emission Rate (lb/MMBtu)	Amount of NO_x Removed (tons/year)	Cost Effectiveness ($/ton)
LNB + SCR	0.02	24.8	20,900
LNB + SNCR	0.05	15.5	19,500
LNB + FGR	0.05	15.5	7,700
LNB	0.10	0	0

3.3 Carbon Monoxide

3.3.1 Formation

Carbon monoxide (CO) is formed as a result of incomplete combustion of fuel. Control of CO is accomplished by providing adequate fuel residence time and high temperature in the combustion device to ensure complete combustion. These control factors, however, also result in high emission rates of NO_x. Conversely, a low NO_x emission rate achieved through flame temperature control (by water injection in turbines and low-NO_x burners in boilers) can result in higher levels of CO emissions. Thus, a compromise is established whereby the flame temperature reduction is set to achieve the lowest NO_x emission rate possible while keeping the CO emission rates at acceptable levels.

Gas Turbines

CO emissions from the gas turbines are a function of oxygen availability (excess air), flame temperature, residence time at flame temperature, combustion zone design, and turbulence. Alternative CO control methods include exhaust gas cleanup methods such as catalytic oxidation, and front-end methods such as combustion controls wherein CO formation is suppressed.

3.3.1.1 Available Control Technologies

A review of EPA's BACT/LAER Clearinghouse indicates several levels of CO control which may be achieved for natural gas fired gas turbines. Emission levels and control technologies have been identified and ranked as follows:

2 to 6 ppm	CO catalyst
10 to 15 ppm	Combustion controls (associated with NO_x levels higher than those proposed for the Hermiston Cogeneration project)
15 to 30 ppm	Combustion controls (associated with low-NO_x combustor)

These levels of control are evaluated in terms of best available control technology in the following sections.

3.3.1.2 LAER - 2 to 6 ppm CO with Catalytic Oxidation

The most stringent CO control level available for the gas turbines would be achieved with the use of an oxidation catalyst system, which can remove approximately 80 percent of CO. According to the list of turbines in the BACT/LAER Clearinghouse (see Appendix A) with limits on CO, oxidation catalyst systems have been concluded to represent BACT for CO control for 11 of 117 turbines. The lowest emission level listed in the Clearinghouse is 2 ppm for the AES Placerita plant in Southern California. This is concluded to represent LAER for CO for natural gas fired, combined cycle turbines.

Technical Analysis

As with SCR catalyst technology for NO_x control, oxidation catalyst systems seek to remove pollutants from the turbine exhaust gas rather than limiting pollutant formation at the source. Unlike an SCR catalyst system, which requires the use of ammonia as a reducing agent, oxidation catalyst technology does not require the introduction of additional chemicals for the reaction to proceed. Rather, the oxidation of CO to CO_2 utilizes the excess air present in the turbine exhaust; the activation energy for the reaction to proceed is lowered in the presence of the catalyst. Technical factors relating to this technology include the catalyst reactor design, optimum operating temperature, pressure loss to the system, and catalyst life.

Catalytic oxidation reactors have been successfully applied to various commercial sources. In gas turbine applications, the catalyst bed is oriented perpendicular to the gas flow, and may be installed vertically or horizontally.

As with SCR, CO catalytic oxidation reactors are required to operate in a relatively narrow temperature range. Optimum operating temperatures for these systems generally fall into the range of 700 to 1,100°F. At lower temperatures, CO conversion efficiency falls off rapidly. Above 1,200°F, catalyst sintering may occur, thus causing permanent damage to the catalyst.

Typical pressure losses across an oxidation catalyst reactor are in the range of 1.5 to 2.5 inches of water. Pressure losses in this range correspond roughly to a 0.25 percent loss in power output and fuel efficiency (U.S. Generating, November 1992).

Catalyst systems are subject to loss of activity over time. Since the catalyst itself is the most costly part of the installation, the cost of catalyst replacement should be considered on an annualized basis. Catalyst life may vary from the manufacturer's 3-year guarantee (typical), to a 5- to 6-year predicted life. Periodic testing of catalyst material is necessary to predict actual catalyst life for a given installation. The following economic analysis assumes that catalyst will be replaced every 3 years. At temperatures exceeding 1,000°F, this system is also expected to control 30 percent of the unburned hydrocarbon (VOC) emissions for each gas turbine combined-cycle unit, based on natural gas firing.

Economic Analysis

Capital and annual costs associated with installation of an oxidation catalyst reactor were obtained from Engelhard, a vendor of catalyst systems. The basic equipment cost is $1,200,000. Capital costs include the catalytic reactor, initial catalyst charge, freight, engineering and design, and installation. As shown in Table 3-10, the purchased equipment cost is $1,989,600. When adding direct installation costs and indirect costs, the total capital cost of this equipment is estimated at $3,389,000.

Annual operating costs, summarized in Table 3-11, include operating labor (2 hours/shift), routine inspection and maintenance, spent catalyst replacement, and lost cycle efficiency due to the increased backpressure. Annualized catalyst replacement cost was calculated based on an assumed 3-year life, for an annualized cost of about $260,000. As shown in Table 3-11, estimated annual costs total $1,343,750. At an estimated control efficiency of 80 percent to reduce CO to 2 ppm, the use of oxidation catalyst represents 161 tons CO removed per year per gas turbine at a cost of $8,300 per ton of CO controlled. This technology is not considered cost-effective, and is concluded not to represent BACT for CO from the gas turbines.

3.3.1.3 Next Best Level of Control - Combustion Controls

Operation of the gas turbine at the base load condition inherently limits formation of CO by promoting complete combustion in order to generate the maximum power from each pound of fuel. The CO emissions will be limited to 46 lbs/hr per combustion turbine. This amounts to 403 tons per year for the two gas turbines.

Of 117 turbines listed in the BACT/LAER Clearinghouse with CO limits, good combustion or turbine design is concluded to represent BACT for 50 applications. The other turbines do not have BACT listed, only the emission limit (see Appendix A). By operating the turbines properly to ensure good combustion, Hermiston Generating Co. will keep CO emissions at or below 15 ppm. This control method is proven reliable, does not carry additional economic impact, and does not result in increased emissions of other pollutants.

GAS TURBINES - CAPITAL COSTS OF CATALYTIC OXIDATION FOR CO CONTROL

Item	Cost
DIRECT COSTS	
(1) Purchased Equipment	
(a) Basic Equipment (A)	$1,200,000
(b) Auxiliary Equipment (0.35 A)	$420,000
(c) Instrumentation (0.10 A)	$120,000
(d) Structural Support (0.10 A)	$120,000
(e) Taxes & Freight (0.08 (a + b))	$129,600
Total Purchased Equipment Cost (B)	$1,989,600
(2) Direct Installation (0.30 B)	$596,900
TOTAL DIRECT COST (TDC) (1) + (2)	$2,586,500
INDIRECT COSTS	
(3) Indirect Installation Cost	
(a) Engineering and Supervision (0.10 TDC)	$258,700
(b) Construction and Field Expenses (0.10 TDC)	$258,700
(c) Construction Fee (0.05 TDC)	$129,300
(d) Contingencies (0.03 TDC)	$77,600
(4) Other Indirect Costs	
(a) Startup and Testing (0.01 TDC)	$25,900
(b) Working Capital (30 days O&M cost)	$52,300
TOTAL INDIRECT COST (TIC):	$802,500
TOTAL CAPITAL COST (TCC)	**$3,389,000**

TABLE 3-11

GAS TURBINES - ANNUALIZED COSTS OF CATALYTIC OXIDATION FOR CO CONTROL

Item	Cost
DIRECT OPERATING COSTS:	
(a) Operating Labor (C) ($25/man-hr)	$54,750
(b) Supervisory Labor (0.15 C)	$8,200
(c) Maintenance (0.03 TDC)	$77,600
(d) Replacement Parts	
a) Catalyst (3 year life) (0.65A/3)	$260,000
b) Other (0.1 A)	$120,000
(e) Utilities	
b) Fuel (0.25 % of total fuel input)	$107,000
(f) Disposal Costs	included in catalyst replacement cost
INDIRECT OPERATING COSTS	
(h) Overhead (0.3 (a+b) + 0.12 (c))	$28,200
(i) Property Tax (0.01 TCC)	$33,900
(j) Insurance (0.01 TCC)	$33,900
(k) Administration (0.02 TCC)	$67,800
(l) Capital Recovery (0.163 TCC)	$552,400
ANNUALIZED COST, $/yr	$1,343,750
CO CONTROLLED, ton/yr	161
COST EFFECTIVENESS, $/ton	$8,300

3.3.1.4 Best Available CO Control for the Gas Turbines

Although the most stringent alternative for control of CO is the use of catalytic oxidation, this alternative is not considered representative of BACT on the basis of economic impacts. As the next most stringent alternative, combustion control is concluded to be representative of BACT since it is demonstrated, cost effective, and will not result in adverse energy and environmental impacts.

3.3.2 Auxiliary Boiler

A review of the BACT/LAER Clearinghouse indicates that combustion controls are the technology of choice for CO control for auxiliary boilers. However, the use of catalytic oxidation is considered technically feasible, and is evaluated as the LAER for CO control for the auxiliary boiler. Achievable CO emissions and control technologies have been identified and ranked as follows:

- 80 percent Control-Catalytic Oxidation
- Combustion Controls

These levels of control are evaluated in terms of BACT in the following sections.

As for turbines, emissions of CO from boilers is dependent on the combustion efficiency of each unit. Oxygen availability (excess air), flame temperature, residence time at flame temperature, combustion zone design, and turbulence also govern CO formation in boilers. Control methods take into account the design of the combustion system in order to minimize formation of CO, or use "back-end" techniques which remove CO from the exhaust gas.

3.3.2.1 LAER - Catalytic Oxidation

Catalytic oxidation is considered to be the most stringent control which could most likely be applied to gas-fired boilers. However, this control alternative has not been widely applied to boilers of this size and fuel type due to costs. Boilers in the size range proposed for this project firing natural gas typically do not generate large quantities of CO emissions, and thus the cost of CO removal with this alternative is typically prohibitive.

Capital costs for a catalytic oxidation system for the auxiliary boiler are based on vendor quotations for a boiler the same size as the auxiliary boiler in question. As shown in Table 3-12, the basic equipment cost is approximately $192,900. When adding direct installation costs and indirect costs, the total capital cost of a catalytic oxidation system on the proposed auxiliary boiler would be approximately $546,300.

Annualized costs estimated for this system are shown in Table 3-13. Additional operating labor, increased maintenance and utilities, catalyst replacement (3-year life estimated), and indirect operating costs bring the total annualized cost of this alternative to $240,100. Based on a removal efficiency of 80 percent, the maximum potential emissions controlled by catalytic oxidation would be 19.9 tons CO per year for the auxiliary boiler based on 4,320 hrs/yr operation. The minimum cost of CO removal by catalytic oxidation is $12,100 per ton of CO removed. This is not considered cost-effective, and thus this alternative is not considered representative of BACT for CO.

3.3.2.2 Next Best Level of Control - Combustion Controls

The auxiliary boiler will be equipped with a high-efficiency burner which will limit the formation of CO by providing for total combustion of the fuels. Such burners are part of the standard equipment supplied with the boiler, and thus will not result in increased economic impacts to the proposed project. They are designed to extract the maximum energy per pound of fuel and will not result in increased energy consumption, nor do they present significant environmental impacts.

Carbon monoxide emissions from combustion-controlled firing are expected to be about 24.8 tons per year. For all of the gas turbine auxiliary boilers in the BACT/LAER Clearinghouse with limits on CO (nine boilers total), good combustion practices have been concluded to represent BACT for CO. Therefore, the use of combustion control for minimization of the formation of CO is concluded to be representative of BACT for the auxiliary boiler.

3.4 Particulate Matter

3.4.1 Formation

Particulate emissions from combustion sources consist of ash from the fuel and particulate of carbon and hydrocarbons resulting from incomplete combustion. Therefore, units firing fuels with low ash contents and high combustion efficiency exhibit correspondingly low particulate emissions.

AUXILIARY BOILER - CAPITAL COSTS OF CATALYTIC OXIDATION FOR CO CONTROL

Item	Cost
DIRECT COSTS	
(1) Purchased Equipment	
(a) Basic Equipment (A)	$192,900
(b) Auxiliary Equipment (0.35 A)	$67,500
(c) Instrumentation (0.10 A)	$19,300
(d) Structural Support (0.10 A)	$19,300
(e) Taxes & Freight (0.08 (a + b))	$20,800
Total Purchased Equipment Cost (B)	$319,800
(2) Direct Installation (0.30 B)	$95,900
TOTAL DIRECT COST (TDC) (1) + (2)	$415,700
INDIRECT COSTS	
(3) Indirect Installation Cost	
(a) Engineering and Supervision (0.10 TDC)	$41,600
(b) Construction and Field Expenses (0.10 TDC)	$41,600
(c) Construction Fee (0.05 TDC)	$20,800
(d) Contingencies (0.03 TDC)	$12,500
(4) Other Indirect Costs	
(a) Startup and Testing (0.01 TDC)	$4,200
(b) Working Capital (30 days O&M cost)	$9,900
TOTAL INDIRECT COST (TIC):	$130,600
TOTAL CAPITAL COST (TCC)	$546,300

AUXILIARY BOILER - ANNUALIZED COSTS OF CATALYTIC OXIDATION FOR CO CONTROL

Item	Cost
DIRECT OPERATING COSTS:	
(a) Operating Labor (C) ($25/man-hr)	$27,375
(b) Supervisory Labor (0.15 C)	$4,100
(c) Maintenance (0.03 TDC)	$12,500
(d) Replacement Parts	
a) Catalyst (3 year life) (0.65A/3)	$41,800
b) Other (0.1 A)	$19,300
(e) Utilities	
b) Fuel (0.25 % of total fuel input)	$13,200
(f) Disposal Costs	included in catalyst replacement cost
INDIRECT OPERATING COSTS	
(h) Overhead (0.3 (a+b) + 0.12 (c))	$10,900
(i) Property Tax (0.01 TCC)	$5,500
(j) Insurance (0.01 TCC)	$5,500
(k) Administration (0.02 TCC)	$10,900
(l) Capital Recovery (0.163 TCC)	$89,000
ANNUALIZED COST, $/yr	$240,100
CO CONTROLLED, ton/yr	19.9
COST EFFECTIVENESS, $/ton	$12,100

3.4.2 Gas Turbines

When the New Source Performance Standard for Stationary Gas Turbines (40 CFR 60 Subpart GG) was promulgated in 1979, the EPA recognized that "particulate emissions from stationary gas turbines are minimal," and noted that particulate control devices are not typically installed on gas turbines, and the cost of installing a particulate control device is prohibitive (USEPA, September 1977). Performance standards for particulate control of stationary gas turbines were, therefore, not proposed or promulgated.

The most stringent particulate control method demonstrated for gas turbines is the use of low ash fuel (such as natural gas). BACT/LAER Clearinghouse listings for turbines do not contain descriptions of the particulate control method for the vast majority of entries. Of the 80 turbines listed in the Clearinghouse, only 37 have limits on PM. Proper combustion control and natural gas firing is the predominant control method listed for turbines with PM limits.

Typical particulate control devices, such as electrostatic precipitators (ESPs) and baghouse filters, are not suitable for use with turbines due to both the extremely low particulate emission concentration as well as physical characteristics of the particles. For ESPs, which operate on the principal of charge migration, the low particulate concentration would prevent significant charge buildup on particles, and thus lower migration of particles to collecting plates. For baghouse filters, liquid fuel particulate is typically hygroscopic, and thus would tend to adhere to the bags and not be easily dislodged as required to clean the bags.

Vendors of ESPs and baghouse filters who were contacted indicated that they have not sold any of either of these units for gas- or oil-fired turbine applications. They stated that such sources typically meet emission standards "without controls." For these turbines, the peak particulate emission concentration is on the order of 0.002 grain per dry standard cubic foot (gr/dscf) (during oil firing), which is lower than these vendors were willing to guarantee (0.005 gr/dscf); lower guarantees are generally not given due to the difficulty in reliably measuring particulate concentrations this low (Research-Cottrell 1988; Joy Technologies 1988). The use of ESPs and baghouse filters is, therefore, considered technically infeasible, and not representative of BACT.

Given the lack of feasible alternatives, the use of natural gas and good combustion control can be concluded to be BACT for PM control in the proposed gas turbines. These measures will limit PM emissions to less than 8 lb/hr per combustion turbine and total PM emissions to 70.0 tons per year for the two gas turbines.

3.4.3 Auxiliary Boiler

As with the gas turbines, emissions of particulate from the auxiliary boilers will consist of ash from the fuel and particles of carbon and hydrocarbons resulting from incomplete combustion.

Traditional particulate control devices have not been applied to natural gas fired boilers due to the extremely small level of emissions firing this fuel. When proposing NSPS for boilers with heat input greater than 100 MMBtu/hr, EPA chose not to develop emissions standards for particulate matter from units firing only natural gas, and noted that emissions of PM from the combustion of natural gas are low, and therefore, the costs of further emission control would be unreasonably high. Further, in developing NSPS for boilers with heat inputs less that 100 MMBtu/hr, EPA again chose not to require standards of performance for PM from units firing only natural gas, and noted that due to the low uncontrolled PM emission levels from natural gas fired sources, imposition of any type of PM control technology to these sources would impose significant costs for no benefit.

Consequently, the use of any type of add-on particulate matter control device on the proposed auxiliary boiler is considered unreasonable and unrepresentative of BACT. Firing natural gas as the only fuel in the auxiliary boiler will limit emissions of PM to less than 1.4lb/hr (0.01 lb/MMBtu) and is considered representative of BACT for PM control.

3.5 Hydrocarbons (VOCs)

3.5.1 Formation

Hydrocarbons (VOCs) are emitted from gas fired turbines and auxiliary boilers as a result of incomplete combustion of fuel. Control of these pollutants is accomplished by providing adequate fuel residence time and high temperature in the combustion device to ensure complete combustion.

3.5.2 Gas Turbines

3.5.2.1 Catalytic Oxidation

The most stringent VOC control level for gas turbines has been achieved using catalytic oxidation. According to the list of turbines in the BACT/LAER Clearinghouse with limits on VOC, oxidation catalyst systems have been concluded to represent BACT for VOC control for only 5 of 29 gas turbines with VOC limits listed.

The same technical factors which apply to the use of oxidation catalyst technology for control of CO emissions (narrow operating temperature range, loss of catalyst activity over time, system pressure losses) apply to the use of this technology for control of VOCs. Further discussion on these factors can be found in Sections 3.3.1.2 and 3.3.2. Note, however, that very little VOC is expected to be oxidized below 1,000° F.

According to vendors, a specially formulated catalyst is preferred for VOC oxidation and requires about twice the catalyst required for CO oxidation. The basic equipment cost was scaled from a similar gas turbine combined-cycle system ($2,166,800). Capital costs are summarized in Table 3-14, and the total capital cost is estimated to be $6,107,700. Annualized costs are summarized in Table 3-15, and the total annualized cost is estimated to be $2,271,950. A VOC removal efficiency of 60 percent yields removal of 9.2 tons per year of VOCs per gas turbine. The cost per ton of VOC removed is estimated at $247,000. This is not considered cost-effective. Therefore, the use of an oxidation catalyst is concluded to be economically infeasible, and not representative of BACT for control of VOCs from the gas turbines.

3.5.2.2 Combustion Controls

Conclusions pertaining to use of combustion controls for VOCs are similar to those drawn for control of CO. This control method is proven, reliable, does not result in increased emissions of other pollutants, and has no adverse economic impacts. Total VOC emissions from the two gas turbines will be 30.6 tons per year. Combustion controls have been concluded to represent BACT for 24 of 29 turbines listed with VOC controls in the BACT/LAER Clearinghouse, and as the next most stringent control alternative after catalytic oxidation, is concluded to represent BACT for the gas turbines.

GAS TURBINES - CAPITAL COSTS OF CATALYTIC OXIDATION FOR VOC CONTROL

Item	Cost
DIRECT COSTS	
(1) Purchased Equipment	
(a) Basic Equipment (A)	$2,166,800
(b) Auxiliary Equipment (0.35 A)	$758,400
(c) Instrumentation (0.10 A)	$216,700
(d) Structural Support (0.10 A)	$216,700
(e) Taxes & Freight (0.08 (a + b))	$234,000
Total Purchased Equipment Cost (B)	$3,592,600
(2) Direct Installation (0.30 B)	$1,077,800
TOTAL DIRECT COST (TDC) (1) + (2)	$4,670,400
INDIRECT COSTS	
(3) Indirect Installation Cost	
(a) Engineering and Supervision (0.10 TDC)	$467,000
(b) Construction and Field Expenses (0.10 TDC)	$467,000
(c) Construction Fee (0.05 TDC)	$233,500
(d) Contingencies (0.03 TDC)	$140,100
(4) Other Indirect Costs	
(a) Startup and Testing (0.01 TDC)	$46,700
(b) Working Capital (30 days O&M cost)	$83,000
TOTAL INDIRECT COST (TIC):	$1,437,300
TOTAL CAPITAL COST (TCC)	$6,107,700

TABLE 3-15

GAS TURBINES - ANNUALIZED COSTS OF CATALYTIC OXIDATION FOR VOC CONTROL

Item	Cost
DIRECT OPERATING COSTS:	
(a) Operating Labor (C) ($25/man-hr)	$54,750
(b) Supervisory Labor (0.15 C)	$8,200
(c) Maintenance (0.03 TDC)	$140,100
(d) Replacement Parts	
a) Catalyst (3 year life) (0.65A/3)	$469,500
b) Other (0.1 A)	$216,700
(e) Utilities	
b) Fuel (0.25 % of total fuel input)	$107,000
(f) Disposal Costs	included in catalyst replacement cost
INDIRECT OPERATING COSTS	
(h) Overhead (0.3 (a+b) + 0.12 (c))	$35,700
(i) Property Tax (0.01 TCC)	$61,100
(j) Insurance (0.01 TCC)	$61,100
(k) Administration (0.02 TCC)	$122,200
(l) Capital Recovery (0.163 TCC)	$995,600
ANNUALIZED COST, $/yr	$2,271,950
VOC CONTROLLED, ton/yr	9.2
COST EFFECTIVENESS, $/ton	$247,000

3.5.3 Auxiliary Boiler

3.5.3.1 Catalytic Oxidation

The most stringent VOC control level for boilers has been achieved using catalytic oxidation; however this technology has not been installed on auxiliary gas-fired boilers in this size range due to cost considerations. The low emission rate of VOC from the proposed boiler (3.0 tons per year) and the high capital cost ($1,606,100 as shown in Table 3-16) combine to result in a prohibitive cost-effectiveness, even considering that this alternative could control 60 percent of the VOC emitted from the boiler. The capital cost of this technology includes the incremental cost ($661,500) to custom design the packaged boiler to accommodate VOC catalyst operating at 1,000°F without efficiency penalties. As shown in Table 3-17, the estimated cost-effectiveness of this alternative is $357,600 per ton of VOC controlled. This is not considered cost-effective and, therefore, is not representative of BACT for VOC control for the auxiliary boiler.

3.5.3.2 Combustion Controls

As described in Section 2.3.2, the auxiliary boiler will be equipped with high-efficiency burners which will provide for total combustion of the fuel, thereby limiting VOC emissions to about 1.4 lb/hr. This amounts to only 3.0 ton VOC per year emitted from the boiler. These burners do not present adverse economic, environmental, or energy impacts, and as the next most stringent alternative after catalytic oxidation, can be concluded to represent BACT for VOC emissions from the auxiliary boiler.

3.6 Toxic Emissions

The DEQ has a toxics policy which requires the applicant to identify toxic emissions from a source if any criteria pollutant is emitted above "significant emission rates." The significant emission rates are contained in Tables 1 and 2 of the DEQ Hazardous Air Pollutant Interim Program manual.

Toxic emissions from the gas turbines and the auxiliary boiler were estimated using a method from the California Air Resources Board (CARB) (CARB, August 1991). The CARB developed a speciation manual for VOCs and particulate matter toxic compounds. The data were obtained from source sampling on specific equipment and averaged for each group of equipment.

TABLE 3-16

AUXILIARY BOILER - CAPITAL COSTS OF CATALYTIC OXIDATION FOR VOC CONTROL

Item	Cost
DIRECT COSTS	
(1) Purchased Equipment	
(a) Basic Equipment (A)	$330,800
(b) Auxiliary Equipment (0.35 A)	$115,800
(c) Instrumentation (0.10 A)	$33,100
(d) Structural Support (0.10 A)	$33,100
(e) Taxes & Freight (0.08 (a + b))	$35,700
Total Purchased Equipment Cost (B)	$548,500
(2) Direct Installation (0.30 B)	$164,600
TOTAL DIRECT COST (TDC) (1) + (2)	$713,100
INDIRECT COSTS	
(3) Indirect Installation Cost	
(a) Engineering and Supervision (0.10 TDC)	$71,300
(b) Construction and Field Expenses (0.10 TDC)	$71,300
(c) Construction Fee (0.05 TDC)	$35,700
(d) Contingencies (0.03 TDC)	$21,400
(4) Other Indirect Costs	
(a) Startup and Testing (0.01 TDC)	$7,100
(b) Working Capital (30 days O&M cost)	$24,700
TOTAL INDIRECT COST (TIC):	$231,500
OTHER COSTS	
(5) Custom design of boiler	$661,500
TOTAL CAPITAL COST (TCC)	**$1,606,100**

TABLE 3-17

AUXILIARY BOILER - ANNUALIZED COSTS OF CATALYTIC OXIDATION FOR VOC CONTROL

Item	Cost
DIRECT OPERATING COSTS:	
(a) Operating Labor (C) ($25/man-hr)	$54,750
(b) Supervisory Labor (0.15 C)	$8,200
(c) Maintenance (0.03 TDC)	$21,400
(d) Replacement Parts	
a) Catalyst (3 year life) (0.65A/3)	$71,700
b) Other (0.1 A)	$33,100
(e) Utilities	
b) Fuel (0.25 % of total fuel input)	$107,000
(f) Disposal Costs	included in catalyst replacement cost
INDIRECT OPERATING COSTS	
(h) Overhead (0.3 (a+b) + 0.12 (c))	$21,500
(i) Property Tax (0.01 TCC)	$16,100
(j) Insurance (0.01 TCC)	$16,100
(k) Administration (0.02 TCC)	$32,100
(l) Capital Recovery (0.163 TCC)	$261,800
ANNUALIZED COST, $/yr	$643,750
VOC CONTROLLED, ton/yr	1.8
COST EFFECTIVENESS, $/ton	$357,600

The speciation manual contains lists of compounds found in exhaust gas from major air emission sources, such as internal combustion engines and boilers. Each compound is listed as weight fraction of VOC and/or PM. Therefore, emission rates of VOCs and PM must be known or estimated for the source in question. Toxic organic emissions are formed due to incomplete combustion in the gas turbines and the auxiliary boiler. The toxic organic emissions estimated for the gas turbines and the auxiliary boiler are summarized in Table 3-18. The only heavy metal detected in the natural gas from Pacific Gas Transmission Company was mercury (2×10^{-12} lb/ft^3 gas) (McKinney, December 1992). The emission rates for mercury were estimated from the mercury content of the natural gas and are shown in Table 3-19.

The VOC weight fractions reported by CARB for formaldehyde in the speciation manual (0.7 to 7 percent of VOC) (CARB, August 1991) were not used to estimate emissions of formaldehyde. A more conservative emission factor from an EPA toxic pollutant emission factor compilation was used to calculate formaldehyde emissions (220.3 lb/10^{12} Btu)(USEPA, October 1990). This emission factor provides formaldehyde emission estimates which are conservatively higher than emission calculations resulting from the CARB method for the combustion turbines and the auxiliary boiler.

The formaldehyde emission rate for the gas turbine is the only air toxic in Table 3-18 which exceeds the Oregon significant emission rate. This VOC was modeled to determine impact on ambient air quality, and was found to have no significant impact. The results from the modeling are contained in the PSD analysis (ENSR, May 1993).

The combustion efficiency of the gas turbines and auxiliary boiler will be optimized, thereby minimizing the emissions of particulate and VOCs, and in turn, the toxic emissions. Efficient combustion and low ash fuel (natural gas) are concluded to constitute BACT for the toxic emissions from the gas turbines and the auxiliary boiler.

TABLE 3-18

Summary of Toxic Organic Emissions

Species	Weight Fraction of VOC	Emission Rate During Natural Gas Firing (lbs/hr)	Total Estimated Emission Rate(1)		Significant Emission Rate(2)	
Gas Turbine						
VOC		3.5				
Benzene	0.000800	0.002800	24.5	lbs/yr	3100	lbs/yr
Formaldehyde(3)		0.373629	3273	lbs/yr	2000	lbs/yr
Pentane (isomers)	0.000900	0,003150	0.025	lbs/8 hrs	3300	lbs/8 hrs
N-Butane	0.009100	0.031850	0.255	lbs/8 hrs	3500	lbs/8 hrs
N-Pentane	0.000900	0.003150	0.025	lbs/8 hrs	3300	lbs/8 hrs
Auxiliary Boiler						
VOC		1.4				
Benzene	0.032500	0.045500	196.6	lbs/yr	3100	lbs/yr
Cyclohexane	0.008700	0.012180	0.097	lbs/8 hrs	1920	lbs/8 hrs
Formaldehyde(3)		0.031569	136.4	lbs/yr	2000	lbs/yr
Hexane (isomers)	0.009000	0.012600	0.101	lbs/8 hrs	3210	lbs/8 hrs
Pentane (isomers)	0.081000	0.113400	0.907	lbs/8 hrs	3300	lbs/8 hrs
N-Butane	0.081500	0.114100	0.913	lbs/8 hrs	3500	lbs/8 hrs
N-Pentane	0.054000	0.075600	0.605	lbs/8 hrs	3300	lbs/8 hrs
Toluene	0.016400	0.022960	0.184	lbs/8 hrs	685	lbs/8 hrs

(1) Emission rates for the toxic organics were obtained from multiplying the weight fraction of the compound by the VOC emission rate. The weight fractions were obtained from a speciation manual from the California Air Resources Board (CARB, August, 1991).

(2) Significant emission rates specified by Oregon Department of Environmental Quality; Hazardous Air Pollutant Interim Program.

(3) Formaldehyde emissions were estimated using an emission factor of 220.3 lb/10E12 Btu from an EPA compilation of toxic emission factors (EPA-450/2-90-011, October, 1990).

Note: The emissions are estimated per source since the significant emissions rates are established per source.

TABLE 3-19

Summary of Toxic Particulate Emissions

Species	Emission Rate During Natural Gas Firing (lbs/hr)	Total Estimated Emission Rate (lbs/8 hrs)		Significant Emission Rate(1)	
Gas Turbine					
Mercury(2)	0.000120	0.000960	lbs/8 hrs	0.09	lbs/8 hrs
Auxiliary Boiler					
Mercury(2)	0.000005	0.000040	lbs/8 hrs	0.09	lbs/8 hrs

(1) Significant emissions rates specified by Oregon Department of Environmental Quality Hazardous Air Pollutant Interim Program.

(2) The emission rate of mercury was calculated from the mercury content of the natural gas, which was provided by the Pacific Gas Transmission Company (McKinney, December 1992)

Note: The emissions are estimated per source since the significant emission rate is established per source.

4.0 SUMMARY AND CONCLUSIONS

A summary of alternatives determined to be representative of BACT follows. The selected BACT alternatives are presented in Table 4-1. Expected total emissions are summarized in Table 4-2. Table 4-2 emissions are based upon the application of BACT as determined in this report.

4.1 Nitrogen Oxides

Gas Turbines

The use of selective catalytic reduction (SCR) in combination with low NO_x combustors for gas turbine NO_x control is considered both the most stringent level available and cost-effective, and thus, is concluded to be BACT for the Hermiston gas turbines.

Auxiliary Boiler

The auxiliary boiler will be equipped with a low-NO_x burner at 0.1 lb NO_x/MMBtu for NO_x control. SCR is considered the most stringent level of control for boilers of this size, yet would entail significant capital and operating costs. Even considering that this alternative could control 24.8 tons NO_x per year assuming 4,320 hours per year operation, the cost-effectiveness ($20,900 per ton) of this technology is considered prohibitive. Thus, SCR is not economically feasible and not representative of BACT for the Hermiston auxiliary boiler.

Selective non-catalytic reduction (Thermal DeNO$_x$® or NO$_x$OUT®) is generally considered the next most stringent NO_x control alternative which could be applied to a gas-fired auxiliary boiler, but has typically not been installed on auxiliary boilers of this size range due to technical and economic considerations. This alternative is concluded not to represent BACT for the auxiliary boiler due to cost-effectiveness which exceeds $19,500/ton. Flue gas recirculation (FGR) in conjunction with the low-NO_x burner represents another NO_x control alternative. FGR would result in a decrease in NO_x emissions of 50 percent compared to the base case (0.1 lb NO_x/MMBtu) burner. However, this alternative is also cost-prohibitive at $7,700 per ton NO_x removed. Therefore, the low-NO_x burner is concluded to represent BACT for NO_x emissions from the Hermiston auxiliary boiler.

TABLE 4-1

BACT Analysis
Summary of Selected BACTs[1]

Pollutant	Gas Turbines Control Technology	Auxiliary Boiler Control Technology
NO_x	SCR with Low-NO_x combustors	Low-NO_x burner
CO	Good combustion control	Good combustion control
VOCs	Good combustion control	Good combustion control
PM	Good combustion control; Natural Gas	Good combustion control; Natural Gas
Toxics	Good combustion control and low ash fuel (natural gas) to minimize VOC and particulate formation	Good combustion control and low ash fuel (natural gas) to minimize VOC and particulate formation

1 - Note that the fuel is natural gas, which is BACT for PM, and toxics.

TABLE 4-2

Annual Emissions From the Hermiston Cogeneration Facility After Application of BACT

Source	Annual Operating Hours	Emissions (Tons/Year)					
		NOx(1)	SO2(2)	PM	CO	VOCs(3)	H2SO4(2)
Natural Gas Firing							
Gas Turbine #1	8760	122.6	NIL	35.0	201.5	15.3	NIL
Gas Turbine #2	8760	122.6	NIL	35.0	201.5	15.3	NIL
Auxiliary Boiler	4320	30.9	0.4	3.0	24.8	3.0	NIL
Total Emissions		**276.1**	**0.4**	**73.0**	**427.8**	**33.6**	**NIL**

(1) The NOx emissions are presented at 15 % oxygen and 60 F.
(2) The gas turbines burning natural gas emits only trace amounts of sulfur dioxide and sulfuric acid mist.
(3) For the gas turbines the VOCs are reported as methane, while the VOCs for the auxiliary boiler are reported as unburned hydrocarbons.

4.2 Carbon Monoxide

Gas Turbines

Catalytic oxidation of CO has been used on some turbine installations for removal of CO from the exhaust gas stream. In this application, the use of this control alternative represents an additional capital cost to the project of approximately $3,389,000 and an annual operating cost increase of $1,343,750. Based on a control efficiency of 80 percent, this alternative could control 161 tons per year of CO. The cost of $8,300 per ton of CO controlled renders CO oxidation not cost-effective for this particular application, and not representative of BACT.

The use of turbine combustor controls will limit the emissions of CO from the gas turbines to 15 ppm or less. This control alternative is reliable, proven, and does not result in adverse economic, energy, or environmental impacts on the proposed project. Combustion controls are thus concluded to represent BACT for CO emissions from the Hermiston gas turbines.

Auxiliary Boiler

Catalytic oxidation of CO is considered technologically applicable to the proposed auxiliary boilers. It does, however, present prohibitive economic impacts when applied to a gas-fired auxiliary boiler. Additional capital costs of $546,300 and additional operating costs of $240,100 per year are estimated. An additional 19.9 tons per year of CO could be controlled, but at the cost of $12,100 per ton CO removed. This is not considered cost-effective and is not representative of BACT.

The use of combustion controls does not result in increased economic, energy, or environmental impacts. This control alternative will limit CO formation to 11.5 pounds per hour at full load, and is concluded to represent BACT.

4.3 Hydrocarbons (VOCs)

Gas Turbines

In addition to controlling CO emissions, catalytic oxidation has been applied to some turbine systems for control of unburned hydrocarbon emissions. In this particular application, however, the use of this control technology is not economically feasible given the high cost of the control equipment and the relatively low level of hydrocarbon emissions. Based on an estimate of annualized costs, catalytic oxidation for control of hydrocarbon emissions from the Hermiston gas turbines would cost about $247,000 per ton, which is unreasonable, and thus not representative of BACT.

The use of combustion controls, therefore, as the next most stringent alternative, is concluded to represent BACT for the Hermiston gas turbines, since it will not provide unreasonable technical, economic, energy, or environmental impacts.

Auxiliary Boiler

Catalytic oxidation, while technically feasible for the proposed auxiliary boiler, would similarly present adverse economic impacts on the proposed project. The low emission rate of VOCs from the boiler (3.0 ton/yr) and the high capital cost of equipment for this alternative ($1,606,100) as well as other annual costs result in an unreasonable cost of $357,600 per ton CO removed.

Combustion controls are the next most stringent alternative for control of hydrocarbon emissions, and are concluded to be representative of BACT for the Hermiston auxiliary boiler.

4.4 Particulate Matter

Gas Turbines

Particulate emissions from the gas turbines will consist of ash from the fuel and particulate of carbon and hydrocarbons resulting from incomplete combustion. Baghouses and ESPs are considered technically infeasible as control of PM for the gas turbines. The most stringent particulate control method demonstrated for gas turbines is the use of natural gas. This alternative is concluded to represent BACT for control of PM from the Hermiston gas turbines.

Auxiliary Boiler

As with the gas turbines, the most stringent particulate control method demonstrated for the auxiliary boiler is the use of natural gas, which is concluded to represent BACT for control of PM from the Hermiston auxiliary boiler.

4.5 Toxic Emissions

The use of natural gas, which contains traces of mercury (2×10^{-12} lb/ft^3 gas), will minimize toxic particulate emissions from the gas turbines and the auxiliary boiler. Controlled and efficient combustion will minimize particulate and VOC emissions, thereby minimizing toxic emissions from the gas turbines and the auxiliary boiler. Therefore, good combustion control and clean, low ash fuel (natural gas) constitute BACT for toxic emissions from the Hermiston gas turbines and auxiliary boiler.

5.0 REFERENCES

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USEPA. April 1976. Control of Particulate Matter from Oil Burners and Boilers. EPA-450/3-76-005.

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Appendix F2

Air Quality and Visibility Modeling Results for the Hermiston Generating Project, prepared by ENSR Consulting and Engineering

Air Quality Modeling Checklist

This must be submitted with any modeling submitted to DEQ

Revised October 20, 1992

Air Quality Modeling Checklist

References:

RFAQMS = DEQ Requirements for Air Quality Modeling Submittals
GOAQM = EPA Guideline on Air Quality Models
(including Supplements A & B)

1. Was a modeling plan submitted to DEQ before modeling began?
   Yes X No ____

2. Emission Summary Tables (RFAQMS #1A, p.1) Report Page No. Appendix A

3. Stack Parameter Summary (RFAQMS #1B, p.1) Report Page No. 7-3

4. Plot Plan (RFAQMS #1C, p.2) showing:

	Yes	No
Emission Release Locations	X	
Nearby Buildings	X	
Cross Section Directions	X	
Property Lines	X	
Fence Lines	X	
Roads	X	

5. Cross Section Diagrams (RFAQMS #1D, p.2) showing:

	Yes	No
Both Buildings & Stacks	X	
At Least 2 Cross Sections at Right Angles	X	
Signature & P.E. Stamp of Plant Engineer	X	
Supporting Photographs of X-Sections (if an existing source)		X

6. Topographic Map (RFAQMS #1F, p.2) showing:

	Yes	No
Source Location	X	
Contour Lines	X	
Receptors	X	
Maximum Impact Locations	X	

7. Table of Nearby Building Dimensions (RFAQMS #1E, p.2) Report Page No. 6-5

8. Models:
   a. Terrain modeled:
      Flat X Intermediate X Complex X
   b. Was SCREEN used? (RFAQMS #2A, p.3) Yes X No ___
   c. Was ISCST2 used? (RFAQMS #2A, p.3).. Yes X No ___
      If yes:
      Model Version No. 92273
      Were Direction Specific Building Dimensions used? Yes
   d. Was Complex-1 used? (RFAQMS #2B, p.4) Yes X No ___
      Were multiple runs used to locate the maximum predicted impact locations? Yes X No ___
   e. Were other models used? Yes ___ No X
      Which Ones? ____________
   f. Do the model input options agree with those shown on pp, 3 & 4 of the RFAQMS? Yes X No ___

g. Was deposition modeling required near the plant? Yes___ No X
If so, Was FDM used? Yes___ No___

9. Urban vs. Rural Dispersion

Have you documented your selection to use urban or rural dispersion? (RFAQMS #4, p. 5) Yes X No___

10. Meteorology:

a. Was screening meteorology used? Yes X No___

If Yes, (and for flat terrain impacts), did your input contain the array shown on p.6 of RFAQMS)? Yes X No___

Was the neutral/unstable mixing height set equal to 1 m above plume height?' (RFAQMS #5A, p.7) Yes X No___

Do the screening wind directions include the 36 radials plus "line up" directions? (RFAQMS #5A,p.7) Yes X No___

If Yes (and for complex terrain impacts), was the EPA Valley Screening option used? (RFAQMS #2B, p.4) Yes X No___

b. Was actual meteorology used? Yes___ No X

If Yes, who did you contact within the Department regarding the adequacy of using this data?___
When?___
(RFAQMS #5B, p.7)

11. Receptors

Was a fine mesh of receptors (spaced no further apart than 100 meters) used to define the maximum impact areas for all averaging times? Yes X No___
(RFAQMS #3, p.5)

If screening meteorology is used, are receptors placed directly downwind of each source to cover each wind direction selected?
Yes X No___ (RFAQMS #3, p.6)

If ISCST2 was used, were actual terrain elevations used? Yes X No___
(RFAQMS #3, p.6)

12. Impact Analysis Summary (RFAQMS #9, p.9)

a. Were the modeling results summarized for each pollutant and for each averaging time? Yes X No___

Are they compared against the ambient standards and available PSD increments? Yes X No___

Are the controlling meteorology conditions summarized?
Yes X No___

Are the controlling receptor locations and elevations summarized?
Yes X No___

b. Were all existing and proposed emissions sources included in the analysis? Yes___ No X (RFAQMS #1A, p.1, & #6, p.8)

c. Were all pollutants with emissions above our Significant Emission Rates evaluated? Yes X No ___
(OAR 340-20-225 Table 1 and Table 2(Medford)) + Air Toxics

d. Were ambient background levels included in the analysis for comparison against ambient standards? Yes ___ No X
(RFAQMS #6, p.8)

e. Were impacts evaluated on any nonattainment areas located within 50 km. of the source? Yes X No ___ (RFAQMS #6, p.8)
(Federal Register Vol. 43, #118 (6/19/78) p. 26398)

f. Were impacts evaluated on the nearest PSD Class I area and other applicable Class I areas? Yes X No ___ (RFAQMS #7, p.8)

g. (For PSD sources): Were other Air Quality Related Values (AQRVs) addressed? Yes X No ___ (RFAQMS #8, p.9)

h. (For PSD sources), was a visibility analysis performed?
Yes X No ___ (RFAQMS #8, p.9)

i. Was it necessary to model impacts from other nearby sources for evaluation of impacts against the ambient standards? Yes ___ No X
(RFAQMS #6, p.8)

13. Data Bases

Are you including your model input data to us in electronic form? (disk or tape)? (RFAQMS #11, p.10) Yes X No ___

Signature of person responsible for modeling:

Arthur Samberg Date 5/25/93

Name and Telephone Number of Modeling Contact

Name Art Samberg

Telephone Number (919) 571-0669

Air Quality Modeling

Demonstration of Nonsignificant Impacts - Hermiston Generating Project; Letter Report prepared by ENSR Consulting and Engineering

ENSR

ENSR Consulting
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Suite [illegible]
Raleigh, NC 27[illegible]
[illegible]
FAX [illegible]

January 21, 1994

Mr. Larry Miller
Oregon Department of Environmental Quality
Northwest Regional Office
2020 SW 4th Avenue
Suite 400
Portland, Oregon 97201

Re: Demonstration of Non-Significant Impacts - Hermiston Generating Project

Dear Larry:

INTRODUCTION

The purpose of this letter is to present to DEQ an updated demonstration that predicted air quality impacts from operation of the Hermiston Generating Project will be below applicable state and federal Significant Impact Levels (SILs) when each combustion turbine operates at a minimum of 75 percent load. The following steps were taken to reduce particulate matter impacts to below Oregon's TSP SIL. These measures are:

- raising the height of the two exhaust stacks from 188 feet (57.3 meters) to 213 feet (65 meters, de minimis GEP height), and
- securing a guarantee from General Electric (GE) of reduced particulate matter emission rates.

In addition, though unrelated to the demonstration of non-significant impacts, the auxiliary boiler has been deleted from the project.

ANALYSIS

In the PSD permitting document submitted to DEQ in May, 1993, non-significant impacts were demonstrated from operation of the proposed facility, at loads ranging from 85 percent to 100 percent. For subsequent submittals to DEQ, analyses were performed to support lower operating loads. We have conducted additional modeling analyses incorporating an increased stack height (up to the allowable GEP height) and a reduced particulate matter emission rate, guaranteed by GE. Dispersion modeling was performed at the proposed maximum and minimum levels of operation of each combustion turbine.

Two source parameters that differ from those presented in the May, 1993 PSD document are:

- the height of the exhaust stacks, which have been increased from 188 feet to 213 feet, and
- the maximum particulate matter emission rate from both combustion turbines, which has been reduced from 16 pounds per hour to 14.6 pounds per hour.

Table 1 presents the source data associated with operation of the combustion turbines at maximum and 75 percent load. The following should be noted with regard to the information contained in Table 1:

- short-term source parameters are based on an ambient temperature of 80°F,
- source parameters for determination of annual-average impacts are based on 50°F, and
- the minimum operating load is 75 percent.

In addition, maximum load is defined as the maximum firing rate of each combustion turbine as recommended by the manufacturer for continuous operation.

The dispersion modeling analysis was performed in accordance with DEQ's Requirements for Air Quality Submittals (revised, October 22, 1993). As with previous modeling runs supporting this permit application, screening meteorology was used. Results of the analysis are shown in Table 2. Predicted impacts, as presented in this table, are compared to applicable Significant Impact Levels. As can be seen from this table, all predicted impacts are below the respective SIL. As was the case in previous analyses, the predicted 24-hour TSP impact associated with partial load operation comes closest to the SIL. For this analysis, the predicted 24-hour TSP impact (at 75 percent load) represents 96 percent of the applicable SIL. All other impacts are considerably below applicable SILs.

To provide assurance that predicted impacts for all pollutants (including toxic air pollutants) will be less under the current scenario than those presented in the May, 1993 PSD document, impacts associated with unit emission rates (or CHI/Q values) were compared under maximum load operation. At an ambient temperature of 50°F (applicable to long-term modeling runs), CHI/Q impacts are approximately 21 percent lower than previous[ly] predicted. At an ambient temperature of 80°F, CHI/Q impacts are approximately 3 perce[nt] lower than previously predicted. Please note that under separate cover we will transmit the

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final proposed formaldehyde emission rates from the combustion turbines and a demonstration of acceptable ambient impacts.

SUMMARY

This letter presents the results of dispersion modeling which was performed to support the permitting of the Hermiston Generating Project. The analysis was conducted to reinforce the demonstration that unrestricted operation of the Hermiston Generating Project at all proposed operating loads (minimum of 75 percent load) will result in predicted impacts that are below applicable state and/or federal Significant Impact Levels. With respect to previous analyses supporting this project, the most noteworthy aspects of this evaluation which differ are the inclusion of a GEP stack (213 feet) and a reduction in the total (both combustion turbines) particulate matter emission rate from 16 pounds per hour to 14.6 pounds per hour. As was shown in Table 2, all predicted impacts are below applicable Significant Impact Levels.

Under separate cover, ENSR will provide DEQ with the dispersion modeling files necessary for verification of the results presented herein. If you have any questions about this analysis, or on the information contained in this letter, please call Mr. Roy Skinner at (916) 783-7868. We thank you for your continued attention to the Hermiston Generation Project.

Sincerely,

Art Samberg

Art Samberg
Manager, Air Quality Services

cc: P. Hanrahan/Oregon DEQ
R. Skinner
J. Hopkins/U.S. Generating Co.

File: 5402-038-261-7.3

TABLE 1

MODELING SOURCE PARAMETERS[1,2]
HERMISTON GENERATING PROJECT

Fixed Parameters	Maximum Load	75 Percent Load
Stack Height	213.0 ft 64.9 m	213.0 ft 64.9 m
Stack Inner Diameter	18.0 ft 5.49 m	18.0 ft 5.49 m
Exit Temperature	210°F (206°F) 372 K (370 K)	205°F (201°F) 369 K (367 K)
Exit Velocity	60.9 ft/sec (64.5 ft/sec) 18.6 m/sec (19.7 m/sec)	49.5 ft/sec (51.6 ft/sec) 15.1 m/sec (15.7 m/sec)
Short-term Emission Rates	**Maximum Load**	**75 Percent Load**
TSP/PM_{10}	(3)	(3)
CO	43.0 lb/hr 5.42 g/sec	35.0 lb/hr 4.41 g/sec
Annual Average Emission Rates	**Maximum Load**	**75 Percent Load**
TSP/PM_{10}	(3)	(3)
NO_x	28.0 lb/hr 3.53 g/sec	23.0 lb/hr 2.90 g/sec

(1) All source parameters are for natural gas firing of one combustion turbine.

(2) Fixed parameters and short-term emission rates are based on an ambient temperature of 80°F. Annual average emission rates and fixed parameters in parentheses are based on an ambient temperature of 50°F.

(3) The guaranteed TSP/PM_{10} emission rate is 14.6 lb/hr (1.84 g/sec) from both combustion turbines. Insignificant TSP impacts are achieved when the total emissions are exhausted from one or both stacks.

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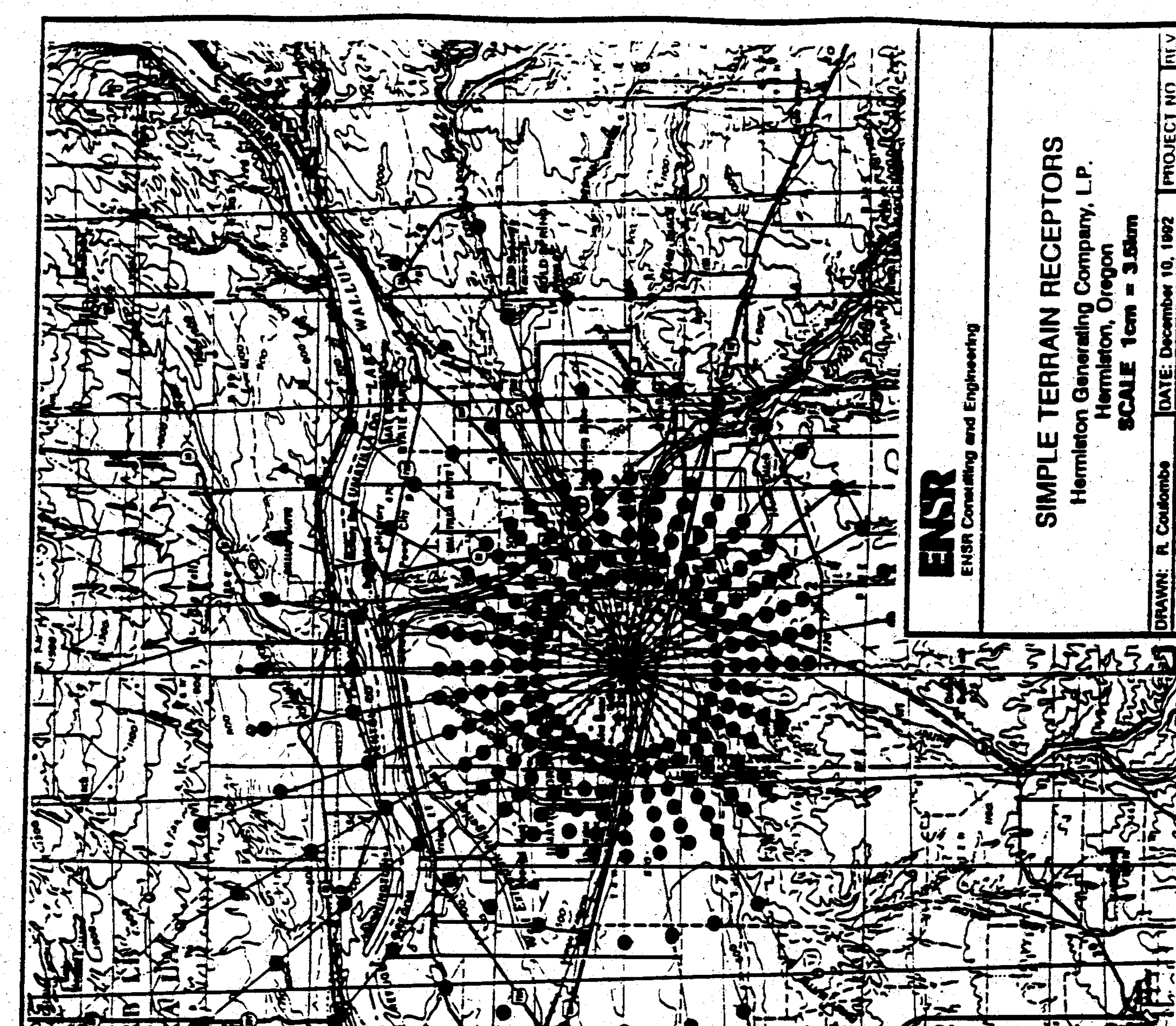
TABLE 2

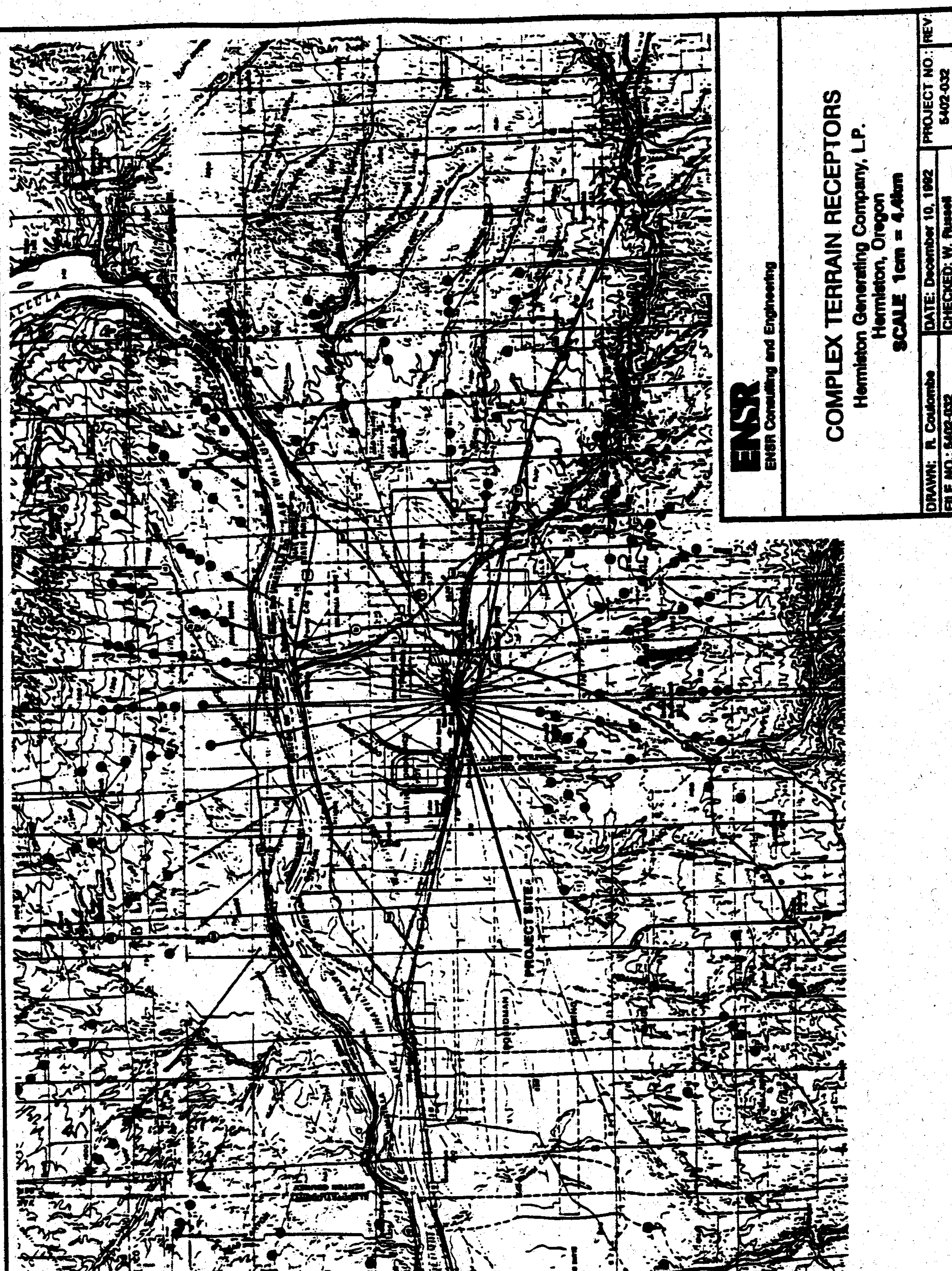
SUMMARY OF SIGNIFICANT IMPACT LEVEL MODELING ANALYSIS HERMISTON GENERATING PROJECT

Pollutant	Averaging Period	Maximum Predicted Impacts ($\mu g/m^3$)[1][2]			
		Maximum Load	75 Percent Load	SIL ($\mu g/m^3$)	Significant Impacts?
TSP	24-hour	0.77	0.96	1.0	No
	Annual	0.13	0.16	0.2	No
NO_x	Annual	0.50	0.51	1.0	No
CO	1-hour	11.38	11.58	2,000	No
	8-hour	7.96	8.06	500	No

(1) All predicted impacts are based on two combustion turbines operating continuously (8,760 hours per year).

(2) Predicted short-term (1, 8 and 24-hour average) impacts are based on source parameters at an ambient temperature of 80°F. Predicted long-term (annual average) impacts are based on source parameters at an ambient temperature of 50°F.


ENSR
ENSR Consulting and Engineering
SIMPLE TERRAIN RECEPTORS
Hermiston Generating Company, L.P.
Hermiston, Oregon
SCALE 1cm = 3.5km
DRAWN: R. Coulombe
FILE NO.: 5402-032
DATE: December 10, 1992
CHECKED: W. Russell
PROJECT NO
5402 032
REV


ENSR
ENSR Consulting and Engineering
COMPLEX TERRAIN RECEPTORS
Hermiston Generating Company, L.P.
Hermiston, Oregon
SCALE 1cm = 4.4km
DRAWN: R. Coulombe
FILE NO.: 5402-032
DATE: December 10, 1992
CHECKED: W. Russell
PROJECT NO.: 5402-032
REV:
PROJECT SITE

Visibility Modeling Results

Table F2-1. Summary of Visibility Modeling Results Hermiston Generating Project

	Columbia River Gorge[1/]				Strawberry Mountain				Eagle Cap			
Maximum Visual Impacts Inside Class I Areas												
	Delta E		Contrast		Delta E		Contrast		Delta E		Contrast	
Background	Predicted Value	Critical Value	Predicted Value	Critical Value	Predicted Value	Critical Value	Predicted Value	Critical Value	Predicted Value	Critical Value	Predicted Value	Critical Value
Sky	0.00	2.0	0.001	0.05	0.141	2.0	0.002	0.05	0.189	2.0	0.002	0.05
Terrain	0.064	2.0	0.001	0.05	0.093	2.0	0.001	0.05	0.143	2.0	0.002	0.05
Maximum Visual Impacts Outside Class I Areas												
	Columbia River Gorge[1/]				Strawberry Mountain				Eagle Cap			
	Delta E		Contrast		Delta E		Contrast		Delta E		Contrast	
Background	Predicted Value	Critical Value	Predicted Value	Critical Value	Predicted Value	Critical Value	Predicted Value	Critical Value	Predicted Value	Critical Value	Predicted Value	Critical Value
Sky	0.202	2.0	0.002	0.05	0.345	2.0	0.003	0.05	0.579	2.0	0.005	0.05
Terrain	0.125	2.0	0.001	0.05	0.216	2.0	0.002	0.05	0.402	2.0	0.004	0.05

1 Columbia River Gorge is not a designated Class I area. However, at the request of the Department of Environmental Quality, the impact of the proposed facility on visibility in the Columbia River Gorge has been evaluated based on Class I criteria.

Visual Effects Screening Analysis for
Source: Hermiston Generating Co.
Class I Area: Strawberry Mountain

*** Level-1 Screening ***

Input Emissions for

Particulates	16.00	LB /HR
NOx (as NO2)	62.00	LB /HR
Primary NO2	.00	LB /HR
Soot	.00	LB /HR
Primary SO4	.00	LB /HR

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	175.00 km
Source-Observer Distance:	170.00 km
Min. Source-Class I Distance:	170.00 km
Max. Source-Class I Distance:	215.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability: 6	
Wind Speed: 1.00 m/s	

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	84.	170.0	84.	2.00	.141	.05	.002
SKY	140.	84.	170.0	84.	2.00	.048	.05	-.001
TERRAIN	10.	84.	170.0	84.	2.00	.093	.05	.001
TERRAIN	140.	84.	170.0	84.	2.00	.014	.05	.000

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	5.	52.9	164.	2.00	.348	.05	.003
SKY	140.	5.	52.9	164.	2.00	.104	.05	-.003
TERRAIN	10.	5.	52.9	164.	2.00	.216	.05	.002
TERRAIN	140.	5.	52.9	164.	2.00	.082	.05	.002

Visual Effects Screening Analysis for
Source: Hermiston Generating Co.
Class I Area: Eagle Cap Wilderness

*** Level-1 Screening ***

Input Emissions for

Particulates	16.00	LB /HR
NOx (as NO2)	62.00	LB /HR
Primary NO2	.00	LB /HR
Soot	.00	LB /HR
Primary SO4	.00	LB /HR

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	167.00 km
Source-Observer Distance:	140.00 km
Min. Source-Class I Distance:	140.00 km
Max. Source-Class I Distance:	241.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	6
Wind Speed:	1.00 m/s

R E S U L T S

..terisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	84.	140.0	84.	2.00	.189	.05	.002
SKY	140.	84.	140.0	84.	2.00	.074	.05	-.002
TERRAIN	10.	84.	140.0	84.	2.00	.143	.05	.002
TERRAIN	140.	84.	140.0	84.	2.00	.020	.05	.001

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	5.	43.6	164.	2.00	.579	.05	.005
SKY	140.	5.	43.6	164.	2.00	.167	.05	-.005
TERRAIN	10.	5.	43.6	164.	2.00	.402	.05	.004
TERRAIN	140.	5.	43.6	164.	2.00	.141	.05	.003

Visual Effects Screening Analysis for
Source: Hermiston Generating Co.
Class I Area: Columbia River Gorge

*** Level-1 Screening ***

Input Emissions for

Particulates	16.00	LB /HR
NOx (as NO2)	62.00	LB /HR
Primary NO2	.00	LB /HR
Soot	.00	LB /HR
Primary SO4	.00	LB /HR

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	160.00 km
Source-Observer Distance:	180.00 km
Min. Source-Class I Distance:	180.00 km
Max. Source-Class I Distance:	300.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability: 6	
Wind Speed: 1.00 m/s	

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	84.	180.0	84.	2.00	.113	.05	.001
SKY	140.	84.	180.0	84.	2.00	.037	.05	-.001
TERRAIN	10.	84.	180.0	84.	2.00	.064	.05	.001
TERRAIN	140.	84.	180.0	84.	2.00	.011	.05	.000

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	5.	56.1	164.	2.00	.202	.05	.002
SKY	140.	5.	56.1	164.	2.00	.065	.05	-.002
TERRAIN	10.	5.	56.1	164.	2.00	.125	.05	.001
TERRAIN	140.	5.	56.1	164.	2.00	.048	.05	.001

Appendix G

City and County Letters Regarding Plan Compliance

UMATILLA COUNTY BOARD OF COMMISSIONERS

Courthouse, 216 S.E. Fourth Street, Pendleton, Oregon 97801
Phone: 503-276-7111 FAX: 503-276-4841

Bill Hansell, Glenn Youngman, Emile Holeman
COMMISSIONERS

William C. Jones
LEGAL COUNSEL

Marcia Wells
OFFICE MANAGER

Bob Small
PERSONNEL DIRECTOR

August 9, 1993

Bob Robison
Oregon Department of Energy
625 Marion Street NE
Salem, OR 97310

Re: US Generating Company Application for a Site Certificate

Dear Mr. Robison:

The Board of Commissioners has reviewed the final application for a Site Certificate submitted by US Generating Company. The Board presented the application to the County Planning Commission as well as other affected Departments.

As you know, the County submitted comments to you on February 8, 1993 with regard to the preliminary application. The final application appears to address each of the issues raised in that letter, as well as clarify several matters. The applicant took an additional step to show the project is consistent with the County Comprehensive Plan and Development Ordinance, as well as the Statewide Land Use Goals. This extra effort is appreciated.

The County concludes that the proposed project is consistent with and complies with the County's acknowledged comprehensive plan and land use regulations and that the applicant has accurately interpreted the relevant county plan policies and land use regulations in its application to ODOE. As noted by our letter of July 13, 1993, we advised you that the site certificate application identifies all the applicable substantive land use regulations and criteria for Umatilla County.

The Board of Commissioners recommends the following proposed certificate conditions to address all county land use approvals:

1. In accordance with Section 11, Senate Bill 1016, following issuance of the site certificate and prior to commencement of construction, the applicant shall apply for and obtain all appropriate land use approvals from Umatilla County, including, as necessary, a conditional use permit. The county conditional use permit shall be

valid and not expire until two years have elapsed from the date of its original approval by the county unless further extended by the county in accordance with county ordinances.

2. The applicant shall file with the Umatilla County Planning Department a landscaping plan for the power plant prior to issuance of a building permit. The landscaping plan, incorporating native vegetation where feasible, shall be implemented and shall provide screening and visual buffering for the power plant and its parking and loading areas to the extent reasonably feasible.

3. The applicant shall enter into an irrevocable consent agreement (ICA) with the county by which the applicant agrees to waive its right to oppose the formation of a Local Improvement District (LID) for that portion of Westland Road fronting the power plant property and extending south from the power plant site to its intersection with Interstate 84.

4. The power plant will incorporate an on-site fire suppression system and will be constructed from fire retardant materials to the extent reasonably feasible. The power plant will incorporate spill prevention and containment designs for the storage of all hazardous materials. Fire suppression and hazardous material safety designs shall be established in consultation with the Hermiston Fire Department and the State Fire Marshal.

5. Prior to issuance of a building permit, the applicant shall file a site plan with the County which shall consist of a map showing the property lines, location of buildings, access road or roads and the names of the owner and developer of the site. The site plan shall also show that county ordinances related to parking and loading requirements, setbacks, signs, and vision clearance are satisfied.

6. The applicant shall file with the county an application for a minor partition in conformance with the information included in the site certificate application, and file and record a final plat in accordance with county ordinances.

7. Prior to construction, the applicant shall submit a plan acceptable to EFSC, who will consult with Umatilla County, for an emergency at the Umatilla Army Depot. The plan shall be developed in consultation with the Umatilla County Chemical Stockpile Emergency Preparedness Program.

8. The applicant shall take reasonable steps to reduce or manage exposure to electromagnetic fields (EMF),

consistent with EFSC findings presented in the "Report of the EMF Committee To The Energy Facility Siting Council," March 30, 1993. Prior to and during construction and during operation, the applicant shall provide information to the public, upon public request, about EMF levels associated with the power plant and related transmission lines.

We appreciate your consideration of our comments. It has been a pleasure to work with you, your staff, and representatives of Hermiston Generating.

Sincerely,

BOARD OF COMMISSIONERS

Emile M. Holeman

Emile M. Holeman

William S. Hansell

William S. Hansell

Glenn Youngman

Glenn Youngman

/tjm

City of Umatilla
Hub City For The Columbia River Basin And Pacific Coast

Telephone 922-3226
P. O. Box 130
UMATILLA, OREGON
97882

August 3, 1993

Mr. Bob Robison
Energy Facility Analyst
Oregon Department of Energy
625 Marion St., NE.
Salem, OR 97310

Dear Mr. Robison:

You have asked the City of Umatilla to confirm that the Hermiston Generating Company has identified the City's application land use criteria and regulations. The Umatilla Planning Commission reviewed the final application for a site certificate submitted by Hermiston Generating Co. The application was presented to the Planning Commission at a public informational hearing on July 22, 1993.

The site certificate application identifies all the applicable substantive land use regulations and criteria for the City of Umatilla. Based on the review of the application, the City of Umatilla concurs with applicant's determination that the proposed project is consistent with the City's acknowledged comprehensive plan and land use regulations and that the application to ODOE accurately interprets the relevant City plan policies and regulations.

The City of Umatilla recommends the following proposed certificate conditions to address the City's land use approval necessary for the upgrade to the transmission line within the city:

1) Project is not to exceed the boundaries of existing easements when installing the proposed transmission line upgrade to minimize the impact on future development in Umatilla.

2) In accordance with Senate Bill 1016, Section 11, following issuance of the site certificate and prior to commencement of construction, applicant shall apply for and obtain all appropriate land use permits approvals from the City of Umatilla including any necessary conditional use permit. The City's conditional use permit shall remain valid and not expire as long as construction of the transmission line is commenced within one year from the construction commencement date of the project provided for in the

site certificate.

3) At the time of filing for the required city land use permit/approval applicant shall pay all application fees and related costs in accordance with city ordinances and application requirements.

4) The applicant shall take all reasonable precautions to minimize dust and noise during construction. Such precautions can include, but are not limited to, the watering of disturbed areas during operations to minimize wind blown dust.

5) At the time of filing for the required city land use permit/approval, applicant shall file a map at a scale satisfactory to the city describing the transmission line corridor to allow the city to appropriately depict the corridor on the official city zoning map.

Thank you for attending our Planning Commission meeting and assisting in the review of the Hermiston Generating Project.

Sincerely,

Bonnie Parker
City Administrator

Appendix H1

Review of Biological and Epidemiological Studies Relating to EMF, prepared by BPA, Office of Engineering

Review of Biological and Epidemiological Studies Relating to EMF

A study in Denver, Colorado, (Wertheimer and Leeper 1979) and one in Sweden (Tomenius 1986) first reported that some cancer risks were about 2-3 times greater for children living near certain types of power lines assumed to be carrying high current. Those researchers suggested that the finding may be related to the magnetic fields of 2-3 milligauss (mG) and above produced in homes by such lines. The possibility could not be ruled out, however, that other factors, or chance, may be involved. If certain power lines actually do influence cancer rates, this would mean that 2 or 3 children out of 10,000 children exposed to such lines would develop cancer each year, compared to the average rate of 1 in 10,000 per year (Ahlbom et al. 1987).

A second study done in Denver (Savitz et al. 1988) found results that were generally consistent with the earlier work on childhood cancer by Wertheimer and Leeper (1979). However, the relative risk[1]/ in the new study (1.5) was smaller than that reported earlier (2-3). It was also on the borderline of statistical

1/ Results of case-control studies are given in terms of relative risk (or odds ratio). A relative risk of 1.0 means that exposure to some factor (assumed to be EMF in this case) is the same for people with a disease (cases) as for people without the disease (controls). A value of 2 means cases were exposed to the factor twice as often as the controls. This establishes a "statistical association" between the disease and the factor. This may not represent a cause-and-effect association, however.

significance, which means that it could have been due to chance. Results of another study, from the Seattle area, found no association between power lines and leukemia in adults (Severson et al. 1988). An earlier power line study in Denver by Wertheimer and Leeper (1982) also found no increase in adult leukemia. However, the earlier Denver study did find an increased risk for some other types of adult cancers.

A study done in Los Angeles County, California, provided additional support for an association between childhood leukemia risk and high current power lines (London et al. 1991). The odds ratio for very high current lines compared to very low current and underground lines was 2.15. Associations with actual measured electric and magnetic fields, however, were weaker and not statistically significant.

A new study done in Sweden found that the relative risk for leukemia in children living near transmission lines was 3.8 where magnetic fields were greater than 3 mG (Feychting and Ahlbom 1992). The Swedish National Board for Electrical Safety (1993) issued a document entitled *Revised Assessment of Magnetic Fields and Health Hazards*. It states that the agency "has revised the previous assessment of health hazards to the extent that the Board in the future will act on the assumption that there is a connection between exposure to power frequent magnetic fields from power lines and childhood cancer, when preparing regulations on electrical installations." The document also notes, "It should be stated that a connection between cancer and magnetic fields has not yet been scientifically proven..." (Swedish National Board for Electrical Safety 1993).

Preliminary information on a larger study done in Denmark indicates no increased risk of leukemia for children living near transmission lines in that country (Olsen et al. 1992). However, there was an elevated risk of lymphoma reported in the Danish study. A Danish blue ribbon panel examining the EMF issue has recommended against government regulation:

> [There is] no scientific reason for establishing standards with respect to high-current plants. New research results must be followed closely in the future. *(EMF Health and Safety Digest, June 1993)*

Earlier studies in Rhode Island (Fulton et al. 1980), in Taiwan (Lin and Lu 1989), and in England (Myers et al. 1985) found no significant association between childhood cancer and power lines. Other community studies in England found no consistent evidence to support a power line-cancer association (Coleman et al. 1985, McDowall 1986).

A study in Washington State first reported that men in various "electrical occupations" had died more frequently from leukemia than men in other occupations (Milham 1982). Other studies reported similar findings, suggesting an increased risk of around 20 to 50 percent (Savitz and Calle 1987, Coleman and Beral 1988). However, the studies were primarily based on information only from death certificates (i.e., job title and cause of death). It therefore was not possible to determine whether the preliminary findings were related to electric and magnetic fields, or to other exposures such as those from chemicals.

Research on electric and magnetic fields and cancer was reviewed in a draft report by the U.S. Environmental Protection Agency (EPA) (EPA 1990). The EPA concluded that magnetic fields are a possible but unproven cause of cancer in humans and more research is needed. The EPA's Science Advisory Board (SAB) also reviewed the issue and reached a similar conclusion. The SAB, however, recommended that the EPA report should be rewritten to correct inconsistencies in the report (SAB 1991).

In addition to research on humans and laboratory animals, several studies have investigated possible effects of transmission line electric and magnetic fields on plants, wildlife, and domestic animals (BPA 1993a). Crop growth is not noticeably affected by even the largest transmission lines. Trees that are allowed to grow too close to transmission line conductors can be damaged by the strong electric fields near the conductors. Normally, trees are not allowed close to conductors to prevent electrical flashover, i.e., spontaneous arcing of electrical current from lines to trees.

Studies have shown that honey bees in commercial hives can be adversely affected by strong transmission line electric fields. Shocks received by bees while in the hive cause decreased honey production and increased mortality. As a precaution, BPA recommends that beehives not be placed directly on the transmission line right-of-way.

Wildlife do respond to effects (e.g., changes in food supply) of cleared rights-of-way. However, there is no evidence that their behavior is noticeably affected by the presence of electric and magnetic fields. Few studies have attempted to determine whether wildlife may be affected by long-term exposure to these fields. As noted above, some effects of electric and magnetic fields have been found in laboratory animal studies. It is not known whether such effects occur in wildlife similarly exposed to these fields.

Several studies have looked at the behavior and production of livestock raised near transmission lines. These studies found no indication that electric or magnetic fields have any major effects on livestock. Most of the studies were not designed to detect any subtle field effects, however. More detailed information on the potential health effects of electric and magnetic fields can be found in two free BPA publications: *Electrical and Biological Effects of Transmission Lines: A Review* (1993a) and *Electric Power Lines: Questions and Answers on Research Into Health Effects* (1993b). Copies may be obtained by calling BPA's document request line, 800-622-4520.

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Appendix H2

230-kV Transmission Line Analysis for the Hermiston Generating Project

230-kV Transmission Line Analysis for the Hermiston Generating Project Appendix H2

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List of Figures

230-kV Transmission Line Analysis for the Hermiston Generating Project[1/]

Magnetic Field Analysis

When alternating current (ac) flows through a conductor, an alternating magnetic field is created around the conductor. Areas of equal magnetic field intensity can be envisioned as concentric cylinders with the conductor at the center. The magnetic field intensity drops rapidly with distance from the conductor. Overhead transmission lines carry power over three conductors with currents that are 120 degrees out of phase with each other. The magnetic fields from these conductors tend to cancel out because of the phase difference. However, when a person stands on the right-of-way under a transmission line, one conductor is always significantly closer and will contribute a net uncancelled magnetic field at the person's location. The strength of the magnetic field depends on the current in the conductor, the geometry of the structures, and the degree of cancellation from other conductors.

The proposed construction associated with the Hermiston Generating Project involves a new 230-kV circuit, an existing 115-kV circuit with new conductors, and an existing 12.47-kV distribution underbuild circuit. Figure H2-1 illustrates the typical structural configuration and is used for the EMF calculations that follow. Except for special construction required for under crossings of other transmission lines, Figure H2-1 represents the minimum conductor attachment heights. All of these circuits help to reduce each other's net ground-level magnetic field. The

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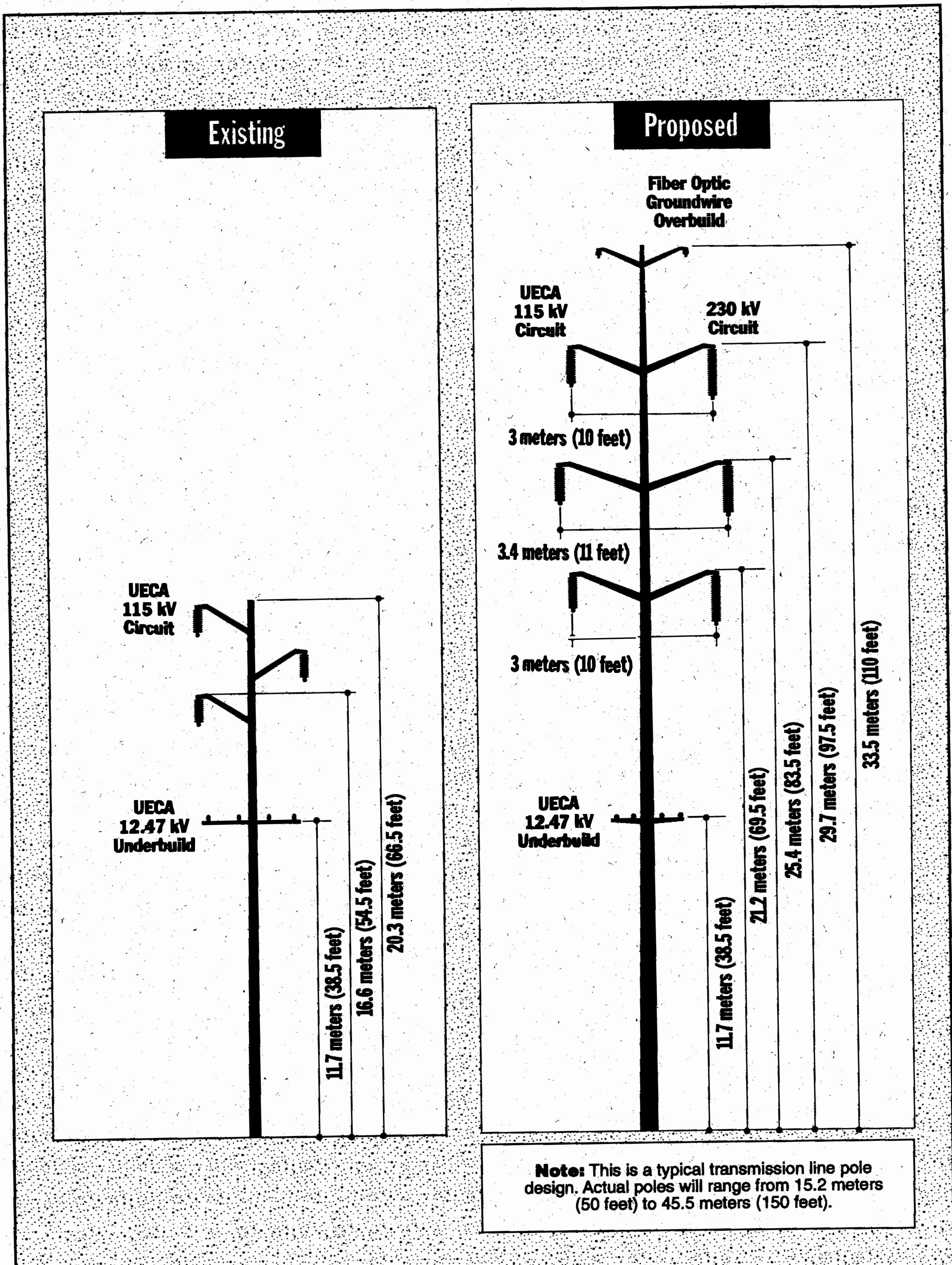
1/ This analysis is taken substantially from CH2M Hill (1993) and Ormsby (1994).



Source: CH2M HILL 1993

Figure H2-1 Typical Existing and Proposed Transmission Line Pole Designs ground-level magnetic field intensity across the right-of-way can be calculated based on currents and the geometry of the structure. However, in this case, simple analysis is complicated by a variety of circuit loading situations. Between the McNary Substation and UECA's Westland Substation, the existing 115-kV circuit is separated by switches into five distinctly different segments. These switches connect transmission line taps to other substation loads so that the current in each succeeding downstream segment, leaving the McNary Substation, is less than the previous segment.

As loads change with the seasons, UECA routinely switches its Boardman area substations on and off of this transmission line twice per year; once in the spring and once in the fall. The loads on the 12.47-kV distribution conductors also vary with each of the five line segments and as irrigation loads and residential heating loads rise and fall. Consequently, neither the existing nor the proposed transmission line can be easily characterized or modeled for the purpose of calculating ground-level magnetic fields.

In order to completely study the ground-level magnetic field effects, all five line segments could be studied for both high and low estimated loads on the 115-kV and 12.47-kV circuits. However, for the proposed 230-kV construction, calculations show that due to the cancellation effect, the lowest ground-level magnetic fields occur when the 115-kV and 12.47-kV loads are highest. Conversely, when the 115-kV and 12.47-kV loads are low, the 230-kV load current predominates, and the magnetic field on the right-of-way is highest.

The magnetic field intensities estimated here are based on the structure configuration shown on Figure H2-1 with the conductor positioned at its lowest point between structures (the estimated maximum sag point). The magnetic fields are computed using a program called "Fields" developed by the Southern California Edison Research Center. This program and others like it have been used to predict magnetic field levels that have been confirmed by field measurements by CH2M HILL (1993) and numerous operating utilities.

Typical EMF Effects

In order to illustrate the ground-level magnetic field effect in a somewhat typical line section, CH2M HILL selected the 1-mile-long segment between the UECA Umatilla and Rockpile switches near Umatilla. This section of line has a more heavily loaded 115-kV circuit and a 12.47-kV distribution underbuild circuit that serves significant irrigation loads in the area. Figure H2-2 illustrates the ground-level magnetic fields due to the existing facilities. Figure H2-3 illustrates the effects of the proposed construction for this line segment.

Maximum EMF Effects

Of most interest is the line segment and circuit load that produces the highest ground-level magnetic field. For the transmission line along the proposed route, this can be determined by locating the segment that would have the lowest normal (not emergency) 115-kV and 12.47-kV currents. This area would probably be the 5.6-kilometer (3.5-mile) part of the line segment just north of the Lamb-Weston plant and parallel to Interstate 82.

Figure H2-4 illustrates the ground-level magnetic field strength for the existing 115-kV construction on this line segment. This line segment is not currently constructed with a 12.47-kV distribution underbuild circuit. Therefore, there is no field cancellation help from other conductors.

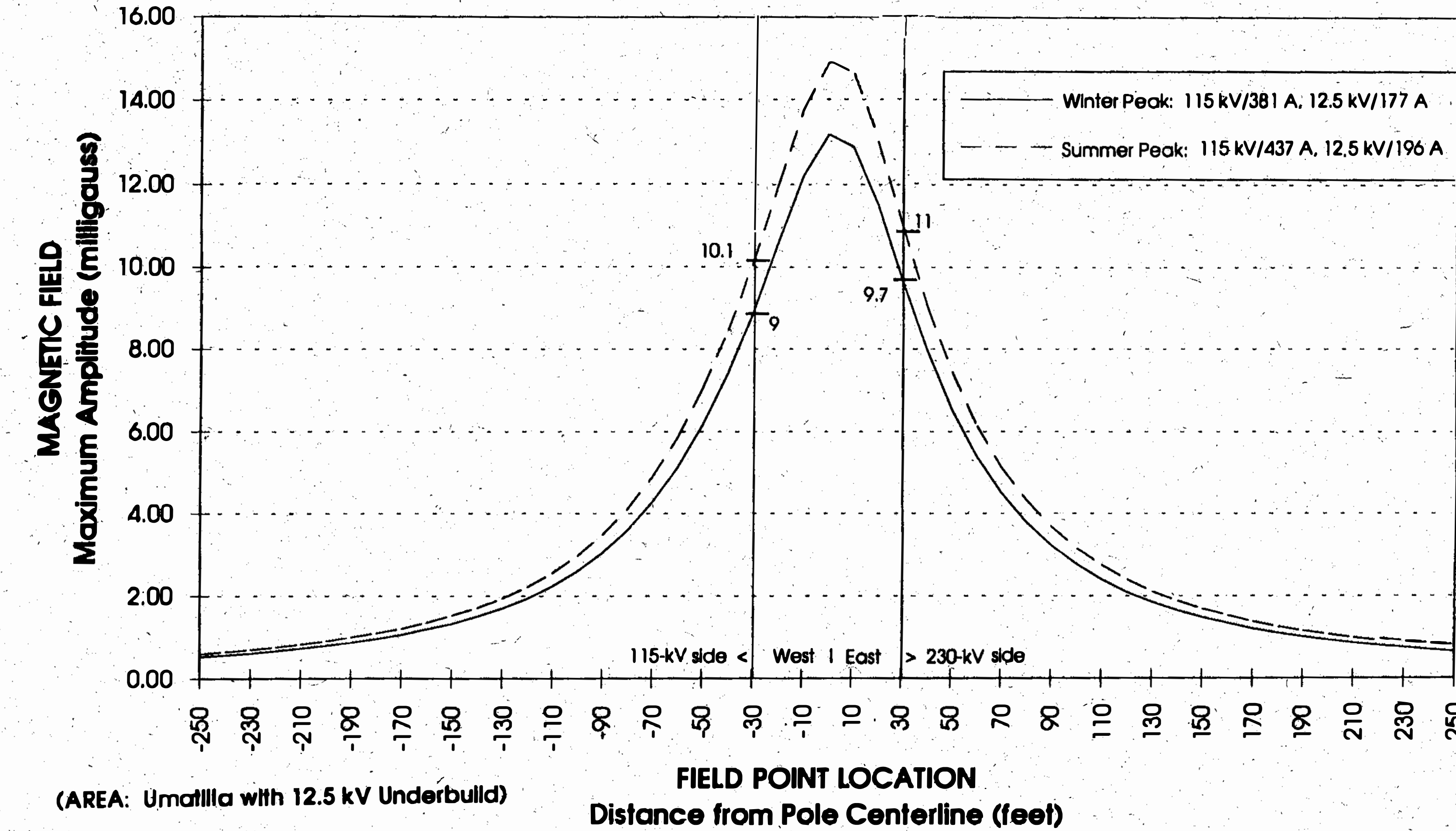
Figure H2-5 illustrates the effects of the proposed 230-kV transmission line construction, for this same line segment, under the maximum generation capacity load of 477 MW; 1,200 amps. Because the normal 115-kV currents are relatively low for both winter and summer, and because there is no distribution underbuild initially installed, there is very little field cancellation. However, cancellation of fields is enhanced in the calculation by arranging the 230-kV phase conductors to gain the maximum cancellation effect possible.

Figure H2-6 illustrates the maximum field effects for the optional transmission line route.

Magnetic Field Mitigation Measures

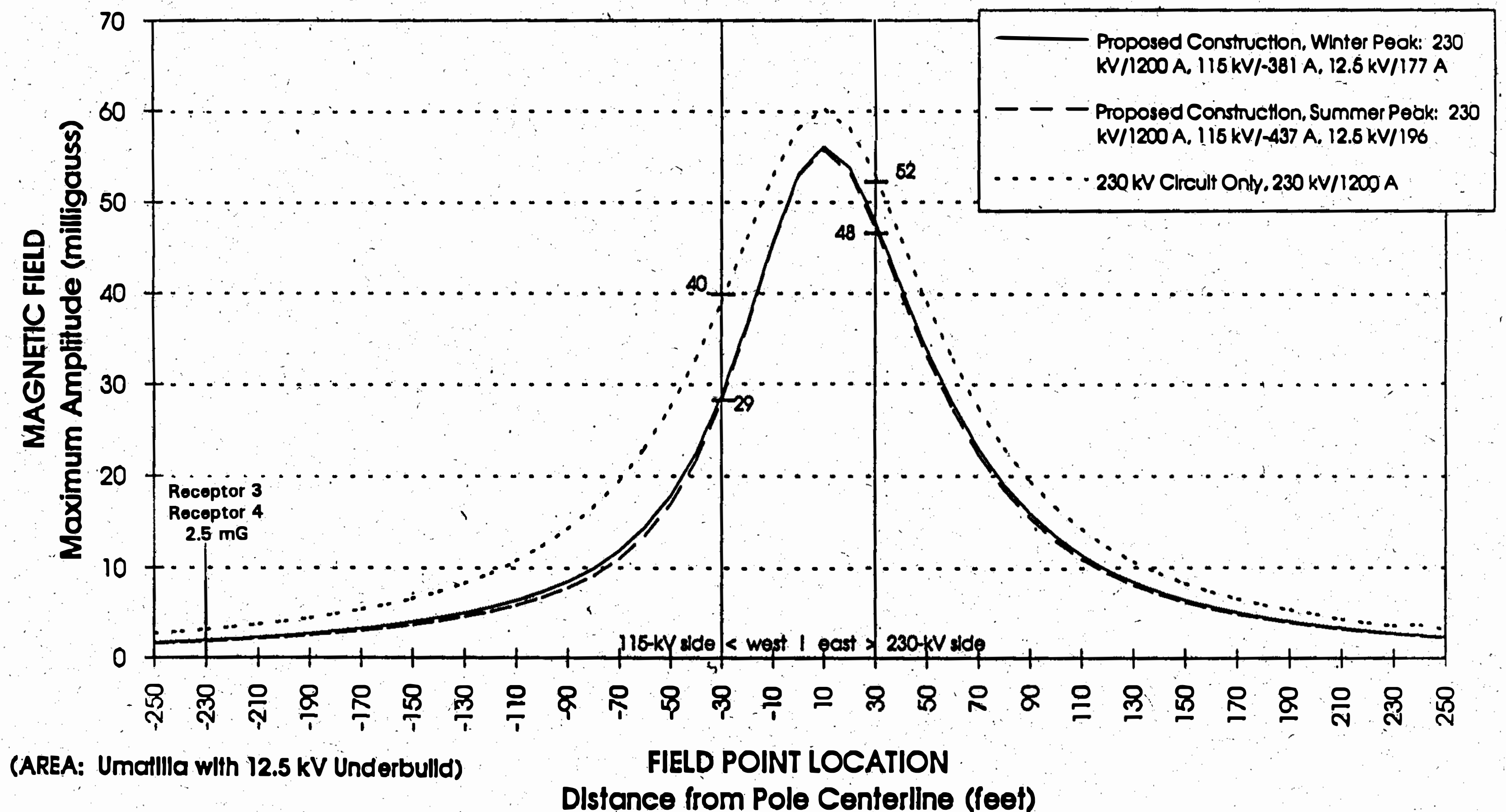
Transmission Conductor Arrangement

Power utilities that operate transmission lines attempt to organize the conductors attached to structures in ways that are consistent and intuitive, so that line workers are less apt to make mistakes in maintenance operations. For the double circuit transmission line proposed here, the most common transmission conductor arrangement would place both A-phase conductors at the top position, both B-phase conductors in the middle, and both C-phase conductors on the bottom.



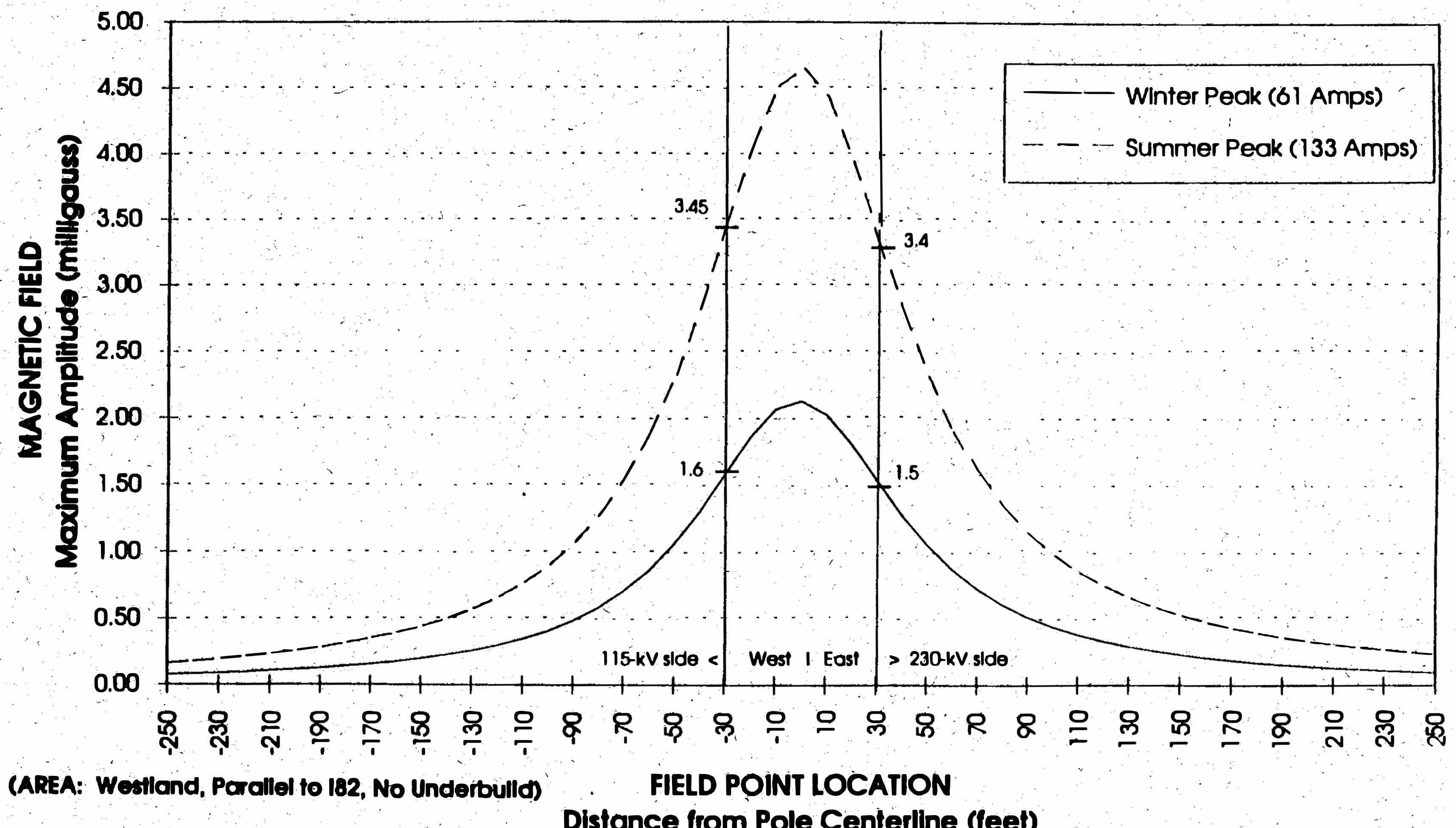
Source: CH2M HILL 1993

Figure H2-2. Typical Existing 115 kV Line Segment Maximum Field Effects



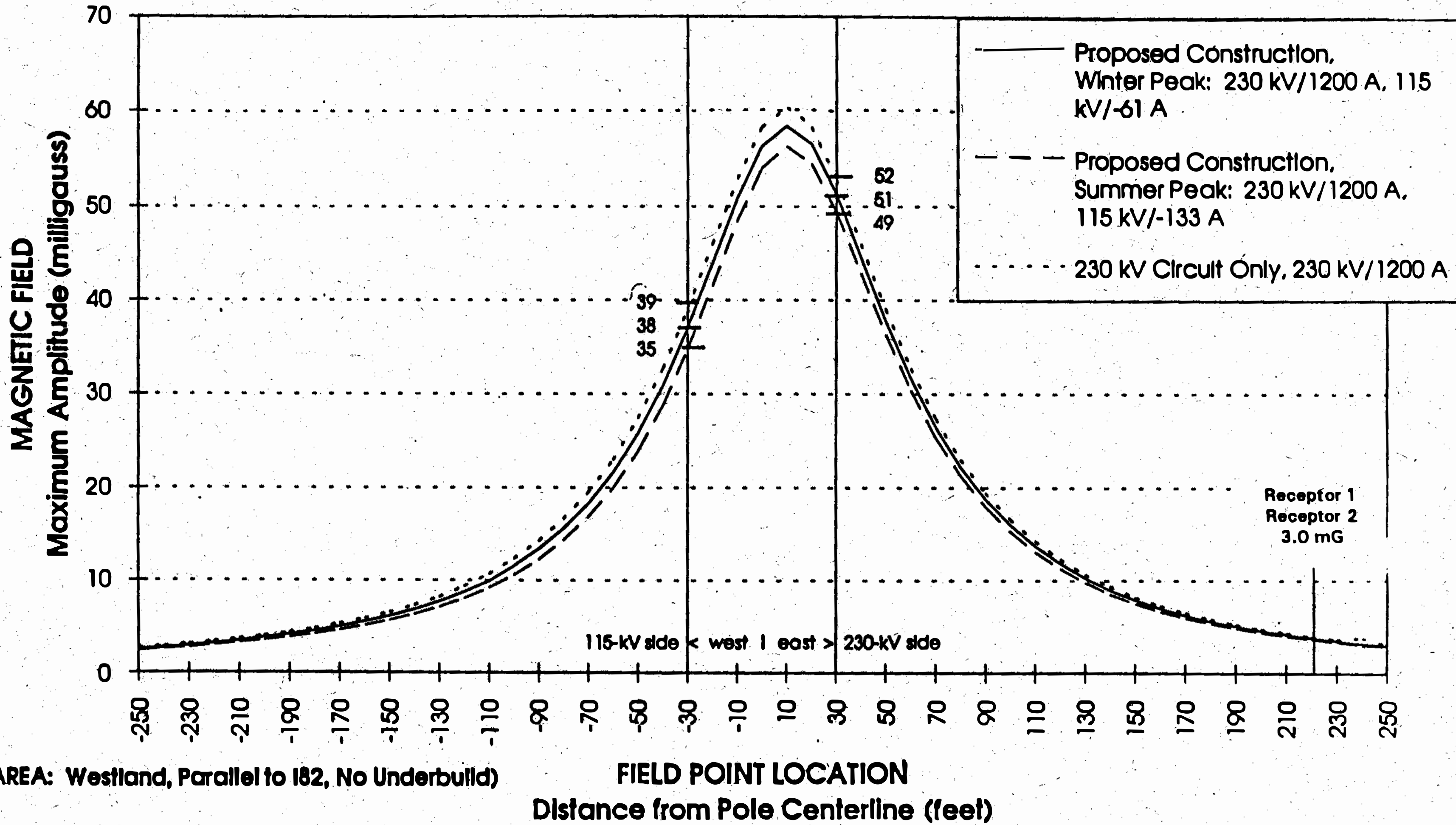
Source: CH2M HILL 1993

Figure H2-3. Proposed Double Circuit 230/115 kV Transmission Line Typical Segment Field Effects



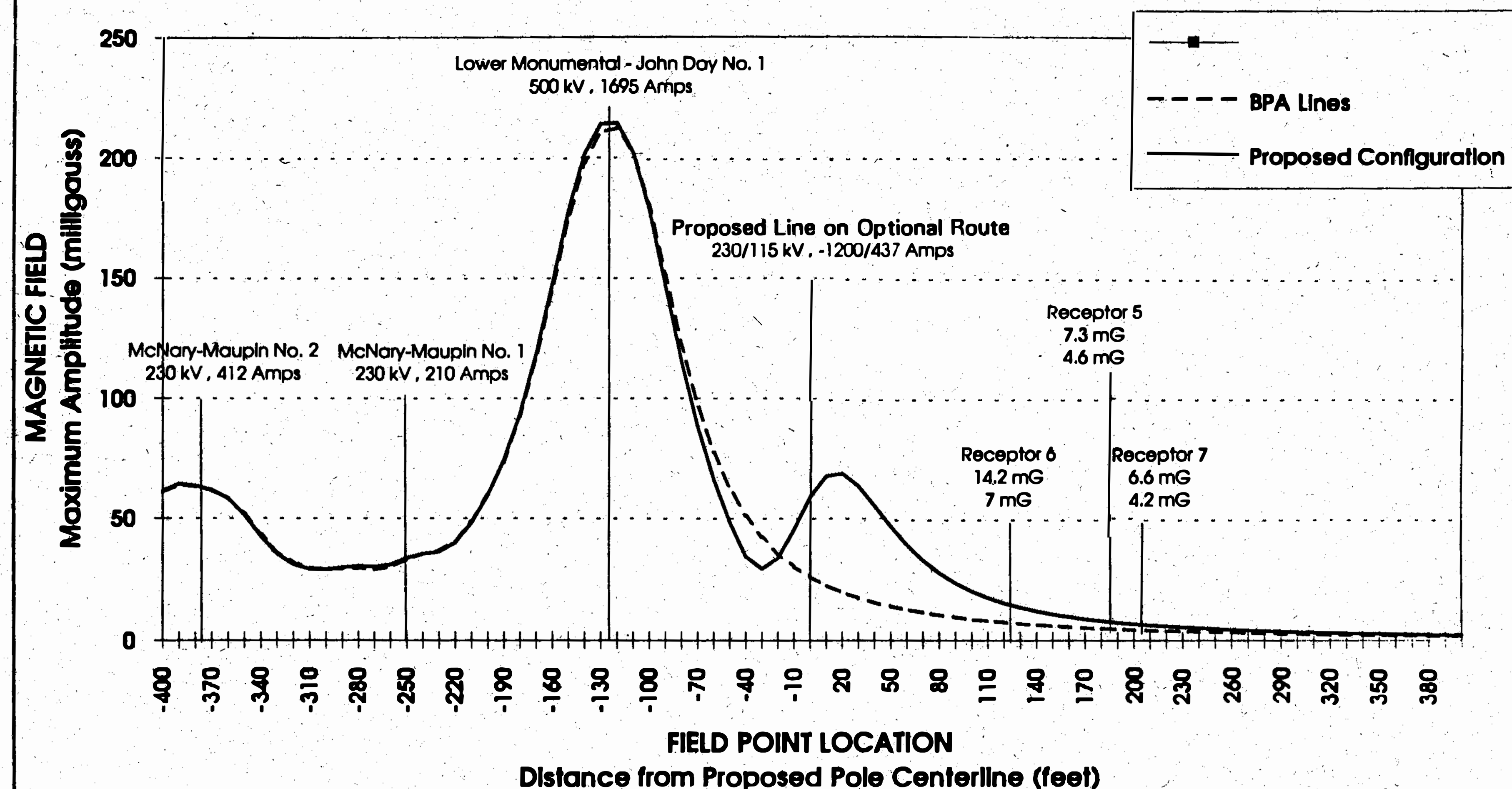
Source: CH2M HILL 1993

Figure H2-4. Existing 115 kV Line Maximum Field Effects



Source: CH2M HILL 1993

Figure H2-5. Proposed Double Circuit 230/115 kV Transmission Line Field Effects



(Parallel to BPA Corridor- Optional Alignment)

Source: Ormsby 1994

Figure H2-6. Optional Transmission Line Route Maximum Field Effects

For the case where the power in all circuits flows in the same direction, there is some field cancellation to be gained by rearranging the locations of the phase conductors. However, for the proposed construction, the 230-kV power flows toward McNary while the 115-kV power flows from McNary. At any moment in time, the A-phase conductors of the 115-kV and 230-kV circuits have currents flowing in exactly opposite directions; this is also true of the B-phase and C-phase conductors. The opposing currents produce opposing magnetic fields that tend to cancel each other. Therefore, for the proposed construction, ground-level field cancellation is greatest when the same 115-kV and 230-kV phase conductors are at the bottom positions. In other words, for this case, the traditional arrangement of phase conductors on the pole will produce the lowest magnetic fields. Computer analysis confirms this effect. However, because the 230-kV currents are on the order of three times greater than the 115-kV currents, the magnetic field from the 230-kV circuit predominates, and the cancellation effect of the 115-kV currents at ground level is not very significant.

Distribution Conductor Arrangement

Some small additional field cancellation is achieved by keeping the C-phase distribution conductor under the C-phase 230-kV conductor where distribution power flow opposes the 230-kV power flow. Because the normal 230-kV currents are more than six times greater than the normal distribution currents, the additional cancellation effect due to the distribution phase-placement is not significant. Therefore, in a line segment where 230-kV and 12.5-kV power might flow in the same direction, there is little justification for changing to a nonstandard distribution phase conductor arrangement.

Line Capacities and Loads

230-kV

The 230-kV circuit will consist of conductors sized for the maximum HGC generation capacity. The selection of these conductors includes an economic analysis to minimize the total of the initial cost and the long-term cost of resistive losses. After construction, any attempt to increase power flows in the 230-kV circuit would result in excessively costly resistive losses. The capacity of the 230-kV line is fixed by the economies of transmitting the rated output of the generator, 477 MW.

115-kV

The UECA 115-kV circuit is sized to support normal loads as well as emergency situations. For example, in the Westland area, UECA's 115-kV line carries an annual peak load of about 133 amps. However, UECA's transmission plan includes the construction of a tie-line from this area that would connect to the eastern parts of their system. When the normal 115-kV feed to the eastern substations is out of service, the Westland area 115-kV could be switched to provide an alternate route. Therefore, the UECA 115-kV circuits will carry small normal currents, but must be capable of much higher, long-term, emergency currents.

12.5-kV

The UECA 12.5-kV distribution circuits are also constructed with capacity to support both normal and emergency loading. The 12.5-kV conductors must also have sufficient capacity to allow load growth. As the normal 12.5-kV distribution load grows, so will the UECA 115-kV transmission load that supplies the distribution system. Because the 230-kV load is fixed at the generation capacity, the magnetic field cancellation effect due to the 12.5-kV and 115-kV lines will grow so long as the area's electrical demand grows. Historically, electrical demand in the area has grown. Therefore, in the future, one could expect that the normal ground level magnetic fields will tend to decrease somewhat from predicted initial levels.

EMF Estimates at Homes and Commercial Buildings

The seven areas that contain buildings that may experience an increase in magnetic fields are shown on Figure H2-7. As explained, fields at these locations will fluctuate as the load current in the conductors changes from hour to hour.

Proposed Transmission Line Route

Areas 1, 2, 3, and 4 are along the proposed transmission line route.

- Area 1 includes a two-story residence located just north of the Lamb-Weston facility and approximately 79.2 meters (260 feet) east of the transmission line. At this location, the transmission line would be built jointly with the UECA 115-kV line and a 12.47-kV distribution line.

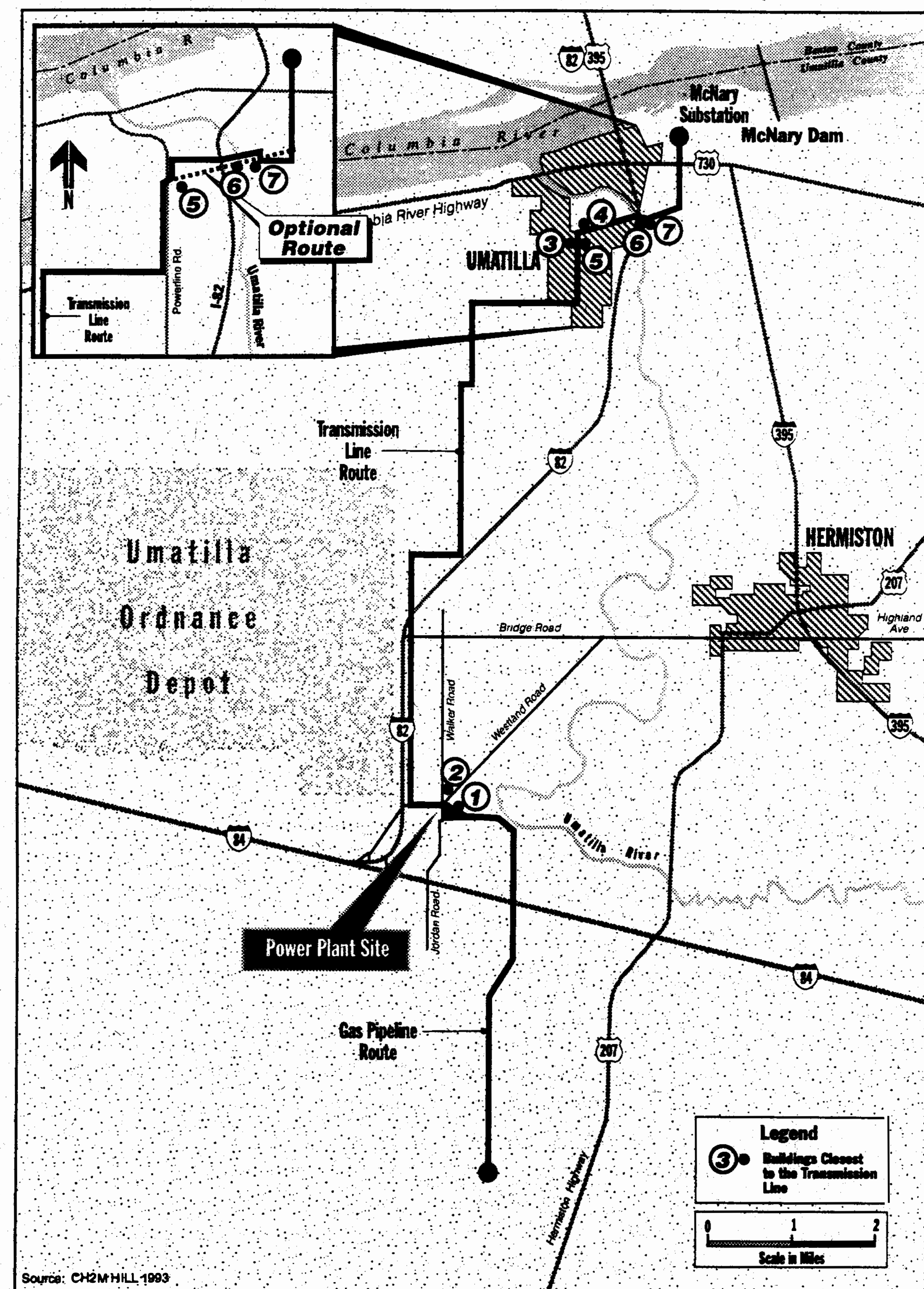


Figure H2-7 Building Proximity to Proposed Transmission Line

- Area 2 consists of a trailer and a furniture business on the northeast corner of Westland and Walker Roads. The trailer is the closest structure and lies approximately 67 meters (220 feet) northeast of the 90-degree angle structure on the northwest corner of the intersection.

- Area 3 includes three frame residences located on the west side of Powerline Road approximately 70 meters (230 feet) from the 90-degree angle pole where the transmission line turns east. At this location, a three-phase, four-wire, 12.47-kV Pacific Power distribution line stands between the homes and the UECA transmission line.

- Area 4 includes residences located approximately 1/4 mile east of Area 3 and approximately 70 meters (230 feet) north of the UECA transmission line. At this location, the proposed double-circuit transmission line would be underbuilt with a UECA 12.47-kV distribution circuit.

The 115-kV and 12.47-kV circuit loadings range from significant values that minimize the 230-kV magnetic field to low values that tend to produce the greatest 230-kV fields. The worst-case ground level magnetic field levels at any building along the proposed transmission line route will be no greater than those values given on Figure H2-5 for the actual distance and direction that the buildings are located from the centerline, or about 3 mG.

Optional Transmission Line Route

There are two buildings and one church close enough to the optional transmission line route to experience a potential increase in magnetic field exposure. These are identified as Areas 5, 6, and 7 on Figure H2-7.

- Area 5 includes a church (which may also be a residence) located approximately 58 meters (190 feet) south of the proposed optional transmission line route (Ormsby 1994).

- Area 6 includes one residence located approximately 38 meters (125 feet) south of the proposed optional transmission line route (Ormsby 1994).

- Area 7 includes one residence located approximately 62 meters (205 feet) south of the proposed optional transmission line route (Ormsby 1994).

The worst-case ground level magnetic field at any building along the optional transmission route will be no greater than those values given on Figure H2-6 for the actual distance and direction that the buildings are located from the centerline, or about 14.2 mG.

References

CH2M HILL. 1993. 230-kV Transmission Line Issue Analysis for the Hermiston Generating Project, Hermiston, Oregon. Submitted to Bonneville Power Administration by Hermiston Generating Company. November 1993.

Ormsby, S. Gordon. 1994. Letter from S. Gordon Ormsby, P.E., CH2M HILL, Corvallis, Oregon, February 16, 1994 to Jean Hopkins, U.S. Generating Company, Bethesda, Maryland.

Appendix I

Responses to Public Comment on the
Draft Environmental Impact Statement

Letters of Comment on the Draft Environmental Impact Statement and BPA Responses

The Notice of Availability of the draft environmental impact statement (EIS) was published in the Federal Register on April 1, 1994. The draft EIS was mailed to Federal, state, and local agencies and individuals for comments immediately prior to the public notice date.

All letters of comment that address specific analyses in the draft EIS were reviewed by the Bonneville Power Administration (BPA) staff and its consultants. Suggestions for correcting text or data and requests for further discussion of a subject have been given consideration. Those editorial changes and suggestions that were practicable, reasonable, and improved the quality of the final EIS are incorporated herein.

Constructive criticism presenting a major environmental point of view or one in opposition to that presented in the draft EIS, when persuasively supported, is treated by making revisions in the appropriate part of the final EIS. When a major point of view is not persuasive, reasons are given why BPA did not change its point of view.

The sections of the final EIS that have been modified as a result of comments received are identified in the responses. Other responses are self explanatory.

The commentors and the page on which their letter occurs are:

RESPONDENT	SYMBOL	PAGE
Environmental Protection Agency	EPA	
Hermiston Generating Company	HGC	
Individual	I	
Randy Seiffert		
National Marine Fisheries Service	NMFS	
Oregon Department of Fish and Wildlife	ODFW	
Rural Electrification Administration	REA	

Comments of Environmental Protection Agency

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

MAY 26 1994

REPLY TO
ATTN OF: WD-126

Dawn Boorse
Project Manager
Bonneville Power Administration
P.O. Box 3621-PG
Portland, Oregon 97208

Dear Ms. Boorse:

In accordance with our responsibilities under the National Environmental Policy Act and Section 309 of the Clean Air Act, the Environmental Protection Agency (EPA) has reviewed the **Hermiston Generating Project Draft Environmental Impact Statement** (draft EIS). The draft EIS analyzes a No Action, and one action alternative to build a combustion-turbine electrical generation plant near Hermiston, Oregon in Umatilla County.

Based on our review, we have rated the draft EIS EC-1 (Environmental Concerns – Adequate). Please see the attached explanation of our rating system. At this time, we see no outstanding issues of concern regarding this project. The EIS is very well written and provides excellent detail in describing the potential effects on the environment.

For clarification purposes only, we would recommend that the final EIS provide additional explanations on the following points:

EPA-1 1) On page 3-43, the EIS discusses jurisdictional wetland exemptions. We would recommend that the final EIS include citations from applicable regulations that indicate exactly what types of wetlands are exempted from Section 404 of the Clean Water Act regulations.

EPA-2 2) In the final EIS we would like to see some indication that the Oregon Department of Environmental Quality has reviewed and approved the air quality analysis provided to them by the Bonneville Power Administration.

EPA-3 3) On page 3-61, the EIS mentions a transmission line crossing over the Umatilla River. The final EIS should provide additional clarification on what types of mitigation measures will be used at this site to prevent impacts to the riparian areas and direct impacts to the Umatilla River.

Responses to Environmental Protection Agency

EPA-1. Comment noted. Text in Section 3.3.1.1 has been revised to include citations from applicable regulations.

EPA-2. Text has been added to Section 3.6.1.1 to describe the PSD application and review process by ODEQ. For more than a year, ODEQ has been participating in review and consultation regarding HGC's Application for Site Certification and subsequent revisions of that application. ODEQ's input was reflected in the Oregon Department of Energy's decision to issue a Site Certificate for the project. ODEQ did not comment on BPA's draft EIS.

EPA-3. No transmission line poles would be placed in wetlands, including Wetland 1, which is the riparian corridor along the Umatilla.

COMMENTS OF ENVIRONMENTAL PROTECTION AGENCY

This rating and a summary of our comments will be published in the *Federal Register*. Thank you for the opportunity to review this draft EIS. Please contact John Bregar at (206) 553-1984 if you have any questions about our comments.

Sincerely,

Joan Cabreza, Chief
Environmental Review Section

Enclosure

cc: Ken Barnhart

RESPONSES TO ENVIRONMENTAL PROTECTION AGENCY

COMMENTS OF ENVIRONMENTAL PROTECTION AGENCY

RESPONSES TO ENVIRONMENTAL PROTECTION AGENCY

SUMMARY OF THE EPA RATING SYSTEM
FOR DRAFT ENVIRONMENTAL IMPACT STATEMENTS:
DEFINITIONS AND FOLLOW-UP ACTION *

Environmental Impact of the Action

LO--Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplish with no more than minor changes to the proposal.

EC--Environmental Concerns

The EPA review has identified environmental impacts that should be avoid in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO--Environmental Objections

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU--Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1--Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or date collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2--Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoid in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3--Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussion are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640 policy and Procedures for the Review of Federal Actions Impacting the Environment

COMMENTS OF HERMISTON GENERATING COMPANY

RESPONSES TO HERMISTON GENERATING COMPANY

U.S. Generating Company

May 21, 1994

Ms. Dawn Boorse
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

Dear Dawn:

The attached comments on the Draft Environmental Impact Statement (DEIS) for the Hermiston Generating Project are submitted on behalf of Hermiston Generating Company, L.P. Our comments fall into two categories; updated design information, and specific comments on statements in the DEIS.

Thank you for your continued efforts in the NEPA review process. If you have any questions regarding these comments, please contact Roy Skinner at (916) 983-7868 or Dick Sandvik at (503) 595-1828.

Sincerely,

Roy C. Skinner for

Jean Hopkins
Director, Regulatory Affairs

cc: Ellen Hall, Enserch
Adam Bless, ODOE

[illegible] Market Street Suite [illegible] • San Francisco California [illegible]

COMMENTS OF HERMISTON GENERATING COMPANY

Updated Design Information

Hermiston Generating Company has made or is proposing certain changes to the project design as set forth in the DEIS. As you know, these changes were addressed in the Design Revisions handout at the April 26, 1994 Open House for the project. So that the Final EIS accurately describes the project and its related and supporting facilities, the following revisions should be made to the DEIS. Impacts associated with these changes are discussed as appropriate.

HGC-1

1. Page 2-13 of the DEIS, under the third bullet on the page, states that the power plant would include "Control/office/warehouse buildings, housing control equipment, workshops, maintenance areas, and offices. This building would be approximately 418 square meters (4,500 square feet);" The actual size of this building will be 7,800 square feet. The EIS should be revised to read as follows:

   "Control/office/warehouse buildings, housing control equipment, workshops, maintenance areas, and offices. This building would be approximately 725 square meters (7,800 square feet);"

HGC-2

2. Page 2-13 of the DEIS, under the fourth bullet on the page, states that the power plant would include "Two open structures of approximately 650 square meters (7,000 square feet), each housing a heat recovery steam generator." The heat recovery steam generators (HRSGs) would not be within any type of structure; these are free-standing pieces of equipment. The EIS should be revised to read as follows:

   "Two heat recovery steam generators of approximately 650 square meters (7,000 square feet). These units are free standing and will not be enclosed within a structure."

   The noise analysis for the project assumed that the HRSGs would not be enclosed, and therefore, accurately reflects the proposed design.

HGC-3

3. Page 2-16 of the EIS, third full paragraph, states "... the exhaust flow would vent to a stack at least 2.5 times the height of the tallest surrounding structure." The highest point on the heat recovery steam generators would be approximately 87 feet high. The stacks would not be 2.5 times this height. However, the stacks would still meet Good Engineering Practice (GEP) height as required by air quality regulations. The EIS should be revised to read as follows:

   "... the exhaust flow would vent to an emission stack designed to GEP standards."

HGC-4

4. Page 2-28 of the EIS, fifth paragraph, states "One 18,927 liter (5,000 gallon) sulfuric acid tank would be supported on saddles and surrounded by a secondary containment dike. A normally closed drain valve would be provided at the bottom of the dike." This facility may not contain a drain valve. The diked area would be sized to contain

RESPONSES TO HERMISTON GENERATING COMPANY

HGC-1 The text of Section 2.2.2.1 has been revised to reflect this comment.

HGC-2 The text of Section 2.2.2.1 has been revised to reflect this comment.

HGC-3 The text of Section 2.2.2.1 has been revised to reflect this comment.

HGC-4 The text of Section 2.2.8.3 has been revised to reflect this comment, with some clarifications. It is noted that the dike may be drained by a normally closed valve or by a pump. Either way, the diked area must be sized to contain the full tank volume plus the 50-year, 24-hour storm event, because the type of drain system does not make a difference if a tank leak occurs during a storm. The above change is required to be consistent with the proposed change suggested in HGC-6.

COMMENTS OF HERMISTON GENERATING COMPANY

HGC-4 (cont'd)

100 percent of the maximum chemical capacity of the tank plus the 24-hour, 50 year storm event. Any material captured within the contained area would be pumped out and either added to the cooling water system, or if contaminated, disposed of as required by regulations. The EIS should be revised to read as follows:

"One 18,927 liter (5,000 gallon) sulfuric acid tank would be supported on saddles and surrounded by a secondary containment dike. A normally closed drain valve would be provided at the bottom of the dike, or the containment area would be sized to contain 100 percent of the maximum chemical capacity of the tank plus the 24-hour, 50-year storm event."

HGC-5

5. Page 2-29 of the DEIS, fifth paragraph, states "Curbs and drains would be installed at all chemical treatment areas; these would route spills along underground gravity feed lines to a chemical sump..." These areas will be contained, but may not have drains connected to the gravity system. The curbed area would be sized to contain 100 percent of the maximum chemical capacity of the tank plus the 24 hour, 50-year storm event and any material captured within the contained area would be pumped out and either added to the cooling water system, or if contaminated, disposed of as required by regulations. The EIS should be revised to read as follows:

"Curbs would be installed at all chemical treatment areas; the curbed areas will either be designed to contain 100 percent of the maximum chemical capacity of the tank plus the 50-year, 24-hour storm event, or drains would be provided that would route spills along underground gravity feed lines to a chemical sump..."

HGC-6

6. Page 3-34 of the DEIS, first bullet under *Measures Included as Part of The Project*, states "The ammonia and sulfuric acid tanks would be surrounded by dikes with normally closed drain valves." As stated above, the sulfuric acid tank may not contain a drain valve. The EIS should be revised to read as follows:

"The ammonia and sulfuric acid tanks would be surrounded by dikes These dikes would be designed to contain 100 percent of the maximum chemical capacity of the tank plus the 50-year, 24-hour storm event. The diked area around the ammonia tank will contain a normally closed drain valve. The sulfuric acid tank will either contain a normally closed drain valve or will not include a drain system. If no drain system is included, any material captured within the contained area would be pumped out and either added to the cooling water system, or if contaminated, disposed of as required by regulations."

7. The design of the power plant may include a secondary cooling tower which would reduce or eliminate the need for the evaporators for the zero discharge system. This cooling tower is not currently addressed in the DEIS. This facility would reduce costs and energy consumption compared to the design discussed in the DEIS To reflect this current design, the following changes should be made to the DEIS

RESPONSES TO HERMISTON GENERATING COMPANY

HGC-5 The text of Section 2.2.8.3 has been revised to reflect this comment.

HGC-6 The text of Sections 3.2.2.4 and 2.2.8.2 has been revised to reflect this comment.

COMMENTS OF HERMISTON GENERATING COMPANY

HGC-7a

a. The following bullet should be added to page 2-13, after the fifth bullet:

- The facility may include a smaller secondary cooling tower consisting of two cells.

HGC-7b

b. On page 2-17 the first sentence of the first full paragraph should be replaced with the following:

"Cooling for the condenser would be evaporative (wet) cooling using two four cell mechanical induced draft cooling towers. The facility may also include one smaller two cell cooling tower as part of the zero discharge system."

HGC-7c

c. On page 2-17, the first sentence of the second full paragraph should be replaced with the following:

"Each of the four cell cooling towers would be approximately 70.1 meters (230 feet) long by 16.8 meters (55 feet) wide by 15.2 meters (50 feet) high, and would include a basin holding approximately 1.9 million to 2.3 million liters (500,000 to 600,000 gallons) of water that is circulated through the condenser for cooling. The two cell tower would be approximately 14.6 meters (48 feet) long by 7.3 meters (24 feet) wide by 10.4 meters (34 feet) high."

HGC-7d

d. The following should be added at the end of the first paragraph of Section 3.3.2.3 on page 3-47:

"These projected deposition rates represent a project design with only the two main four cell cooling towers. If a secondary cooling tower is incorporated into the design, the highest rate of salt deposition in areas that would affect crops or native vegetation is 5.2 kg/ha-mo (4.7 lb/ac-mo) and 0.3 kg/ha-mo (0.3 lb/ac-mo), respectively."

HGC-7e

e. A third bullet should be added to page 3-48 under "Measures Included as Part of the Project" which reads as follows:

- If a secondary cooling tower is included as part of the project, the total dissolved solids in the circulating water for the secondary cooling tower will be maintained at 100,000 parts per million or less on an annual average basis. The drift rate of the primary cooling towers will be 0.001 percent or less of the circulating water volume and the drift rate of the secondary cooling tower will be 0.0005 percent or less of the circulating water volume.

HGC-7f

f. The discussion of "Icing Impacts" at the bottom of page 3-75 and the top of page 3-76 should be revised to read as follows:

RESPONSES TO HERMISTON GENERATING COMPANY

HGC-7a The text of Section 2.2.2.1 has been revised to reflect this comment.

HGC-7b The text of Section 2.2.2.2 has been revised to reflect this comment.

HGC-7c The text of Section 2.2.2.2 has been revised to reflect this comment.

HGC-7d The text of Section 3.3.2.3 has been revised to include new information on cooling tower drift.

HGC-7e The text of Section 3.3.2.3 has been revised to reflect this comment.

COMMENTS OF HERMISTON GENERATING COMPANY

HGC-7f (cont'd)

"Based on the modeling, there are no predicted occurrences of cooling tower-induced icing on nearby roadways. If the project design includes only the two main cooling towers, icing on the railroad tracks to the south-southeast of the site is predicted to occur in only 1 year out of 5 years modeled, at a maximum frequency of 1.5 hours per year. If thesecondary cooling tower is included in the design, icing is predicted to occur up to 3.8 hours each year. These predicted occurrences..."

HGC-7g

g. The discussion of "Fogging Impacts" at the top of page 3-76 should be revised to read as follows:

"If the project design includes only the two main cooling towers, fogging is predicted to occur .... Walker Road for one 6-minute period in 5 years. If the secondary cooling tower is included in the project design, fogging is predicted to occur along Westland Road during two of five years for a maximum of 1.0 hour per year, along Walker Road during one of five years for a maximum of 0.4 hours per year, along the Lamb-Weston access road during five of five years for a maximum of 1.1 hours per year, and along the railroad during five of five years for a maximum of 3.8 hours per year.

Revised analyses of fogging and icing, and impacts on vegetation are attached for a design that includes the secondary cooling tower.

HGC-8

8. The current design of the powerplant includes a temporary access road from Westland Road onto the site. This road would be approximately 300 feet south of the intersection of Westland Road and the Lamb-Weston access road. This road has been added to better accommodate construction access. Attached is an evaluation of traffic impacts associated with this access road conducted by Wilbur-Smith Associates.

HGC-9

9. The sixth bullet on page 2-13 identifies a 1.9-million-liter (500,000-gallon) tank for demineralized water storage. The current design eliminates this tank and this bullet should be deleted.

HGC-10

10. The seventh bullet on page 2-13 identifies a filtered water storage tank with a capacity of 7.6-million-liters (2-million-gallons). This tank may not be necessary. Therefore this bullet should be revised as follows:

- Filtered water storage tank with 7.6-million-liter (2-million-gallon) capacity, if necessary;"

HGC-11

11. Figure 2-7, page 2-21, shows the transmission pole height to be 110 feet. Although most transmission poles will be approximately 110 feet high, pole heights will actually range from about 50 feet (e.g. where the transmission line crosses under existing transmission lines) to about 150 feet (e.g. where the transmission line crosses over

RESPONSES TO HERMISTON GENERATING COMPANY

HGC-7f The text of Section 3.6.2.3 has been revised to reflect this comment.

HGC-7g The text of Section 3.6.2.3 has been revised to reflect this comment.

HGC-8 The text of Section 3.8.2.2 and Figure 3-9 have been revised to reflect this comment.

HGC-9 The text of Section 2.2.2.1 has been revised to reflect this comment.

HGC-10 The text of Section 2.2.2.1 has been revised to reflect this comment.

COMMENTS OF HERMISTON GENERATING COMPANY

HGC-11 (cont'd)

Interstate 82 at the Umatilla River) to allow adequate clearance, given topography and other obstacles.

Additionally, on page 3-59, the fourth sentence of the large full paragraph states that "The height of the upgraded transmission line would be 33.5 meters (110 feet), nearly twice the size of the existing 115 kV line." This sentence should be revised to read "The average height of the new steel transmission poles along the upgraded line would be approximately 33.5 meters (110 feet), nearly twice the height of the existing wood poles."

On page 3-122, the first sentence of the first paragraph should also be revised as follows to reflect the variation in transmission pole height:

> "Approximately every other existing 20.3 meter (66.5-foot) high wood pole used to support the UECA transmission line would be replaced with metal poles having an average height of approximately 33.5 meters (110 feet)."

Specific Comments on DEIS

HGC-12

1. To reflect developments at the state level since the DEIS was prepared, the following changes should be made to the DEIS:

   a. The last sentence of the first paragraph on page iv should be deleted and replaced with the following:

      "The Energy Facility Siting Council issued an Order March 11, 1994, approving Hermiston Generating Company's request for a site certificate. A Site Certification Agreement was executed on March 16, 1994.

      A party to the EFSC's proceeding has appealed the decision to the Oregon Supreme Court. There is one issue on appeal; the validity of the EFSC's rule exempting the Hermiston Generating Project from proving need for power. An accelerated briefing schedule was agreed to, and the appeal is set for oral argument before the Supreme Court on June 14, 1994.

   b. Change the date in the sentence leading into the bulleted items on page 1-4 to May 23, 1994.

   c. Under the fifth bullet on page 1-4, delete the entire second sentence EFSC is no longer required to make a decision on whether or not to issue a site certificate within 9 months.

RESPONSES TO HERMISTON GENERATING COMPANY

HGC-11 The text in Sections 2.2.2.2, 3.4.2.4, and 3.9.2.3, as well as Figure 2.7, have been revised to reflect this comment.

HGC-12 The text in the Summary/Abstract and Section 1.3 has been revised to reflect this comment.

Comments of Hermiston Generating Company

HGC-12 (cont'd)

d. Delete the last sentence of Section 1.3 on page 1-5 and insert the following new bullet to reflect the current status of the EFSC review for the project:

- The EFSC issued an Order on March 11, 1994, approving Hermiston Generating Company's request for a site certificate. A Site Certification Agreement was executed on march 16, 1994.

  A party to the EFSC's proceeding has appealed the decision to the Oregon Supreme Court. There is one issue on appeal; the validity of the EFSC's rule exempting the Hermiston Generating Project from proving need for power. An accelerated briefing schedule was agreed to, and the appeal is set for oral argument before the Supreme Court on June 14, 1994.

HGC-13

2. The first paragraph on page 2-7 states that "The Port is proceeding with design for the water supply system, which should be operational in early 1994." The expected operational date for the water supply system is actually mid-1995 rather than early 1994.

HGC-14

3. The first sentence of the last paragraph on page 2-17 should read as follows to correctly describe the water treatment process:

   "The filtered water and recycled water from the zero discharge system would be treated in the demineralizer system for steam cycle use."

HGC-15

4. The second sentence in the second full paragraph on page 2-20 reads "Spacing between the new steel poles would vary from 152 to 244 meters (500 to 800 feet)." The distance between these poles should be changed to 152 to 305 meters (500 to 1,000 feet) to reflect expected transmission line design.

HGC-16

5. The last sentence on page 3-1 reads "Second, soils impacts would be negligible since no prime farmland would be taken out of production,..." The word "permanently" should be inserted before "taken" to reflect the fact that while some small amount of prime farmland would be disturbed during construction of the gas pipeline, that land would be restored when construction is completed.

HGC-17

6. The first bullet on page 3-17 addresses the geotechnical survey for the project. Through discussions with the Oregon Department of Geology and Mineral Industries (DOGAMI) it was determined that trenching is not necessary for the geotechnical evaluation because there is very low potential for active faulting at the power plant site. Therefore, the second sentence under the first bullet should be revised to read as follows:

   "The survey would include core drilling sufficient to learn: .."

Responses to Hermiston Generating Company

HGC-13 The text of Section 2.2.1.2 has been revised to reflect this comment.

HGC-14 The text of Section 2.2.2.2 has been revised to reflect this comment.

HGC-15 The text of Section 2.2.2.2 has been revised to reflect this comment

HGC-16 The text of Section 3.1 has been revised to reflect this comment.

HGC-17 The text of Section 3.1.2.1 has been revised to reflect this comment.

COMMENTS OF HERMISTON GENERATING COMPANY

HGC-17 (cont'd)

Additionally, the sixth sentence under this bullet should be deleted which reads "The HGC would notify the Department of Geology and Mineral Industries and the Department of Natural Resources of trenching plans ..."

HGC-18

7. The first bullet on page 3-17 also addresses peer review of the geotechnical survey report. Since the DEIS was issued, the site certificate for the Hermiston Generating Project was revised in its final form to allow the peer review to be conducted by DOGAMI. The discussion of peer review under this bullet, starting with the fourth sentence should be revised to read as follows:

   "The survey would be peer reviewed by the Oregon Department of Geology and Mineral Industries (DOGAMI) or a qualified registered geologist that is independent from HGC and its contractors and subcontractors. If the peer reviewer is not DOGAMI, the choice of peer reviewer shall be approved by EFSC in consultation with the DOGAMI."

HGC-19

8. The second bullet at the top of page 3-18 should be deleted which reads "After backfilling of the gas pipeline trench, the fill should not be compacted." In order to prevent settling of the trench line, the backfill material must be compacted to approximately the same level as the surrounding ground. Easements from the property owners will require restoration of the land to its original condition, which will necessitate compaction.

   Other conditions in the DEIS require revegetation of areas temporarily impacted by construction. Compliance will necessarily require soil preparation prior to planting to ensure success.

HGC-20

9. The first bullet on page 3-21 addresses the geotechnical survey for the project. As mentioned above, through discussions with the Oregon Department of Geology and Mineral Industries (DOGAMI) it was determined that trenching is not necessary for the geotechnical evaluation because there is very low potential for active faulting at the power plant site. Therefore, the second sentence under the first bullet should be revised to read as follows:

   "The survey would include core drilling sufficient to learn: ..."

   Additionally, the sixth sentence under this bullet should be deleted which reads "The HGC would notify the Department of Geology and Mineral Industries and the Department of Natural Resources of trenching plans ..."

HGC-21

10. The first bullet on page 3-21 also addresses peer review of the geotechnical survey report. As stated above, since the DEIS was issued, the site certificate for the Hermiston Generating Project was revised in its final form to allow the peer review to be conducted by DOGAMI. The discussion of peer review under this bullet, starting with the fourth sentence should be revised to read as follows:

RESPONSES TO HERMISTON GENERATING COMPANY

HGC-18 The text of Section 3.1.2.1 has been revised to reflect this comment.

HGC-19 The text of Section 3.1.2.1 has been revised to reflect this comment.

HGC-20 The text of Section 3.1.2.2 has been revised to reflect this comment.

HGC-21 The text of Section 3.1.2.2 has been revised to reflect this comment.

COMMENTS OF HERMISTON GENERATING COMPANY

HGC-21 (cont'd)

"The survey would be peer reviewed by the Oregon Department of Geology and Mineral Industries (DOGAMI) or a qualified registered geologist that is independent from HGC and its contractors and subcontractors. If the peer reviewer is not DOGAMI, the choice of peer reviewer shall be approved by EFSC in consultation with the DOGAMI."

HGC-22

11. The bullet on the bottom half of page 3-33 addresses stormwater management and erosion control. The third sentence under this bullet says that the erosion control plan should address both construction and long-term stormwater runoff and erosion potential, and states that the plan should be subject to approval by ODEQ. A stormwater permit has been obtained from ODEQ for project construction, but ODEQ has stated that no stormwater permit will be required for operation of the facility. Therefore, there is no mechanism to require ODEQ to review long-term stormwater runoff and erosion plans, and this bullet should be revised to reflect this.

HGC-23

This bullet also states that the stormwater management and erosion control plan should include a variety of mitigative measures. However, depending on site conditions, it may not be appropriate or effective to implement all of these measures. For example, it may not be appropriate to gravel or pave temporary access roads, particularly if these roads will only be in use during the dry weather season. This bullet should be revised to indicate that these measures should be implemented as appropriate to control erosion and sedimentation. Specific control measures during construction will be identified in the stormwater control plan, subject to ODEQ approval.

HGC-24

12. On page 3-55, in the last sentence of the last bullet, the word "designed" should be replaced with "designated."

HGC-25

13. Table 3-9, page 3-66, identifies the PM_{10} PSD increments for Class I and Class II areas on an annual geometric mean basis as 5 and 19, respectively, and the PSD increment for Class I and Class II areas on a 24-hour basis as 10 and 37, respectively. As of June 3, 1994, the annual geometric mean numbers will be changed to 4 for Class I areas and 17 for Class II areas. Similarly, the 24-hour numbers will be changed to 8 for Class I areas and 30 for Class II areas.

HGC-26

14. Footnote 3 in Table 3-11, page 3-69 states that "..., only emission rates corresponding to the maximum impact scenarios are listed here." This sentence should be corrected to state "..., maximum emission rates are listed here."

HGC-27

15. Footnote 8 in Table 3-11, page 3-69 should be corrected to read as follows:

"Based on VOC emission rate of 3.5 lb/hr/combustion turbine firing natural gas only. Ammonia is a vendor-guaranteed emission rate."

RESPONSES TO HERMISTON GENERATING COMPANY

HGC-22 The text in Section 3.2.2.4 has been revised to clarify that a single stormwater plan should be prepared for ODEQ's approval, and that the plan should include some permanent erosion control measures. These permanent measures should be installed during construction.

HGC-23 The text in Section 3.2.2.4 pertaining to temporary access roads has been removed. Additional text discussing the Stormwater Control Plan has been added.

HGC-24 The text of Section 3.4.1.2 has been revised to reflect this comment.

HGC-25 Table 3-9, in Section 3.6.12, has been revised to reflect this comment.

HGC-26 Table 3-11, in Section 3.6.2.1, has been revised to reflect this comment.

HGC-27 Table 3-11, in Section 3.6.2.1, has been revised to reflect this comment.

COMMENTS OF HERMISTON GENERATING COMPANY

HGC-28 16. On page 3-70, the first full paragraph, the following should be added after the third sentence for clarification

"CEMS will be provided for NO_X and CO."

HGC-29 17. On page 3-70, the last sentence of the first bullet under **New Source Performance Standards** states "The Hermiston Generating Project's estimated NO_X emissions of 4.5 ppmv are well below the NSPS of 90 ppmv." The 90 ppmv should be corrected to 106 ppmv.

HGC-30 18. On page 3-71, the fourth sentence of the first full paragraph states "The proposed plant site would not be located within 10 kilometers (16 miles) of any Class I area." This should read "... located within 10 kilometers (6.2 miles) ..."

HGC-31 19. On page 3-71, the last sentence under *Significant Emissions* should be changed to read as follows:

"The Hermiston Generating Project exceeds significant emission rates for two toxic air pollutants, formaldehyde and ammonia, and for ..."

HGC-32 20. On page 3-72, the fourth sentence of the second full paragraph should be revised to read "Annual average and 24-hour concentrations are derived from the 1-hour maximum by multiplying by 0.4 for a 24-hour average and by 0.08 for an annual average."

HGC-33 21. On page 3-73, the last sentence of the bullet should be revised to read "The BACT assessment performed for the Hermiston Generating Project is included as Appendix F1."

HGC-34 22. The last sentence in the partial paragraph at the top of page 3-75 should be revised to read as follows to accurately reflect air quality regulations:

"The project must demonstrate that any other fuel meets all the state and Federal standards and that the project does not cause or contribute significantly to any exceedances of the air quality standards"

HGC-35 23. On page 3-78, the first bullet, as worded, would require watering for dust control, even during wet weather conditions. The language under this bullet should be revised to read as follows:

"To reduce fugitive dust emissions caused by construction activities during periods of dry, windy weather, unpaved construction areas would be watered a minimum of twice daily during construction. Trucks hauling dirt would be covered or wet down as conditions require, to control dust."

RESPONSES TO HERMISTON GENERATING COMPANY

HGC-28 The text of Section 3.6.2.1 has been revised to reflect this comment.

HGC-29 The New Source Performance Standard (NSPS) for NO_x was recalculated and the results were not significantly different from 90 ppmv. Therefore, no change to the text was made.

HGC-30 The text of Section 3.6.2.1 has been revised to reflect this comment.

HGC-31 The text of Section 3.6.2.1 has been revised to reflect this comment.

HGC-32 The text of Section 3.6.2.1 has been revised to reflect this comment.

HGC-33 The text of Section 3.6.2.1 has been revised to reflect this comment.

HGC-34 The text in Section 3.6.2.1 has been revised to reflect this comment. However, "significantly" was deleted because the project cannot cause or contribute in any way to an exceedance of the air quality standards.

HGC-35 The text of Section 3.6.2.6 has been revised to reflect this comment and the wording of EFSC's Final Order.

COMMENTS OF HERMISTON GENERATING COMPANY

HGC-36

24. On page 3-155, the second paragraph should be revised to reflect the predicted magnetic field for the alternate transmission line route as well as the existing route. The following should be added after the third sentence in the paragraph:

"For the alternate transmission line route, the maximum magnetic field at the nearest building (38 meters [125 feet] from the center of the right-of-way) is expected to increase from approximately 7 milligauss to 14 milligauss."

HGC-37

25. On page 3-157, the second and third bullets should be replaced with the following two bullets to accurately reflect the way in which the gas pipeline will be designed to incorporate safety features for overpressurization or other conditions that may impose risk to the public:

- Fuel control systems on the gas turbines will include separate fuel shut-off valves to stop all fuel flow to the units under shutdown conditions. Fuel flow will be restarted only when all permissive firing conditions have been satisfied. Each fuel shut-off valve will have a mechanical device for local manual tripping, and a means for remote tripping. A vent valve will be provided on fuel gas systems, downstream of the pipeline, to automatically vent the piping downstream of the shut-off valve when that valve closes.

- Isolation valves will be installed on the gas pipeline at the PGT pipeline connection point and at the power plant. Gas handling facilities will be operated in accordance with accepted, proven industry standards and procedures.

RESPONSES TO HERMISTON GENERATING COMPANY

HGC-36 The text of Section 3.14 has been revised to reflect this comment.

HGC-37 The text of Section 3.14.1.2 has been revised to reflect this comment.

COMMENTS OF INDIVIDUALS

May 22, 1993
3454 SW 37th Ave.
Portland, Oregon 97219

Public Involvement Manager - ALP
Bonneville Power Administration
P.O. Box 12999
Portland, Oregon 97208

RECEIVED BY
PUBLIC INVOLVEMENT
LOG #: HERM-02-1
RECEIPT DATE:
5/23/94
AREA DISTRICT

Dear Public Involvement Manager:

The following are my comments on the Hermiston Generating Project Draft EIS:

I-1 1. My principal concern with this draft EIS is the reason it was prepared. When a project, such as the Hermiston Generating Project, is the subject of a thorough siting process, such as that conducted by the Oregon Energy Facility Siting Council, which offers ample opportunity for involvement by the public and other interested parties, it appears that the preparation of a Federal EIS adds little value. It seems unlikely that a Federal EIS in these cases is

RESPONSES TO INDIVIDUALS

I-1 Comment noted. As the enabling Federal agency in this action, BPA has the responsibility under NEPA to identify and evaluate possible environmental impacts of the project. The record established in the Energy Facility Siting Council's deliberations was used extensively to avoid duplication of effort.

COMMENTS OF INDIVIDUALS

going to uncover any significant environmental problems that might have been overlooked by the State siting process or result in any substantially different mitigation than would be required by the site certificate. Furthermore, given the Energy Policy Act of 1992, BPA's authority to refuse to wheel the project output for environmental (as opposed to technical) reasons would seem limited. The preparation of a Federal EIS in these cases appears to add little except to the cost and development time for the project. These costs will ultimately be borne by the consumers of the power and steam. BPA and the Department of Energy should consider changes to their NEPA regulations which require preparation of an EIS (or an EA) in situations like this one.

I-1 (cont'd)

I-2 2. It would appear that the so-called "optional route" for the transmission

RESPONSES TO INDIVIDUALS

I-2 The optional transmission line route does appear to have environmental advantages over the proposed route. BPA's final decision on the recommended transmission line route will appear in the Record of Decision.

COMMENTS OF INDIVIDUALS

I-2 (cont'd) line in the vicinity of the Umatilla River crossing is environmentally preferable.

I-3 3. On Table 3-12, ambient concentrations of pollutants are shown to be higher at part load than at full load. My guess is that this is due to poorer dispersion at part load because of the lower stack exit velocity and temperature shown in Table 3-10. However, the higher concentrations at ~~ped~~ part load may seem counterintuitive to the lay reader. Perhaps a brief explanation can be added.

Thank you for the opportunity to comment.

Sincerely,
Randy D. Seiffert
Randy D. Seiffert
Private Citizen

RESPONSES TO INDIVIDUALS

I-3 Comment noted. Text has been added to Section 3.6.2.1 to explain pollutant concentrations at full and part-load.

COMMENTS OF NATIONAL MARINE FISHERIES SERVICE

RESPONSES TO NATIONAL MARINE FISHERIES SERVICE

UNITED STATES DEPARTMENT OF COMMERCE
Office of the Under Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

May 18, 1994

Ms. Dawn Boorse
Department of Energy
Bonneville Power Administration
Public Involvement
Portland, Oregon 97212-0999

Dear Ms. Boorse:

Enclosed are comments on the Draft Environmental Impact Statement for Hermiston Generating Project (DOE/DEIS-0294), Hermiston, Oregon.

Thank you for giving us an opportunity to review the document.

Sincerely,

Donna S. Wieting
Acting Director
Ecology and Conservation Office

Enclosure

Comments of National Marine Fisheries Service

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
ENVIRONMENTAL & TECHNICAL SERVICES DIVISION
911 NE 11th Avenue - Room 620
PORTLAND, OREGON 97232
503/230-5400 FAX503/230-5435

F/NWO3

Ms. Dawn Boorse
Department of Energy
Bonneville Power Administration
Public Involvement
P.O. Box 12999
Portland, Oregon 97212-0999

RE: Draft Environmental Impact Statement, Hermiston Generating Project (DOE/DEIS-0204) Near Hermiston, Oregon

Dear Ms. Boorse:

The National Marine Fisheries Service (NMFS) has reviewed the draft environmental impact statement (DEIS) for the Hermiston Generating Project near Hermiston, Oregon. The proposal is for the Bonneville Power Administration (BPA) to allow wheeling of electrical power from a proposed private cogeneration plant in Oregon. The proposed cogeneration plant would utilize water withdrawn from the Columbia River, which has been designated as critical habitat for three species of salmon listed as endangered or threatened under the Endangered Species Act.

Our comments are based on NMFS's responsibility for the protection and enhancement of marine, estuarine and anadromous fishery resources and their habitats. We offer the following comments for your consideration.

Anadromous Fish Impacts

NMFS-1 As stated in the DEIS, water withdrawal for the cogeneration plant would add to the cumulative effects of water withdrawals from the Columbia River. To adequately address to what extent this project would add to the cumulative effects, it is necessary to know the effects of the currently allowed withdrawals on anadromous fish. In the absence of this information, NMFS cannot agree with the determination that the water withdrawal would not constitute a significant impact on anadromous fish resources.

NMFS-2 The proposed cogeneration project would use a daily average of 4.2 cfs with a maximum of 5.5 cfs. The proposed Ida-West project would utilize 5.5 cfs. Both projects would acquire water from the Port of Umatilla. The Port has a water right for up to 155 cfs, however, only 60 cfs was permitted to be withdrawn

Responses to National Marine Fisheries Service

NMFS-1 The current condition of the Columbia River's anadromous fish runs is a result of decades of water withdrawals, hydroelectric dams, timber harvesting, habitat loss, fishing pressure, and numerous other factors. This condition has been exhaustively documented elsewhere, such as in the Northwest Power Planning Council's 1986 publication, Compilation of Information on Salmon and Steelhead Losses in the Columbia River Basin. Various agencies, including BPA, NMFS, and the Corps of Engineers, are participating in ongoing studies to assess the effects of water withdrawals and other activities on anadromous fish.

Upon receipt of NMFS' comment, BPA had additional discussions with NMFS regarding the conclusion that the project's proposed water withdrawal would not constitute an adverse impact on anadromous fish resources. BPA has examined both the relative amount of the water withdrawal proposed for this project, as well as other mitigating factors, in concluding that the project would not have such an effect. First, according to the System's Operation Review (BPA, 1993), an average of 36.2 million acre feet are currently withdrawn from the Columbia River each year. Net depletions (that is, withdrawals minus return flows) equal approximately 15.3 million acre feet per year. The Hermiston Generating Project would withdraw and consume an average of 4.2 cfs, the equivalent of 3,065 acre feet per year. This amount would equal 0.008 percent of total system withdrawals, or two - ten thousandths (0.02 percent) of net annual depletions from the Columbia River, clearly an insignificant portion of the total. As expressed in a follow-up letter to BPA, NMFS agrees that the Hermiston Generating Project can move forward.

Secondly, BPA and the Corps of Engineers and Bureau of Reclamation are currently studying alternative ways of managing the river, including giving a higher priority to maintaining flows to protect fish and lower priority to optimizing hydropower production. The 474 megawatts of generating capacity from the Hermiston Generating Project would provide non-hydro power to the Northwest power grid, providing needed flexibility to BPA to reduce hydropower production and protect fisheries resources.

COMMENTS OF NATIONAL MARINE FISHERIES SERVICE

2

NMFS-2 (cont'd) utilizing their new pump station. Assuming a maximum daily usage, the two plants would utilize 18 percent of the new water withdrawal.

NMFS-3 The DEIS indicates that the reduced flow would reduce power generation at the mainstem projects by 756 megawatt hours. The cogeneration plant would generate 474 megawatts. The loss of power would require increased generation at other projects or increased power purchases. The effects of increased generation at other projects as a result of wheeling should be addressed in a Supplemental Environmental Impact Statement (SEIS).

NMFS-4 Under the No Action Alternative, the applicant has indicated that without wheeling capability, costs for the development of alternative power lines would be prohibitive. No information on these costs is provided for comparison. Since three cogeneration projects are proposed in the same general vicinity, this information is crucial to the analysis and required for informed decision making.

Summary

NMFS-5 NMFS feels that further information on potential impacts to salmonids as a result of wheeling should be provided in a SEIS. Without this information, we are concerned that issues that are not adequately discussed in the DEIS may negatively impact Columbia River anadromous fish stocks. NMFS-6 Further information on costs associated with alternative transmission lines should also be provided to address the No Action Alternative.

Thank you for the opportunity to review and comment on the proposed project. Questions concerning our comments should be directed to Ben Meyer, of my staff, at (503) 230-5425.

Sincerely,

Brian J. Brown
for Merritt E. Tuttle
Division Chief

cc: USFWS, Portland
Oregon Department of Fish and Wildlife

RESPONSES TO NATIONAL MARINE FISHERIES SERVICE

Third, the Hermiston Generating Project includes funding for a mitigation program designed to augment instream flows in the Columbia River or its tributaries (see Section 3.2.2.1).

NMFS-2 The text of Sections 3.2.2.1 and 3.2.4 has been changed to reflect this comment.

NMFS-3 The Hermiston Generating Project would add 474 megawatts of capacity to the Pacific Northwest's total generating capacity. Each megawatt of capacity equals 8,760 megawatt hours per year if a plant operates 100 percent of the time. Operating at a planned capacity of 93 percent, the Hermiston Generating Project would produce approximately 3.86 million megawatt hours of electricity each year. As stated in the draft EIS, lost generation from reduced flows in the lower Columbia River as a result of the project's water use would be approximately 756 megawatt hours annually, or about two - ten thousandths (0.02 percent) of the power that would be generated by the Hermiston Generating Project.

This net increase in energy production could lead to some decrease in demand for BPA power as some customers turn to the new energy source to fulfill part of their demand for power. The text of the draft EIS, Section 3.2.4, has been modified to indicate that the power generation foregone at BPA's hydropower plants could be replaced through increased generation at other projects or increased power purchases, or could be offset by increased conservation or decreased customer demand for BPA power. The 756 megawatt hours that would be lost would be imperceptible compared to seasonal and annual variations in BPA's load requirements, and would not be made up by construction of new generating capacity.

For these reasons, development of a Supplemental Environmental Impact Statement to evaluate the potential impacts of new generating resources is not warranted.

COMMENTS OF NATIONAL MARINE FISHERIES SERVICE

RESPONSES TO NATIONAL MARINE FISHERIES SERVICE

NMFS-4 As stated in the draft EIS, the Federal action by BPA that requires NEPA review is the decision regarding whether to wheel power from the McNary Substation near Hermiston, Oregon to the Alvey Substation near Eugene, Oregon. BPA is required by law to wheel power if it has adequate capacity on its system. BPA conducted a system analysis for the wheeling, which determined that sufficient system capacity exists. As noted in the draft EIS, connecting the Hermiston Generating Project to BPA's existing transmission system would require upgrading approximately 12 miles of an existing transmission line from 115 kV to 230 kV.

If wheeling were denied by BPA, a new transmission line would be required from the project site to Alvey Substation. This would require a transmission line at least 200 miles long. Recent construction cost estimates provided to U.S. Generating Company on new, single circuit, 230 kV transmission lines range from about $300,000 to $430,000 per mile. A 200-mile-long line would therefore cost approximately $60 million to $80 million to construct.

If all three cogeneration projects that are proposed in Umatilla and Morrow Counties were constructed, they could potentially share in some of the costs of a new transmission line. However, the power from the projects would be sold to three separate customers, so that additional transmission lines or wheeling would be required to service these customers. Additionally, a single 230 kV line would not be adequate to supply more than one power plant, and the cost of a larger line would be greater than the $60 to $80 million noted above. In any case, it is apparent the construction of a new transmission line would add substantially to the cost of the projects.

Additionally, use of an existing transmission line right-of-way is much preferred from an environmental standpoint because it creates much less disturbance than a new right-of-way. New rights-of-way generally require new access roads, disturbance of previously undisturbed habitat, and greater impacts on land uses and human populations because the lines must generally be routed through developed areas.

COMMENTS OF NATIONAL MARINE FISHERIES SERVICE

RESPONSES TO NATIONAL MARINE FISHERIES SERVICE

NMFS-5 See response to comment NMFS-1.

NMFS-6 See response to comment NMFS-4.

COMMENTS OF OREGON DEPARTMENT OF FISH AND WILDLIFE

Oregon

DEPARTMENT OF
FISH AND
WILDLIFE

Salem District Office

May 23, 1994

Dawn Boorse
Bonneville Power Administration
Public Involvement Manager - ALP
P.O. Box 12999
Portland, OR 97212

Dear Ms. Boorse:

The Oregon Department of Fish and Wildlife (Department) has reviewed the Draft Environmental Impact Statement for the Hermiston Generating Project, and offers the following comments.

ODFW-1

The DEIS identifies a specific proposal for mitigation of impacts to water quantity and quality (DEIS, Section 3.2.4, Page 3-38). However, no specific proposals for mitigation of impacts on wildlife habitat have been identified.

The DEIS indicates that a plan to mitigate project impacts on wildlife is being developed by Hermiston Generating Company, in conjunction with the Department (Section 3.3.2.1., page 3-46, Section 3.4.2.1., page 3-56, Section 3.4.4, page 3-60). Discussions between the Department and Hermiston Generating Company are ongoing; however, agreement on specific mitigation proposals has not yet been reached.

The Department requests that the Final EIS identify specific proposals for mitigation of impacts on wildlife habitat.

Thank you for your consideration of these comments. If you have questions, please contact Mark Henjum at 963-2138.

Sincerely,

Gail McEwen

Gail McEwen
Land Use Coordinator
Habitat Conservation Division

c. Lauman, Henjum, Zarnowitz, McAllister

4412 Silverton Road NE
Salem, OR 97305
(503) 378-6925
FAX (503) 378-6233

RESPONSES TO OREGON DEPARTMENT OF FISH AND WILDLIFE

ODFW-1 After reviewing the Department's comments and the draft EIS conclusions regarding impacts to wildlife habitat, BPA has decided not to recommend any mitigation for wildlife habitat. The permanent impact is small (5.2 hectares [12.9 acres]) and the habitat is of low value. No sensitive species are known to use the area. For these reasons, BPA has concluded that the impacts do not warrant mitigation.

COMMENTS OF RURAL ELECTRIFICATION ADMINISTRATION

United States Department of Agriculture · Rural Electrification Administration · Washington D.C. 20250

19 MAY 1994

Ms. Dawn Boorse
Public Utilities Specialist
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

Dear Ms. Boorse:

We have reviewed the Draft Environmental Impact Statement (DEIS) concerning the Hermiston Generating Project located near Hermiston in Umatilla County, Oregon. The DEIS review was conducted in compliance with the National Environmental Policy Act in accordance with the Council on Environmental Quality regulations.

REA-1 The Rural Electrification Administration independently reviewed the discussions of the project's impacts and found them adequate and comprehensive. We believe the DEIS evaluated fully the potential impacts to air and water quality, floodplains, wetlands, farmlands, threatened and endangered species, cultural and historic properties, effect on the human health and safety, and a number of other significant environmental concerns with respect to the proposed project. However, we have one general comment on the mitigation measures discussed in the DEIS. We recommend that the DEIS address only the most practical and best suited mitigation measures for the protection and preservation of environmental resources which may be impacted by the proposed project.

Thank you for the opportunity to comment on the DEIS. We have no further comments at this time. Should you have any questions or if this office can be of further assistance to you, please contact Mr. Nurul Islam at (202) 720-1414.

Sincerely,

Lawrence R. Wolfe

LAWRENCE R. WOLFE
Chief, Environmental Compliance Branch
Electric Staff Division

RESPONSES TO RURAL ELECTRIFICATION ADMINISTRATION

REA-1 The mitigation measures recommended in the draft EIS are thought to be the most practical and best suited measures for the protection of the environmental resources that may be affected by the Hermiston Generating Project.

Comments of Oregon Department of Fish and Wildlife

Oregon

DEPARTMENT OF FISH AND WILDLIFE

Salem District Office

May 23, 1994

Dawn Boorse
Bonneville Power Administration
Public Involvement Manager - ALP
P.O. Box 12999
Portland, OR 97212

Dear Ms. Boorse:

The Oregon Department of Fish and Wildlife (Department) has reviewed the Draft Environmental Impact Statement for the Hermiston Generating Project, and offers the following comments.

ODFW-1

The DEIS identifies a specific proposal for mitigation of impacts to water quantity and quality (DEIS, Section 3.2.4, Page 3-38). However, no specific proposals for mitigation of impacts on wildlife habitat have been identified.

The DEIS indicates that a plan to mitigate project impacts on wildlife is being developed by Hermiston Generating Company, in conjunction with the Department (Section 3.3.2.1., page 3-46, Section 3.4.2.1., page 3-56, Section 3.4.4, page 3-60). Discussions between the Department and Hermiston Generating Company are ongoing; however, agreement on specific mitigation proposals has not yet been reached.

The Department requests that the Final EIS identify specific proposals for mitigation of impacts on wildlife habitat.

Thank you for your consideration of these comments. If you have questions, please contact Mark Henjum at 963-2138.

Sincerely,

Gail McEwen

Gail McEwen
Land Use Coordinator
Habitat Conservation Division

c. Lauman, Henjum, Zarnowitz, McAllister

4412 Silverton Road NE
Salem, OR 97305
(503) 378-6925
FAX (503) 378-6233

Responses to Oregon Department of Fish and Wildlife

ODFW-1 After reviewing the Department's comments and the draft EIS conclusions regarding impacts to wildlife habitat, BPA has decided not to recommend any mitigation for wildlife habitat. The permanent impact is small (5.2 hectares [12.9 acres]) and the habitat is of low value. No sensitive species are known to use the area. For these reasons, BPA has concluded that the impacts do not warrant mitigation.

COMMENTS OF RURAL ELECTRIFICATION ADMINISTRATION

United States Department of Agriculture
Rural Electrification Administration
Washington D.C. 20250

19 MAY 1994

Ms. Dawn Boorse
Public Utilities Specialist
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

Dear Ms. Boorse:

We have reviewed the Draft Environmental Impact Statement (DEIS) concerning the Hermiston Generating Project located near Hermiston in Umatilla County, Oregon. The DEIS review was conducted in compliance with the National Environmental Policy Act in accordance with the Council on Environmental Quality regulations.

REA-1 The Rural Electrification Administration independently reviewed the discussions of the project's impacts and found them adequate and comprehensive. We believe the DEIS evaluated fully the potential impacts to air and water quality, floodplains, wetlands, farmlands, threatened and endangered species, cultural and historic properties, effect on the human health and safety, and a number of other significant environmental concerns with respect to the proposed project. However, we have one general comment on the mitigation measures discussed in the DEIS. We recommend that the DEIS address only the most practical and best suited mitigation measures for the protection and preservation of environmental resources which may be impacted by the proposed project.

Thank you for the opportunity to comment on the DEIS. We have no further comments at this time. Should you have any questions or if this office can be of further assistance to you, please contact Mr. Nurul Islam at (202) 720-1414.

Sincerely,

Lawrence R Wolfe

LAWRENCE R. WOLFE
Chief, Environmental Compliance Branch
Electric Staff Division

RESPONSES TO RURAL ELECTRIFICATION ADMINISTRATION

REA-1 The mitigation measures recommended in the draft EIS are thought to be the most practical and best suited measures for the protection of the environmental resources that may be affected by the Hermiston Generating Project.

DOE/BP-2384
July 1994
325