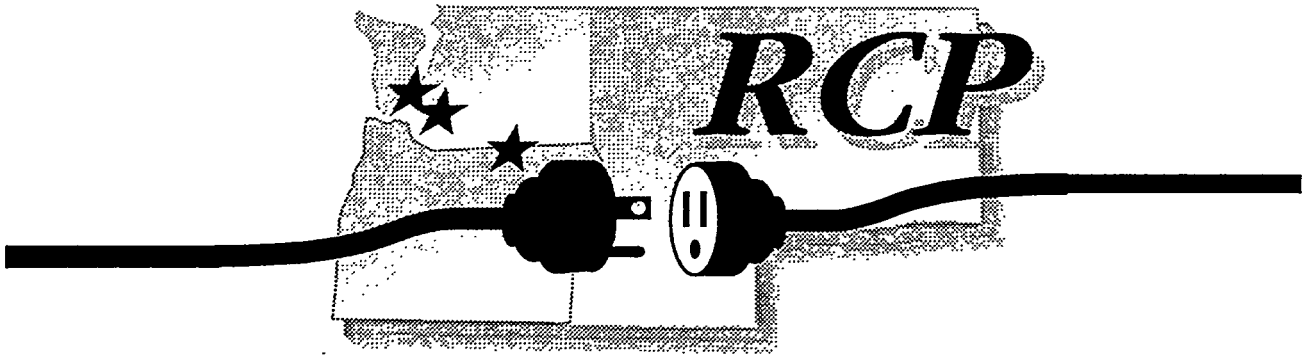
RESOURCE CONTINGENCY PROGRAM
DRAFT
ENVIRONMENTAL IMPACT STATEMENT



MASTER

U.S. Department of Energy

Bonneville
POWER ADMINISTRATION

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GLOSSARY

A-1	Agricultural-1
A-2	Agricultural-2
AAQS	Ambient air quality standards
a-c	Alternating-current
Access roads	Roads that are necessary to first construct and then to maintain a transmission line. Access roads are initially built where no roads conveniently exist. Where country roads or other access is already established, access roads are constructed as spurs directly to the structure sites. Access roads are usually maintained to provide access to tower sites, except where they pass through cultivated land.
ADLN	"Advanced" dry low-NO_x
ADT	Average daily traffic
Alluvium	Unconsolidated deposits of transported particles.
Ambient air	Air surrounding a particular spot, such as a power plant.
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.
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.
ASIL	Acceptable Source Impact Level
ATDM	All Terrain Dispersion Model
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 one year.
BACT	Best Available Control Technology. 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.
BOD	Biological oxygen demand
BP	Before present
BPA	Bonneville Power Administration

British thermal unit (Btu)	A quantity of heat necessary to raise the temperature of 0.45 kg (1 pound) of water 1°F.
Capacity	A measure of the ability of a transmission line to carry electricity.
CARB	California Air Resources Board
CDFO	Canadian Department of Fisheries and Oceans
Centimeter (cm)	A unit of measurement (in the metric system) equivalent to 0.3937 inches.
CFR	Code of Federal Regulations
cfs	Cubic feet per second
Class I Area	Area designated for the most stringent degree of protection from the 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.
cms	Cubic meters per second
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, through the sequential use of an energy source.
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.
CT	Combustion turbine. An integral part of cogeneration facilities operating on fuels that are capable of converting heat energy into electrical energy.
Corps	U.S. Army Corps of Engineers
Council	Northwest Power Planning Council
CPI	Chehalis Power, Inc.

CRBG	Columbia River Basalt Group
CRP	Conservation Reserve Program
CSZ	Cascadia Subduction Zone
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	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 reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time.
CZMA	Coastal Zone Management Act
dB	Decibel. Logarithmic ratio between pressure caused by a given sound and the standard sound pressure.
dB(A)	The first two letters (dB) are an abbreviation for the term "decibel," the unit in which sound is most commonly measured. The last letter (A) is an abbreviation for the scale (A scale) on which the sound measurements were made. 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 the two levels.
DO	Dissolved oxygen
Ecology	Washington Department of Ecology
ECRM	Erosion Control, Revegetation, and Maintenance
EFSC	Energy Facility Site Council
EFSEC	Energy Facility Site Evaluation Council
EIS	Environmental Impact Statement. 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 Department of Energy NEPA guidelines.
Electric and magnetic field (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).

Emergent	As used here, a plant that is rooted and has parts extending above a water surface.
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.
EMS	Emergency Medical Services
EMT	Emergency Medical Technician
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.
Environmentally Sensitive Area	Region that has wetlands, steep slopes, floodplains, parks, recreation facilities, and public preserves.
Eocene	Period of geologic time extending from about 38 to 55 million years ago.
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
ESCP	Erosion and Sediment Control Plan
Eutrophication	Prolific plant growth
FEMA	Federal Emergency Management Agency
FEMAT	Forest Ecosystem Management Team
FERC	Federal Energy Regulatory Commission
Fish and Wildlife Conservation Act	Encourages Federal agencies to conserve and promote conservation of non-game fish and wildlife species and their habitat.
Fish and Wildlife Coordination Act	Requires Federal agencies undertaking project affecting water resources to consult with the USFWS and the state agency responsible for fish and wildlife resources to conserve or improve wildlife resources.
FPD	Fire Protection District
g	Acceleration of gravity
GD-1	General Development-1
GD-5	General Development-5
Geologic hazard	A geologic condition, either natural or man-made, that poses a potential danger to the life and property, e.g. landslides.

GEP	Good Engineering Practice
GIS	Geographic Information System
gpd	Gallons per day
gpm	Gallons per minute
Groundwater	The supply of fresh water under the earth's surface in an aquifer or soil.
Growth Areas	Area where most new growth is to be directed, and where density housing and commercial development may occur. Also, area where expenditures will be focused for urban levels of utilities and other public services.
GWCA	Ground Water Control Area
Habitat	The environment occupied by individuals of a particular species, population, or community.
Hectare (ha)	An area equivalent to 10,000 square meters or 2.471 acres.
HNO_3	Nitric acid
HRA	Historical Research Associates, Inc.
HRSG	Heat recovery steam generator
I-5	Interstate 5
I-82	Interstate 82
I-84	Interstate 84
Industrial Area	Area where several industrial land uses may be concentrated, usually large amounts of land are available, near major transportation corridors, and where major utility services are available or the potential for utility extension exists. An Industrial Area is to receive primary attention for utility and road service, and promotional efforts.
Industrial Park	Chehalis Industrial Park
Impact	Positive or negative environmental consequences of a proposed action.
ISCST2	Industrial Source Complex Short Term
IWD	Industrial waste discharge
kg	Kilograms
km	Kilometer. One thousand meters
kV	Kilovolt. One thousand volts
KVA	Key Viewing Area
kV/m	Kilovolts per meter

kWh	Kilowatt hour
l	Liter
LAER	Lowest Achievable Emission Rate
L_{eq}	A symbol that represents the logarithmically weighted average noise level.
Liquefaction	Liquid-like behavior of a solid material.
LOS	Level of Service
lpd	Liters per day
lpm	Liters per minutes
M	Magnitude
m.y.BP	Million years before present
MCE	Maximum Credible Earthquake. The largest event that is believed to be reasonably possible at the project site on the basis of geological and seismological evidence considering both regional and local influences.
MCL	Maximum contaminant level
MW	Megawatt. One thousand kilowatts (kW) or one million watts (W).
m	Meter. Unit of length equal to 3.28 feet.
Methane	An odorless, colorless, flammable gas formed by the anaerobic decomposition of organic matter. Methane (CH_4) is the major component of natural gas, making up 90 to 95 percent of the volume. In addition to its use as fuel, methane is an important source of hydrogen and is used in a wide variety of organic compounds.
mG	Milligauss
mg/l	Milligrams per liter
Miocene	Period of geologic time extending from about 5 to about 24 million years ago.
Mitigation	Actions to avoid, minimize, reduce, eliminate, or compensate for the impact of a proposed activity or management practice.
MMI	Modified Mercalli Intensity
MP	Milepost
mph	Miles per hour
msl	Mean sea level
MTY	Metric tons per year

MWh	megawatt hour
NAGPRA	Native American Graves Protection and Repatriation Act
National Historic Preservation Act	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.
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.
NCAP	(2-57)
NEPA	National Environmental Policy Act. Major Federal legislation passed by Congress in 1969 that requires the 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 known to the public and to the decisionmaker, prior to a decision being made on the project.
NESC	National Electrical Safety Code
NGS	National Geographic Society
NMFS	National Marine Fisheries Service
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.
NOAA	National Oceanic and Atmospheric Administration
NOC	Notice of Construction
Noise	Unwanted sound that interferes with the normal activities of humans and the natural environment.
Nonattainment	An area which does not meet air quality standards set by the Clean Air Act for specified localities and time periods. Locations where pollutant concentrations are greater than the AAQS.
NO_x	Oxides of nitrogen
NPDES	National Pollution Discharge Elimination System. Federal water quality program administered by the State agency responsible for water quality.
NRHP	National Register of Historic Places
NRPB	National Radiological Protection Board
NSPS	New Source Performance Standards

NSR	New Source Review
NWP	Northwest Pipeline Corporation
NWS	Northwest Wildlife Surveys
O_3	Ozone
OAPCA	Olympic Air Pollution Control Authority
OAR	Oregon Administrative Record
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
ONHP	Oregon Natural Heritage Program
Open Space Area	Region that has wetlands, steep slopes, floodplains, parks, recreation facilities, and public preserves.
ORAU	Oak Ridge Associated Universities
OSHA	Occupational Safety and Health Administration
OSP	Oregon State Police
OWL	Olympic-Wallowa Lineament
Palustrine	General freshwater wetlands classification associated with partially saturated areas not part of a surface water system.
Particulate matter	Fine solid particles that remain individually dispersed in stack emissions.
PCB	Polychlorinated biphenyl
PGA	Peak ground accelerations
PGE	Portland General Electric
PGT	Pacific Gas Transmission
Physiographic province	A region of similar structure and climate that has a unified geomorphic (pertaining to surface form) history.
PID	Planned Industrial District
Pleistocene	Period of geologic time extending from about 2 million years ago.
PM	Particulate matter
PM_{10}	Particulate matter with aerodynamic diameter of less than 10 microns
Port	Port of Umatilla-City of Hermiston
ppbv	Parts per billion by volume

PPG	Pacific Plate Glass
ppm	parts per million
ppmdv	parts per million by dry volume
ppmv	Parts per million by volume
Prior Converted Cropland	Area that may have been a wetland in the past but which currently has been modified by physical manipulation (e.g., drainage) such that non-wetland crops can be cultivated.
PSD	Prevention of Significant Deterioration
Quaternary	Period of geologic time approximately 2 million years ago.
RCP	Resource Contingency Program
RCRA	Resource Conservation and Recovery Act. Federal regulations addressing management of hazardous waste. In Washington State these are implemented through the adopted state regulations, Washington State Dangerous Waste Regulations (WAC 177-353).
RCW	Revised Code of Washington
ROD	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), 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 not.
Reed-Chehalis soils	Soils that are very deep and formed on alluvium of flood planes, abandoned river channels, and river terraces.
ROW	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.
RM	River mile
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.
Rural Area	Region where a rural lifestyle is to be maintained by directing urban levels of growth and associated public services into Growth Areas.
RV	Recreational vehicle
Salkum-Prather-Lacamas soils	Soils that are deep and formed on weathered glacial drift and mixed material of glacifluvial or sedimentary origin.

SARA	Superfund Amendment and Reauthorization Act.
SCA	Site Certificate Application
SCS	Soil Conservation Service
SCR	Selective catalytic reduction. An air pollution control technology that reduces NO_x to nitrogen and water when combined with a reducing agent, such as ammonia.
Sensitive wildlife	Refers to all wildlife species that are protected by state and/or Federal regulations administered by the USFWs and WDFW.
SEPA	State Environmental Policy Act
Shrub-Steppe	A community of low drought-tolerant shrubs and bunch grasses
SHPO	State Historic Preservation Office
SIL	Shrub-steppe. A community of low drought-tolerant shrubs and bunch grasses. Significant impact level.
SIP	State Implementation Plan
SMA	Shoreline Management Act of 1971
SMMP	Shoreline Management Master Program
Smog	Photochemical ozone
SMP	Shoreline Master Program
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.
SO_4	Sulfate
SO_4^{2-}	The chemical formula for sulfate with two additional electrons.
SPCC	Spill Prevention, Control, and Containment
SR	State Route
Supply System	Washington Public Power Supply System
Surface water	Any water, temporary or permanent, which is above the ground surface, observable with the unaided eye.
SWAPCA	Southwest Air Pollution Control Authority
TAP	Toxic air pollutant
TDS	Total dissolved solids

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.
TMDL	Total Maximum Daily Load
Topography	Relief features or surface configuration of an area.
TPY	Tons per year
Transmission	The act or process of transporting electrical energy in bulk from a source or sources of supply to other principal parts of a system or to other utility systems.
Transmission line	The structures, insulators, conductors, and other equipment used to transfer electrical power from one point to another.
TSCA	Toxic Substances Control Act
TSD	Treatment, storage, and disposal
TSP	Total suspended particulate matter
UBC	Uniform Building Code. A code published by the International Conference of Building Officials. Covers the fire, life, and structural safety aspects of all building and related structures.
UECA	Umatilla Electric Cooperative Association
UFC	Uniform Fire Code
$\mu g/m^3$	Micrograms per cubic meter
USC	United States Code
USCA	United States Code Annotated
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	Volatile organic compound
WAC	Washington Administrative Code
WAM	Westinghouse Acoustic Model
Wastewater	Water that carries wasted from buildings, institutions, and industrial establishments.
WDF	Washington Department of Fisheries
WDFW	Washington Department of Fish and Wildlife
WDH	Washington Department of Health

WDNR	Washington Department of Natural Resources
WDW	Washington Department of Wildlife
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.
WNHP	Washington Natural Heritage Program
WPCF	Water Pollution Control Facilities
WWTP	Wastewater Treatment Plant

SUMMARY

Resource Contingency Program Draft Environmental Impact Statement Summary

CHAPTER I—INTRODUCTION

The Bonneville Power Administration (BPA) has statutory responsibilities to supply electrical power to its utility, industrial, and other customers in the Pacific Northwest. In 1990, to cover the outer range of potential load growth with new resources, BPA embarked upon the Resource Contingency Program (RCP). Instead of buying or building generating plants now, BPA has purchased options to acquire power later, if and when it is needed. This environmental impact statement (EIS) addresses the environmental consequences of purchasing power from these options.

The decision to acquire any of these option energy projects to fulfill statutory supply obligations will be influenced by Federal system load growth, the outcome of BPA's Strategic Business Plan, required operational changes in Columbia-Snake River Hydroelectric facilities, and the loss of major generating resources.

In September 1993, three option development agreements were signed with three proposed natural gas-fired, combined cycle combustion turbine CT projects near Chehalis and Satsop, Washington, and near Hermiston, Oregon. Together these three projects could supply BPA with 1,090 average megawatts (aMW) of power. Under these agreements, sponsors are conducting environmental studies, obtaining permits, and conducting project design work, and BPA is completing this EIS process.

In September 1993, BPA published a Notice of Intent to prepare an EIS on the three proposed projects. In February 1994, BPA released an Implementation Plan on the proposed scope of the EIS. In August 1995, BPA is expected to issue a Record of Decision on which, if any, of the projects BPA will hold for potential future acquisition.

This EIS addresses three proposed alternatives: the proposed action, no action, and other actions. The proposed action is the acquisition of power from all five available units optioned at all three plant sites (there are two units available at both Chehalis and Hermiston and one unit at Satsop). This EIS addresses the environmental effects of constructing and operating all five units under option for power delivery to BPA.

CHAPTER II—CHEHALIS GENERATION FACILITY

Project Description

The Chehalis Generation Facility (CGF) would be located in the Newaukum River valley in the Chehalis Industrial Park approximately 5.1 kilometers (km) (3.2 miles) south of the Chehalis city limits in an unincorporated area of Lewis County, Washington (Figure S-1). The site is currently used as part of a farm operation, with a small portion of the site dedicated to crop production. Properties in the vicinity are mostly agricultural and residential, but there are some commercial and light industrial uses as well.

The CGF would consist of up to two gas-fired combined-cycle combustion turbines that could supply BPA up to 456 aMW of firm energy. In emergency situations when natural gas is not available, the project could burn fuel oil for up to 30 days a year. The project would require a 12.9 km (7.8 mile) natural gas pipeline that would connect into Northwest Pipeline's Jackson Prairie Gas Storage facility. The project would store 12 million liters (l) (3.2 million gallons) of No. 2 fuel oil in two aboveground storage tanks. The project would also install cogeneration infrastructure (e.g., auxiliary boilers, etc.) to potentially sell steam to future industries that may locate in the industrial park.

The project would require approximately 518.1 km (1,700 feet) of 500-kilovolt (kV) double circuit overhead transmission line and a new substation to electrically interconnect the project to BPA's adjacent 500-kV transmission system.

During the winter period (October to March) the CGF would use an average of 4,183 liters per minute (lpm) (1,105 gallons per minute [gpm]) of reclaimed wastewater from the City of Chehalis wastewater treatment plant (WWTP) and 1,514 lpm (400 gpm) of municipal water from the Chehalis River. The project would treat and then discharge 386 lpm (102 gpm) into the Chehalis River through the existing WWTP outfall line.

During the summer period (April to September) the project would use an average of 2,574 lpm (680 gpm) of reclaimed wastewater and 5,811 lpm (1,535 gpm) of municipal water from the Chehalis River. However, the Chehalis River experiences low flows during the summer period, and the State limits water withdrawals when the river falls below 4.67 cubic meters per second (cms) (165 cubic feet per second [cfs]) (280,335 lpm [74,057 gpm]). To protect the aquatic environment from net water loss, the project in addition to a 1,162 lpm (307 gpm) discharge of treated process wastewater, could purchase 4,542 lpm (1,200 gpm) of existing water rights to the Chehalis River. In 9 out of 10 years, during the peak summer period when river flows are the lowest for a maximum of 45 days, the project will withdraw a maximum of 7,222 lpm (1,908 gpm) from a deep underlying aquifer to either supply the CT facility or discharge this water (after treatment) into the river to augment stream flow.

This water plan requires pre- and post-process water treatment facilities, and includes three pipelines: two for supply and one for process wastewater. One supply line and the process wastewater line would convey water between the Chehalis WWTP and the proposed project. The other supply line would convey city of Chehalis municipal water to the project.

Affected Environment and Environmental Impacts

Table S-1 provides a summary of potential impacts from the CGF to the physical and social environment, and mitigation measures. The resource areas evaluated in the EIS are briefly described below.

Geology, Soils, and Floodplains

The project components are situated in the Puget Lowlands. Deep, poorly drained soils blanket this region of low relief. Large earthquakes and more distant volcanic eruptions occur periodically. Floodplains of the Newaukum and Chehalis rivers and Dillenbaugh and Berwick creeks lie within the project vicinity.

Earthquakes and landslides associated with the proposed project may adversely impact the environment, resulting in explosion or leakage of gas and chemicals. Soil erosion during project construction may cause minor and temporary increases in sedimentation to water courses. Soil compaction during construction may inhibit revegetation efforts resulting in additional erosion. Up to 7.7 ha (19.1 acres) of floodplains will be temporarily effected by the construction of the gas pipeline. Up to 12.1 ha (30.1 acres) of prime farmland will be permanently lost at the CT facility site. With soil erosion control mitigation, constructing the facility to meet earthquake standards for the area, the project's minor amount of permanent disturbance to prime farmlands and minor amounts of temporary disturbance to floodplains, the project is considered to have low impacts to geology, soils, and floodplains.

Water Resources

The Chehalis and Newaukum rivers are perennial streams that are used for municipal water supply by the cities of Chehalis and Centralia. Underneath the project site there is a shallow unconfined, and a deep confined aquifer. The aquifers provide potable (drinking) water to residential users. The shallow aquifer and the surface waters predominantly are not hydraulically connected to the deep aquifer.

Washington State law requires a 4.67 cms (165 cfs) (280,335 lpm [74,057 gpm]) minimum flow in the Chehalis River at Chehalis during the summer dry season. The Chehalis River experiences problems related to excessive plant growth, high temperatures, and bacteria, and has been designated as "water quality limited" by the state. The deep aquifer groundwater is very salty and only marginally potable.

During the winter period (October to March), the project's water requirements would be supplied by reclaimed and municipal water from the City of Chehalis. During the summer period (April to September), based on summer flows in the Chehalis River, the project would likely require water from the aquifer for approximately a 45-day summer period when the river drops below the state-

required minimum flow. This groundwater would be used for both process make-up water and to replace Chehalis River withdrawals to achieve no net loss of river discharge.

The use of groundwater would have localized impacts on well users in the vicinity of the project wells. Water levels close to the project's wells would drop and then fully recover during the rest of the year when the pumps are not in use. Once every 10 years, predicted extended summer low flows would require the project to pump the aquifer for a 6-month period, and this would have greater impacts on well levels, but they are expected to recover. The project is considered to have a low impact on water quantity, because of the augmentation of instream flows in the Chehalis, localized impacts to the underground aquifer, and mitigation of impacts to local wells.

The Chehalis River downstream from the proposed project is ecologically stressed due mainly to an overload of biological oxygen demand (BOD) causing a depletion of dissolved oxygen. The proposed project would treat its effluent to existing permitted standards and reduce the overall BOD loading discharged to the river. Therefore, at currently proposed treatment levels, impacts to water quality are considered low.

Water required for the project would contribute to the cumulative withdrawal of surface and groundwater in the region. The project's water requirement, together with water requirements accompanying increasing growth in the project vicinity, could over time lengthen seasonal low flow periods in the rivers. Groundwater withdrawals to augment low flows in the Chehalis River, or to provide water supply to the project could over time contribute significantly to the decrease available head in the deep aquifer. Therefore, the cumulative impact to water quantity from the proposed project is considered moderate.

With regard to cumulative impacts to water quality, the proposed project would continue to contribute to the cumulative loading of BOD in the Chehalis River during summer low flows. If Ecology enforces the anti-degradation policy (WAC 173-201A-070) for the Chehalis River outlined in their recent TMDL study, severe restrictions on BOD loadings will be placed on current and future effluents, including the proposed project. However, because the project would reduce BOD loading below current levels, cummulative impacts to water quality are considered low.

Air Quality

The project is located in rural Lewis County where ambient concentrations of regulated air pollutants are in compliance with the national standards to protect human health. There are few industries in the area that emit significant levels of any air pollutant, notably the coal mining operations and the Centralia coal-fired power plant.

The CGF would emit 802 metric tons per year (MTY) (884 tons per year [TPY] of nitrous oxides (NO_x), 289 metric tons (319 tons) of sulfur dioxide (SO_2), 198 metric tons (218 tons) of particulates (PM_{10}), and 61 metric tons (67 tons) of volatile organic compounds (VOCs), and 1,097 metric tons (1,209 tons) of carbon monoxide (CO). The emitted amounts of NO_x, SO_2, particulates, and CO are greater than 91 MTY (100 TPY), and therefore this project would be considered a major new source for these pollutants and subject to strict state and Federal control requirements. The project would also emit 211 metric tons (233 tons) of ammonia per year, 0.45 metric tons (0.5 tons) of benzene, and 3.2 metric tons (3.5 tons) of formaldehyde. Although these levels are greater

than the Washington state small quantity emission rates for toxic air pollutants (TAPs), the modeled ambient concentrations would be within Acceptable Source Impact Levels (ASILs).

The CT facility would utilize dry low-NO_x or advanced dry low-NO_x burners, selective catalytic reduction, and water injection for NO_x emission control. Catalytic oxidation is proposed for CO control.

Dispersion modeling using worst-case meteorological data predicted that ambient air pollution emissions would be in compliance with national standards to protect human health. However, the predicted concentration of one TAP (1,3-Butadiene) was greater than the ASIL. More refined dispersion modeling using on-site meteorology (currently being collected) will be conducted. Emissions from the project should result in insignificant concentrations and deposition rates in the nearest wilderness areas and national parks, and further modeling is being undertaken to confirm that this is the case.

Plumes from the cooling towers are predicted to be predominantly 30 meters (m) (98 feet) long. Extended plume lengths greater than 100 m (328 feet) would occur for only 100 hours per year. Fogging would not affect any highways in the project vicinity. No occurrences of icing resulting from operation of the cooling towers are predicted to occur.

Based on the expected design controls and other mitigation, air quality impacts resulting from the proposed project are considered low. Although the project is considered a major new source and there will be some localized effects of the cooling tower plume within the industrial park, the project will not exceed air quality standards, and for all but approximately 100 hours each year, the cooling tower plumes will be modest in size. Further analysis using on-site meteorological data will be conducted to provide a more precise evaluation of potential impacts and required mitigation.

Noise

Existing noise in the project area predominately comes from traffic on Interstate-5 (I-5). There are also some existing light industrial businesses in the project vicinity including the Fred Meyer distribution center and traffic on Bishop Road and Jackson Highway.

Construction noise is exempted from the Washington State regulations, but there would be time-of-day limits placed on construction. Operational noise modeling, which included attenuation, predicted that the noise resulting from operation of the project would be less than the daytime and nighttime residential standards of 50 dB(A). However, the predicted increases in noise levels resulting from operation of the project are greater than 5 decibels (dB) at one location, which is considered to be a significant impact according to U.S. Environmental Protection Agency (EPA) Region 10 noise guidelines. At all other locations ambient noise would be dominated by traffic noise from I-5. Because noise levels are less than the nighttime residential standards, and elevated noise levels would be significant at only one location, overall noise impacts are considered low.

Vegetation and Wetlands

The CGF lies within Washington's Puget Lowlands physiographic province. This province is unique within western Washington because it supports a variety of native vegetation types, such as

oak woodlands, prairies, and mixed conifer forest—habitats that are uncommon in the surrounding western hemlock (*Tsuga heterophylla*) vegetation zone.

Construction would temporarily disturb 44.8 ha (112.8 acres) of plant communities dominated by herbaceous species as are found within existing rights-of-way (ROWs), but these communities would return to a similar condition after construction. Construction in forested and shrub-dominated communities would permanently convert 0.4 ha (1.0 acre) of such vegetation to grass-dominated habitats. 12 ha (30.1 acres) of pastureland at the CT facility would be permanently converted to an industrial use.

Approximately 8.9 ha (21.8 acres) of wetlands would be temporarily disturbed and 0.97 ha (2.4 acres) of forest wetlands would be permanently disturbed along the water supply and gas transmission pipeline routes. This disturbance includes vegetation clearing, trench excavation and backfilling, equipment trafficking, and water quality degradation (due to potentials for increased sedimentation and potential hydrocarbon spills). Filling (i.e., trenching) of wetland habitats during construction of the water and gas pipelines would result in a temporary loss of wetland functions and values. Wetland habitats would be restored as soon as construction is complete.

Impacts from the project on vegetation and wetlands are considered low, because the majority of the impacts are temporary in nature, disturbed areas will be reseeded with native plant species, protection will be taken to minimize soil erosion, and the disturbed area will be returned to its original contours.

Wildlife and Fishery Resources

The project vicinity supports a variety of wildlife species that are typical of the conifer and deciduous forest habitats, grassland habitat, and wetland and riparian habitats of western Washington. The Chehalis and Newaukum rivers in the project vicinity provide aquatic habitat for wildlife and fish and also support some of the wetland and riparian habitats.

Four Federally listed wildlife species—the northern spotted owl (*Strix occidentalis caurina*), bald eagle (*Haliaeetus leucocephalus*), peregrine falcon (*Falco peregrinus*), and marbled murrelet (*Brachyramphus marmoratus*)—were identified by the U.S. Fish and Wildlife Service (USFWS) as potentially occurring within a 8-km (5-mile) radius of the project. Bald eagle wintering habitat has been identified along the Chehalis River.

The Chehalis and Newaukum rivers support anadromous salmon and steelhead fish stocks. These waterways also potentially support the Olympic mudminnow and bulltrout, both candidate species for Federal listing.

Potential impacts of construction and operation of the project on wildlife include temporary and permanent conversion/loss of habitat from construction and operation of the project. Potential impacts to fisheries include degradation of spawning habitat associated with pipeline crossings of the Newaukum River and Dillenbaugh and Berwick creeks. Fisheries could benefit from the project's planed augmentation of flows in the Chehalis River during the summer low flow periods. Overall, the project is considered to have low impacts to fish and wildlife species.

Land Use

The CT facility site, transmission line, gas pipeline, and much of the water supply and wastewater lines would be located in unincorporated Lewis County. Part of the water supply and wastewater lines would be located within the city limits of the city of Chehalis. The area of the combustion turbine is currently being developed as an industrial area by the Port of Chehalis. Other lands in the project vicinity have a generally rural character and include a variety of uses such as forestry, agriculture, residences, and light industries.

The project would be consistent with the intended land uses identified by Lewis County and the city of Chehalis for the Port of Chehalis Industrial Park, and would add to the industrial character and land use of the park. Portions of the gas pipeline route cross agricultural and forest lands, but would only have temporary impacts. An existing gas pipeline ROW would be used for much of the route. The project is therefore considered to have a low impact to land use.

Cultural Resources

A historic properties inventory of the project vicinity resulted in discovery of two prehistoric archaeological sites in the gas pipeline ROW. Archaeological test excavations determined that one of the sites is eligible for nomination to the National Register of Historic Places (NRHP). The project will minimize construction impacts through this area, and before construction begins an archeological dig and investigation of the site will be conducted. With this mitigation, the project is considered to have low impacts to cultural resources.

Socioeconomics

Lewis County had a 1993 population of 62,900. Manufacturing and retail trade are the largest employers in the county. Impacts to employment would be most pronounced during the 2-year construction phase when up to 200 people would be employed on a monthly basis. During operation, the project would create 22 jobs, and the county and state would benefit by increased property taxes worth approximately $4.2 million annually. Other taxes, such as business and natural gas taxes will also be collected. Increases in housing demand and traffic resulting from the project would be minor and could be mitigated. Overall, the project is considered to have a low, beneficial socioeconomic impact.

Recreational Resources

A number of parks and recreation facilities are found in the general vicinity of the project. While none are located near (within 1.6 km [1 mile]) the CT facility site, the proposed ROWs for water and for the gas supply pipeline are adjacent to or will pass through several of these sites. With mitigation there would be no permanent effects on recreation and impacts are considered low.

Public Health and Safety

Natural gas and fuel oil would be used or stored on site, both of which are flammable and can be explosive under certain circumstances. They can also have adverse effects on the environment if released in an uncontrolled manner. Lubricating oils, hydraulic fluids, cleaning solvents, paint, paint thinners, wastewater from cooling tower collection sumps, and other materials, in addition to process wastes, would be found on site, and could pose a risk to public health and safety if not

handled and disposed of properly. Some materials are classified as hazardous and would need careful handling and disposal to protect human health.

The safety procedures planned for handling the materials to be stored and used at the proposed project, and the proposed measures to contain spills and address safety issues will minimize the risk to public health and safety. Therefore, potential impacts to public health and safety from the CGF are considered low.

Visual Quality

The CT facility and electrical transmission line would be located in a developing industrial park situated in the Newaukum River Valley, directly southeast of the city of Chehalis. The industrial park is composed of scattered industrial and small business buildings and facilities, and residential and agricultural lands. The park can be viewed from local residences, and by travelers on I-5 and local roads. Other project components (water, wastewater, and gas pipelines) would extend beyond the industrial park.

Although the size of project and components are similar in scale to nearby existing industrial development, much of the industrial park is still agricultural land, and there are many residences surrounding the site that would be visually impacted by the project. Visual impacts of the proposed project, therefore, are considered moderate.

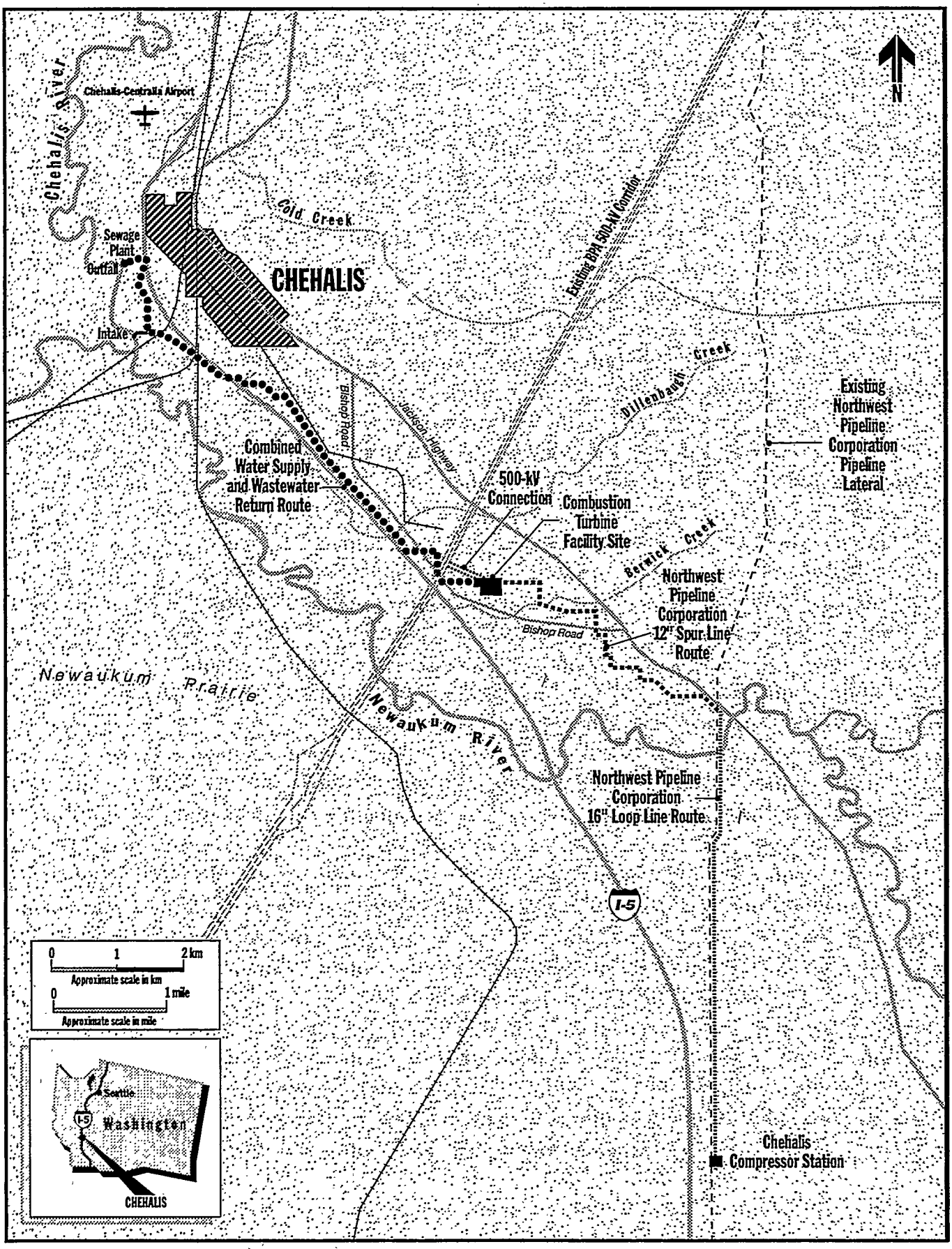


Figure S-1 Project Vicinity Map

Table S-1. Summary of Potential Impacts and Mitigation–Chehalis Generation Facility

Resource Area/Potential Impacts	*Degree of Impact*		*Mitigation Measures*
	Project Alone	*Cumulative*	
Geologic Hazards (during operation) • Landslides/Pipeline rupture • Earthquakes/building damage • Volcanic activity/Ashfall	Low	Low	• Conservative seismic design criteria • Design to minimize damage from ground liquefaction • Avoid construction of pipelines on steep slopes
Soils (during construction) • Erosion • Compaction (loss of fertility) • Loss of prime farmland	Low	Low	• Erosion and Sediment Control Plan (ESCP) including: sediment traps; silt fences; diversion structures; revegetation. • Segregation and stockpiling of agricultural soil, and replacement in proper sequence.
Flood Plains (during construction) • Temporary disruption of floodplain functions	Low	Low	• Site specific water body crossing plans designed to minimize impacts.
Water Resources (during operation) Quantity • Depleted surface water—Chehalis River • Depleted groundwater—deep aquifer	Low	Moderate	• Retire existing water rights • Use of reclaimed water • Augment low flows in Chehalis River with groundwater from deep aquifer • Investigate water minimization technologies • Optimize project well locations to minimize impacts • Monitor effects on existing wells and enhance as required (e.g., larger pumps, drill deeper)
Quality • Degraded surface water quality—Chehalis River	Low	Low	• Water treatment as required prior to discharge back to Chehalis City WWTP outfall to meet existing NPDES permit regulations • Addition of groundwater to lower effluent temperature

Resource Area/Potential Impacts	Degree of Impact		Mitigation Measures
	Project Alone	Cumulative	
Air Quality (during construction and operation) • Emissions of criteria air pollutants such as nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOCs), particulate matter (PM_{10}), sulfur dioxide (SO_2). • Emissions of toxic pollutants such as ammonia, benzene, formaldehyde, lead • Health problems associated with above pollutants • Decreased visibility in scenic areas • Deposition of sulfur and nitrogen compounds • Local fogging and icing from cooling tower plumes • Fugitive dust during construction	Low	Low	• Use of Best Available Control Technology (BACT) to control levels of pollutant emissions. Under BACT, the "most stringent control technology" must be applied to the control of each pollutant, unless it can be demonstrated to EPA that less stringent measures will provide required control • Water tank trucks will spray to control dust, as required
Noise (during construction and operation) • Disturbance from construction activities • Disturbance from operational noise to nearby residences	Low	Low	• Mufflers on construction equipment • No construction on Sundays, legal holidays, or between 10 pm and 6 am • CT facility construction will use noise silencers and sound absorbing material • Major noise sources will be separated and enclosed in acoustical buildings • Noise barriers will be constructed between sources and sensitive receptors

Table S-1. Summary of Potential Impacts and Mitigation–Chehalis Generation Facility

Resource Area/Potential Impacts	*Degree of Impact*		*Mitigation Measures*
	Project Alone	*Cumulative*	
Vegetation/Wetlands (during construction and operation) • Temporary disturbance to plant communities • Permanent conversion of forest vegetation to grass or shrub vegetation • Invasive plant species in cleared areas could alter vegetation composition • Temporary disturbance to wetlands and loss of function until restored after construction	Low	Low	• Avoidance of wetlands where possible • ESCP (see Soils) • Revegetation with native species • Minimized construction width for pipelines in wetland areas • Wetland soils stockpiled and replaced
Wildlife and Fisheries (during construction and operation) • Temporary habitat disturbance • Permanent conversion of forested habitat to shrubs and grass habitat • Permanent loss of grass habitat at CT facility site • Deposition of sediments from construction erosion reducing spawning beds • Loss of riparian vegetation • Degraded water quality in Chehalis River • Lower flow in Chehalis from net loss of project from evaporation	Low	Low	• Retain native vegetation as much as possible during construction • Replant disturbed habitat soon after construction • Avoid waterway construction between June 15 and September 30 • Prevent construction equipment from entering streams • Properly store chemicals on construction site • ESCP (see Soils) • Augment net water loss in Chehalis with groundwater • Adequately treat effluent from project before discharging to Chehalis River
Land Use (during construction) • Temporary disruption to existing land uses • Inconvenience to local residents and travelers	Low	Low	• Employ practices that will minimize noise, dust, and traffic in adjacent neighborhoods • Consult with adjacent land owners about construction and replanting schedules • Consult with Newakum Valley Golf Club to minimize disruption to course from gas spur line construction

Resource Area/Potential Impacts	*Degree of Impact*		*Mitigation Measures*
	Project Alone	*Cumulative*	
Cultural Resources (during construction) • Disturbance of prehistoric and historic archaeological sites	Low	None	• Reroute gas pipeline to avoid an archaeological site • If rerouting is impractical, prepare and implement an approved cultural resources management plan for the site • Halt construction if previously unrecorded sites are found, and consult with SHPO • Provide information to contractors regarding discovery procedures
Socioeconomics and Public Services (during construction and operation) • Increased demand for temporary and permanent housing • Temporary and permanent employment opportunities would increase in project vicinity • Wages and taxes paid by the project would benefit local and regional economy • Increased demand for local services • Traffic on local roadways would increase	Low (Beneficial)	Low	• None expected
Recreation (during construction) • Competition for campsites at private and public campgrounds in the project vicinity	None	None	• None required
Public Health and Safety (during operation) • Negative health effects from exposure to accidental releases of fuels and chemicals stored on CT facility site • Accumulation of solid and moderate risk wastes from project operation • Electric shock	Low	Low	• Spill Prevention Control, and Countermeasures (SPCC) plan • Reuse and recycle plan • Hazardous Materials Management Plan • Storage tanks designed to contain any spills • Storm Water Pollution Prevention Plan (SWPP)

Table S-1. Summary of Potential Impacts and Mitigation–Chehalis Generation Facility

Resource Area/Potential Impacts	*Degree of Impact*		*Mitigation Measures*
	Project Alone	*Cumulative*	
Visual Quality (during operation) • Visual intrusion of buildings, cooling towers, electrical tower, and emission stacks to residents and travelers • Plumes from cooling towers and emission stacks • Visual disturbance from pipeline ROWs	Moderate	Moderate	• Painting structures to blend with environment • Shrub/tree screening of buildings • Visual screens around buildings (where appropriate) • Tree/shrub plantings in parking areas • Limited and directional outdoor lighting • Reseeding construction ROWs soon after completion

CHAPTER III—HERMISTON POWER PROJECT

Project Description

The Hermiston Power Project (HPP) would be located 4.8 km (3 miles) south of Hermiston, Oregon, in an industrial area adjacent to the J.R. Simplot potato processing plant (Figure S-2). The project site is surrounded by agricultural land, agricultural businesses, and railroad yards.

The project consists of up to two gas-fired combined cycle combustion turbines that could supply BPA up to 430 aMW of firm power. In emergency situations when natural gas is not available, the project could burn fuel oil for up to 15 days per year. The project will require two natural gas pipelines to connect to both Pacific Gas Transmission (PGT) and Northwest Pipeline (NWP). The gas pipelines are 6.4 km (4 miles) and 13 km (8 miles) long, respectively. The project would store 7.6 million liters (2 million gallons) of fuel oil in aboveground storage tanks.

Water Supply

Water for the cogeneration facility would be purchased from the Port of Umatilla regional water system, which draws water from the Columbia River under an existing water right. The HPP would require an average of 6,000 liters per minute (lpm) (1,944 gallons per minute [gpm]) of process water per minute. The water supply for the project would originate at the Port of Umatilla treatment facility and be transported to the cogeneration facility site by a 2.1-km (1.3-mile) pipeline that would parallel State Route (SR) 207 to the project site. Potable water would be obtained from the J.R. Simplot Potato Processing Plant adjacent to the proposed cogeneration facility site.

The cogeneration facility's process wastewater, including cooling tower blowdown, would be collected and routed to the existing Simplot potato plant land application system for use in crop irrigation. Sanitary wastes would be disposed of by routing to the J.R. Simplot Company sanitary sewer system.

In addition to the production of electricity for BPA, excess steam from waste heat in the power plant would be used by the J.R. Simplot potato plant for processing operations. The existing boilers at the plant could be shut down and placed in a stand-by condition.

There are two transmission alternatives to connect the project into BPA's McNary Substation: the Western 230-kV Alternative and the Eastern 500-kV Alternative.

Western 230-kV Alternative

The Western 230-kV Alternative involves using, for the most part, an existing Umatilla Electric Cooperative Association (UECA) 115-kV transmission line corridor that generally runs parallel to the eastern boundary of the Umatilla Ordnance Depot from the Westland Substation at the Lamb-Western potato plant north to the city of Umatilla, then east and north to the McNary Substation. The UECA 115-kV line is planned for upgrading to two 230-kV circuits to accommodate both the existing 115-kV UECA line and a 230-kV line required by the planned Hermiston Generating project (HGP) at the Lamb-Weston potato plant site 3.2 km (2 miles) west of the proposed HPP. This upgrading will take place prior and independent to the HPP being developed. The 230-kV

conductor dedicated to UECA will be taken over by the HPP, and UECA will construct a new 115-kV distribution line along Power Line Road.

The project would be connected to the UECA line at the Westland Substation by construction of approximately 2.4 km (1.5 miles) of new 230-kV line from the cogeneration facility site west and then north to Feedville Road, and then continuing approximately 3.2 km (2 miles) west along Feedville Road to the Westland Substation at the Lamb-Weston plant. The portion of the proposed 230-kV line along Feedville Road would be constructed on the same poles supporting an existing UECA 115-kV line from Westland Substation to the Feedville Substation.

Eastern 500-kV Alternative

This alternative consists mainly of a new 500-kV single-circuit line constructed within a 13.7-km (8.5-mile) portion of the existing 76.2-m (250-foot) wide BPA McNary Roundup Corridor between Feedville Road and the McNary Substation. The new 500-kV line would be constructed on steel poles or towers on the eastern side of the existing 230-kV McNary Roundup Line No. I.

From the McNary Substation south for a distance of approximately 1.4 km (0.9 mile), the HPP would use the existing BPA 500-kV McNary-Lower Monumental transmission line's poles and conductors. At the southern end of that line segment, the HPP 500-kV line would depart from the McNary-Lower Monumental corridor and continue south and slightly west along a new route for a distance of approximately 0.6 km (0.4 mile), to the point where the line reaches the BPA 230-kV McNary Round-Up corridor.

A new section of McNary-Lower Monumental 500-kV line would need to be constructed to replace that portion taken over by the project. This section, which is approximately 1.6 km (1 mile) in length, would be located about 0.2 km (0.1 mile) west of its present location.

The connection from the cogeneration facility to the McNary Roundup Corridor (approximately 8.7 km [5.4 miles]) would consist of a new 500-kV line on steel poles along the proposed NWP Gas Line Alternative route, most of which is along the south side of Feedville Road.

Affected Environmental and Environmental Impacts

Table S-2 provides a summary of potential impacts from the HPP to the physical and social environment, and mitigation measures. The resource areas evaluated in the EIS are briefly described below.

Geology, Soils, and Floodplains

Geology in the project vicinity is typical of the Columbia Plateau, with low seismicity and stable terrain. Soils, too, are typical of a broad region of the Columbia Plateau, with deep, sandy soils derived from alluvium and wind-blown deposits. The 100-year floodplain of the Umatilla River lies within 0.8 km (0.5 mile) of the project.

There are no unique geologic sites associated with the project components. There are no active faults in the project vicinity and seismicity in the area is of moderate intensity. Soil erosion during project construction may cause minor and temporary increases in sedimentation to water courses.

The Western 230-kV Alternative has two crossings of the Umatilla River, but the transmission line will be located on existing poles and there will be no construction within the river. Soil compaction during construction may inhibit revegetation efforts resulting in additional erosion. Up to 2 hectares (ha) (5 acres) of prime farmland will be permanently lost at the cogeneration facility. With soil erosion control mitigation, constructing the facility to meet earthquake standards for the area, and the project's minor amount of permanent loss of prime farmland, the project is considered to have low impacts to geology, soils, and floodplains.

Water Resources

The water supply source for the proposed project is the Port of Umatilla's water project which will pump water from the Columbia River for municipal and industrial use. Columbia River water availability is good, as is its quality. Groundwater quality near the proposed cogeneration facility does not currently meet Federal drinking water standards for nitrates and total dissolved solids. The Columbia River indirectly and the local groundwater directly would receive the project's wastewater effluent through an agricultural land application process.

The project will require 7,135 lpm (1,855 gpm) from the Umatilla water project which is approximately 2.8 percent of the Port's supply. Approximately 6,000 lpm (1,944 gpm) of wastewater effluent would be reused through the adjacent J.R. Simplot land application facility as a local irrigation supplement. The proposed cogeneration facility's 38.6 lpm (146 gpm) effluent would be combined with Simplot process water, then land applied to irrigated cropland under Simplot's existing discharge permit. Because the project uses only a small fraction of the regionally available water supply, and process effluent from the project will be managed through an existing land application, the project is considered to have low impacts to water resources.

Air Quality

In Umatilla County ambient concentrations of regulated air pollutants currently meet national standards. The proposed project would annually emit 345 metric tons (380 tons) of NO_x, 73 metric tons (80 tons) of particulates, 749 metric tons (826 tons) of CO, 1.8 metric tons (2 tons) of SO_2, and 46 tons of VOCs. Because the predicted levels of NO_x and CO are greater than 100 tons per year, the project would be considered a major new stationary source of air emissions for these pollutants, and subject to strict state and Federal control requirements. The project would also emit 46.6 metric tons (51.4 tons) of ammonia per year, 1.5 metric tons (1.7 tons) of benzene, and 2.8 metric tons (3.1 tons) of formaldehyde, all of which are within acceptable Oregon Source Impact Levels (SILs) for Toxic Air Pollutants (TAPs).

Ambient concentrations of air pollutants resulting from emissions from the cogeneration project, determined from dispersion modeling, would be within Oregon SILs except for NO_x. NO_x is predicted to be slightly greater than Oregon SILs. Emissions of NO_x would be mitigated with low NO_x burners, and Selective Catalytic Reduction (SCR).

Plume lengths from the cooling tower are predicted to be less than 1,300 m (4,265 feet) 90 percent of the time. Fogging will not affect any major highways. Only a few hours within a 5-year period of fogging (and road icing) are predicted for the Simplot access roads (nearest affected roadways) as a result of the cooling towers plumes.

When the project is in operation, the existing steam boilers at the potato processing plant could be shut off, and therefore, the project could reduce these air emissions. Based on the expected design control technology and mitigation measures, air quality impacts from the project are considered low.

Noise

The cogeneration facility site is located in an area surrounded by industrial and agricultural uses. Construction noise would be typical of noise from similar projects and is exempt from Oregon State regulations. Operational noise modeling including attenuation predicted that the noise from the cogeneration facility would be less than the state 50 dB(A) nighttime residential standard. Because of the industrial use of the area and the proposed noise attenuation measures, overall noise impacts are considered low.

Vegetation and Wetlands

The project lies within Oregon's Columbia Plateau physiographic province. Much of the natural vegetation in the vicinity of the project has been disturbed or eliminated by agricultural and rural development. Several emergent, scrub-shrub, and forested wetland habitats are found in the project vicinity. Riparian habitats are located along the Umatilla River and several irrigation ditches.

Site-specific surveys of the project vicinity have been conducted for rare plants and wetlands. No rare plants were located during the surveys.

Approximately 6.9 ha (17 acres) of cropland would be permanently converted to industrial use at the cogeneration facility site.

Western 230-kV Alternative. A total of 4.49 ha (11.1 acres) of vegetation and wetlands would be impacted if the Western 230-kV Alternative is chosen. Approximately 4.25 ha (10.5 acres) would be temporarily disturbed and 0.04 ha (0.1 acre) would be permanently disturbed.

Eastern 500-kV Alternative. A total of 4.53 ha (11.2 acres) of vegetation and wetlands would be impacted if the Eastern 500-kV Alternative is chosen. Approximately 4.45 ha (11.0 acres) would be temporarily disturbed and 0.06 ha (0.16 acre) would be permanently disturbed.

Construction of the water supply and natural gas pipelines would affect areas of shrub-steppe and grass/forb vegetation, wetlands, and cropland. However, only about 0.4 ha (1 acre) of these areas would be permanently affected.

Impacts from the project on vegetation and wetlands are considered low, because the majority of the impacts are temporary in nature, disturbed areas will be reseeded with native plant species, protection will be taken to minimize soil erosion, and the disturbed area will be returned to its original contours.

Wildlife and Fishery Resources

The project vicinity supports a variety of wildlife including species that are typical of arid grassland and shrub-steppe habitats, riparian habitats, and wetlands. Because riparian and wetland habitats are relatively rare in the region, these habitats are especially important for local wildlife

populations. The Umatilla River provides most of the riparian habitat, while wetlands are associated with the Umatilla River and the Power City Wildlife Area located along the Eastern 500-kV Alternative route. The Columbia River 15 km (9 miles) north of the cogeneration facility site contains important anadromous salmon and steelhead fish stocks.

The bald eagle as the only threatened or endangered species that may occur within a 8-km (5-mile) radius of the project. All of the bald eagle observations were along the Umatilla River or in other habitats to the south of the river during winter surveys. There is no designated critical habitat for any Federally listed species in the project vicinity.

Western 230-kV Alternative. Impacts of construction and operation of the HPP on wildlife include: (1) temporary disturbance of 4.25 ha (10.5 acres) of wildlife habitat; (2) permanent conversion of 0.04 ha (0.1 acre) of wildlife habitat; (3) displacement and increased disturbance of wildlife from noise of construction and operation; and (4) increased risk of avian collisions and electrocution caused by new transmission lines. The Western 230-kV Alternative maximizes the use of existing transmission ROW and poles and therefore the degree of impact is less for this alternative than the Eastern 500-kV Alternative. Impacts to wildlife resources for this alternative are considered low.

Eastern 500-kV Alternative. Impacts of construction and operation of the HPP on wildlife include: (1) temporary disturbance of 4.45 ha (11.0 acres) of wildlife habitat; (2) permanent conversion of 0.06 ha (0.16 acre) of wildlife habitat; and (3) displacement and increased disturbance of wildlife from noise of construction and operation. Impacts to wildlife resources for this alternative are considered low. Overall impacts to wildlife and fishery resources are considered low.

Construction of the PGT gas line would result in the permanent loss of less 0.1 ha (0.1 acre) and temporary disturbance of approximately 8 ha (20 acres) of mostly shrub-steppe habitat.

Construction of the NWP gas line would temporarily affect about 16 ha (40 acres) and permanently affect less than 0.1 ha (0.1 acre) of mostly grassland habitat and cropland.

Construction of the water supply line would temporarily disturb about 2 ha (5 acres) of mostly cropland.

Land Use

The project would be located in the southwest portion of Umatilla County, Oregon. The cogeneration facility would be located approximately 4.8 km (3 miles) south of the city of Hermiston, and 6.4 km (4 miles) west of the city of Stanfield. Both transmission alternatives would be located primarily in unincorporated Umatilla County, but would also pass through several jurisdictions. Both of the gas pipelines would be primarily located in unincorporated Umatilla County, although the PGT route would enter into the Urban Growth Boundary of the city of Stanfield. The water supply pipeline would be located entirely in unincorporated Umatilla County.

All of the project facilities including both transmission alternatives would be compatible with the comprehensive plan or zoning land use designations assigned to the lands in which the facilities would be located. Some of the facilities would be allowed as a permitted use. The majority of facilities would be permitted as conditional uses by the governmental jurisdictions in which they

would be sited. Because, the project components are consistent with county and local land use designations, but will require conditional use permits, the project is considered to have a low impact to land use.

Cultural Resources

An historic properties inventory of the project vicinity resulted in discovery of six historic area canals and three trash dumps. The canals are eligible for NRHP nomination as part of the Bureau of Reclamation's Umatilla Project.

The Eastern 500-kV Alternative crosses six canals, and the Western 230-kV Alternative one canal. Each of the two natural gas pipelines would cross one canal. However, the project's effects on elements of these historic properties would be minor because placement of the transmission line towers or poles could avoid the canals, the gas pipelines would be tunneled underneath the structure, or the canals would be restored to their original condition. The project, therefore, is considered to have a low impact on cultural resources.

Socioeconomics

The predominantly rural Umatilla County had a 1992 population of 61,100. Accordingly, the agricultural business and employment sector plays a significant role in the economy in the county. In addition, a large secondary sector provides services to the agricultural industry. Impacts to employment would be most pronounced during the 2-year construction phase when up to 300 people would be employed on a monthly basis. During operation, the project would create 24 jobs. After 3 years of operation, the county would benefit by increased property taxes worth approximately $5 million annually. Other taxes such as business and natural gas taxes would also be collected. Increases in housing demand and traffic patterns would be minor and could be mitigated. The project would provide a relatively inexpensive source of steam to the potato processing plant and help that facility keep a competitive advantage. Overall, the project is considered to have a low, beneficial socioeconomic impact.

Recreational Resources

There are no recreational facilities that would be affected by project facilities nor in the project vicinity, and therefore there will be no impact to recreational resources.

Public Health and Safety

Natural gas and fuel oil would be used or stored on site, both of which are flammable and can be explosive under certain circumstances. Lubricating oils, hydraulic fluids, cleaning solvents, paint, paint thinners, wastewater from cooling tower collection sumps, and other materials and process wastes would be found on site, and could pose a risk to public health and safety if not used and disposed of properly. Some materials are classified as hazardous and would need careful handling and disposal to protect human health.

Visual Quality

The cogeneration facility site is located in an industrial area south of the city of Hermiston. Surrounding lands in the project vicinity are primarily agricultural. The industrial area and nearby agricultural areas contain industrial, warehouse, and agricultural buildings and facilities. The

industrial area and cogeneration facility site can be viewed by travelers on I-82, I-84, and SR 207. A number of existing transmission lines occur in the project vicinity connecting with the McNary Substation. These are located adjacent to local roads, and/or pass through agricultural and open lands.

The cogeneration facility would intensify the industrial character of the area where it would be sited. Because the facility would be similar in appearance to existing nearby industrial and agricultural facilities, it would be visually compatible with the existing visual character of the area. The gas transmission lines would create only a temporary and minor visual disturbance through primarily grass and agricultural lands. The visual impacts of the cogeneration facility and the gas pipelines, therefore, would be considered low. The potential visual impacts of the two transmission line alternatives are compared below.

Western 230-kV Alternative. This alternative would minimize the need for new transmission poles by using existing UECA poles. Although the UECA would have to rebuild a new section of 115-kV line, this transmission line would not be viewed by large numbers of people, and would generally follow existing transmission corridors. The visual impacts of this alternative are, therefore, considered low.

Eastern 500-kV Alternative. This alternative involves constructing a new transmission line with steel towers or poles, mainly using a vacant ROW adjacent to the existing McNary-Roundup 230-kV transmission line. However, this new 500-kV transmission line would likely be quite noticeable to travelers on Highway 395 and many rural residences east of Hermiston, even though the main portion of it would be within existing ROW. Therefore, the visual impacts of this alternative are considered moderate.

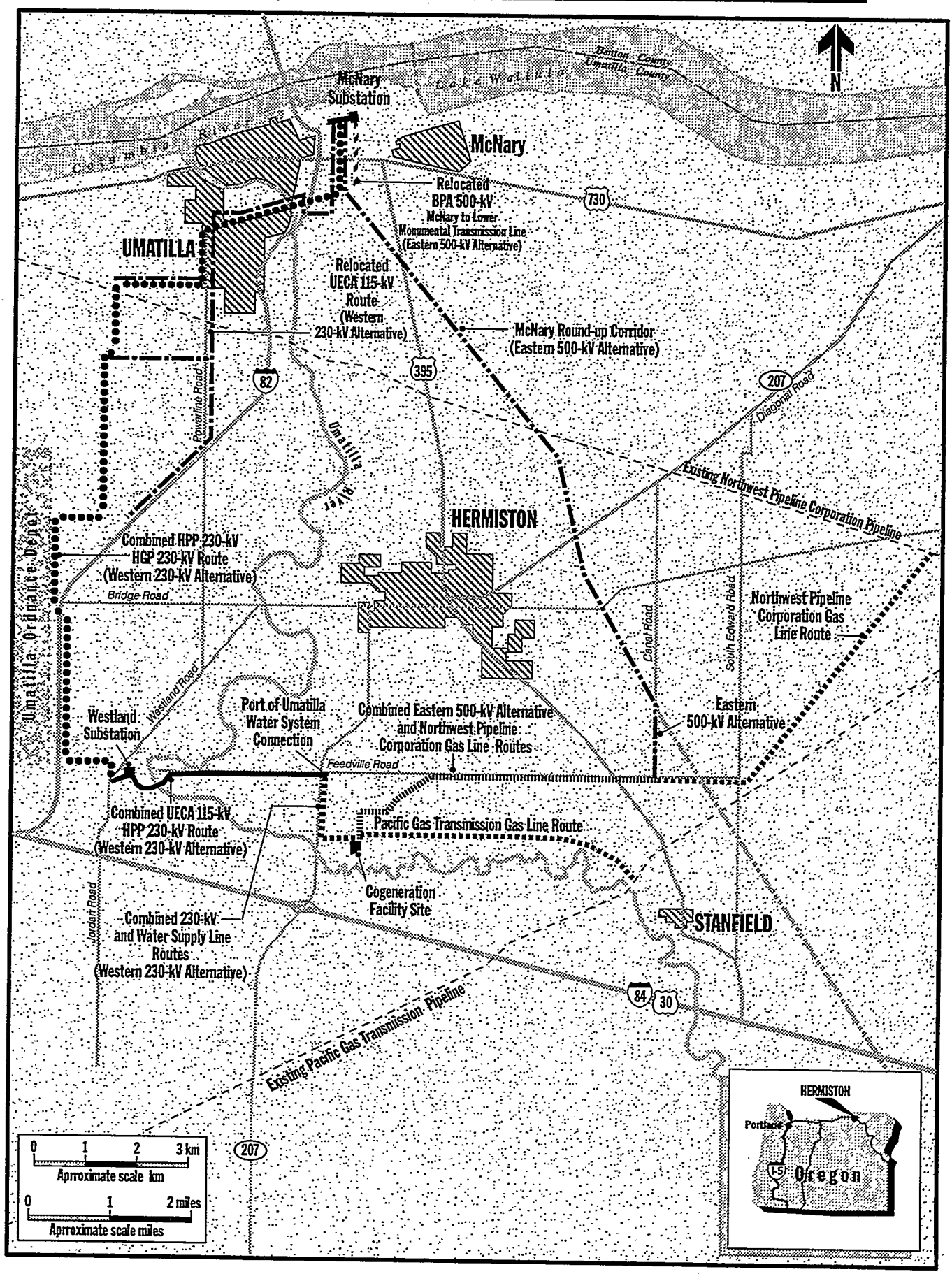


Figure S-2 Project Vicinity Map

Table S-2. Summary of Potential Impacts and Mitigation–Hermiston Power Project

Resource Area/Potential Impacts	*Degree of Impact*		*Mitigation Measures*
	Project Alone	*Cumulative*	
Geologic Hazards (during operation)			
• Landslides/Pipeline rupture • Earthquakes/building damage • Volcanic activity/Ashfall	Low	Low	• Conservative seismic design criteria • Design to minimize damage from ground liquefaction • Avoid construction of pipelines on steep slopes
Soils (during construction)			
• Erosion • Compaction (loss of fertility) • Loss of prime farmland	Low	Low	• Erosion and Sediment Control Plan (ESCP) including: sediment traps; silt fences; diversion structures; revegetation. • Segregation and stockpiling of agricultural soil, and replacement in proper sequence.
Flood Plains (during construction)			
• Temporary disruption of floodplain functions	Low	Low	• Site specific water body crossing plans designed to minimize impacts.
Water Resources (during operation)			
Quantity			
• Depleted surface water—Columbia River	Low	Low	• None required
Quality			
• Degraded ground and surface water quality	Low	Low	• Storage of effluent during freezing soil conditions to minimize nitrogen build-up in groundwater or effluent runoff • Spill containment measures (SPCC plan) • ESCP

Resource Area/Potential Impacts	Degree of Impact		Mitigation Measures
	Project Alone	Cumulative	
Air Quality (during construction and operation) • Emissions of criteria air pollutants such as nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOCs), particulate matter (PM_{10}), sulfur dioxide (SO_2). • Emissions of toxic pollutants such as ammonia, benzene, formaldehyde, lead • Health problems associated with above pollutants • Decreased visibility in scenic areas • Deposition of sulfur and nitrogen compounds • Local fogging and icing from cooling tower plumes • Fugitive dust during construction	Low	Low	• Use of Best Available Control Technology (BACT) to control levels of pollutant emissions. Under BACT, the "most stringent control technology" must be applied to the control of each pollutant, unless it can be demonstrated to EPA that less stringent measures will provide required control • Water tank trucks will spray to control dust, as required.
Noise (during construction and operation) • Disturbance from construction activities • Disturbance from operational noise to nearby residences	Low	Low	• Mufflers on construction equipment • No construction on Sundays, legal holidays, or between 10 pm and 6 am • Cogeneration facility construction will use noise silencers and sound absorbing material • Major noise sources will be separated and enclosed in acoustical buildings • Noise barriers will be constructed in the cooling towers

Resource Area/Potential Impacts	*Degree of Impact*		*Mitigation Measures*
	Project Alone	*Cumulative*	
Vegetation/Wetlands (during construction and operation) • Temporary disturbance to various upland non-forested plant communities • Permanent loss of cropland at cogeneration facility site • Temporary disturbance to wetlands and loss of function until restored after construction	Low	Low	• Avoidance of wetlands where possible • ESCP (see Soils) • Revegetation with native species
Wildlife and Fisheries (during construction and operation) • Temporary disturbance of cropland, shrub, and grass habitat • Temporary disturbance to wildlife from construction activities • Permanent loss of habitat from transmission poles/towers	Low	Low	• Retain native vegetation as much as possible during construction • Replant disturbed habitat soon after construction • Avoid waterway construction between June 15 and September 30 • Prevent construction equipment from entering streams • ESCP (see Soils)
Land Use (during construction) • Temporary disruption to existing land uses • Inconvenience to local residents and travelers • Permanent loss of prime farmland at cogeneration facility site	Low	Low	• Employ practices that will minimize noise, dust, and traffic in adjacent neighborhoods

Table S-2. Summary of Potential Impacts and Mitigation–Hermiston Power Project

Resource Area/Potential Impacts	*Degree of Impact*		*Mitigation Measures*
	Project Alone	*Cumulative*	
Cultural Resources (during construction) • Disturbance of prehistoric and historic archaeological sites • Temporary alteration of historic canals by gas pipelines	Low	None	• Restore canal walls to original condition • Avoid placement of transmission poles or towers on canal banks • Conduct specific site surveys at crossings of Umatilla River • Halt construction if previously unrecorded sites are found, and consult with SHPO • Provide information to contractors regarding discovery procedures
Socioeconomics and Public Services (during construction and operation) • Increased demand for temporary and permanent housing • Temporary and permanent employment opportunities would increase in project vicinity • Wages and taxes paid by the project would benefit local and regional economy • Increased demand for local services • Traffic on local roadways would increase	Low (Beneficial)	Moderate	• Establish a housing clearing house • Coordinated worker traffic patterns • Heavy equipment deliveries coordinated to road restrictions • Heavy equipment delivered by rail
Recreation (during construction) • Competition for campsites at private and public campgrounds in the project vicinity	None	None	• None
Public Health and Safety (during operation) • Negative health effects from exposure to accidental releases of fuels and chemicals stored at cogeneration facility site • Accumulation of solid and moderate risk wastes from project operation • Electric shock	Low	Low	• Spill Prevention Control, and Countermeasures (SPCC) plan • Reuse and recycle plan • Hazardous Materials Management Plan • Storage tanks designed to contain any spills • Storm Water Pollution Prevention Plan (SWPP)

Resource Area/Potential Impacts	*Degree of Impact*		*Mitigation Measures*
	Project Alone	*Cumulative*	
Visual Quality (during operation)			
• Visual intrusion of buildings, cooling towers, and emission stacks to residents and travelers • Plumes from cooling towers and emission stacks • Visual disturbance from pipeline ROWs	Low	Low	• Painting emission stacks in a matte finish to prevent glare • Shrub/tree screening of buildings • Tree/shrub plantings along western and southern perimeter of cogeneration facility site • Limited and directional outdoor lighting • Reseeding construction ROWs soon after completion
• Visual Intrusion of new electrical transmission lines, towers, and/or poles	Eastern 500-kV Alternative		
	Moderate	Moderate	
	Western 230-kV Alternative		
	Low	Low	

CHAPTER IV—SATSOP COMBUSTION TURBINE PROJECT

Project Description

Most of the proposed Satsop Combustion Turbine project components would be located near Satsop, Grays Harbor County, Washington, at a 5.3-ha (13-acre) industrial site currently owned and operated by the Washington Public Power Supply System (Supply System). The site was formerly used as an equipment laydown area for the nuclear power plants. The surrounding 647-ha (1,600-acre) Supply System property was developed in the 1980s for two nuclear power plants (WNP-3 and WNP-5). WNP-5 was canceled, and in May 1994, Supply System voted to terminate the contractual agreement with BPA to construct and operate WNP-3. The combustion turbine site, electrical transmission line, and water supply and wastewater lines would be in Grays Harbor County. The project's natural gas fuel supply line would also cross portions of Thurston County (Figure S-3).

The project consists of one gas-fired combined cycle combustion turbine (CT) that could supply BPA up to 207 aMW of firm power. In emergency situations when natural gas is not available, the project could burn fuel oil for up to 15 days per year. The project would require a 77-km (48-mile) natural gas pipeline to connect to a Northwest Pipeline mainline near Vail, Washington. The project would store 8.2 million l (1.8 million gallons) of No. 2 fuel oil in an above-ground storage tank.

The project would be connected to BPA's existing Satsop Substation, approximately 1,220 m (4,000 feet) east of the combustion turbine site. The existing wood poled, 115-kV transmission line would be replaced by a steel tower supporting 115-kV/230-kV transmission lines. This line would also parallel two existing 230-kV transmission lines in that ROW.

The project would require an average of 5,079 liters per minute (lpm) (1,342 gallons per minute [gpm]) of process water. This would be supplied by existing Ranney Wells adjacent to the Chehalis River, associated with the Supply System Nuclear Plant WNP-3 under an existing water withdrawal permit. The availability of Chehalis River water is subject to minimum flow restrictions. An existing outflow line from the WNP-3 cooling tower runs adjacent to the combustion turbine site. This outflow line would be connected to the proposed project to deliver process makeup water to the project.

The project would discharge its process effluent back to the WNP-3 outflow line via a connection, and be discharged to the Chehalis River through the existing outfall structure. Maximum effluent discharge would be 894 l (236 gallons) per minute.

Affected Environment and Environmental Impacts

Table S-3 provides a summary of potential impacts from the Satsop Combustion Turbine project to the physical and social environment, and mitigation measures. The resource areas evaluated in the EIS are briefly described below.

Geology, Soils, and Floodplains

The combustion turbine site is situated along the Chehalis River valley; the gas pipeline route crosses the Willapa Hills and Puget Lowlands. Tertiary volcanic and marine strata and Quaternary glacial outwash and river alluvium form the bedrock and surficial geology. Generally thick, erodible soils occur in the area. Large earthquakes and more distant volcanic eruptions occur periodically. Landslides and accelerated soil erosion are hazards in steep sloping disturbed areas.

Earthquakes and landslides involving the proposed project may result in explosion or leakage of gas or chemicals. Project design would include seismic consideration and minimize the potential for environmental impacts. Environmental effects resulting from landslides and volcanic activity would be minimal. Soils along the gas pipeline route and at the combustion turbine site are subject to soil erosion and compaction. However, by following the erosion and sediment control plan (ESCP), these impacts would be minimal. Up to 81 ha (200 acres) of prime farmland along the pipeline route would be temporarily disturbed, but would be stockpiled and replaced to minimize the impact. Up to 6.7 ha (16.5 acres) of floodplains would be temporarily effected by the construction of the gas pipeline. With soil erosion control mitigation, constructing the CT facility to meet earthquake standards for the area, and the project's minor and temporary disturbance to floodplains, the project is considered to have low impacts to geology, soils, and floodplains.

Water Resources

The major water features near the proposed CT facility site include the Chehalis River, the Satsop River, and an alluvial aquifer that underlies these rivers. The Chehalis River is required under Washington law to maintain a minimum baseflow of 15.6 cms (550 cfs) (934,452 lpm [246,857 gpm]).

The project would use an average of 5,079 lpm (1,342 gpm) of water from existing Ranney wells, hydraulically connected to the Chehalis River. The project would discharge up to 893 lpm (236 gpm) into the Chehalis River though an existing diffuser structure.

Existing surface and well water rights are not expected to be adversely affected from Ranney well pumping to meet project requirements. Although there would be a net water loss in the Chehalis River from consumption by the proposed project, the loss would not be significant compared to the available river water. Therefore, the project would have a low impact on water quantity.

Water quality constituents in the project's process wastewater to the Chehalis River are expected to be regulated to acceptable levels under the existing NPDES permit. However, levels of lead and mercury will require monitoring to ensure that proper mitigation measures can be applied to maintain acceptable levels. Therefore, with anticipated mitigation, project impacts to water quality are considered low.

Air Quality

The project is located in rural Grays Harbor County where ambient concentrations of regulated air pollutants are in compliance with national standards to protect human health.

The project would annually emit 195 metric tons (215 tons) of NO_x, 24.5 metric tons (27 tons) of SO_2, 51.7 metric tons (57 tons) of particulates, 256.7 metric tons (283 tons) of CO, and 41.7 metric tons (46 tons) of VOCs. Because the amounts of NO_x and CO are greater than 91 MTY (100 TPY), the project would be considered a major new source for these pollutants and subject to strict state and Federal control requirements. The project would also annually emit 0.53 metric tons (0.58 tons) of benzene, 0.91 metriction (1 ton) of formaldehyde, and 110.7 metric tons (122 tons) of ammonia. Although these levels would be greater than the Washington state small quantity emission rates for toxic air pollutants (TAPs), the modeled ambient concentrations would be within Acceptable Source Impact Levels (ASILs). To mitigate emissions of NO_x, the project would utilize dry low-NO_x burners and SCR. Catalytic oxidation would be utilized for CO control.

Dispersion modeling using on-site meteorological data predicted that ambient air pollution concentrations resulting from the project would be less than the ambient air quality standards. Emissions from the project would result in insignificant concentrations and deposition rates in the nearest wilderness areas and national parks. Based on the anticipated design technology and planned mitigation measures, the project is considered to have low air quality impacts.

Noise

Construction noise would be typical of noise from similar projects and is exempt from Washington State regulations. Construction would be limited to daytime hours. Operational noise modeling predicted that noise from the project at the nearest residences (including attenuation) would be 44 decibels using the A-weighted scale (dB[A]), which is less than the Washington State daytime and night-time standards 50 dB(A). However, at one nearby residence, the predicted cumulative increase in noise levels over background levels if a second turbine was added would be between 5 and 10 dB. This is considered a significant impact at this residence according to EPA Region 10 noise guidelines. Overall noise impacts from the project, however, are considered low.

Vegetation and Wetlands

The project components lie within Washington's Puget Trough physiographic province and within the Pacific Northwest's western hemlock vegetation zone (Franklin and Dyeness 1973). Vegetation is diverse and includes forests, oak woodlands, shrub habitats, grasslands (pastures) and agricultural plant communities, prairies, vegetated developed areas, and wetland/riparian communities. At least one population of white-top aster (*Aster curtus*) (a Federal-candidate and state-listed sensitive species) is known to occur along the proposed natural gas pipeline ROW.

Approximately 176.1 ha (435 acres) of terrestrial vegetation would be affected by the proposed gas pipeline construction. The majority of this affected area is forested (including regenerating forests), although shrub habitats, oak woodland, prairie, grassland, agricultural land, and developed land would also be affected. A stand of white-top aster would be affected by construction of the project's gas pipeline.

About 5.3 ha (13 acres) of wetlands would be temporarily disturbed and about 2.8 ha (7 acres) of forest wetlands would be permanently disturbed along gas pipeline route. This disturbance includes vegetation clearing, trench excavation and backfilling, equipment traffic, and potential water quality degradation from increased sedimentation and possible hydrocarbon spills. Filling (i.e., trenching) of wetland habitats during construction of the water and gas pipelines would result

in a temporary loss of wetland functions and values. Wetland habitats would be restored as soon as construction is complete.

Because most of the vegetation disruption would be temporary and much of the vegetation disturbed is common to the area, the project is considered to have low impacts to vegetation. The developer is working with the WDNR to develop mitigation measures that will reduce the potential impact to the white-top aster.

Wildlife and Fishery Resources

The project vicinity is typical of western Washington in the wildlife habitats (conifer, deciduous, and riparian forests, grasslands and prairies, and wetlands), and the variety of wildlife species these habitats support. The 77-km (48-mile) gas pipeline proposed for the project crosses 24 streams in the Chehalis River and South Puget Sound basins. Streams in the project vicinity support and provide passage to significant stocks of anadromous fisheries.

Three Federally listed wildlife species, the marbled murrelet, bald eagle, and northern spotted owl, were identified by the USFWS as potentially occurring within a 8-km (5-mile) radius of the project. Only the bald eagle (Federal threatened), great blue heron (state monitor), and pileated woodpecker (state candidate) were observed in the project vicinity. Three bald eagle nests have been identified in the project vicinity near the Chehalis River and Black Lake and eagles winter along the Chehalis and Deschutes rivers. The Washington Department of Fish and Wildlife (WDFW) has identified winter waterfowl concentration areas in the Chehalis and Deschutes rivers floodplains and sensitive habitats including oak woodlands and prairies. No designated critical habitat for any Federally listed species occurs in the project vicinity.

Two Federal candidate fish species, the Olympic mudminnow and bull trout, were identified by the USFWS as potentially occurring in project vicinity streams. Extensive investigations in area streams as part of the development of WNP-3 and WNP-5 found mudminnow only in low gradient portions of the Chehalis River, and did not find bull trout. Based on specific habitat characteristics of project vicinity streams, it is very unlikely that bull trout exists, and possible that the mudminnow would be present in some of the low gradient portions of the streams crossed by the gas pipeline.

Potential impacts to wildlife from construction and operation of the proposed project include: (1) permanent conversion of 111 ha (278 acres) of habitat, (2) temporary disturbance of 65 ha (161 acres) of wildlife habitat, (3) disturbance to wildlife from noise of construction and operation. Potential impacts to fisheries include (1) sedimentation and turbidity, (2) acoustic shock, (3) cover loss, and (4) migratory interruption. With the proposed mitigation measures, the project is expected to have low impacts on wildlife and fisheries.

Land Use

The CT facility site and 24 km (15 miles) of the 77-km (48-mile) gas pipeline would be located in unincorporated southeast Grays Harbor County, Washington. The remaining 53 km (33 miles) of the gas line route would be located in Thurston County, Washington. The 5.3-ha (13-acre) CT facility site is located within the existing Supply System complex on land designated by Grays Harbor County for industrial use. Land use policies and plans along the gas pipeline route are under the jurisdiction of both counties and the state of Washington. Land uses and land use

designations along the route are diverse and include agricultural, forest, rural residential, and industrial. The section of pipeline passing through the Capital State Forest would require an easement from the Washington Department of Natural Resources. The portion of the gas pipeline passing through across the Black Lake drainage ditch does not comply with Thurston County Regulations and would likely require specific mitigation measures to be developed with the Energy Facility Site Evaluation Council (EFSEC) and Thurston County. Because the majority of impacts from the gas pipeline are temporary and minor and mitigation measures will be developed to minimize the disruption to the Black Lake drainage ditch, the project is considered to have low impacts to land use.

Cultural Resources

An historic properties inventory of the project vicinity resulted in discovery of two archaeological sites, 11 roads, and 111 springboard-cut stumps. None of these resources are eligible for nomination to the NRHP. The proposed pipeline has the potential to affect one of the archaeological sites, but can be mitigated. Therefore, impacts to cultural resources are considered low.

Socioeconomics

Grays Harbor County (1993 population of 66,500) has been historically dependent on manufacturing, services, and trade relating to the logging industry. Thurston County (1993 population of 180,500) is home to the state capitol of Olympia, and has employment dominated by the government sector. Impacts to employment would be most pronounced during the 2-year construction phase when up to 135 people would be employed on a monthly basis. During operation, the project would create jobs. During construction, both counties and the state would benefit from increased sales taxes. Since Supply System is a public agency, it is exempt from property taxes, but would pay $1.1 million annually for other taxes such as businesses and natural gas taxes. Increases in housing and traffic resulting from the project would be minor and could be mitigated. Overall, the project is considered to have a low, beneficial socioeconomic impact.

Recreational Resources

While there are a number of recreational facilities within the region where the project is located, only three are within the immediate vicinity (within 1.6 km [1 mile]) of project components. The project would not have any impacts on recreation.

Public Health and Safety

Natural gas and fuel oil would be used or stored on site, both of which are flammable and can be explosive under certain circumstances. They can also have adverse effects on the environment if released in an uncontrolled manner. Lubricating oils, hydraulic fluids, cleaning solvents, paint, paint thinners, wastewater from cooling tower collection sumps, and other materials and process wastes would be found on site, and could pose a risk to public health and safety if not used and disposed of properly. Some materials are classified as hazardous and would need careful handling and disposal to protect human health.

The proposed measures to contain spills and address safety issues, and the safety procedures planned and required by regulations for handling materials to be stored and used at the proposed

project will minimize the risk to public health and safety. Therefore, potential impacts to public health and safety are considered low.

Visual Quality

The Chehalis River Valley is an important regional visual resource. The scenic valley is dotted with farms scattered among fields of various crops and grazing dairy cattle. SR 12, a major route between the Washington coast and the Puget Sound region, passes through the valley. The proposed CT facility would be located near the existing WNP-3 and WPN-5 cooling towers in the hills south of the valley. With the exception of the emission stack and occasional emission plumes, travelers along SR 12 and residences in the Chehalis River Valley would not be able to observe the proposed facility. Nearby residents and travelers on Keys Road and West Keys Road would see the taller components of the facility above the landscaped berm.

The proposed gas pipeline would cross from south to north through the valley, primarily through agricultural lands. South of the valley, the gas pipeline route would largely follow existing utility ROWs and pass through a variety of primarily low intensity land uses such as agricultural, forestry, and rural residential.

Because the CT facility and associated structures are similar in visual form to the existing WNP-3/WNP-5 site, and the buried gas pipeline would not create a significant visual intrusion to the area, the project is considered to have a low impact to visual quality.

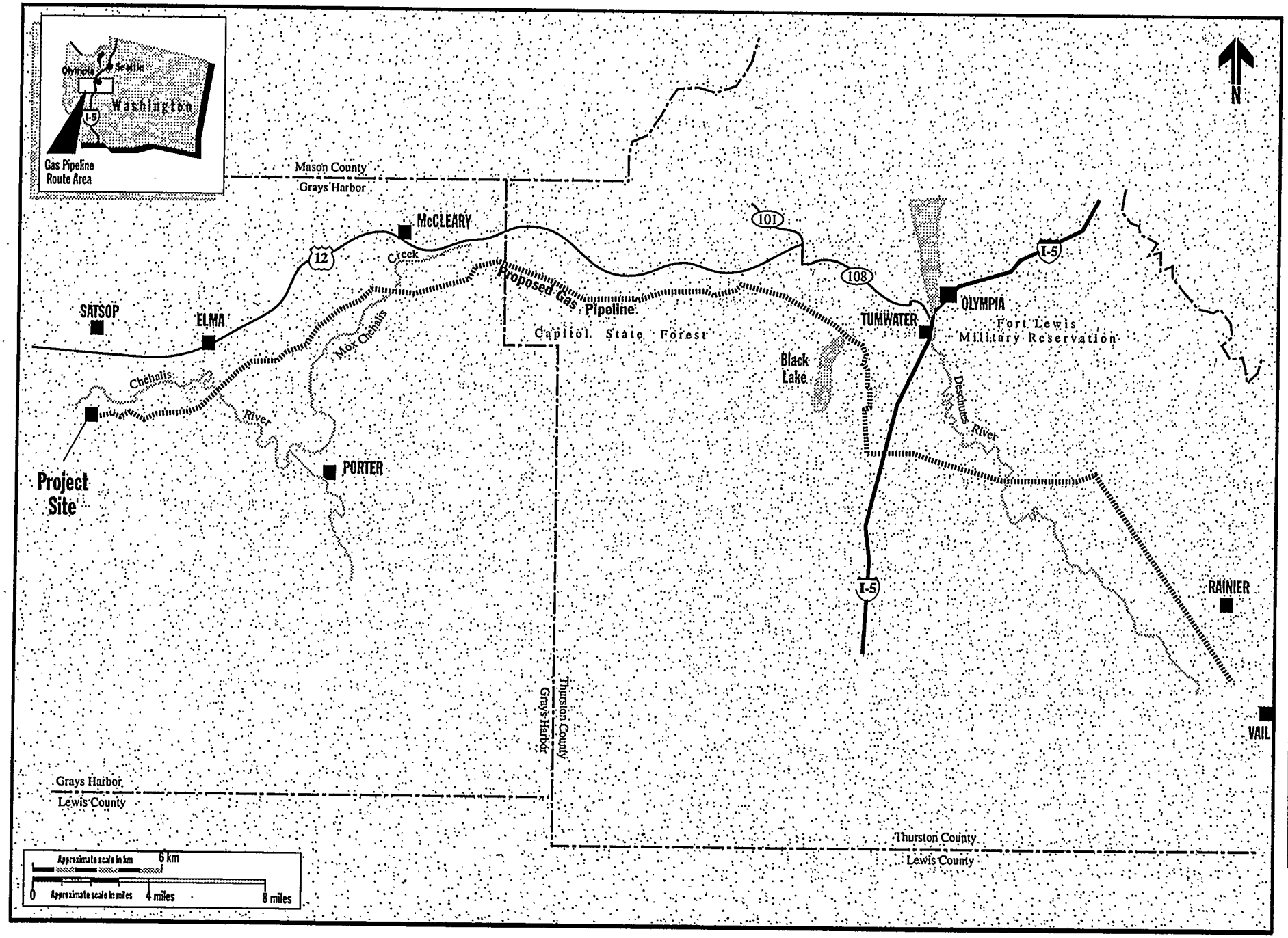


Figure S-3 Project Vicinity Map

Table S-3. Summary of Potential Impacts and Mitigation–Satsop Combustion Turbine Project

Resource Area/Potential Impacts	*Degree of Impact*		*Mitigation Measures*
	Project Alone	*Cumulative*	
Geologic Hazards (during operation) • Landslides/Pipeline rupture • Earthquakes/building damage • Volcanic activity/Ashfall	Low	Low	• Conservative seismic design criteria • Design to minimize damage from ground liquefaction • Avoid construction of pipelines on steep slopes • Electrical tower placement will avoid unstable areas along Fuller Creek gorge • Shut down plant during significant ash fall
Soils (during construction) • Erosion • Compaction (loss of fertility) • Loss of prime farmland	Low	Low	• Erosion and Sediment Control Plan (ESCP) including: sediment traps; silt fences; diversion structures; revegetation. • Segregation and stockpiling of agricultural soil, and replacement in proper sequence.
Flood Plains (during construction) • Temporary disruption of floodplain functions	Low	Low	• Site-specific water body crossing plans designed to minimize impacts.
Water Resources (during operation) Quantity • Depleted surface water/Chehalis River/ groundwater aquifer	Low	Low	• None required
Quality • Degraded surface water quality—Chehalis River	Low	Low	• Water treatment as required prior to discharge to Chehalis River to meet existing NPDES permit requirements • Addition of Ranney well water to lower effluent temperature

Table S-3. Summary of Potential Impacts and Mitigation–Satsop Combustion Turbine Project

Resource Area/Potential Impacts	*Degree of Impact*		*Mitigation Measures*
	Project Alone	*Cumulative*	
Air Quality (during construction and operation) • Emissions of criteria air pollutants such as nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOCs), particulate matter (PM_{10}), sulfur dioxide (SO_2). • Emissions of toxic pollutants such as ammonia, benzene, formaldehyde, lead • Health problems associated with above pollutants • Decreased visibility in scenic areas • Deposition of sulfur and nitrogen compounds • Local fogging and icing from cooling tower plumes • Fugitive dust during construction	Low	Low	• Use of Best Available Control Technology (BACT) to control levels of pollutant emissions. Under BACT, the "most stringent control technology" must be applied to the control of each pollutant, unless it can be demonstrated to EPA that less stringent measures will provide required control • Water tank trucks will spray to control dust, as required.
Noise (during construction and operation) • Disturbance from construction activities • Disturbance from operational noise to nearby residences	Low	Low	• Mufflers on construction equipment • No construction within 305 m (1,000 feet) of occupied dwellings on Sundays, legal holidays, or between 10 pm and 6 am • CT facility construction will use noise silencers and sound absorbing material • Major noise sources will be separated and enclosed in acoustical buildings • Noise barriers will be constructed between sources and sensitive receptors

Resource Area/Potential Impacts	*Degree of Impact*		*Mitigation Measures*
	Project Alone	*Cumulative*	
Vegetation/Wetlands (during construction and operation) • Temporary disturbance to plant communities (including aster-curtus, a federal-candidate/state-listed sensitive species) • Permanent conversion of forest vegetation to grass or shrub vegetation • Invasive plant species in cleared areas could alter vegetation composition • Temporary disturbance to wetlands and loss of function until restored after construction	Low	Low	• Avoidance of wetlands where possible • ESCP (see Soils) • Revegetation with native species • Mitigation plan for minimizing impact to aster-curtis • Minimized construction width for pipelines in wetland areas • Wetland soils stockpiled and replaced
Wildlife and Fisheries (during construction and operation) • Temporary habitat disturbance • Permanent conversion of forested habitat to shrubs and grass habitat • Deposition of sediments from construction erosion reducing spawning beds • Loss of riparian vegetation • Degraded water quality in Chehalis River • Lower flow in Chehalis from net loss of project from evaporation • Acoustic shock to fish from blasting • Interruption of migration	Low	Low	• Retain native vegetation as much as possible during construction • Replant disturbed habitat soon after construction • Avoid waterway construction between June 15 and September 30 • Avoid construction near active bald eagle nests • Prevent construction equipment from entering streams • Properly store chemicals or construction site • ESCP (see Soils) • Adequately treat effluent from project before discharging to Chehalis River
Land Use (during construction) • Temporary disruption to existing land uses • Inconvenience to local residents and travelers	Low	Low	• Employ practices that will minimize noise, dust, and traffic • Mitigation plan to minimize impacts to Black Lake Drainage Ditch (with ECSEC and Thurston County) • Construct landscaped buffer between CT facility and residences

Table S-3. Summary of Potential Impacts and Mitigation–Satsop Combustion Turbine Project

Resource Area/Potential Impacts	*Degree of Impact*		*Mitigation Measures*
	Project Alone	*Cumulative*	
Cultural Resources (during construction) • Disturbance of prehistoric and historic archaeological sites	Low	None	• Reroute gas pipeline to avoid an archaeological site (if possible) • Halt construction if previously unrecorded sites are found, and consult with SHPO • Provide information to contractors regarding discovery procedures
Socioeconomics and Public Services (during construction and operation) • Increased demand for temporary and permanent housing • Temporary and permanent employment opportunities would increase in project vicinity • Wages and taxes paid by the project would benefit local and regional economy • Increased demand for local services • Traffic on local roadways would increase	Low (beneficial)	Low	• Traffic and parking control plan during construction to be developed (with EFSEC)
Recreation (during construction) • Competition for campsites at private and public campgrounds in the project vicinity • Temporary disturbance to recreational areas near construction areas	Low	Low	• Dust supression during construction • Properly muffled construction vehicles
Public Health and Safety (during operation) • Negative health effects from exposure to accidental releases of fuels and chemicals stored at CT facility site • Accumulation of solid and moderate risk wastes from project operation • Electric shock	Low	Low	• Spill Prevention Control, and Countermeasures (SPCC) plan • Reuse and recycle plan • Hazardous Materials Management Plan • Storage tanks designed to contain any spills • Storm Water Pollution Prevention Plan (SWPP)

Resource Area/Potential Impacts	*Degree of Impact*		*Mitigation Measures*
	Project Alone	*Cumulative*	
Visual Quality (during operation) • Visual intrusion of buildings, cooling towers, electrical tower, and emission stack to residents and travelers • Plumes from cooling towers and emission stacks • Visual disturbance from pipeline ROWs	Low	Low	• Hydroseeding of CT facility site after construction • Two planted screening berms will be constructed along Keys Road • Painting structures to blend with environment • Shrub/tree screening of buildings (where appropriate) • Limited and directional outdoor lighting • Reseeding construction ROWs soon after completion

CHAPTER I — INTRODUCTION

1.0 PURPOSE AND NEED

1.1 NEED

The Bonneville Power Admistration (BPA) has statutory responsibilities to supply electrical power to its utility, industrial, and other customers in the Pacific Northwest region as defined by the Northwest Power Planning and Conservation Act. In 1990, to ensure that new resources would be available to meet the highest potential load growth, BPA embarked upon the Resource Contingency Program (RCP). Instead of buying or building generating plants now, the RCP allows BPA to purchase options to acquire power later, if and when it is needed. This environmental impact statement (EIS) addresses the environmental consequences of acquiring all of the generating resources under the RCP.

The environmental consequences of acquiring all of the options under the RCP include construction and operation impacts that would occur if and when a decision were to be made between the years 1995 and 2005 to acquire their output. The decision to acquire any or all of these option energy projects to fulfill statutory supply obligations is influenced by the following variables:

- Federal System Load Growth

  Demand for Federally supplied power is expected to increase an average of 1 percent over the next 20 years. Because load growth cannot be predicted with certainty, BPA and the Northwest Power Planning Council (Council) have developed a series of forecast scenarios that encompass plausible variations in the factors that determine loads. The 1991 BPA and Council Joint Forecast shows that Federal System loads will most likely increase between 0.5 percent (medium-low case) and 1.2 percent (medium-high case). Higher load growth makes it more likely the optioned resources would need to be acquired.

- Draft Strategic Business Plan

  In 1993, BPA embarked on a major effort to reassess its role and need for resources. That process is still very much in a development stage; however, it has provided preliminary indications that BPA's load growth may not be as high as was predicted in the 1990 and 1992 resource programs, and that BPA's customers may develop more resources to serve their own loads than was previously anticipated. The more resources that BPA customers develop on their own, the less likely it is that the optioned resources would need to be acquired. As documented in BPA's June 1994 Draft Strategic Action Plan, BPA plans to primarly rely on purchased power and nonfirm energy to meet load growth during the next 3 to 5 years, but will also maintain resource options from the RCP in case they are needed. Furthermore, as a result of the Draft Strategic Business Plan, BPA may acquire the output of the resource to meet loads or provide energy management services (e.g., fuel management, wheeling, energy backup etc.) for these specific resources when acquired by a customer for their power needs.

- Columbia-Snake River Hydroelectric Facilities Operational Changes

  Operation changes in the hydro system to benefit listed fish stocks under the Endangered Species Act (ESA) or to implement the Council's Fish and Wildlife Program are occurring and

are still very much in the development stage. Future actions by regulatory agencies could reduce firm output of the hydro system further, perhaps by hundreds of average megawatts (aMW) thereby increasing the need for new energy resources. The need for acquiring the optioned resources will increase as production from the hydro system decreases.

- Canadian Entitlement

In February 1994, BPA prepared a draft EIS (DOE/EIS-0197) on the Delivery of the Canandian Entitlement from the three storage dams constructed in Canada on the Columbia River as a result of the 1964 Columbia River Treaty with Canada. That EIS evaluates the environmental effects of various options for disposition of the Canadian Entitlement. Alternatives include various purchase, generation, and transmission development components. Disposition of the Canadian Entitlement must begin in 1998 concurrent with the expiration in steps of the past sale of Canadian Entitlement within the United States. These option projects could be used to generate power for the disposition of entitlement benefits to Canada.

- Loss of generating resources

In 1992, Portland General Electric (PGE) decided to permanently close the Trojan Nuclear Power Plant. Through a net billing contract with the Eugene Water and Electric Board, Trojan provided BPA 214 aMW of energy. It is possible that other power plants may shut down in the Pacific Northwest in the near future for re-licensing, technical, or ecoomic reasons. If other plants close or reduce their output, the need for optioned resources will increase.

1.2 PURPOSE

The purpose underlying the potential acquisition of these optioned resources are:

- meet contractual obligations to supply requested cost-effective electrical power to BPA customers while minimizing adverse environmental impacts;
- ensure consistency with BPA's statutory responsibilities, including the Pacific Northwest Electric Power Planning and Conservation Act, while taking into account consideration the Council's Conservation and Electric Power Plan and Fish and Wildlife Program, the National Energy Policy Act, and the ESA as admended;
- restore and enhance environmental quality, and avoid or minimize potential adverse environmental effects; and
- reduce resource lead time necessary to bring the resource to commercial operation.

1.3 BACKGROUND

In 1990, BPA embarked on a multifaceted resource acquisition program to fulfill the most likely range of need by acquiring: all cost effective conservation; cost-effective unsolicited renewable and thermally matched cogeneration projects; various energy projects through the billing credits and competitive acquisition solicitations, and wind and geothermal demonstration projects. At that time,

to cover the outer range of need (lower probability of need) BPA embarked upon the RCP to purchase energy options.

In May 1992, BPA issued a RCP solicitation. In response to BPA's request for energy options, 64 proposals were submitted totaling 7,842 aMW of energy. The proposed projects where evaluated agaisnt the RCP goals of project viability, cost-effectiveness, and minimal enviromental impacts. BPA selected three projects that best met these goals. In September 1993, three option develop agreements were signed that could supply BPA with 1,090 aMW of power. All three proposed projects are natural gas-fired, combined-cycle combustion turbines.

Under these agreements sponsors are conducting environmental studies, obtaining permits, and project design work, and BPA is completing this EIS process.

In September 1993, BPA published a Notice of Intent to prepare an EIS on these three proposed gas-fired combustion turbine projects. In February 1994, BPA released an Implementation Plan on the proposed scope of the EIS. In August 1995, it is anticipated that BPA will issue a Record of Decision on what, if any, proposed units at the projects BPA will hold for potential future acquisition.

2.0 ALTERNATIVES

2.1 No Action

Under the no action alternative, BPA would not acquire the energy output associated with the proposed projects, thereby foregoing the opportunity to reduce a potential energy deficit with these projects. In that event, the projects would not be constructed without a commitment from another party to acquire the energy output. If the projects were not constructed, the environmental impacts associated with them would not occur.

2.2 Proposed Action

The proposed action is the acquisition or wheeling of power from all five available units optioned at all three plant sites, but only if there is a need for power at a future date (see Table 2-1). The decision to purchase the output from any project will be made only: (1) during a 5 to 10 year holding period following this EIS process; (2) if it is determined that there is a need to purchase a block of power; and (3) if BPA has determined that one or more units under this program are cost-effective relative to other available resources.

Table 2-1. RCP Projects

Project	*Developer*	*Location*	*# of Units*	*aMW Each*	*Option Period*
Chehalis Power	CRSS Capital	Chehalis, WA	2	228	1995-2005
Hermiston Power	Hermiston Power Partnership	Hermiston, OR	2	215	1995-2000
Satsop Project	Washington Public Power Supply System (Supply System)	Satsop, WA	1	204	1995-2005

This EIS addresses the environmental effects, including cumulative effects, under the scenario that all five units under option are constructed and operated for power delivery to BPA. During the time period of these optioned resources (1995 to 2005), BPA's need for power may be equal to or greater than the energy available from these resources. Therefore, these five units of the three optioned projects are not considered alternatives to one another.

2.3 OTHER ACTIONS

Since the proposed action may satisfy only part of BPA's power needs, other resources will be considered independent of the proposed action, including acquisition of all cost effective conservation. Furthermore, once the need for power determination has been made, BPA will compare these optioned resources against other resources, and BPA may pursue other resources independent of the optioned projects. Other resource types potentially available to meet future loads include the following:

- Conservation (commercial, residential, and industrial)
- Renewables (hydropower, geothermal, wind, and solar)
- Cogeneration
- Combustion Turbines
- Nuclear Power
- Coal and Clean Coal
- Imports

In BPA's April 1993 Record of Decision on the Resource Program Environmental Impact Statement (DOE/EIS-0162) which is based upon resource needs identified in the 1990 and 1992 Resource Programs, BPA identified a management strategy for matching power supply with demand over the next two decades. The strategy is referred to as the "emphasize conservation alternative." This strategy is one of thirteen alternative strategies that BPA developed to meet a projected power deficit of 2,000 to 2,500 aMW in the year 2000.

Under the "emphasize conservation alternative," BPA is committed to acquiring all cost-effective conservation and system efficiency improvements. This action is expected to save BPA 477 average megawatts (aMW) and 134 aMW respectively. The next resource priorities of this preferred alternative are renewables and cogeneration resources which BPA expects to acquire 105 aMW and 260 aMW respectively. As part of this strategy, BPA will also rely on gas-fired combustion turbines for up to 1,040 aMW.

Every two years, BPA develops a resource program that explains how BPA proposes to meet its expected load obligations. In developing the resource program, BPA prepares load forecasts jointly with the Council. A range of forecasts is prepared to reflect uncertainties about the future load growth. Next, a range of load resource balances is prepared by comparing the capability of the existing Federal system resources to the range of projected Federal system loads over the next 20 years. Concurrent with the process, BPA and the Council develop new resource supply forecasts to plan acquisitions of cost effective resources as they are needed to meet load growth. Under this approach, resources other than the proposed action will be examined and evaluated in the future for their eligibility and ability to satisfy BPA's future needs.

CHAPTER II — CHEHALIS GENERATION FACILITY

1.0 PROJECT DESCRIPTION

1.1 SITE LOCATION

The Chehalis Generation Facility would be located on a 12-hectare (ha) (30.1-acre) parcel in the Chehalis Industrial Park (Industrial Park) (see Figure 1-1). The Industrial Park is approximately 5.1 kilometers (km) (3.2 miles) south of the Chehalis city limits in an unincorporated area of Lewis County, Washington. The legal description for this parcel is the southwest quarter of the southeast quarter of Section 10, Township 13 North, Range 2 West of the Willamette Meridian, Lewis County. The site, accessed via Bishop Road, is currently used as part of a farm operation, with a small portion of the site dedicated to crop production. Properties in the vicinity are mostly agricultural and residential, but there are some commercial and light industrial uses as well.

1.2 PROJECT COMPONENTS

Major project components would include:

- Two 159 megawatt (MW) gas-fired combustion turbine generators
- Two heat recovery steam generators (HRSGs)
- Two 80 MW steam turbine generators
- Auxiliary boiler (to sell steam if required)
- Natural gas supply line to connect the project to an existing Northwest Pipeline Corporation (NWP) lateral. The line would have two sections: a 40.6 centimeter (cm) (16-inch) outside diameter 7.2-km (4.5-mile) steel loop line; and a 30.5-cm (12-inch) outside diameter 4.8-km (3-mile) steel spur line.
- Backup fuel oil tanks each with a holding capacity of 6 million liters (l) (1.6 million gallons)
- Process water supply and wastewater treatment systems. There would be three 40.6 cm (16-inch) diameter 8.9-km (5.5-mile) pipelines: two for make-up water supply and one for wastewater disposal.
- Cooling system
- Electrical interconnection (518.1 meters [m] [1,700 feet]) with an existing Bonneville Power Administration (BPA) 500-kilovolt (kV) transmission system, and system modifications

The proposed combustion turbine (CT) facility layout is depicted in Figure 1-2, with project components summarized below.

1.2.1 Combustion Turbine Facility

The CT facility would consist of two natural gas-fired combined-cycle combustion turbines that together could supply 456 average megawatts (aMW).

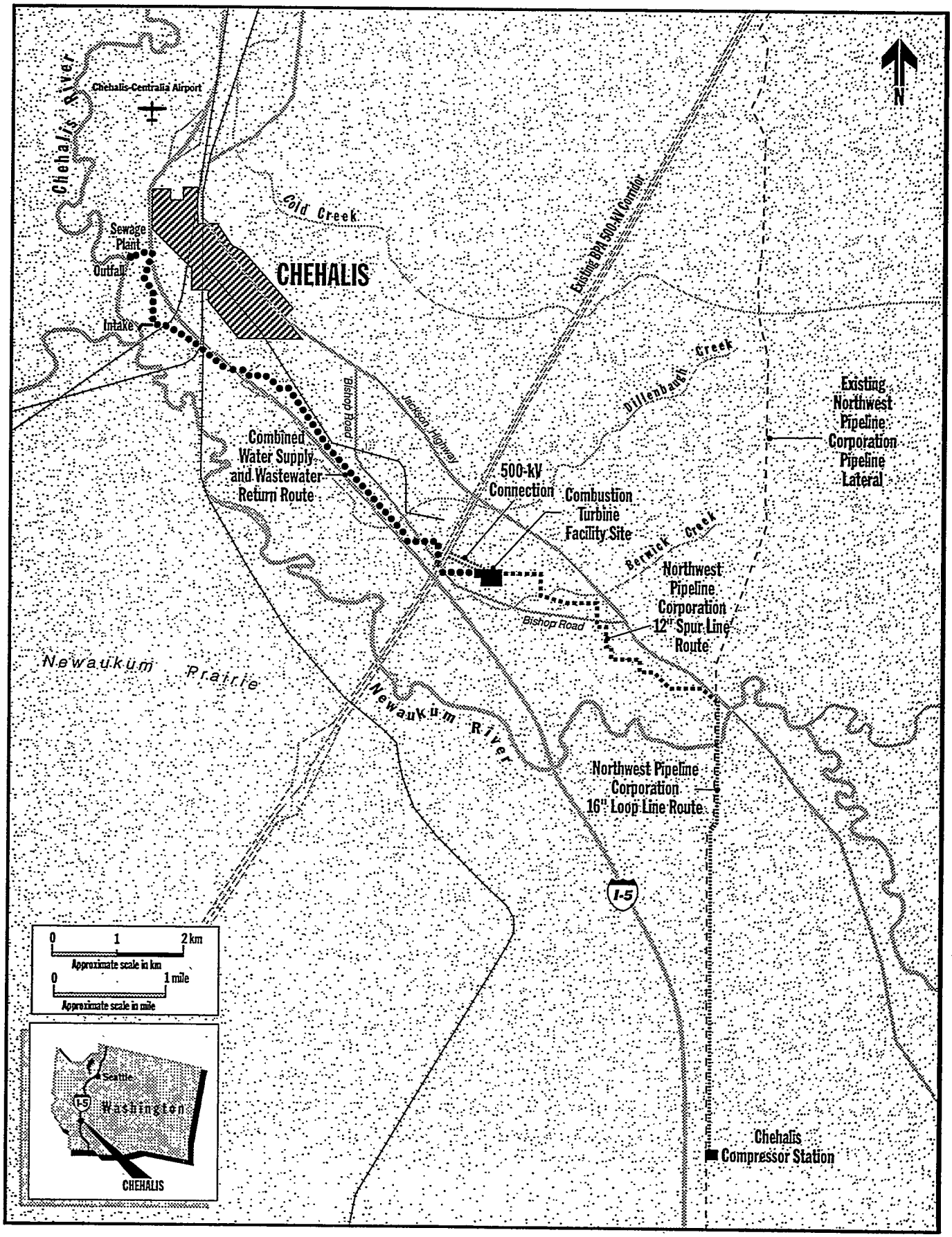


Figure 1-1 Project Location and Components

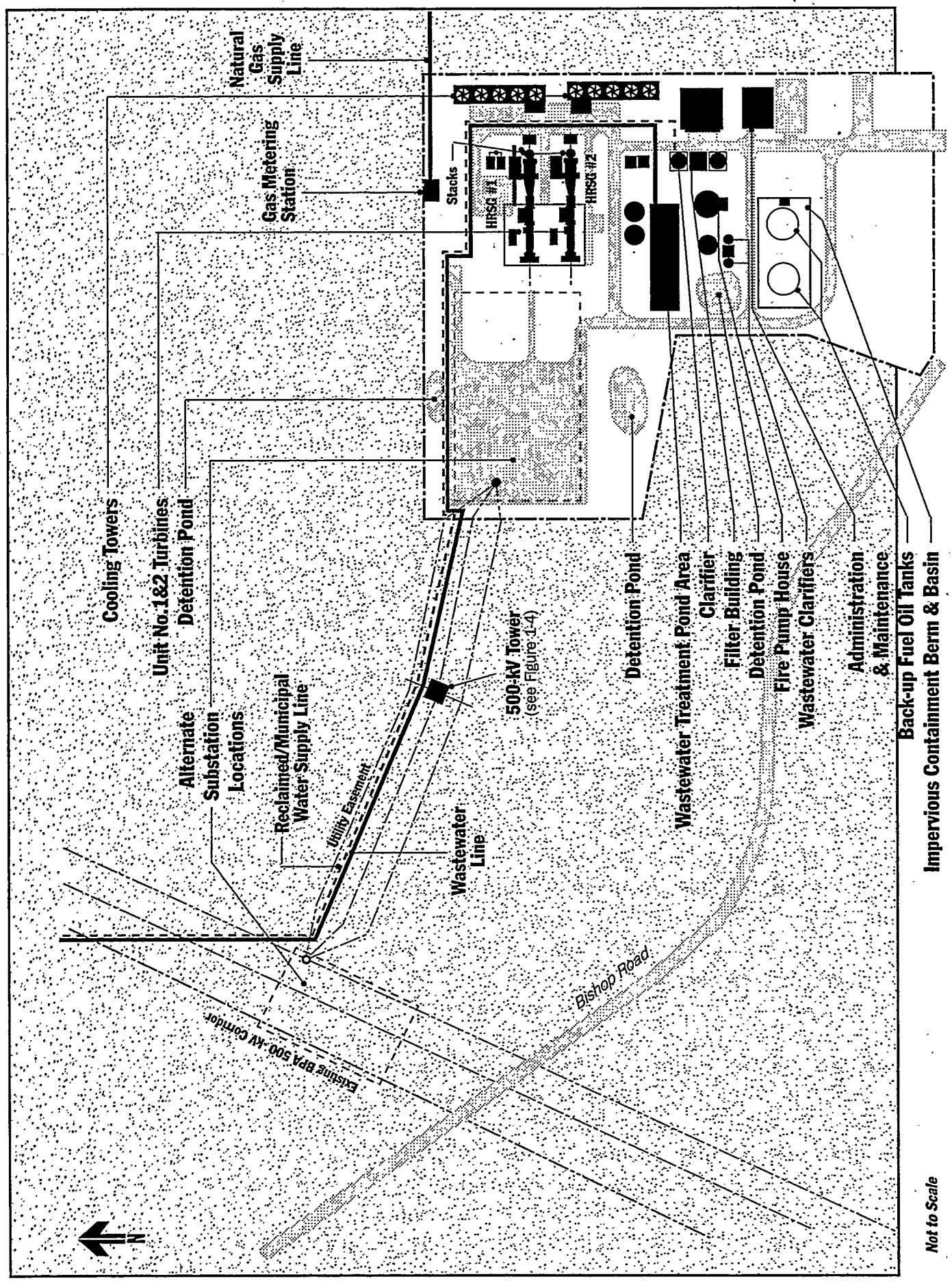


Figure 1-2 CT Facility Site Plan

Each unit would include a gas-fired combustion turbine that would generate 159 MW, an 80 MW steam turbine, a HRSG, a 60-m (225-foot) high emission stack, and required auxiliary equipment. Figure 1-3 presents a conceptual flow diagram of the combined-cycle generation process.

Facility design includes provision for excess steam to be sold to other nearby industries in the future. The evaluation of air emission and visual impacts from the proposed project take into account an auxiliary boiler (with a 60-m [225-foot] high emission stack) to be used if cogeneration takes place.

Several buildings would be constructed on site as part of the project: a turbine building (housing the gas and steam turbines, generators, and electrical room); a water treatment building; a feed water pump building; a fire pump building; and an administration building (containing the control room, offices, maintenance shop, and warehouse). The proposed site layout, including the position of these buildings, is presented in Figure 1-2.

1.2.2 Gas Supply Lines and Fuel Oil Backup Tanks

The CT facility's primary fuel would be natural gas. To connect to the natural gas supply, the project would require an underground gas pipeline connecting the CT facility to the NWP's Chehalis Compressor Station 12.9 km (8 miles) south of the facility. The connecting line would consist of two sections (Figure 1-1). A 40.6-cm (16-inch) outside diameter steel loop line would be installed parallel to and within the right-of-way (ROW) of an existing NWP lateral from the Chehalis Compressor Station north for approximately 7.2 km (4.5 miles) to a point just south of Jackson Highway. Installation of the loop line requires a crossing of the Newaukum River and a tributary of Olequa Creek (a tributary of the Cowlitz River). From this point a 30.5-cm (12-inch) outside diameter steel spur line would connect the loop line with the CT facility covering a distance of about 4.8 km (3.0 miles) (Figure 1-1).

In case of an interruption of natural gas supply (the primary fuel used), the plant design includes a backup fuel supply of No. 2 fuel oil. Fuel oil would be delivered by truck and stored in one 6,056,640 l (1.6 million gallon) storage tank for each combustion turbine unit. This would supply enough fuel for approximately 5 days of operation. In the unlikely event of a spill or leak, a containment system would be included to confine 110 percent of the contents of the tanks, including precipitation from the largest storm event for the area as required by regulations.

1.2.3 Electrical Interconnection/System Modifications

The project would require approximately 518 m (1,700 feet) of 500-kV double circuit overhead transmission line and a new substation on the CT facility site to electrically interconnect the project to BPA's adjacent Paul/Allston 500-kV Line No. 1. Power would be generated at 18-kV at the plant, with voltage increased to 500-kV at a substation located either at the northwest corner of the CT facility site or along the existing 500-kV Corridor (Figure 1-2). BPA would design and construct the substation, which would include a new 500-kV ring bus, breakers, and connections for the units. Protective relaying breakers and disconnect switches would provide control and safety protection. One steel transmission tower, located approximately midway between the CT facility

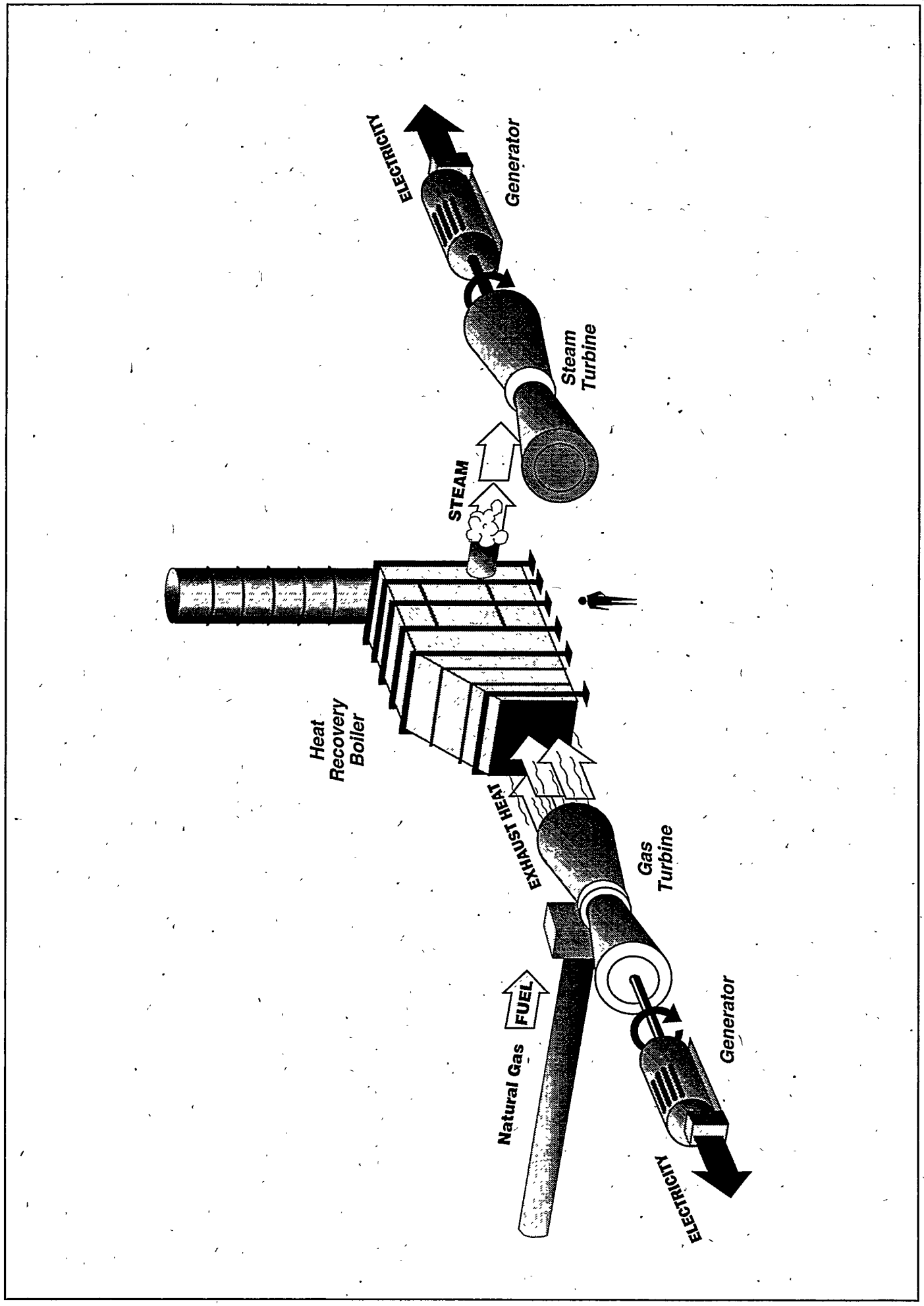


Figure1-3 Combined Cycle Combustion Turbine Process

site and the BPA corridor, would be required for the interconnect. The tower configuration is shown in Figure 1-4.

1.2.4 Water Supply System

The proposed CT facility requires a water supply to replace evaporated cooling water. The cooling water is used to condense steam, and reject heat to the atmosphere. Make-up water requirements vary with outside air temperatures, with more water required during the warmer months. During the winter the CT facility would require an average of 5,697 liters per minute (lpm) (1,505 gallons per minute [gpm]), and during the summer an average of 8,385 lpm (2,215 gpm). Anticipated average discharge of process water from the facility would be 386 lpm (102 gpm) and 1,162 lpm (307 gpm) during winter and summer, respectively.

Three water sources are proposed to supply water to the facility, ranked in the following priority:

(1) Reclaimed water from the city of Chehalis wastewater treatment plant (WWTP) effluent;

(2) City of Chehalis municipal water from the Chehalis River; and

(3) Well water from a 15.2-m (50-foot) thick, deep aquifer, 93.9 m (308 feet) below the ground surface at the CT facility site.

Water Management Plan

Availability of reclaimed water and municipal water is lower in the summer than in the winter. Therefore, a combination of water supply from the above three sources would be necessary to meet project needs. The proposed water management plan for the project is described below for winter and summer, and is depicted in Figure 1-5.

Winter (October to March). During the winter the primary source would be reclaimed water from the city of Chehalis WWTP, furnishing a monthly average of 4,183 lpm (1,105 gpm). The remaining water would be city of Chehalis municipal water, supplying a monthly average of 1,514 lpm (400 gpm). The fluctuations of required make-up water and available reclaimed water during this period would be covered by the use of municipal water from the city of Chehalis. Both the Chehalis WWTP and the river are running at very high levels during this period.

The anticipated winter wastewater discharge to the Chehalis Wastewater System would be 386 lpm (102 gpm). After treatment the wastewater would be returned to the city's WWTP outfall system (Figure 1-5).

Summer (April to September). The CT facility's summer average water requirement of 8,385 lpm (2,215 gpm) would be supplied by the city's WWTP providing 2,574 lpm (680 gpm) of reclaimed water, supplemented by city municipal water at a rate of 5,811 lpm (1,535 gpm). Fluctuations in available reclaimed or municipal water would be compensated by use of up to 7,223 lpm (1,908 gpm) from four planned wells.

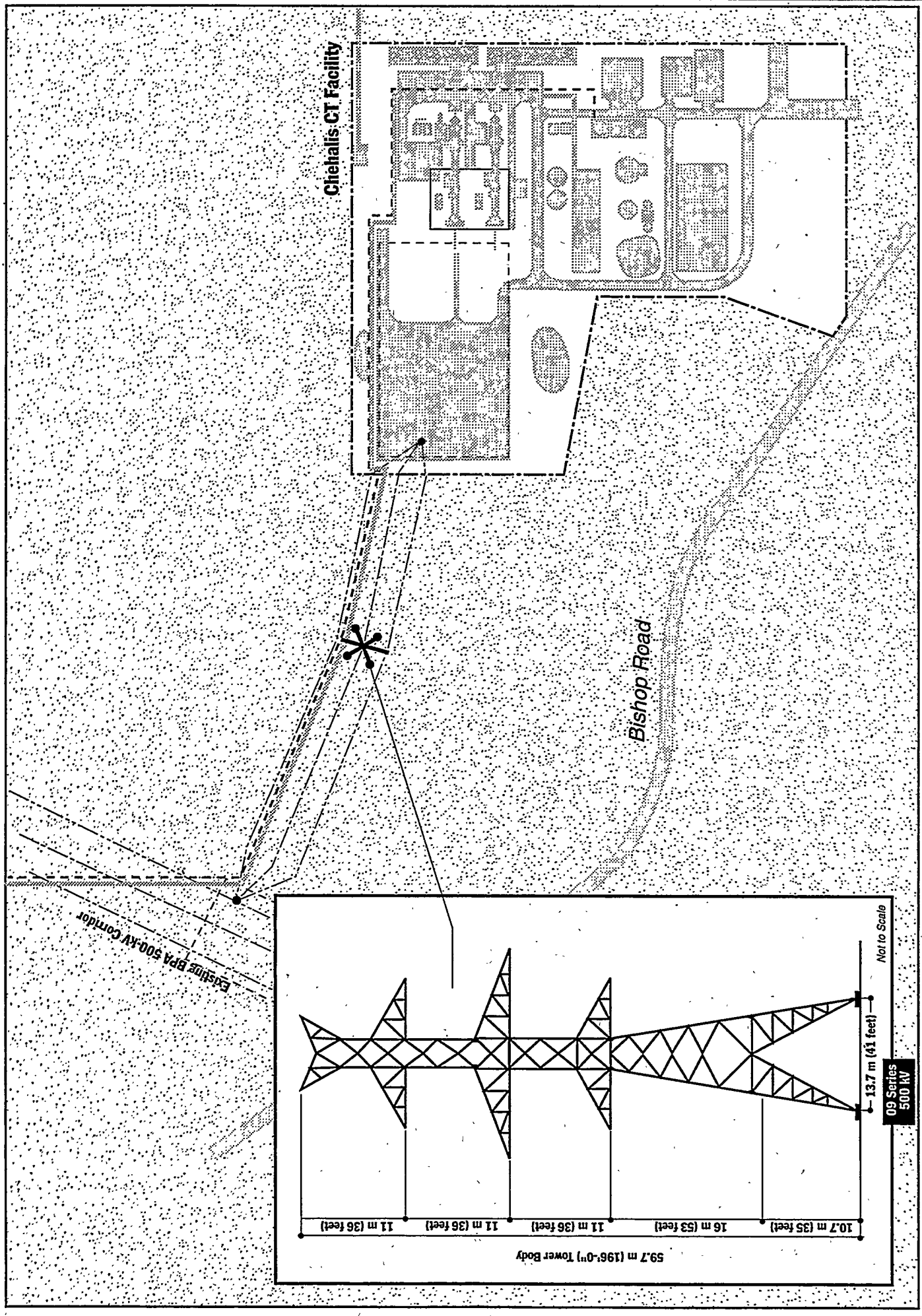


Figure 1-4 Transmission Tower and Right-of-Way Location

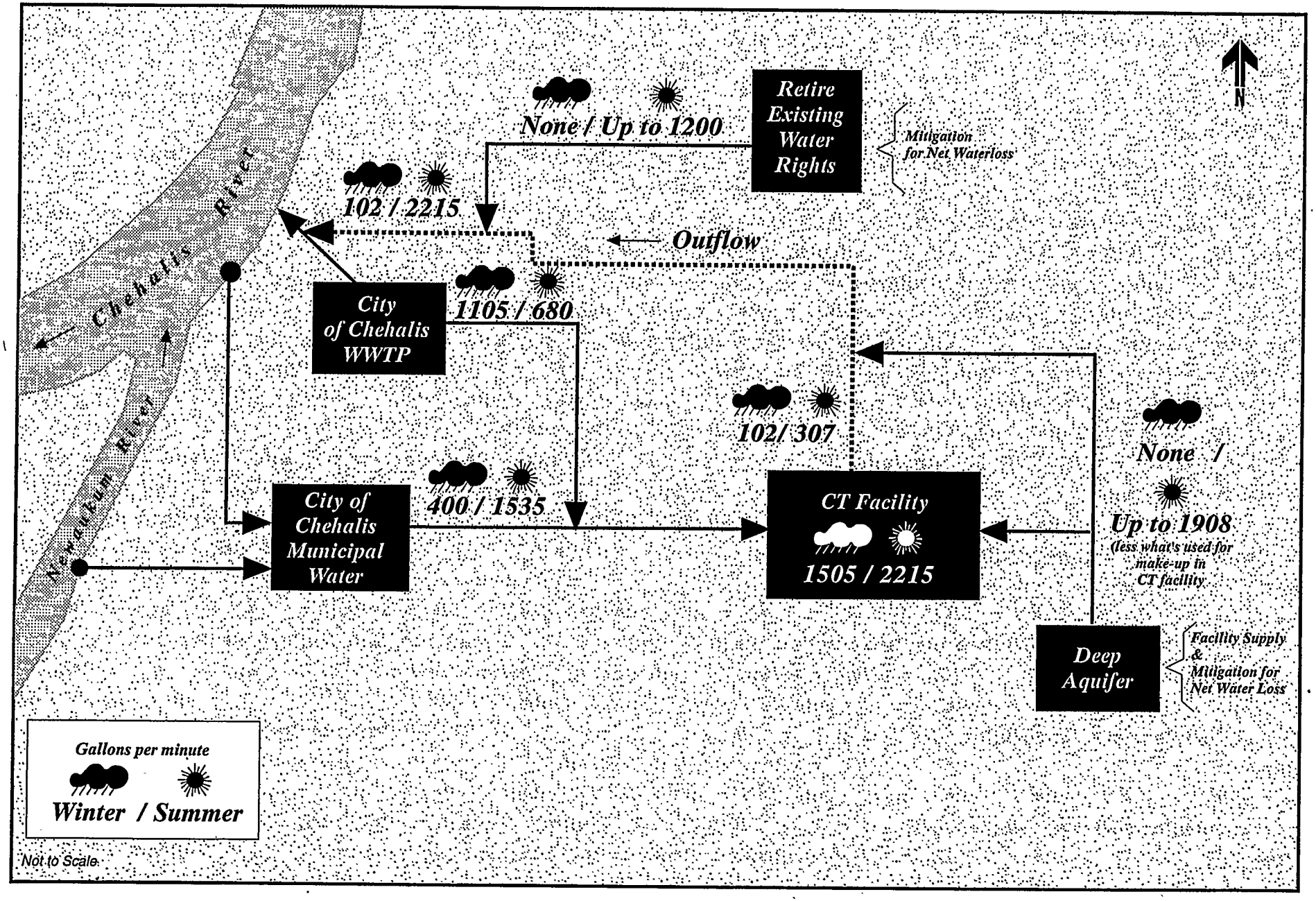


Figure 1-5 Chehalis Water Supply/Wastewater Management Plan

The Chehalis River summer water level would be lowered by the removal of the reclaimed water and municipal water to supply the facility. The following actions are anticipated to help restore river levels:

(1) A credit would be taken for the 1,162 lpm (307 gpm) of wastewater discharge returned to the Chehalis River.

(2) Existing irrigation water rights of at least 4,542 lpm (1,200 gpm) could be purchased or optioned (and retired) to raise the river water level during the summer.

(3) Groundwater could be pumped from the four planned wells, treated, and added to the wastewater stream from the facility (Figure 1-5). The anticipated groundwater supply (up to 7,223 lpm [1908 gpm]) could be used both for Chehalis River flow augmentation as well as water supply for the CT facility.

Water Treatment

Raw water supplied to the CT facility would be pre-treated before use in the internal power and cooling cycles. Treatment includes initial clarification and softening of the raw water supply in a clarifier system. A combination of aluminum sulfate, lime, and soda ash would be used to precipitate hardness and phosphates, and to flocculate suspended solids. The precipitated solids would be dewatered through a filter press and sent to a licensed landfill; the clarified water would then be pH adjusted, chlorinated, and filtered. Treated water would be sent to storage for use as make-up water for the cooling towers, general process, and boiler make-up.

Water Supply and Wastewater Pipelines

Three pipelines are proposed to be constructed: two for make-up water supply and one for wastewater disposal. All three pipes are to be 40.6-cm (16-inch) diameter, laid parallel, and buried in a single 6.4-m (21-foot) wide by 1.2-m (4-foot) deep trench approximately 8.9 km (5.5 miles) long. One supply line would convey water between the Chehalis WWTP and the proposed CT facility. The other supply line would convey water from the city of Chehalis municipal water system. The wastewater disposal line would convey process wastewater from the CT facility to the existing city WWTP outfall line to the Chehalis River.

1.2.5 Wastewater Treatment System

Prior to discharge, process wastewater from project operations (such as cooling tower blowdown, demineralizer neutralization sump, and other processes) would be sent through a treatment system consisting of three connected detention ponds, each with a capacity of 519,735 l (137,300 gallons), yielding a combined detention time of 48 hours. In addition to process wastewater, the detention ponds would also collect wastewater from interior floor drains, equipment drains, and stormwater drainage. The first pond would be used for high temperature anaerobic treatment; the second would provide air injection for biological aerobic treatment; the third would be used for radiational and convective cooling and effluent polishing. After treatment to remove any metals and other contaminants, and to regulate temperature, the water would be piped to the existing city of Chehalis WWTP outfall line to the Chehalis River.

1.2.6 Stormwater Collection

Stormwater drainage would be collected in on-site detention ponds sized to contain the volume of runoff generated during the 2-year, 24-hour rainfall event. All of the areas would be dry ponds, detaining stormwater only during and shortly after a rainfall. Stormwater collected within hazardous material secondary containment areas would be retained by normally closed, valved outlets. This stormwater would be routed to the storm drainage system in a manner consistent with local, state, and Federal regulations.

1.3 Operating Schedule

The CT facility would operate as directed by the BPA dispatcher. The facility would be designed to be taken off line or run at reduced rates as needed to support BPA system requirements. To minimize BPA generation costs, the facility could be shut down when adequate lower cost hydroelectric power is available. Each unit at the plant can be operated between 60 to 100 percent of rated output to allow BPA to firm its hydroelectric system and match capacity loads. The plant's operating schedule would change seasonally and daily depending largely on the availability of water for hydroelectric generation and changes in hydroelectric system operations made to enhance fish passage. For purposes of evaluating impacts, water use, and discharge and air emissions are based on worst-case operating scenarios.

1.4 Construction Schedule

Construction could begin between 1995 and 2005, depending on BPA's need for electricity. The CT facility would be constructed over a 24-month period, including a 5-month period for engineering and design. Site preparation would require conventional construction equipment, including bulldozers, front-end loaders, trucks, tractor-scrapers, and graders. After site preparation, the combustion turbines, generators, electrical and other equipment, and support facilities of the power plant would be installed. Electrical transmission lines, and wastewater and water supply lines would be installed during the 24-month construction period.

1.5 Decommissioning

The Chehalis Generation Facility would have a life expectancy of 30 to 40 years. If the proposed power plant were to reach the end of its useful life, it would be renovated or decommissioned. If the power plant were to be decommissioned, all structures and equipment at the power plant site would be dismantled and removed. Transmission interconnection lines and structures would also be dismantled and removed, and pipelines would be capped and abandoned or removed.

2.0 AFFECTED ENVIRONMENT, CHEHALIS

2.1 GEOLOGY, SOILS, AND FLOODPLAINS

2.1.1 Regional Geology

The proposed project is located in the north-south trending Puget Lowlands physiographic province of western Washington. This wide expanse of low hills, flat terraces, and river valleys lies between the south Cascades Range to the east and the Willipa Hills of the Coast Range to the west. The site lies beyond the farthest southern extension of Pleistocene (2 million years before present [m.y.BP] and younger) glaciation.

Alluvial glacial outwash overlies older lake, river, and marine sediments near Chehalis, Washington. This reflects Pleistocene glacial advances from the north and east that supplied sediment to area rivers. A thick sequence of sediment appears to have filled the Puget Lowlands since the Miocene (5 to 24 m.y.BP) (McCrumb et al. 1989).

Collision of crustal plates has dominated the geologic development of the Pacific Northwest for the last 60 million years. Eastward subduction of the Juan de Fuca Plate below the North American Plate along the Cascadia Subduction Zone (CSZ) produced the basin in which the sediment filling the Puget Lowlands was deposited. The plate boundary and its associated structures are sources of stress that produce earthquakes in this region.

2.1.2 Project Vicinity Geology

CT Facility Site and Electrical Transmission Line

The CT facility site rests on a nearly flat surface about 75 m (250 feet) above mean sea level (msl). Berwick Creek is located about 91 m (300 feet) south of the site while Dillenbaugh Creek is approximately 914 m (3,000 feet) to the north. The site rests on Quaternary (2 m.y.BP) sedimentary deposits, with the surface material mapped as sand and gravel outwash of the Hayden Creek Drift (Figure 2.1-1) (Schasse 1987). Subsurface investigation has revealed 9.1 to 12.2 m (30 to 40 feet) of sand and gravel that appear to correlate with the Quaternary Logan Hill Formation (Figure 2.1-2). Below this to a depth of 94.5 m (310 feet) is a thick, stiff, hard, bluish-gray clay that appears to correspond to the Miocene (5 to 24 m.y.BP) Wilkes Formation. The 14.3-m (47-foot) thickness of sand encountered below the clay may be an interbed of the Wilkes, or the Eocene (38 to 55 m.y.BP) Lincoln Creek Formation consisting of marine sedimentary strata. Schasse (1987) notes that the Wilkes Formation is restricted to the northwest trending Napavine syncline, which roughly parallels the Newaukum River south and east of the CT facility site.

Water Supply and Wastewater Lines

The geology along the combined water supply and wastewater pipeline route is similar to the geology of the CT facility site. Topographic relief varies little as the route crosses small tributaries

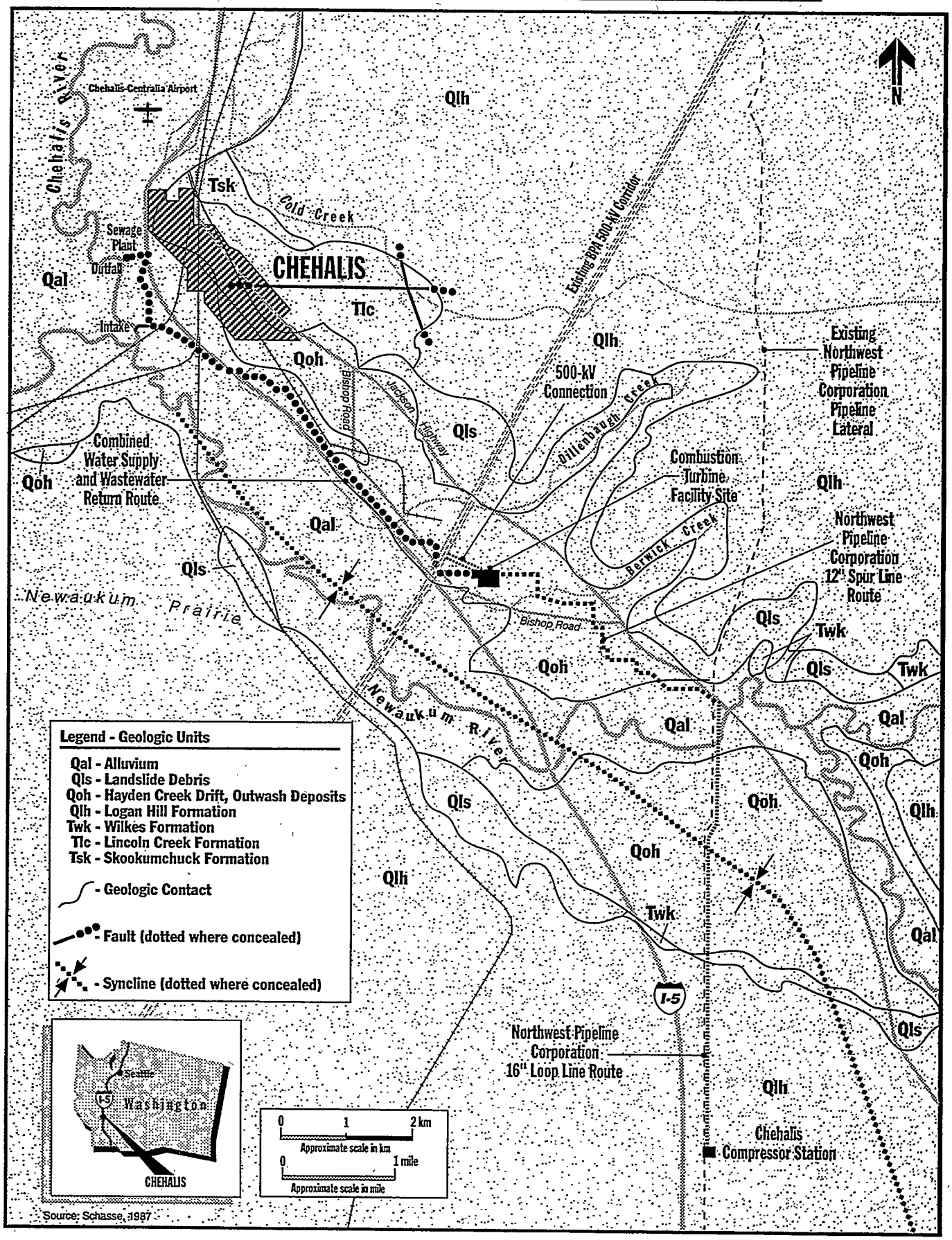


Figure 2.1-1 Project Vicinity Geology

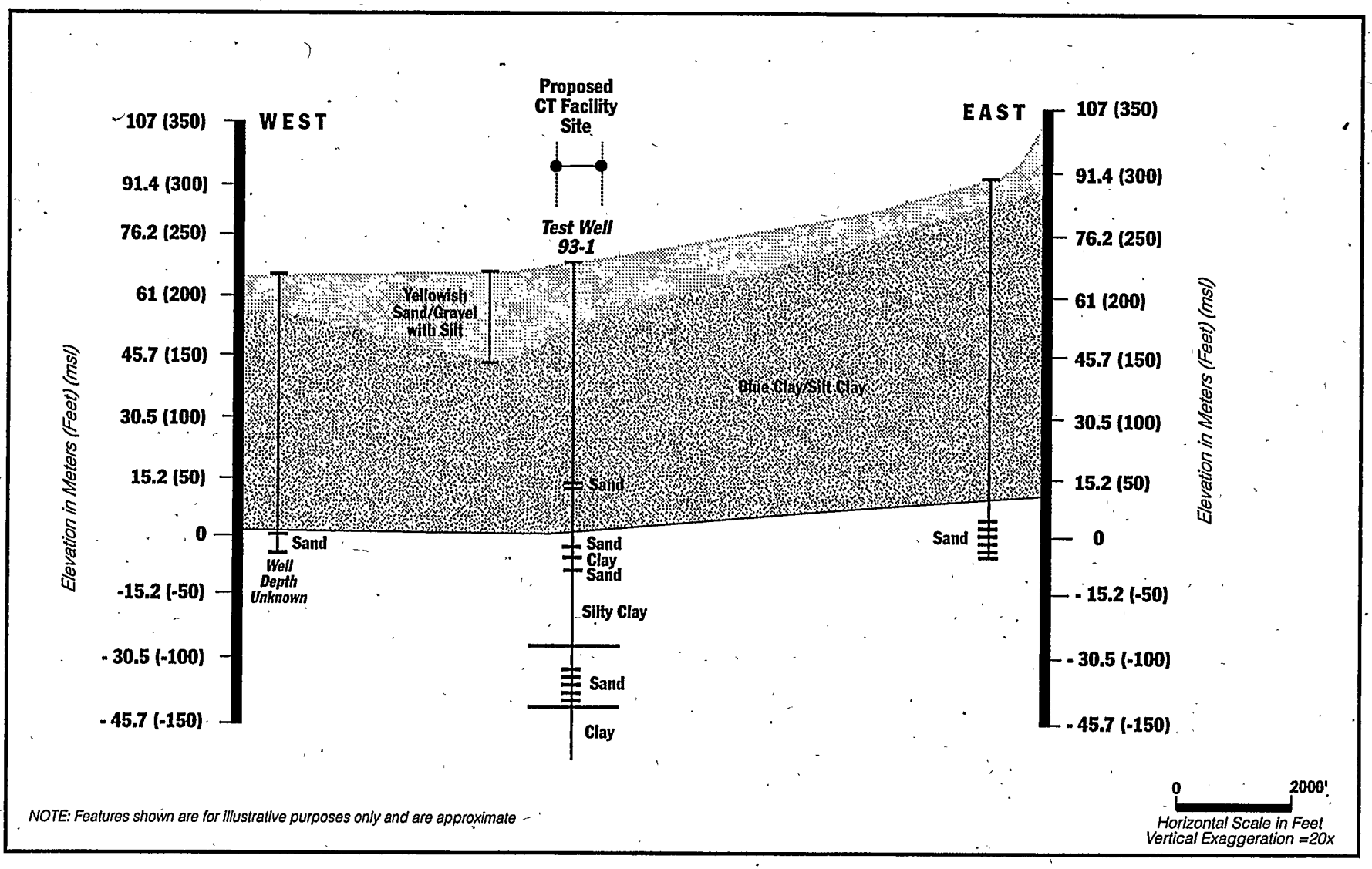


Figure 2.1-2 Subsurface Geology of Chehalis CT Facility Site

and river terraces. Near the Newaukum River, recent river deposits of sand and gravel form the surficial geology.

Natural Gas Pipeline

The geology along the natural gas pipeline route is also similar to the geology of the CT facility site. The spur line route crosses low relief topography composed of sand and gravel outwash of the Hayden Creek Drift. Recent sand and gravel alluvium covers the surface along the Newaukum River where the spur line ties in with the gas pipeline loop to the Chehalis Compressor Station.

The loop line route crosses several surficial geological units between the tie-in with the spur line and the Chehalis Compressor Station. Sand and gravel alluvium of the Newaukum River would be the first deposit crossed for about 762 m (2,500 feet). South of this, the loop line crosses the Newaukum Prairie composed of Hayden Drift Creek sand and gravel outwash. East of Napavine, the terrain rises to Jackson Prairie. This rise has been mapped by Schasse (1987) as an ancient landslide deposit that is several hundred feet wide where crossed by the route (Figure 2.1-1). South of this deposit, the remainder of the route lies in the Logan Hill Formation composed of sand and gravel outwash. One to two m (3.2 to 6.6 feet) of silt blankets the Logan Hill Formation.

2.1.3 Geologic Hazards

Landslides

A map of the slope stability of the Chehalis area documents that the project components lie in a zone of low landslide potential (mapped as stable by Fiksdal [1978]). Landslides or other forms of mass movement are unlikely to occur because of the gentle gradient of the CT facility site, water supply and wastewater pipeline routes, and transmission line route.

The gas pipeline route crosses a mapped landslide deposit east of the town of Napavine (Fiksdal 1978). This deposit extends along the topographic rise that separates the Newaukum Prairie from Jackson Prairie. Fiksdal (1978) considers this deposit stable but recommends site-specific engineering studies for construction projects where slopes exceed 30 percent.

Volcanic Activity

Four volcanos in the region have reported historic activity. Mount Rainier and Mount St. Helens are the closest, lying within 85 km (52.8 miles) of the project site. Lava flows, mudflows, pyroclastic flows, and ash fall may result from volcanic activity. Flows are unlikely to affect the project because of its distance; ash carried aloft, however, may reach the project site. Downwind ash accumulation may be in the range of 5 cm (2 inches) or more (Waldron 1989). The May 25, 1980 eruption of Mount St. Helens deposited 0.8 cm (0.03 inches) of ash in Chehalis (Schuster 1989). Drainages that the gas pipeline routes cross lie outside of watersheds draining from volcanic sources and are, therefore, unlikely to be affected by river-borne muds and floods.

Earthquakes

The project is located in a high seismic hazard zone with the potential for strong earthquake ground motion. A total of 26 historic moderate to large earthquakes have been recorded in the Pacific Northwest. The largest and oldest of these was the 1872 North Cascade event estimated at

2.1.4 Soils

Characteristics

Soils in the project vicinity are one of two general groups: the Reed-Chehalis and the Salkum-Prather-Lacamas. The Salkum-Prather-Lacamas soils are very deep and formed on weathered glacial drift and mixed material of glaciofluvial or sedimentary origin. Slopes vary from 0 to 65 percent across plains, high terraces, bottom land, and ridgetops. These soils are well, moderately well, and poorly drained. Textures include silty clay loam and silt loam at the surface with silty clay and clay in the subsoil. Scamman soils form a minor component of this group.

The Reed-Chehalis soils are very deep and formed on alluvium of floodplains, abandoned river channels, and river terraces. Slope varies from 0 to 3 percent. Soils range from poorly to well drained and are subject to seasonal flooding. Textures are silty clay loam and silty clay at the surface with silty clay loam, silt loam, silty clay, and clay in the subsoil. Newberg and Alvor soils form a minor component of this group.

Soils in the project vicinity are greater than 1.8 m (6 feet) thick and display slight to moderate potential for erosion by water (Evans and Fibech 1987). This is due to the low relief of the project vicinity and clayey nature of the soils, which resist the erosive force of water. Project vicinity soils are clayey, with low to moderate shrink-swell potential (the ability of certain clay minerals to change volume as they absorb water). Table 2.1-1 lists the characteristics of the soils associated with project components. The clayey soil of the CT facility site is underlain by a 9.1- to 12.2-m (30- to 40-foot) thick layer of sand and gravel that overlies a thick clay layer extending to a depth of about 94.5 m (310 feet). The soils along the water and gas pipeline routes are similar (Table 2.1-1). Most are silty clay loams and silt loams. Soils such as the Newburg fine sandy loam and the Chehalis clay loam belong in the Reed-Chehalis group, which formed in alluvium along water courses. Erodibility is moderate where slopes are steep. Locally, water perches above a subsoil during winter and early spring in the Scamman, Prather, and Chehalis soils. The Lacamas, Salkum (0 to 5 percent), Reed, and Alvor soils may be flooded during winter and early spring. Shrink-swell potential is low to moderate along the pipeline routes.

Prime Farmland

Project vicinity soils are considered prime farmland with the exception of the Salkum (>5 percent slope), Scamman (>5 percent slope), and Xerothents along the gas and water line routes (Evans and Fibech 1987). All soils of the CT facility site, electrical transmission line, water supply and wastewater lines are designated prime farmland. Ninety-five percent of the gas spur line (4 km [2.5 miles]) and gas loop line (9.6 km [6 miles]) occupies prime farmland. Not all the prime farmland, however, is currently being used for agricultural production.

2.1.5 Floodplains

As shown in Figure 2.1-3, no floodplains as defined by the Federal Emergency Management Agency (FEMA) occur on the CT facility site. The proposed water supply and wastewater lines occupy portions of the 100-year floodplain where they cross Dillenbaugh Creek and along Interstate 5 (I-5).

Magnitude (M)=7.3. During this century, three events greater than M=7 have occurred in this region: the 1918 M=7.0 and 1947 M=7.3 central Vancouver Island events, and the 1949 M=7.1 event near Olympia, Washington, centered about 40 km (25 miles) from the proposed CT facility site. The most recent large event (M=6.5) occurred in 1965 between Seattle and Tacoma.

Several regional seismic sources are identified as being capable of generating moderate to large earthquakes in the project vicinity. These sources include: (1) the interplate and intraplate CSZ, and (2) structures within the crust of the North American plate. The interplate CSZ marks the boundary between the North American and Juan de Fuca plates and is approximately 100 to 150 km (60 to 90 miles) wide and located 10 to 40 km (6.2 to 25 miles) beneath the coastal areas of the Pacific Northwest. Earthquakes associated with the intraplate CSZ have occurred within the subducted Juan de Fuca Plate at depths of 35 to 90 km (22 to 56 miles). The 1949 Olympia and the 1965 Seattle-Tacoma earthquakes occurred in the intraplate CSZ and were M=7.1 and M=6.5, respectively. Seismic data indicate that intraplate earthquakes of $M \geq 4$ from 1970 through 1990 occurred at a depth greater than 45 km (28 miles) (Weaver and Shedlock 1991).

Several structures within the crust of the North American plate are capable of producing significant earthquakes and include: the Olympia, Nisqually, Hood Canal, and Shelton lineaments; the Seattle fault; and the Mount St. Helens seismic zone (Rogers 1988, Buckman et al. 1992). Of these sources, the Mount St. Helens seismic zone is closest to the project (40 km [25 miles]) and is estimated to be capable of generating an earthquake of M=7.25.

Reasonable estimates of magnitudes for the interplate and intraplate CSZ events are M=8.5 and M=7.5, respectively. The peak ground acceleration (PGA) estimated for the project vicinity from these two events is on the order of 0.3 gravity (g) (0.3 g indicates that the horizontal acceleration during an earthquake would equal 30 percent of the vertical acceleration due to the force of gravity). This level of ground motion is consistent with the design levels associated with the Uniform Building Code (UBC) Seismic Zone 3. Seismic zones are ranked from 0 to 4, with 4 including areas expected to have major damage because of their proximity to major fault systems, and 0 indicating little or no risk. The project is, therefore, considered at moderate to high risk of earthquake damage.

Liquefaction is a phenomenon in which loose to medium-dense, saturated granular soils lose their shear strength during dynamic loading (usually an earthquake) and behave as a fluid. Liquefaction can have adverse effects on building foundations, resulting in settlement and loss of structural integrity. Buried pipelines may be affected by the buoyant effect of the liquefied soil causing the pipeline to rise or sink depending on whether the buoyant force on the pipeline is greater or less than the weight of the pipeline. The gas pipeline route passes through several areas susceptible to liquefaction, which include the Newaukum River Valley and other streams. Alluvium in these areas is composed of loose saturated sand; this type of deposit has liquified during moderate to large earthquakes.

Table 2.1-1. Soil Types Associated with Project Components

Component	Ha (Acres)	Prime Farmland	Water Potential Erosion
CT Facility Site			
118 Lacamas	12.0 (30.1)	Yes	Low
193 Scamman (0-5%)	2.75 (6.8)	Yes	Low
Electrical Transmission-Lines			
118 Lacamas	—	Yes	Low
193 Scamman (0-5%)	—	Yes	Low
Water/Wastewater Lines			
118 Lacamas	21 (5.2)	Yes	Low
193 Scamman (0-5%)	2.8 (6.9)	Yes	Low
172 Reed	13.3 (32.9)	Yes	Low
48 Chehalis	5.2 (12.9)	Yes	Moderate
148 Newberg	0.8 (2.0)	Yes	Low
247 Xerothent	0.28 (0.7)	No	Moderate-High
167 Prather	0.97 (2.4)	Yes	Low
Gas Spur Line			
118 Lacamas	6.4 (15.7)	Yes	Low
193 Scamman (0-5%)	1.98 (4.9)	Yes	Low
187 Salkum (0-5%)	0.69 (1.7)	Yes	Low
173 Reed	2.6 (6.5)	Yes	Low
Gas Loop Line			
1 Alvor	0.48 (1.2)	Yes	Low
148 Newberg	0.65(1.6)	Yes	Low
187 Salkum (0-5%)	2.26 (5.6)	No	-
118 Lacamas	5.26 (13.0)	Yes	Low
167 Prather	13.3 (32.8)	Yes	Low
193 Scamman (0-5%)	1.29 (3.2)	Yes	Low
194 Scamman (5-15%)	0.48 (1.2)	No	Moderate
188 Salkum (5-15%)	1.13 (2.8)	No	Moderate
189 Salkum (15-30%)	0.16 (0.4)	No	Moderate
48 Chehalis	0.4 (1.0)	Yes	Moderate

Note: No shallow, stony, dry, unstable, hardpan, or alkali soils occur in the project vicinity. In addition, no soils susceptible to wind erosion occur.
Source: Evans and Fibech 1987

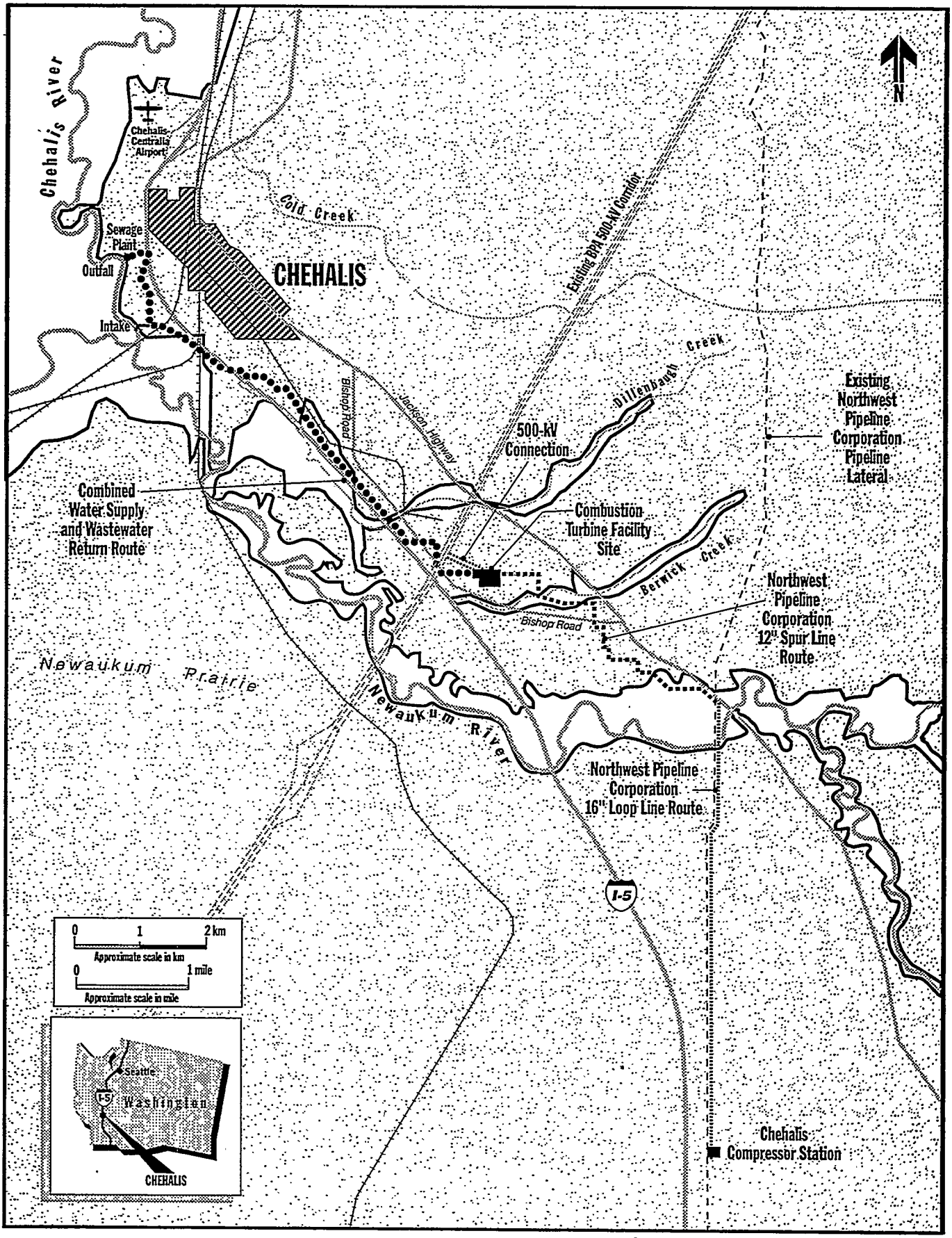


Figure 2.1-3 100-year Floodplain Diagram

The proposed gas spur line crosses the floodplain of Berwick Creek and enters the floodplain of the Newaukum River at the junction with the gas loop line. Numerous small tributaries are crossed by the gas loop line between the tie-in with the spur line and the connection to the Chehalis Compressor Station, although floodplains of these tributaries have not been delineated by FEMA.

2.2 WATER RESOURCES

2.2.1 Water Availability

Surface Water

The Chehalis River near Chehalis has a mean annual discharge of 57.94 cubic meters per second (cms) (2,046 cubic feet per second [cfs]) (3,476,156 lpm [918,306 gpm]). The flow is high during the winter-wet season and low during the summer dry season. The mean monthly Chehalis River stream flows at Chehalis are shown in Figure 2.2-1. The Chehalis River intake for the city of Chehalis water supply is immediately downstream of the confluence of the Newaukum River. Three pumps provide a total withdrawal capacity of 0.283 cms (10 cfs) (16,989 lpm [4,488 gpm]) at this intake. The city of Chehalis owns rights to withdraw 0.425 cms (15 cfs) (25,483 lpm [6,732 gpm]) from the Chehalis River.

The Newaukum River has a mean annual discharge of 14.04 cms (496 cfs) (842,706 lpm [222,620 gpm]). The seasonal flow pattern is the same as the Chehalis River. The mean monthly Newaukum River discharges at Chehalis are shown in Figure 2.2-2. The Newaukum River intake for the cities of Chehalis and Centralia water supply is upstream from the proposed CT facility site. The City of Chehalis owns rights to withdraw 0.123 cms (4.34 cfs) (7,374 lpm [1,948 gpm]) from the Newaukum River at this intake.

The frequency of low flows in the Chehalis River is shown in Table 2.2-1. The Washington Department of Ecology (Ecology) requires a 4.67 cms (165 cfs) (280,335 lpm [74,057 gpm]) minimum flow in the Chehalis River between the Newaukum River and the Grand Mound gaging station from August 15 through October 1 (Washington Administrative Code [WAC] 173-522-020). According to the low-flow statistics, the mean monthly Chehalis River flow drops below the minimum required late summer/early fall baseflow for about 1.5 months each year. If this occurs, water withdrawals from the Chehalis River could be disallowed. The minimum baseflow required during late summer/early fall at the mouth of the Newaukum River is 0.99 cms (35 cfs) (59,465 lpm [15,709 gpm]). The mean daily Newaukum River flow also drops below the required baseflow at least once a year.

The city of Chehalis daily municipal water demand peaks in August and September. The primary source is the Newaukum River. The city withdraws water from the Chehalis River only after its demands exceed its water right allocation on the Newaukum River. Currently, the city water demand exceeds the maximum allowable Newaukum River withdrawal during the summer daily peak periods. The city's water demand and reliance on the Chehalis River for supply is expected to increase by 68 percent in the next 20 years (Chehalis Power, Inc. [CPI] 1994).

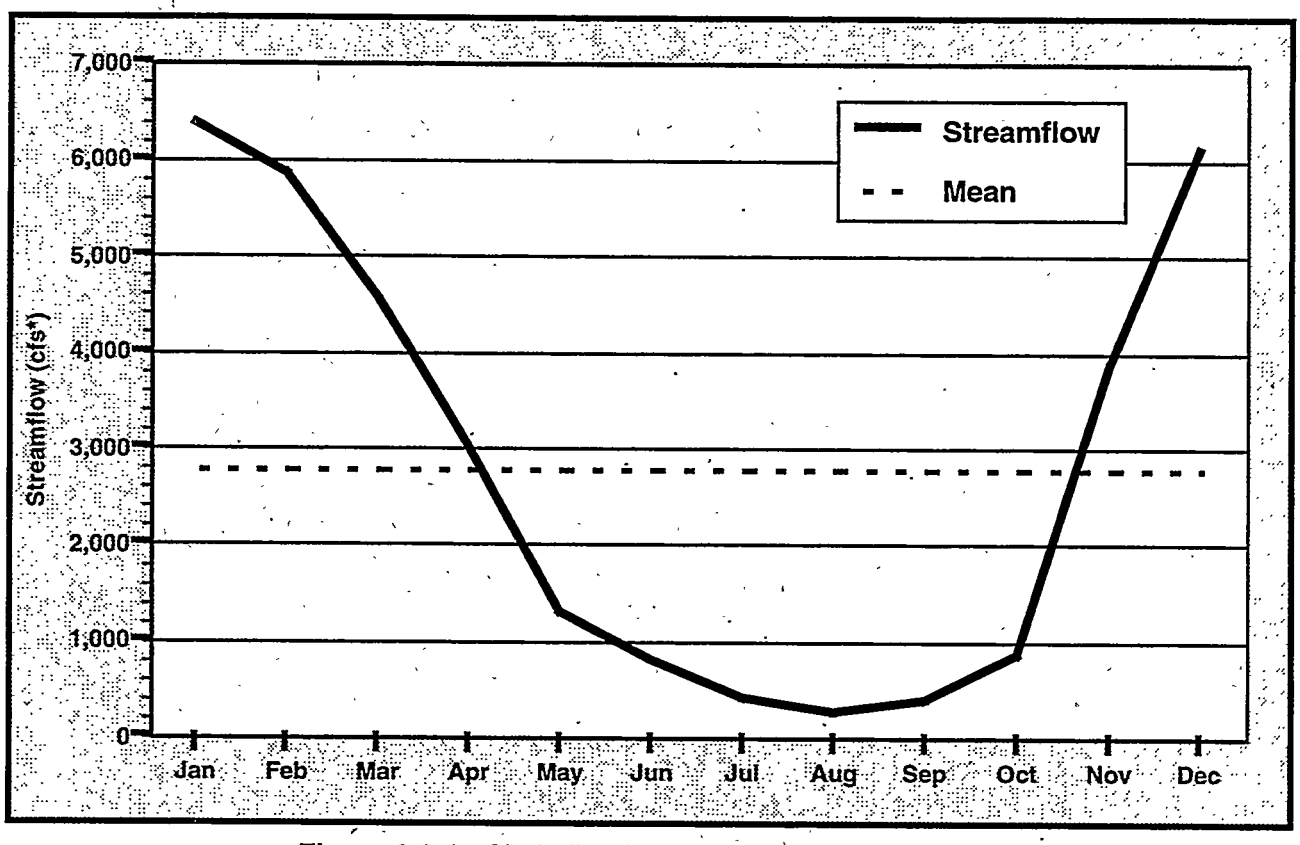


Figure 2.2-1 Chehalis River Average Monthly Streamflow, Year: 1929-1992

* cfs x 0.028317 = cms cfs x 448.83 = gpm cfs x 3.7854 = lpm

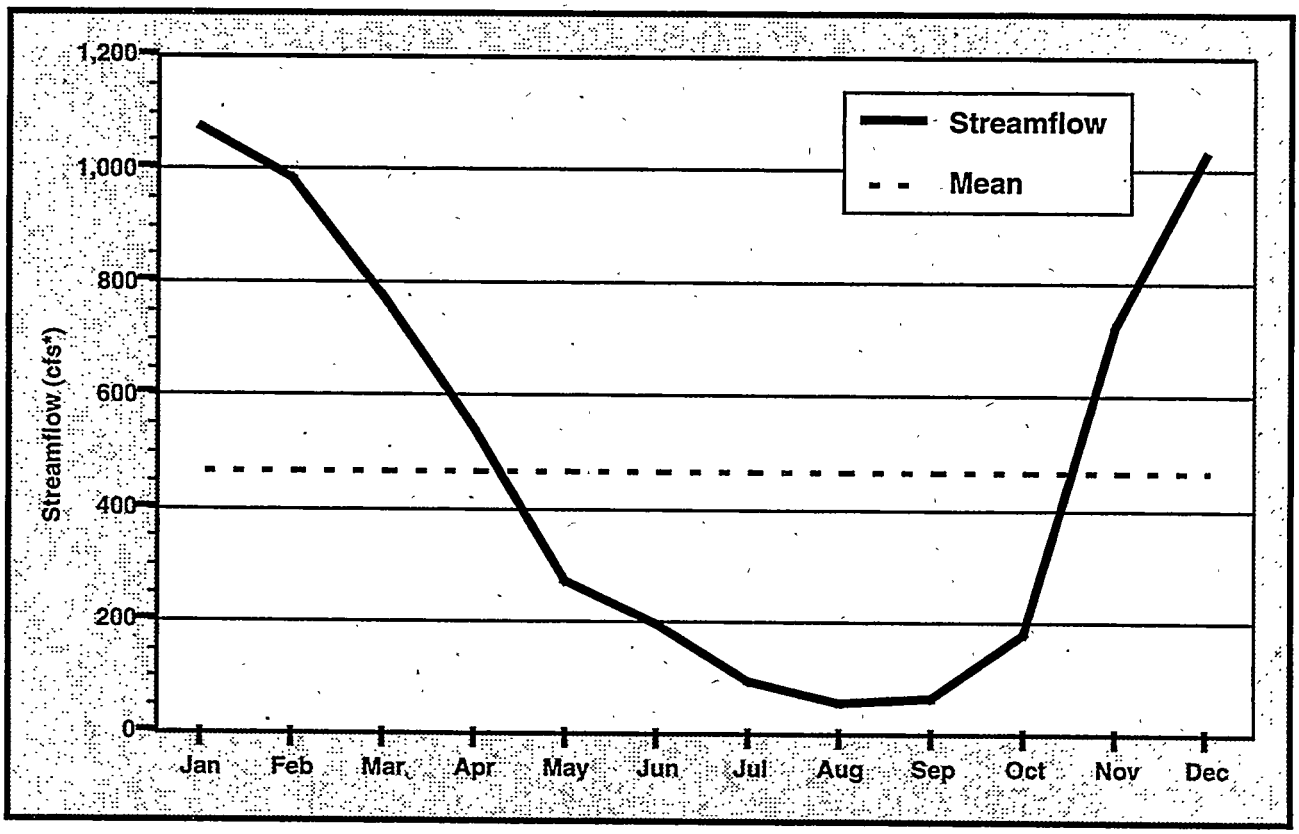


Figure 2.2-2 Newaukum River Average Monthly Streamflow, Year: 1929-1992

Table 2.2-1. Estimated Low Streamflow–Chehalis River at Chehalis

Return Period	5-year cms (cfs)	10-year cms (cfs)	50-year cms (cfs)	100-year cms (cfs)
1-day Low Flow	2.7 (94)	2.3 (82)	1.9 (66)	1.7 (61)
7-day Low Flow	2.8 (99)	2.5 (87)	2.0 (69)	1.8 (64)
30-day Low Flow	3.2 (113)	2.8 (99)	2.2 (79)	2.8 (100)

Groundwater

A shallow and deep aquifer underlie the CT facility site. The deep aquifer is confined by a 80.8-m (265-foot) thick layer of blue clay to silty-clay soils. The aquifer soils comprise sand and gravel channels that may or may not be interconnected. Currently, about 61 m (200 feet) of head exists in the deep aquifer. Head in the deep aquifer has declined approximately 15.2 m (50 feet) since the 1940s due mainly to the increase in the number of installed pumping wells. In May 1994, a 7-day pump test was performed to test the hydraulic properties of the deep aquifer. A test water production well and observation wells were installed on and near the CT facility site for the pump test.

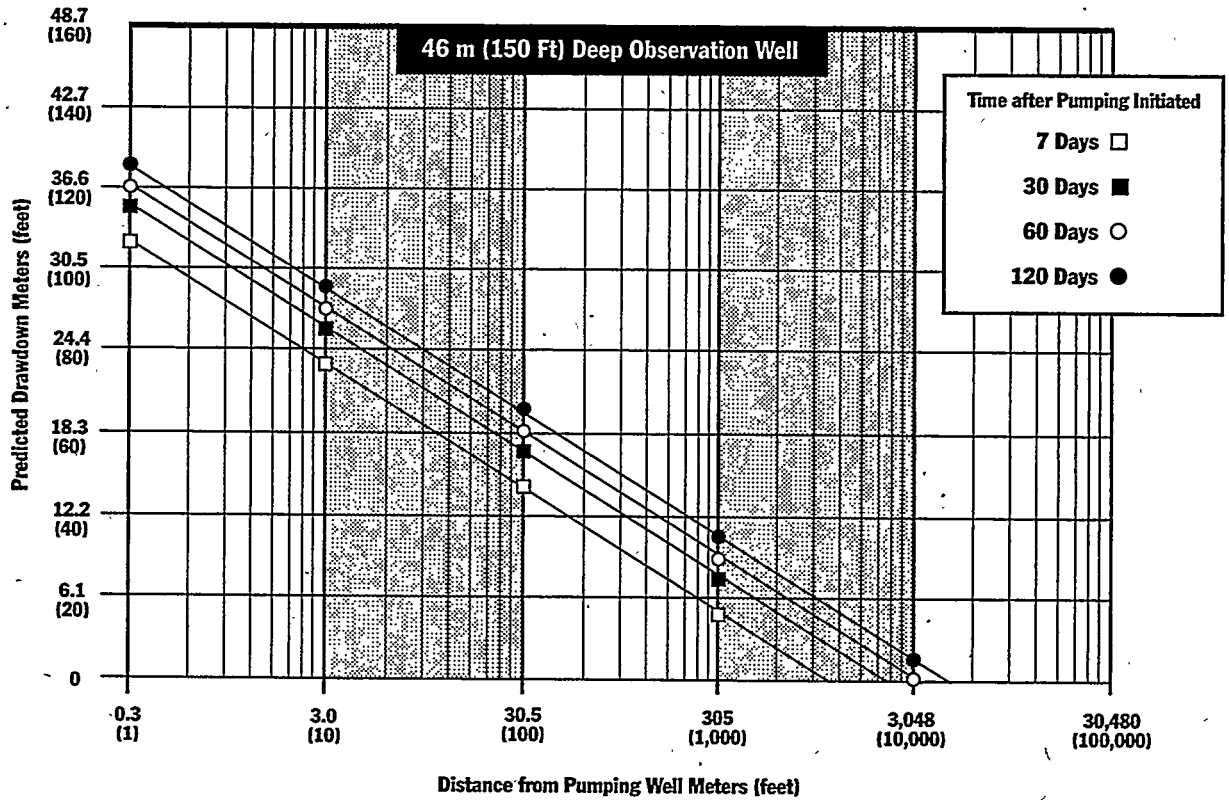
During this pump test, the 106.7 m (350 feet) deep production well pumped a maximum of 1,893 lpm (500 gpm) for 7 days. Drawdowns were measured in the observation wells and in several privately owned wells located within 640 m (2,100 feet) of the production well. A well located 304.8 m (1,000 feet) away and screened at the same elevation as the test well was drawn down 12.2 m (40 feet) or about 5 percent of currently available head. The drawdown in these wells ranged from 0.46 m (1.5 feet) to 1.83 m (6 feet) during the pump test.

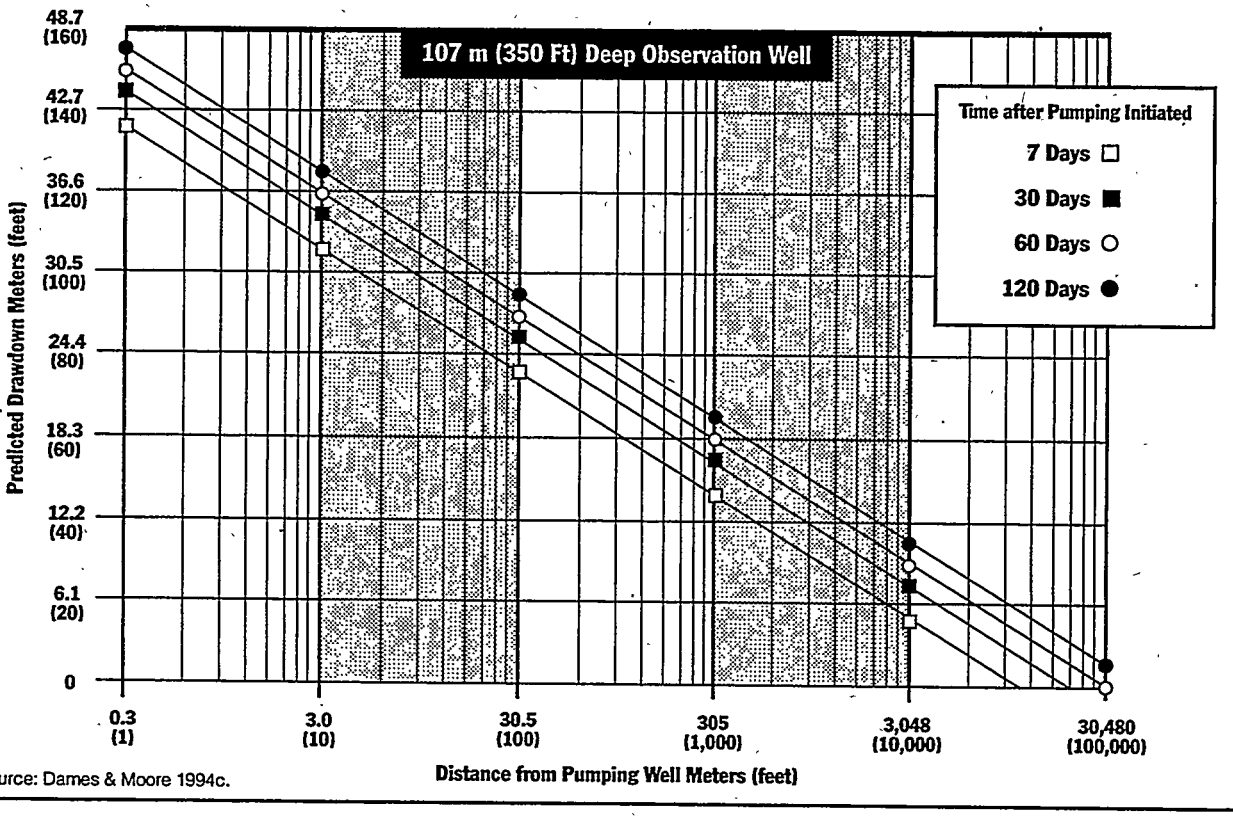
The test results showed that the test well could pump 1,893 lpm (500 gpm) for 60 days with a drawdown of about 45.7 m (150 feet) at the bottom of the well. This is 60 percent of the existing 76.2 m (250 feet) of available head. The drawdowns at local wells would be less than 45.7 m (150 feet), depending on their horizontal and vertical distance from the production well (Figure 2.2-3).

Recovery of head during the pump test was not complete. The test well recovered 90 percent, and local wells recovered 60 to 70 percent within 7 days after the end of test well pumping. Water levels take considerably longer to recover after pumping compared to the elapsed time of the pumping. Water levels in the test and observation wells recovered within 8 months to elevations observed prior to the 1994 pump test.

The shallow aquifer underlying the CT facility site is not hydraulically connected to the deep aquifer. The shallow wells observed during the 7-day pump test did not show signs of being affected by deep aquifer pumping, and the water quality of the two aquifers are different.

Predicted Drawdowns in Observation Wells Resulting from 1,893 lpm (500 gpm) Pumping at the CGF Production Well





Source: Dames & Moore 1994c.

Figure 2.2-3 Predicted Drawdowns

2.2.2 Water Quality

Surface Water

Ecology has rated the Chehalis River at the city of Chehalis as "water quality limited." According to Ecology, the river is experiencing prolific plant growth (eutrophication) because of excessive nitrogen and oxygen demanding material loading, and high temperatures. Excessive algae and aquatic weed growth create discolored water and foul odors and consume dissolved oxygen, causing a stress environment for fish and other aquatic life. Water quality has been further aggravated by recurring elevated bacteria counts and turbidity.

Ecology has undertaken a Total Maximum Daily Load (TMDL) study of the river. The reach of the Chehalis River downstream of the confluence of the Newaukum to Centralia is similar to a lake experiencing thermal stratification during the summer months. The bottom of the river has become anaerobic because of the summer stratification. Currently, this situation is aggravated during Chehalis River low flows due to the damaged city of Chehalis sewage treatment plant outfall. Effluent pours out the bottom of the concrete structure, then is transported downstream creating a continuous plume of foam and an odor of treated sewage. This is most likely a violation of aesthetic water quality criteria. Ecology's TMDL study annually proposes to remove any discharges of biological oxygen demand (BOD) into this reach during the summer—including the city of Chehalis sewage treatment plant effluent (Ecology 1994). The study states that one possible way of removing the sewage treatment plant effluent is to use it as land spreading or for industrial use such as a power plant.

Metals in the Chehalis River could cause water quality problems, but there is a lack of consensus among the agencies on this matter. The U.S. Geological Survey (USGS) detected metal concentrations in Chehalis River water samples that appear to have exceeded standards (Ecology 1994). However, the USGS identified a bias in methods used to determine the metal concentrations in the samples. Ecology has documented industrial sources of metals in the Chehalis River, although Ecology acknowledges the possibility of elevated natural background levels of metals. Ecology believes that no conclusions can be drawn as to whether violation of metals criteria occur in the Chehalis River in the project vicinity (Ecology 1992).

Groundwater

The deep aquifer contains high concentrations of dissolved salt (chlorides) and total dissolved solids (TDS). The chloride concentrations of groundwater samples taken from the deep aquifer in April 1994 were as high as 358 milligrams per liter (mg/l), compared to the 250 mg/l drinking water standard. TDS concentrations in these same samples reached 2,140 mg/l, compared to the aesthetic standard of 500 mg/l.

Nitrogen in the deep aquifer groundwater has been detected in the form of ammonia, and nitrite/nitrate. The highest concentration of ammonia found in the deep aquifer groundwater samples was 2.59 mg/l compared to a maximum surface water standard of 10 mg/l (based on a temperature of 10°C [50°F] and a pH of 7.8). The highest nitrite/nitrate concentration in these samples was 0.225 mg/l, compared to the drinking water standard of 10 mg/l.

2.3 AIR QUALITY

2.3.1 Existing Air Emission Sources

Emissions from existing sources largely determine the air quality of the project vicinity. Within 50 km (31 miles) of the CT facility site there are only a few major sources of emissions with emission rates greater than 91 metric tons per year (MTY) (100 tons per year [TPY]) of any regulated pollutant (Table 2.3-1). Two classes of small sources are often determined to cumulatively affect existing air quality. These are mobile sources (cars and trucks) and residential wood combustion. Based on available air quality data, wood smoke and vehicular traffic in the largely rural areas surrounding the CT facility site probably do not contribute to impacts to air quality in the project vicinity.

Table 2.3-1. Major Sources of Air Emissions within 50 km (31 miles) of the CT Facility

		Emissions in MTY (TPY)					
Plant	*Location*	*TSP*	*PM_{10}*	*SO_2*	*NO_x*	*VOC*	*CO*
Centralia Mining	Centralia	549 (605)	217 (239)				
Crown Beverage	Olympia					238 (262)	
Hardel Plywood	Olympia	93 (102)	35 (39)	0.9 (1)	23 (25)	22 (24)	33 (36)
Pacific Power	Centralia	2,489 (2,744)	2,485 (2,739)	53,931 (59,449)	21,536 (23,736)	164 (181)	1,411 (1,555)
PPG Industries[1]	Chehalis	7 (8)	7 (8)	9 (10)	193 (213)	2 (2)	1 (1)
Simpson Timber	McCleary	95 (105)	72 (79)	1.8 (2)	26 (29)	14 (15)	37 (41)
Tomkins Inc.	Yelm					177 (195)	

Source: Ecology 1991
[1] Not currently in operation.

2.3.2 Meteorology and Climate

Dispersion of emitted air pollutants is governed by wind direction, wind speed, temperature (which contributes to plume rise), and the turbulence of the lower atmosphere. The climate of the Pacific Northwest is dominated by the presence of the Pacific Ocean, the position of large scale pressure systems, and the presence of local and regional terrain. The two extreme seasons in

western Washington, wet cool winters and dry warm summers, are separated by transition seasons. In the late fall and winter, low pressure systems in the Gulf of Alaska intensify and control the weather systems entering the Pacific Northwest. The prevailing flow of air during this period is from the south through the west southwest (Figure 2.3-1) and west. Air reaching the Chehalis area is cool and moist. Wintertime flows entering the region are stable and have little or no vertical motions.

In late spring and summer, clockwise circulation of air around large high pressure systems over the north Pacific Ocean results in northwest and northerly flows of air into the Pacific Northwest. This flow is directed, by the influences of high terrain, south through the Puget Sound lowlands and south and southwest through the Lewis County area (Figure 2.3-1). During the summer, long periods of sunshine and warmer temperatures create more unstable conditions in the lower atmosphere, thus providing greater dispersion. However, air flowing into the region is still marine in character, preventing the atmosphere from becoming very stable or very unstable for long periods.

During the winter, temperatures show little diurnal variation. Maximum temperatures are in the 40s (°F) and minimum temperatures are in the 30s (°F). Precipitation in the fall and winter averages 10 to 20 cm (4 to 8 inches) per month (Table 2.3-2). Daily precipitation at least 0.026 cm (0.01 inch) can be expected on about 20 days during December. Fog, with visibility range less than 0.4 km (0.25 mile), frequently occurs during this period.

Daily temperatures in the summer range from the 50s to the 80s (°F) and occasionally into the 90s (°F). Summer precipitation totals average about 2.5 cm (1 inch) or less per month (Table 2.3-2). Thunderstorms occur during the summer at a frequency of less than one day per month.

2.3.3 Existing Air Quality

Licensing major new sources of air emissions becomes more difficult if the source is located in or near an area where ambient air quality concentrations are greater than applicable Ambient Air Quality Standards (AAQS). The air quality in Lewis County achieves all local, state, and national AAQS, based on information from several air pollution monitoring stations operated within 50 km (31 miles) of the site (Table 2.3-3). The AAQS presented in Table 2.3-3 are the most restrictive of the local, state, or national standards. Some pollutants (nitrogen oxide [NO_x] and ozone [O_3]) are not monitored because of the low level of industrialization in the region. In general, the moderate temperatures and frequent cloud cover inhibit formation of photochemical ozone (smog).

Monitoring data in the Chehalis region indicate that ambient air pollution concentrations are below AAQS. Lewis County is in attainment for all criteria air pollutants. Monitoring stations are located in proximity to sources of air emissions (Longview and Olympia) and are, therefore, not representative of air quality at the CT facility site. The air quality in the area surrounding the CT facility site is probably much better than indicated by monitoring data.

Locations where pollutant concentrations are greater than the AAQS are referred to as nonattainment areas. There are several nonattainment areas in Washington State (Figure 2.3-2). King, Pierce, and parts of Snohomish and Clark counties have been designated as O_3 nonattainment

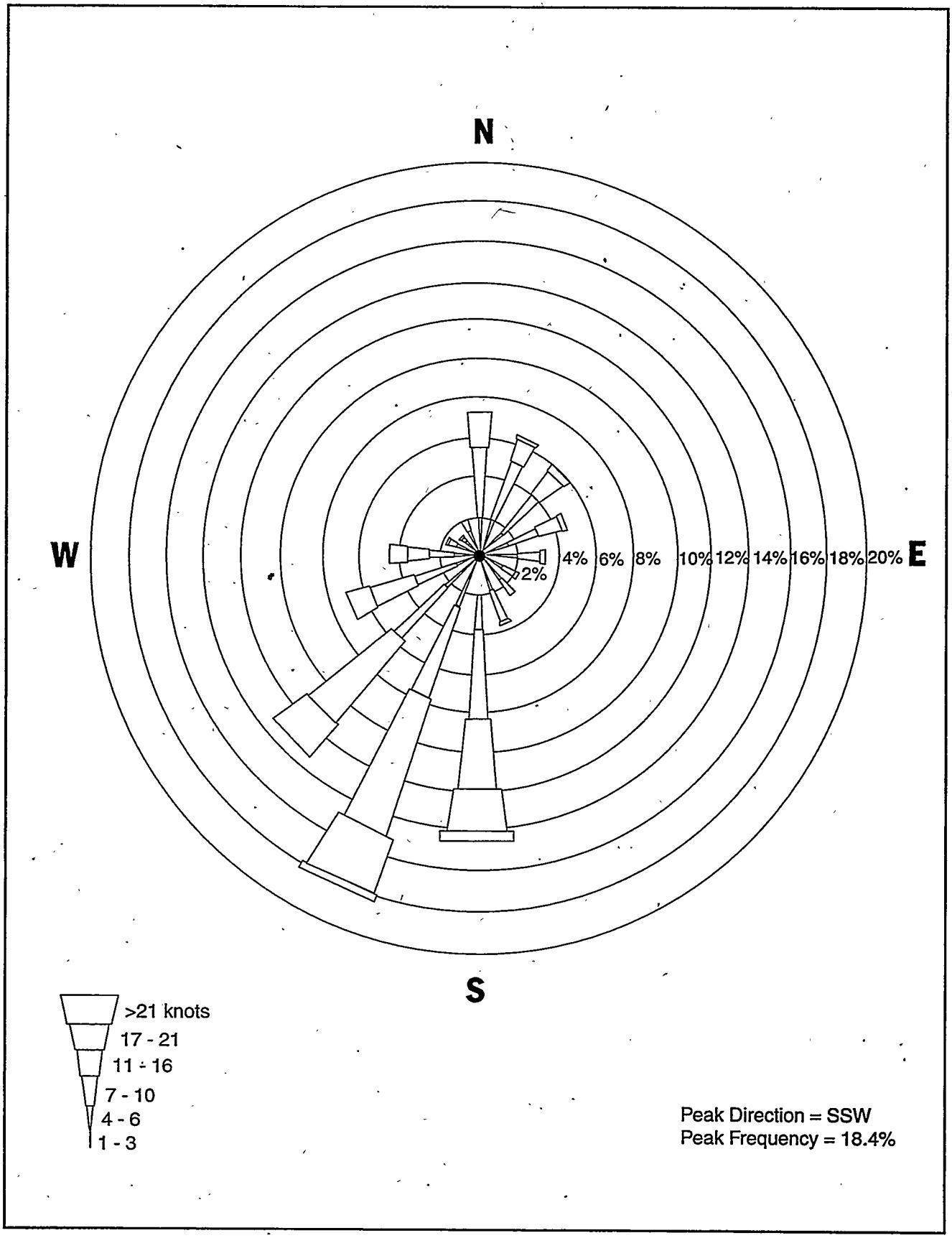


Figure 2.3-1 Olympia Airport Windrose for Combined Years 1988-1992

Table 2.3-2. Monthly Total Precipitation and Average Temperature Monitored at Centralia, Washington

Month	Total Precipitation cm (inch)	Average Temperature °C (°F)
January	18.7 (7.38)	3.9 (39.0)
February	12.6 (4.98)	5.9 (42.6)
March	12.0 (4.73)	7.0 (44.6)
April	7.6 (3.01)	9.7 (49.4)
May	5.2 (2.03)	13.0 (55.4)
June	4.5 (1.78)	15.8 (60.4)
July	2.1 (0.84)	18.2 (64.8)
August	3.7 (1.46)	17.9 (64.3)
September	5.6 (2.22)	15.7 (60.2)
October	10.5 (4.13)	11.3 (52.3)
November	16.4 (6.44)	7.1 (44.7)
December	19.6 (7.71)	4.8 (40.7)
Annual	118.6 (46.71)	10.8 (51.5)

Source: National Oceanic and Atmospheric Administration (NOAA) 1990

Table 2.3-3. Regional Ambient Air Pollution Concentrations

Pollutant	Averaging Period	Monitoring Station	Concentration	Air Quality Standard
PM_{10}[1] ($\mu g/m^3$)[2]	Annual average	Lacey	26	50
		Longview	24	
		Olympia	27	
	Second Highest 24-Hour	Lacey	78	150
		Longview	46	
		Olympia	52	
CO[3] (ppm[4])	Second Highest 1-Hour	Olympia	8.6	35
	Second Highest 8-hour	Olympia	5.2	9

Source: Ecology 1993

1 PM_{10} = Particulate matter with aerodynamic diameter of less than 10 microns
2 $\mu g/m^3$ = Micrograms per meter
3 CO = Carbon monoxide
4 ppm = Parts per million

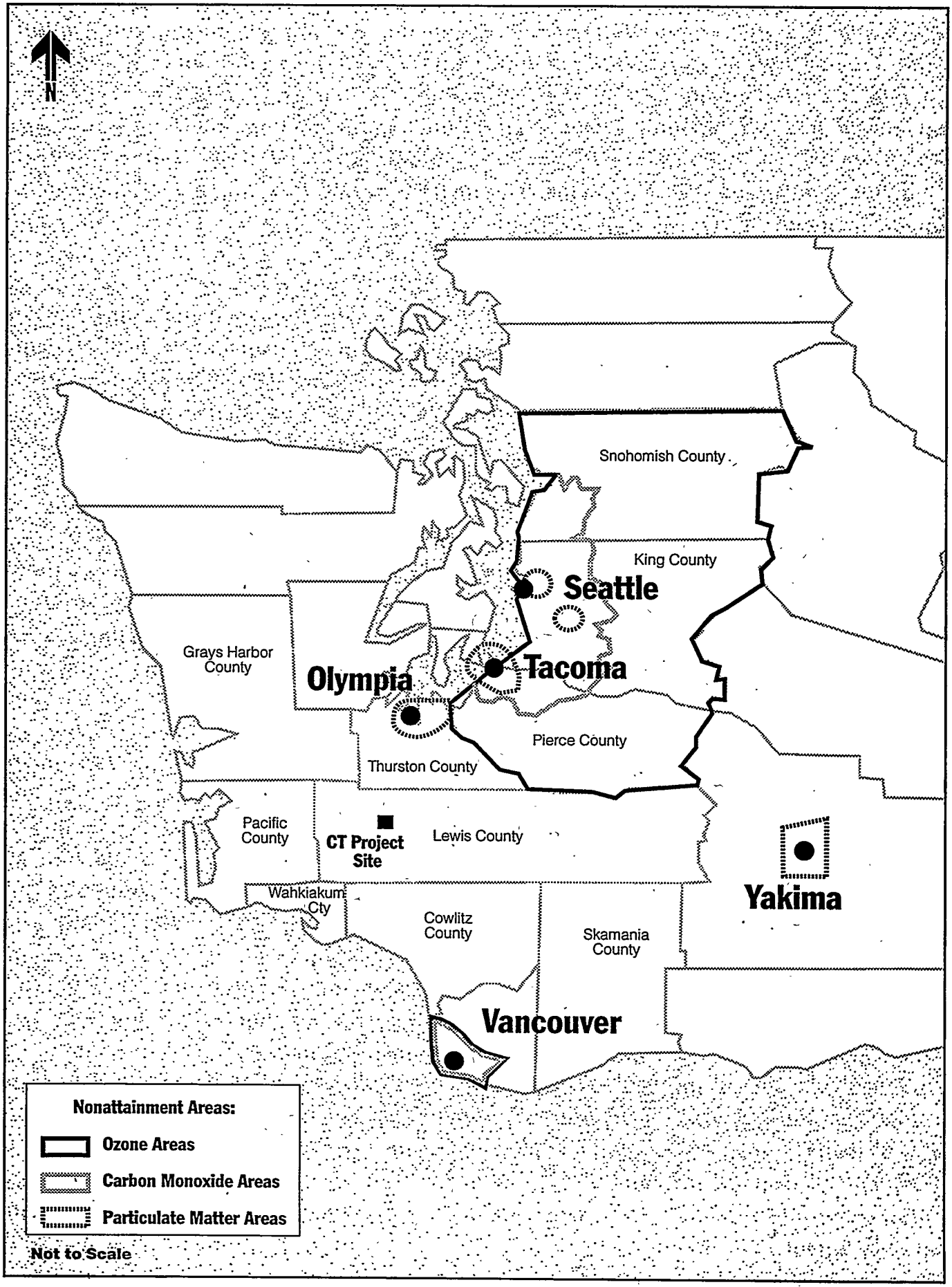


Figure 2.3-2 Washington State Nonattainment Areas

areas. Parts of King, Pierce, Snohomish, Clark, and Spokane counties are nonattainment for CO. There are several PM_{10} nonattainment areas in Washington State. The only nonattainment areas within 50 km (31 miles) of the CT facility site is the PM_{10} nonattainment area surrounding Olympia, and the Pierce County CO and O_3 nonattainment area.

2.4 NOISE

2.4.1 Noise Measurement and Terminology

Noise is defined as unwanted sound that interferes with the normal activities of humans and the natural environment. Ecology regulates noise levels at various classes of properties (residential, commercial, or industrial). The noise generated by the project, when added to existing background noise, should not exceed the permissible environmental noise levels (see Section 4.16.4).

Noise is measured in decibels (dB), a logarithmic ratio between pressure caused by a given sound and the standard sound pressure. The human ear is not equally sensitive to all frequencies in the sound spectrum. Thus, it is standard to represent sound levels using the A-weighted scale (dB[A]) corresponding to the range and characteristics most consistent with the way humans perceive sounds. The dB(A) scale is logarithmic; small fluctuations (less than 3 dB[A]) do not always result in direct increases in loudness. Typical sound levels are presented in Table 2.4-1.

Table 2.4-1. Typical Sound Levels

Sound Source	*Distance from Source (m [feet])*	*dB(A)*
Soft whisper	5 (16)	30
Library	0	40
Normal conversation	1 (3)	60
Busy traffic	0	70
Heavy truck	15 (49)	90
Construction noise	3 (10)	110
Jet takeoff	60 (197)	120

Source: Lipscomb and Taylor 1978

Sound levels at an average residence typically range from 45 to 55 dB(A). Sounds associated with nearby freeway and highway traffic are louder, ranging from 65 to 80 dB(A). Because sounds vary (depending on the type of monitoring equipment and the duration of use), the equivalent average sound level (L_{eq}) is used to represent the acoustical energy equivalent of the fluctuating sound over a specified period.

For time varying noise sources, the statistical sound levels describe how often a given sound level is exceeded during the measurement period. 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 the lowest ambient noise levels of the noise environment. Identifiable noise sources would be added to the background noise, forming the total noise environment. The L_{eq} is the sound level of a steady non-varying noise which is equivalent in total acoustic energy to the noise level of time varying noise. The L_{eq} represents an average acoustic energy for the measurement.

2.4.2 Ambient Noise Levels

Sound levels were measured in the vicinity of the proposed CT facility site. Monitoring was conducted during four periods in December 1993 and March 1994, and included weekdays, weeknights, weekend days, and weekend nights. Monitoring station locations were selected to represent areas where the proposed project might have the greatest impact on sensitive receivers and to obtain adequate spatial representation of ambient noise levels in the project area (Figure 2.4-1).

The minimum L_{eq} measurements monitored are presented in Table 2.4-2. In this table, properties with residences are designated residential areas and properties without residences are classified as industrial. Sound measurements were influenced by traffic-induced noise from I-5, Bishop Road, and Jackson Highway. Daytime sound levels ranged from 47.9 dB(A) to 68.4 dB(A) at Station 9. Station 9 was the closest monitoring station to I-5 and measured the highest ambient noise levels. Station 10 is the farthest monitoring location from I-5. The minimum nighttime sound levels (44 dB[4]) were measured at Station 7 on a weekend. The maximum nighttime sound levels (64.3 dB[A]) were measured on a weekday at Station 9.

2.5 VEGETATION AND WETLANDS

2.5.1 Vegetation

The project area lies within Washington's Puget Trough physiographic province and the western hemlock (*Tsuga heterophylla*) vegetation zone (Franklin and Dyrness 1973). This vegetation zone supports a variety of native vegetation types such as oak woodlands, prairies, and mixed conifer forests dominated by western hemlock and Douglas-fir (*Pseudotsuga menziesii*).

CT Facility Site

The site of the CT facility is currently in agricultural use and has been used in the past to grow grass hay, peas, and rye grain. The site has been classified by the Soil Conservation Service (SCS) as a Prior Converted Cropland, an area that may have been a wetland in the past but which currently has been modified by physical manipulation (e.g., drainage) such that non-wetland crops can be cultivated. These areas no longer exhibit important wetland values. As a Prior Converted Cropland, the site no longer falls within the jurisdiction of the Clean Water Act, which is administered by the U.S. Army Corps of Engineers (Corps). Confirmation of this classification has been requested of the Corps to verify the site is not considered a jurisdictional wetland under Section 404 of the Clean Water Act, and that a permit will not be required.

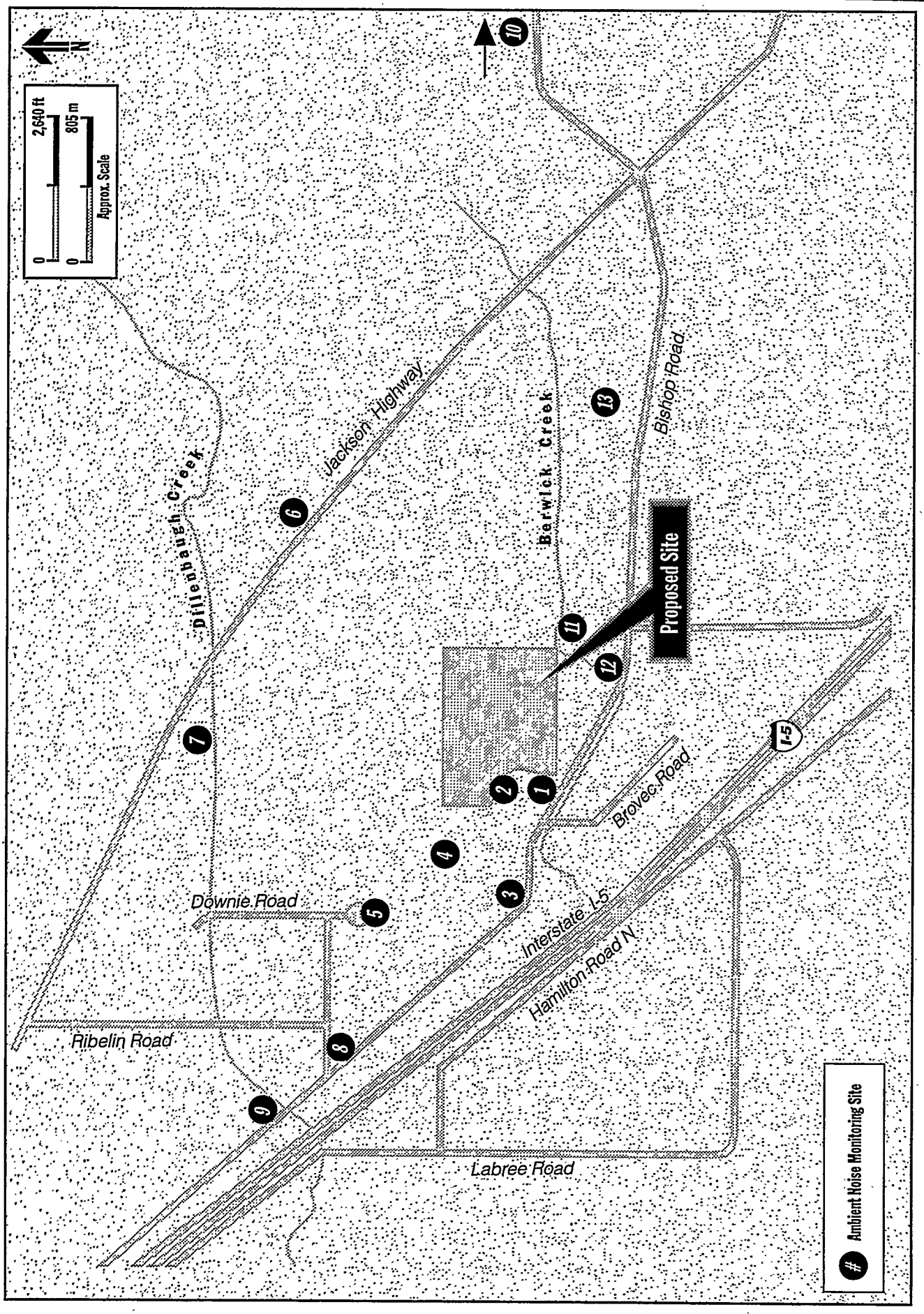


Figure 2.4-1 Noise Monitoring Locations in the Vicinity of the CT Facility Site

Table 2.4-2. Minimum Ambient Noise Levels in the Project Vicinity

Monitoring Station	Property Classification	Measurement Period	Noise Level (dB[A])	
			Daytime L_{eq}	Nighttime L_{eq}
1	Residential	weekday	60.2	60.5
		weekend	52.7	51.3
2	Industrial	weekday	55.2	54.9
		weekend	48.2	46.2
3	Residential	weekday	62.3	59.3
		weekend	53.2	52.1
4	Industrial	weekday	60.0	58.2
		weekend	51.6	50.2
5	Industrial	weekday	57.1	51.3
		weekend	54.0	45.4
6	Residential	weekday	55.3	56.7
		weekend	50.0	44.6
7	Residential	weekday	54.6	50.0
		weekend	52.2	44.4
8	Residential	weekday	63.1	60.4
		weekend	59.8	57.1
9	Residential	weekday	68.4	64.3
		weekend	65.6	61.2
10	Industrial	weekday	50.0	50.2
		weekend	47.9	44.5
11	Residential	weekday	49.6	46.2
		weekend	52.9	46.9
12	Residential	weekday	56.9	53.3
		weekend	55.8	51.5
13	Residential	weekday	55.6	49.0
		weekend	54.3	47.4

Source: Hunt et al. 1994

Gas Pipeline Route

The proposed loop pipeline would be constructed within an existing cleared ROW. Upland vegetation adjacent to that ROW includes forest (including oak woodlands), shrublands, grasslands and agricultural areas such as croplands and pastures, and wetlands. The spur line will be constructed in a new ROW that passes primarily through agricultural fields and pastures. These habitats are briefly discussed below.

Forest. Forest overstories are typically dominated by western redcedar (*Thuja plicata*), Douglas-fir, western hemlock, red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllum*) with a understory usually comprised of Oregon holly-grape (*Berberis nervosa*), pearly everlasting (*Anaphalis*

margaritacea), salal (*Gaultheria shallon*), vine maple (*Acer circinatum*), and sword-fern (*Polystichum munitum*). Garry oak (*Quercus garryana*) is the dominant species in occasional patches of oak woodland.

Shrubland. Vegetation in shrublands is comprised primarily of snowberry (*Symphoricarpos albus*), bracken (*Pteridium aquilinum*), Scot's broom (*Cytisus scoparius*), blackberries (*Rubus* spp.), and reed canarygrass (*Phalaris arundinacea*).

Grassland/Agricultural areas. These areas include croplands, pastures, and Christmas tree farms. Pastures are dominated by non-native grasses such as redtop (*Agrostis* spp.) and bluegrass (*Poa* spp.). Some grassland areas are located near roads and other developed areas. Plants found in this latter habitat type include fescues (*Festuca* spp.), velvetgrass (*Holcus lanatus*), and teasel (*Dipsacus sylvestris*).

Wetlands. Seventeen palustrine wetlands would be temporarily affected by construction of the loop and extension pipeline segments. Twelve wetlands are located along the loop line and five are located along the extension. Most of these wetlands occur as a result of a perched water table at or near the soil surface, although some wetlands are spring-fed. Wetland habitat types include persistent emergent and scrub-shrub habitats within the existing ROW and forested, scrub-shrub, and persistent emergent habitats outside of the existing ROW. Typically, forested wetlands are dominated by Oregon ash (*Fraxinus latifolia*). Scrub-shrub wetlands are dominated by Nootka rose (*Rosa nutkana*) and hardhack (*Spiraea douglasii*). Emergent habitats are dominated by reed canarygrass, soft rush (*Juncus effusus*), and velvetgrass. The pipeline would also cross the Newaukum River, an unnamed tributary to Olequa Creek, and Berwick Creek. Riparian vegetation associated with each of these stream crossings is grazed pasture.

Water Supply/Wastewater Disposal Lines

Upland plant communities in and along the route of the water pipelines include the habitats described above. Eight wetlands occur within the route of the water pipelines. Wetland habitats include forested, scrub-shrub, and persistent emergent plant communities. These wetland communities are also described above.

2.5.2 Threatened, Endangered, and Sensitive Plant Species

The U.S. Fish and Wildlife Service (USFWS) was contacted for information on the potential occurrence of Federal threatened and endangered species, and Federal candidate species in or adjacent to the project area. The USFWS response indicated there are no listed plants.

The Washington Natural Heritage Program (WNHP) was also contacted for information on state-listed endangered, threatened, and sensitive plant species; and high quality native plant communities and wetlands occurring within or near the project area. The WNHP indicated that the small-flowered trillium (*Trillium parviflorum*) is known from a location about 2 km (1.25 miles) from the proposed gas pipeline route. This species is a state-listed sensitive plant and has no Federal status. Small-flowered trillium is a spring-blooming herbaceous perennial that inhabits moist woods and riparian habitats within the Puget Trough.

It is possible that construction of some of the project components could adversely impact sensitive plants, including the small-flowered trillium. Sensitive plant surveys are required to determine if sensitive plants would be impacted by construction of the project. Potential impacts may be avoidable depending on the number of plants involved and characteristics of the specific impact sites. The developer will be conducting complete surveys during the spring of 1995. In the event the project is found to potentially impact sensitive plants, the developer and BPA will consult with USFWS and/or WNHP to develop appropriate actions to avoid or otherwise mitigate those impacts.

2.6 Wildlife and Fisheries Resources

2.6.1 Wildlife Habitat

Six habitat types are identified in a 681-ha (1,679-acre) mapped project study area, consisting of the area within a 152-m (500-foot) buffer around the CT facility site, and the transmission line, water supply and wastewater lines, and gas pipeline ROWs. These habitat types include: forest, upland shrub, grassland/agriculture, wetlands, open water, and developed. Each of these types provide habitat for a variety of species, although some may be used only seasonally or provide the habitat needed for only one of the habitat requirements for various animals (e.g., forage, but not roosting or nesting).

Wildlife species represented in all, or nearly all, of the six habitat types of the project vicinity include the great blue heron (*Ardea herodias*), northern flicker (*Colaptes auratus*), violet-green swallow (*Tachycineta thalassina*), Steller's jay (*Cyanocitta stelleri*), golden-crowned sparrow (*Zonotrichia atricapilla*), coyote (*Canis latrans*), and black-tailed deer (*Odocoileus hemionus*) (Dames & Moore 1994a). Habitat characteristics and wildlife species associated with the six habitat types within the mapped study area are discussed in the following sections.

Forest

Conifer and deciduous forest types contribute approximately 129 ha (320 acres), or 19 percent, to the total mapped study area. Given the intensive forest management practiced in the region, all of the forests are second growth; there are no old-growth (150+ years old) or mature (80+ years old) forests in the project vicinity (Dames & Moore 1994a).

Coniferous forests, occupying 114 ha (282 acres) and 88 percent of the forested lands in the mapped study area, are generally dominated by Douglas-fir (*Pseudotsuga menziesii*) (Table 2.6-1). The majority (109 ha [270 acres]) of the conifer forests in the mapped area is associated with the proposed gas loop pipeline ROW. Wildlife species that typically occur in second-growth forests of western Washington include the chestnut-backed chickadee (*Parus rufescens*), golden-crowned kinglet (*Regulus satrapa*), winter wren (*Troglodytes*), chipmunk (*Eutamias* spp.), and tree squirrel (*Sciurus* spp.) (Dames & Moore 1994a).

Deciduous forest accounts for only 15 ha (36 acres), or 12 percent, of the forested habitat in the mapped study area (Table 2.6-1). The riparian component of the deciduous forest type, dominated by large black cottonwood trees (*Populus trichocarpa*), is associated with the Chehalis and

Table 2.6-1. Wildlife Habitat Types in the Mapped Study Area[1] for the Chehalis Generation Facility, by Component

Habitat Type	CT Facility Site/Electrical Transmission Line		Water Supply, Wastewater Lines		Gas Spur Pipeline		Gas Loop Pipeline		Total	
	ha (acre)	percent	ha (acre)	percent	ha (acre)	percent	ha (acre)	percent	ha (acre)	percent
Forest										
Conifer	--	--	3 (7)	1	2 (5)	1	109 (270)	43	114 (282)	17
Deciduous	--	--	7 (17)	2	1 (2)	1	7 (17)	3	15 (36)	2
Forest Subtotal			**10 (24)**		**3 (7)**		**116 (287)**		**129 (318)**	
Upland shrub	--	--	10 (24)	4	2 (5)	1	19 (47)	7	31 (76)	4
Grassland/agriculture	13 (32)	100	79 (196)	30	114 (281)	77	78 (192)	31	284 (701)	42
Wetland										
Palustrine emergent	--	--	49 (121)	19	6 (15)	4	18 (45)	7	73 (181)	11
Palustrine scrub/shrub	--	--	8 (20)	3	2 (4)	1	11 (28)	4	21 (52)	3
Palustrine forest	--	--	5 (12)	2	2 (5)	1	4 (10)	2	11 (27)	1
Wetland Subtotal			**62 (153)**		**10 (24)**		**33 (83)**		**105 (260)**	
Open water	--	--	3 (8)	1	--	--	2 (5)	1	5 (13)	1
Developed	<1 (<1)	<1	101 (249)	38	21 (51)	14	5 (11)	2	127 (311)	19
TOTAL	**13 (32)**	**100**	**265 (654)**	**100**	**150 (368)**	**100**	**253 (627)**	**100**	**681 (1,679)**	**100**

[1] Vegetation/habitat cover types were identified and mapped 152 m (500 feet) on either side of the gas and water pipeline ROWs and the CT facility site.
Source: Dames & Moore 1994a

Newaukum rivers. These stands provide important perching and nesting opportunities for birds that use riparian and open water habitats, including osprey (*Pandion haliaetus*), belted kingfisher (*Ceryle alcyon*), and bald eagle (*Haliaeetus leucocephalus*) (Dames & Moore 1994a). The upland deciduous forests are dominated by red alder (*Alnus rubra*).

The majority of the forested habitat (116 ha [289 acres]) occurs along the gas loop pipeline (Table 2.6-1); 109 of those hectares (269 acres) comprise conifer forest. The water and gas spur pipelines include 10 and 3 ha (24 and 7 acres), respectively, of forested habitat. Of the 15 total ha (36 acres) of deciduous forest in the project vicinity, 7 ha (17 acres) each occur at the water supply line and gas loop line.

Upland Shrub

The upland shrub habitat type occupies 31 ha (76 acres), or 4 percent, of the mapped study area (Table 2.6-1). Typical woody vegetation found in this habitat type includes scrub red alder, Himalayan blackberry (*Rubus discolor*), and salmonberry (*Rubus spectabilis*). These pioneering species provide forage opportunities for many songbirds and small mammals; additionally, raptors and other carnivores are likely to forage on birds and small mammals in this habitat type. Species commonly observed in upland shrubs include the downy woodpecker (*Picoides pubescens*), American robin (*Turdus migratorius*), black-capped chickadee (*Parus atricapillus*), scrub jay (*Aphelocoma coerulescens*), and song sparrow (*Melospiza melodia*) (Dames & Moore 1994a).

The gas loop pipeline contains the largest amount of upland shrub habitat with 19 ha (47 acres) within the mapped study area (Table 2.6-1). Approximately 10 ha (24 acres) of upland shrub occur along the water pipeline route, whereas only 2 ha (4 acres) occur along the gas spur pipeline. No upland shrub is present on the CT facility site (Table 2.6-1).

Grassland/Agriculture

The largest habitat type represented in the project vicinity is grassland/agriculture, occupying 284 ha (701 acres), or 42 percent, of the mapped study area (Table 2.6-1). Included in this habitat type are pastures, croplands, orchards, and untended fields. Croplands do not provide year-round habitat for wildlife; however, several species, including the ring-necked pheasant (*Phasianus colchicus*) and killdeer (*Charadrius vociferus*), use them for nesting and forage during seasons when cover and food availability is optimal (Dames & Moore 1994a). Pastures and untended fields typically provide more cover and species commonly observed include the song sparrow, Swainson's thrush (*Catharus ustulatus*), American goldfinch (*Carduelis psaltria*), and black-tailed deer (Dames & Moore 1994a).

Approximately 40 percent of the grassland/agriculture habitat in the mapped study area occurs along the gas spur pipeline (114 ha [281 acres]). In addition, this habitat type accounts for 77 percent of the entire gas spur line (Table 2.6-1). Likewise, the CT facility site solely comprises grassland/agriculture. This habitat type also predominates the habitat type along the water line and gas loop line, as well, with 79 and 78 ha (196 and 192 acres), respectively.

Wetlands

Wetland habitat types occupy approximately 105 ha (260 acres), or 15 percent, of the mapped study area (Table 2.6-1). Palustrine emergent wetlands dominate the wetland habitats in the mapped

area occupying 73 ha (181 acres), or 70 percent of the total wetland habitat. The terrestrial and aquatic components of emergent wetlands typically provide high-quality forage and cover habitat for a variety of species. Species observed include the great blue heron, killdeer, red-winged blackbird (*Agelaius phoeniceus*), and red-tailed hawk (*Buteo jamaicensis*). Palustrine scrub-shrub and forested wetlands account for the remaining 30 percent of the wetland habitat type with scrub/shrub wetlands contributing 21 ha (52 acres) and forested wetlands contributing 11 ha (27 acres) (Table 2.6-1). Species typically found in these wetland types include the northwestern salamander (*Ambystoma gracile*), northwestern garter snake (*Thamnophis sirtalis*), downy woodpecker, Steller's jay, golden-crowned kinglet, coyote, and raccoon (*Procyon lotor*) (Dames & Moore 1994a).

Approximately 47 percent (49 ha [121 acres]) of wetlands in the mapped study area are emergent wetlands located along the water line route, primarily associated with the floodplains of the Chehalis River (Table 2.6-1) (Dames & Moore 1994a); 24 percent of all habitats along the water line are wetlands. Conversely, the gas spur line contains only 10 ha (24 acres), 6 percent, of wetlands.

Open Water

Approximately 5 ha (13 acres) of open water is present in the mapped study area, including rivers, creeks, and ponds (Table 2.6-1). This area constitutes less than 1 percent of the mapped area. Only the water and gas loop pipelines contain open water habitats, each contributing only 1 percent to the total habitat areas of their respective pipelines (Table 2.6-1). The Chehalis and Newaukum rivers and Bishop, Berwick, and Dillenbaugh creeks provide aquatic habitat for wildlife species such as the great blue heron, bald eagle, osprey, river otter, and beaver (*Castor canadensis*). Additionally, the riparian forests and shrubs associated with these waterways provide habitat for species that use both aquatic and terrestrial elements (e.g., osprey, belted kingfisher, and great blue heron). Several small ponds near the proposed water and gas loop pipelines occupy 0.8 ha (2 acres) and provide breeding and forage habitat for waterfowl and amphibians. Waterfowl observed foraging and loafing in several of the ponds include the mallard (*Anas platyrhynchos*), ring-necked duck (*Aythya collaris*), northern shoveler (*Anas clypeata*), northern pintail (*Anas acuta*), and pied-billed grebe (*Podilymbus podiceps*) (Dames & Moore 1994a).

Developed

Approximately 19 percent (127 ha [311 acres]) of the mapped study area is developed for industrial, commercial, and residential use. Included in the area designated as developed are a railyard, sewage plant, I-5, and both high- and low-density residential areas in the community of Chehalis. Varying levels of development impart different degrees of disturbance on wildlife; however, developed areas generally do not provide suitable habitat for species except for those that are highly adapted to human-modified environments, including the European starling (*Sturnus vulgaris*) and rock dove (*Columba livia*) (Dames & Moore 1994a).

Developed lands account for approximately 38 percent (101 ha [249 acres]) of the water pipeline whereas the gas loop line contains only 5 ha (11 acres), or 2 percent, developed lands (Table 2.6-1). A nominal amount (<1 ha) of developed lands are included in the CT facility site.

2.6.2 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 and Washington Department of Fish and Wildlife (WDFW)—Non-Game Program. The USFWS identified 11 species, 4 Federally listed, and 7 candidate, that potentially occur in the vicinity of the project (Table 2-6.2). The WDFW identified nine state threatened, endangered, candidate, or monitor species as potentially occurring in the project vicinity. Additionally, WDFW identified several priority habitat regions in or near the project vicinity.

Federally Listed Wildlife Species

Four listed species: the northern spotted owl (*Strix occidentalis caurina*), the bald eagle, peregrine falcon (*Falco peregrinus*), and marbled murrelet (*Brachyramphus marmorata*), were identified by USFWS as potentially occurring in the vicinity of the project (letters from Kate Benhut, USFWS, Olympia, Washington, December 29, 1993 and April 21, 1994). Candidate species include the northern red-legged frog (*Rana aurora aurora*), spotted frog (*Rana pretiosa*), northwestern pond turtle (*Clemmys marmorata marmorata*), harlequin duck (*Histrionicus histrionicus*), northern goshawk (*Accipiter gentilis*), mountain quail (*Oreortyx pictux*), and Pacific fisher (*Martes pennanti pacifica*). In addition to Federal listing status, these species have been identified by WDFW as state endangered, threatened, candidate, or monitor species (Table 2.6-2). Those species identified by USFWS as threatened or endangered are discussed below; habitat requirements and use of the project vicinity are addressed in each discussion.

Spotted Owl. The northern spotted owl, a Federally listed endangered species, was cited by the USFWS as a species potentially occurring in the project vicinity. It is not likely to occur in the project vicinity because no suitable old-growth or mature forest habitat occurs. The WDFW reported that the nearest documented spotted owl location is greater than 3.2 km (2 miles) from the southern end of the gas loop pipeline (letter from T. Young, WDFW, Olympia, Washington, March 22, 1994).

Bald Eagle. The bald eagle, a state- and Federally listed threatened species, is known to winter along the Chehalis and Newaukum rivers in the vicinity of the project. Bald eagles typically winter in western Washington between November 1 and March 31. Wintering eagles in the Pacific Northwest most commonly perch on tall snags, ponderosa pine, and cottonwoods (Stalmaster and Newman 1979, Fielder and Starkey 1986); proximity to a food source is probably the most important factor influencing perch selection by bald eagles (Steenhof et al. 1980). Bald eagles tend to select perches that provide a good view of the surrounding area and prefer the highest perch sites available (Servheen 1975, Stalmaster 1976).

Bald eagle wintering habitat in the project vicinity is composed primarily of large cottonwood trees in relatively undisturbed areas. WDFW designated wintering areas occupy approximately 16 ha (40 acres) in two separate locations: one area is within 0.8 km (0.5 mile) of the proposed water intake and water pipelines, and the other is within 0.8 km (0.5 mile) of the southern-most segment of the proposed gas spur pipeline (Dames & Moore 1994a). Mid-winter surveys in the project vicinity documented two wintering bald eagles along the Chehalis and Newaukum rivers in 1988 and 1989. One bald eagle was observed in the project vicinity during a site survey in November 1993 near the Newaukum River (Dames & Moore 1994a).

Table 2.6-2. Sensitive Wildlife Species Potentially Occurring in the Project Vicinity

Common Name	Status		Observed in Project Vicinity
	Federal	State	
Spotted Frog	Category 2 Candidate	State Candidate	No
Northern Red-legged Frog	Category 2 Candidate		No
Northwestern Pond Turtle	Category 2 Candidate	State Endangered	No
Great Blue Heron		Monitor Species	Yes
Harlequin Duck	Category 2 Candidate		No
Marbled Murrelet	Federal Threatened	State Threatened	No
Bald Eagle	Federal Threatened	State Threatened	Yes
Northern Goshawk	Category 2 Candidate	State Candidate	No
Peregrine Falcon	Federal Endangered		No
Northern Spotted Owl	Federal Endangered	State Endangered	No
Pileated Woodpecker		State Candidate	Yes
Mountain Quail	Category 2 Candidate		No
Pacific Fisher	Category 2 Candidate	State Candidate	No

[1] Status: WDFW: **State Endangered**—wildlife species native to the state of Washington that are seriously threatened with extinction throughout all or a significant portion of their range within the state. **State Threatened**—wildlife species that are likely to become an endangered species within the foreseeable future throughout a significant portion of their range within the state without cooperative management or removal of threats. **State Candidate**—wildlife species native to the state of Washington that WDFW will review for possible listing as endangered, threatened, or sensitive. **Monitor Species**—wildlife species that are of interest because: (1) they were at one time classified as endangered, threatened, or sensitive; (2) they require habitat that has limited availability during some portion of their life cycle; (3) they are indicators of environmental quality; (4) further field investigations are required to determine their population status; (5) there are unresolved taxonomic problems that may bear upon their status classification; (6) they may be competing with and impacting other species of concern; or (7) they have significant popular appeal.

USFWS: **Federal Endangered**—designated as an endangered species by the Federal government. **Federal Threatened**—designated as a threatened species by the Federal government. **Category 2 Candidate**—need additional information to propose as threatened or endangered under the Endangered Species Act.

Food stocks for bald eagles potentially wintering in the project vicinity consist primarily of anadromous and resident fish in the Chehalis and Newaukum rivers. The Chehalis River provides optimal spawning and rearing habitat for both anadromous and resident fish. In addition to the available fish for prey, the wetlands along the Chehalis and Newaukum rivers support regular large concentrations of wintering waterfowl, also a major prey item for bald eagles.

One bald eagle nest site has been documented in the project vicinity: 1.6 km (1 mile) south of the proposed CT facility site in a cottonwood tree next to the Newaukum River (Dames & Moore 1994a). The nest is visible from the eastern portion of the CT facility site; I-5 runs between the nest and the site. This is a newly established nest that was not documented prior to the 1993 nesting season.

Peregrine Falcon. The peregrine falcon, a Federally listed endangered species, potentially migrates through the project vicinity in the spring and fall. Peregrines feed almost exclusively on avian prey captured while in flight. Marshes and riparian areas are particularly important feeding areas for peregrines since they attract and concentrate prey (Craig 1986). The large amount of emergent wetland complexes in the project vicinity and WDFW-designated wintering waterfowl concentration areas provide potential forage habitat for peregrine falcons that may migrate through the project vicinity. However, no peregrine falcon observations have been documented in the project vicinity and no observations were made during site reconnaissance, so it is unlikely that this species occurs more than rarely in the project vicinity.

Marbled Murrelet. The USFWS indicated that the marbled murrelet, a Federally and state-listed threatened species, potentially nests in the project vicinity between early April and mid-September. The marbled murrelet is not likely to occur in the project vicinity because there are no old-growth or mature forest stands present.

A Biological Assessment for the four Federally listed species is included in Chapter VI, Appendix A.

Federal Candidate Wildlife Species

Spotted Frog. The spotted frog, a Category 2 Federal candidate species and a state candidate species, is nearly always found in or near perennial water bodies such as springs, ponds, lakes, or slow-moving streams and often associated with emergent, non-woody vegetation (Leonard et al. 1993). It requires open water such as lakes and ponds for breeding. Suitable habitat for the spotted frog exists in the project vicinity; however, no observations of the species were made during site investigations, and the occurrence of the spotted frog in the project vicinity is unknown.

Northern Red-legged Frog. During non-breeding seasons, the red-legged frog, a Category 2 Federal candidate species, is highly terrestrial and frequently encountered in woodlands adjacent to streams (Leonard et al. 1993). Breeding habitat requirements include ponds (often temporary) with little or no flow, sturdy underwater stems for egg attachments, and inundation length sufficient for metamorphosis (Nussbaum et al. 1983). Suitable breeding and non-breeding habitats occur in the vicinity of the project; however, no observations of the red-legged frog were made during site investigations and the occurrence of species in the vicinity of the project is unknown.

Northwestern Pond Turtle. The pond turtle, a Category 2 Federal candidate species and a state-listed endangered species, requires ponds or slow-moving portions of rivers with emergent wetland vegetation and basking sites. The Chehalis and Newaukum rivers and small ponds located in the river floodplains potentially provide suitable pond turtle habitat. However, no observations of the turtle were made during site investigations and the occurrence of the species in the vicinity of the project is unknown.

Harlequin Duck. Western populations of harlequin ducks, a Category 2 Federal candidate species, are found along the coasts of the northwestern United States, Canada, and Alaska. Harlequins usually nest along rock shores adjacent to the rapids of turbulent mountain streams and leave these inland nesting areas to winter at sea (Bellrose 1976). The two rivers, Chehalis and Newaukum,

associated with the project do not provide suitable nesting habitat for the harlequin duck. No observations of the harlequin duck were made during site investigations and it is unlikely that the harlequin duck occurs within the vicinity of the project.

Northern Goshawk. The northern goshawk, a Category 2 Federal candidate species and state-proposed candidate species, is primarily a forest dweller, usually using mature and old-growth conifers. During migration periods and in winter, goshawks can also be seen in habitats such as alpine areas, farmlands, prairies, and deserts (Palmer 1988). Goshawks forage within and below the forest canopy with prey items consisting primarily of medium-sized birds and mammals (Storer 1966). It is unlikely that this species occurs in the project vicinity because the mapped area does not contain suitable goshawk habitat and no observations of the species were made during site visits.

Mountain Quail. Mountain quail, a Category 2 candidate species for Federal listing, occurs primarily in chaparral, brushy ravines, and mountain slopes (National Geographic Society [NGS] 1987). The vegetation composition and structure of the upland shrub habitat in the mapped area is potentially suitable for mountain quail; however, use by this gamebird is not likely due to its very limited and localized distribution within the state. No observations of the quail were made during site investigations.

Pacific Fisher. The Pacific fisher, a species proposed for Federal listing, occupies a diversity of habitat types, from upland hardwood forests to forested wetlands, with the common characteristic being an abundance of cover (Strickland et al. 1982). Fishers typically avoid open areas with no overhead cover, such as fields, roads, burns, and open bogs. The forested areas of the project vicinity potentially provide suitable habitat for the fisher; however, no observations of the fisher were made during site investigations; the occurrence of the species in the project vicinity is unlikely, since it is well outside the known distribution in the state (Washington Department of Wildlife [WDW] 1991).

State-listed Wildlife Species and Priority Habitats

Pileated Woodpecker. The pileated woodpecker, a state candidate species, was observed in a conifer forest stand in the vicinity of the project (Dames & Moore 1994a). The pileated woodpecker prefers dense, mature forest but also seems to be adapting well to human encroachment, becoming more common and more tolerant of disturbed habitats and second-growth woodlands (NGS 1987). Although the mapped area does not include mature/old-growth forests, woodlands in the vicinity are likely to contain habitat suitable for the pileated woodpecker.

Great Blue Heron. The great blue heron, a state monitor species, was observed during a 1994 site investigation (Dames & Moore 1994a). Suitable habitats for the great blue heron include wetlands, shorelines, and tideflats. Trees are preferred heronry sites, with spruce trees commonly used along the Pacific Coast (Bayer 1978). However, the type of tree used for nesting in not as important as its height and distance from human activity (Miller 1943). The Chehalis and Newaukum rivers provide suitable forage habitat for the heron and although suitable nesting habitat exists in the project vicinity, the amount of human disturbance decreases the potential for nest sites to occur.

Priority Habitats. WDFW identified priority habitat regions in the project vicinity, specifically those areas of scrub-shrub and emergent wetlands that support regular large concentrations of wintering waterfowl, cavity-nesting duck, and nesting Canada geese (letter from Lea Knutson, WDFW, Olympia, Washington, November 15, 1993). These priority habitats occur along the Chehalis and Newaukum rivers and Dillenbaugh Creek.

2.6.3 Fisheries

Project Setting

There are four major waterways with significant aquatic resources in the vicinity of the proposed project: the Chehalis and Newaukum rivers, and Dillenbaugh and Berwick creeks. The Chehalis River system contains some of the largest salmon runs of coastal Washington. This includes annual production (numbers of hatchery and wild fish returning to Grays Harbor) of coho (*Oncorhynchus kisutch*) ranging from about 50,000 to 200,000 fish; fall chinook (*O. tshawytscha*) of approximately 10,000 to 20,000; and spring chinook of about 1,000 fish. However, much of this production occurs in major tributaries and hatcheries of the Chehalis River downstream of the project vicinity. Steelhead (*O. mykiss*) are also present in this system, with annual harvests occasionally exceeding 1,000 fish. The Newaukum River is a moderate-sized tributary of the Chehalis River and supports significant numbers of both salmon and steelhead.

The Dillenbaugh and Berwick creeks are small streams in the project vicinity. Although no anadromous fish were found in a recent survey (Dames & Moore 1993a), these streams may support anadromous species (primarily coho and possibly steelhead) as well as resident trout and other species. Dillenbaugh Creek, in general, provides good to excellent anadromous fish rearing habitat; spawning habitat, however, is limited, especially near the proposed water supply line construction sites. Berwick Creek generally provides little spawning and rearing habitat, especially in the region of the gas pipeline route where heavy bank erosion and high turbidity from cattle activity and local development along the stream have degraded habitat quality. Both streams also lack good riparian cover in their lower reaches, further reducing rearing habitat quality.

The gas loop line route would cross one unnamed minor tributary to Olequa Creek (a tributary to the Cowlitz River, which enters the Columbia River). The Olequa Creek tributary at the pipeline crossing is primarily a drainage ditch of low habitat quality. It is characterized by substrate consisting of fine sediment; no spawning substrate near the crossing; slow flow; and riparian vegetation, predominantly grass and few some trees along the south bank. The stream in this area is about 3.7 m (12 feet) wide. This stream is high in the watershed and presence of anadromous stocks is unknown but doubtful.

Federally Listed Fish Species

No threatened or endangered fish species are known to occur in any waterway in the project vicinity, although the Olympic mudminnow (*Novumbra hubbsi*) and bull trout (*Salvelinus confluentus*), both Federal candidate species, were listed by the USFWS (letters from K. Benhut, USFWS, Olympia, Washington, December 29, 1993 and April 21, 1994) as potentially occurring there.

Olympic Mudminnow. The Olympic mudminnow is a Federal Candidate Category 2 and state candidate species. The natural known distribution of the Olympic mudminnow includes the north side of the Chehalis River corridor and, at times, the lower Deschutes River basin (Meldrim 1968, Wydoski and Whitney 1979). It is restricted to coastal lowlands, does not extend to the base of the Olympic mountains, and has limited distribution east of the Satsop River (Harris 1974).

Based on habitat characteristics and distribution of mudminnows, the species is unlikely to be present in streams crossed by the proposed gas pipeline.

Also, the documented range of Olympic mudminnow species is north of the project vicinity (Wydoski and Whitney 1979); there are no records for either the Chehalis or Newaukum rivers documented in the WDFW databases, and no mudminnows were observed in the project vicinity during fish reconnaissance studies conducted in October 1993 (Dames & Moore 1993a). However, their presence in most of these areas is unlikely because of high stream gradient, lack of suitable substrate, and location outside the typical distribution range.

Bull Trout. The bull trout is a Federal Candidate Category 2 species but not a state candidate species. Only since 1978 have Dolly Varden and bull trout been classified as two separate species (Cavender 1978). More thorough analysis in later years established that specific characteristics were available to properly separate the two species (Haas and McPhail 1991). Washington bull trout are found throughout Washington State coastal and inland streams and lakes. In the streams draining into Puget Sound and the Washington coast, their distribution may overlap with Dolly Varden.

Bull trout are more often associated with cool, clear mountain streams and lakes. Highest abundance has been found in streams dominated by gravel and cobble (Bond 1992). In lakes, these fish prefer regions of temperature less than 15°C (59°F). They require cool streams for spawning, typically in high elevation headwater streams that are fed by snow melt or springs (Bond 1992). Although some bull trout may spend their entire life in a small segment of a stream, most are highly migratory, traveling between headwater spawning streams and larger stream reaches or lakes to rear as adults and larger juveniles. Consequently, part of their habitat requirement is interbasin migratory routes free of blockages (Pratt 1992). Because of the bull trout's characteristic of residing in the substrate or other protected areas as juveniles, they require clean, mostly sediment-free bottom areas, or an abundance of large woody debris for cover.

The presence of bull trout is unlikely in most streams associated with the project. Intensive monthly river sampling on the Chehalis River near the Satsop River over a 3-year period found no bull trout/Dolly Varden (Envirosphere 1978, 1979, 1980). These data suggest that, at least in the lower regions of the Chehalis River basin, this species is not present. Also, any anadromous form probably does not exist in the upper Chehalis River. Bull trout could be present in some streams crossed in the project vicinity. However these crossing areas are fairly low elevation, developed stream basins, untypical of this species' habitat use. Also, the Dames & Moore (1993a) surveys of streams in the area did not find this species. Consequently, bull trout could be present in some streams crossed by the proposed gas pipeline but are unlikely in most areas.

2.7 LAND USE

2.7.1 Land Use Characteristics

Land uses in the vicinity of the proposed CT facility and within a 0.8-ha (0.5-mile) study area corridor along the water supply, wastewater, natural gas supply lines, and electrical intertie route are identified in Figure 2.7-1.

CT Facility Site and Electrical Transmission Line

The proposed CT facility site and electrical connection are located in the Industrial Park on undeveloped land currently being used seasonally for agriculture. Property within the Industrial Park is owned by the Chehalis Industrial Commission (a private entity that encourages development of the Industrial Park), and the Port of Chehalis (Port of Chehalis 1993). Current land uses within the Industrial Park include light industry and agriculture. Some of the nearby industrial uses include the Pacific Plate Glass (PPG) plate glass plant (no longer operating), and a Fred Meyer distribution center. Possible future development at the Industrial Park includes an expansion of the Fred Meyer facility, a paper recycling company, a second distribution facility, and other industrial facilities. Land uses adjacent to the Industrial Park include light industry, seasonal agriculture (including peas, barely, and hay), and residential.

Water Supply and Wastewater Lines

Water supply and wastewater pipelines would connect the CT facility with the city of Chehalis WWTP and municipal water supply system. The 8.9-km (5.5-mile) long pipelines would be constructed entirely in existing city of Chehalis water and sewer line ROWs. For much of the route, the lines would be located between railroad (Chehalis Western) ROW and street ROW.

Land uses in the portion of the pipeline route within the city of Chehalis include a mix of single and multiple residential areas and commercial land uses. As the ROW heads south out of the city limits, adjacent uses become more sparsely developed and are a mixture of rural residential, agricultural, and industrial uses.

Gas Pipeline

The gas loop line would parallel an existing NWP gas pipeline from where it connects with the Chehalis Compressor Station northerly to a point where the existing pipeline passes under Jackson Highway, a distance of approximately 7.2 km (4.5 miles). At the intersection of the existing pipeline ROW and Jackson Highway, the gas spur line would depart the existing pipeline ROW and head in a northwest direction approximately 4.8 km (3.0 miles) to the CT facility site.

The existing pipeline ROW the gas loop line would follow crosses a mix of forested land, cleared forest, and agricultural lands. The agricultural lands are pasture or seasonal crop lands. Farming activity occurs within the ROW where it transects a cultivated parcel. Within the forested areas, the ROW is clear of trees.

The gas spur line route passes through primarily agricultural land, passing near low-density and rural residential areas. At one point, the spurline route crosses a golf course.

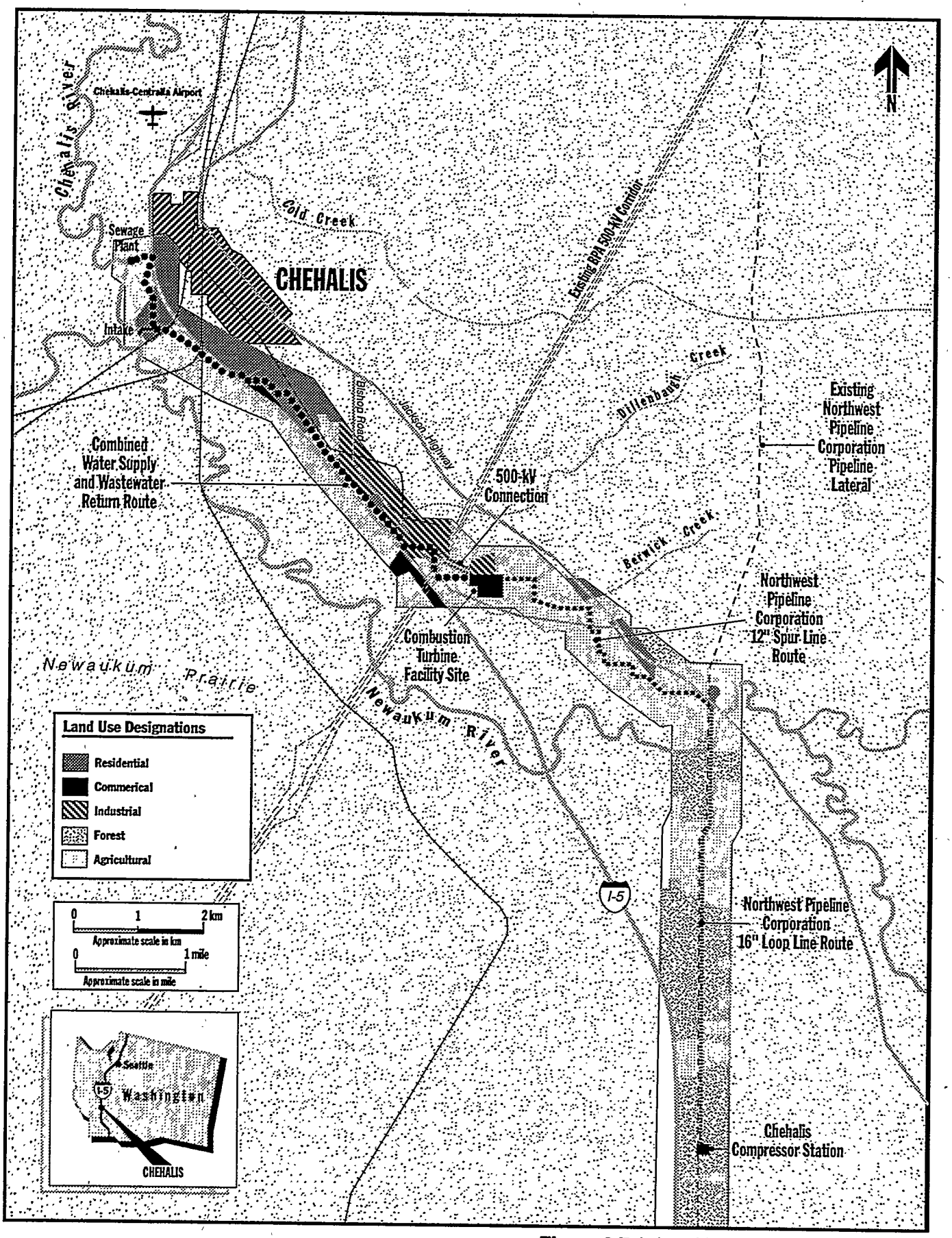


Figure 2.7-1 Land Uses in the Project Vicinity

2.7.2 Comprehensive Plans and Policies

Project components would be located within two local jurisdictions: Lewis County and the city of Chehalis. Most of the project components would lie within unincorporated Lewis County. Part of the water supply and wastewater lines would be located within the city limits of the city of Chehalis. The project would fall under the land use regulatory jurisdiction of the following plans and policies listed in (Table 2.7-1) and are described below.

Table 2.7-1. Comprehensive Land Use Policies and Plans by Governmental Entity

Governmental Entity	*Plan or Policy*
Lewis County	Lewis County Comprehensive Land Use Plan
	Lewis County Growth Management Regulations
	Lewis County Shoreline Master Program
	Lewis County Flood Damage Prevention Ordinance
City of Chehalis	City of Chehalis Comprehensive Plan
	City of Chehalis Shoreline Master Program
	City of Chehalis Comprehensive Scheme of Development

Lewis County Comprehensive Land Use Plan

The 1991 Lewis County Comprehensive Land Use Plan designates the CT facility site and the industrial park for urban development. The Industrial Park is included in an area intended for industrial development and is governed by urban industrial land use policies in the plan.

The plan recognizes the importance of the environment, but relies on other regulatory agencies (such as Ecology and WDFW) for primary protection of the environment. The county currently has no zoning (Lewis County 1991). Because the county has not adopted zoning, residential uses are not discouraged or prohibited along Bishop Road and Jackson Highway, adjacent to the Industrial Park.

Urban industrial policies in the plan encourage locating and designing new industrial sites to facilitate access and circulation and minimize impacts of industrial development on adjacent land uses by using landscaping, screening, buffers, and other methods.

The Industrial Park is within the city's sewer service area and is provided with city water and sewer service. The Industrial Park has been designated for industrial development in the comprehensive plans of both the city and the county.

Lewis County Growth Management Regulations

The Lewis County Planning Commission is currently considering a draft critical areas ordinance. The county and the city of Chehalis have not started preparing growth management comprehensive plans (Dames & Moore 1994b). It is not known what regulations the county and city will adopt to regulate critical areas.

Lewis County Shoreline Master Program

Lewis County's Shoreline Management Master Program (SMMP), adopted pursuant to the State Shoreline Management Act (SMA), governs activities within 61 m (200 feet) of designated shorelines and their associated wetlands. The site is not within 61 m (200 feet) of a designated shoreline, so it is not subject to requirements of the County's Shoreline Master Program (SMP). However, proposed pipeline routes between the Chehalis WWTP and cogeneration facility will cross Dillenbaugh Creek, which is subject to the requirements of the SMP.

Lewis County Flood Damage Prevention Ordinance

The CT facility is not within a 100-year floodplain, as designated by FEMA Flood Insurance Rate Maps. The water pipelines will likely be located within floodplain area and will comply with the Lewis County Flood Damage Prevention Ordinance.

City of Chehalis Comprehensive Plan

The comprehensive plan for the city of Chehalis indicates that the CT facility site is an industrial area. The city's comprehensive plan is relevant to the facility because the city may eventually annex the site, since it already provides the site with water and sewer service.

City of Chehalis Shoreline Master Program

The city of Chehalis adopted the county's SMP with changes that are specific to the city. The city's SMP would apply to the gas, water supply and wastewater pipelines located within 61 m (200 feet) of the ordinary high water mark of Dillenbaugh Creek or the Chehalis River.

Port of Chehalis Comprehensive Scheme of Development

The Port adopted a comprehensive scheme of development in March 1993 (Port of Chehalis 1993). The scheme outlines the Port's joint plans with the Chehalis Industrial Commission for the Industrial Park. The Port and the Industrial Commission are proposing a joint project to develop approximately 170 ha (420 acres) for heavy industrial as Phase I of a three-phase development. The 170-ha (420-acre) Phase I is to be located south of the already developed portion of the Industrial Park and south of the Chehalis city limits. The CT facility site is located in the Phase I heavy industrial area.

The scheme identifies infrastructure improvements needed to attract industrial development to the area (including the CPI site). These improvements include provision of water and sewer

service, natural gas, and electricity; and the extension of Maurin Road. The first phase of these improvements is currently underway (Dames & Moore 1994b).

The Port and the Industrial Commission established an industrial development district to implement the infrastructure improvements. The Maurin Road extension currently underway is one of these improvements. The Fred Meyer distribution center will use the Maurin Road extension for access to its site (pers. comm., H. Pehl, Director, Port of Chehalis, Chehalis, Washington, December 8, 1993).

The scheme also includes recommendations on general engineering standards that the Port is using to construct infrastructure for Phase I. For example, the design standards for stormwater management are in accordance with Ecology's Storm Water Management Manual and the Washington State Department of Transportation Hydraulics Manual (Port of Chehalis 1993).

2.8 Cultural Resources

Archaeologists conducted an inventory of the CT facility site (Historical Research Associates, Incorporated [HRA] 1994a), transmission connector corridor (Dames & Moore 1994b), water supply and wastewater lines (Nelson 1993), and the gas spur and loop routes (Ebasco Environmental 1994). These surveys resulted in the re-examination of a previously recorded archaeological site, 45-LE-51, and discovery of one prehistoric archaeological site, 45-LE-427. Apart from these two sites, no other cultural resources were identified or located in the project vicinity.

Site 45-LE-51

45-LE-51, located in the vicinity of the gas loop line, is a large scatter of prehistoric stone tool waste and fire-affected rock located where a high, flat terrace joins the Newaukum River. The terrace is approximately 15 m (49.2 feet) above the level of the river. The size of the site is unknown because it extends onto private property beyond the natural gas pipeline easement on the east, north, and west. The site as traced measures 335 by 107 m (1,099 by 351 feet), or 3.6 ha (8.8 acres), but is probably larger. The gas loop line ROW runs through the approximate center of the site.

Artifacts discovered at the site include stone tool waste shatter and pressure flakes, mostly of agate, which is available naturally nearby. The surveyors located one projectile point of undetermined type and a small, flat stone with grinding polish on one side. The landowner has found projectile points at various times over the years.

Archaeologists from the University of Washington recorded this site and excavated eight test pits along the pipeline ROW when the existing pipeline was first constructed in the mid-1950s (Touhy and Bryan 1958). Their effort was part of a survey and excavation program sponsored by NWP. These test pits produced 12 projectile points, 2 blades, 10 scapers, 3 cores, 1 chopper, and hundreds of pieces of stone tool waste. The projectile point illustrated in Touhy and Bryan (1958) resembles leaf-shaped Cascade type points that represent the Early Period (4,000 to 8,000 BP) of Washington prehistory. Touhy and Bryan (1958) reported that 95 percent of the stone tool waste at this site is

of microcrystalline material (chert, agate, etc.), and that the rest consists of basalt, felsite, and other fine-grained rocks. They interpreted the site as a temporary camp.

Archaeological test excavations conducted in June 1994 determined that 45-LE-51 is eligible for nomination to the National Register of Historic Places (NRHP) (HRA 1994b). These excavations showed that there is an intact deposit of artifacts extending more than 0.5 m (1.6 feet) below ground surface. This deposit contains stone tool raw material and waste chippage, and unifacial and bifacial tools.

Site 45-LE-427

45-LE-427 extends in the vicinity of the gas loop line from the Newaukum River to the east along the rim of a low river terrace. Prehistoric site 45-LE-51 is located to the south, across the river, and approximately 300 m (984.3 feet) away across a lower floodplain containing no cultural debris. 45-LE-427 is a very large scatter of stone tool waste and fire-cracked rock.

The site extends at least 450 m (1,476 feet) from east to west, and 150 m (492 feet) from north to south. Its area is thus roughly 6.75 ha (17.2 acres). On its eastern side, the site adjoins a home site, which the surveyors did not inspect. The site probably extends to the banks of the Newaukum River, located on the eastern side of the home site's parcel.

Though the site covers a very large area, the artifacts occur in low density across most of it. The terrace rim at the south edge of the site is slightly higher in elevation than the rest of the site and has somewhat higher density. Another low ridge at the northwestern part of the site also has a higher artifact density. The density also seems higher approaching the river on the eastern side of the site.

Artifacts at the site include stone tool waste flakes and shatter, and large quantities of fire-affected rock. The raw material types include translucent to white agate; obsidian; and white, reddish, and brown cherts. Most of the material is agate. The surveyors located one projectile point of unknown type and one large scraper.

Archaeological test excavations conducted in June 1994 determined that 45-LE-427 is not eligible for nomination to the NRHP (letter from J.S. King, Project Archaeologist, HRA, Seattle, Washington, June 9, 1994). These excavations showed that the site is a low-density scatter of cultural material confined to the plowzone. Because of this, sample sizes that could be recovered at the site would be too low to draw statistically valid conclusions about prehistoric use of the area.

2.9 Socioeconomics and Public Services

2.9.1 Population and Housing

Population characteristics in the project vicinity and the state are presented in Table 2.9-1. A breakdown of minority population from the 1990 Census of Population and Housing is presented in Table 2.9-2. Lewis County's population growth of 5.9 percent between 1980 and 1990 was very low compared to the state of Washington growth of 17.8 percent during the same time. The

county's lower growth is largely attributed to the recession periods of the early-1980s. The most populated communities in Lewis County are Chehalis (6,527) and Centralia (12,101).

Table 2.9-1. Population Characteristics

Characteristics	Lewis County	Chehalis	Centralia	Washington State
Population:				
1990	59,358	6,527	12,101	4,866,692
1980	56,025	6,100	11,555	4,132,353
1970	45,467	5,727	10,054	3,413,250
Percent Change:				
1980-1990	5.9%	7.0%	4.7%	17.8%
1970-1980	23.2%	6.5%	14.9%	21.1%

Table 2.9-2. Minority Group Breakdown

Race and Hispanic Origin	State of Washington	Lewis County
White	4,308,937	57,663
Black	149,801	189
Percent of total population	3.1	0.3
American Indian, Eskimo, or Aluet	81,483	641
Percent of total population	1.7	1.1
Asian or Pacific Islander	210,958	372
Percent of total population	4.3	0.6
Other race	115,513	493
Hispanic origin (of any race)	214,570	1,366
Percent of total population	4.4	2.3

Source: U.S. Bureau of Census 1990

Lewis County had 25,487 housing units in 1990, of which 88.2 percent were occupied, 70 percent by owners, and 30 percent by renters (U.S. Bureau of Census 1990). Of the 3,009 unoccupied units, 358 were available for general rent, while 1,419 were available for seasonal and recreational rent. Approximately 69 percent of all housing units in the county were single-unit unattached and attached units. The 1990 median housing unit value in Lewis County was $57,600, while median contract rent stood at $276 per month.

The city of Chehalis had 2,694 housing units in 1990, of which 93.6 percent were occupied. Of the unoccupied units, 53 were available for general rent, while only one unit was available for

seasonal and recreational rent. Approximately 71 percent of all housing units were unattached or attached single units. The 1990 median housing unit value in Chehalis was $56,600, while median contract rent stood at $301 per month.

The city of Centralia had 5,234 housing units in 1990, of which 93.7 percent were occupied. Of the unoccupied units, 86 were available for general rent, while 13 units were available for seasonal and recreational rent. Approximately 70 percent of all housing units were unattached or attached single units. The 1990 median housing unit value in Centralia was $50,800, while median contract rent was $278 per month.

There are 23 hotels and motels in Lewis County, including 6 in Centralia and 2 in Chehalis. The towns of Morton and Packwood each has five motels and the town of Randle has three. The towns of Winlock and Silver Creek each has one motel. Additionally, six bed and breakfasts are located in Lewis County.

2.9.2 Employment and Income

Employment in Lewis County (covered by unemployment insurance) from the 1990 Census for Lewis County is presented in Table 2.9-3. From 1970 to 1990, Lewis County's labor force grew by 40 percent. The bulk of that growth occurred during the 1970s when the labor force grew by 33 percent. From 1980 to 1990 the increase was only 6 percent. The state of Washington's labor force grew by 77 percent from 1970 to 1990; 40 percent from 1970 to 1980 and 26 percent from 1980 to 1990. Slow growth during the last decade was caused by the recession of the early-1980s. Lewis County was particularly hard hit because of its heavy reliance on the lumber and wood products industry. National and regional cutbacks in construction combined with the trend within the timber industry toward greater productivity (fewer people producing the same or greater output) to slow growth and even decrease the size of the labor force in the county.

Per capita income is generally cited as an indicator of economic well-being. Although somewhat lower than that of the state of Washington's and the nation, Lewis County's per capita income grew at a rate comparable to the growth experienced by the state and nation between 1970 and 1979. However, decline of the timber industry coupled with stagnation in other industries kept per capita income in Lewis County from realizing the gains made by the state and the nation in the early-1980s. A slight upswing in Lewis County's per capita income came about in 1987, probably correlated with growth in the trade and services sectors. From 1970 to 1989, per capita income nationwide rose by 44 percent, while the state rose by 41 percent, and Lewis County rose by 23 percent (from $11,347 to $13,920).

2.9.3 Fiscal Budgets

The 1993 revenues collected by Lewis County amounted to $36.97 million. The amended 1993 revenues for the city of Chehalis amounted to $13.6 million, while the anticipated revenues for 1994 are $14.6 million.

Table 2.9-3. Lewis County Employment

Type of Work	Number of Jobs
Industry[1]	
Agriculture, forestry, and fisheries	1,798
Mining	454
Construction	1,368
Manufacturing, nondurable goods	1,252
Manufacturing, durable goods	3,504
Transportation	947
Communications and other public utilities	632
Wholesale trade	566
Retail trade	4,468
Finance, insurance, and real estate	723
Business and repair services	882
Personal services	755
Entertainment and recreation services	282
Health services	1,708
Educational services	2,022
Other professional and related services	998
Public administration	1,088
Class of Worker	
Employed Persons 16 years and over	23,427
Private wage and salary workers	16,829
Government workers	4,050
Self-employed workers	2,473
Unpaid family workers	73

[1] Includes both government and private sectors
Source: U.S. Bureau of Census 1990

2.9.4 Law Enforcement

The Lewis County Sheriff's Department has 25 patrol officers. The Sheriff's office and detention facilities are located in the County Courthouse, approximately 3.2 km (2 miles) from the Industrial Park. The department has expressed a need for additional personnel during the summer and game hunting seasons.

The city of Chehalis has an integrated office for managing law enforcement, fire protection, and emergency medical services (EMS). The law enforcement portion of the department has 18 total

officers and 5 support staff. The city has no jail facilities but has a contract with the Lewis County Sheriff's Department to use their detention facilities. The department appears to be able to meet its current and reasonably foreseeable needs.

2.9.5 Fire Protection

Lewis County Fire Department is an all-volunteer fire and EMS department. Overall, the department has 5 fire stations and 70 firefighters. The department has 6 fire engines and 12 tanker trucks with pumps. The department also has a heavy-duty ambulance truck, which also serves as a rescue vehicle and is equipped with extraction equipment. The department feels that it is able to meet existing fire protection needs within the county and does not need additional firefighters or equipment. District Six of the department services the portion of the county in which the Industrial Park is located. Response time to the Industrial Park is 4 minutes.

The City of Chehalis Fire Protection and EMS department has 13 full-time trained firefighters and Emergency Medical Technicians (EMTs), and 15 volunteer firefighters. The department has a response time of 5 minutes. The department is able to provide two engines to a fire or EMT call within this time frame, but it takes an estimated 10 to 15 minutes to obtain personnel to respond with a third unit. At this time, there is a need to add three firefighters and one battalion chief to the full-time staff to meet firefighting and EMS service needs for the city of Chehalis.

2.9.6 Medical Services

The Lewis County Fire Department provides EMS. Twenty of the department's 70 volunteer firefighters are trained EMTs. The department has two volunteer paramedics and an ambulance truck. It also coordinates responses with a private ambulance company. EMT response time is 4 minutes.

The City of Chehalis Fire Department also provides EMS, and all of the department's firefighters are EMTs. The department has an ambulance and a pump truck, both of which run as aid vehicles. EMS response time to the Industrial Park is less than 5 minutes.

Providence Hospital, located in Centralia, provides major medical services to all of Lewis County. The facility, which has over 100 beds and over 600 staff members, employs 10 emergency room physicians and 80 non-emergency physicians. The facility provides all major forms of health care, including emergency services. Major burns and other major medical service needs are provided in Tacoma and Seattle.

2.9.7 Transportation

I-5 provides the primary north/south access to the proposed project from metropolitan areas such as Olympia, Tacoma, Seattle, and Portland. The primary route to the proposed CT facility site is via Exit 76 from I-5, east on Parkland Drive, south on Interstate Avenue, and south on Bishop Road. An alternative route would originate on Jackson Highway (Highway 99), southeast and south on Ribelin Road, west on Sturdevant Road, and then south on Bishop Road. Table 2.9-4 provides

traffic counts for Lewis County roads and Table 2.9-5 provides counts for city of Chehalis streets leading to the proposed CT facility site from I-5.

Table 2.9-4 Lewis County Average Daily Traffic Counts

Road	Year	Average Daily Traffic (ADT)
Maurin Road	1987	383
Sturdevant Road	1987	1,583
Brovec Road	1987	23
Bishop Road		
north side of Maurin Road	1990	3,612
south side of Maurin Road	1990	1,521
Interstate Avenue		
west of Bishop Road	N/A	3,387
Ribelin Road		
off Jackson Highway	1987	153
south of Sturdevant Road	1987	66
Jackson Highway		
north of Bishop Road	1988	4,275
north of Ribelin Road	1990	4,298

Source: pers. comm., R. Veech, Lewis County, Chehalis, Washington, December 16, 1993.

All Lewis County roads identified in Table 2.9-2 consist of one lane in each direction, and have no load restrictions. No Level of Service (LOS) ratings have been established for these roads. Jackson Highway, Bishop Road, Interstate Avenue, and Sturdevant Road have the highest average daily traffic counts, respectively (pers. comm., R. Veech, Lewis County, Chehalis, Washington, December 16, 1993). In 1992, there were 4 accidents on the full length of Bishop Road, 1 on Interstate Avenue, and 14 on Jackson Highway. No accidents were recorded for Maurin, Sturdevant, Brovac, or Ribeline roads (pers. comm., E. Bal, Washington State Patrol, Records Section, Olympia, Washington, December 16, 1993).

Interstate Avenue and Parkland Drive are main arterials within the city of Chehalis, providing major access to and from I-5. The city of Chehalis has not established vehicle count capacity ratings for its streets and is currently in the process of establishing LOS ratings. No truck traffic is allowed on Mills Avenue, Snively Avenue, or 16th Street. The city does not maintain accident statistics (pers. comm., B. Hyde, City of Chehalis, Chehalis, Washington, December 16, 1993).

Table 2.9-5 City of Chehalis Two-Way Traffic Counts–September 1993

Street	*Traffic [ADT]*
Interstate Avenue (North-South)	
Parkland Drive to 80 ft. south	10,955
Pony Soldier Motel to city limits	6,331
Parkland Drive (East-West)	
I-5 to Interstate Avenue	13,323
Pacific Avenue to Interstate Avenue	9,061
16th Street (North-South)	
SW Johnson to SW Kelly	2,417
SW Market to SW William	1,810
SW William to SW Wilson	2,140
Mills Avenue: No counts available	
Snively Avenue (East-West)	
16th Street to 18th Street	843
20th Street (North-South)	
S. Market to SW Snively Avenue	2,642
SW Salsbury to City Limits	2,784

ADT: Average daily traffic
Source: pers. comm., S. Hill, Department of Public Works, City of Chehalis, Chehalis, Washington, December 16, 1993.

2.10 RECREATION RESOURCES

A number of parks and recreation facilities are found in the general vicinity of the project. While none are located within 1.6 km (1 mile) of the CT facility site, the proposed water, wastewater and gas supply pipelines are adjacent to or will pass through several of these facilities.

Public parks and recreation facilities present in the vicinity of the project are listed in Table 2.10-1, and are shown in Figure 2.10-1. Although no use data are available for city of Chehalis recreation facilities, the two large municipal parks, Stan Hedwall Park and Recreation Park, are the most intensively used public recreation facilities in the project vicinity. In addition to these public facilities, semi-public and privately run facilities are located in the vicinity. They include school playgrounds and a playfield, a museum, movie theaters, restaurants, and a golf course. The Newaukum River, a popular sport fishing river, is also located within 3.2 km (2 miles) of the CT facility site.

No recreation facilities operated by Lewis County are located within the project vicinity. The closest county facility is Back Memorial County Park located in Adna, approximately 11.2 km (7

Table 2.10-1. Public Park and Recreation Facilities within 8 km (5 miles) of the Project

Reference Number (see Figure 2.10-1)	*Name*	*Amenities*	*Owner*
1	Stan Headwall Park	Picnic areas, camping, play area, fishing, hiking, swimming, archery; community gardens, athletic fields, restrooms	City of Chehalis
2	Recreation Park	Swimming pool, kitchen, athletic fields, picnic shelters, play equipment, historic exhibits, landscaped gardens, open space, restrooms	City of Chehalis
3	Westside Park	Picnic tables and benches, play equipment, basketball courts	City of Chehalis
4	Henderson Park	Chehalis Parks and Recreation office and maintenance buildings; picnic tables, play equipment	City of Chehalis
5	Dobson Park	Picnic tables, play equipment, open space	City of Chehalis
6	McFadden Park	Scenic viewpoints, picnic tables, play equipment, open space	City of Chehalis
7	Millet Field	Playfield	City of Chehalis
8	Chehalis Loop Bike Route	Designated 24-km (15-mile) bike route on existing roads	N/A
9	Newaukum River	Boat landings and sport fishing	N/A
10	Newaukum Valley Golf Course	Golf course, pro shop	Private

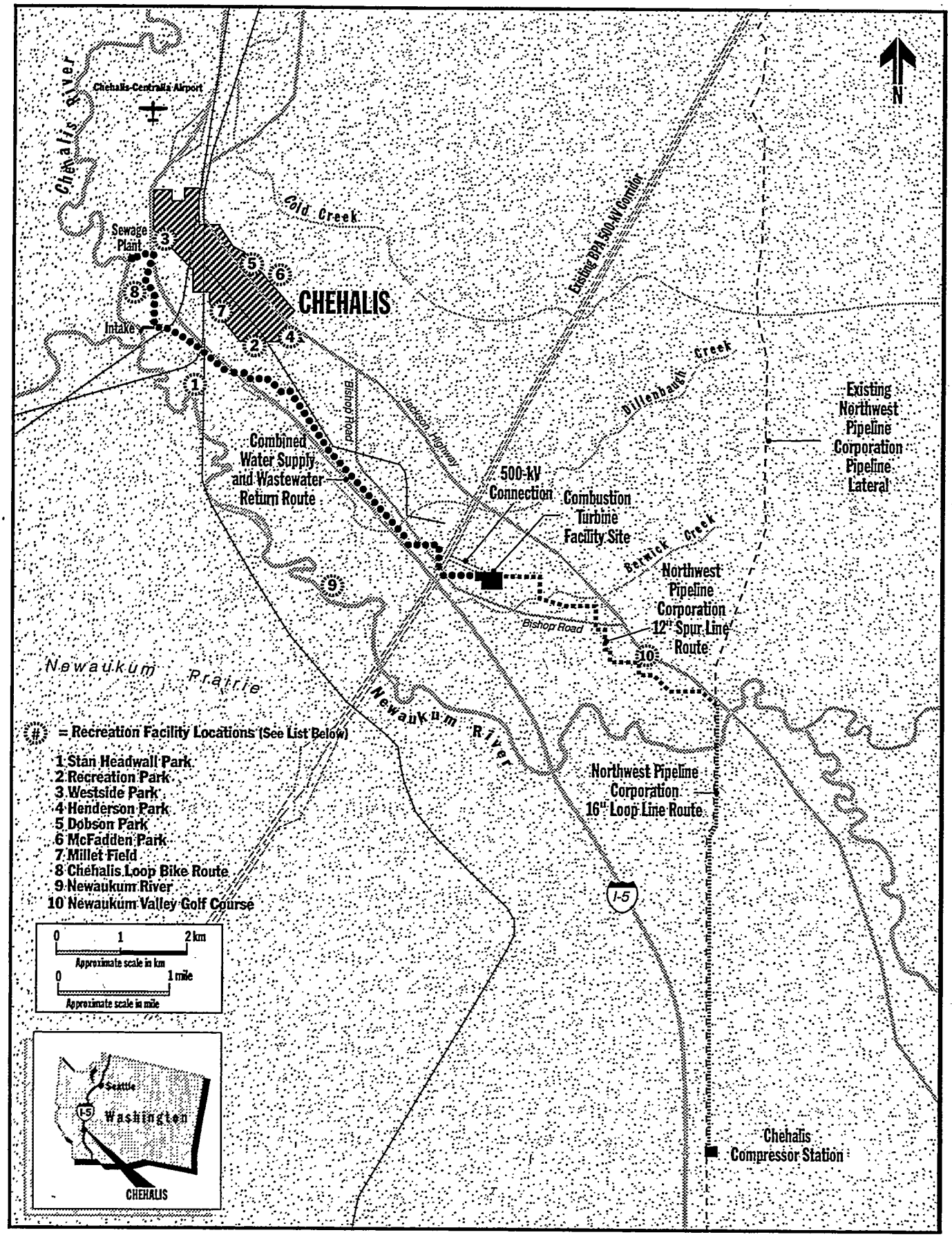


Figure 2.10-1 Public Parks and Recreation Facilities within 8 km (5 miles) of the Project

miles) from the CT facility site. County use figures indicate that, 93,992 visitors used Back Memorial County Park, while county parks served 794,134 visitors in 1991.

No state recreation facilities are located in the project vicinity. The closest state recreation facility is Lewis and Clark State Park, approximately 14.4 km (9 miles) from the CT facility site. This facility provides nature trails, camping, historical sites, and a Mount St. Helens interpretive center. There are no wild and scenic rivers, national trails, wilderness areas, estuarine sanctuaries, or public lands within the project vicinity.

2.11 Public Health and Safety

2.11.1 Project Materials

The proposed project would involve the use of some products and processes during construction and operations that could affect public health and safety. For example, both natural gas and fuel oil would be used or stored on site, both of which are flammable and can be explosive under certain circumstances. They can also have adverse effects on the environment if released in an uncontrolled manner. Lubricating oils, hydraulic fluids, cleaning solvents, paint, paint thinners, wastewater from cooling tower collection sumps, and other materials, in addition to process wastes, would be found on site, and could pose a risk to public health and safety if not used and disposed of properly. Some materials are classified as hazardous and would need careful handling and disposal to protect human health. Specific materials that could be used for project construction and operation are discussed in Section 3.11.

A Phase I Environmental Site Assessment study of the CT facility site was conducted to assess the possibility that hazardous materials exist in the soil or underlying groundwater as a result of prior use or migration of pollutants from an adjacent site. The study indicated that the site and adjacent properties have at least a 50-year farming history, and there has been no prior industrial use of the site. The Site Assessment concluded that there was no evidence of contamination at the proposed CT facility site.

2.11.2 Electric and Magnetic Fields

Power lines, like all electrical devices and equipment, produce electric and magnetic fields (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.

EMFs 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 EMF strengths for some common electrical appliances are presented in Table 2.11-1.

Table 2.11-1 Typical Electric and Magnetic Field Strengths 0.3 m (1 foot) from Common Appliances

Appliance	*Electric Field (kV/m)*	*Magnetic Field[1] (mG)*
Coffee Maker	0.030	1 - 1.5
Electric Range	0.004	4 - 40
Hair Dryer	0.040	0.1 - 70
Television	0.030	0.4 - 20
Vacuum cleaner	0.016	20 - 200
Electric Blanket [2]	0.01 - 1.0	15 - 100

1 By 1 to 1.5 m (3 to 5 feet), the magnetic field from appliances is usually decreased to less than 1 mG.
2 Values are for distances from a blanket in normal use, not 0.3 m (1 foot) away.
Source: Miller 1974, Gauger 1985

The average background magnetic field level measured in the center of rooms in 992 homes throughout the United States was 0.9 milligauss (mG) (Zafanella 1994). In 15 percent of the homes, the magnetic field level was greater than 2.1 mG. Fields very close to electrical appliances are much stronger than these levels, but appliance fields decrease in strength with distance very rapidly. 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 EMF strengths for some BPA transmission lines are given in Table 2.11-2.

There are no national standards for electric or magnetic fields. Some states have established electric or magnetic field standards. The state of Washington has not set a standard for either.

2.12 Visual Quality

The CT facility would be located in a developing industrial park (the Industrial Park). The Industrial Park is composed of light industry and warehouse buildings along with roads and parking areas. One of the most visually significant complexes in the Industrial Park area is the PPG glass plant. The plant consists of several large buildings and a water tower that can be seen for several miles in the valley. Undeveloped land is interspersed throughout the Industrial Park, and some of it is temporarily used for agriculture. The CT facility site is located on an undeveloped parcel that is not being used to grow crops. Three regional electrical transmission lines, supported by free-standing steel towers, cross the Newaukum River Valley and pass through the Industrial Park approximately 518.1 m (1,700 feet) northwest of the CT facility site. The transmission towers are major visual elements, and can be seen throughout the valley.

The visual character of the landscape along the proposed 4.8 km (3.0 mile) gas spur line route reflects the agricultural and rural residential land uses the pipeline would pass through. The

Table 2.11-2. 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 ROW	1.0	63	30
Edge of ROW	0.5	14	7
60 m (200 feet) from Center	0.01	1	0.4
230-kV			
Maximum on ROW	2.0	118	58
Edge of ROW	1.5	40	20
60 m (200 feet) from Center	0.05	4	2
500-kV			
Maximum on ROW	7.0	183	87
Edge of ROW	3.0	62	30
60 m (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
Note: Above information obtained from BPA study to characterize nearly 400 transmission lines located in the Pacific Northwest.

proposed 8.4-km (5.2-mile), 40.6-cm (16-inch) diameter gas loop line would be located in the same ROW as an existing gas line. From the junction with the spur line to the Chehalis Compressor Station, the loop line route passes through forested, cleared forest and agricultural lands, all of which influence the visual character of the lands adjacent to route.

The proposed 8.9-km (5.5-mile) combined water supply and wastewater line route is located in the Newaukum/Chehalis River valley and follow existing city of Chehalis water and sewer line ROWs between the CT facility site and the city WWTP. The route passes through commercial, industrial and agricultural lands, all of which influence the visual characteristics of the areas adjacent to the route.

3.0 ENVIRONMENTAL EFFECTS, CHEHALIS

3.1 GEOLOGY, SOILS, AND FLOODPLAINS

3.1.1 Geologic Impacts

Landslides

The gas transmission line route crosses an area considered susceptible to landslide where the route rises to the south from the Newaukum River Valley onto Jackson Prairie. A landslide along this portion of the route could cause pipeline rupture. Other project components occur on low gradient terrain that is not prone to mass movement.

Earthquakes

The project vicinity is subject to periodic ground movement from earthquakes. Earthquakes have the potential to damage the facility site, pipeline and overhead transmission lines, causing potentially adverse environmental effects from leakage of gas or chemicals.

Portions of the pipeline routes are susceptible to liquefaction damage from moderate to large earthquakes. This occurs primarily where the route crosses river valleys. Liquification at the CT facility site is unlikely due to the nature of the underlying soils.

Volcanic Activity

Impacts from renewed Cascade volcanic activity would be limited to ash fall at the CT facility site due to the distance from volcanic sources. Temporary facility shutdown may be necessary but no environmental impacts are anticipated. Other project components are not expected to be affected.

3.1.2 Soils Impacts

Soil erosion by flowing water would potentially have the greatest impact from construction-related activity for the project. Soils associated with all project components generally occur on areas of low relief, which reduces the potential for erosion. Table 3.1-1 presents potential soils impacts by project components.

Compaction of soil could reduce soil fertility due to decreased aeration, infiltration, and water holding capacity, which would adversely affect the ability of vegetation to reestablish. This impact cannot be readily quantified, and is mainly limited to the pipeline routes and workspace at the CT facility site that would not contain structures.

All project components are located on or cross soil types considered to be prime farmland. However, with regard to impacts, only the 12-ha (30.1-acre) CT facility site would be permanently removed from potential use as agricultural land. Prime farmland soils along the pipeline routes and electrical transmission line route would be temporarily disturbed during construction, and restored.

Table 3.1-1 shows acres of prime farmland temporarily and permanently affected by the project components.

Table 3.1-1. Soils Impacts by Project Component

Project Component	Affected Soil Area (ha [acres])		Water Erosion Potential ha (acres)[1]	Prime Farmland (ha [acres])	
	Temporary Disturbance	Permanent Disturbance		Temporary Disturbance	Permanent Disturbance
CT Facility Site	12 (30.1)	12 (30.1)	0.0	12 (30.1)	12 (30.1)
Water/ Wastewater Lines	25 (63.0)	0.0	5.5 (13.6)	25.2 (62.3)	0.0
Gas Spur Line	11.6 (28.8)	0.0	0.0	11.6 (28.8)	0.0
Gas Loop Line	25.4 (62.8)	0.0	2.2 (5.4)	21.4 (52.8)	0.0
Electrical Transmission Line	0.04 (>0.1)	0.04 (>0.1)	0.0	0.04 (>0.1)	0.04 (>0.1)

[1] Includes soils with moderate and high erosion potential

3.1.3 Floodplain Impacts

The CT facility site and electrical transmission line were located to avoid the 100-year floodplain. The water and gas pipeline routes cross several floodplains, including the Newaukum River and other low-lying areas. The pipeline routes would temporarily disrupt floodplain functions during construction as shown in Table 3.1-2. For both the water and gas lines, there are no practical alternatives to crossing floodplains to connect to the existing water and gas supply. Construction of the pipelines would occur during the dry season when it is unlikely that the rivers and creeks would flood. Also, the pipelines would be buried and would not inhibit floodplain functions following construction.

3.1.4 Mitigation

Geologic Impacts

- Final design for all components will include conservative seismic design and performance criteria to minimize the potential for seismic impact.

- Where the potential for liquefaction is encountered during engineering design studies for the gas pipeline, design methods will be included to minimize the risk of impacts. These methods may include the use of concrete collar weights or increased pipe wall thickness to maintain pipeline stability.

- Pipeline alignment will avoid steep slopes to the extent feasible, including avoidance of installation downhill from steep or potentially unstable slopes.

Table 3.1-2. Temporary Floodplain Impacts by Project Components

Project Component	*Associated Water Body*	*ha (acres)*
CT Facility Site	—	0.0
Electrical Transmission line	—	0.0
Water Supply/Wastewater Lines	Dillenbaugh Creek	2.21 (5.45)
Gas Line	Newaukum River	3.7 (9.1)
	Berwick Creek	1.8 (4.55)

Soils Impacts

- An Erosion and Sediment Control Plan (ESCP) for the project has been developed. Erosion control measures include limiting certain construction activities; installing temporary sediment traps and silt fences, and diversion structures; and revegetation. Clearing, excavation, and grading will be limited to areas absolutely necessary for the project. Non-construction areas will be marked in the field and equipment restricted from these areas, and existing vegetation will remain undisturbed. Planning of initial ground-disturbing activities during the dry season will reduce initial erosion and allow time to install erosion control measures before the rains begin. The ESCP includes measures to reduce the environmental impact of soil compaction by roughening the surface before revegetation.

- The Federal Energy Regulatory Commission (FERC) standard Erosion Control, Revegetation, and Maintenance (ECRM) Plan for pipelines will be applied to the project. The plan includes many of the same features as the ESCP for the project with the addition of temporary and permanent slope breakers, trench breakers, and revegetation along the entire route.

- Surface runoff will be diverted around and away from cut and fill slopes and conveyed in pipes or protected channels. Sediment traps will be used for runoff from disturbed areas. Vegetation will be re-established on all disturbed areas. Surfaces will be roughened prior to seeding to reduce compaction. Hydroseeding will occur during the growing season with mulching to control erosion in the interim. Seed mixture recommended by the SCS and the WDFW will be used. Slope and trench breaks will be used along the pipeline route at an interval determined by slope gradient and length according to the FERC ECRM.

- FERC requires topsoil segregated on all annually rotated agricultural land during pipeline construction, including areas of prime farmland and where landowners have requested topsoil segregation. Segregated topsoil will be replaced in its proper sequence during trench refilling, reducing the potential for loss of agricultural production. Topsoil segregation along the route is required on all areas of prime farmland under active cultivation.

Floodplain Impacts

- Site-specific waterbody crossing plans will be prepared to mitigate impacts associated with pipeline crossings of rivers, streams, and wetlands.

3.1.5 Unavoidable Adverse Impacts

Minor soil erosion at the CT facility site and the pipeline routes is expected during construction activities. This has a low impact on the environment due to the low relief, soil characteristics, and adherence to the ESCP and water body crossing plans. Temporary disturbance of lands used for agricultural production will occur along the pipeline routes. This has a low impact as topsoil will be segregated and replaced on agricultural land along the pipeline routes. The CT facility site will permanently remove 12 ha (30.1 acres) of farmland from potential production. However, the site has been zoned for industrial use and, therefore, its removal is considered a low impact.

3.1.6 Cumulative Impacts

The proposed project is primarily is located in the Industrial Park. More industrial development is expected to occur in the Industrial Park in the coming years. Such development would result in the permanent loss of agricultural land and minor soil erosion during construction activities. The continued conversion of open areas to building and paved areas would result in increased stormwater runoff. Based on the extent of existing development within the Industrial Park, the cumulative impacts from the proposed project are considered low. Impacts from future industrial development in the Industrial Park would be evaluated for cumulative geologic, soils, and floodplain impacts at the time of development.

3.2 Water Resources

3.2.1 Water Quantity Impacts

Three water sources are planned to supply necessary water to the CT facility. They are, in descending order of priority, (1) reclaimed water from the Chehalis WWTP, (2) city of Chehalis municipal water supply (originating in the Chehalis River), and (3) groundwater from the deep aquifer that underlies the project site. This source could also replace surface water that would be withdrawn from the Chehalis River and evaporated by the CT Facility during low flow periods.

The only time in which the WWTP and Chehalis municipal water could not completely supply the proposed CT facility water demands is during the summer. The average Chehalis WWTP discharge in the summer is 2,574 lpm (680 gpm), while the average summer water requirement for the proposed CT facility is 8,385 lpm (2,215 gpm). City of Chehalis municipal water sources

would provide for the remaining water required by the CT facility. However, the current summer water demand of the city of Chehalis fully consumes the available municipal water from the city's Newaukum River intake. Therefore, additional water (up to 5,811 lpm [1,535 gpm]) would need to be withdrawn, pursuant to an existing city water right, from the Chehalis River during the summer to meet the CT facility summer water supply requirements. Water withdrawal from the Chehalis River is not allowed by Ecology (WAC 173-522-020) when summer mean daily flow drops below 4.67 cms (165 cfs) (280,335 lpm [74,057 gpm]). During these periods, deep aquifer groundwater would supply the remaining CT Facility water requirements that have not been supplied under the city water rights to the Chehalis River.

It is anticipated that during the summer the CT facility would return a minimum of 1,162 lpm (307 gpm) to the Chehalis River. The water that would be evaporated by the proposed CT facility and not returned to the Chehalis River is considered a net loss of river discharge.

A groundwater right application has been filed by the developer with Ecology for 7,571 lpm (2,000 gpm) to cover pumping from four wells in the deep aquifer underlying the proposed project site. This amount of water would be enough to meet the water supply needs of the proposed CT facility during the summer period (April to September), and replace Chehalis River withdrawals to achieve no net loss of river discharge when Chehalis River flow drops below 4.67 cms (165 cfs) (280,335 lpm [74,057 gpm]).

Depending on the level of pumping, the withdrawal of groundwater from the four project wells could impact local and regional groundwater quantity. Well pumping reduces groundwater pressure head around the well which results in a drawdown of water levels in nearby wells. As drawdown increases, the quantity of groundwater available for extraction decreases. The amount of drawdown is greatest at the pumping well, and decreases with horizontal and vertical distance away the pumping well screen. Figure 2.2-3 shows the relationship between drawdown, distance (vertical and horizontal) and duration of pumping. With respect the proposed project production wells, local groundwater levels would be reduced more than regional levels because drawdowns would be greater near the proposed production wells.

The 1994 pump test showed that given current aquifer recharge and withdrawal rates, if the test production well pumped continuously at 1,893 lpm (500 gpm) for 6 months each year, water levels in the test well would recover to 60 to 90 percent of its original level during the 6-month interim period. The proposed maximum groundwater withdrawal is 7,569 lpm (2,000 gpm) from four wells spaced 304.8 m (1,000 feet) apart from one another. The regional drawdown resulting from this proposed groundwater pumping scheme would be on the order of 4.9 to 7.3 m (16 to 24 feet). This drawdown would be additional to the local short term drawdown. Based on analysis of the 1994 pump test, two production wells (spaced 304.8 m [1000 feet] apart) pumping 1,893 lpm (500 gpm) each for 6 months a year would draw down local groundwater levels (see Figure 2.2-3) such that additional well drilling or pump enhancement may be required for four nearby private wells. Once the final locations of the four project wells are determined, additional investigation of potential impacts to local wells will be required.

A 6-month pumping period represents the worst case, and is greater than that anticipated by the operation of the proposed project. On a mean annual basis, the time that would be required for

deep aquifer pumping is expected to only be 1.5 months, with a 3.5- to 4-month pumping period required once every 10 years. These pumping periods would be required when the flow in the Chehalis River is below Ecology's required minimum flow of 4.67 cms (165 cfs) (280,335 lpm [74,057 gpm]). The aquifer head following 1.5 months of pumping would completely recover before the start of the next pumping period the following year (Dames & Moore 1993b). It can be expected that the aquifer head would also fully recover from the 3.5- to 4-month pumping period, if the next pumping interval did not occur again for several years.

3.2.2 Water Quality Impacts

The proposed CT facility would treat its wastewater effluent from the boiler and cooling tower blowdown, make-up water pre-treatment train, and groundwater for river augmentation prior to discharging it to the Chehalis River through the existing Chehalis WWTP outfall. The discharge of the proposed CT facility effluent would be small in comparison to the minimum allowable Chehalis River baseflow. The effluent stream would be diluted up to 30 times in the 91-m (300-foot) long mixing zone downstream of the outfall into the Chehalis River given a properly functioning outfall structure.

It can be expected that worst-case water quality conditions in the Chehalis River would occur in summer, when flow in the river has dropped below the 4.67 cms (165 cfs) (280,335 lpm [74,057 gpm]) minimum required by Ecology. During these periods the proposed project anticipates obtaining 30 percent of its water requirement as reclaimed water from the WWTP, and 70 percent as groundwater from proposed project wells. Also, additional groundwater would be mixed with the effluent stream to offset the net loss of WWTP effluent discharge lost to evaporation (letter from D. Seitzinger, CRSS, to R. Diffely, BPA, December 19, 1994).

The water treatment design parameters for the project are based on meeting the water quality specifications in the current Chehalis WWTP National Pollutant Discharge Elimination System (NPDES) permit held by the City of Chehalis, and Washington state water quality standards (WAC 173-201). The predicted water quality constituents in the project effluent during the worst-case summer Chehalis River water quality conditions were examined. Although the constituents designated in the existing NPDES permit (BOD, total suspended solids, fecal coliform bacteria, pH, and total residual chlorine) were within permitted levels, some constituents (e.g., chlorides) exceeded state water quality standards. Additional treatment will therefore be required to bring all water quality constituents to within Washington state standards (to operate the project).

Ecology's recent TMDL study reports that DO levels in the Chehalis River downstream of the Chehalis WWTP are currently below water quality standards because of elevated BOD. Ecology has indicated in the study that the city's existing NPDES permit does not ensure maintenance (or improvement) of downstream DO levels. If Ecology enforces the waste load allocation recommendation proposed in their TMDL study, all summer discharge from the city of Chehalis WWTP outfall (including the proposed CT facility) would be required to have a zero BOD concentration (Ecology 1994).

A water quality analysis of proposed CT facility plant discharges with and without augmentation (Memorandum to Dave Seitzinger, CRSSC, from Dave Bjerklie, Dames & Moore Inc., Seattle,

Washington, September 20, 1994) indicate that exceedances of mercury (chronic), cadmium (chronic), lead (chronic) and silver (chronic and acute) may occur in the mixing zone within the Chehalis River at the WWTP outfall. The analysis indicates that all of the above metals in the river background are higher than the chronic levels. Some of the metals concentrations in the river are reported as below detection, and therefore accurate values could not be used in the analysis. Under these circumstances, the discharge concentration and the mixing concentrations would be affected by the inaccuracy. This analysis indicates that metals treatment may be needed to prevent contribution to chronic exceedances in the river mixing zone. Accurate metals data and a better understanding of the mixing zone would provide a more definitive assessment of the need for metals treatment. Assuming a sufficient level of effluent metals treatment is developed, the project effluent would not significantly adversely affect Chehalis River water quality.

3.2.3 Mitigation

- In order to compensate for any net loss of summer discharge that would occur in the Chehalis River, the following actions are anticipated:
  - Existing upstream irrigation water rights (up to 4,542 lpm [1,200 gpm]) could be purchased or optioned to increase river levels.
  - Groundwater from the facility's wells could be used to augment flow.
- Additional groundwater studies will be undertaken to optimize location and determine potential impacts of the four project wells. Strategies will be developed to detect and prevent impairment of existing water rights. Monitoring of local wells will be conducted to track long- and short-term drawdowns. Impacted groundwater water rights owners' pumps will be upgraded by increasing pump capacity, placing pumps deeper, and supplying additional power. Existing water rights could also be purchased.
- If Ecology enforces the wasteload allocation recommendation proposed in the TMDL study, boiler blowdown, wastewater, deep aquifer water, and other wastewater (including stormwater) would have to be treated to remove all BOD prior to discharge through the city of Chehalis WWTP outfall.
- Repair of the currently damaged Chehalis WWTP outfall structure would reduce aesthetic degradation of the Chehalis River.
- Water minimization technologies to reduce water consumption will be investigated.

3.2.4 Unavoidable Adverse Impacts

Water Quantity

There is a potential net water loss of 7,223 lpm (1,908 gpm) to evaporation in the cooling towers during the summer. When Chehalis River discharge drops below the minimum required baseflow of 4.67 cms (165 cfs) (280,335 lpm [74,057 gpm]), the proposed augmentation actions could serve to sufficiently offset loss. Although the pumping of groundwater from the proposed wells to

supplement summer water requirements of the project would lower the head of the deep aquifer, only a few existing wells would be affected, and these effects would be mitigated. Therefore, with the mitigation measures described, impacts to water quantity from the proposed project would be low.

Water Quality

Ecology has indicated in their TMDL study that the City of Chehalis's existing NPDES permit does not ensure maintenance (or improvement) of downstream DO levels. If Ecology enforces the wasteload allocation recommendation for the Chehalis River outlined in the TMDL study, severe restrictions on BOD loadings will be placed on the effluent from the proposed project. However, because the proposed project would discharge a smaller quantity of reclaimed water to the river than the project receives from the WWTP (with BOD maintained at current NPDES permit levels), the overall BOD loading discharged to the river would be reduced. Therefore, the impact on water quality is low.

3.2.5 Cumulative Impacts

Water Quantity

Water required for the proposed project would contribute significantly to the cumulative withdrawal of surface and groundwater in the region. During the proposed project's lifespan of 30 to 40 years, increasing withdrawals from the Chehalis River would be needed to meet the water requirements of the project and growth expected in and around the City of Chehalis. Greater withdrawals could have the effect of increasing the frequency and length of low flow periods in the river. These low flow periods not only create stress to the aquatic ecosystem, but also increase the demand for groundwater during those periods when river water may not be available under Ecology's regulations (WAC 173-522-020).

At current growth projections for the City of Chehalis, the existing water right held by the City may be fully exercised over the next 20 years to provide water for expected city growth and the proposed project (CPI 1994). After this 20-year period, additional water rights or water supply sources may be required to supply the city or operate the proposed project, creating additional cumulative withdrawals.

Groundwater withdrawals to provide water for the proposed project would contribute to cumulative withdrawals of groundwater. In the worst case, if maximum pumping were required to supply the summer requirements of the project (four wells for up to 6 months) in addition to the local well impacts, the head of the deep aquifer could drop 4.9 to 7.3 (16 to 24 feet) and stabilize. This regional drawdown would be equivalent to a third to one-half the total reduction in the deep aquifer head that has occurred over the past 40 years.

Therefore, cumulative impacts to regional water quantity are considered moderate.

Water Quality

Concentrations of water quality constituents in the effluent from the proposed project would contribute to the cumulative loadings in the Chehalis River, and would have to be taken into account

when evaluating future development in the region. If Ecology enforces the wasteload allocation recommendation for the Chehalis River outlined in the recent TMDL study, severe restrictions on BOD loadings will be placed on current and future effluents, including the proposed project. However, because the proposed project would decrease the overall BOD loading on the river, the cumulative water quality impact is low.

3.3 Air Quality

3.3.1 Criteria Pollutant Emissions

Final selection of specific equipment and performance factors for the proposed project will be made when the project is called by BPA under the Resource Contingency Program (RCP). A basic configuration for the facility has been assumed for the purpose of this environmental analysis. From the possible operating scenarios and equipment configurations, worst-case conditions were selected for the environmental analysis. Supplemental firing with duct burners in the HRSG is not proposed.

Ammonia emissions have been included in the analysis in the event that Selection Catalytic Reduction (SCR) is selected as a control technology. If an alternative control technology is selected, the analysis of NO_x emissions will be adequate and the ammonia emissions can be eliminated.

The CT facility would be fueled primarily by natural gas. In the event of natural gas curtailment, low sulfur No. 2 distillate oil would be used as a backup. Fuel oil would be used no more than 720 hours per year. The project would operate under a power purchase agreement that would allow the CT units to be taken out of service for a portion of the year, if the demand for electricity is low. When burning natural gas, the project would operate between 60 and 100 percent load. The number of startups, which have higher than average emission rates, and are estimated at between 20 and 90 per year, have been included in the analysis. The CT facility would include auxiliary boilers that will fire between 480 and 3,600 hours per year.

Best Available Control Technology

Washington regulations (WAC 173-400-110-[3][a]) require new sources to design using Best Available Control Technology (BACT). The U.S. Environmental Protection Agency (EPA) recommends the "top down" evaluation process for BACT analyses. This approach ranks all available control technologies in descending order of control effectiveness. The most stringent or "top" alterative is examined first; this alternative is established as BACT unless the applicant demonstrates to the satisfaction of the permitting authority that technical, energy, environmental, or economic considerations justify a less stringent technology. If the most stringent technology is eliminated, then the process is repeated for the next most stringent alternative.

For the proposed CT facility, BACT design information will be documented in the Prevention of Significant Deterioration (PSD) permit application and reviewed by Ecology. The proposed controls for the project are summarized in Table 3.3-1.

The technology determined to be BACT for the control of NO_x in recent combined cycle projects has been the use of dry low-NO_x combustors in the turbine with SCR, which relies on the use of

ammonia to reduce NO_x to nitrogen. This technology has proven effective in significantly reducing NO_x emissions, but at the expense of approximately 10 ppm of unreacted ammonia, increased particulate matter emissions, and higher operating and maintenance costs. In an attempt to avoid the negative factors that accompany SCR, turbine manufacturers have been focusing research and development efforts on "advanced" dry low-NO_x (ADLN) combustor technology to reduce NO_x transmissions from the turbine. Within the time frame for the CT facility, at least one turbine manufacturer expects to have an ADLN gas turbine available with NO_x emissions of 9 parts per million (ppm) (without SCR).

Table 3.3-1. Proposed Control Technologies

Pollutant	*Proposed BACT*
NO_x - Natural Gas Firing	Dry Low-NO_x combustor with SCR or advanced dry low-NO_x combustor
NO_x - Fuel Oil Firing	Water injection SCR
CO	Proper combustion control
SO_2	Low sulfur fuel (natural gas), limited use of backup fuel oil (0.05% sulfur content)
VOC	Proper combustion control
PM_{10}	Proper combustion, low use of natural gas or primary fuel Limited use of backup fuel oil
Ammonia (from operation of SCR)	Proper combustion Adequate mixing
Other toxins	Proper combustion Limited fuel oil use

Source: CPI 1994, Chapter 6

To allow for this anticipated improvement in combustion turbine technology, CPI has chosen to delay its decision regarding BACT for NO_x emissions. When firing natural gas, NO_x emissions will be controlled by suing either ADLN or dry low-NO_x technology and SCR. When firing No. 2 fuel oil, steam injection will be used to reduce NO_x emissions to avoid damage to the SCR caused by sulfur in the fuel. The air quality analysis that follows considers the maximum emissions that might occur with either technology (i.e., 9 ppm NO_x and 10 ppm ammonia).

The use of natural gas as a base fuel and proper combustion will provide BACT for volatile organic compounds (VOCs), sulfur dioxide (SO_2), carbon monoxide (CO), toxic air pollutants (TAPs), and particulate matter. The use of low sulfur No. 2 fuel oil as a backup fuel will limit SO_2 and particulate matter emissions during gas curtailments.

CPI will maintain and operate the control equipment in accordance with vendor recommendations and generally accepted practices to prevent excessive emissions and to minimize fuel consumption.

Modeling

The PSD application for the Chehalis CT project has recently been revised to include modeling using COMPLEX1 and Industrial Source Complex Short Term (ISCST2), and 3 months of onsite meteorological data (CPI 1994, Chapter 6). The proposed control technologies have also been amended. This Draft Environmental Impact Statement (EIS) incorporates the revised control technologies and emissions estimates. However, the predicted maximum concentrations based on earlier SCREEN2 results and worst case meteorology have been retained. Although the SCREEN2 predictions are acknowledged to be high, modeling with only 3 months of data likely underpredicts the maximum project related concentrations. The EIS modeling evaluation will be revised once a complete year of meteorological data has been collected and the results are incorporated into the PSD application. This will likely occur before the Final EIS is prepared. Maximum air quality emission concentrations from the project were predicted using a conservative dispersion models, maximum emissions, and worst-case meteorology.

The SCREEN2 model was used in the analysis. Dispersion is influenced by local terrain, short-term meteorological conditions, and the influence of buildings near the stack. The SCREEN2 addressed these features and is recommended by EPA (EPA 1992a, 1992b, 1993).

The SCREEN2 model requires emission rates as part of the input data. The modeled emission rates were based on the annual average and maximum short-term emission rates. Additional input data, including the stack exit velocity and temperature, were based on values for the more conservative natural gas firing case. The modeling predicted project-related concentrations in simple, elevated, and complex terrain that surrounds the CT facility site. The SCREEN2 model predicts maximum 1-hour concentrations. The predicted 1-hour concentrations were converted to averaging periods corresponding to the AAQS by multiplying by 0.9, 0.7, 0.4, or 0.1 to obtain 3-hour, 8-hour, 24-hour or annual concentrations, respectively.

Maximum predicted air pollutant concentrations resulting from emissions from the project are less than the AAQS and the PSD Class II increments (Table 3.3-2). All concentrations of particulate matter with aerodynamic diameter of less than 10 microns (PM_{10}), SO_2, and nitrogen dioxide (NO_2) were predicted to be greater than the significance levels for these pollutants, indicating that the air quality analysis should consider other sources of emissions located near the Chehalis CT facility site. The predicted concentrations are greater than the PM_{10} and SO_2 De Minimis monitoring levels, indicating that preconstruction monitoring may be required.

Maximum air pollution concentrations were predicted to occur at a location about 1 km (0.6 mile) from the CT facility site. Screening modeling does not consider wind direction. Therefore, the direction of the maximum concentration from the CT facility site cannot be determined.

The CT facility site is within 100 km (62.1 miles) of several nonattainment areas, including the Olympia and Tacoma PM_{10}, Puget Sound O_3, and Puget Sound and Vancouver CO nonattainment areas. Emissions from the project were modeled to predict maximum project-related concentrations

Table 3.3-2. Predicted Air Pollutant Concentrations

Pollutant	Maximum Concentrations ($\mu g/m^3$)	AAQS ($\mu g/m^3$)	PSD Increment (Class II) ($\mu g/m^3$)	De Minimis Monitoring Levels ($\mu g/m^3$)	Significant Impact Levels ($\mu g/m^3$)
PM_{10} (annual)	1.80	50	17		1
PM_{10} (24-hour)	15.9	150	30	10	5
CO (8-hour)	125.7	10,000		575	500
CO (1-hour)	179.5	40,000			2,000
NO_2 (annual)	7.40	100	25	14	1
SO_2 (annual)	2.70	52	20		1
SO_2 (24-hour)	31.9	262	91	13	5
SO_2 (3-hour)	71.9	1,300	512		25
SO_2 (1-hour)	79.8	1,048			

Source: Dames & Moore 1994c

in the nonattainment area. The maximum air pollution concentrations predicted for the nonattainment areas are less than the air quality significance levels.

The CT facility will also be a source of TAPs. Annual emissions of ammonia will be greater than 9.1 metric tons (10 tons). Therefore, dispersion modeling was required to determine the ambient concentrations of the TAPs. TAP emissions for both natural gas and fuel oil firing were modeled using the SCREEN2 model (EPA 1992a). The SCREEN2 model predicts maximum possible 1-hour concentrations from sources based on worst-case meteorological data. Predicted concentrations were then adjusted by application of multiplication factors. The maximum 1-hour concentrations predicted by SCREEN2 were multiplied by 0.4 and 0.1 to obtain 24-hour and annual average concentrations, respectively (EPA 1992b). Concentrations of representative TAPs are compared to the Acceptable Source Impact Levels (ASILs) in Table 3.3-3. The ASIL for each pollutant is the concentration that will limit the risk of an additional cancer case to one in one million.

Concentrations of TAPs resulting from natural gas combustion are less than the ASILs, including concentrations resulting from ammonia, benzene, and formaldehyde. Emissions resulting from fuel oil combustion result in ambient concentrations greater than the ASIL for one TAP. The concentration of 1,3-Butadiene is predicted to be 4.6 times longer than the ASIL. Additional analysis of the 1,3-Butadiene concentrations will be conducted using on-site meteorology and a refined modeling methodology.

Table 3.3-3. Ambient Concentrations of Toxic Air Pollutants

Toxic Air Pollutant	Averaging Time	Concentration ($\mu g/m^3$)	
		ASIL	Predicted
Gas Fired			
Ammonia	24-hour	59.9	8.54
Benzene	Annual	0.12	0.0032
Formaldehyde	Annual	0.077	0.0318
Oil Fired			
Benzene	Annual	0.12	0.0179
1,3-Butadiene	Annual	0.0036	0.0165
Chromium (VI)	Annual	0.000083	0.000048
Lead	24-hour	0.5	0.0024
Arsenic	Annual	0.000083	0.000048

Source: Dames & Moore 1994c

Maximum potential emissions from the project (Table 3.3-4) are based on the following assumptions:

- SO_2 emissions are based on a natural gas sulfur content of 2 grains/standard cubic foot and a fuel oil sulfur content of 0.05 percent or less by weight.
- The NO_x and SO_2 annual emissions are based on 4,440 hours of natural gas firing per year for two units; 720 hours of fuel oil firing per year for two units; 2,880 hours of auxiliary boiler operation and 90 start/stop cycles per units per year for two units.
- The SO_2, NO_x, and VOC emissions are without an SCR (worst case).
- All particulate matter are assumed to have an aerodynamic diameter of less than 10 microns (PM_{10}).
- The PM_{10} annual emissions are based on 8,040 hours of natural gas firing per year for two units; 720 hours of oil firing per year for two units; 480 hours of auxiliary boiler operation and 20 start/stop cycles per unit per year for two units.
- The CO annual emissions are based on 4,020 hours of natural gas firing per year for two units at 60 percent load; 4,020 hours of natural gas firing per year for two units at 100 percent load; 360 hours of fuel oil firing per year for two units at 60 percent load, 360 hours

of fuel oil firing per year for two units at 100 percent load; 480 hours of auxiliary boiler operation and 20 startups per unit per year for two units.

- The annual VOC emissions are based on 60 percent load conditions (worst case).

Table 3.3-4. Maximum Project Emissions (Potential to Emit)

	Pollutant (MTY [TPY])			
	NO_x	PM_{10}	CO	SO_2
Turbine				
Natural Gas	471.8 520.1	121.2 (133.6)	1035.5 (1141.4)	225.4 (248.5)
Fuel Oil	227 (251.2)	14.3 (15.8)	120.1 (132.4)	38.9 (42.9)
Auxiliary Boiler	21.8 (24.0)	2.2 (2.4)	10.3 (11.4)	6.9 (7.6)
Total	721 (795)	138 (152)	1,166 (1,285)	271 (299)

Source: Dames & Moore 1994c

Emissions of SO_2, NO_x, PM_{10}, and CO are all greater than 91 MTY (100 TPY) and thus the proposed CT facility will be considered a major new source. Also, emissions of SO_2, NO_x, PM_{10}, CO, and VOCs are greater than the respective significant emission rates (40, 40, 25, 100, and 40 TPY, respectively), and therefore, the facility will be subject to PSD review.

Construction of the project's buried and overhead transmission lines would result in the generation of fugitive dust and exhaust from the construction equipment. These short-term emissions are not subject to regulatory review and would result in small ambient air quality concentrations. There would be no direct emissions to the air resulting from the operating transmission lines.

3.3.2 Emission of Toxic Air Pollutants

Emission of TAPs were estimated from the chemical composition of total organic gases and particulate matter present in the CT facility exhaust, for both natural gas and distillate oil firing (California Air Resources Board [CARB] 1991). TAP emissions of volatile and particulate matter were estimated by multiplying the total hydrocarbon and particulate matter emission rate, respectively, by the fraction of the substances to be quantified. The estimated hourly and annual emission rates for the TAP with the largest emissions are listed in Table 3.3-5. Annual average emissions are based on 8,040 hours of natural gas firing and 720 hours of fuel oil firing, both at 100 percent load. The annual emissions of benzene, formaldehyde, and ammonia are greater than

the small quantity emission rates for toxic and carcinogenic air pollutants (WAC 173-460-080). Therefore, ambient concentrations of these pollutants must be determined using dispersion models, and the predicted concentrations must be compared to the Washington State ASILs.

Table 3.3-5. Toxic Air Pollution Emission Rates

	Emission Rate		
Toxic Air Pollutant	*(kg/hour [pound/hour])*	*(kg/hour [pound/year])*	*Small Quantity Emission Rates (kg/hour [pound/hour])*
Gas Fuel			
Ammonia	25.5 (54.0)	199,579.6 (440,000)	2,381 (5,250)
Benzene	0.2 (0.4)	1,459 (3,216)	4.5 (10)
Formaldehyde	4.42 (9.75)	35,556 (78,390)	9.1 (20)
Oil Fuel			
Benzene	0.15 (0.327)	107 (235)	4.5 (10)
Formaldehyde	1.64 (3.62)	1,182 (2,606)	9.1 (20)
1,3-Butadiene	2.25 (4.96)	1,619 (3,571)	4,762.7 (10,500)
Chromium	0.01 (0.0240)	7.7 (17)	79.4 (175)
Lead	0.09 (0.208)	68.0 (150)	79.4 (175)
Arsenic	0.01 (0.0175)	5.9 (13)	0.2 (0.5)

Source: Dames & Moore 1994c

3.3.3 Effects on Class I Areas

Visibility

Washington air quality regulations require the evaluation of visibility impairment for all Class I areas within 160 km (100 miles) of the proposed site. Six Class I areas fall within this range: Olympic National Park, Mount Rainier National Park, Goat Rocks Wilderness Area, Alpine Lakes Wilderness Area, Mount Adams Wilderness Area, and Mount Hood Wilderness Area. Visibility impacts related to the project will be greatest in the closest park, the Mount Rainier National Park. The visibility in the atmosphere may be affected by emissions of particulate matter directly into the air, by the presence of NO_2 gas, and by secondary aerosol formation from SO_2, sulfate (with two additional electrons; SO_4^{2-}), NO_x, and CO emissions. Visibility degeneration resulting from project emissions was assessed using the EPA visibility model VISCREEN, following the guidance provided by EPA (1988) for a Level 1 analysis.

The VISCREEN model estimates the contrast between the plume and the background, and the plume perceptibility (color difference) parameter, ΔE, which is a function of difference in brightness, color hue, and saturation. The contrast and ΔE parameters are calculated separately for sky and terrain backgrounds. The model considers different sun angles and plume/viewer angles, and determines the maximum possible visibility impact. The Level 1 analysis uses worst-case meteorology.

The visibility analysis used conservative estimates for all parameters, including maximum emission rates from the project, the minimum distance to the Class I areas, and very stable turbulence conditions (stability class F, wind speed equal to 1 m/second). The emission plume was modeled with a background visual range of 256 km (160 miles) for all of the Class I areas.

Visibility degradation resulting from emissions from the project were predicted for an observer within each Class I area viewing a vista inside the park or wilderness area, and for an observer inside each Class I area viewing a distant vista outside of the park or wilderness area. Results of the Level II screening analysis indicated that during worst-case meteorological conditions, and while burning fuel oil, the plume from the combustion turbine will not be perceptible or visually significant (CPI 1994).

Deposition

The Class I areas are most sensitive to the deposition of sulfur and nitrogen compounds. Based on the available data, the maximum deposition rate for sulfur compounds that can be tolerated by most terrestrial ecosystems is 20 kilograms (kg)/ha/year (44 pounds/acre/year). Adverse effects are very unlikely below 5 kg/ha/year (11 pounds/acre/year) (U.S. Department of Agriculture 1992). For areas that contain sensitive lichen species, 5 to 15 parts per billion by volume (ppbv) of the annual average SO_2 concentration is considered adverse. Injury from nitrogen deposition is not expected if NO_x deposition is less than 3 kg/ha/yr (7 pounds/acre/year), and the daily ambient NO_2 concentration is less than 15 ppbv.

The potential for sulfur and nitrogen deposition was evaluated by modeling emissions from the project using the SCREEN2 model and worst-case meteorological data. The model predicted maximum 1-hour ambient concentrations at a point on the park boundary closest to the CT facility site. This 1-hour concentration was multiplied by 0.9, 0.4, or 0.1 to obtain 3-hour, 24-hour, or annual average concentrations, respectively. Maximum predicted concentrations in Mount Rainier National Park resulting from project emissions are less than the PSD Class I increments (Table 3.3-6).

Results of the SCREEN2 modeling were used to determine the maximum predicted annual average SO_2 and 24-hour NO_2 concentration in Mount Rainier National Park. For this part of the analysis, all NO_x from the project was assumed to be emitted as NO_2. The maximum concentrations are presented in Table 3.3-7. Emission from the project will 3.8 and 0.5 percent of the U.S. Forest Service (USFS) zero injury levels.

Total sulfur and nitrogen deposition resulting from project emissions were estimated for Mount Rainier National Park following EPA guidance (EPA 1993). Deposition was estimated by multiplying the predicted concentration by a deposition velocity and the length of the averaging

Table 3.3-6. Maximum Predicted Concentrations in Mount Rainier PSD Class I Area

Pollutant	*Averaging Time*	*PSD Class I Increment ($\mu g/m^3$)*	*Predicted Concentration ($\mu g/m^3$)*
SO_2	Annual	2	0.1
	24 - hour	5	0.7
	3 - hour	25	1.7
Particulate	Annual	5	0.042
	24 - hour	10	0.4
NO_x	Annual	2.5	0.2

Source: Dames & Moore 1994c

Table 3.3-7. Predicted Concentrations within Mount Rainier National Park

Pollutant	*Averaging Period*	*Predicted Concentration (ppbv)*	*Suggested Limits (ppbv)*
SO_2 annual	Annual	0.023	5.00
NO_2 average	24-hour	0.564	15.00

Source: Dames & Moore 1994c

period. This analysis assumes that concentrations of SO_2 are deposited as SO_2, NO_x is emitted as NO_2, and NO_2 is deposited as nitric acid (HNO_3). Predicted annual deposition of SO_2 and HNO_3 in Mount Rainier National Park are less than the limits suggested by the USFS (Table 3.3-8). A refined modeling analysis using on-site hourly meteorology will be undertaken to investigate the deposition rates of SO_2 and HNO_3 in Mount Rainier National Park.

3.3.4 Cooling Tower Plume Effects

Unusable excess heat from the project would be dissipated to the atmosphere by the evaporative cooling towers. Air leaving the cooling towers is warmer than the surrounding air, and is saturated with as much moisture as it can carry. As the air mixes with the surrounding atmosphere, it cools and loses its ability to carry the moisture that it gathered in the cooling towers. The moisture then condenses into liquid water droplets that form a visible plume. As the plume is carried downwind, the liquid water droplets will evaporate and the plume will gradually disappear. If the ambient air

Table 3.3-8. Pollutant Deposition Rates for Mount Rainier National Park

Pollutant	Estimated Annual Deposition (kg/ha/year [pounds/acre/year])	Suggested Limits (kg/ha/year [pounds/acre/year])
SO_2	0.098 (2.2)	5.00 (11)
HNO_3	3.71 (8.2)	5.00 (11)

Source: Dames & Moore 1994c

is saturated, a fog or cloud will already exist and the cooling towers' plumes will not have a visible impact other than that which is already present.

The potential impacts from the cooling towers' plume are as follows:

- The condensed water droplets are visible and can obscure or impair the view from locations in the vicinity of the CT facility site.
- The plumes can create a ground shadow that can create a loss of incoming solar energy for some croplands immediately adjacent to the facility.
- Some of the water droplets may contact the ground before being re-evaporated, causing a slight increase in precipitation at locations immediately adjacent to the CT facility site.
- During certain wind conditions, the plumes can became bent over and create a localized fog that may impair driving conditions.
- When a bent over plume contacts the ground during freezing conditions, a layer of ice may form on surfaces including roadways and powerlines.
- A small quantity of droplets, referred to as drift, comprised of water that was not evaporated from the cooling towers and subsequently recondensed. The drift contains impurities found in the cooling water including dissolved salts, metals, and algae growth suppressants. These impurities will be deposited when the drift droplets evaporate in ambient air.

An evaluation of the impacts expected to result from the cooling towers' plumes was conducted (McCulley, Frick & Gilman, Inc. 1994). The analysis used the SACTI model (Argonne National Laboratory 1984) and 5 years of meteorological data from Olympia Airport. The SACTI model predicted the number of hours of visible plumes, the number of hours of ground shadowing, the number of hours of plume fogging, and the amount of drift deposition.

The SACTI model predicted that visible plumes would occur, but the number of hours of long plumes would be very small (Figure 3.3-1). Maximum plume lengths would be on the order of

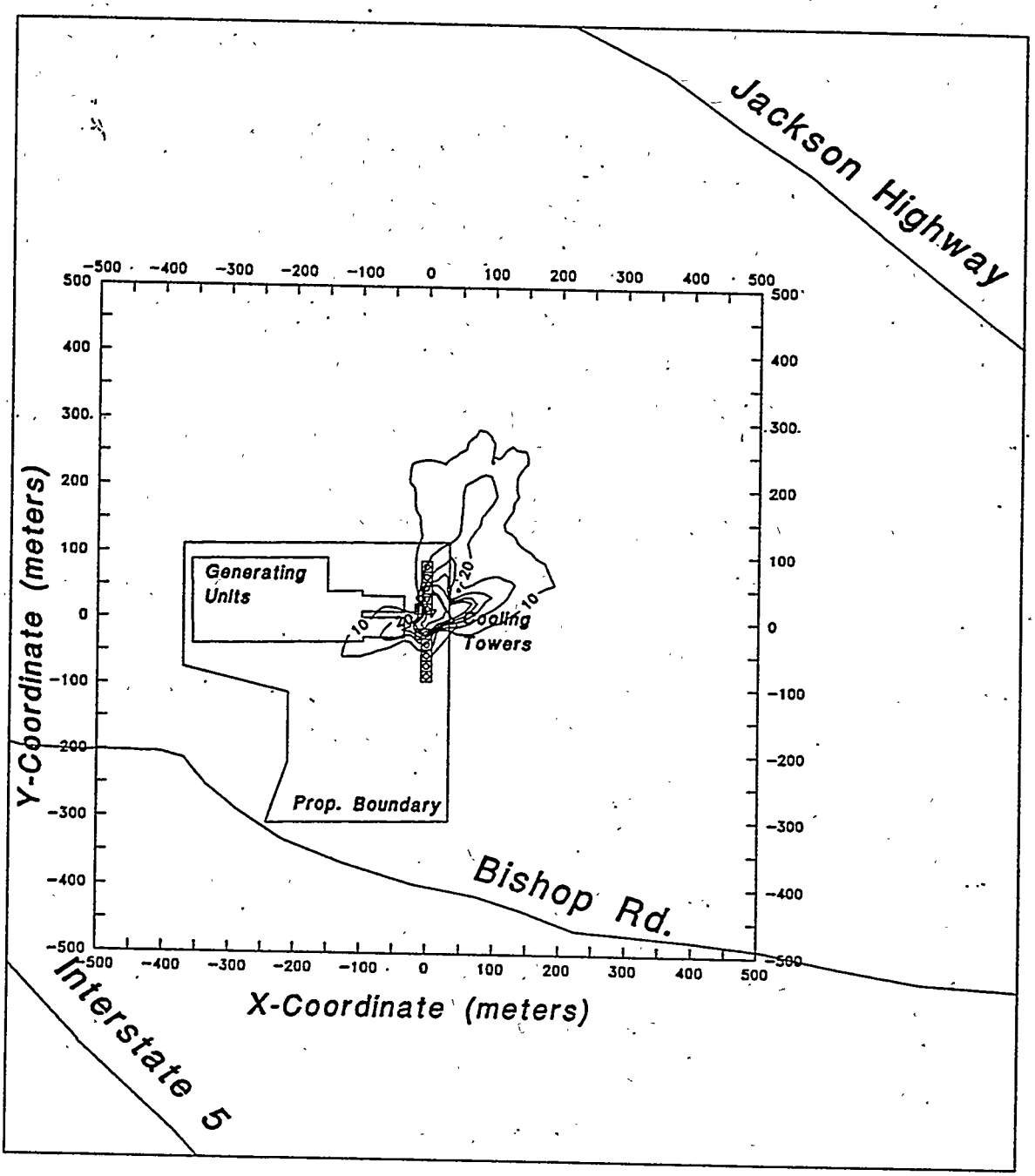


Figure 3.3-1 No. of Hours per Year of Visible Plumes Above Ground- 100% Annual Capacity

300 m (984.3 feet) and typical plume lengths would be less than 30 m (98.4 feet). Plumes extending more than 300 m (984.3 feet) from the cooling towers would occur at a frequency of a few hours per year (Figure 3.3-2). Pictorial examples of typical and worst-case plume lengths are presented in Figure 3.3-3 for winds parallel and perpendicular to the cooling towers.

The number of hours of shadowing, fogging, and icing were also predicted by the SACT1 model (Figure 3.3-4). For areas greater than 100 m (328.1 feet) from the cooling tower, 100 hours per year of shadowing can be expected. Fogging resulting from operation of the cooling towers would be restricted to southerly wind conditions and would affect an area immediately to the northeast of the CT facility site (Figure 3.3-5). Two hours per year would produce fogging conditions that extend to distances greater than 200 m (656.2 feet) from the cooling towers. Fogging would not impact any highways in the area of the CT facility site. For the 5 years of meteorological data analyzed, no hours of icing were predicted to occur as a result of cooling tower operations.

Salt deposition patterns for the area surrounding the cooling tower were predicted by the SACTI model. Within 1 km (0.6 mile) of the cooling towers, about 1 gram per square meter per year of deposition can be expected (Figure 3.3-6). This level of deposition is not expected to have an adverse environmental impact.

3.3.5 Mitigation

The project will be required to demonstrate that the emission controls meet the requirements for BACT. BACT is required in attainment areas for major new sources, and is the highest and most efficient control level consistent with energy, environmental, and economic factors for the facility. The method of evaluating BACT requires the developer to submit information on a complete range of technologies for each pollutant, and to choose the best technology unless substantial reason exists to preclude it (e.g., not commercially available). Control technologies in the proposed project design (described previously in Section 3.3.1) are the most stringent emissions controls available for combustion gas turbines.

3.3.6 Unavoidable Adverse Impacts

The project would emit combustion by-products to ambient air. As stated in Section 3.3.1, concentrations resulting from project-related emissions would be less than applicable local, state, and national AAQS. Furthermore, project-related emissions would result in concentrations and depositions in the PSD Class I areas that are less than the guidance values. Air quality impacts resulting from the proposed project are considered low.

3.3.7 Cumulative Impacts

The CT facility will consist of two units (with two separate emission stacks), with no anticipated additional units. Additional sources in the area of the project may include other industrial facilities and potential industrial facilities that may locate there. Any additional sources of air emissions would be subject to regulatory review and would have to demonstrate that their emissions will result in ambient air pollution concentrations that are less than the AAQS. If concentrations resulting from

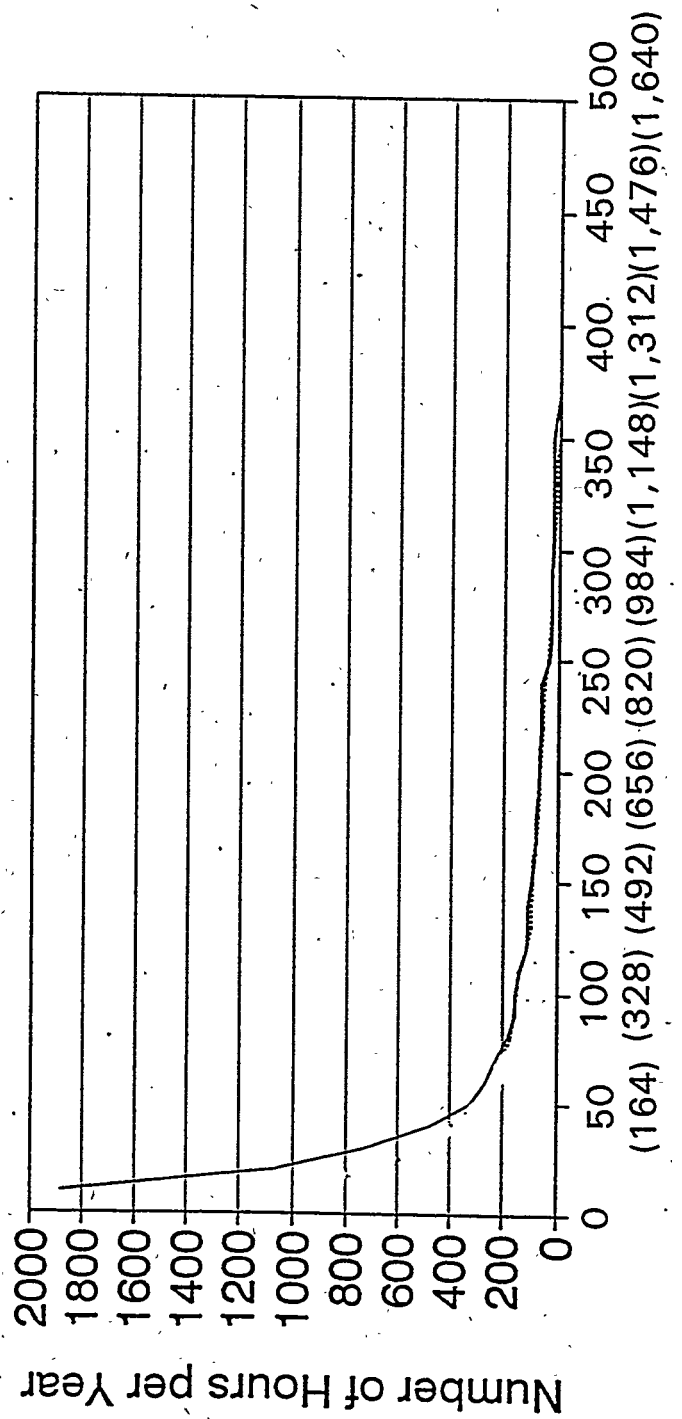


Figure 3.3-2 Number of Hours Plumes Occur Irrespective of Location

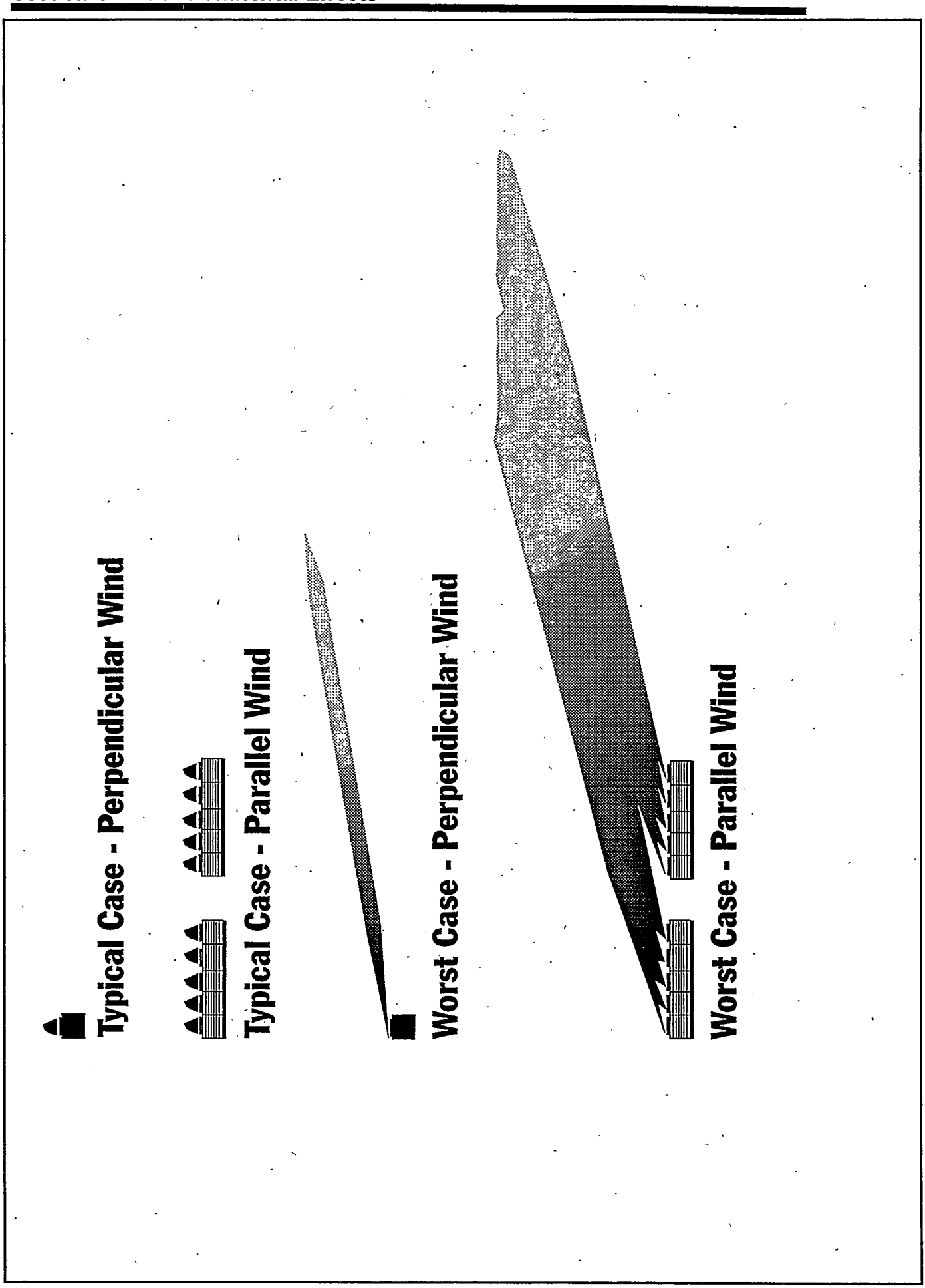


Figure 3.3-3 Typical and Worst-case Plume Lengths

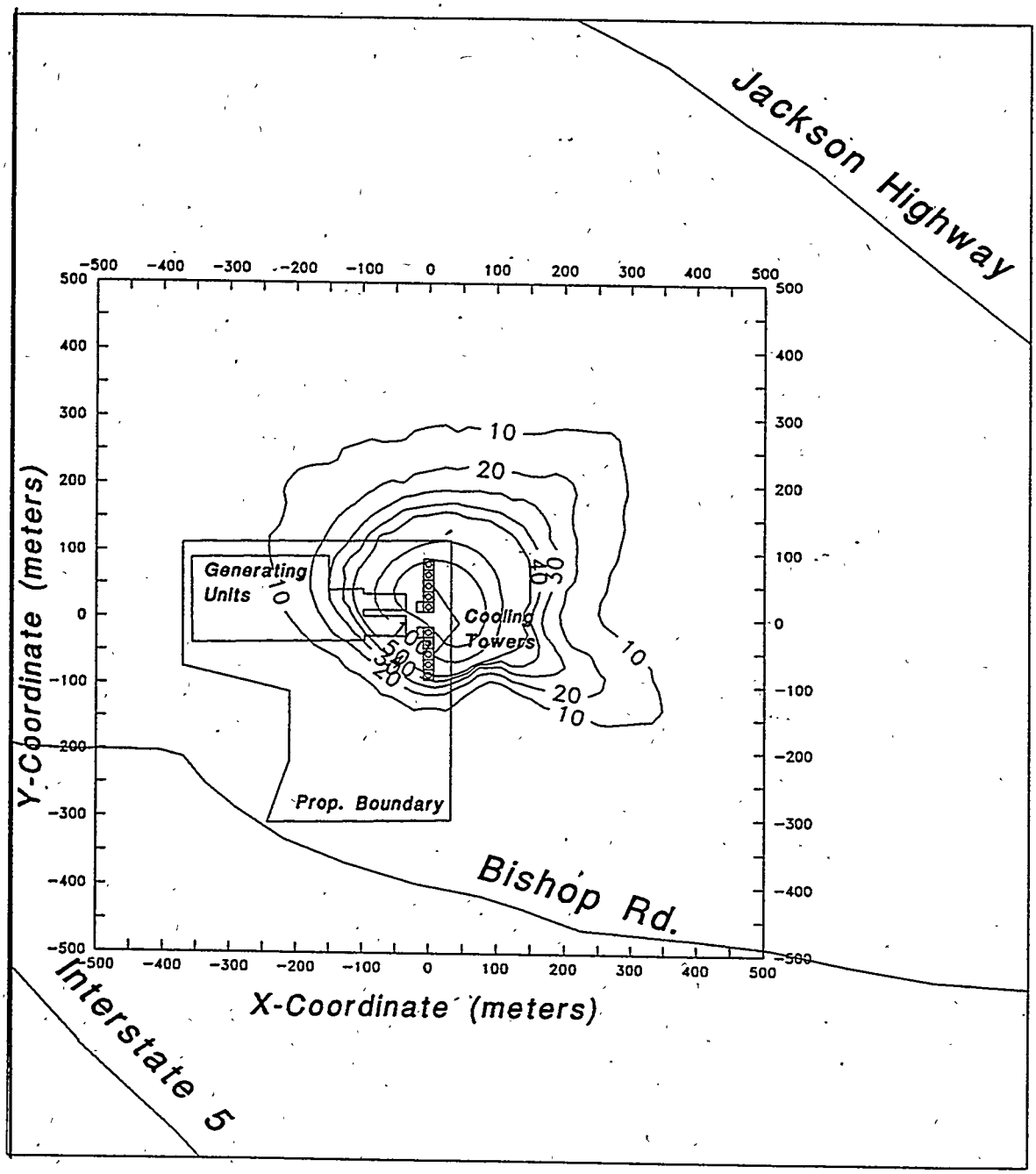


Figure 3.3-4 No. of Hours per Year of Ground Shadowing - 100% Annual Capacity.

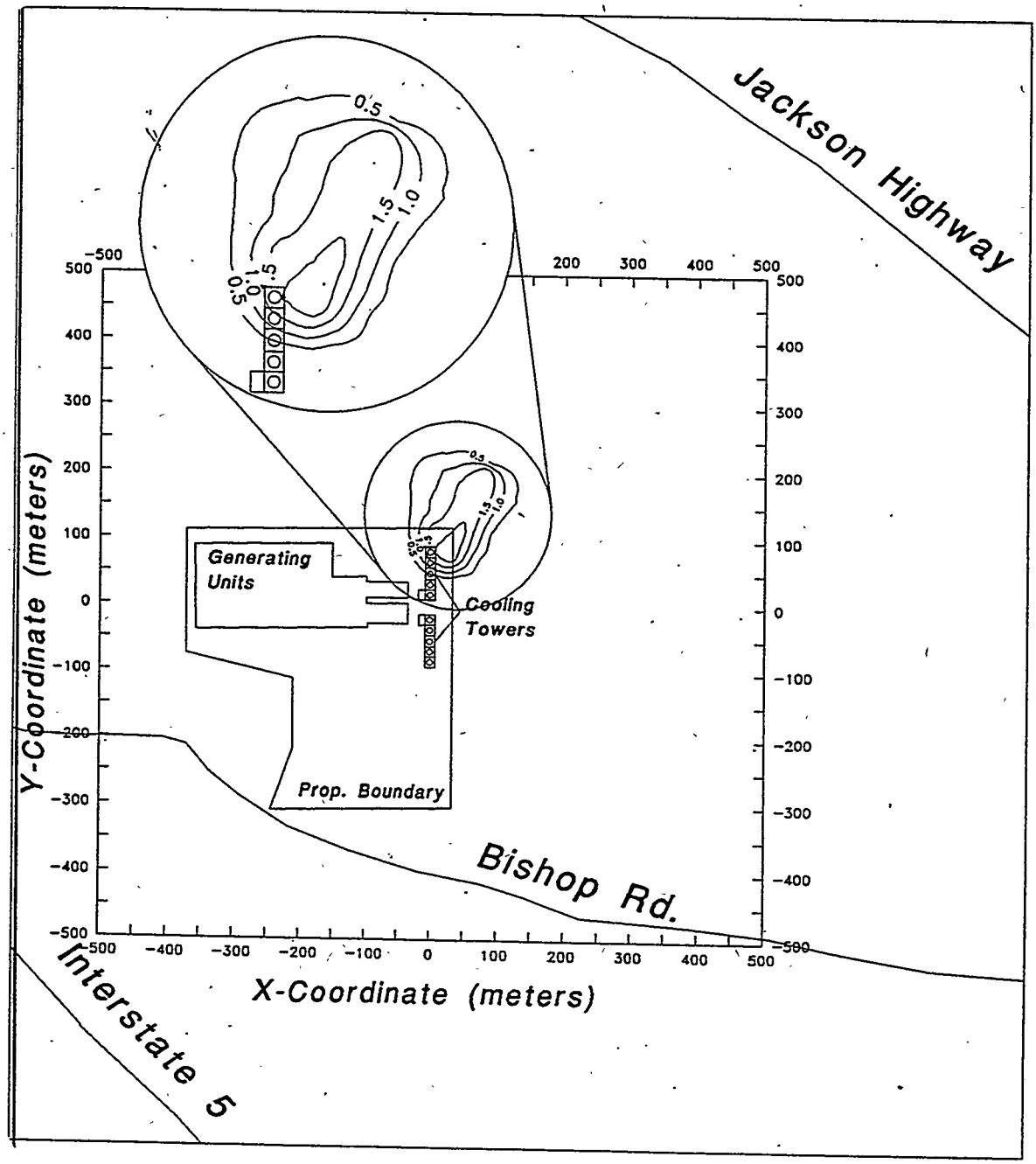


Figure 3.3-5 No. of Hours of Plume Fogging Per Year - 100% Annual Capacity

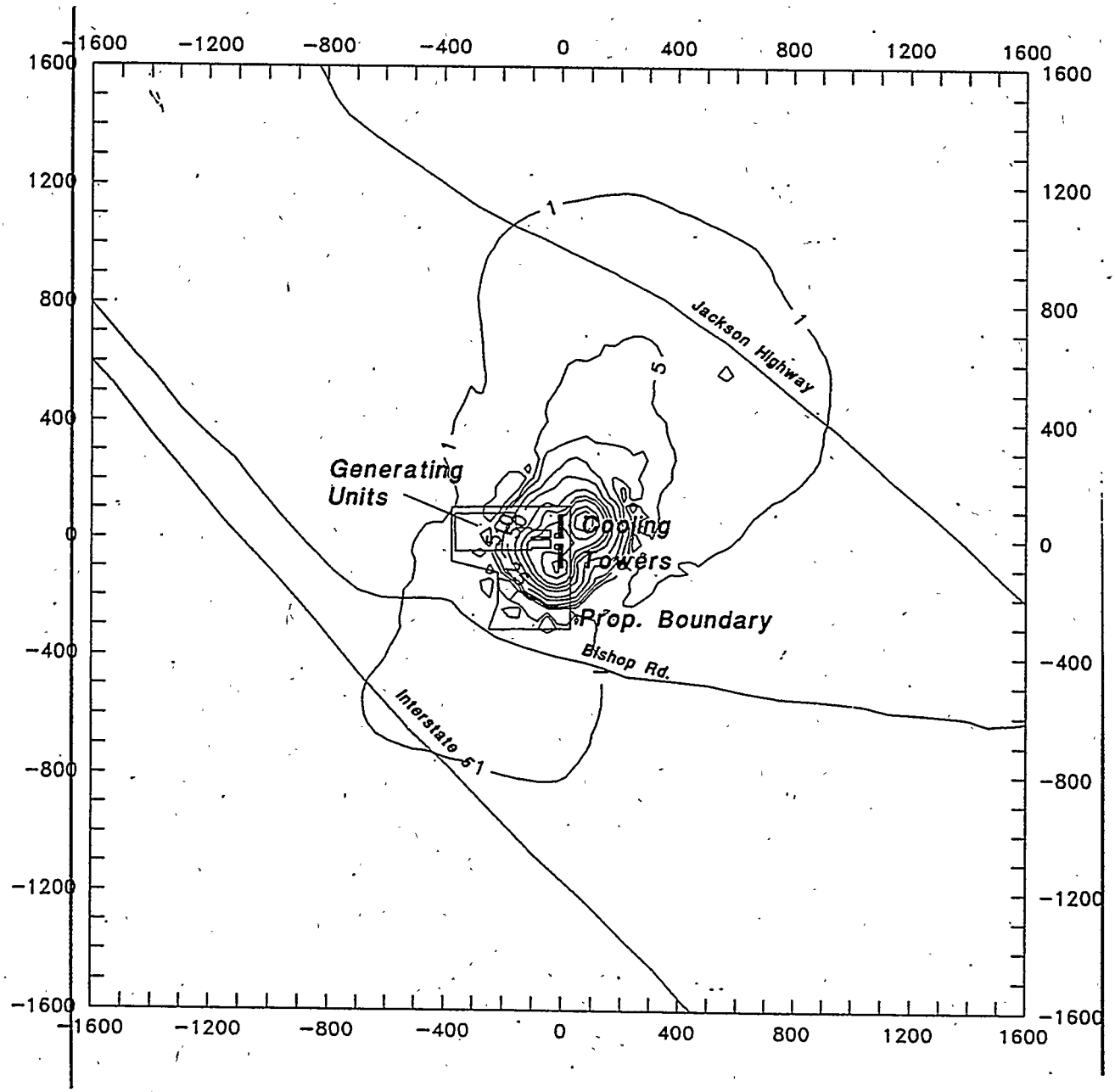


Figure 3.3-6 Salt Deposition in Grams Per Square Meter Per Year - 100% Annual Capacity

these new sources are greater than the significance levels, the air quality impact analysis would have to include an evaluation of emissions from existing facilities, including the proposed project.

3.4 NOISE

3.4.1 Impacts from Construction and Operation

Construction

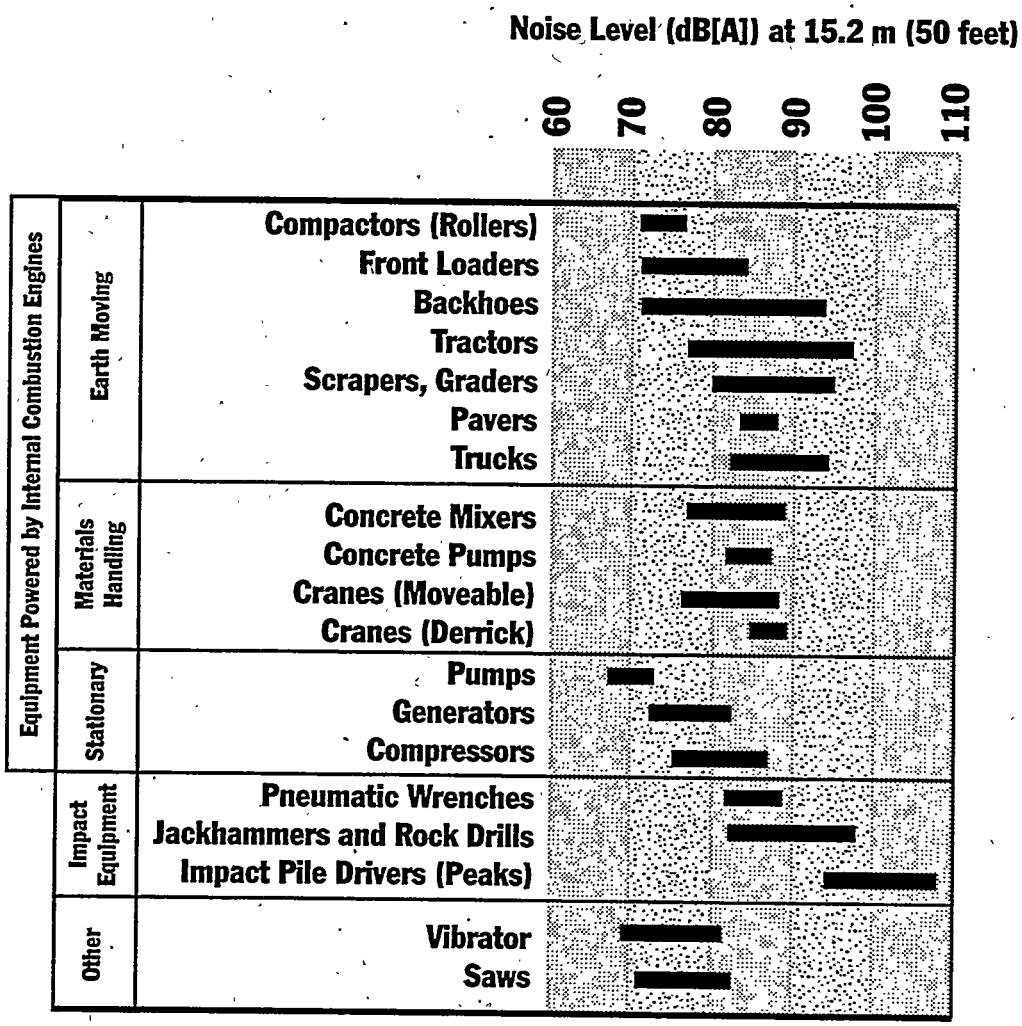
The noise levels produced by construction activities would vary widely, depending on the specific equipment being operated at the time. Construction activities are excluded from Ecology noise ordinances (WAC 173-60-040). Figure 3.4-1 shows typical sound level ranges for construction equipment that may be used for this project.

Operation

Noise from the CT facility would emanate from the HRSG, stacks, generator building, cooling towers, and transformers. Ecology has established allowable noise levels from industrial facilities. To determine if project-related sound levels in the areas immediately surrounding the facility would be within Ecology's limits, sound modeling was performed using the CONCAWE and SOUNDPLAN environmental noise models (Hunt et al. 1994). CONCAWE is a sound propagation model designed to estimate sound levels from stationary sources by incorporating sound pressure levels (or sound power levels) from the source(s). The model also accounts for barriers, atmospheric attenuation, excess attenuation (such as vegetation and terrain), and source direction to specific receptor locations. SOUNDPLAN determines the effect of attenuation for sound barriers. The sound levels of sources used in the model are listed in Table 3.4-1.

Noise resulting from the project sources, without abatement, was predicted for 13 noise monitoring locations (shown previously in Figure 2.4-1). Background noise levels were subtracted from the predicted noise levels to produce the maximum increases in noise resulting from the project. The project was remodeled with abatement to determine if the noise increases above background could be mitigated. Finally, the project was remodeled to determine the effects of typical wind conditions. Project-related sound levels were predicted using weather conditions typical of calm summer evenings (15°C [59°F], 70 percent relative humidity) when people are most likely to be either outside or to have their windows open. In addition to the 13 monitoring locations, sound levels were predicted for a number of receptors surrounding the facility for the purposes of contouring the results.

Predicted noise levels from the project without abatement are shown in Table 3.4-2. Predicted noise increases without the effects of abatement range from 0.1 dB(A) at monitoring Location 10 (industrial) during the daytime, to 26.4 dB(A) at location 2 (industrial) during the nighttime. The largest project-related increase for a residential location was 15.3 dB(A) at Location 1, located immediately to the southwest of the CT facility site.



Source: Oregon State Highway Division 1990

Figure 3.4-1 Typical Construction Sound Levels

Table 3.4-1. Sound Power Levels

Source	Sound Power Level (dB(A))
Stack Outlet	109
HRSG Casing	111
Turbine Building	99
Cooling Tower	108
Turbine Inlet Filter	108
Electrical Transformer	94

Source: Hunt et al. 1994

Table 3.4-2. Predicted Noise Levels for the Project Without Abatement

Monitoring Station	EDNA Classification	Background Noise Levels (dB[A])	Project Noise Levels Without Abatement (dB[A])	Maximum Increase in Noise Levels (dB[A])	
				Day	Night
1	Residential	51-62	66.5	14.0	15.3
2	Industrial	46-57	72.6	24.1	26.4
3	Residential	52-64	60.3	7.9	8.8
4	Industrial	50-60	63.3	12.0	13.3
5	Industrial	45-60	59.4	6.5	14.2
6	Residential	45-63	55.8	6.8	11.5
7	Residential	44-55	57.6	6.5	13.4
8	Residential	57-63	53.6	0.9	1.6
9	Residential	61-68	51.3	0.1	0.3
10	Industrial	45-52	39.8	0.4	0.6
11	Residential	46-57	63.1	10.1	16.3
12	Residential	52-59	62.2	7.3	11.1
13	Residential	47-57	40.5	0.2	0.8

Source: CPI 1994

To meet the regulations for maximum permissible environmental noise levels, as much as a 17 dB(A) decrease in the total plant sound power level is required. Predicted noise levels from the project with abatement measures are shown in Table 3.4-3. Noise levels at all residential locations, resulting from the project with noise abatement, are 50 dB(A) or less at all residential monitoring locations, and less than 56 dB(A) at all industrial monitoring locations (Table 3.4-3). A contour map of project sound levels is presented in Figure 3.4-2. At all residential locations, the CT facility would not be audible above background noise. The project would be heard above background noise levels at only one industrial location, Station 2, immediately adjacent to the CT facility site.

Table 3.4-3. Predicted Noise Levels for the Project With Abatement

Monitoring Station	*EDNA Classification*	*Maximum Permissible Nighttime Noise Levels (dB[A])*	*Minimum Nighttime Noise Levels (dB[A])*	*Predicted Noise Levels with Abatement and Wind Effects (dB[A])*	*Total Noise Levels (dB[A])*	*Maximum Increase Above Background (dB[A])*
1	Residential	50	51.3	50.0	53.7	2.4
2	Industrial	70	46.2	56.0	56.4	0.4
3	Residential	50	52.1	43.8	52.7	0.6
4	Industrial	70	50.2	46.9	51.9	1.7
5	Industrial	70	45.4	42.9	47.3	1.9
6	Residential	50	44.6	46.0	48.4	3.8
7	Residential	50	44.4	47.6	49.3	4.9
8	Residential	50	57.1	37.1	57.1	0
9	Residential	50	61.2	34.5	61.2	0
10	Industrial	70	44.5	30.2	44.7	0.2
11	Residential	50	46.2	50.7	52.0	5.8
12	Residential	50	51.5	45.8	52.5	1.0
13	Residential	50	47.4	30.8	47.5	0.1

The sound modeling also included a 5 m/second (11.1 miles per hour [mph]) wind from the southwest. At one residential location, monitoring Station 11, including the effects of wind would result in a 4 dB(A) increase in projected-related noise. The noise level at this location is slightly greater than the 50 dB(A) standard.

EPA does not have enforceable noise limits applicable to industrial operations, however, EPA Region 10 has published general guidance for noise assessments (EPA 1980). These guidelines evaluate increases in the L_{eq} above existing conditions using by the following criteria:

- An increase of 0 to 5 dB(A) is considered a slight impact
- An increase of 5 to 10 dB(A) is considered a significant impact

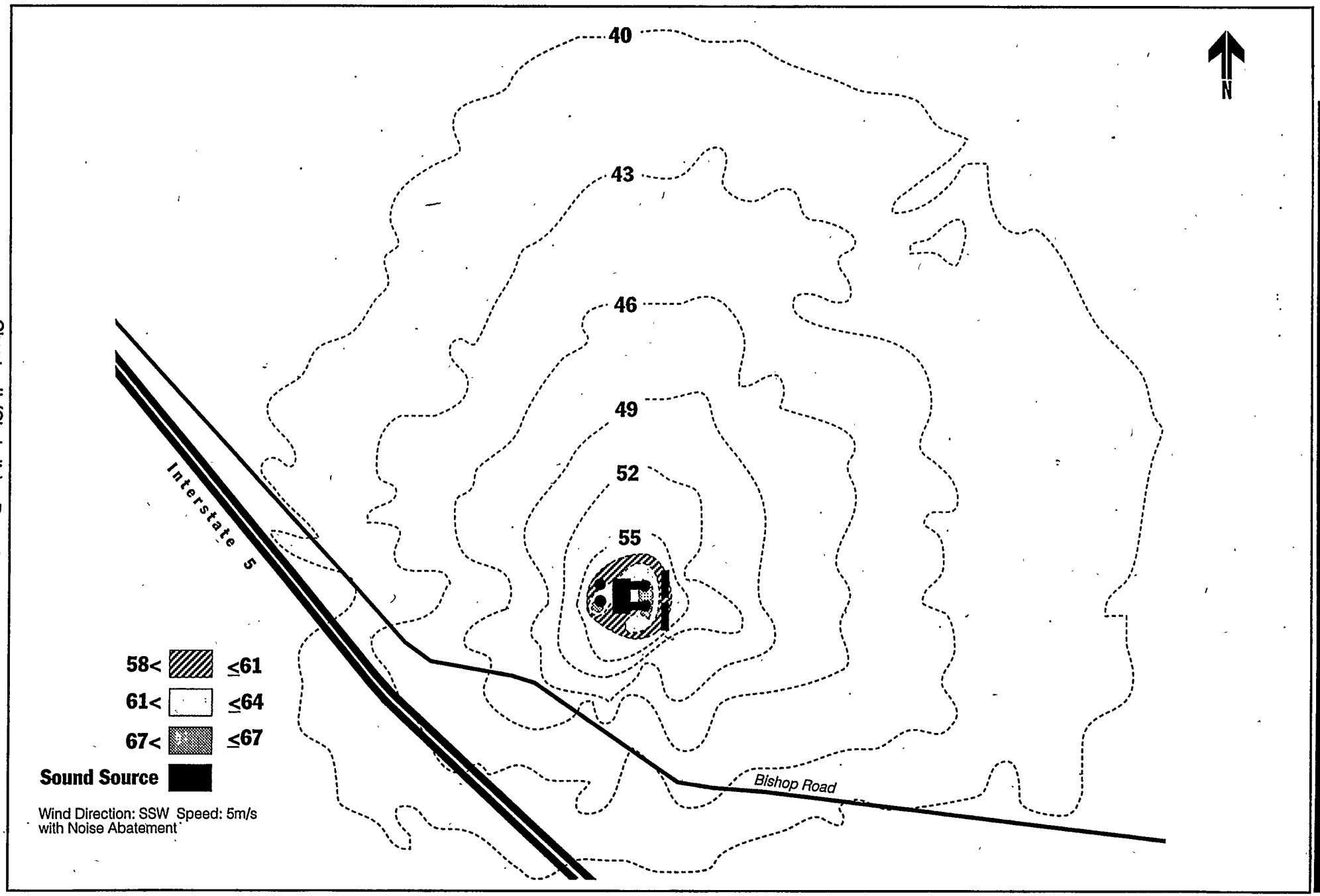


Figure 3.4-2 CT Facility Noise Contour Map

- An increase of greater than 10 db(A) is considered a very serious impact.

Noise levels from the CT facility at the residential properties would increase from between 0 and 2 dB during the day, with an increase greater than 5 dB at only one location at night (Location 11). The increase at Location 11 would be greater than 5 dB(A) and, according to the criteria above, represents a significant impact.

Foul weather transmission line noise will meet all EPA and Washington State limits, and will be lower than noise impacts from the CT facility. Fair weather noise from the line would not exceed background.

3.4.2 Mitigation

The developer will undertake the following noise mitigation measures to comply with the 50 dB(A) nighttime noise limit at all residential receiver locations:

- Line the inner walls of the HRSG with sound-absorbing mineral wool, increase the outer wall thickness, and shroud the outer walls with an absorbing sound barrier.
- Install in-line insertion loss type noise silencers in the turbine air inlet filters.
- Line or baffle the base of the exhaust stack with absorptive mineral wool.
- Install a noise barrier along the top edge of the cooling tower to absorb noise from the fans and cascading water and to install low-noise cooling fans.
- Locate sources of sound inside acoustically treated buildings.
- Install acoustically absorbing silencers on the combustion turbine inlet system, enclosure ventilation systems, and emergency relief valves.
- Install separate acoustical enclosures for major noise sources, including the combustion turbine, generator, and pumps.
- Install acoustically absorbing insulation in duct walls of the combustion turbine inlet air and exhaust systems.
- Minimize turbine building wall reverberation by use of effective wall linings, or using building material with sound-deadening properties.

The following construction sound abatement measures will be included in the project construction specifications to mitigate construction sound impacts:

- Construction will not be performed on Sundays, legal holidays, or between 10 p.m. and 6 a.m. on other days, except when night construction is necessary for continuous construction processes.

- All construction equipment will have sound devices no less effective than those provided on the original equipment. Equipment will not be operated with unmuffled exhaust systems.

- Pile driving or blasting operations, if required, will not be performed on Sundays, legal holidays, or between 8 p.m. and 8 a.m. on other days.

3.4.3 Unavoidable Adverse Impacts

Although the modeled noise levels caused by the proposed project are lower than the Ecology nighttime limits, it is possible that noise from the facility will be audible at night above traffic noise at some of the residences adjacent to the CT facility site when the background sound levels are low. Wind effects could increase project-related sound levels at receivers located to the north, northeast, and east of the CT facility site. Because the planned mitigation measures would attenuate the noise to acceptable levels, except for Location 11, overall unavoidable adverse impacts from noise are considered low. However, impacts at Location 11 without further mitigation are considered high.

3.4.4 Cumulative Impacts

Other proposed industrial projects in the Chehalis region would cause no significant cumulative noise impacts. As shown in Figure 3.4-2, the modeled noise increases caused by the CT facility decrease rapidly with distance from the site. Currently there are no other proposed industrial projects within 3.2 km (2 miles) of the proposed project. Therefore, cumulative impacts are considered low.

3.5 VEGETATION/WETLANDS

The project's permanent and temporary areal impacts to the various upland and wetland vegetation are presented in Table 3.5-1. Construction would temporarily disturb plant communities dominated by herbaceous species and/or shrubs as are found within pastures and existing ROWs, but these communities would be restored to a similar condition after construction. Construction of permanent ROWs in forested communities would permanently convert such vegetation to grass- or shrub-dominated habitats because the new ROW would be maintained to be devoid of trees.

New pipeline corridors through forested habitats could result in increased windthrow potential for adjoining, undisturbed forested areas. Also, the temporary loss or change of vegetation cover could allow the establishment or spread of invasive plant species, which in turn could alter vegetation composition in adjacent undisturbed areas.

Wetlands would be disturbed along the water and gas pipeline routes. This disturbance includes vegetation clearing, trench excavation and backfilling, equipment trafficking, and water quality degradation (due to potentials for increased sedimentation and potential hydrocarbon spills). Except for the permanent clearing of forest vegetation, these impacts are expected to be temporary. However, some permanent impacts may involve altered hydrological patterns in shallow subsurface and surface water, as might be caused by slight changes in topography due to construction activities.

Table 3.5-1. Areal Impacts to Vegetation Affected by Project Components

Habitat Type	Water Supply and Waste Wastewater Line		Gas Spur Line		Gas Loop Line		CT Facility		Totals		
	Permanent impact (ha [acre])	Temporary impact (ha [acre])	Permanent impact (ha [acre])	Temporary impact (ha [acre])	Permanent impact (ha [acre])	Temporary impact (ha [acre])	Permanent impact (ha [acre])	Temporary impact (ha [acre])	Permanent impact (ha [acre])	Temporary impact (ha [acre])	Total impact (ha [acre])
UPLAND											
Forest	0.3 (0.7)	—[1]	0.1 (0.3)	—	—	4.1 (10.0)	—	—	0.4 (1.0)	4.1 (10.0)	4.5 (11.0)
Shrubland	—	1.5 (3.6)	—	0.2 (0.5)	—	0.9 (2.2)	—	—	—	2.6 (6.3)	2.6 (6.3)
Grassland/ Agriculture	—	2.7 (6.6)	—	17.0 (42.1)	—	9.5 (23.4)	12 (30.1)	—	12 (30.1)	29.2 (72.1)	41.2 (102.2)
Upland Total	**0.3 (0.7)**	**4.2 (10.2)**	**0.1 (0.3)**	**17.2 (42.6)**	**—**	**14.5 (35.6)**	**12 (30.1)**	**—**	**12.4 (31.1)**	**35.9 (91.0)**	**48.3 (119.5)**
WETLAND											
Emergent	—	3.4 (8.5)	—	0.3 (0.7)	—	2.7 (6.6)	—	—	—	6.4 (15.8)	6.4 (15.8)
Scrub-shrub	—	—	—	0.6 (1.5)	—	1.1 (2.6)	—	—	—	1.7 (4.1)	1.7 (4.1)
Forested	—	—	0.97 (2.4)	—	—	0.8 (1.9)	—	—	0.97 (2.4)	0.8 (1.9)	1.77 (4.3)
Wetland Total	**—**	**3.4 (8.5)**	**0.97 (2.4)**	**0.9 (2.2)**	**—**	**4.6 (11.1)**	**—**	**—**	**0.97 (2.4)**	**8.9 (21.8)**	**9.87 (24.2)**
TOTAL	**0.3 (0.7)**	**7.6 (18.7)**	**1.07 (2.7)**	**18.1 (44.8)**	**—**	**19.1 (46.7)**	**12 (30.1)**	**—**	**13.37 (33.5)**	**44.8 (112.8)**	**58.17 (146.3)**

[1] indicates no impact

Such changes in surface or groundwater flows could result in a change in vegetation or wetland functions.

Filling (that is, trenching) of wetland habitats during construction of the water and gas pipelines would result in a temporary loss of wetland functions and values. Temporarily disturbed wetland habitats would be restored as soon as construction is completed.

3.5.1 CT Facility Site

Construction of the CT facility would permanently convert approximately 12 ha (30.1 acres) of agricultural land (pasture) to an industrial use. There are no wetlands or riparian habitats at this site.

3.5.2 Gas Pipeline

About 31.8 ha (78.5 acres) of upland vegetation will be affected by construction of the gas pipelines. Nearly 7.3 km (4.5 miles) of the pipelines will be constructed in an existing cleared gas transmission ROW.

Approximately 0.12 ha (0.3 acre) of forested upland habitat will be permanently converted to grass- or shrub-dominated habitat, specifically in those areas being converted to permanently maintained ROW. In addition, less than 0.4 ha (1 acre) of non-wetland (but as yet undetermined) habitat would be permanently converted to an industrial use by above-ground appurtenances of the gas pipelines such as vent pipes and corrosion test points. About 4.1 ha (10.0 acres) of forested and 27.6 ha (68.2 acres) of non-forested upland habitat will be temporarily disturbed or cleared during construction of the gas transmission lines. Additional permanent and temporary impacts to upland vegetation will result from the construction and/or use of additional work areas, temporary access roads, disposal areas, and pipe storage yards. The size and locations of these project components have not yet been identified. All temporarily disturbed areas will be revegetated when construction is completed.

Approximately 6.4 ha (15.7 acres) of wetland habitat will be affected by construction of the gas pipelines. About 0.97 ha (2.4 acres) of wetland habitat will be permanently affected by ROW maintenance and above-ground appurtenances such as vent pipes and corrosion test points. The remaining 5.38 ha (13.3 acres) will be temporarily affected by clearing in the construction and maintenance ROWs and by other activities during construction. All temporarily disturbed locations will be revegetated when construction is completed.

About 0.97 ha (2.4 acres) of forested wetland habitat will be permanently converted to grass- or shrub-dominated habitat. About 0.8 ha (1.9 acre) of forested habitat will be temporarily cleared, but allowed to revegetate to a forested condition after construction is completed.

3.5.3 Electrical Transmission Line

The entire proposed route of the electrical transmission connection passes through agricultural lands. No measurable loss of habitat is anticipated from construction of the transmission lines and the single tower, and there are no wetlands or riparian habitats along this route.

3.5.4 Water Supply/Wastewater Disposal Lines

Construction of the two water supply pipelines and wastewater pipeline would temporarily impact 1.5 ha (3.6 acres) of shrubland, 2.7 ha (6.6 acres) of agricultural/grassland. Approximately 0.6 ha (1.6 acre) of upland forested habitat would be permanently converted to grassland or shrubland communities. In addition, less than 0.4 ha (1 acre) of upland (but as yet undetermined) vegetation would be permanently converted to an industrial use by above-ground appurtenances of the water pipelines. Additional permanent and temporary impacts to upland vegetation will result from the construction and/or use of additional work areas, temporary access roads, disposal areas, and pipe storage yards. The size and locations of these project components have not yet been identified.

Seven wetlands and 3.4 ha (18.5 acres) of emergent wetland area are located within the 15.2-m (50-foot) construction disturbance corridors and will be temporarily disturbed. No forested wetland habitat will be temporarily disturbed or permanently converted to emergent or scrub-shrub wetland habitat. All temporarily disturbed areas will be revegetated once construction is completed.

3.5.5 Mitigation

Most of the impacts associated with construction and maintenance of project components will be limited to terrestrial vegetation communities. Because current Federal and state regulations require that impacts to wetland communities be avoided when possible, impacts to wetland and riparian habitats will be avoided, or minimized by the use of appropriate design, appropriate construction techniques, and revegetation practices. The following mitigation measures will be implemented:

- Wetlands will be avoided where possible by placing the project component away from the wetlands.

- Implementation of the project's ESCP will include erosion and sedimentation controls to protect water quality and sensitive areas.

- Temporarily disturbed areas will be restored to their near-original grade and seeded with desirable erosion control species.

- In wetland and riparian habitats, the widths of construction ROWs will be minimized to minimize impacts to these habitats. Construction will also be attempted during the dry season. Wetland soils will be stockpiled and then used to backfill the pipeline trench in the original sequence. The revegetation plan in these habitats emphasizes the use of native plant species suitable for erosion and sedimentation control and desirable wildlife habitat.

- Construction of project components will comply with state and local permits that regulate construction in general, and those permits that specifically regulate construction in wetlands, riparian areas, and other sensitive areas.

- The project will be coordinated with EFSEC, the Corps, and other appropriate agencies to ensure a full range of acceptable mitigation measures.

3.5.6 Unavoidable Adverse Impacts

In constructing the project, it is not possible to completely avoid the loss of upland and wetland vegetation. Approximately 12 ha (30.1 acres) of upland grassland/agricultural vegetation will be permanently converted to an industrial use by construction of the CT facility. In addition, less than 0.8 ha (2 acres) of upland (but as yet undetermined) habitat would be permanently converted to an industrial use by above-ground appurtenances of the gas and water pipelines. Also, 0.3 ha (0.7 acre) of forested upland habitats would be permanently converted to grass- or shrub-dominated habitats. Because no unique vegetation will be cleared, and because environmental restoration will be implemented, permanent vegetation clearing and habitat conversion is considered an unavoidable, but low, impact.

About 3.4 ha (8.5 acres) of emergent wetland and 3.1 ha (10.2 acres) of non-forested upland habitat would be temporarily cleared during construction of the gas and water transmission lines, and therefore functionally lost until sufficient time passes for similar vegetation to become established. Additional permanent and temporary impacts to upland vegetation will result from the construction and/or use of additional work areas, temporary access roads, disposal areas, and pipe storage yards. The size and locations of these project components have not yet been identified. Temporary impacts from vegetation clearing and water quality degradation are expected to be negligible assuming adherence to mitigation standards to minimize impacts. Because no unique vegetation will be cleared, and because environmental restoration will be implemented, temporary vegetation clearing is considered an unavoidable, but low, impact.

These unavoidable impacts to upland vegetation are considered to be generally low because the upland vegetation to be disturbed or displaced (primarily agricultural, pasture, and cropland habitats) is common in the vicinity of the proposed project and because habitat restoration measures will be implemented by the developer.

3.5.7 Cumulative Impacts

Because all of the habitat types disturbed by the project are prevalent throughout western Washington and in the vicinity of the project, the cumulative impacts of these temporary and permanent disturbances to these habitats either locally or regionally are considered low.

3.6 Wildlife and Fisheries Resources

3.6.1 Wildlife Habitat Disturbance and Conversion

Development of the proposed project would result in impacts to approximately 32 ha (79 acres) of various wildlife habitats (Table 3.6-1). The majority of the impacted area (28 ha [69 acres]) would be subjected to only temporary disturbance during the construction activities. A total of 4.1 ha (10.0 acres) of upland and wetland forest types would be permanently converted to herbaceous and shrub habitats. Following construction activities, all habitat types, with the exception of the forests, will be revegetated to their original habitat type. Upland forest areas will be re-established as either grassland or shrubland, and forested wetlands will be re-established as palustrine emergent or scrub-shrub wetlands.

The largest habitat type affected would be 41.2 ha (102.2 acres) of grassland/agriculture, or only 13.2 percent of that habitat type in the mapped area. An estimated 9.87 ha (24.2 acres) of wetlands would be affected by the proposed project, the majority of which (6.4 ha [15.8 acres]) consists of emergent wetlands. No loss of open water habitat is anticipated; however, approximately 0.04 ha (0.1 acre) of open water habitat would be temporarily disturbed during construction of the gas loop pipeline at its Newaukum River crossing. Temporary and permanent habitat loss is discussed by project component in the following sections.

CT Facility Site

Approximately 12 ha (30.1 acres) of grassland/agriculture habitat, which provides nesting and forage habitat for species such as the ring-necked pheasant and killdeer, would be permanently lost upon construction of the CT facility (Table 3.6-1). This acreage amount translates into a 8 percent loss of the grassland/agriculture habitat type in the mapped area; however, the amount of this particular habitat type in the vicinity of the project is extensive, given the suburban development and topography of the region. Grassland/agriculture habitat provides nesting and foraging habitat for a variety of birds, including killdeer and ring-necked pheasant. Construction of the facility may result in loss of available habitat and, depending on construction timing, destruction or abandonment of nests.

Gas Pipeline

The gas supply pipeline for the proposed project consists of two components: a 4.8-km (3.0-mile) spur line and a 7.2-km (4.5-mile) loop line. Because the spur line would require creating a new ROW and the loop line would parallel and partially overlap an existing gas pipeline ROW, these components and their effects to wildlife habitat are discussed separately below.

The 4.8-km (3.0-mile) gas spur line would be constructed from the proposed CT facility site to the existing NWP ROW. A total of 19.17 ha (47.5 acres) would be impacted from construction of the 23-m (75-foot) wide ROW (Table 3.6-1). The majority (79 percent) of the area that would be affected by the spur line ROW is grassland/agricultural lands (17.0 ha [42.1 acres]). These agricultural lands provide seasonal forage habitat and cover for such species as the pine siskin (*Carduelis pinus*) and red-tailed hawk. The ring-necked pheasant and killdeer are species that would potentially breed and nest in the agricultural lands. Because of the intensity of management that

Table 3.6-1. Effects on Habitats From Project Components

Habitat Type	Water Supply and Wastewater Line[1] ha (acre)	Water Supply and Wastewater Line[1] percent of habitat in mapped area[3]	Gas Spur Line[1] ha (acre)	Gas Spur Line[1] percent of habitat in mapped area[3]	Gas Loop Line[2] ha (acre)	Gas Loop Line[2] percent of habitat in mapped area[3]	CT Facility Site ha (acre)	CT Facility Site percent of habitat in mapped area[3]	Total ha (acre)	Total percent of habitat in mapped area[3]	Total temporary disturbance (ha [acre])	Total permanent conversion/ loss (ha [acre])
Forest												
Conifer	--	--	0.01 (0.3)	<0.1	3.0 (7.4)	2.6	--	--	3.01 (7.7)	2.6		3.0
Deciduous	0.3 (0.7)	2.0	--	--	0.04 (0.1)	<0.1	--	--	0.34 (0.8)	2.0		0.3
Forest Subtotal	**0.3 (0.7)**		**0.01 (0.3)**		**3.04 (7.5)**				**3.35 (8.5)**			
Upland shrub	1.5 (3.6)	3.2	0.2 (0.5)	0.3	0.9 (2.2)	1.0	--	--	2.6 (6.3)	4.5	2.6 (6.3)	
Grassland/agriculture	2.7 (6.6)	1.4	17.0 (42.1)	2.3	9.5 (23.4)	1.1	12 (30.1)	4.9	41.2 (102.2)	9.7	29.2 (72.1)	12 (30.1)
Wetland												
Palustrine emergent	3.4 (8.5)	4.5	0.3 (0.7)	0.3	2.7 (6.6)	1.9	--	--	6.4 (15.8)	6.7	6.4 (15.8)	
Palustrine scrub/shrub	--	--	0.6 (1.5)	1.4	1.1 (2.6)	1.9	--	--	1.7 (4.1)	8.1	1.7 (4.1)	
Palustrine forest	--	--	0.97 (2.4)	2.7	0.8 (1.9)	3.6	--	--	1.77 (4.3)	6.4	0.8 (1.9)	0.97 (2.4)
Wetland Subtotal	**3.4 (8.5)**		**1.87 (4.6)**		**4.6 (11.1)**				**9.87 (24.2)**			
Developed	5.4 (13.4)	4.3	0.8 (1.9)	0.6	0.1 (0.2)	<0.1	--	--	6.3 (15.5)	5.0	6.3	
TOTAL	**13.3 (32.8)**	**2.2**	**19.9 (49.1)**	**1.2**	**18.1 (44.4)**	**1.3**	**12 (30.1)**	**4.9**	**63.3 (156.7)**	**8.2**	**28 (69)**	**28 (69)**

[1] Affected habitats measured 9 m (30 feet) either side of the centerline of the proposed ROW route.
[2] Affected habitats measured 11 m (35 feet) to the east of the centerline; the remainder of the loop line lies within an existing ROW.
[3] Mapped area defined as 152 m (500 feet) either side of the gas and water pipeline ROWs and generation facility site, totaling 681 ha (1,679 acres).
Source: Dames & Moore 1994a

occurs on these lands and their proximity to industrial development, it is not likely that the project will result in population decreases for grassland birds. Approximately 0.97 ha (2.4 acres) of forested wetland and a nominal amount (<0.1 ha [0.1 acre]) of conifer forest would be permanently converted to non-forested habitat types. The palustrine, scrub-shrub, and emergent wetland habitat types contribute 1.87 ha (4.6 acres) to the total amount of land to be temporarily disturbed by the ROW.

The proposed alignment of the 7.2-km (4.5-mile) gas loop pipeline is partially within an existing maintained ROW. Therefore, areas approximately 11 m (35 feet) east of the existing ROW centerlines would be affected, resulting in impacts to 19.1 ha (46.7 acres) of habitat along the loop line (Table 3.6-1). Three ha (7.4 acres) of conifer forest, 0.4 ha (1.1 acres) of forested wetland, and >0.1 ha (0.1 acre) of deciduous forest would be permanently converted to non-forested habitats. Conifer forests, the most affected forest type, supports golden-crowned kinglets and chipmunks, for example. The remaining 5.3 ha (13.1 acres) of impacted area, including 9.5 ha (23.4 acres) of grassland/agriculture and 2.7 ha (6.6 acres) of palustrine emergent wetland, would be temporarily disturbed during construction and revegetated to their original habitat type.

Electrical Transmission Line

Approximately 518.1 m (1,700 feet) of electrical transmission would be constructed to connect the proposed CT facility with BPA's 500-kV system. The proposed route of the electrical transmission line lies wholly within the grassland/agriculture habitat type. No measurable loss of habitat is anticipated from construction of the transmission lines and single tower. This transmission line would be designed with sufficient separation between insulators to reduce the potential collision and electrocution hazard for raptors.

Water Supply and Wastewater Lines

Approximately 8.9 km (5.5 miles) of ROW for the water supply and wastewater disposal system is being proposed for the project, resulting in impacts to 7.9 ha (19.4 acres) from construction and maintenance of the 23-m (75-foot) wide ROW. The majority (36 percent) of this proposed water pipeline ROW is developed (5.4 ha [13.4 acres]) and would be temporarily disturbed during construction activities. A total of 3.4 ha (8.5 acres) of emergent and scrub-shrub wetlands and 2.7 ha (6.6 acres) of grassland/agriculture would be temporarily impacted by construction of the ROW. The wetlands in the project vicinity are WDFW-designated wintering habitat for a variety of waterfowl and provide forage opportunities for species, including the bald eagle. However, the water line is not routed directly through any waterfowl concentration areas and, therefore, should not affect the quality of the wintering waterfowl habitat.

3.6.2 Construction and Operation Disturbance to Wildlife

The proposed project would create a notable disturbance to wildlife during construction and other ground-disturbing activities. General disturbance would be greatest during the construction period due to the use of heavy equipment, traffic, and increased human activity. These disturbances are likely to displace wildlife over the course of the activities. Additionally, required periodic vegetation maintenance along the gas pipeline ROW during project operation would also temporarily displace wildlife for a short duration.

3.6.3 Impacts to Sensitive Wildlife Species

Of the four threatened or endangered species (northern spotted owl, bald eagle, peregrine falcon, and marbled murrelet) listed by the USFWS as potentially occurring in the vicinity of the project, only the occurrence of the bald eagle has been documented. The peregrine falcon potentially migrates through the area on an intermittent basis and for very short time periods; the marbled murrelet and northern spotted owl are not likely to occur since the appropriate nesting habitat, old-growth, or mature forests is not present (see Chapter VI, Appendix A, Biological Assessment).

Construction and operation of the proposed project components would not result in the loss of bald eagle wintering habitat, nor would the components result in the disturbance of the documented nest. The bald eagle nest site is approximately 1.6 km (1 mile), line-of-sight, from the CT facility site. I-5 runs between the site and the nest. Bald eagles are generally intolerant of human activity during nesting season; therefore, the Pacific States Bald Eagle Recovery Plan recommends temporary restrictions on disturbing activities within 0.8 km (0.5 mile) of visible nests (USFWS 1986). Since the nest site is 1.6 km (1 mile) from the proposed CT facility site, no restrictions on construction are required.

The timing and anticipated length of construction activities are such that the more intensive operations would be completed before wintering bald eagles would typically occupy the project vicinity, thereby reducing possible disturbing effects to wintering bald eagles and migrating peregrine falcons. Operation of the completed project would not increase the noise or human activity level already present in the moderately industrial/residential area and would not cause any reduction of prey.

Food stocks for both bald eagles and peregrine falcons would not be affected by any component of the proposed project. Water withdrawal from the Chehalis River is not likely to substantially affect fisheries resources, nor would waterfowl concentration areas be affected by construction or operation of the project.

None of the Federal candidate wildlife species discussed in Section 2.6.2 are likely to occur in the vicinity of the project. Therefore, the proposed project would not impact these sensitive species. All state-listed species, except the pileated woodpecker and great blue heron, have a Federal status as well, and potential impacts have been identified in previous sections. Impacts, other than temporary disturbance, to the pileated woodpecker and great blue heron are unlikely because the amount of habitat disturbance would be nominal.

3.6.4 Wildlife Mitigation

Mitigation measures for wildlife and habitat impacts include the following:

- Retain native vegetation as much as possible in the affected areas to preserve wildlife habitat and provide a buffer of vegetation for surrounding habitat areas.

- Replant disturbed habitats with native vegetation immediately after construction to minimize the duration of habitat disturbance. In areas requiring maintenance, plant native grassland

species that need less frequent maintenance than native pioneer shrubs, thus reducing the frequency of human activity in the area.

- Contact USFWS every 6 months prior to implementation of the project to update the list of endangered, threatened, or candidate wildlife species. If there are any new species listed, coordinate any possible mitigation measures with the appropriate agencies.

3.6.5 Unavoidable Adverse Impacts to Wildlife

The temporary disturbance of approximately 44.8 ha (112.8 acres) of various wildlife habitat types and permanent conversion of 0.97 ha (2.4 acres) of forested habitats and 12 ha (30.1 acres) of grassland/agriculture would result from project implementation (Table 3.6-1). Only 8 percent of the wildlife habitat in the project vicinity would be affected, including 29.2 ha (72.1 acres) of grassland/agricultural, 1.7 ha (4.1 acres) of wetland, 2.6 ha (6.3 acres) of upland shrub, and 0.3 ha (0.9 acre) of deciduous forest. The most significant temporary loss of a single habitat would occur in the grassland/agriculture type, where 13 percent of that habitat type in the mapped area would be affected. Additionally, 21 percent of the available wetlands and 2 percent of the available deciduous forest habitats would be affected.

Temporary disturbance from project construction would likely displace wildlife during the period of those activities. These disturbances would most likely be short term, with the exception of the CT facility site where complete removal of the wildlife habitat would permanently displace any species currently residing there. Displacement of wildlife would periodically occur along the gas and water line ROWs because of required vegetation maintenance. Overall, given the temporary nature of habitat disturbance, the relatively small amount of wildlife area that would be affected and planned mitigation measures, the proposed project is considered to have low impacts to wildlife and habitats.

3.6.6 Cumulative Impacts to Wildlife

In the project vicinity, the major impact to wildlife would be the temporary disturbance to grassland habitat from ROW construction and maintenance. The amount of habitat available to wildlife decreases and is fragmented, resulting in smaller populations and isolated gene pools. Also, this project would contribute marginally to the continued growth and development in the Chehalis area and subsequent loss of additional wildlife habitat and increased disturbance to local wildlife. Because the site is already disturbed and other components as proposed would result in only temporary disturbance, the direct contribution of the proposed project to regional cumulative impacts on wildlife habitat would be low.

3.6.7 Fisheries Impacts

Gas Pipeline and Water Supply and Wastewater Lines

The greatest potential for impact is from construction of pipelines across the Newaukum River and Dillenbaugh and Berwick creeks. All of these waterways, especially the regionally important Newaukum River, support spawning stocks of anadromous fish. Increased sedimentation from

construction has the potential to increase fine sediments within spawning gravels, thereby reducing egg survival. In addition, increased sediment can have short-term adverse effects by reducing fish food supplies.

Construction of pipelines across streams may also reduce riparian vegetation. Riparian areas are important to fish resources because they supply food, add large woody debris useful for cover and pool formation, and provide shade that helps maintain water temperatures within tolerable ranges for trout and salmon. However, the loss of riparian vegetation should not cause significant adverse effects to any of the streams because of the relatively small area that would be affected (less than 18 m [60 feet] at any stream crossing). Also the crossing location at Berwick Creek was selected to minimize the removal of riparian trees to less than three trees. Crossings at Newaukum River and the tributary to Olequa Creek have trees along only one bank, so removal of large riparian trees is kept to a minimum. If the crossing at Newaukum River were drilled, riparian disturbance would be eliminated here.

Water Supply and Wastewater Disposal System

During winter, when the project's water supply comes from the reclaimed wastewater and Chehalis River municipal intake, the Chehalis River flow would be reduced because most water used in the cooling process would evaporate and not be returned to the river. No negative effects to aquatic resources from winter water loss are likely to occur because of normally high flows. However, this water loss during summer could indirectly affect fish by reducing habitat or possibly increasing temperature. If groundwater or retiring existing water rights were used to make up for evaporation loss, the net effect on flow could be substantially reduced. Initial pump test data suggest there is no direct connection between the deep wells and shallow aquifer that would affect river flow.

Before being discharged back to the Chehalis River, wastewater from the CT facility would be allowed to cool to approximately 15.6°C (60°F). However, during summer days when daily air temperatures exceed 15.6°C (60°F) there is a possibility that discharged water will be warmer because cooling takes place in open ponds. On these days, discharge water temperatures could exceed state temperature standards for a Class A water (18°C [64°F]), requiring mitigation. Current regulations are that the temperature at the edge of the mixing zone may not exceed 0.3°C (0.5 °F) over ambient when river temperature is greater than 18°C (64°F). If well water were used to mix with the discharge water, then water from the discharge may actually be cooler than the river during the summer. However, if discharge water quality did not meet Ecology standards, it would have to be treated prior to discharge, to minimize impacts to aquatic resources.

3.6.8 Impacts to Sensitive Fish Species

Factors such as possible reduced habitat area in the summer and increases in the Chehalis River temperature from cooling water discharge could have effects on the two Federal candidate species, Olympic mudminnow or bull trout, if present. Based on recent distribution data, it is unlikely these two stocks are present in any of the water bodies affected by the project. It is expected that through the permitting process (e.g., industrial waste discharge [IWD] permit and water rights) these factors will be mitigated prior to operations, eliminating potential impacts to these stocks. While some potential habitat (maximum of 30.5-m [100-foot] wide area at each crossing) may be disturbed for

both species from construction activity at stream crossing sites (e.g., increased short-term sediment, lost cover, reduced food supply), the mitigation measures imposed during construction should eliminate most impacts to these fish.

3.6.9 Fisheries Mitigation

Mitigation measures for potential impacts to fisheries resources include the following:

- Obtain an IWD permit for the project, in which acceptable levels of chemicals and temperature will be determined to adequately protect water quality and aquatic resources.
- Restrict construction of all pipeline and water lines across streams to between June 15 and September 30. This period may be reduced or enlarged in the State Hydraulic Project Approval.
- Cross any stream flowing at the time of construction using flumes or dam and pump methods to carry water over a pipeline trench, or drill the pipeline under stream beds. Temporary bridges will be used at all stream crossings to ensure equipment does not enter the stream.
- Use the FERC September 11, 1992 version of Wetland and Waterbody Construction and Mitigation Procedures for gas pipeline route construction through streams.
- Store all chemicals and hazardous substances at least 15.2 m (50 feet) away from streams.
- Install erosion and sedimentation control measures, such as silt fences and hay bales at the streambanks, and restore streambanks to original contours, reseed, replant with native vegetation, and cover with jute matting immediately following construction.
- Follow the mitigation techniques required by the Hydraulic Project Approval permit, including implementation of standard guidelines for erosion and sediment control and restricting construction timing to a period when anadromous fish spawning and egg incubation are not occurring.
- Use groundwater to augment net water loss in the Chehalis River during summer low flow periods.

3.6.10 Unavoidable Adverse Impacts to Fisheries

Potential unavoidable adverse impacts to fisheries include: (1) limited and temporary sediment erosion associated with instream pipeline construction, (2) slight loss of riparian vegetation with pipeline route construction at the stream crossings, (3) minor water habitat loss from the Chehalis River associated with intake of cooling water, and (4) slight decrease of the Chehalis River's water quality because of increased water temperatures and chemical concentrations associated with cooling water discharge. With the mitigation measures discussed, impacts to aquatic resources of the Chehalis and Newaukum River drainages are considered low.

3.6.11 Cumulative Impacts

Overall, the direct contribution of constructing and operating the proposed project to regional cumulative impacts to fisheries would be low. Potential cumulative impacts could occur with additional withdrawal of water from the Chehalis River from future projects in the area, and these effects would have to be evaluated at the time of such development.

3.7 LAND USE

3.7.1 Impacts to Existing Land Use

The CT facility would be consistent with the present and future land uses at the Industrial Park, and would have no impact on land use in the Industrial Park or in the project vicinity. The CT facility would be similar in scale and appearance to the present industrial and warehouse facilities in the Industrial Park. Approximately 12 ha (30.1 acres) of prime farmland would be removed from potential agricultural production by the CT facility.

The 7.2-km (4.5-mile) gas loop line would be routed within an existing gas pipeline ROW and would have no permanent impacts on adjacent land uses. The only impacts along the ROW would occur during construction of the pipeline and would be temporary. Agricultural lands could be temporarily taken out of production for one growing season.

The 4.8-km (3.0-mile) gas spur line would be placed in a new ROW, causing minor permanent negative impacts to adjacent land uses, and moderate impacts to land uses during construction. The new ROW would pass through primarily agricultural lands, and would also pass through rural residential areas and the Newaukum Valley Golf Course. The pipeline would follow ownership boundaries when possible to minimize disruptions. The golf course owners would be consulted in determining the final route of the pipeline. It is anticipated that the required 3- to 3.6-m (10- to 12-foot) wide ditch would be located on the side of fairways, and would not cross the middle of the fairways or greens. Upon completion of construction, vegetation within the ROW would be replanted.

The water supply and wastewater pipelines would follow existing ROWs. The only impact from the new lines would occur during construction of the pipelines, and would be minor. After completion of construction activities, the ROW would be revegetated.

3.7.2 Consistency With Local Comprehensive Plans and Policies

Lewis County

The proposed CT facility (including the transmission lines) would comply with the Lewis County Comprehensive Land Use Plan designation of urban-industrial (pers. comm., M. Zengel, Planning Director, Lewis County Planning Dept., Chehalis, Washington, December 8, 1993). Because the county has not adopted a zoning ordinance, no zoning regulations apply to the site. The county has yet to adopt critical areas regulations as required by the Growth Management Act.

The Lewis County SMP recommends that, where reasonable, utility line routes shall follow existing developed ROWs or roads. Placement of the new pipelines within existing utility corridors is considered to be an efficient use of the land. Although technically this would be a land use intensification, the uses are compatible, and long-term impacts are restricted to a narrow area. The water supply, wastewater, and gas loop line conform to this policy, while the gas spur line is located in a new corridor.

The CT facility site is not within 61 m (200 feet) of a designated shoreline, thus is not subject to requirements of the county's SMP. However, the proposed pipelines to and from the Chehalis WWTP could be within 61 m (200 feet) of designated shoreline areas along Dillenbaugh Creek and/or the Chehalis River, and shoreline management guidelines would have to be followed. The gas pipeline, water supply line, and wastewater line cross the 100-year floodplain of the Newaukum and Chehalis rivers and Berwick and Dillenbaugh creeks. Therefore, these crossings would have to be in conformance with the Lewis County Flood Damage Prevention Ordinance, and would require a county Shoreline Management Permit for the Newaukum and Chehalis rivers, and a county Flood Hazard Control Zone Permit for Berwick and Dillenbaugh Creek.

Because the Lewis County Planning Commission has not yet adopted any growth management regulations, the effects of growth management regulations on the project have not been assessed.

City of Chehalis

The Industrial Park (where the CT facility would be located) will most likely be included within the city of Chehalis urban growth area. The project would be consistent with city of Chehalis land use regulations for industrial parks. The city could require ROW permits for roadway interference during construction and stormwater management permits. The city would accommodate the pipelines within city water and sewer line ROWs consistent with local, state, and Federal regulations to minimize impacts.

The proposed water pipeline routes will cross Dillenbaugh Creek, which is subject to the city SMP. The installation of an additional intake pipeline to the Chehalis River, if necessary, also falls under the jurisdiction of the SMP. The city of Chehalis indicated that Chehalis Power will be required to install pipelines underground and to restore disturbed ground.

Port of Chehalis

The proposed facility would be consistent with the comprehensive development scheme for the industrial park (pers. comm., H. Pehl, Director, Port of Chehalis, Chehalis, Washington, December 8, 1993).

3.7.3 Mitigation

The following measures will be implemented to mitigate any potential impacts to land use in the project vicinity.

- Standard construction management practices will be followed to minimize impacts associated with construction such as dust, noise, and increased traffic would be developed to reduce potential nuisances to nearby land owners.

- To mitigate temporary impacts from construction on agricultural lands, negotiations will be held with land owners to coordinate planting and construction schedules.

- To mitigate impacts to the Newaukum Valley Golf Course, the following mitigation measures will be followed:

  (1) NWP will work with the golf course owners to determine the final route to minimize impacts on fairways and irrigation systems.

  (2) The pipeline route will avoid crossing any greens.

  (3) Fairway crossings will be located to the side and/or will cross perpendicularly to avoid traversing the center of fairways.

  (4) Construction periods will be staged to avoid conflicts with times of major golf usage.

  (5) Construction areas will be fenced for safety. The fenced area will be approximately 18 m (60 feet) wide, and the fence will be removed as each pipeline section is completed.

  (6) A ditch approximately 3 to 3.6 m (10 to 12 feet) wide will be opened for the pipeline. As the pipeline is installed, the ditch will be immediately recovered and revegetated as appropriate.

  (7) The pipeline will be buried approximately 0.9 to 12 m (3 to 4 feet) deep.

  (8) The golf course owner will be compensated by NWP for any loss in green fees during construction.

3.7.4 Unavoidable Adverse Impacts

Approximately 12 ha (30.1 acres) of prime farmland would be permanently removed from potential agricultural use by the CT facility, however, the site is within an industrially zoned area. Other agricultural lands could be temporarily impacted (for one growing season) by pipeline construction depending on what time of year construction occurred. Land uses along the gas pipeline route (and especially the spur line) would be temporarily disrupted during construction.

Because the project would be consistent with all existing comprehensive plans, and because impacts would be temporarily and minor if the mitigation measures are implemented, overall impacts to land use from the proposed project are considered low.

3.7.5 Cumulative Impacts

The CT facility would be similar in size and scale to nearby industrial land uses and would add to the industrial character and intended land use of the Industrial Park. The gas, water supply, and

wastewater pipelines would have no cumulative impacts on land use in the project area. Therefore, the overall project would have a low cumulative impact to land use in the project vicinity.

3.8 CULTURAL RESOURCES

3.8.1 Impacts

As currently planned, the project would directly affect one prehistoric archaeological site, 45-LE-51, which is potentially eligible for NRHP nomination. This effect would occur from construction of the gas pipeline loop from the Chehalis Compressor Station to the tie-in with one gas spur line to the CT facility. The new loop would cut through this archaeological site, potentially disturbing and displacing archaeological deposits. Specifically, the natural gas pipeline construction would involve cutting a trench at least 0.9 m (3 feet) deep and 0.6 m (2 feet) wide. This would extend for more than 100 m (328 feet) through the archaeological site, displacing artifacts and features from their depositional context. Construction of the gas pipeline will be undertaken by NWP, and subject to FERC regulations.

Project components other than the gas loop line, including the CT facility, electrical transmission lines, and water supply and wastewater lines, would not affect known cultural resources.

3.8.2 Mitigation

- If rerouting of the natural gas pipeline to avoid site 45-LE-51 is not feasible, the developer will obtain a formal determination of NRHP eligibility from the Washington State Historic Preservation Officer (SHPO). If the SHPO formally finds 45-LE-51 eligible for the NRHP, the developer will prepare and implement an approved cultural resources management plan. The plan will include a detailed research design and plan to conduct scientific excavations to recover data in the Area of Potential Effect of the project. Excavations will also occur outside the project boundary as necessary to afford reasonable interpretation of archaeological deposits. The data recovery program will be completed according to the Secretary of the Interior's guidelines "Recovery of Scientific, Prehistoric, Historic, and Archaeological Data: Methods, Standards, and Reporting Requirements." The data recovery plan will be designed to recover archaeological materials that archaeologists can analyze. This analysis will contribute to the solution of research questions or problems that are important in the understanding of Washington prehistory.

- The developer will carry out the following emergency procedures if construction personnel encounter previously unrecorded cultural resources during construction or operation of the project:

  - The developer will notify the SHPO upon encountering an unrecorded cultural resource.

  - The developer will halt construction in the immediate vicinity of the find until the developer and the SHPO can determine whether the cultural resource is potentially eligible for NRHP nomination.

- If the developer and the SHPO determine the cultural resource eligible for the NRHP, they will implement avoidance or data recovery procedures.

- The developer will supervise the preparation and distribution of a pamphlet explaining to project construction workers the procedures to follow in case they discover cultural resources during construction.

3.8.3 Unavoidable Adverse Impacts

The project would destroy scientific data at 45-LE-51, which is a potentially significant prehistoric archaeological site. Although the measures proposed are sufficient to mitigate part of this loss, complete excavation would be unfeasible and uneconomical. There would, therefore, be a net loss of information about prehistory. However, there are many other such sites in the project vicinity. Therefore, with the proposed mitigation adverse impacts to cultural resources from the proposed project are considered low.

3.8.4 Cumulative Impacts

The project would not cause cumulative impacts to cultural resources.

3.9 Socioeconomics and Public Services

3.9.1 Workforce and Housing

Construction

The construction workforce for the project would average approximately 97 workers over the 24-month construction period, with approximately half of the construction workers coming from outside the local area. The peak number of construction workers is estimated to be approximately 200, with approximately 100 of those coming from outside the local area.

Construction workers will travel up to 96 km (60 miles) to a worksite on a daily basis rather than temporarily relocate their residences during the construction period (Weber and Howell 1982). The project is located approximately 46.4 km (29 miles) from Olympia, 91.2 km (57 miles) from Tacoma, and 139.2 km (87 miles) from both Seattle and Portland. Any non-local construction workers that chose to relocate would most likely leave when their task is completed.

The expected workforce could create an average demand for 80 housing units over the 24-month construction period. It is estimated that a majority of the housing needs during peak construction would be for rentals and transient-type housing such as recreational vehicle (RV) spaces, motel/hotel rooms, mobile home spaces, or mobile home rentals. Currently, there are sufficient transient-type housing units available in the project vicinity to meet this demand.

Operation

In assessing the impact of the operational labor force on the local community, a worst-case scenario is assumed whereby all would be hired non-locally and relocate into Lewis County, and

local community services would experience maximum impacts. Assuming 22 full-time workers, and using the state of Washington's 2.53 people per household multiplier, the total population would increase by 56 people. This is equivalent to 1.7 percent of the 3,212-person increase in population projected for the county by the year 2000. This impact is considered negligible.

Housing vacancy rates for Lewis County, and the cities of Chehalis and Centralia, were extremely low in 1990: 1.7, 1.9, and 2.1 percent, respectively. Housing vacancy rates tend to fluctuate along with shifts in economic trends. It is reasonable to assume that the influx of 22 employees and their 34 dependents into Lewis County would not place an undue burden on the housing market, and that these workers and their dependents would be able to obtain adequate housing.

3.9.2 Employment and Income

Based on the labor market characteristics of Lewis County, it has been assumed that the approximate equivalent of 80 construction jobs could be filled by workers from within Lewis County fairly continuously over the 2-year construction period. The county's economy would benefit from increased employment opportunities and income paid to its local labor force. It would also benefit from local expenditures by commuting construction workers. Total annual construction payroll for all components has been estimated to be $5.63 million.

It is assumed that the CT facility's operational work force of 22 would be individuals hired outside of Lewis County (worst case). Using an employment multiplier of 0.6 indirect jobs created for each nonlocally hired operational employee (Weber and Howell 1982), an estimated 13 indirect annual jobs would be generated during a 30-year facility life. The facility's permanent work force would earn an average annual salary of $36,909 per employee, or a total of $812,000. In addition, an estimated annual average of $200,000 would be spent locally on salaries for other maintenance personnel and miscellaneous expenditures. Thus, Lewis County and the surrounding area would realize a long-term benefit from additional direct employment as well as the estimated $1 million (1993 dollars) in wages and other expenditures and their multiplier effects paid throughout the 30-year life of the proposed project.

3.9.3 Fiscal Budgets

Expenditures associated with construction of the facility would generate additional sales taxes. These expenditures would be scattered throughout Washington, Oregon, and other states. While the contribution to the state of Washington's collection of sales taxes by this project would be positive, the level of this increase in the context of total annual sales tax revenues collected by the state of Washington would be less than 1 percent.

Other forms of tax revenue would be annually generated from project operation. These include increases in property, business and occupation, and brokered natural gas taxes. Moreover, any new housing ownership by facility employees may improve the property tax base of Lewis County. The state of Washington would also benefit, because it would collect more sales taxes from additional expenditures made by the facility's permanent full-time employees. Of these, the only estimate that can be made with any level of confidence is the amount of property taxes levied against the facility.

It is estimated that the proposed project would contribute $4,256,000 annually to property tax collected by Lewis County. The collection of additional sales taxes and business occupation, and brokered natural gas taxes would negligibly increase state tax revenue collection; less than 1 percent.

3.9.4 Law Enforcement

The Lewis County, Chehalis, and Centralia law enforcement departments are all operating at or above capacity to meet existing service needs. The Lewis County Sheriff's Department needs two additional officers for day shifts but has indicated the project would not have a major impact on the department. While the Lewis County Jail operating at above capacity at present, it is in the process of constructing an additional minimum security facility. Any in-migration associated with construction and operation of the facility would likely place a minimal additional burden on the department (Energy Facility Site Evaluation Council [EFSEC] 1993).

The City of Chehalis Police Department is concerned about the potential impacts of increased traffic flows and accidents caused from construction workforce and material delivery for the proposed project. The traffic control capabilities in the area of the Industrial Park are not considered adequate. Because the department has indicated that it can meet only existing needs for law enforcement, it would have a difficult time meeting additional peak hour traffic flow needs (EFSEC 1993).

3.9.5 Fire Protection

The Lewis County Fire Department has indicated that the facility would have an impact on its ability to provide fire protection services (EFSEC 1993).

The city of Chehalis would be primarily responsible for providing fire protection services to the area if it is annexed into the city. As this would elongate the area now being serviced by the station, it could reduce the department's ability to meet its 5 minute maximum response time criterion (EFSEC 1993).

3.9.6 Medical Services

The Lewis County Fire Department has indicated that the facility would have an impact on its ability to provide EMS (EFSEC 1993).

The potential limitations confronted by the Chehalis Fire Department would also affect its ability to provide EMS in a timely fashion (EFSEC 1993).

Providence Hospital appears to be adequately meeting the area's emergency and non-emergency health care needs. It would not be significantly affected by the potential additional medical service needs associated with construction and operation of the proposed project.

3.9.7 Transportation

Construction of the proposed project would likely generate average of 97 car/light truck trips and a peak of 160 to 200 personal vehicles (for two 3-month periods) to and from the site during typical work hours. This would result in an average traffic increase of 25.3 percent and a peak of 52.2 percent to Maurin Road (above 1987 traffic counts), an average increase of 2.7 percent and peak of 5.5 percent to Bishop Road (above 1990 traffic counts on the north side of Maurin Road), and an average increase of 2.9 percent and peak of 5.9 percent to Interstate Avenue. The significance of the impacts of these increases could not be assessed because capacity limits are not available for these streets. In addition, an undetermined number of heavy truck trips would be generated by the delivery of construction materials to the site.

During operation of the facility, 22 additional car/light truck trips would be generated to and from the CT facility site, representing an increase of 5.7 percent for Maurin Road and a 0.6 percent increase for Bishop Road and Interstate Avenue. This would be an insignificant impact to area traffic flows. When the facility operates on its backup fuel oil supply, up to an additional four heavy trucks would access the site each hour to ensure an adequate source of fuel. This would have a temporary, insignificant impact on local traffic volume and flows.

3.9.8 Mitigation

- The influx of temporary construction workers and construction-related traffic, as well as permanent increase in traffic resulting from facility operation, will most likely require some expansion of the Lewis County and Chehalis police departments.

- The city of Chehalis would most likely have to add an additional fire station and associated equipment, or establish a service agreement with another jurisdiction. With the presence of an additional fire station and equipment, the department indicates that it would also be able to meet the additional fire protection needs.

3.9.9 Unavoidable Adverse Impacts

Assuming all potential adverse impacts will be mitigated, the level of impact to the socioeconomic environment of the region is considered low. Construction and operation of the proposed project would also provide benefits to the socioeconomic environment of the project vicinity and region.

3.9.10 Cumulative Impacts

Other developments are occurring in the Industrial Park and surrounding region. Collectively, these would increase local employment while placing additional burdens on community services and the local transportation network. The most significant negative impact would be the increase in traffic flow from personal vehicles (e.g., cars, light trucks, and vans) and heavy trucks (e.g., semitrailers), along established routes. The Lewis County, Chehalis, and Centralia law enforcement departments are all operating at or above capacity to meet existing service needs. Further

development in Lewis County would necessitate expansion of these services. The contribution to overall cumulative impacts to the socioeconomic environment by the proposed project is considered low.

3.10 Recreation Resources

3.10.1 Effect on Recreation

With the exception of the Newaukum Valley Golf Course adjacent to the gas spur line route, there are no recreational facilities near the CT facility site, or along the gas line or water supply and wastewater lines. Therefore, the project is not expected to have any permanent effect on recreation. The gas spur line would cross sections of the Newaukum Valley Golf Course. Impacts would be limited to the construction phase and steps would be taken to minimize disruption to the course use, listed previously in Section 3.7.3, Land Use. Following construction, golfing activities will be allowed over the top of the buried pipeline. There will be no visual or use impact to the golf course users during pipeline operation.

The only impact to recreation in the project vicinity that could be attributed to the project would be temporary, occurring during the construction period. The construction work force would be partially composed of workers from outside the project vicinity who would require local housing during the construction period. It is likely that some non-local workers would stay in campers or RVs while working on the project. As a result, there could be temporary competition with recreationists for campsites at private and public campgrounds in the project vicinity.

3.10.2 Mitigation

Because adverse effects to recreation resources in the project vicinity are expected to be negligible, no mitigation efforts would be required.

3.10.3 Unavoidable Adverse Impacts

There are no unavoidable adverse impacts to recreation resources associated with construction or operation of the project.

3.10.4 Cumulative Impacts

There would be no cumulative impacts to recreation as a result of construction or operation of the project.

3.11 Public Health and Safety

3.11.1 Combustion Facility Turbine

Regulated Fuel Substances

The combustion turbines would burn natural gas as the primary fuel supply. The No. 2 fuel oil to be used as a backup fuel would be stored in two above-ground tanks with capacities of 1.6 million l (1.1 million gallons) each. Each tank would be surrounded by a concrete dike of sufficient size to contain 110 percent of the total volume of the tank including precipitation from the greatest storm recorded for the area as set by regulations. Fuel oil would be delivered to the facility via tanker trucks from local suppliers. It is estimated that up to four trucks per hour for 16 hours per day would be required to maintain supply during the 15 days of anticipated fuel oil firing. A 1,529-l (550-gallon) diesel above-ground tank would be used to store fuel to operate the fire pump, and would be similarly protected.

In the unlikely event of an accidental release of the fuel, direct impacts would include an increase in the exposure of the fuel to the facility personnel. However, with adequate ventilation and emergency safety measures, the impact is expected to be low.

Regulated Non-Fuel Substances

The chemicals listed in Table 3.11-1 may be used and stored at the CT facility site. Direct impacts to facility personnel would result from any accidental release of the substances. Indirect impacts of non-fuel substances to off-site populations could result from an uncontrolled release of large volumes of these substances.

Solid Waste

Operation and construction of the CT facility would increase the generation of solid waste. Table 3.11-2 presents a list of typical solid waste materials generated by CT facilities, and indicates the proposed disposal method for each.

The water supply and wastewater treatment processes would create sludges requiring disposal in a suitable facility. These sludges would be tested for potential hazardous characteristics and disposed of in an appropriately certified facility.

3.11.2 Gas, Water Supply, Wastewater Pipelines and Electrical Transmission Line

Hazardous substances used during construction of the pipelines and transmission line include fuel, lubricants, and other substances associated with vehicle maintenance. During construction of these facilities, adverse environmental effects could be caused by the accidental release of regulated substances.

Table 3.11-1. Chemicals Likely to be Stored at the CT Facility

Item No.	Storage Method	Contents	Estimated Liters (Gallons)
1	No. 2 Fuel Oil Storage Tank No. 1	Fuel Oil	4,163,940 (1,100,000)
2	No. 2 Fuel Oil Storage Tank No. 2	Fuel Oil	4,163,940 (1,100,000)
3	Aqueous Ammonia Storage Tank	Ammonia	35,961 (9,500)
4	Shot Chemical Feed Tank (Closed Cooling Corrosion Inhibitor)	*	379 (100)
5	Shot Chemical Feed Tank (Closed Cooling Corrosion Inhibitor)	*	379 (100)
6	Phosphate Tank	NA_3PO_4	379 (100)
7	Phosphate Tank	NA_3PO_4	379 (100)
8	Oxygen Scavenger Tank	DEAE	379 (100)
9	Oxygen Scavenger Tank	DEAE	379 (100)
10	Neutralizing Amine Tank	Morpholine	379 (100)
11	Neutralizing Amine Tank	Morpholine	379 (100)
12	Bulk Phosphate Storage Tank	NA_3PO_4	7,571 (2,000)
13	Bulk Oxygen Scavenger Tank	DEAE	7,571 (2,000)
14	Bulk Neutralizing Amine Tank	Morpholine	7,571 (2,000)
15	Inhibitor Tank	Polyphosphate	1,893 (500)
16	Biocide Tank	NaOCl	30,283 (8,000)
17	Acid Tank	Sulfuric Acid	30,283 (8,000)
18	Inhibitor Tank	Polyphosphate	1,893 (500)
19	Biocide Tank	NaOCl	30,283 (8,000)
20	Acid Tank	Sulfuric Acid	30,283 (8,000)
21	Acid Batch Tank	Sulfuric Acid	1,893 (500)
22	Acid Storage Tank	Sulfuric Acid	26,498 (7,000)
23	Caustic Batch Tank	NaOH	1,893 (500)
24	Caustic Storage Tank	NaOH	26,498 (7,000)
25	Fuel Tank Fire Pump Pkg.	No. 1 Diesel	2,082 (550)
26	Acid Day Tank	Sulfuric Acid	1,893 (500)
27	Anti Scalant Day Tank	Sodium Tolyltriazole	1,893 (500)
28	Acid Day Tank	Sulfuric Acid	1,893 (500)
29	Anti Scalant Day Tank	Sodium Tolyltriazole	1,893 (500)
30	Lube Oil Tank, Comb. Turbine	Lube Oil	21,198 (5,600)
31	Lube Oil Tank, Comb. Turbine	Lube Oil	21,198 (5,600)
32	Lube Oil Tank, Steam Turbine	Lube Oil	TBD
33	Lube Oil Tank, Steam Turbine	Lube Oil	TBD
34	Stm. Turbine Control Fluid	Fryquel EHC	TBD
35	Stm. Turbine Control Fluid	Fryquel EHC	TBD
36	Liquid Alum. Storage Tank	$Al_3(SO_4)^3$	26,498 (7,000)

TBD = To be determined.
* Sodium metasilicate, sodium hydroxide, sodium nitrate, sodium tetraborate.

Table 3.11-2. Typical Solid Waste Materials Generated by a CT Facility

Waste Stream	Classification	Amount	Frequency	On-Site Treatment	Storage	Off-Site Treatment/ Disposal
Used Lead Acid Batteries	Hazardous	2-cells	Once Per Year	None	90-days	Recycle to Battery Vendors
Spent SCR Catalyst Material	Hazardous	170-230 cum	Once Every 3-5 Years	None	None	Ship to Hazardous Waste Disposal Facility
Oil Rags, Oil Absorbent Material	Hazardous	<1 cu. m	Once Per Month	None	90-days	Ship to Hazardous Waste Disposal Facility
Spent Cation Demineralizer Resins	Nonhazardous	48 cu. m	Once Every 8-10 Years	None	None	Recycle to Resin Vendors
Spent Anion Demineralizer Resins	Nonhazardous	45 cu. m	Once Every 4-5 Years	None	None	Recycle to Resin Vendors
Office Waste Materials (Trash and Garbage)	Nonhazardous	>9 kg/day	Daily	None	None	Ship to Sanitary Landfill

3.11.3 EMF and Shock Hazard

EMF

Both electric and magnetic alternating-current (a-c) 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, a number of 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, National Radiological Protection Board [NRPB] 1992, Oak Ridge Associated Universities [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 EMFs and

cancer. A review of some of the studies relating to EMF and possible biological and health effects are included in Chapter VI, Appendix D.

A magnetic field exposure assessment was done for the proposed project using industry-accepted computer modeling techniques by first estimating what future magnetic levels would be without the proposed project. This analysis served as a baseline measurement for engineers to 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 exist nearby.

There are a few homes and businesses within the vicinity of the proposed substation and transmission line. However it is unlikely that any of them are close enough to experience any increase in magnetic field exposures from the new facilities. Figure 3.11-1 shows the magnetic field profiles for the proposed 500-kV double circuit transmission line.

Electrical Shock

Power lines, like electrical wiring, can cause serious electric shocks if certain precautions are not taken. These precautions include building the lines to minimize the shock hazard. All BPA lines are designed and constructed in accordance with the National Electrical Safety Code (NESC). NESC specifies the minimum allowable distances between the lines and the ground or other objects. These requirements basically determine the edge of the ROW and the height of the line (i.e., the closest point that houses, other buildings, and vehicles are allowed to the line) to limit electric field effects to acceptable levels.

People must also take certain precautions when working or playing near power lines. It is extremely important that a person not bring anything, such as a TV antenna or irrigation pipe, too close to the lines. BPA provides a free booklet that describes safety precautions for people who live or work near transmission lines (Living and Working Around High Voltage Power Lines).

Transmission lines can also induce voltages into objects near the lines. This effect can lead to nuisance shocks if a voltage is induced on something like wire fencing which is on wood posts and, therefore, insulated from ground. Usually, however, this becomes a problem only with lines of voltages above 230 kV. Should problems develop with either high- or low-voltage lines, they can be corrected by simple grounding techniques. For 500-kV lines, grounding of certain objects near the lines is a routine part of the construction process.

3.11.4 Mitigation

The following measures would be implemented to mitigate potential impacts to public health and safety from construction and operation of the proposed project.

- A Spill Prevention, Control, and Countermeasures (SPCC) Plan will be developed and in place prior to the arrival and storage of any chemicals at the proposed CT facility. The plan will meet all the requirements of 40 Code of Federal Regulations (CFR) Part 112.

- A reuse and recycling plan will be prepared for all construction and operation materials.

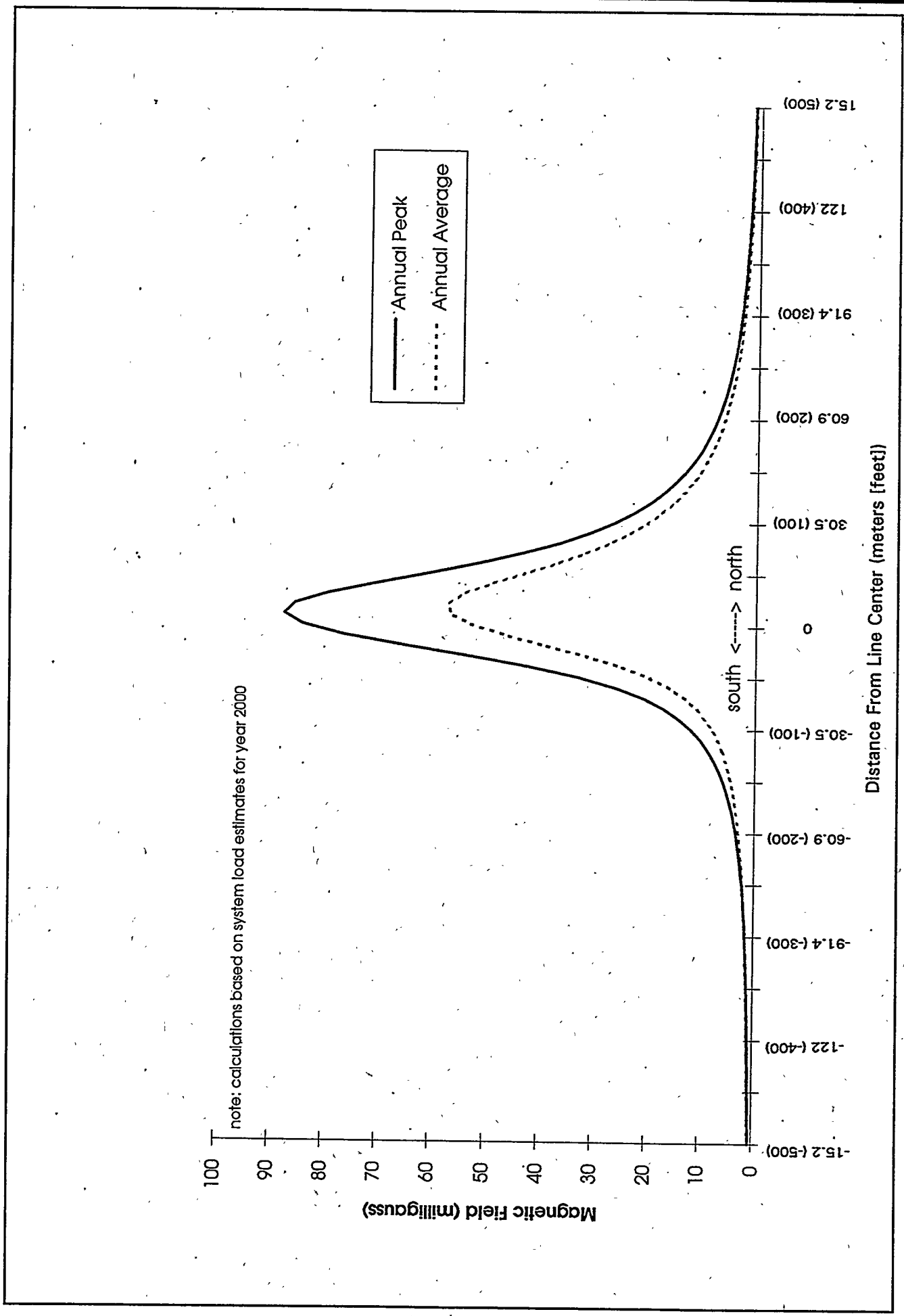


Figure 3.11-1 Magnetic Field Profiles for the Proposed 500-kV Double Circuit Transmission Line

- The storage and use of substances at the site will conform to the Uniform Fire Code (UFC), Article 80. In compliance with this regulation, a Hazardous Materials Inventory Statement and a Hazardous Materials Management Plan will be produced and filed with the Public Utilities Building Department prior to the arrival of any hazardous materials. These plans will include all the information as listed in the UFC, Appendix II-E. In addition, the facility will adhere to the reporting requirements under the Superfund Amendment and Reauthorization Act (SARA) Title III.

- A final Storm Water Pollution Prevention Plan will be developed to address the construction activities and handling of hazardous substances associated with construction of the gas, water supply, and wastewater lines. The plan will address structural controls (silt fences, straw bale barriers, etc.), vegetation practices (temporary and permanent cover practices), and site management of solid/liquid/hazardous wastes.

3.11.5 Unavoidable Adverse Impacts

Steps and measures have been taken to ensure that the construction and operation of the project would not have significant adverse impacts on the health and safety of the public. Therefore, adverse impacts to public health and safety from the proposed project are considered low.

3.11.6 Cumulative Impacts

Operation of the project would increase the amount of solid waste disposed of at a landfill. In regard to hazardous waste, the potential for exposure to hazardous fuel and non-fuel substances would increase. However, all necessary control measures will be taken to minimize likelihood of an accidental release. Therefore, cumulative impacts would be low.

3.12 Visual Quality

3.12.1 General Effects of Project Components

CT Facility

When completed, the CT facility would be similar in appearance to the industrial character of the nearby PPG facility and nearby warehouse facilities. The power turbines would be enclosed in buildings. Other ancillary elements would be industrial in appearance and would include fuel and liquid storage tanks, an electrical switchyard, cooling towers, and emission stacks. Major project elements would be painted tan, and minor elements forest green.

The three emission stacks would be up to 69 m (225 feet) high and would have the greatest visual impact of any project component. They would join the PPG watertower and BPA transmission line towers as major vertical visual elements in the project vicinity. The emission stacks will be painted grey to reduce their visual impacts. The cooling towers would be similar in size (24 m [60 feet]) to other project components and would not attract visual attention. However, plumes from the cooling towers would be moderately noticeable at times. The Chehalis Generation

Facility Visible Plumes Analysis (McCulley, Frick & Gillman, Inc. 1994) indicates that plumes from the cooling towers would frequently be visible, but would usually reach a maximum height of 24 m (60 feet) above the cooling towers. During unusual conditions of high humidity, cold temperatures, and good visibility, the plumes would extend horizontally up to 350 m (1,148 feet).

Plumes from the emission stacks would rarely be seen. The model run by McCulley, Frick & Gillman, Inc. (1994) predicted that plumes would be seen 130 hours per year and would occur during the cooler months (the average temperature when plumes would be visible would be 0°C [32°F]) and high ambient humidity. When the plume would be visible, typical plume length would be 150 m (492.1 feet).

Electrical Transmission Line

Construction of the 518.1-m (1,700 foot) overhead transmission line is expected to pose minimal visual impacts in the overall landscape setting. The extent of the corridor is relatively small compared to existing and ongoing land disturbances created by activities such as agriculture. Construction activities would be similar in appearance to the current construction of the adjacent warehouse facilities and the proposed CT facility. Viewers would observe earthwork equipment, construction trailers, building construction, and cranes. No interim screening would be provided, but construction duration will be short and exposed soils will be reseeded within several months.

The electrical transmission line is expected to introduce low visual impacts upon the existing landscape. The line would be visually compatible with the existing 500-kV BPA transmission corridor. The most sensitive residential viewers would be those who live along Bishop Road because of the comparatively close distance to the transmission line. Some of these semi-rural residences are within 0.4 km (0.25 mile) of the transmission corridor, and there is little intervening vegetation to provide visual screening. Other residential viewers are expected to be minimally affected because of intervening vegetation that would block most views.

Gas Pipeline

There would be temporary minor visual impacts that would occur during construction of the gas pipeline. The impacts would result from vegetation clearing, trenching, and placement of pipe sections by heavy equipment. Where the route crosses cultivated agricultural lands, seasonal crops would be removed in the construction ROW. Where the pipe crosses rural roads, sections of pavement would be removed and replaced while traffic was diverted.

The pipeline would cross part of the Newaukum Valley Golf Course. Construction activities would be temporarily observable by golfers. Upon completion of pipe installation, all disturbed lands in the golf course would be restored.

The pipeline would also pass near low-density and rural residential areas, but be from 0.4 to 0.8 km (0.25 and 0.5 mile) away from the residences, so the visual impacts of construction activities would be minor.

Water Supply and Wastewater Lines

The 8.9-km (5.5-mile) combined water supply/wastewater lines ROW would be primarily routed along existing utility, highway, and railroad ROWs. The route crosses through commercial,

industrial, and agricultural lands, with varying levels of development. The only visual impacts associated with the project would occur during construction, and would be temporary and minor.

3.12.2 Effects on Key Viewing Areas

To describe existing visual conditions and simulate potential visual impacts associated with construction of the CT facility and other components, key viewing areas (KVAs) representing views of the project from the surrounding area were used. The KVAs were selected to represent a variety of locations from where a number of different types of viewers could conceivably see project components. Two KVAs (KVA-1 and KVA-3) were selected to represent close-up views from in the Newaukum Valley, and one KVA (KVA-2) to represent the more distant views from nearby hillsides. Figure 3.12-1 depicts the locations of the three KVAs. Visual conditions at the KVAs are described below.

KVA-1

Primary viewers of the proposed CT facility in the project vicinity would include residents, interstate and local travelers, agricultural workers, and industrial/warehouse workers. Low-density residential development is located throughout the Newaukum River Valley. The closest and most visually sensitive residential viewers are located along Bishop Road. Up to 15 residences are located within 46 to 305 m (150 to 1,000 feet) of the CT facility site property line.

From the residences located along Bishop Road, some project components would be visible above the screen of evergreen trees that would be planted to soften the views of the CT facility. The temporary meteorological tower that can be seen in the existing photograph of the project site from KVA-1 (Figure 3.12-2) is approximately the same height as the proposed emission stacks (91 m [225 feet]). The top portion of the emission stacks would be seen over the screen of evergreen trees that at maturity, would be approximately 9.1 m (30 feet) high. Facility components that would be visible from KVA-1 would be similar to those described (and depicted in a photo-simulation) from KVA-3.

Visual impacts of the electrical transmission line from KVA-1 would be minor. One additional tower would be located near the existing 500-kV corridor and would be viewed against the existing towers as a background. Views of the tower location could be partially screened by residences along Bishop Road.

KVA-2

Elevated residential viewers are located in the hills that bound the Newaukum River Valley. KVA-2 (Figure 3.12-3a) is representative of the existing views toward the CT facility site from elevated hillside residences located north of Jackson Highway. This viewpoint, taken near Yates Road, looks west toward the CT facility site at a viewing distance of approximately 1,981 m (6,500 feet). Similar viewshed conditions exist from hillside elevated residences located near Route 603 in the hills south of the Nekaukum River.

The proposed CT facility would be visible in the distance as illustrated in the photo-simulation (Figure 3.12-3b). Existing trees growing throughout the Newaukum River Valley would typically screen the facility buildings and tanks from most high vantage points, but the tall emission stacks

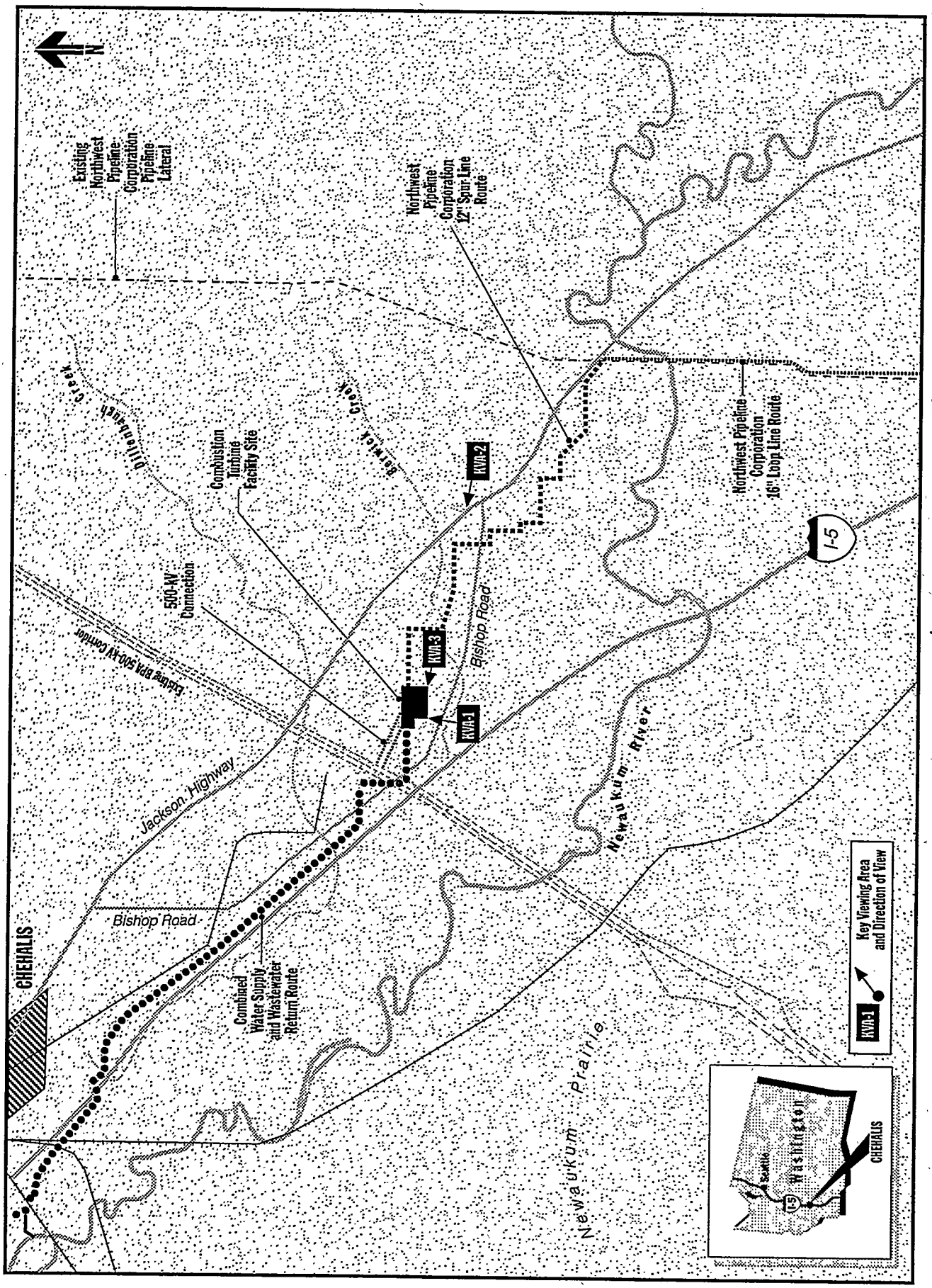


Figure 3,12-1 Location of Key Viewing Areas

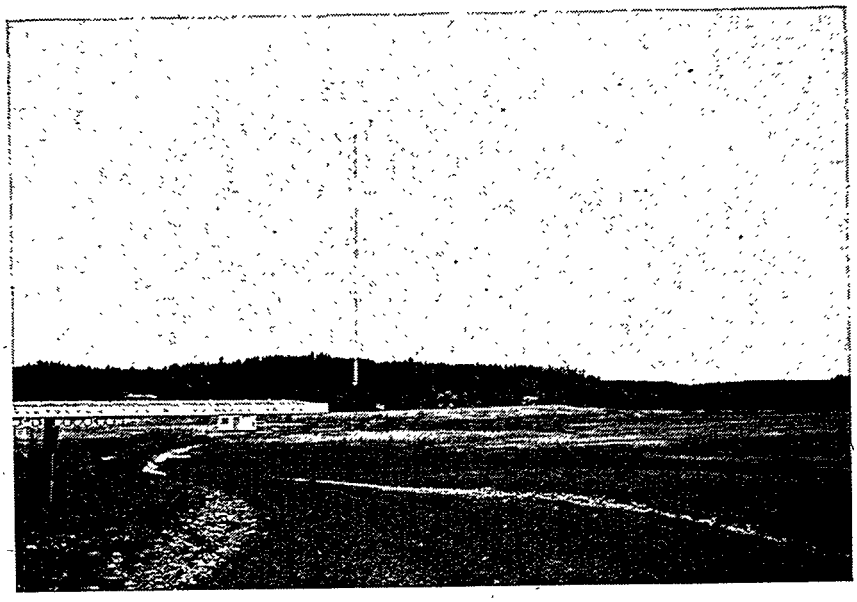


Figure 3.12-2 KVA-1 (view looking north from residences along Bishop Road at the location of the site access road)

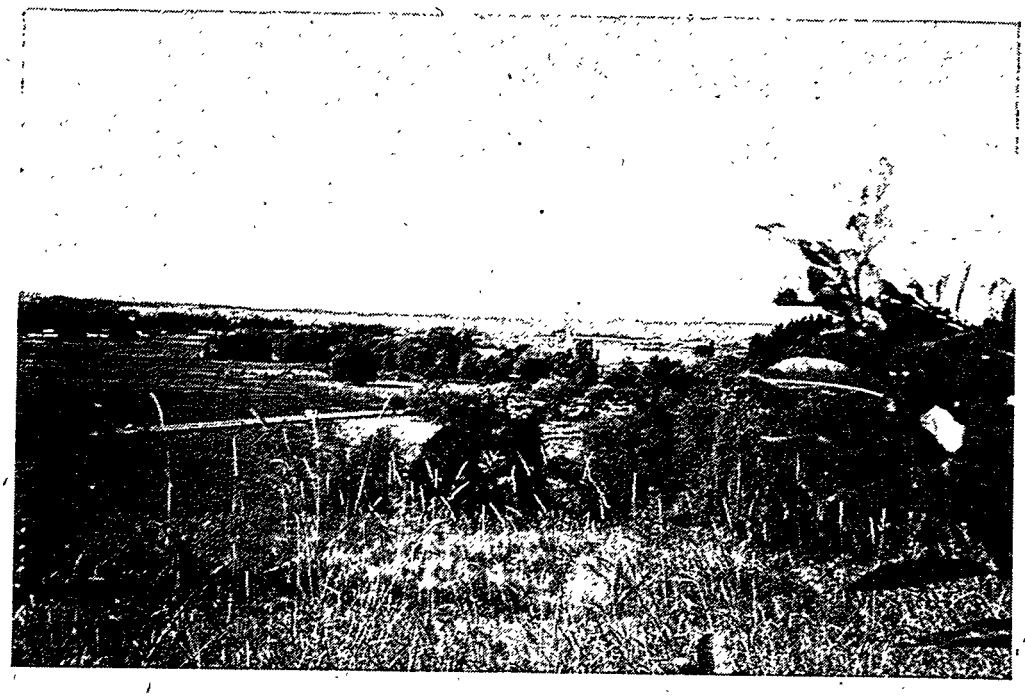


Figure 3.12-3a KVA-2 (existing view looking west from residences along Yates Road; existing PPG plant can be seen 2 miles in the distance)

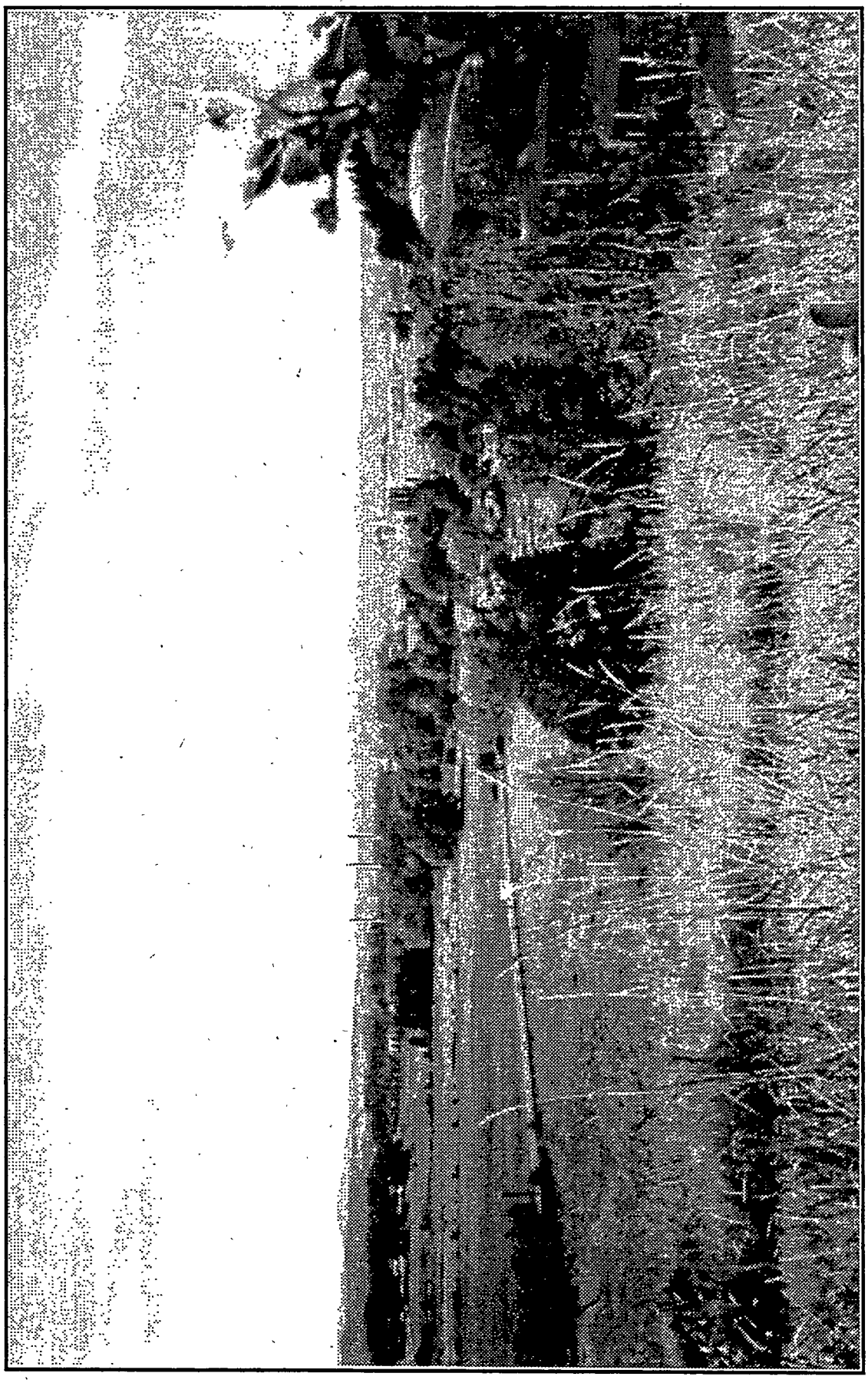


Figure 3.12-3b KVA-2 (Visual Simulation of Proposed Facility as Viewed from Yates Road)

would be visible above the treeline and would introduce another vertical element, similar to the PPG water tower and the existing transmission towers, into the view from the hillsides.

KVA-3

Potential highway viewers include travelers using Bishop Road, Route 603, Jackson Highway, and I-5. Bishop Road, which mainly serves local residents, is located near the CT facility site (91 m [300 feet] at the closest point). KVA-3 is representative of local roads close to the site. Figure 3.12-4a depicts the view of the CT from KVA-3. Most views of the site from Bishop Road are blocked by residences that front the road on both sides. A few penetrating views exist between residences. Figure 12.3-4b is a visual simulation that depicts the view residents and local travelers would have of the proposed facility from close range. From this vantage point, the row of evergreen trees would provide some screening, but project facilities, particularly the cooling towers and emission stacks, would be visible above the screen.

There are several other locations in the vicinity of the CT facility from where viewers would view the project components. Among them is the Jackson Highway, which is a primary travel route into the city of Chehalis. Although the highway comes to within 0.8 km (0.5 mile) of the CT facility, it is not directly oriented toward the site. Sideways views of the site would be possible between breaks at the roadside. The visual impact of the project from Jackson Highway would be moderate.

I-5, which is a major transportation corridor, is located approximately 1 km (0.25 mile) to the southwest of the CT facility site. However, because of earthwork cuts and heavy vegetation on the northeast side of I-5, most views of the CT facility elements would be blocked.

3.12.3 Mitigation

Several aesthetic and landscape treatments are already proposed as part of project design that will ameliorate visual impacts to some degree. These include providing a partial vegetation screen around portions of the CT facility and painting the buildings with neutral, natural colors. The emission stacks will be painted a light color to blend with the sky.

In addition to these treatments, recommended mitigation measures to reduce the visual impacts to close residential viewers include:

- Additional screening by including low trees/shrubs along the chain link fencing that will surround the CT facility.

- Screening walls around ancillary elements. Wall treatments could include material/texture patterns and vines.

- A visual screen of dense evergreen trees in rows along the northern and southeast property line to screen views of the CT facility. Upon maturity, the trees would be from 6.1 to 9.1 m (20 to 30 feet) high. To ensure adequate air circulation, no trees would be planted along the cooling tower cells.

Figure 3.12-4a KVA-3 (close view looking northwest near the intersection of Bishop Road and Kirkland Road. Viewing distance is approximately 1/4 mile)

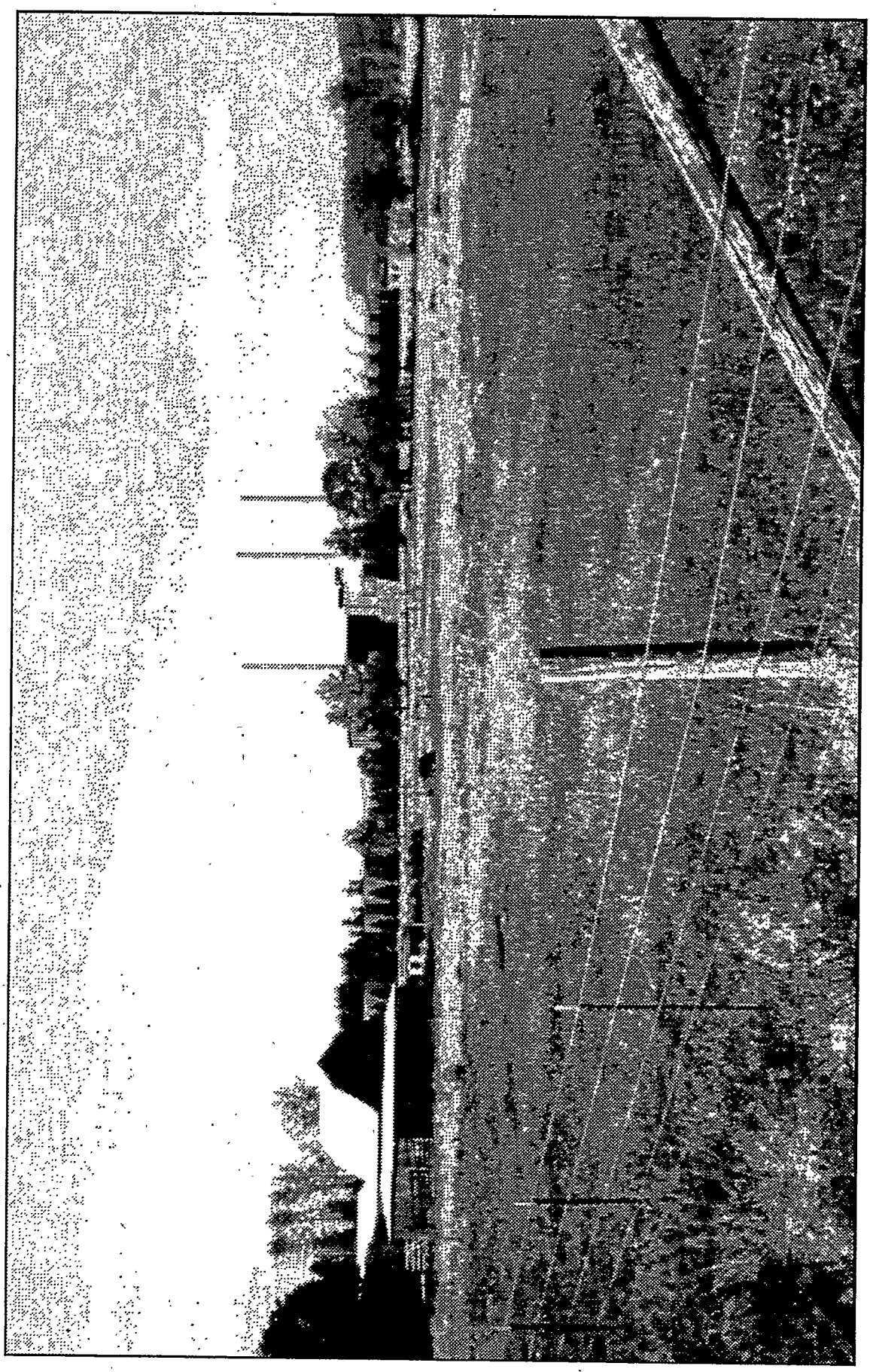


Figure 3.12-4b KVA-3 (Visual Simulation of Proposed Facility as Viewed from the Intersection of Bishop and Kirkland Roads).

- Trees and shrub plantings in parking strips in the interior of the CT facility site.

- Limiting outdoor lighting to no more than the level necessary to maintain safe conditions. All directional lighting will be pointed downward, and all stair lighting will be manually engaged so that stairs will remain unlighted when not in use.

- Reseeding all pipeline construction ROWs as soon as possible after construction of buried pipelines.

3.12.4 Unavoidable Adverse Impacts

Unavoidable visual impacts from the CT facility would be caused by the cooling towers and emission stacks, and their associated plumes. Because of their required size, these elements cannot be fully screened, although the stacks would partially blend with the sky, particularly on overcast days.

Plumes would be frequently seen from the cooling towers but would generally be less than 18 m [60 feet] above the towers (McCulley, Frick & Gillman 1994). The maximum worst-case plume length of 300 m (984.3 feet) would occur during cold, humid weather. Visible vapor could occur from the emission stacks an average of only 130 hours a year (approximately 2 percent of the time). The maximum (worst-case) emission stack plume length of 150 m (492.1 feet) would occur during cold (average temperature 0°C [32°F]) weather.

The most sensitive residential viewers would be those who live along Bishop Road because of the comparatively close distance to the CT facility. A few of these semi-rural residences would be located within 45.7 m (150 feet) of the project property line. The proposed evergreen plantings would provide some degree of visual screening, but the scale of the facility and extremely close viewing range would make the visual impact of the facility moderate to high. Visual impacts would be most pronounced after construction, before the vegetation screening has matured.

Visual impacts for travelers along Bishop Road are also estimated to be moderate to high. Views along many portions of the road are blocked by adjacent residences, but there are several locations where local travelers would have open views of the facility, either between residences or at the Bishop Road/Kirkland Road intersection. Like nearby residential viewers along Bishop Road, travelers along Bishop Road would pass very close to the CT facility, which would dominate the scene. Viewer sensitivity of highway travelers is considered somewhat less than residential viewers, but Bishop Road is a frequently used local route.

For more distant and elevated viewers like residents living in the hills near Yates Road or Route 603, the facility would be visible, but the adverse impact is considered low because of the viewing distance. Valley vegetation and development would most often block the view of the facility, but its presence would still be evident by the appearance of the emission stacks protruding above the treeline. The facility would be visually similar, however, with other tall vertical elements in the project vicinity, including the PPG water tower and an existing corridor of transmission line towers that cross the valley.

Like hillside residences, the visual impacts for travelers using elevated routes like Logan Hill Road, Yates Road, or Route 603 are estimated to be low. The viewing distance is relatively far, most travel routes are not directly oriented toward the facility, and valley vegetation will provide partial screening. The only elements that may be noticed are the emission stacks. Taking into account both the close-up and more distant visual impacts, the overall visual impact is considered moderate.

3.12.5 Cumulative Impacts

Project components such as the CT facility and transmission line would add to the industrial character of the industrial park. Project components would be similar in appearance and scale to existing nearby industrial facilities. The cumulative visual impact for viewers of the project would depend upon viewing distance. Visual impact at close range would be considered moderate to high, whereas impacts to more distant views would be low. Therefore, the overall visual impact is considered moderate.

4.0 ENVIRONMENTAL CONSULTATION, REVIEW, AND PERMIT REQUIREMENTS, CHEHALIS

4.1 NATIONAL ENVIRONMENTAL POLICY ACT

This EIS has been prepared by BPA pursuant to regulations implementing the National Environmental Policy Act (NEPA) (42 United States Code [USC] 4321 et seq.), which requires Federal agencies to assess the impacts that their actions may have on the environment. BPA's potential acquisition of power from the Chehalis Generation Facility requires that BPA describe and assess the potential environmental effects of the proposed project and describe them in an EIS.

4.2 THREATENED AND ENDANGERED SPECIES AND CRITICAL HABITAT

The Endangered Species Act of 1973 (ESA), as amended, (16 USC 1536) requires Federal agencies to ensure that their actions do not jeopardized 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.

Letters were sent to USFWS, National Marine Fisheries Service (NMFS), WDFW, and Washington Department of Natural Resources (WDNR) requesting lists of threatened and endangered wildlife and plant species in the vicinity of the proposed project. No listed fish species under the jurisdiction of NMFS are present in the project vicinity. Three state and Federally listed wildlife species, the bald eagle, peregrine falcon, and marbled murrelet, potentially occur in the vicinity of the project. However, only the bald eagle has been observed in the project vicinity. Two federal candidate fish species, Olympic mudminnow and bull trout, were also listed as potentially occurring in the project vicinity. However, these species have not been recently documented in the project vicinity. Potential impacts of the proposed project on listed species are discussed in Section 3.6. A biological assessment of potential impacts to bald eagle, peregrine falcon, and marbled murrelet is included in Chapter VI, Appendix A.

The small flowered trillium (*Trillium parviflorum*) is known from the vicinity of the project. However, sensitive plant surveys have not been conducted for this project. Thus, an evaluation of the impacts of this project on sensitive plants is not possible at this time. Sensitive plant surveys will be conducted by the developer during 1995, after which potential impacts can be fully evaluated.

The developer should consult with USFWS and appropriate state agencies close to the time of construction. Also, the developer should consult with BPA and appropriate agencies to determine if additional surveys are warranted for any Federally or state-listed species that are on the list at that time.

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 habitat. 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. Refer to Section 3.6 for further discussion of potential impacts to fish and wildlife. Water resources that promote fish and wildlife habitat have not been identified at the Chehalis Generation Facility site.

4.4 Heritage Conservation (Cultural Resources)

Cultural resources 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.

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 NRHP. The agency must consult with the SHPO regarding the inventory and evaluation of properties potentially eligible for NRHP nomination and to determine whether the undertaking would adversely affect them. The Chehalis Generation Facility would involve a permit or agreement with a Federal agency and is therefore a Federal agency undertaking. Potential impacts to Heritage Conservation (Cultural Resources) from the proposed project are discussed in Section 3.8.

4.5 State, Areawide, and Local Plan and Program Consistency

Lewis County Comprehensive Land Use Plan

The 1991 county comprehensive plan designates the Industrial Park, and the CT facility site, for urban development. The county indicated that the Industrial Park is included in an area designated for industrial development. Development is governed by urban industrial land use policies contained in the plan (pers. comm., Mike Zengel, Planning Director, Lewis County Planning Department, Chehalis, Washington, December 8, 1993).

Lewis County Growth Management Regulations

Although the county currently has no zoning regulations, the county and its cities are required to adopt ordinances governing critical areas, urban growth areas, comprehensive plans, and development regulations as part of state Growth Management Act. In 1994, the county and the city

of Chehalis will develop an interim urban growth area plan for the city. The county and city have both designated the Industrial Park for industrial development and will likely include the park within the city's urban growth area.

Lewis County Shoreline Master Program

The CT facility site is not within 61 m (200 feet) of a designated shoreline, so it is not subject to requirements of the county's SMP. However, proposed water supply and wastewater line routes to and from the Chehalis WWTP or to other alternative discharge sites could lie within 61 m (200 feet) of a designated shoreline area. These shoreline areas would be Dillenbaugh Creek, Berwick Creek, the Chehalis River, the Newaukum River, and/or their tributaries.

Lewis County Flood Damage Prevention Ordinance

The CT facility site is not within a 100-year floodplain, as designated by FEMA Flood Insurance Rate Maps. The water supply, wastewater, and gas pipelines would cross the floodplains of the Chehalis and Newaukum rivers, and Berwick and Dillenbaugh creeks.

City of Chehalis Comprehensive Plan

Although the proposed CT facility site is not within the city of Chehalis boundaries, the city does provide the industrial park with water and sewer service and may eventually annex the park (pers. comm., Bob Nacht, city of Chehalis Community Services Dept., Chehalis, Washington, December 7 and 10, 1993). The comprehensive plan for the city of Chehalis designates the Industrial Park for industrial use.

City of Chehalis Shoreline Master Program

The city of Chehalis adopted the county's shoreline master program with several changes. The CT facility site would not be subject to the program, but the water supply and waste water pipelines would be. The water and sewer pipelines would be located within 61 km (200 feet) of the ordinary high water mark of Dillenbaugh Creek and the Chehalis River. The city's SMP would apply to pipelines located within 61 m (200 feet) of the ordinary high water mark of Dillenbaugh Creek or the Chehalis River, the edge of the 100-year floodway, or the edge of any associated wetlands (using the state SMA definition of associated wetlands) (pers. comm., Bob Nacht, city of Chehalis Community Services Dept., Chehalis, Washington, December 7 and 10, 1993). As a result, there would need to be a shoreline substantial development review through the Washington EFSEC.

In addition, pipelines would be required to be buried underground and all disturbed ground restored.

Port of Chehalis Comprehensive Scheme of Development

The comprehensive scheme of development outlines the Port's joint plans for the Chehalis Industrial Park. The Port and the Industrial Commission are proposing a joint project to develop about 170 ha (420 acres) for heavy industry as Phase I of a three-phase development. The heavy industry area would be located south of the existing Industrial Park and would include the CT facility site (Port of Chehalis 1993).

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

Executive Order 11988 requires that floodplains be avoided to the extent possible in projects undertaken by or under contract with BPA. The proposed CT facility site and electrical transmission lines are located outside of the 100-year floodplain. Water and wastewater lines will occupy approximately 0.9 km (0.6 miles) of the Dillenbaugh Creek floodplain while the gas pipeline will occupy approximately 1.6 km (1.0 mile) of the Newaukum River floodplain and 0.8 km (0.5 miles) of the Berwick Creek floodplain. For both the water and gas lines, there are no practical alternatives to crossing floodplains to tie in with the existing water and gas supply. Because the pipelines will be buried, and the contours restored to their original configuration, the floodplain topography will not be altered. The pipelines will be buried at least 0.9 m (3 feet) deep, and should a 100-year flood occur, it is unlikely that the rivers would scour down to the pipelines. Construction of the pipelines would occur during the dry season, when it is unlikely that the river and creeks would flood.

4.8 Wetlands

Several Federal, state, and local agencies are responsible for regulating development in wetlands. These agencies include (but are not limited to) the Corps, which administers the Clean Water Act Section 404 and River and Harbors Act Section 10 permit programs; the SCS, which administers the Farm Bill (Swampbuster) provisions, Prior Converted Cropland designations, and the identification and delineation of wetlands on agricultural lands for purposes of Section 404 permitting; Ecology, which administers the Clean Water Act Section 401 certification program, as well as the State SMP; and Lewis County, which administers the Lewis County SMP and other regulatory programs focusing on rivers, streams, wetlands, and other sensitive areas. Because of the presence of Prior Converted Cropland within the project area, consultation with the Corps has been confirmed that the Corps would not have jurisdiction over the portions of the project containing Prior Converted Cropland.

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.

Approximately 12 ha (30.1 acres) of prime farmland (based on soil type) would be permanently lost to agricultural production as a result of building the CT facility. However, since this land is committed to urban development in the Lewis County Comprehensive Land Use Plan, it is not protected under the Farmland Protection Policy Act. An additional 86 ha (214 acres) of Prime Farmland could be temporarily disturbed during construction of the transmission line water supply,

wastewater, and gas lines. However, soils would be stockpiled and replaced, and there would be no permanent loss of farmland.

4.10 Recreation Resources

The only impact to recreational facilities from the proposed project will be temporary impacts to the Newaukum Valley Golf Course from installing the spur line through the perimeter of the golf course. The owners of this privately owned golf course will be consulted to help minimize construction impacts to the golf course, and compensated as necessary.

4.11 Global Warming

The Chehalis Generation Facility would emit the greenhouse gases carbon dioxide (CO_2) and methane. The burning of natural gas produces CO_2 as the primary combustion product. The new CT plants would also emit small amounts of methane as unburned fuel.

Combined-cycle power plants burning natural gas, like the one proposed for Chehalis, emit less CO_2 per kilowatt of power generated than any other power generation method using fossil fuel. There are three main reasons for this. First, combustion turbines are the most efficient means of producing power from fossil fuels. For each British thermal unit (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. The greatly increases the amount of power generation per unit of fuel burned compared to a simple-cycle power plant. From a global warming perspective, CT plants like the Chehalis Generation Facility are the best method of power generation using fossil fuels.

4.12 Permit for Structures in Navigable Waters

The proposed project may include work or structures in navigable waters of the United States as defined by the Rivers and Harbors Act of 1899 (33 USC 403). Therefore, a Section 10 permit may be required.

4.13 Permit for Discharges into Waters of the United States

The project proposal may include discharge of dredged or fill material into waters of the United States, such as backfill or bedding for the gas, water supply, and wastewater pipelines. This requires a permit from the Corps pursuant to Section 404 of the Clean Water Act as well as a water quality artification from Ecology pursuant to Section 401 of the Clean Water Act.

4.14 Permit for Right-of-Way on Public Lands

Permits from the city of Chehalis, Lewis County, and the state of Washington will be required for locations where water, wastewater, and gas lines will pass under or be located within the ROWs of city, county, and state roads and highways.

4.15 Energy Conservation at Federal Facilities

Not applicable.

4.16 Pollution Control

4.16.1 Air

Emissions produced by the proposed project must meet standards established by the EPA. The Clean Air Act is the principal Federal law governing air pollution control. It was most recently amended in 1990. In the project vicinity, authority for ensuring compliance with the provisions of the Clean Air Act is delegated to the Ecology.

The Chehalis Generation Facility would be considered a major new source of air emissions. Major sources that emit more than 91 MTY (100 TPY) of a regulated air pollutant are required to comply with New Source Review (NSR), BACT, New Source Performance Standards (NSPS), PSD requirements, and are required to obtain a Notice of Construction (NOC) from the Southwest Air Pollution Control Authority (SWAPCA). Once constructed, operational compliance of the CT facility will be administered by SWAPCA, the local air pollution control agency for facilities in Lewis County, Washington. There are several nearby areas (Alpine Lakes, Goat Rocks, and Mount Adams Wilderness Areas, and Mount Rainier and Olympic National Parks) that have been designated by Congress for special protection from air pollutants that might affect soils, vegetation, visibility, and other natural resources. These areas are designated as Class I under the Federal PSD program.

Ecology and SWAPCA have established regulations for new sources to ensure that ambient air quality remains acceptable and to protect Class I areas. These regulations and their supporting information are contained in the State Implementation Plan (SIP), a plan adopted by the state to ensure that the air quality objectives are met. The SIP for Washington has been approved by the EPA. An essential element of the plan is NSR, an engineering review process to ensure that new sources comply with all regulations. Sources constructed under the PSD program are required to maintain air pollution control equipment in proper working order and to periodically test the emissions to demonstrate compliance with emission limitations. Ecology also administers a plan for controlling emissions of TAPs. New sources emitting more than the small quantity emission rates of toxic or carcinogenic air pollutants must demonstrate that the concentrations resulting from these emissions are less than the ASILs.

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 permit is the primary instrument for implementing the act. Ecology is authorized to administer the NPDES program within the state. city of Chehalis sewage treatment plant effluent reuse, discharge of the proposed facility's wastewater outfall line to the Chehalis River, and stormwater runoff would require an NPDES permit. A combined permit may be issued for all of these discharges.

A State Industrial Waste Discharge permit would also be required for discharges directly to the Chehalis waste outfall line, sewage treatment works.

The Washington Department of Health (WDH) has issued draft guidelines for the reuse of wastewater. Final criteria will be passed by state legislature and adopted in the WAC in August 1994. To obtain approval for wastewater reuse for this proposed project, the developer and the city of Chehalis would submit a request to Ecology to amend the existing wastewater discharge permit.

The proposed project would receive its drinking water from city of Chehalis' domestic water system, which is obligated to comply with the provisions of the Safe Drinking Water Act.

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 local landfill. The Resource Conservation and Recovery Act (RCRA), as amended, is designed to provide a program for managing and controlling hazardous waste by imposing requirements on generators and transporters of this waste, and on owners and operators of treatment, storage, and disposal (TSD) facilities. Each TSD facility owner or operator is required to have a permit issued by EPA or the state. Construction and maintenance activities at the proposed project will generate small amounts of hazardous waste. These typically include: solvents, pesticides, paint products, motor and lubricating oils, and cleaners. Under EPA regulations, the amounts of these wastes generated by the proposed project would fall within the definition for a "small quantity generator." The developer will formulate a hazardous waste management program that meets all Federal and state hazardous waste requirements. 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 UFC, entitled "Stationary Tank Storage, Aboveground, Outside of Buildings."

4.16.4 Noise

Washington State has established noise regulations based on land use compatibility (Table 4.16-1). The proposed CT facility site and the area immediately surrounding the site are categorized as industrial. For a residential area, the noise abatement criterion is an L_{eq} of 60 dB(A)

when the noise originates from an industrial site. Between the hours of 10 p.m. and 7 a.m., the noise limitations in Table 4.16-1 are reduced by 10 dB(A) for a residential receiving property. Additionally, at any hour of the day or night, the applicable noise limitations may not be exceeded in any 1-hour period by more that 5 dB(A) for a total of 15 minutes, 10 dB(A) for a total of 5 minutes, or 15 dB(A) for a total of 1.5 minutes. These limits correspond to the L_{25} (25 percent of 1 hour), $L_{8.3}$, and $L_{2.5}$ sound levels.

Table 4.16-1. Maximum Permissible Sound Levels

	Maximum Permitted Sound Levels of Receiver (dB[A])		
Source of Noise	***Residential***	***Commercial***	***Industrial***
Residential	55	57	60
Commercial	57	60	65
Industrial	60	65	70

Source: WAC 173-60-040

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 3.4.

4.16.5 Pesticides

The proposed project would not use or produce pesticides, and would not be affected by regulation regarding the purchase, use, storage, or disposal of pesticides.

4.16.6 Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) requires notification to EPA of new chemicals and regulates the production, use, and disposal of toxic substances. Of particular interest to the production of electricity is the regulation of polychlorinated biphenyls (PCBs). EPA banned the manufacture, processing, distribution in commerce, and use of PCBs on January 1, 1978 except in totally enclosed electrical equipment or under specific authorized uses. The proposed project would not involve the distribution, use, or disposal of PCBs.

4.16.7 Asbestos

There would be no asbestos used in the proposed project.

4.16.8 Comprehensive Environmental Response, Compensation, and Liability Act

A Phase I Environmental Site Assessment was completed for the proposed CT facility site which indicated that no hazardous materials are present.

4.16.9 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).

CHAPTER III — HERMISTON POWER PROJECT

1.0 PROJECT DESCRIPTION

1.1 SITE LOCATION

The proposed Hermiston Power Project would be located 4.8 kilometers (km) (3 miles) south of Hermiston, Oregon, in an industrial area adjacent to the currently operating J.R. Simplot Potato Processing Plant (see Figure 1-1). The legal description of the site is the southeast quarter of the southeast quarter of Section 28, Township 4 North, Range 28 East of the Willamette Meridian. The proposed location for the cogeneration facility is a 6.9-hectare (ha) (17-acre) site in an area currently used for alfalfa production; historical uses were also agricultural. The property is currently owned by the J.R. Simplot Company, and the Hermiston Power Partnership (consisting of wholly owned subsidiaries of Ida-West Energy Company, J.R. Simplot Company, and TransCanada Pipelines, Limited) has an option to lease the site. Most of the cogeneration facility site is surrounded by agricultural land, much of which is owned by Simplot. The site is approximately 0.8 km (0.5 mile) from the nearest residence.

In addition to producing electricity from natural gas combustion and steam generation, the facility would provide steam from waste heat for the J.R. Simplot potato plant for processing operations. The existing Simplot plant boilers would normally be shut down and placed on stand-by when the cogeneration facility was operating.

1.2 PROJECT COMPONENTS

Major project components would include:

- two identical side-by-side combustion turbine generators/two heat recovery steam generators (HRSGs)/two steam turbine generators, capable of producing an average of 430 megawatts (MW).

- Natural gas supply pipeline interconnections with nearby Northwest Pipeline Corporation (NWP) (30-centimeter [cm] [12-inch] diameter; 4.8-km [3-mile] length) and Pacific Gas Transmission (PGT) (30-cm [12-inch] diameter; 7-km [4.25-mile] length) laterals.

- A back-up fuel supply of No. 2 fuel oil stored in two 3.8 million liter (l) (1 million gallon) on-site fuel tanks.

- A process water supply line (25- or 30-cm [10- or 12-inch] diameter; 2.01 km [1.25-mile] length) connecting to the Port of Umatilla-City of Hermiston regional water system at the planned treatment plant north of the Feedville Road.

- A wastewater treatment line (15.2-cm [6-inch] diameter; 914.4-meter (m) [3,000-foot] length) connecting to the existing J.R. Simplot land disposal system adjacent to the proposed facility site.

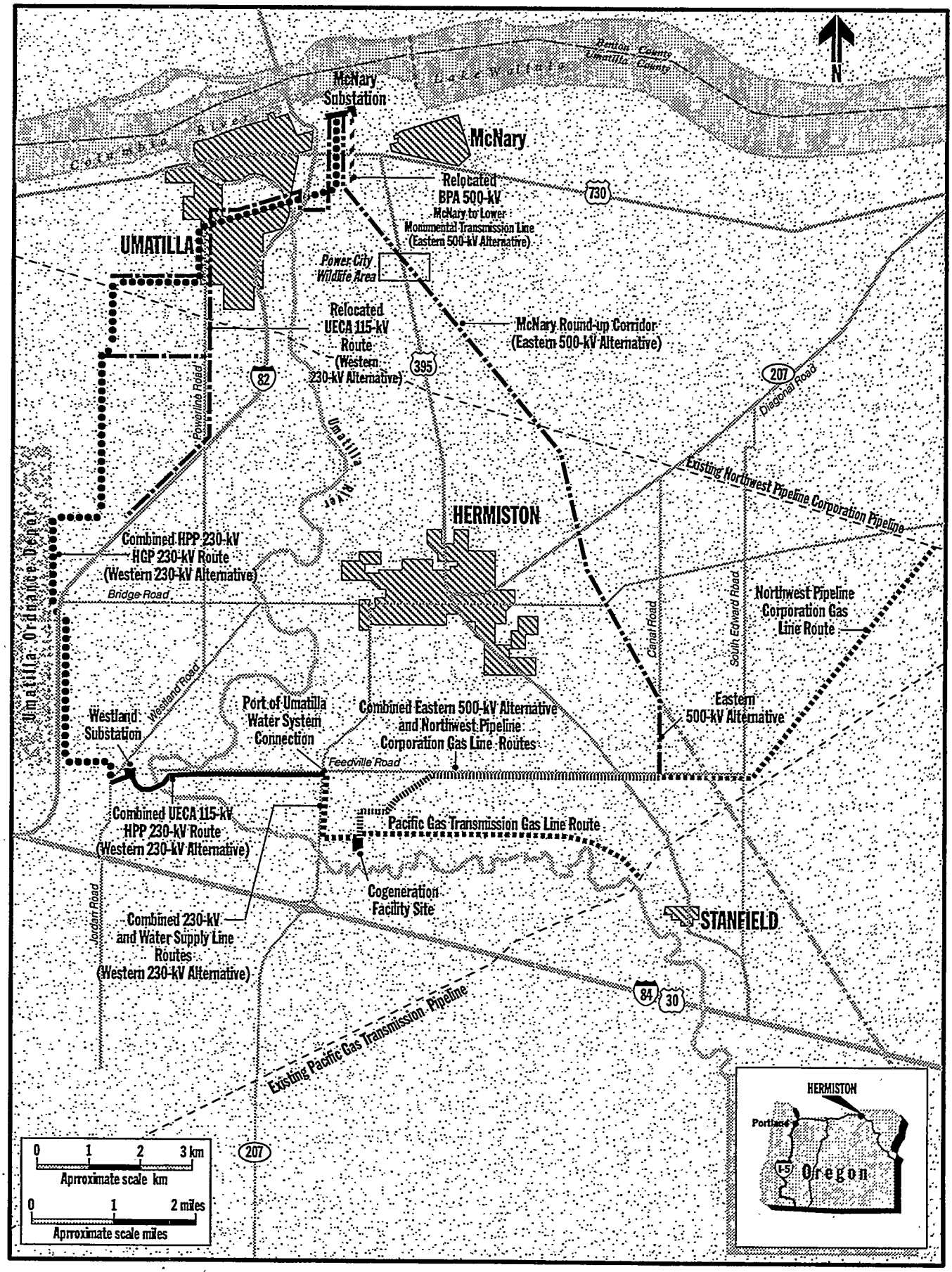


Figure 1-1 Project Location and Components

- Cooling system.

- Electrical interconnection to the existing Bonneville Power Administration (BPA) McNary Substation and substation modifications. The distance to the substation is approximately 14.5 km (9 miles).

The proposed cogeneration facility layout is depicted in Figure 1-2, with project components summarized below.

1.2.1 Cogeneration Facility

The project developers, the Hermiston Power Partnership, are proposing a combined-cycle combustion turbine cogeneration facility containing (1) two natural gas-fired combustion turbines, each coupled on a single shaft with a steam turbine and a common generator; (2) two HRSGs; (3) two steam surface condensers; and (4) two condenser cooling systems. The hot exhaust from each combustion turbine would flow directly to an HRSG, where the heat would be captured to create output steam to power a steam turbine generator. Combining the electrical outputs of the gas-fired combustion turbines and the steam turbines, the facility would generate 430 average megawatts (aMW) (enough electricity to supply 250,000 homes in the Pacific Northwest). Additional low-level heat is recovered in the plant (as compared to a stand-alone power plant) by providing steam (up to 54,530 kilograms [kg]/hour [120,000 pounds/hour]) to the J.R. Simplot potato processing plant. A conceptual diagram illustrating the cogeneration process is presented in Figure 1-3.

The majority of the facility's equipment, including the turbine generators, would be located in a steel building covering approximately 5,575 square m (60,000 square feet). Separate rooms in the building would contain the electrical switches and plant controls. Equipment located outside the building would be two 59.4-m (195-foot) exhaust stacks, cooling towers, HRSGs, electrical substation, and storage tanks for water, back-up fuel oil, and chemicals.

1.2.2 Fuel Supply

The cogeneration facility's primary fuel would be natural gas. Current plans are to have gas supplied from both NWP and PGT (Figure 1-1). The connection to the NWP lateral approximately 13 km (8 miles) to the east, would require a new 30-cm (12-inch) pipeline. The NWP route would share ROW with the Eastern 500-kV Alternative between the cogeneration facility and Canal Road to the east. The route would then continue eastward along the south side of Feedville Road to a point a short distance to the east of South Edward Road. At this point the route would turn toward the northeast and continue along an old dirt road for approximately 4.8 km (3 miles) connecting to the existing NWP lateral (Figure 1-1).

The connection to the PGT line, also to the east, would require 6.4 km (4 miles) of new 30-cm (12-inch) pipeline. The route would run north from the cogeneration facility for approximately 0.4 km (0.25 mile) to the south side of the Union Pacific Railroad Hinkle Yard. The route then would turn to the east and run along the south side of the railroad tracks; paralleling a paved and dirt

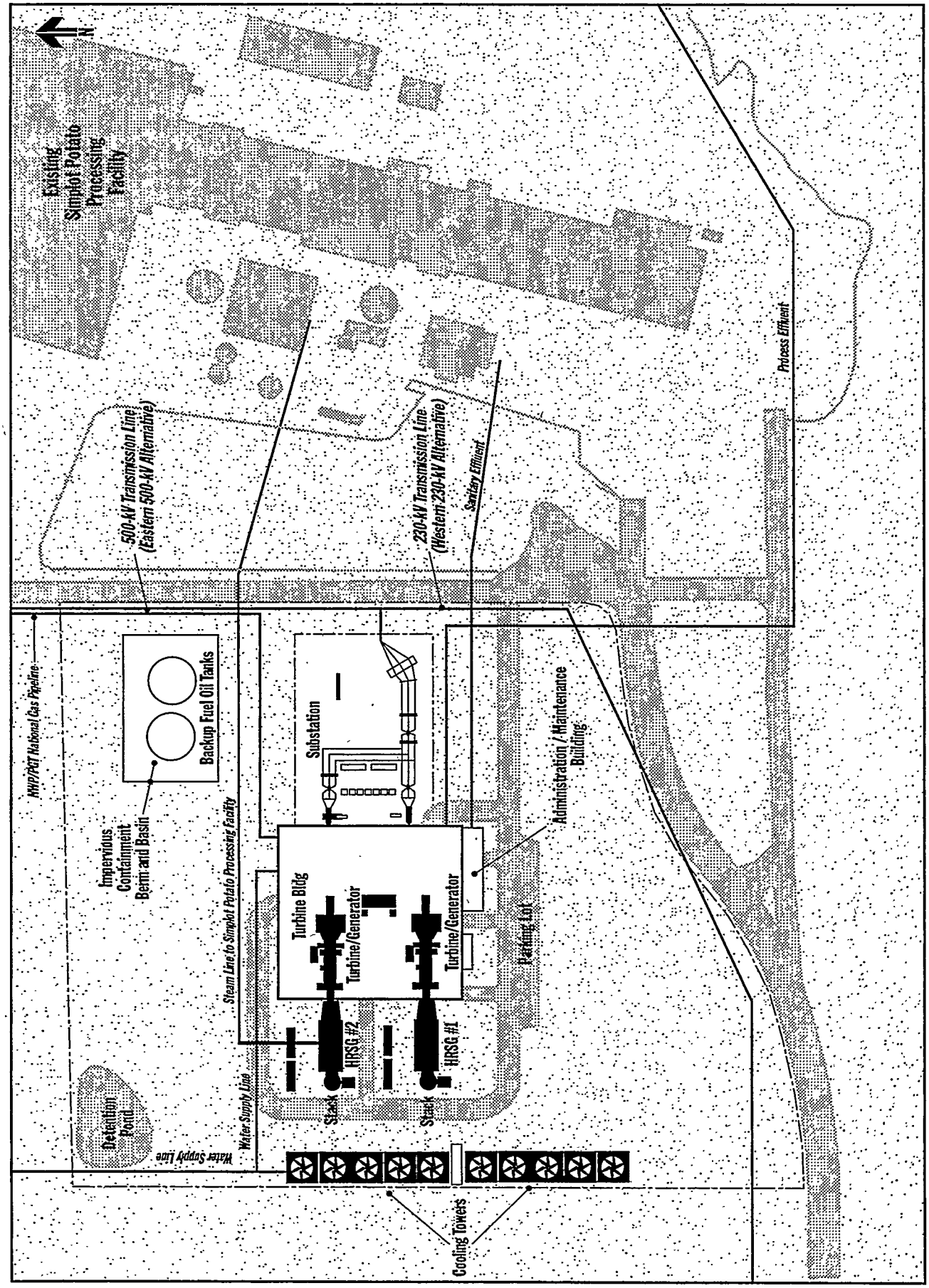


Figure 1-2 Cogeneration Facility Site Plan

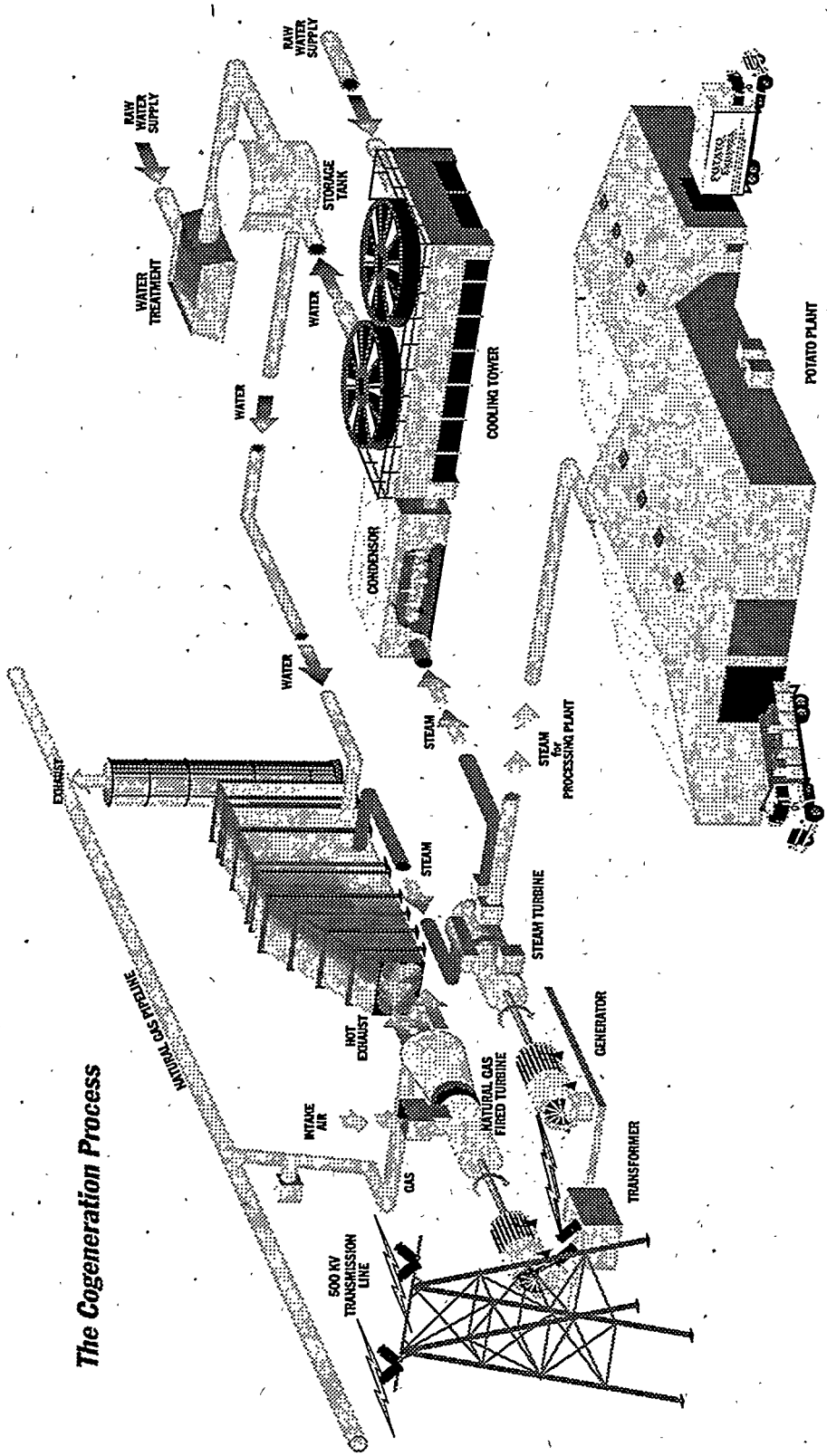


Figure 1-3 Cogeneration Flow Diagram

railroad access road for approximately 5 km (3 miles). The route would then turn to the southeast for approximately 1.6 km (1 mile) and connect with the PGT lateral (Figure 1-1).

In the event of a disruption in the natural gas supply, the project would be designed to burn No. 2 fuel oil. Two 3.8 million l (1 million gallon) fuel tanks, enclosed by a containment system in case of a spill, would be constructed for the project. The containment system would be designed to handle the contents of the one tank plus precipitation from the largest storm recorded for the area as required by regulations. The tanks would supply enough fuel for approximately 4 days of operation. Replacement fuel oil would be brought in by rail car using the potato plant's existing siding.

1.2.3 Electrical Interconnection and Substation Modifications

Electricity generated by the Hermiston Power Project would be transmitted to BPA's McNary Substation, approximately 14.5 km (9 miles) north of the proposed cogeneration facility site.

Two alternatives are being considered for conveying electrical power to the McNary Substation: the Western 230-kilovolt (kV) Alternative and the Eastern 500-kV Alternative. The routes are depicted in Figure 1-1. These alternative routes are described below, together with the modifications required at the McNary Substation to accommodate the new power source.

Western 230-kV Alternative

This alternative involves using, for the most part, an existing Umatilla Electric Cooperative Association (UECA) 115-kV transmission line corridor between the Westland and the McNary substations. The right-of-way (ROW) generally runs parallel to the eastern boundary of the Umatilla Ordnance Depot from the Westland Substation at the Lamb-Weston potato plant north to the city of Umatilla, then east and north to the McNary Substation (Figure 1-1).

This section of ROW was permitted by the Hermiston Generating Project for construction as steel pole double circuit 230/230-kV transmission line to be completed by the end of 1995. The construction includes demolition of the existing UECA structures and transfer of the existing 115-kV UECA conductors to the new structure. The line, although permitted as a 230-kV/230-kV and constructed to provide this capability, will be operated at 230-kV/115-kV until the proposed project is constructed.

If the Western 230-kV Alternative is chosen for the proposed project, the UECA 115-kV line would be relocated to a new wood pole transmission line (UECA 115-kV relocation) to be constructed along the county ROW. The required 230-kV conductor and insulators would then take the UECA position on the 230/230-kV transmission line, along with the Hermiston Generating Project, between the Westland and McNary substations.

The proposed cogeneration facility would be connected to the 230/230-kV transmission at the Westland Substation by constructing approximately 2.4 km (1.5 miles) of new 230-kV line from the cogeneration facility west to State Highway 207 and then north to Feedville Road. The remaining portion would involve the construction of additional 230-kV conductor and insulators on an existing UECA 115-kV line from the intersection of State Highway 207 and Feedville Road to the Westland

Substation at the Lamb-Weston potato plant. This section would involve a crossing of the Umatilla River (Figure 1-1).

Typical pole/conductor configurations for the different portions of the proposed transmission lines are shown in Figures 1-4, 1-5, 1-6, and 1-7.

Eastern 500-kV Alternative

If this alternative is chosen, a new 500-kV transmission line (to be owned and operated by BPA) would be constructed between the cogeneration facility site and the McNary Substation. From the McNary Substation south for a distance of approximately 1.4 km (0.9 miles), the project would use the existing BPA 500-kV McNary-Lower Monumental transmission line's structures. This would require that the existing BPA 500-kV McNary-Lower Monumental circuit, through this section only, be relocated to the county road ROW. The relocated BPA line would be approximately 1.6 km (1 mile) in length and would occupy new steel poles or towers along County Road 1231, approximately 200 m (656 feet) east of its present position. The required Hermiston Power Project conductors and insulators would then take the present position of the BPA McNary-Lower Monumental circuit on the existing transmission line structures. At the southern end of this line segment, a new 500-kV line would depart from the McNary-Lower Monumental corridor and continue south and slightly west along a new route for a distance of approximately 0.4 km (0.2 mile), at which point the line would join the existing BPA 230-kV McNary-Roundup corridor.

From its entrance to the BPA McNary-Roundup corridor, the Hermiston Power Project 500-KV transmission line would require construction of a 12.2 km (7.6 mile) section of line to be located within the existing 76.2-m (250-foot) wide BPA McNary-Roundup corridor. The new 500-kV transmission line would occupy the corridor with BPA's 230-kV McNary-Roundup Line No. 1 and would consist of steel towers or poles constructed at 304.8- or 365.8-m (1,000- or 1,200-foot) intervals along the eastern one-half of the ROW. This section continues until the intersection of the BPA McNary-Roundup corridor with Canal Road.

At Canal Road, the Hermiston Power Project 500-kV line would continue south along Canal Road on single-shaft steel poles approximately 1.4 km (0.9 mile) to the intersection with Feedville Road. Pole placement will be along county road ROW. At Feedville Road the line continues west approximately 5.1 km (3.2 miles) along the south side of Feedville Road. Approximately 0.2 m (0.1 mile) west of the intersection of Feedville and Hermiston-Hinkel roads, the line would continue south and slightly west to the cogeneration facility. The 500-kV transmission line would parallel and use a common ROW corridor with the proposed NWP gas line route between the cogeneration facility and Canal Road (Figure 1-1).

Typical pole/conductor and tower/conductor configurations for the proposed 500-kV transmission line are shown in Figures 1-8 and 1-9.

McNary Substation Modifications

Modifications within the existing substation would be designed and constructed by BPA to accommodate the new power source. These would likely include either new 230-kV or 500-kV ring buses, breakers, meters, protective relays, and disconnect switches.

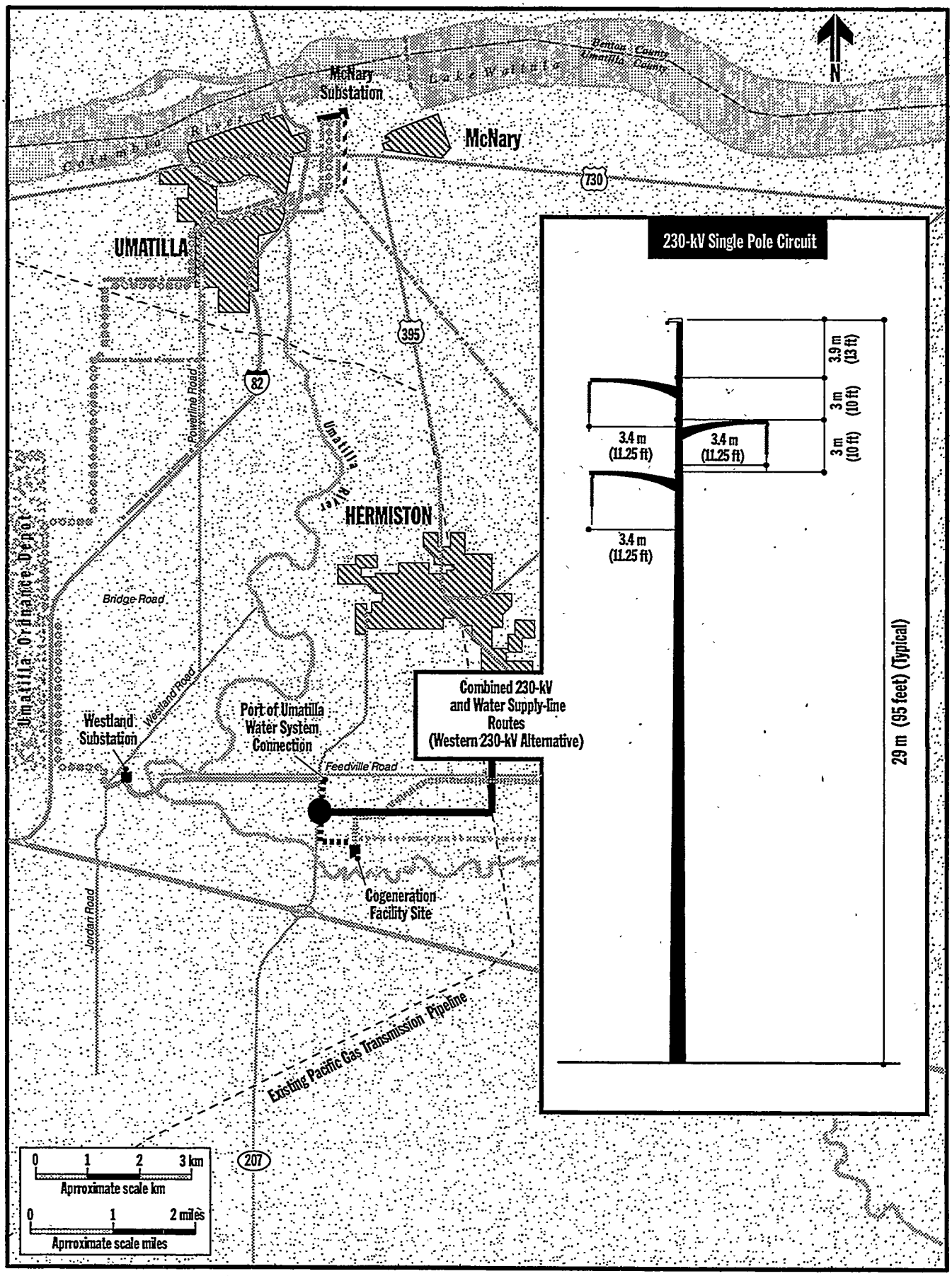


Figure 1-4 Proposed Transmission Line Pole Design-Connection between Cogeneration Facility Site and Feedville Road

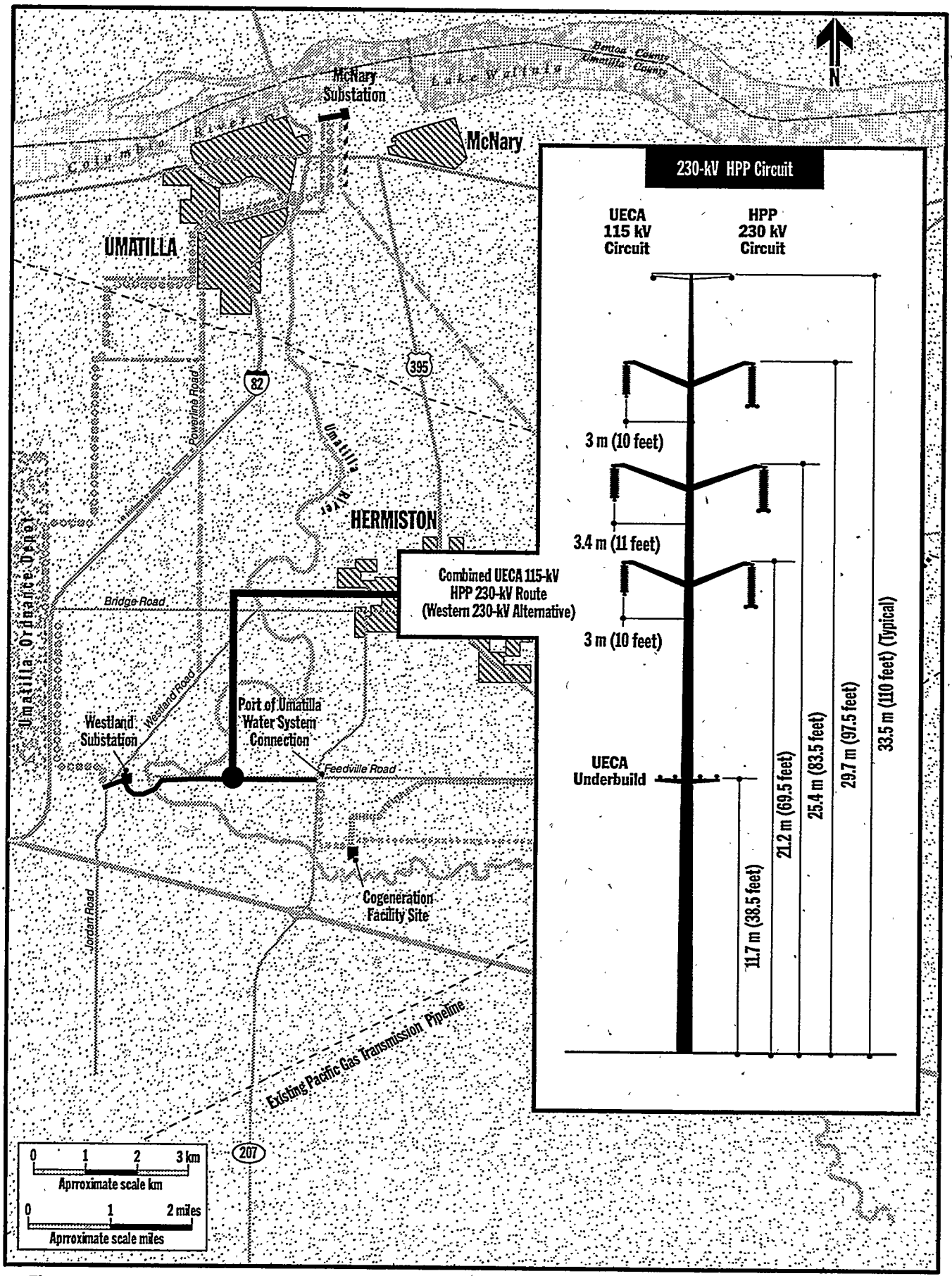


Figure 1-5 Proposed Transmission Line Pole Design-Western 230-kV Alternative (Westland Substation East on Feedville Road)

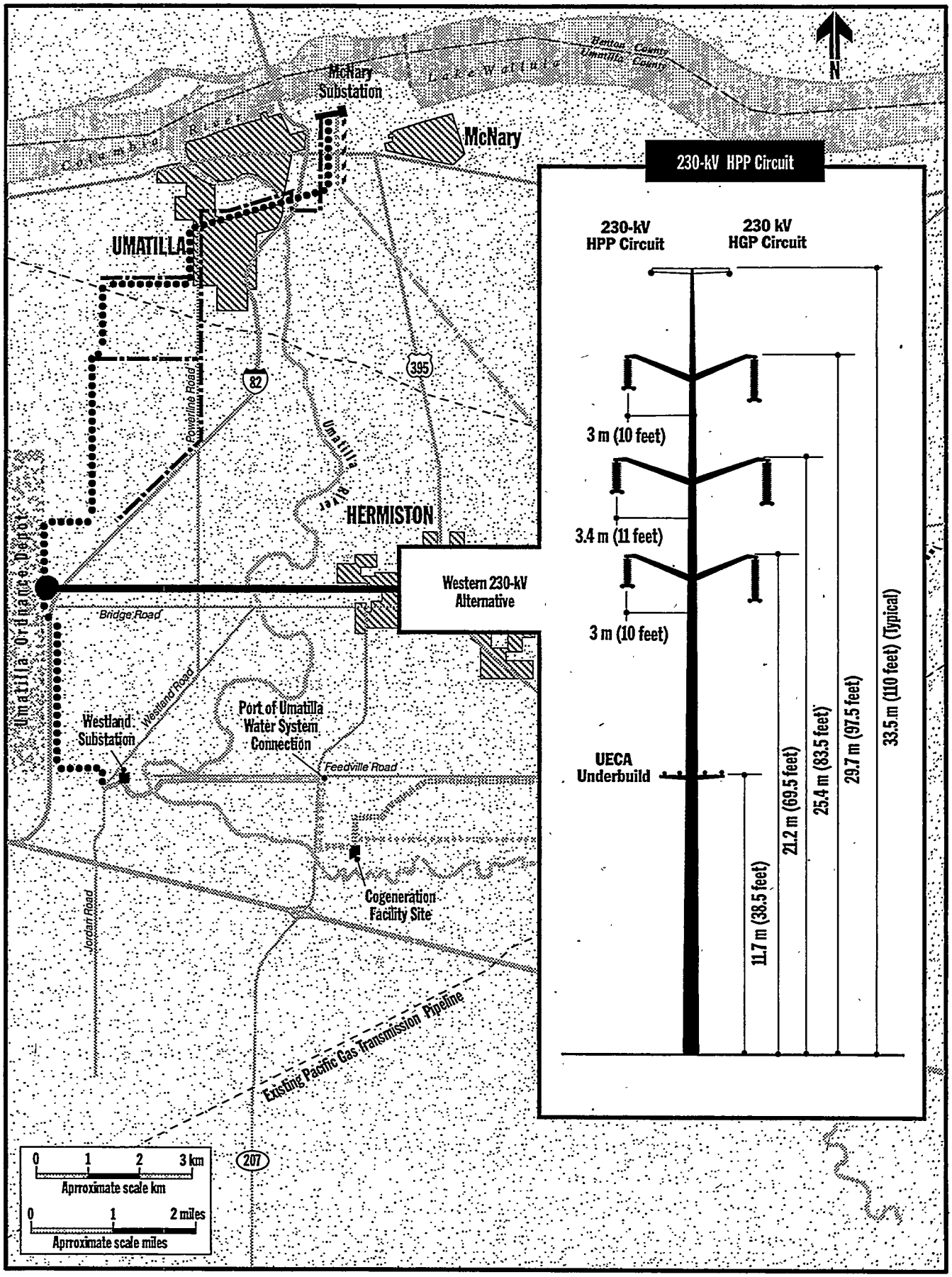


Figure 1-6 Proposed Transmission Line Pole Design-Western 230-kV Alternative (Westland Substation to McNary Substation)

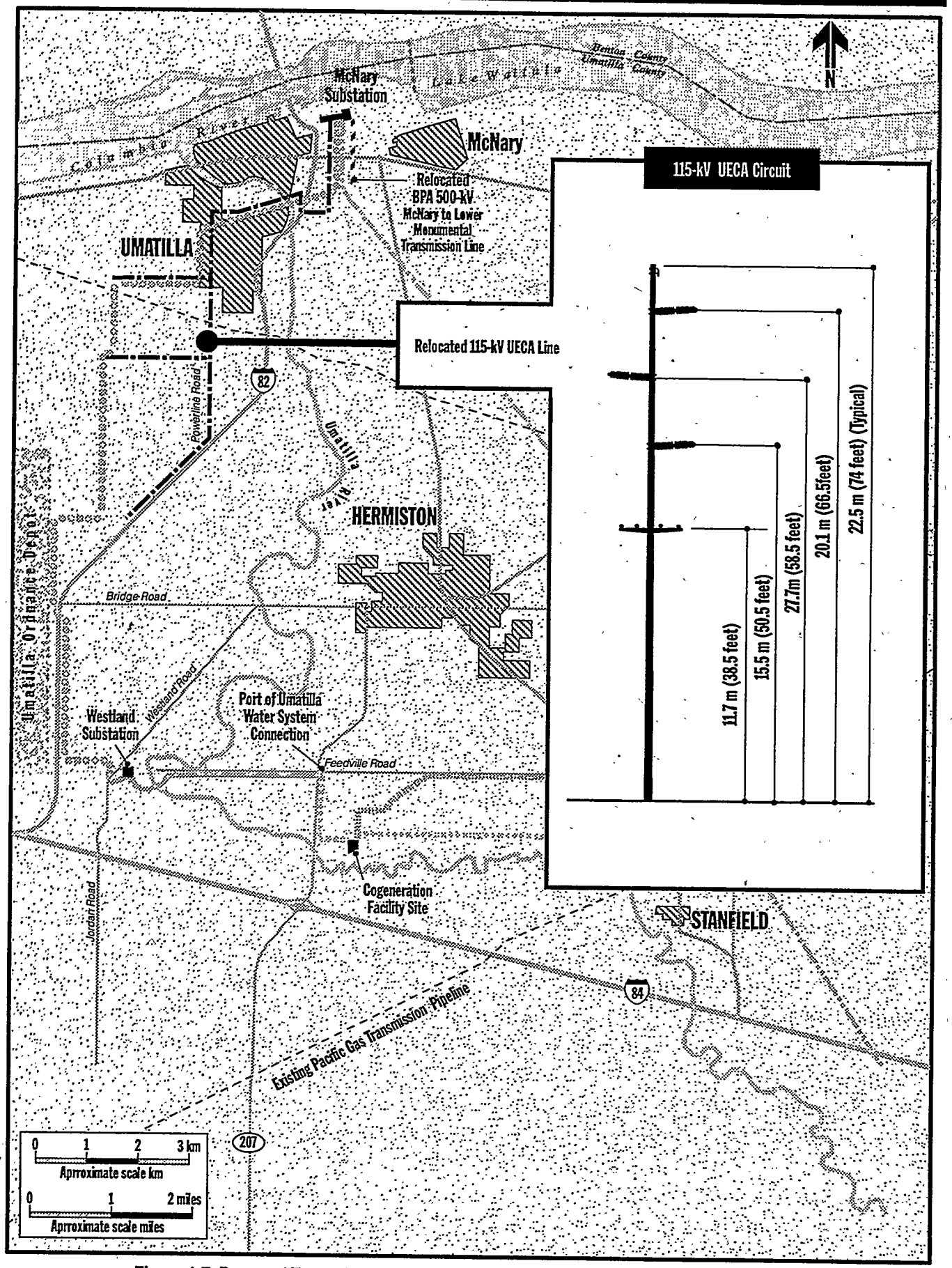


Figure 1-7 Proposed Transmission Line Pole Design-Western 230-kV Alternative (Relocated 115-kV UECA Line)

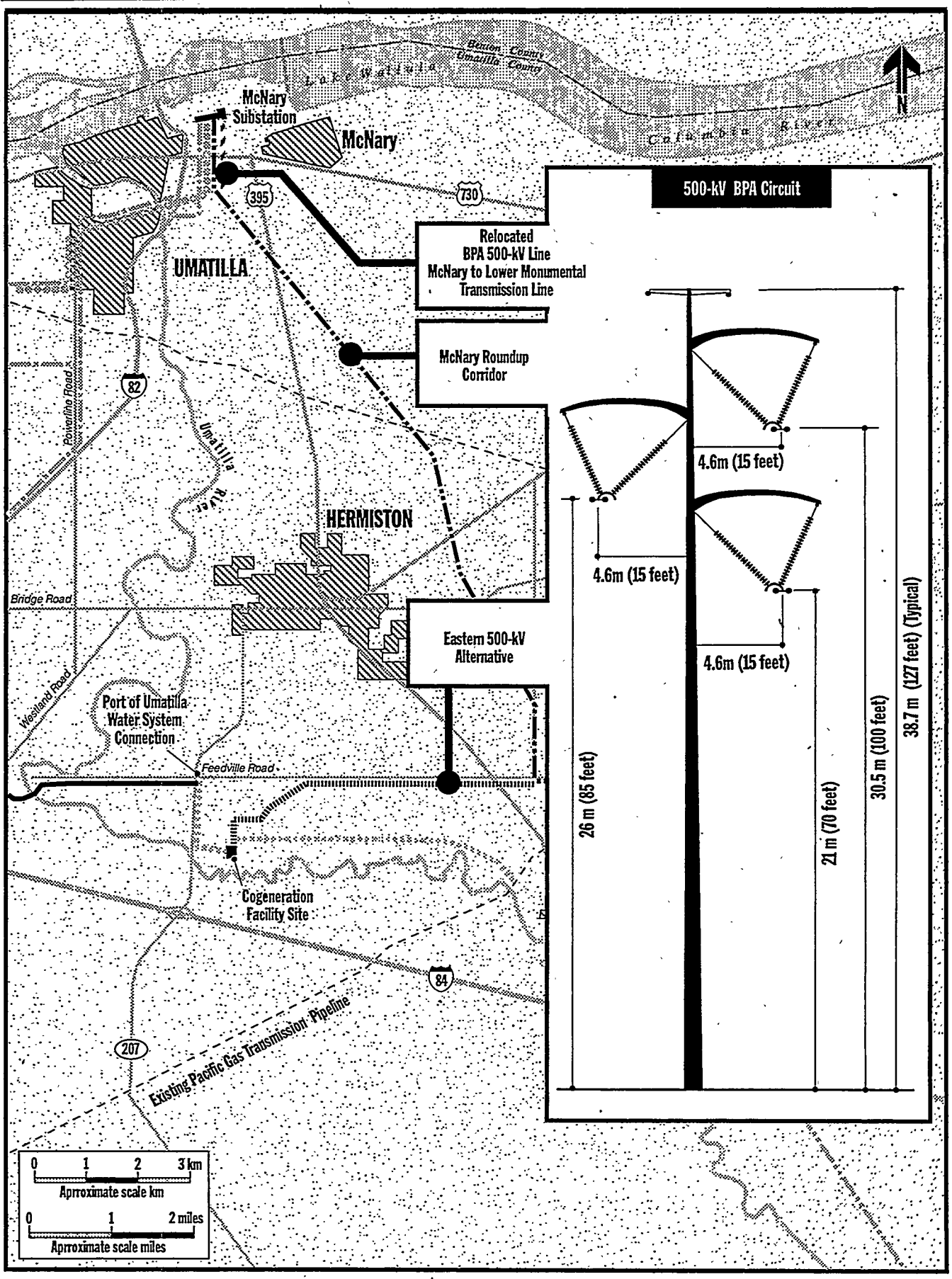


Figure 1-8 Proposed Transmission Line Pole Design-Eastern 500-kV Alternative

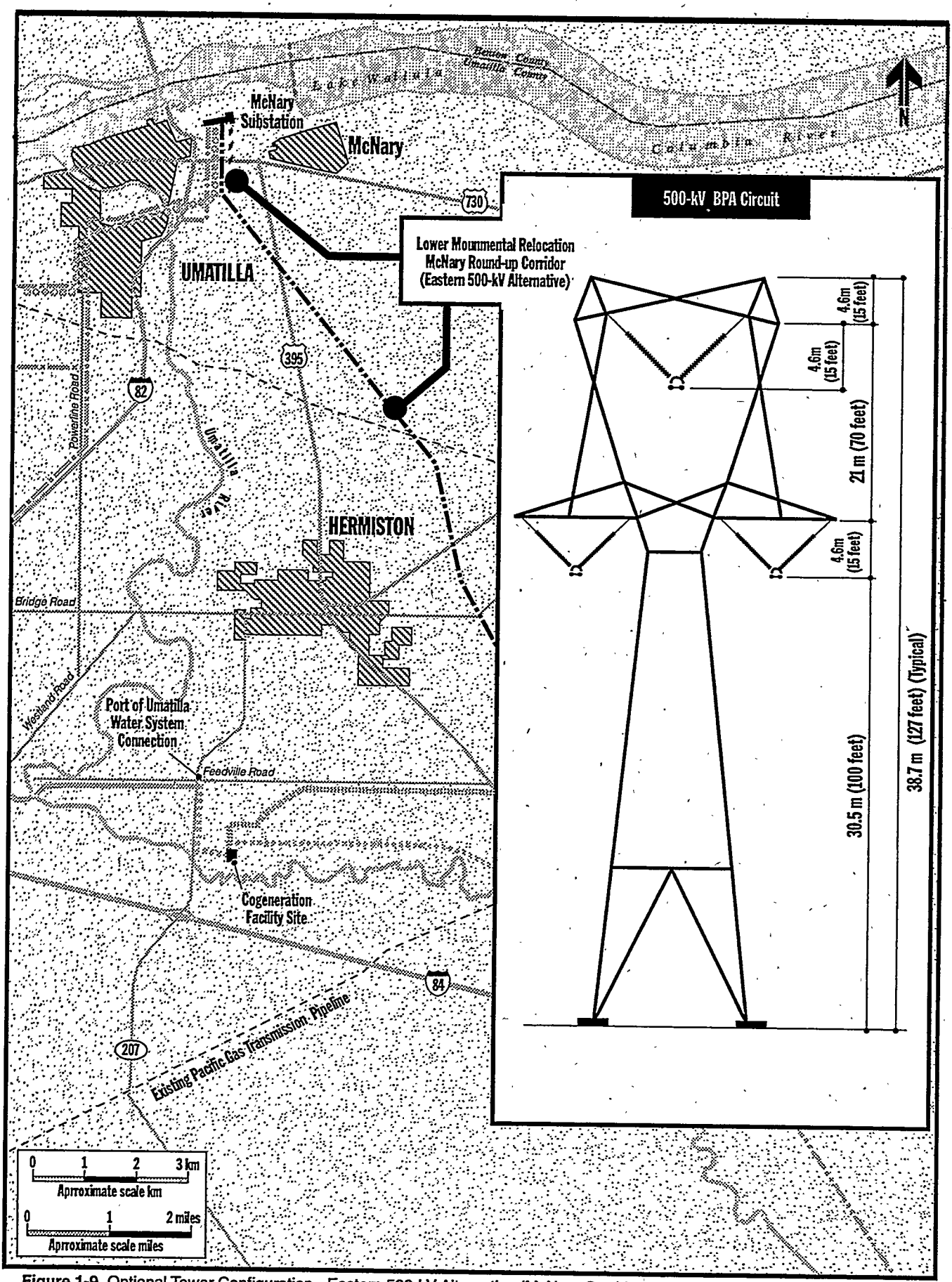


Figure 1-9 Optional Tower Configuration - Eastern 500-kV Alternative (McNary Corridor and Lower Monumental Relocation Only).

1.2.4 Water Supply and Wastewater Systems

Process and boiler make-up water for the cogeneration facility would be purchased from the Port of Umatilla-City of Hermiston (Port) regional water system, which would draw water from the Columbia River under its existing water permit 49497, with a priority date of January 19, 1979. The permit allows the Port to withdraw up to 4.4 cubic meters per second (cms) (155 cubic feet per second [cfs]) (263,328 liters per minute [lpm] [69,564 gallons per minute {gpm}]) of water from the Columbia River. The Port's initial withdrawal of 1.8 cms (62 cfs) (105,333 lpm [27,826 gpm]) at this station would constitute approximately 0.036 percent of the Columbia River volume. The Port began construction of the water supply facilities in November 1994. The Port's facilities are being constructed independently of the proposed project, and would supply water to a number of municipal and industrial users including the city of Hermiston.

The proposed project would require an average of 7,359 lpm (1,885 gpm) of process water. The project will connect to the Port's raw water supply system near the Port's water treatment plant, at the intersection of Feedville Road and State Highway 207 using a 25- or 30-cm (10- or 12-inch) diameter, 2.01-km (1.25-mile) long underground feeder pipeline. The pipeline would parallel State Highway 207 (Figure 1-1). All necessary water treatment will occur on the cogeneration facility site. The project's potable water would be obtained from the J.R. Simplot Company potato processing plant adjacent to the cogeneration facility site.

Stormwater from the cogeneration facility site would be collected by a system of drainage ditches and transported to a detention basin located in the northwest corner of the site. A segregated drain system will be provided for the turbines, HRSGs, water treatment and service areas to allow any chemicals or oils containing wastewater to be processed separately.

The cogeneration facility will produce an average of 553 lpm (146 gpm) of process wastewater, including cooling tower blowdown. This wastewater would be collected and routed 914.4 m (3,000 feet) through a 15.2-cm (6-inch) diameter pipe to the Simplot potato plant land application system. Under an existing Oregon Department of Environmental Quality (ODEQ) Water Pollution Control Facilities (WCPF) permit, Simplot currently recycles its process water on farm land in the vicinity of their plant site. This permit will be amended to allow the proposed project's process wastewater to be land applied with the land of the potato plant.

Sanitary wastewater from the cogeneration plant is proposed to discharge to the J.R. Simplot existing sanitary wastewater treatment system. Simplot's existing sanitary system consists of a two-cell faculative lagoon/evaporation unit, chlorinator, and agricultural irrigation system. An amendment to the existing Simplot WPCF permit is also being sought to allow cogeneration sanitary wastewater to be added to Simplot's existing system.

1.3 Operating Schedule

The cogeneration facility would operate as directed by the BPA dispatcher. The facility would be designed to be taken off line or run at reduced rates as needed to support BPA electrical load requirements. To minimize BPA generation costs, the plant could be shut down when adequate

lower cost hydroelectric power is available. The plant could be operated at between 60 to 100 percent of rated output to allow BPA to firm its hydroelectric system and match capacity loads. The plant's operating schedule would change seasonally and daily depending largely on the availability of water for hydroelectric generation and changes in hydroelectric system operations made to enhance fish passage. For purposes of this environmental impact statement (EIS), environmental impacts from the proposed project are evaluated on the basis of operating scenarios that produce worst-case air emissions and effluent water quality.

1.4 Construction Schedule

Construction of the project could begin between 1995 and 2005, depending on BPA's need for electricity. Once BPA gives the approval for facility construction, the project could be completed in approximately 2 years. Site preparation would require conventional construction equipment, including bulldozers, front-end loaders, trucks, tractor-scrapers, and graders. After site preparation, the combustion turbines, generators, electrical and other equipment, and support facilities of the cogeneration facility would be installed. Once these facilities are in place, the site landscaping would be initiated. Pipeline construction would take approximately 12 months (within the overall 24-month period).

For the Western 230-kV Alternative, the construction period required would be 12 months for the 230-kV construction between the cogeneration facility site and McNary Substation. Approximately 6 months of construction would be required for the relocation of the UECA 115-kV circuit to the county road ROW. These two construction periods would run concurrently.

The Eastern 500-kV Alternative, for the most part, would be routed along county road ROWs to a point where the line would join the BPA McNary-Roundup 230-kV transmission corridor to the McNary Substation. The line would require 10 to 12 months for construction.

All transmission line construction periods described above would occur during the overall project 24-month construction period.

1.5 Decommissioning

The Hermiston Power Project would have a life expectancy of 30 to 40 years. If the proposed power plant were to reach the end of its useful life, it would be renovated or decommissioned. If the power plant were decommissioned, all structures and equipment at the power plant site would be dismantled and sold. Transmission interconnection lines and structures would be deeded to the impacted utilities to continue to serve the area. The McNary Substation would most likely not be decommissioned at the same time and would continue to serve the area. Gas and water line connections would be capped and abandoned or removed.

2.0 AFFECTED ENVIRONMENT, HERMISTON

2.1 GEOLOGY, SOILS, AND FLOODPLAINS

2.1.1 Regional Geology

The proposed project 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 2.1-1. 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.BP). These flood basalts cover an area of approximately 163,170 square km (63,000 square miles) and are up to 3,657.6 m (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 vicinity, the Saddle Mountains Basalt is exposed in nearby hills and buttes. Further subdivisions within the Saddle Mountains Basalt include, from oldest to youngest, the Umatilla Member, the Pomona Member, and the Elephant Mountain Member, all of which appear in the vicinity of the cogeneration facility site. The basalts erupted from feeder dikes injected into north-northwest trending linear fracture zones.

The Columbia Plateau contains a complex system of folds, faults, and basins (Figure 2.1-2). Based on the predominant structural fabric, the Columbia Plateau has been subdivided into three informal structural subprovinces: Palouse Slope, Blue Mountains, and Yakima Fold Belt. The proposed project is situated within the Yakima Fold Belt of the Columbia Plateau, characterized by narrow, asymmetrical anticlines spaced between 4.8 to 48.3 km (3 to 30 miles) apart, separated by broad, low valleys. The anticlines include the Service anticline, 1.6 km (1 mile) east of the cogeneration facility site; The Dalles-Umatilla syncline, 12.9 km (8 miles) northeast of the site; and the Columbia Hills anticline, 17.7 km (11 miles) north of the site. The Rattlesnake-Wallula alignment, located 48.3 km (30 miles) northeast of the cogeneration facility 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 with an infilling of sedimentary deposits. The Umatilla Basin is similar to other basins in the region. These basins appear to have continued to subside since basaltic volcanism stopped about 6 m.y.BP (Reidel et al. 1989).

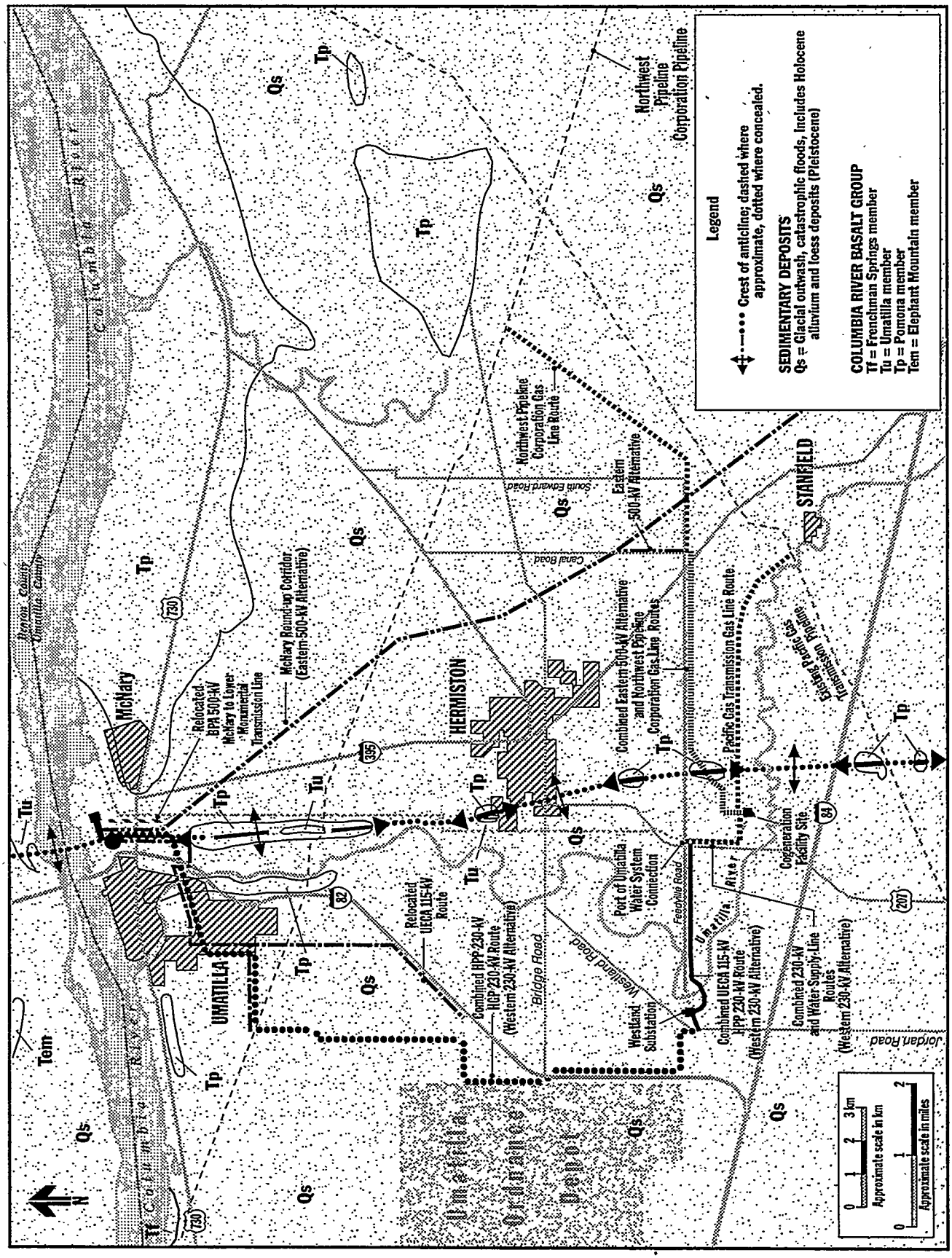
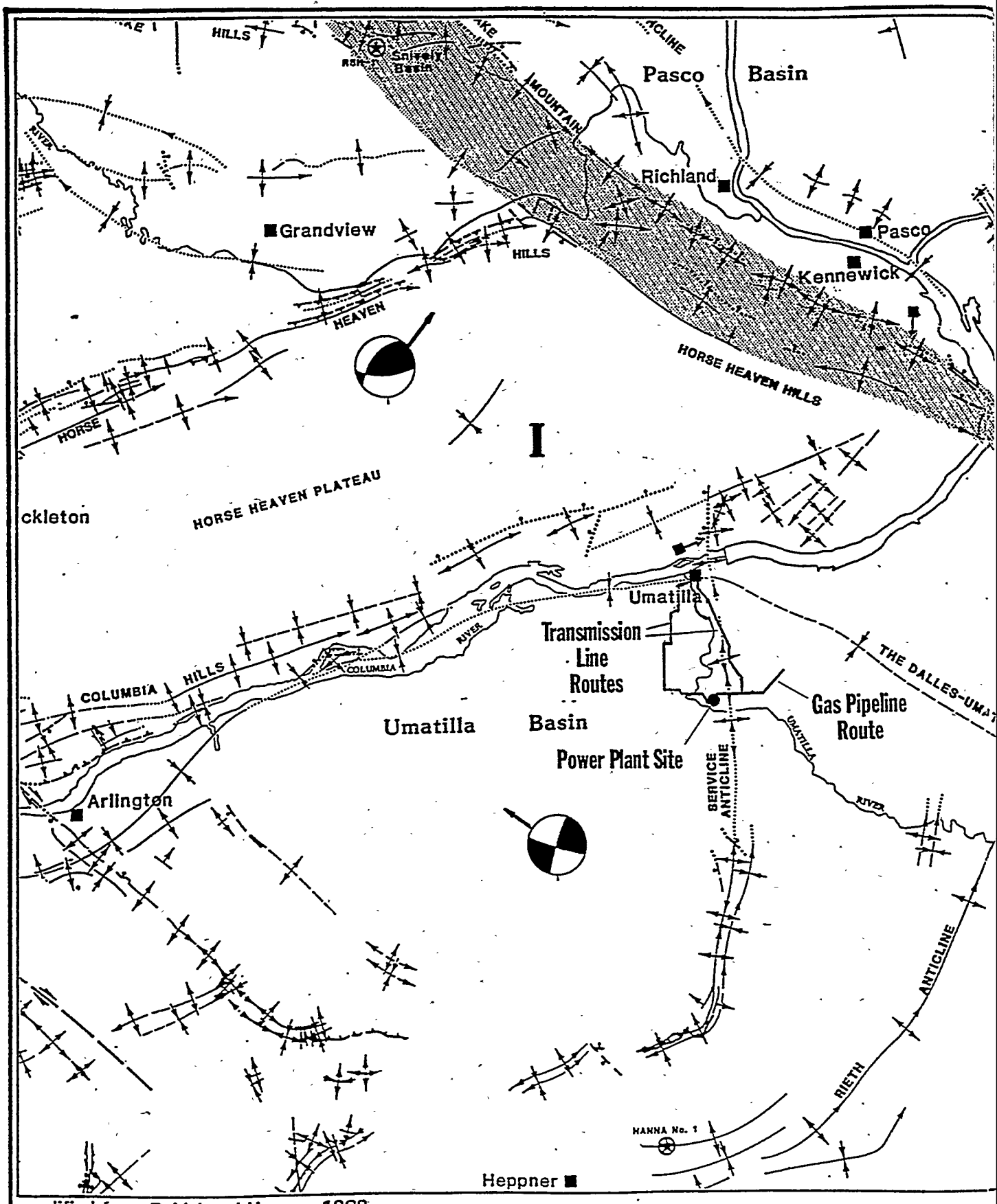
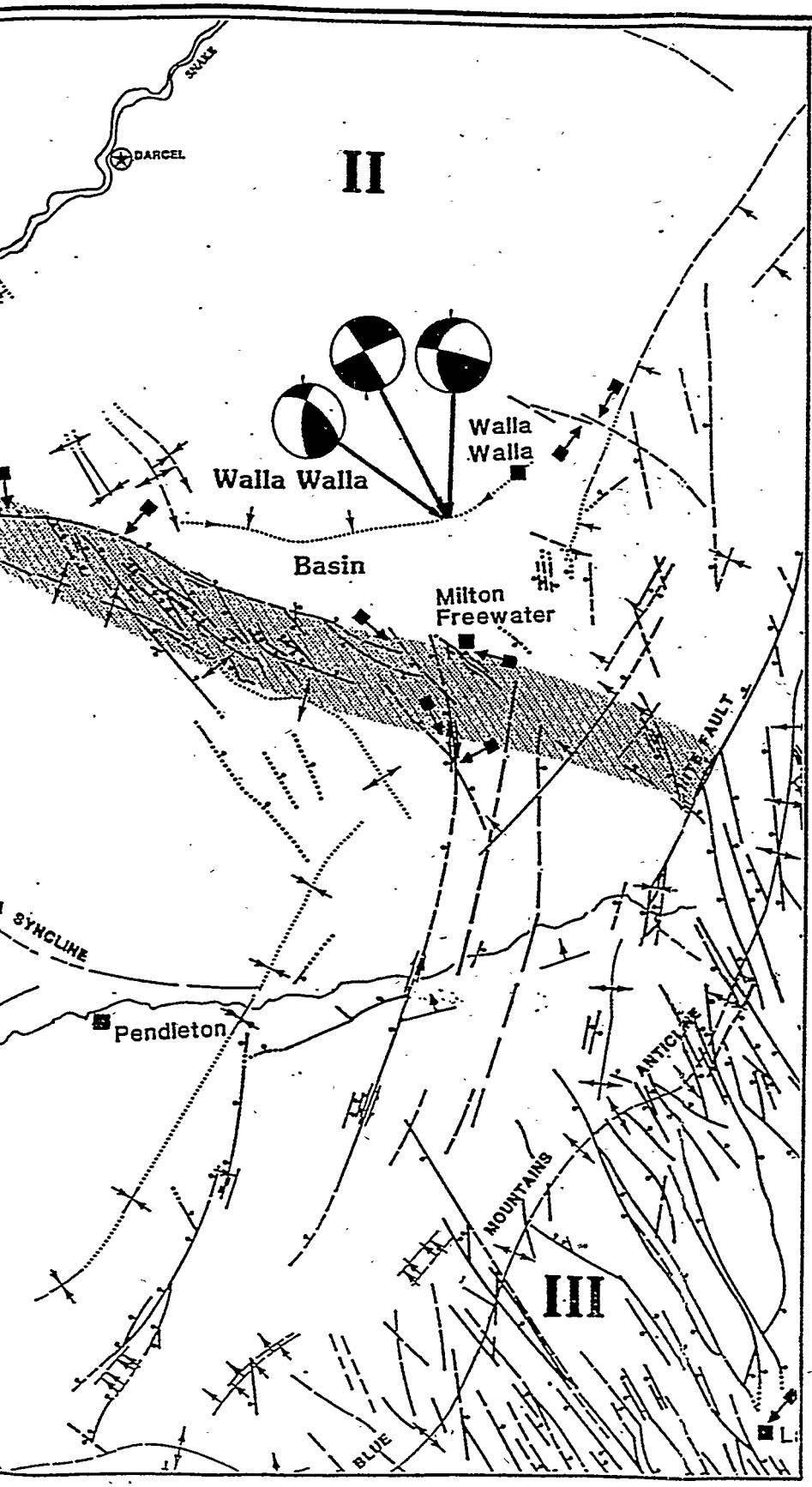


Figure 2.1-1 Geologic Map



modified from Reidel and Hooper, 1989



EXPLANATION

- ANTICLINE
- SYNCLINE
- MONOCLINE - Abrupt increase in dip in direction of arrows
- MONOCLINE - Abrupt decrease in dip in direction of arrows
- FAULT - Bar and ball on downthrown side
- STRIKE-SLIP FAULT - Arrows show direction of relative horizontal movement
- Reported Quaternary Age Displacement
- Selected earthquake single-event focal mechanisms (>3.2 coda-length magnitude)
- RATTLESNAKE-WALLULA ALIGNMENT AND OLYMPIC-WALLOWA LINEAMENT (OWL)

STRUCTURAL SUBPROVINCES

- I YAKIMA FOLD BELT SUBPROVINCE
- II PALOUSE SLOPE SUBPROVINCE
- III BLUE MOUNTAINS SUBPROVINCE

N

10 miles

HERMISTON PROJECT

Figure 2.1-2
Structural and Tectonic Map

2.1.2 Project Vicinity Geology

The project is situated in the Umatilla Lowlands, an area characterized by relatively flat to gently rolling terrain that gradually descends from the Blue Mountains to the Columbia River. The surface topography generally mimics the buried surface of the CRBG. The area is drained by the Umatilla River and its tributaries. Elevation within the project vicinity ranges from approximately 219 m (720 feet) above mean sea level (msl) along the proposed NWP Gas Line route to about 91.4 m (300 feet) msl at the McNary Substation.

The nearly horizontal basalt flows (CRBG) in this area are blanketed by up to 61 m (200 feet) of unconsolidated to poorly consolidated, Pleistocene (0.01 to 2 m.y.BP), glacial outwash, and catastrophic flood deposits (map symbol Qs [Figure 2.1-1]; 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 breached, sending catastrophic floods across the Columbia Plateau through the gorge to the Pacific Ocean. Geologic mapping of these deposits indicates that lake levels and flood crest rose to a maximum elevation of approximately 350.5 m (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.

Cogeneration Facility Site

At the cogeneration facility site, four distinct subsurface materials are present (Squier Associates 1994). The upper 2.4 to 3 m (8 to 10 feet) consists of loose fine sand with some silt, and silty fine sand (Figure 2.1-3). This deposit is interpreted as loess, a wind-blown deposit. Underlying the loess is 16.8 to 18.2 m (55 to 60 feet) of more dense sand with some silt, grading to very dense gravel. The silt content generally decreases with depth. This unit is interpreted as a set of flood deposits, which is consistent with published information about subsurface geologic conditions in the area (Hogenson 1964, Swanson et al. 1981). The gravel layer extends to approximately 61 m (200 feet), where it is underlain by basalt. Nearby wells have encountered basalt of the CRBG at 44.2, 36.6 and 39.6 m (145, 120 and 130 feet), indicating that the surface of the basalt is gently undulating. Geotechnical explorations at the cogeneration facility site have not extended to the depth of anticipated groundwater. Groundwater monitoring wells and water production wells in the area of the cogeneration facility allow interpretation of the groundwater conditions beneath the site (Figure 2.1-3). The static water level was measured at 35.1 m (115 feet). The lower aquifer is in the basalt and is confined.

Water Supply, Gas, and Electrical Transmission Lines

Subsurface geology of the water supply line, gas pipeline, and electrical transmission line routes is believed to be similar, with a sheet of loess being at the surface in most areas. In some areas, flood deposits are at the surface, and the CRBG crops out in scattered locations along the Service anticline and at the Columbia River.

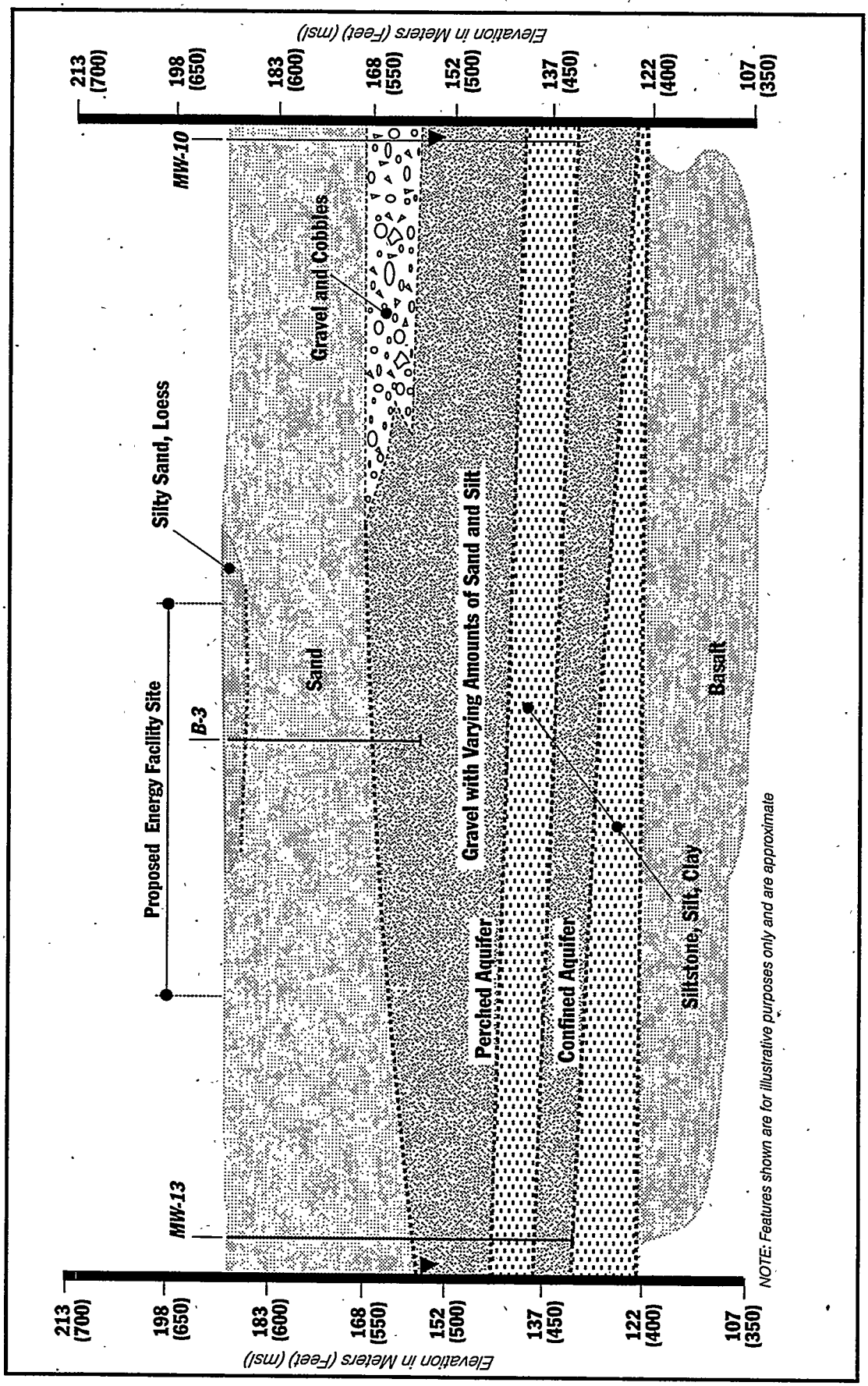


Figure 2.1-3 Geologic Cross Section of Cogeneration Facility Site

2.1.3 Geologic Hazards

Landslides

Landslides or other forms of mass wasting are unlikely to occur near project components or along the ROWs. The proposed cogeneration facility is on gentle topography with slopes less than 5 percent. The site is located on a terrace north of and 18.2 m (60 feet) above the Umatilla River. The slope between the terrace and the river is gentle (about 10 percent) and presents virtually no hazard of slumping or earthflow. In addition, the water table is about 35.4 m (115 feet) below the surface. Under these circumstances, the initiation of landslides is extremely unlikely. The gas pipeline routes are also very gentle and pose no threat of landslide initiation.

No landslides or other evidence of instability occur along the electrical transmission line routes, except in the vicinity of active rock quarries near Umatilla. The gas pipeline route crosses areas of low risk instability. No landslides are present within or near the proposed gas pipeline or transmission line routes.

Volcanic Activity

The project vicinity is a volcanically quiescent area. The last of the flood basalts that comprise the CRBG erupted 6 million years ago. There are no Quaternary age flows or cinder cones within the project vicinity, although 160.9 km (100 miles) to the west lies the High Cascade Range, a chain of stratovolcanoes active during the Pleistocene and Holocene.

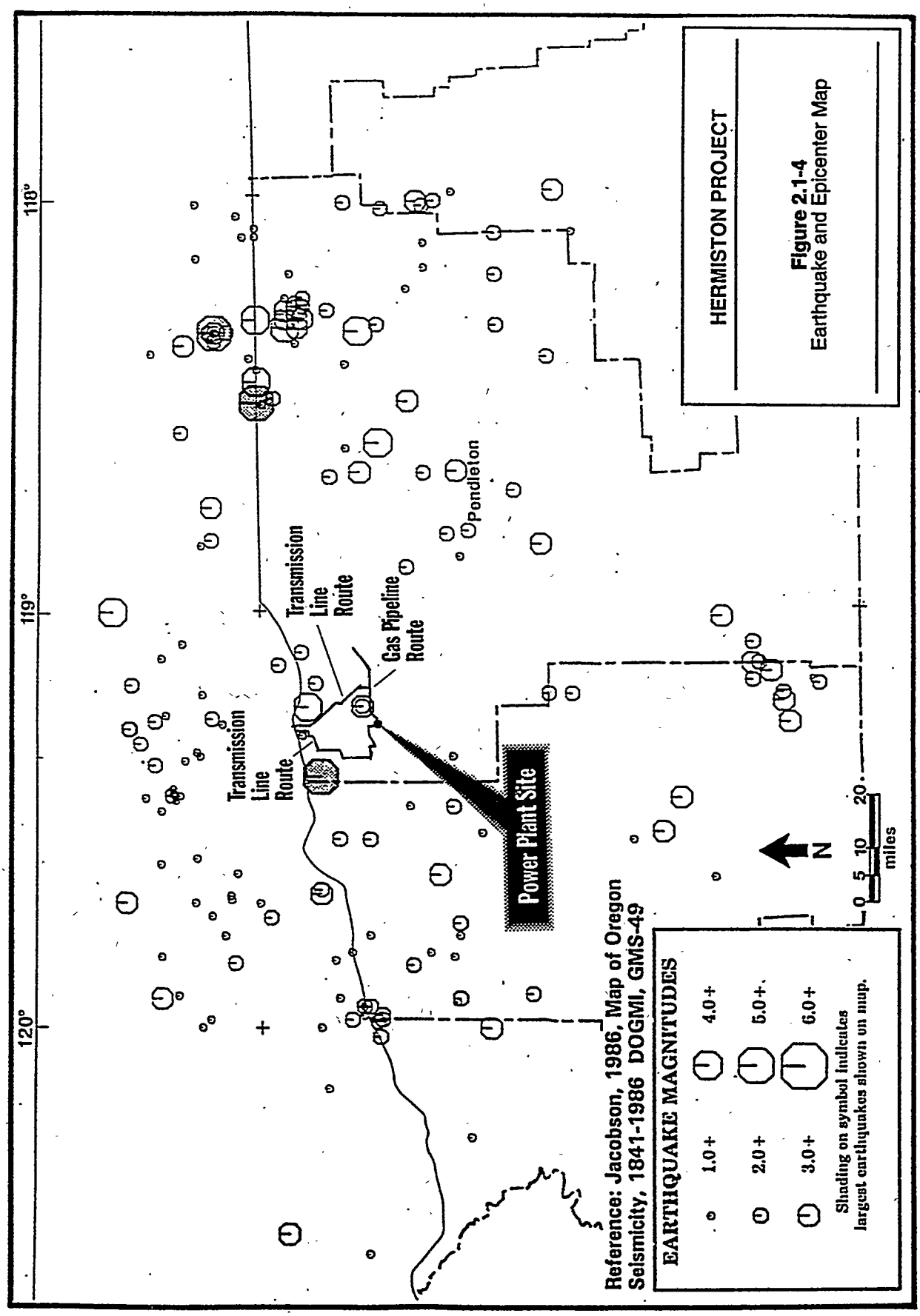
Erosion

The Umatilla River, in the vicinity of the project, has active meanders. A small section of one of these meanders (about 91 m [300 feet]) was observed to be actively eroding during a site visit in October 1993.

Earthquakes

The project lies within the seismically active Columbia Plateau. As illustrated on the earthquake epicenter map (Figure 2.1-4), 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, at a Richter magnitude of 5.8 (Jacobson 1986). The event had a Modified Mercalli Intensity (MMI) of VII-VIII. This earthquake caused surface rupture and possibly liquefaction.

An earthquake centered near Umatilla on March 3, 1893 had a MMI of VII (estimated Richter magnitude of 5.7; Jacobson 1986). However, the Umatilla earthquake was likely a relatively small earthquake on the order of Richter magnitude 4.5 that occurred at a very shallow depth (less than 3.2 km [2 miles]) (letter to Patrick Plumley of Riverside Technology, seismologist, Boise State University, from Zollweg, November 20, 1992). This is supported by the fact that the Umatilla earthquake was felt over a very small area. During the summer of 1992, a 3.7 Richter magnitude earthquake was recorded in the Hermiston-Umatilla area and a 4.2 magnitude earthquake occurred in the Milton-Freewater area (letter to P. Plumley, Riverside Technology Geologist, U.S. Geological Survey [USGS], from G. Mann, November 24, 1992).


HERMISTON PROJECT
Figure 2.1-4
Earthquake and Epicenter Map
118°
119°
120°
Pendleton
Transmission Line Route
Gas Pipeline Route
Transmission Line Route
Power Plant Site
N
0 5 10 20
miles
Reference: Jacobson, 1986, Map of Oregon Seismicity, 1841-1986 DOGMI, GMS-49
EARTHQUAKE MAGNITUDES
1.0+
2.0+
3.0+
4.0+
5.0+
6.0+
Shading on symbol indicates largest earthquakes shown on map.

Pertinent faults within a 100-km (62.1-mile) radius of the cogeneration facility site, and their estimated maximum credible earthquakes (MCE) and corresponding peak ground accelerations (PGAs) are summarized in Table 2.1-1. The values in Table 2.1-1 represent the most recent quantitative estimates of seismic risk for the region. The MCE for the site corresponds to a 5.5 Richter magnitude event occurring in the Umatilla Basin, conservatively estimated to occur at the cogeneration facility 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 1.6 km (1 mile) east of the site, would produce an estimated PGA of 0.45 to 0.5 g.

Table 2.1-1. Estimated Maximum Credible Earthquakes and Peak Ground Accelerations for Significant Faults and Structures in the Region

Fault or Structure	*Distance from Cogeneration Site (km [miles])*	*MCE*	*PGA (gravity) Corresponding to MCE*	*Recurrence Intervals*
Service Anticline	1.6 (1)	5.5	0.45 to 0.5	N/A
Toppenish Ridge Fault	97 (60)	7.3	0.08 0.09	1,000s to 10,000s of years
Wallula-Rattlesnake Alignment	48 (30)	6.4 6.5	0.06 0.09	200 to 1,000 years
Gable Mountain	97 (60)	5.9 5.0	<0.05 <0.05	10,000 years
Umatilla Basin	10.0 (6)	5.5	0.15	N/A

Source: Riverside Technology, Inc. 1993
Squier Associates 1994 (Exhibit G)

Groundwater levels are important in evaluating potential seismic hazard because shallow groundwater in unconsolidated, sandy material can contribute to liquefaction potential. No groundwater was encountered in the upper 30 m (100 feet) at the site (Squier Associates 1994), and nearby wells indicate a depth to groundwater of about 185.1 m (607 feet).

2.1.4 Soils

Eleven soil types occur along the water supply line, transmission line routes, gas line routes, and at the cogeneration facility site. Table 2.1-2 lists the acreages and relevant characteristics of each

Table 2.1-2. Soils Information by Project Component

	Ha (acres)	Prime Farmland	Erosion	
			Wind	Water
Cogeneration Facility Site				
Adkins fine sandy loam (0-5% slope)	2.2 (5.50)	Yes	Moderate	
Quincy loamy fine sand	4.7 (11.50)	No	High	
Subtotal	6.9 (17.00)			
Waterline Route				
Quincy loamy fine sand	2.99 (7.38)	No	High	
Adkins fine sandy loam (gravelly substratum, 0-5% slope)	0.78 (1.92)	Yes	Moderate	
Gravel pit	0.19 (0.48)	No		
Subtotal	3.96 (9.78)			
Western 230-kV Alternative[1]				
Adkins fine sandy loam (0-5% slope)	3.03 (7.48)	Yes	Moderate	
Adkins fine sandy loam (5-25% slope)	3.03 (7.48)	No	Moderate	Moderate
Burbank Loamy fine sand	24.82 (61.32)	No	High	
Gravel Pit	1.5 (3.69)	No		
Powder silt loam	0.36 (0.90)	No		
Quincy fine sand	2.89 (7.13)	No	High	
Quincy loamy fine sand	26.24 (64.8)	No	High	
Water	0.2 (0.48)	No		
Xerofluvents	0.24 (0.59)	No		
Xerollic Durorthids (30-60% slope)	0.10 (0.25)	No		
Subtotal	56.35 (139.16)			
Eastern 500-kV Alternative[2]				
Adkins fine sandy loam (0-5% slope)	15.95 (39.39)	Yes	Moderate	
Burbank loamy fine sand	0.53 (1.30)	No	High	
Quincy fine sand	0.74 (1.82)	No	High	
Quincy loamy fine sand	6.71 (16.56)	No	High	
Starbuck very fine sandy loam	0.60 (1.48)	No	Moderate	Moderate
Taunton fine sandy loam	0.35 (0.86)	No	Moderate	
Thatuna silt loam	0.31 (0.77)	No	Moderate	Moderate
Wanser loamy fine sand	1.06 (2.62)	No	High	
Winchester sand	7.58 (18.73)	No	High	
Subtotal	33.83 (83.53)			
NWP Gas Line Route				
Adkins fine sandy loam (0-5% slope)	9.72 (24.00)	Yes	Moderate	
Quincy fine sand	1.61 (3.99)	No	High	
Quincy loamy fine sand	8.73 (21.56)	No	High	
Taunton fine sandy loam	1.00 (2.47)	No	Moderate	
Thatuna silt loam	0.31 (0.77)	No	Moderate	Moderate
Subtotal	21.38 (52.78)			

Table 2.1-2. Soils Information by Project Component

	Ha (acres)	Prime Farmland	Erosion	
			Wind	Water
PGT Gas Line Route				
Adkins fine sandy loam (10-25% slope)	6.05 (16.91)	No	Moderate	Moderate
Esquatzel silt loam	1.13 (2.78)	No	Moderate	
Quincy loamy fine sand	1.38 (3.40)	No	High	
Taunton fine sandy loam	0.36 (0.88)	No	Moderate	
Subtotal	9.71 (23.97)			

Source: Soil Conservation Service (SCS) 1988
[1] Includes the UECA 115-kV Relocation route
[2] Includes the BPA 500-kV Lower Monumental Relocation route

soil type for project components. Of particular note is the Adkins fine sandy loam, which at 0 to 5 percent slopes is considered prime farmland (SCS 1988). The cogeneration facility site is partially underlain by this soil. More detailed descriptions of the soil types can be found in the Umatilla County Soil Survey. In addition, parts of both transmission line route alternatives, the waterline route and the NWP gas transmission line route are underlain by this soil.

2.1.5 Floodplains

The proposed cogeneration facility site lies on a terrace at least 24 vertical m (80 vertical feet) above the banks of the Umatilla River. As shown in Figure 2.1-5, the facility site lies outside the 100-year floodplain determined by the Federal Emergency Management Agency (FEMA). There are no other significant drainages nearby. Although the NWP gas line would not cross any designated floodplains, the PGT gas line would cross the Umatilla River floodplain.

The Western 230-Kv Alternative crosses the floodplain of the Umatilla River in two locations. One crossing is where the proposed 230-kV conductor would be added to the existing UECA 115-kV line from Feedville Road, across the river to the Westland Substation. The other crossing occurs where the proposed relocated UECA 115-kV line crosses the river just west of I-82 (Figure 2.1-5). Each of these crossings would involve 0.19 ha (0.46 acre) of floodplain based on an assumed 15.24-m (50-foot) ROW. All alternative routes for these actions required for the Western 230-kV Alternative would also involve similar crossings of the Umatilla River floodplain.

A maximum of 28.65 ha (70.8 acres) and a minimum of 60.1 ha (15.0 acres) would be affected by the project, depending on which route alternatives are selected.

2.2 Water Resources

2.2.1 Water Availability

Surface Water

Surface water resources in the project vicinity include the Columbia and Umatilla rivers. The site of the proposed cogeneration facility lies within the Umatilla Plateau hydrologic sub-basin of the Umatilla River, on an escarpment 24 m (80 feet) above and 400 m (0.25 mile) north of the river. The Umatilla River meets the Columbia River at the city of Umatilla, about 14.5 km (9 miles) north of the facility site.

The project vicinity is in the rain shadow of the Cascade Mountains and therefore is arid, with slightly less than 23 cm (9 inches) of precipitation annually. Most precipitation in the region falls between October and April. Because no creeks run through the cogeneration facility site, any runoff would drain overland toward the northwest, then west and eventually south to the Umatilla River along State Highway 207. Because of the permeable nature of the soils, runoff from the site would be rare.

The Umatilla River Basin Plan (State of Oregon 1988), which regulates and guides future water development in the basin, prohibits further withdrawal of water from the Umatilla River and its

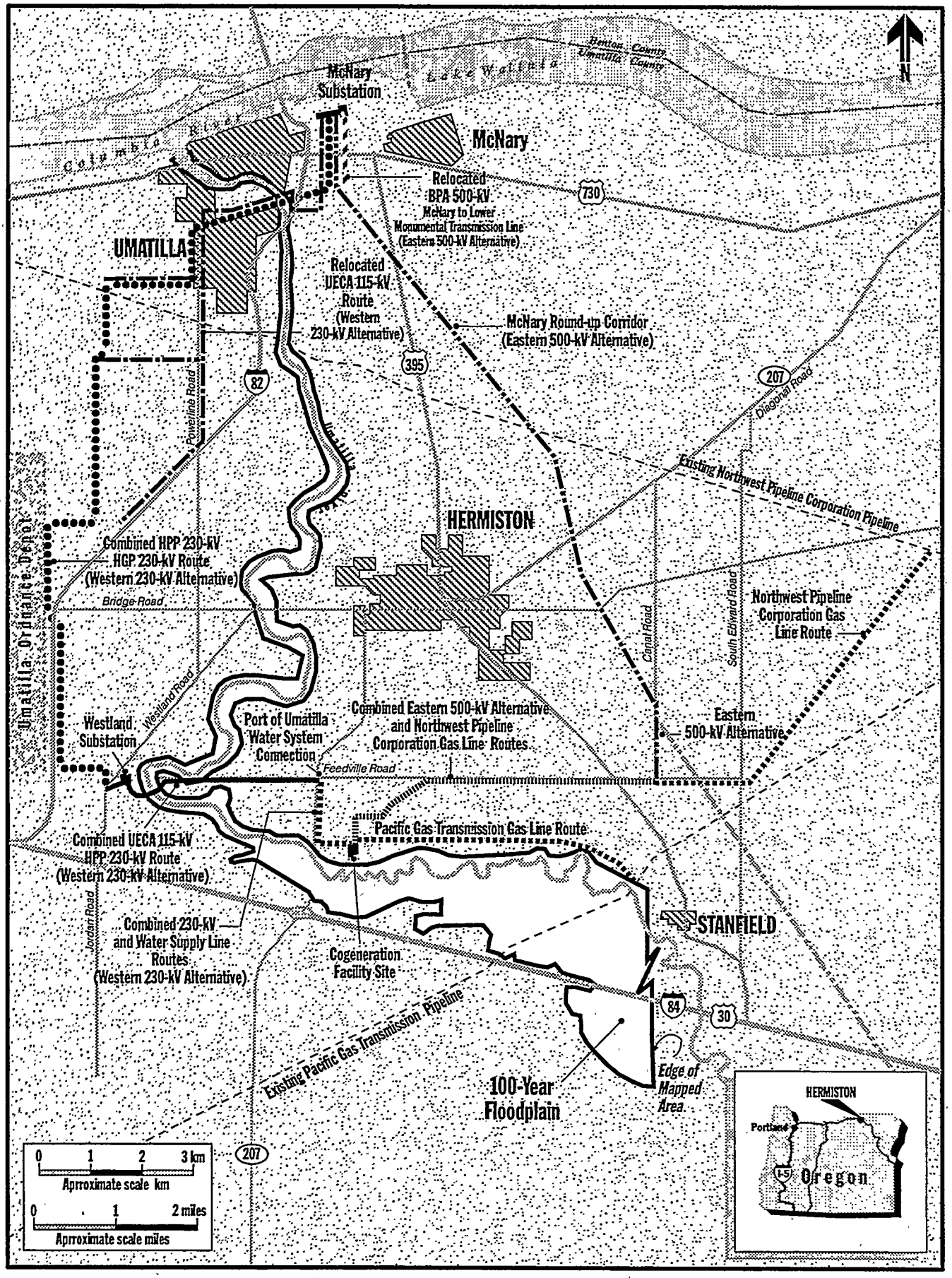


Figure 2.1-5 100-year Floodplain in the Project Vicinity

tributaries in the Umatilla Plateau sub-basin from June 1 through October 31 (Oregon Administrative Record [OAR] Chapter 690, Division 507). Under the Umatilla River Basin Plan, the Umatilla River in the project vicinity is designated for numerous uses excluding large-scale irrigation and power production.

The Columbia River is the region's dominant surface water feature. The Columbia River has an average regulated discharge of approximately 4,808 cms (169,800 cfs) (288,490,384 lpm [76,211,334 gpm]) at McNary Dam, which is about 14.5 km (9 miles) north of the cogeneration facility site. Discharges at McNary Dam vary from about 6,796 to 7,929 cms (240,000 to 280,000 cfs) (407,760,260 to 475,720,303 lpm [107,719,200 to 125,672,400 gpm]) in the high flow period (April through June) to about 3,030 to 3,228 cms (107,000 to 114,000 cfs) (181,793,116 to 193,686,123 lpm [48,024,810 to 51,166,620 gpm]) during the low flow months (August through November). Annual variations also occur, depending on precipitation and snowmelt in the drainage basin. Extreme flows on the Columbia River are moderated by the numerous dams and reservoirs on the river.

The Columbia River provides water for many uses, including irrigation, navigation, hydropower, flood control, recreation, municipal and industrial water supply, and fish and wildlife use. Three Federal agencies, including BPA, the U.S. Army Corps of Engineers (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]).

Groundwater

The project vicinity 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.

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. Permeable gravel interbeds supply water to several high-yielding wells. The aquifer is 30.5 to 38.1 m (100 to 125 feet) thick, with a saturated zone averaging 7.6 m (25 feet) and ranging from 4.6 to 38.1 m (15 to 125 feet) thick. Water levels in this aquifer were 16.8 m (55 feet) below the ground surface in 1975, and have been dropping by about 0.5 m (1.6 feet) per year since the mid-1960s.

The proposed cogeneration facility site is located in the Stage Gulch Ground Water Control Area (GWCA), as designated by the Umatilla Basin Plan. This area abuts the Butter Creek GWCA. 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 are now attempting to recharge shallow aquifers and increase soil moisture with surface water diverted during the winter.

The deep aquifer in the project vicinity is located in the basalt flows that lie beneath sedimentary deposits in the region. 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 vicinity is limited by the Willow Creek monocline, a geologic feature south of the Madison Ranches that acts as a barrier to groundwater flow from the south. Groundwater resources in the basalt aquifer in both the Stage Gulch Critical Groundwater Area and the Butter Creek Critical Groundwater Area are closed to further appropriation.

2.2.2 Water Quality

Surface Water

Except for the Columbia River, surface water quality in the lower Umatilla River Basin often does not meet standards for contact recreation and aquatic life, with non-point source pollution being the major contributor to lower water quality.

The water quality of the Columbia River, however, 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), and includes water quality suitable for potable supply.

Groundwater

Table 2.2-1 presents a summary of worst-case water quality observed at five vicinity wells from January 1989 to April 1993 for water level, nitrate, conductivity, and total dissolved solids (TDS).

Table 2.2-1. Worst-Case Groundwater Quality

	Water Level		NO_3 - N		Electrical Conductivity		TDS	
Well	Min.[1]	Date	Max.[2]	Date	Max[3]	Date	Max[4]	Date
MW-11S	499.65	10/5/92	18.0	4/4/91	630	4/26/90	518	4/14/93
MW-11D	479.33	10/5/92	1.0	7/26/89 1/10/90?	280	10/11/89	230	2/7/93
MW-13S	499.21	4/4/91	31.0	1/13/92	1,000	7/10/91	792	7/10/93
MW-18	538.02	10/6/92	18.6	7/3/91	1,440	1/8/90	1,034	7/3/93
MW-19	537.44	7/6/92	0.7	7/9/91	400	7/9/91	264	10/6/92
MW-20	537.93	10/6/92	43.3	9/7/90	2,730	7/27/89	1,130	7/9/91

Source: EMCON 1992 as cited in CES 1994
1 Static water level, feet msl.
2 Nitrates in milligrams per liter (mg/l) units.
3 Electrical Conductivity in μmhos/cm units.
4 TDSs in mg/l units.

TDS levels in the groundwater approach or exceed the state's drinking water maximum contaminant levels (MCLs). High nitrate levels measured in the shallow wells near the cogeneration

facility site exceed U.S. Environmental Protection Agency (EPA) drinking water standards. Maximum nitrate levels were observed during the winter, spring, and summer.

2.3 Air Quality

2.3.1 Existing Air Emission Sources

Emissions from existing sources largely determine the air quality of the project vicinity. Within 50 km (31 miles) of the cogeneration facility site there are only a few major sources of emissions, mostly in the Umatilla and Pendleton areas. The ODEQ provides estimates of total annual emissions for regulated pollutants by county. Annual air emissions for Umatilla County are provided in Table 2.3-1. In Umatilla County, the major sources of air emission are vehicles and area sources such as agricultural activities. Point sources include the existing Pacific Gas and Electric (PGE) Boardman coal-fired plant.

Table 2.3-1. Air Emissions in Umatilla County

	Air Emissions MTY (TPY)[1]		
Pollutant	*Area and Mobile Sources*	*Point Sources*	*All Sources*
PM_{10}	13,023 (14,355)	86 (95)	13,109 (14,450)
SO_x	1,276 (1,406)	104 (115)	1,379 (1,521)
NO_x	5,296 (5,838)	372 (410)	5,668 (6,248)
CO	26,354 (29,050)	138 (152)	26,491 (29,202)
VOC	5,616 (6,191)	119 (197)	5,795 (6,388)

Source: ODEQ 1993a
[1] MTY = Metric tons per year (TPY = Tons per year)

2.3.2 Meteorology and Climate

Dispersion of emitted air pollutants is governed by wind direction, wind speed, temperature (which contributes to plume rise), and the turbulence of the lower atmosphere. The climate of the project vicinity is dominated by the presence of the Cascade and Blue Mountains and the flow of air from the Pacific Ocean.

The normal flow of air is from the Pacific Ocean, across the Cascades or through the Columbia Gorge, and into the Hermiston area. The Cascade Mountains reduce the amount of precipitation reaching the Columbia Basin. A gradual rise in elevation from the Columbia River to the foothills of the Blue Mountains results in sufficient moisture for agriculture. Lighter summer precipitation

totals are augmented by thunderstorms that move into the area from the south or southwest. When the flow of air from the west is impeded by high pressure systems over the continental interior, hot, dry conditions develop. The coldest winter temperatures occur during outbreaks of cold high pressure systems from central Canada.

During November through January, the average daily maximum and minimum temperatures are 6.4°C (43.5°F) and -1.3°C (29.7°F), respectively. Monthly precipitation totals reach their maximum during November through January, at a little over 2.5 cm (1 inch) per month (Table 2.3-2). Daily precipitation totals of at least 0.025 cm (0.01 inch) can be expected on about 12 days per month during this period. Heavy fog, with visibilities less than 0.4 km (0.25 mile), occur frequently during this period.

Table 2.3-2. Monthly Total Precipitation and Average Temperature Monitored at Hermiston, Oregon

Month	*Total Precipitation cm (inch)*	*Average Temperature °C (°F)*
January	3.4 (1.35)	0.0 (32.0)
February	2.1 (0.82)	3.8 (38.9)
March	1.8 (0.71)	7.1 (44.7)
April	1.6 (0.62)	10.9 (51.6)
May	1.7 (0.68)	15.4 (59.8)
June	1.2 (0.48)	19.7 (67.4)
July	0.5 (0.19)	23.2 (73.8)
August	1.0 (0.39)	22.2 (71.9)
September	1.09 (0.39)	17.6 (63.7)
October	1.8 (0.71)	11.2 (52.1)
November	3.0 (1.19)	4.8 (40.6)
December	3.4 (1.34)	1.7 (35.0)
Annual	22.5 (8.87)	11.5 (52.7)

Source: National Oceanic and Atmospheric Administration (NOAA) 1990

The average daily maximum and minimum temperatures during June through August are 29.3°C (84.8°F) and 13.5°C (56.3°F), respectively. Monthly precipitation totals reach their minimum during this period, averaging about 0.9 cm (0.35 inch) per month. Most of this precipitation originates from thunderstorms. Thunderstorms can be expected on about 2 days per month during yJune through August.

2.3.3 Existing Air Quality

The air quality in the Umatilla region achieves all local, state, and national ambient air quality standards (AAQS). Direct information comes from several air pollution monitoring stations operated within 50 km (31 miles) of the cogeneration facility site (Table 2.3-3). The AAQS presented in Table 2.3-3 are the most restrictive of the local, state, or national standards. Some pollutants (sulfur dioxide [SO_2], nitrogen oxide (NO_x), and ozone [O_3]) are not monitored because of the low level of industrialization in the region.

Table 2.3-3. Regional Ambient Air Pollution Concentrations

Pollutant	*Averaging Period*	*Monitoring Station*	*Concentration[1] ($\mu g/m^3$)*	*Ambient Air Quality Standard ($\mu g/m^3$)*
PM_{10}	24-hour	Pendleton, OR	57	150
		McKay Creek, OR	103	
		Walla Walla, WA	63	
	Annual	Pendleton, OR	30	50
		McKay Creek, OR	34	
		Walla Walla, WA	28	

Source: Ecology 1993, ODEQ 1993a

1 Data are from more industrialized areas and probably exceed concentrations in the immediate vicinity of the cogeneration facility site.

Monitoring data in the Hermiston region indicate that ambient air pollution concentrations are less than the AAQS. Umatilla County is in attainment for all criteria air pollutants. The monitoring stations are located near sources of air emissions (Pendleton and Walla Walla) and are, therefore, not representative of air quality at the cogeneration facility site. The air quality in the area surrounding the cogeneration facility site is probably much better than indicated by monitoring data.

Locations where pollutant concentrations are greater than the AAQS are referred to as nonattainment areas. There are no nonattainment areas within 80 km (50 miles) of the cogeneration facility site. However, ODEQ suspects that the Hermiston area may be nonattainment for total suspended particulate matter (TSP) and for particulate matter with aerodynamic diameter of less than 10 microns (PM_{10}). Also the southern portion of Benton and Walla Walla counties in Washington are suspected particulate matter nonattainment areas. ODEQ and the Washington Department of Ecology (Ecology) are studying the nature of the particulate matter in these areas.

2.4 NOISE

2.4.1 Noise Measurement and Terminology

Noise is defined as unwanted sound that interferes with the normal activities of humans and natural environment. The Oregon Department of Energy regulates noise levels through the Site Certification process. The noise generated by the project, when added to existing background noise, should not exceed the permissible environmental noise levels (see Section 4.16.4).

Noise is measured in decibels (dB), a logarithmic ratio between pressure caused by a given sound and the standard sound pressure. The human ear is not equally sensitive to all frequencies in the sound spectrum. Thus, it is standard to represent sound levels using the A-weighted scale (dB[A]) corresponding to the range and characteristics most consistent with the way humans perceive sounds. The dB(A) scale is logarithmic; small fluctuations (less than 3 dB[A]) do not always result in direct increases in loudness.

Sound levels at an average residence typically range from 45 to 55 dB(A). Sounds associated with nearby freeway and highway traffic are louder, ranging from 65 to 80 dB(A). Because sounds vary (depending on the type of monitoring equipment and the duration of use), the equivalent average sound level (L_{eq}) is used to represent the acoustical energy equivalent of the fluctuating sound over a specified period of time. Table 2.4-1 presents a sample of common sources of sound and their noise levels.

Table 2.4-1. Typical Sound Levels

Sound Source	*Distance from Source (m [feet])*	*dB(A)*
Soft whisper	5 (16.4)	30
Library	0	40
Normal conversation	1 (3.3)	60
Busy traffic	0	70
Heavy truck	15 (49)	90
Construction noise	3 (10)	110
Jet takeoff	60 (197)	120

Source: Lipscomb and Taylor 1978

For time varying noise sources, the statistical sound levels describe how often a given sound level is exceeded during the measurement period. 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 the lowest ambient noise levels of the noise environment. Identifiable noise sources would be added to the background noise, forming the total noise

environment. The L_{eq} is the sound level of a steady non-varying noise which is equivalent in total acoustic energy to the noise level of time varying noise. The L_{eq} represents an average acoustic energy for the measurement.

2.4.2 Ambient Noise Levels

The ambient noise environment was defined by measuring noise levels in the vicinity of the cogeneration facility site. Noise measurements were made using a Bruel and Kjaer 2231 meter, and include an integrating module for statistical calculation of sound levels over the monitoring period. Monitoring was conducted at identified noise sensitive location. Measurements were conducted at the west end of Hinkle Yard, along Feedville Road north of the J.R. Simplot Company property, and at the nearest residence, located on the north side of Umatilla Meadows Road.

Ambient measurements were conducted during a 3-day period in November 1993. The Hinkle Yard L_{50} and L_{10} noise levels were 51 and 53 dB(A), respectively. The Feedville Road L_{50} and L_{10} noise levels were 56 and 58 dB(A), respectively, which included noise from refrigerated rail cars parked about 152 m (500 feet) from the measuring location. The probable minimum noise levels, L_{90}, were also measured. The minimum daytime and nighttime $\pm L_{90}$ were 41 and 42 dB(A). The ambient nighttime L_{eq} of 55 dB(A) was exceeded twice during the 3-day measurement period. On one occasion, two trucks were passing in sequence on Interstate 84 (I-84). The other condition occurred when wind was blowing through large willow trees.

Ambient sound levels were measured at the nearest residence, located about 730 m (2,400 feet) south of the cogeneration facility site along Umatilla Meadows Road. Table 2.4-2 presents the occurrence of maximum and minimum noise levels at the residence.

2.5 Vegetation and Wetlands

2.5.1 Vegetation

The project lies within the Columbia Plateau physiographic province of Oregon (Orr et al. 1992), within the Pacific Northwest's shrub-steppe vegetation zone (Franklin and Dyrness 1973). This zone is generally characterized by dry, hot summers and cool, moist winters. Natural vegetation consists of shrub-steppe and grassland communities. Much of the project area, however, has been grazed or developed agriculturally since the mid-1800s. Intensive cultivation, overgrazing, and fire suppression have substantially altered the native vegetation, allowing introduced weeds to infest portions of this region (Oetting 1993). Much of the ground is currently being crop-farmed, and now supports alfalfa, potatoes, onions, carrots, melons, and corn (Oetting 1993). Plant communities potentially affected by the project are discussed below in relation to the project components that would affect them.

Cogeneration Facility Site

The proposed site of the cogeneration facility is a cultivated field currently used to produce alfalfa hay.

Table 2.4-2. Occurrence of Maximum and Minimum Noise Levels at the Nearest Residential Receptor

Sound Level Parameter	*Time*	*dB(A)*
L_{90}		
Maximum	7:00 am	62.3
Minimum	12:00 pm	40.3
L_{50}		
Maximum	7:00 am	64.8
Minimum	1:00 pm	44.3
L_{10}		
Maximum	8:00 am	70.8
Minimum	2:00 am	46.3
L_{eq}		
Maximum	8:00 am	66.3
Minimum	4:00 am	44.1

Source: CH2M HILL 1994.

Gas Pipeline Routes

Construction of both gas pipelines will potentially affect six different vegetated and open-water habitats. These are briefly discussed below.

Shrub-steppe Vegetation. Shrub-steppe vegetation is a shrub- and grass-dominated, drought-tolerant plant association. Common shrub associates include green rabbitbrush (*Chrysothamnus viscidiflorus*), bitterbrush (*Purshia tridentata*), and gray rabbitbrush (*Chrysothamnus nauseosus*). The grass/forb component consists primarily of weedy species including cheatgrass (*Bromus tectorum*) and Russian thistle (*Salsola kali*).

Grass/Forb Habitats. This vegetation type includes grass-dominated areas that contain primarily non-native plant species of limited wildlife value. This type also includes plantings of non-native crested wheatgrass (*Agropyron cristatum*), cultivated rye, and other palatable forage grasses.

Riparian/Deciduous Shrub Habitats. These plant associations are associated with the Umatilla River and several irrigation ditches and typically consist of non-native Russian-olive (*Elaeagnus angustifolia*), native willows (*Salix* spp.), and golden currant (*Ribes aureum*).

Wetland Habitats. This habitat includes emergent/scrub-shrub wetlands dominated by cat-tail (*Typha latifolia*), spike-rushes (*Eleocharis* spp.), Russian-olive, and other wetland plant species.

Open Water Habitats. Areas of open water include holding ponds for agricultural and industrial purposes, as well as areas of the Umatilla River.

Cropland. Croplands are irrigated and non-irrigated fields purposely cultivated for a specific crop (usually corn, alfalfa, or potatoes), and their immediately adjacent areas.

Electrical Transmission Line

The two alternative routes of the electrical transmission line may affect shrub-steppe, grass/forb, riparian, wetland, open water, pasture, and cropland habitats. Pasture habitats include both non-irrigated and irrigated areas used for livestock grazing.

Water Supply Pipeline

The water supply pipeline traverses shrub-steppe and cropland habitats.

2.5.2 Threatened, Endangered, and Sensitive Plant Species

The Oregon Natural Heritage Program (ONHP) and the Washington Natural Heritage Program (WNHP) were contacted to determine recorded locations of all known Federally listed and state-listed rare plants and other plant species of concern tracked by the ONHP within a 80.6-km (50-mile) radius of the project components. These queries indicated that 15 such plant species had been documented from within this search area, none of which are Federal or state listed as threatened or endangered. During pre-field reviews, potential habitat was thought to exist within the project area for seven of these species. Field investigations were made in mid-April, mid-May, and late June 1994 to locate these target species within the project area. No state or Federally listed, proposed, or candidate plant species were located during any of the surveys.

2.6 Wildlife and Fisheries Resources

2.6.1 Wildlife Habitat

Ten habitat types were identified within a 2,513-ha (6,209-acre) mapped project study area, consisting of the area within a 152-m (500-foot) buffer around the cogeneration facility site, the Eastern 500-kV Alternative line (including the 500-kV McNary-Lower Monumental realignment), the Western 230-kV Alternative line (including the UECA 115-kV Relocation route), the PGT and NWP gas lines, and the water supply line. These types include: grass/forb, sagebrush (*Artemesia tridentata*) dominated shrub-steppe, bitterbrush (*Purshia tridentata*) dominated shrub-steppe, rabbitbrush (*Chrysothamnus* spp.) dominated shrub-steppe, cropland, pastureland, riparian/deciduous shrub, open water, wetlands, and non-vegetated land (Northwest Wildlife Surveys [NWS] 1994a). Each of these types provide habitat for a variety of species, although some habitats may be used on only a seasonal basis or provide the habitat needed for only one life requisite (e.g., forage but not cover). Most of the wildlife species found in the project vicinity are common throughout the Columbia Basin in Oregon and Washington. Field surveys indicate that wide-ranging wildlife species such as the coyote (*Canis latrans*), badger (*Taxidea taxus*), northern harrier (*Circus cyaneus*), and black-billed magpie (*Pica pica*) range throughout all or nearly all of the 10 vegetation types in the mapped area. The amount of each habitat type, habitat characteristics, and wildlife

species associated with each habitat type are described below and summarized by project component in Table 2.6-1.

Croplands and Pasture

Croplands consisting mostly of irrigated potatoes, corn, or alfalfa, along with associated weedy areas between irrigated areas, are the predominant wildlife habitat in the mapped study area, covering 1,111 ha (2,745 acres), or 44 percent of the total project vicinity (Table 2.6-1). The entire 6.9-ha (17-acre) cogeneration facility site is composed of cropland. Approximately 475 ha (1,174 acres) of cropland occurs along the Western 230-kV Alternative route (parts of which also include segments of the existing UECA 115-kV corridor). 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 and possibly nesting habitat for curlews (NWS 1994a, 1994b; Pampush and Anthony 1993; Allen 1980). Pheasants typically use corn fields in the fall for forage and cover. Other species noted to use croplands include western meadowlarks and western kingbirds. 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, songbirds, and waterfowl. Species observed in pastures in the project vicinity 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).

Shrub-Steppe Communities

Sagebrush, rabbitbrush, and bitterbrush dominated shrub-steppe communities are the second most common types of wildlife habitat in the mapped study area, covering a total of 597 ha (1,476 acres) (Table 2.6-1). Elimination of the native shrub-steppe community throughout much of the area over the last half century has resulted in a decline or loss of 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. Most of these habitats are degraded due to grazing and past cultivation, although native grasses such as needle-and-thread grass (*Stipa comata*) occur as less than 0.4-ha (1-acre) inclusions, mostly along the PGT route. Patches of all three types of shrub-steppe habitats occur along the Eastern 500-kV Alternative route and the Western 230-kV Alternative route, while sagebrush and rabbitbrush-dominated shrub-steppe also occurs along the NWP Gas Line Route and the water supply line route. The water supply line route and the PGT Gas Line route support only sagebrush habitat. Sagebrush habitat occupies a total of 251 ha (621 acres), or 10 percent of the mapped area, while rabbitbrush and bitterbrush occupy 214 and 130 ha (533 and 322 acres), respectively, or about 5 and 8 percent, respectively. Bitterbrush-dominated habitat is limited to the Umatilla Ordnance Depot and a few other small areas along the Eastern 500-kV and Western 230-kV Alternative routes, where disturbance is less severe.

Species most commonly observed in this habitat were ground-nesting birds, including the western meadowlark (*Sturnella neglecta*), long-billed curlew, ring-necked pheasant (*Phasianus colchicus*), and northern pocket gopher (*Thomomys talpoides*) (NWS 1994a, Woodward-Clyde Consultants

Table 2.6-1. Wildlife Habitats Within the Mapped Area Associated with Project Components

	Cogeneration Facility Site		Eastern 500-kV Alternative[1]		Western 230-kV Alternative[2]		PGT Gas Line		NWP Gas Line		Water Supply Line		Total[3]	
Habitat Type	*ha (acres)*	*%*	*ha (acres)*	*%*	*ha (acres)*	*%*	*ha (acres)*	*%*	*ha (acres)*	*%*	*ha (acres)*	*%*	*ha (acres)*	*%*
Sagebrush	0	0	122 (302)	13	58.7 (145)	4	83.8 (207)	68	26 (65)	6	4.5 (11)	9	251 (621)	10
Rabbitbrush	0	0	103 (254)	11	243 (600)	15	0	0	34 (85)	7	0	0	216 (533)	5
Bitterbrush	0	0	68.4 (169)	7	61.9 (153)	4	0	0	0	0	0	0	130 (322)	9
Shrub-steppe Subtotal	0	0	293.4 (725)	32	363.6 (898)	23	83.8 (207)	68	60 (150)	13	4.5 (11)	9	597 (1,476)	24
Grass	0	0	98.4 (243)	11	94.7 (234)	6	9.3 (23)	8	244 (602)	51	0	0	366 (904)	14
Riparian/Deciduous	0	0	30.3 (75)	3	21 (51)	1	9.3 (23)	8	0	0	0	0	57.1 (141)	2
Wetland	0	0	28.7 (71)	3	13 (33)	1	3.2 (8)	3	0	0	0	0	39.6 (98)	2
Open Water	0	0	0	0	1.2 (3)	0	0.8 (2)	1	0	0	0	0	2 (5)	0
Pasture	0	0	60.3 (149)	7	34 (85)	2	0	0	0	0	0	0	90.3 (223)	4
Cropland	7.7 (19)	100	298 (736)	32	861.5 (2,128)	30	9.7 (24)	8	148 (365)	31	23 (56)	44	1,111 (2,745)	44
Non-vegetated	0	0	111 (273)	12	179 (443)	10	7.3 (18)	6	23 (56)	5	24 (60)	47	268 (662)	11
Total	7.7 (19)	100	891.4 (2,272)	100	1,568 (3,875)	100	123.4 (305)	100	475 (1,173)	100	51.5 (127)	100	2,531 (6,254)	100

1 Incorporates 500-kV McNary - Lower Monumental realignment route.
2 Incorporates UECA 115-kV relocation route.
3 Total acreage of each habitat exceeds sum of components due to overlap among various components.

Source: NWS 1994b

1993). Black-billed magpies also nest in the sagebrush. Shrub-steppe typically supports higher densities of small mammals, as do grasslands dominated by cheatgrass (Gano and Rickard 1982). Consequently, the shrub-steppe in the project vicinity is likely used for foraging by raptors and other carnivores.

Grass/Forb Communities

Grasslands make up approximately 366 ha (904 acres), or 15 percent of the mapped study area, including: (1) degraded bunchgrass habitat that is now dominated by cheatgrass and tarweed; and (2) plantings of crested wheatgrass, cultivated rye, and other high forage value grasses. The former type is disturbed and probably provides relatively low-quality habitat for wildlife. Species observed in the grasslands include the western meadowlark, long-billed curlew, ring-necked pheasant, grasshopper sparrows (*Ammodramus savannarum*), savannah sparrows (*Passerculus sandwichensis*), and horned lark (*Eremophila alpestris*) (NWS 1994b, 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 are used for nesting as well as foraging. Field surveys indicate that the 4.8-km (3-mile) NWP Gas Line route along the boundary of the SCS's Conservation Reserve Program (CRP) supports nesting habitat for grasshopper and savannah sparrows and foraging habitat for long-billed curlews. Nesting curlews were documented off the proposed ROW to the south and north of Feedville Road in a fallow area.

Riparian/Deciduous Shrub Communities

Riparian/deciduous shrub wildlife habitat occupies approximately 57 ha (141 acres) or 2 percent of the mapped study area (Table 2.6-1). These Russian olive (*Elaeagnus angustifolia*), willow (*Salix* spp.), and cottonwood (*Populus trichocarpa*) dominated areas are found where the combined UECA 115-kV and Western 230-kV Alternative crosses the Umatilla River, as well as at several irrigation ditches and in the Power City Wildlife Area south of McNary Substation along the Eastern 500-kV Alternative route. There are 30 ha (75 acres) of this habitat along the Eastern 500-kV Alternative route, 15 ha (36 acres) along the Western 230-kV Alternative route (including 3 ha [8 acres] along the joint 230-kV/UECA 115-kV ROW), and 9.3 ha (23 acres) along the PGT Gas Line Alternative route.

Wildlife species that use these habitats include raccoons (*Procyon lotor*), beaver (*Castor canadensis*), red-tailed hawk, Swainson's hawk, California quail (*Callipepla californica*), house wren (*Troglodytes aedon*), bewick's wren (*Thryomanes bewickii*), mourning dove (*Zenaida macroura*), and lazuli bunting (*Passerina amoena*).

Wetlands

Emergent wetlands comprise approximately 40 ha (98 acres), or 2 percent of the mapped study area within 21 individual wetlands. Scrub-shrub wetlands were included in the riparian category and described above (Table 2.6-1). Most of this acreage is located in the Power City area along the Eastern 500-kV Alternative route. There are also several small wetlands along the Umatilla River near the crossing of the 230-kV/UECA route. Wildlife species observed in wetland habitats along the Umatilla River include Canada geese (*Branta canadensis*), Forster's terns (*Sterna forsteri*), and mallards (Woodward-Clyde Consultants 1993). Other species observed in the emergent and scrub-shrub wetlands include red-winged blackbirds, Brewer's blackbird, great blue herons (*Ardea*

herodias), green-winged teal (*Anas crecca*), American avocets, black-necked stilts (*Himantopus mexicanus*), killdeers (*Charidrius vociferus*), marsh wrens (*Cistothorus palustris*), song sparrows (*Melospiza melodia*), California quail, brown-headed cowbirds (*Molothrus ater*), painted turtles, treefrogs, (*Pseudacris regilla*), and bullfrogs (*Rana catesbeiana*) (NWS 1994b, Woodward-Clyde Consultants 1993). It is possible that the scrub-shrub component of this habitat provides nesting habitat for several species of song birds such as lazuli bunting and song sparrows.

Open Water

Two ha (5 acres) of open water habitat in the mapped study area occur in the Umatilla River and agricultural/industrial sites. Mallards, common merganser (*Mergus merganser*), wood duck, belted kingfisher (*Cercyle alcyon*), bank swallows, and great blue heron were observed in this habitat (NWS 1994b).

Pastureland

A total of 90 ha (223 acres) of pasture land in the mapped study area, dominated by non-native grasses, supports foraging long-billed curlew, California quail, ring-necked pheasant, and other species (NWS 1994b).

2.6.2 Sensitive Wildlife Species

Currently only two of the sensitive wildlife species potentially occurring in the project vicinity are Federally listed as endangered or threatened; 11 species are candidates for Federal listing (eight Category C2, two Category 3C, and one Category 3B species) (NWS 1994b, letter from R. Peterson, Field Supervisor, U.S. Fish and Wildlife Service [USFWS], Portland, Oregon, April 12, 1994). In addition, 15 species are designated by the Oregon Department of Fish and Wildlife (ODFW) and/or ONHP as threatened, critical or vulnerable (ODFW 1992, ONHP 1993) (Table 2.6-2).

Federally Listed or Proposed Wildlife Species

The bald eagle is the only Federally listed species observed during surveys of the project and there is no critical habitat for any Federally listed species in the project vicinity (NWS 1994c). Surveys and consultation with local wildlife biologists indicate that wintering bald eagles, listed as threatened by the USFWS and ODFW, winter along the Columbia River and use habitats along and near the Umatilla River. Consultation also indicated that peregrine falcons (*Falco peregrinus*), a Federally endangered species, only rarely occur in the area during spring and fall migration, with the only documented observations occurring several miles from the project vicinity (NWS 1994c).

During 1993 to 1994 winter surveys, a small number of bald eagles were observed using habitats along the Umatilla River within 3.1 km (5 miles) of the cogeneration facility site and within 1.6 km (1 mile) of the PGT Gas Line route. Local residents and businessmen reported occasionally seeing a bald eagle in previous winters within 1.6 km (1 mile) of the cogeneration facility site. The section of the Umatilla River near the PGT route has the highest quality foraging and roosting habitat in the vicinity of the project (NWS 1994c). Although providing some potentially suitable roosting and foraging habit, the Power City Wildlife Area near the McNary Round-up corridor (Eastern 500-kV Alternative) is not used because the ponds readily freeze eliminating use by waterfowl, a primary

Table 2.6-2. Sensitive Wildlife Species Potentially Occurring in the Project Vicinity

Common Name	Status			Observed in Study Area
	Federal	ODFW	ONHP	
Blotched tiger salamander	No Status	Undetermined	1	No
Northern leopard frog	No Status	Vulnerable	1	No
Spotted frog	Category 2 Candidate	Undetermined	1	No
Western toad	No Status	Vulnerable	1	No
Painted turtle	No Status	Critical	1	Yes
Northwestern pond turtle	Category 2 Candidate	Critical	1	No
American white pelican	No Status	Vulnerable	2	Yes
Long-billed curlew	Category 3 Candidate	No Status	3	Yes
Northern bald eagle	Threatened	State Threatened	4	Yes
Swainson's hawk	Category 3 Candidate	Vulnerable	1	Yes
Ferruginous hawk	Category 2 Candidate	Critical	1	No
Peregrine falcon	Endangered	State Threatened	4	No
Mountain quail	Category 2 Candidate	No Status	3	No
Franklin's gull	No Status	Peripheral or Naturally Rare	2	No
Yellow-billed cuckoo	Taxonomic Problems	Critical	2	No
Burrowing owl	No Status	Critical	2	No
Bank swallow	No Status	Undetermined	1	Yes
Loggerhead shrike	Category 2 Candidate	Undetermined	1	No
Grasshopper sparrow	No Status	Undetermined	1	Yes
Tri-colored blackbird	Category 2 Candidate	Peripheral or Naturally Rare	2	No
Pacific western big-eared bat	Category 2 Candidate	Critical	2	No
Pallid bat	No Status	Vulnerable	1	No
Fringed myotis	No Status	Vulnerable	4	No
Washington ground squirrel	No Status	Critical	2	No
Pygmy rabbit	Category 2 Candidate	Vulnerable	1	No

ODFW Status: **State Endangered**—wildlife species native to the state of Oregon that are seriously threatened with extinction throughout all or a significant portion of their range within the state. **State Threatened**—wildlife species that are likely to become an endangered species within the foreseeable future throughout a significant portion of their range within the state without cooperative management or removal of threats. **Critical**—species for which listing as threatened or endangered is pending; or those for which listing as threatened or endangered may be appropriate if immediate conservation actions are not taken. **Vulnerable**—species for which listing as threatened or endangered is not believed to be imminent and can be avoided through continued or expanded use of adequate protective measures and monitoring. **Peripheral or Naturally Rare**—peripheral species refer to those whose Oregon populations are on the edge of their range. Naturally rare species are those which had low population numbers historically in Oregon because of naturally limiting factors. **Undetermined**—animals in this category are species for which 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.

USFWS Status: **Federal Endangered**—designated as an endangered species by the Federal government. **Federal Threatened**—designated as a threatened species by the Federal government. **Category 2 Candidate**—need additional information to propose as threatened or endangered under the Endangered Species Act. **Category 3 Canidate**—once listed as a Category 1 or Category 2, but is no longer listed.

ONHP Status:
1 = additional information is needed for a determination of status in Oregon
2 = threatened with extripation or presumed extripated from the state, often peripheral or disjunct
3 = of concern but not currently threatened or endangered; includes taxa that are rare but currently secure, as well as taxa declining in abundance or habitat, but still too common to be proposed as threatened or endangered.
4 = threatened with extinction throughout its range, needing active protective measures

Sources: letter from R. Peterson, Field Supervisor, USFWS, Portland, Oregon, April 12, 1994
ODFW 1992
ONHP 1993

prey of eagles (NWS 1994c). Potential wintering by bald eagles in the project vicinity is most likely limited by the lack of cottonwoods or other large trees and perch sites. Well outside the project vicinity, the Cold Springs and Umatilla National Wildlife Refuges provide regularly used bald eagle habitat; open water in the winter provides habitat for waterfowl. Spawned-out coho salmon in the lower Umatilla River may also provide a source of food from November through January (NWS 1994c).

A Biological Assessment for the one Federally listed species is included in Chapter VI, Appendix B.

Federal Candidate Species

No Federal candidate species (Category C2) were observed in the project study area during field surveys, and habitat for most of these species is limited or non-existent (NWS 1994a, 1994b, 1994c). A Category C2 species, the loggerhead shrike, was observed in the project vicinity. Information on the eight Federal candidate (Category C2) species potentially occurring in the project vicinity, their habitat requirements, and distribution is provided below. Federal candidate (Category C3) species are addressed in the state-listed species section.

Spotted frog. The spotted frog occurs in cold streams, ponds, and marshes throughout the Cascade Mountains and areas of eastern and central Oregon. In the shrub-steppe zone, it is found in cold permanent marshes, ponds, and small lakes. It is unlikely that this species occurs in the project vicinity.

Northwestern pond turtle. The northwestern pond turtle requires sluggish or quiet water with abundant vegetation and basking sites (National Audubon Society 1979). This species is not likely to occur in the project vicinity.

Tri-colored blackbird. Tri-colored blackbirds are found primarily in California (National Geographic Society 1987), but there are a few records in Oregon, including a small number (less than 40) observed infrequently at Mann's Pond, 1.6 km (1 mile) southeast of the cogeneration facility site during the 1989-1992 breeding seasons (NWS 1994a, 1994b). This species nests in large marshes and feeds in adjacent agricultural areas (Ehrlich et al. 1988). Wetlands in the project vicinity are too small to provide optimal habitat. Power City Wildlife Area and Mann's Pond are considered marginally suitable habitat.

Ferruginous hawk. The ferruginous hawk has been documented in Umatilla and Morrow counties (ONHP 1993) and is known to nest 12.8 km (8 miles) east of Hermiston (NWS 1994b). This species typically nests on the ground on the sides or summits of low hills, in juniper trees (Janes 1985), or on rock pinnacles (Ramakka and Woyewodzic 1993). They also use transmission towers and abandoned windmill platforms. Ferruginous hawks prefer shrublands and native grasslands and avoid croplands and areas with high density of perches (Janes 1985). Because of the high proportion of cropland and disturbed grassland, suitable habitat for this species is not available in the project vicinity.

Mountain quail. There are no records of mountain quail in Umatilla or Morrow counties, although it is known to occur in the 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 vicinity does not contain habitats suitable for mountain quail; therefore, they are not likely present.

Loggerhead shrike. The loggerhead shrike has been documented in Umatilla and Morrow counties (ONHP 1993). This species is typically observed in open woodlands and shrublands (Ehrlich et al. 1988). Suitable habitat for this species is found in the project vicinity, especially areas dominated by sagebrush shrub-steppe. A few individuals were observed in the Umatilla Ordnance Depot west of the project in 1994 (NWS 1994b).

Pygmy rabbit. Pygmy rabbits are most common in southeastern Oregon (Washington Department of Wildlife [WDW] 1993), and none have been documented in Umatilla or Morrow counties (ONHP 1993). This species is dependent upon sagebrush, which composes 99 percent of its diet (WDW 1993). The project vicinity has only sagebrush habitat that has been severely degraded by grazing and other activities and, therefore, is not likely to be suitable for this species.

Pacific western big-eared bat. 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). They are dependent upon caves and cave-like structures such as mines, tunnels, and the underside of bridges for roosting (Thomas 1979). Foraging and roosting habitat is present in the project vicinity.

State-listed Wildlife Species

Nine state sensitive species—the long-billed curlew, great egret (*Casmeroduis albus*), Swainson's hawk, grasshopper sparrow (*Ammodramus savannarum*), black-throated sparrow (*Amphispiza bilineata*), burrowing owl (*Athene cunicularia*), bank swallow, American white pelican (*Pelecanus erythrorhynchos*), and painted turtle (*Chrysemys picta*)—were recorded in the project vicinity during field surveys in 1992 through 1994 (NWS 1994a, 1994b; Woodward-Clyde Consultants 1993). Seven of these species were documented in the study area 320- to 381-m (1,050- to 1,250-foot) corridors.

Long-billed curlew. Field surveys indicate that the long-billed curlew, an ONHP Species of Concern and Federal Category C3 candidate species, is fairly common in the project vicinity, and both nesting and foraging habitats have been documented. In Oregon, this species typically nests in cheatgrass (Pampush and Anthony 1993). A dense grassland managed as a CRP by the SCS adjacent to a section of the combined route of the NWP Gas Line and the Eastern 500-kV Alternative provide foraging habitat. An area just to the south and north in this location appears to have suitable curlew nesting habitat (NWS 1994a). Nesting has been documented very close to the Eastern 500-kV Alternative route, NWP gas line, and many areas south of the Umatilla River (NWS 1994a). A main nesting area in the region is on the Umatilla Ordnance Depot west of the Western 230-kV Alternative route. In eastern Oregon, curlews typically nest in grasslands, particularly those dominated by cheatgrass (as long as grass cover is not too high), and forage on invertebrates in nearby irrigated croplands (Pampush and Anthony 1993).

Grasshopper sparrow. During field surveys of the project vicinity, grasshopper sparrows, an ODFW Sensitive species, and ONHP 3 species, both classifications meaning that additional

information is needed to assess vulnerability, were observed near I-84 and on the Umatilla Ordnance Depot along the Western 230-kV Alternative route (NWS 1994b). There is also nesting near Feedville Road north of the PGT Gas Line route, as well as on the NWP Gas Line route (NWS 1994a, 1994b). It is highly likely that this species nests within the project vicinity. Habitats for the grasshopper sparrow include grasslands, pastures, and cultivated fields (Ehrlich et al. 1988).

Swainson's hawk. Swainson's hawks, an ODFW state vulnerable and ONHP 3 species, were observed just south of the Westland Substation during field surveys in 1992 and 1993 (Woodward Clyde Consultants 1993). The 1993 observations indicated that this species may have nested in trees growing in the riparian corridor along the Umatilla River (Woodward Clyde Consultants 1993). Several nests have been documented in the project vicinity, including two very near the Eastern 500-kV Alternative route. One is near the Power City Wildlife Area and one is near the route south-southeast of Hermiston (NWS 1994b). 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. Forage habitat includes grasslands, shrub-grasslands, and croplands.

Burrowing owl. The burrowing owl nests in burrows in shrub-steppe, grasslands, pastures, and roadsides throughout eastern Oregon. Burrowing owls are known to occur on the Umatilla Ordnance Depot to the west of the Western 230-kV Alternative route, and several other areas within the project vicinity. However, no sites are near proposed project components.

Bank swallow. Field surveys located a bank swallow colony along a portion of the 230-kV route to be shared with Hermiston Generating Project. This colony occurred in a sandy bank created by past quarry operations (Woodward Clyde Consultants 1993). There are several nesting colonies along the Umatilla River near the PGT Gas Line route (NWS 1994b). The bank swallow typically nests in burrows near water and forages on insects (Ehrlich et al. 1988). This species is designed by ODFW as state sensitive, undetermined status and is on the ONHP's List 3.

American white pelican. Nonbreeding individuals of this species, listed as sensitive by ODFW and Category 2 by ONHP, commonly occur along the Columbia River and other relatively large ponds and lakes in the area during the summer (NWS 1994c). None of the observations of American white pelicans made during field surveys were within the mapped study area. The nearest nesting takes place 48 km (30 miles) up the Columbia River from Umatilla (NWS 1994b).

Painted turtle. The painted turtle, an ODFW State Critical species, occurs at Power City Wildlife Area and other sites along the Eastern 500-kV Alternative route, and in Mann's Pond, approximately 1.6 km (1 mile) southeast of the cogeneration facility site. This species requires ponds or other slow moving water with muddy bottoms.

None of the other eight state-listed species have been documented in or adjacent to the project study area. These species include: blotched tiger salamander (*Ambystoma tigrinum marmorata*), northern leopard frog (*Rana pipilens*), western toad (*Bufo boreas*), Franklin's gull (*Larus pipixcan*), yellow-billed cuckoo (*Coccyzus americanus*), pallid bat (*Antrozous pallidus pacificus*), fringed myotis (*Myotis thysanodes*), and Washington ground squirrel (*Spermophilus washingtoni*).

The Washington ground squirrel, listed by the ODFW as critical, was recorded in the vicinity of the project in 1990 (Betts 1990). However, this site is now irrigated cropland and no Washington ground squirrels were observed during field surveys in 1992, 1993, and 1994 (Woodward Clyde Consultants 1993, NWS 1994b). A nearby colony, south of the Umatilla River appeared to be abandoned in 1993 (Woodward Clyde Consultants 1993) 1.6 km (1 mile) from its eastern terminus.

Habitat for the other sensitive species potentially occurring in the project vicinity is limited to non-existent at the cogeneration facility site or along the ROWs (NWS 1994a).

2.6.3 Fisheries

There are two fisheries resources within the vicinity of the project—the Columbia and Umatilla rivers. Major stocks present in the Columbia River include spring, summer, and fall chinook salmon (*Oncorhynchus tshawytscha)*; coho salmon (*O. kisutch*); sockeye salmon (*O. nerka*); and summer steelhead (*O. mykiss*). Approximately 0.5 to 1 million adult salmon and steelhead pass this region annually on their upstream migration (WDF and ODFW 1992). Additionally, tens of millions of juvenile salmon and steelhead smolts migrate downstream past this region in the spring, summer, and fall. This region of the Columbia River is currently listed as part of the "critical habitat" for the Federally listed endangered Snake River sockeye salmon, and spring/summer and fall chinook that pass through this region during annual migration (Federal Register, Vol. 55, No. 232, 2 December 1992).

The Umatilla River has many of these same anadromous stocks, including spring and fall chinook and coho salmon, with summer steelhead the only remaining wild stock. Currently, millions of smolts are released annually into the Umatilla system (Fish Passage Center 1994).

Diversion of water and lack of fish passage facilities in the past on the Umatilla River have resulted in difficulty in juvenile smolts successfully leaving the system in the spring and adults returning in the summer and fall. Currently, passage facilities are being operated on the Umatilla to reduce loss of smolts and returning adults (Knapp 1994). Restoration and enhancement projects efforts are occurring for all anadromous stocks within the basin (Bailey and Laws 1994). The Umatilla River also contains resident game fish species (such as resident rainbow trout and some warm water fish such as smallmouth bass), as well as non-game fish (such as chubs and suckers).

2.7 LAND USE

2.7.1 Land Use Characteristics

Cogeneration Facility Site

The cogeneration facility would be located on a 6.9-ha (17-acre) parcel of land in an industrial area of unincorporated Umatilla County. The site is currently used by the J.R. Simplot Company for alfalfa production and is adjacent to (west of) the J.R. Simplot potato processing plant. To the south, the site is bounded by the J.R. Simplot access road, and to the west lies an agricultural field

operated by the J.R Simplot Company. A Union Pacific Railroad transportation facility is located to the north of the site.

Land uses near the cogeneration facility site include the following:

- The J.R. Simplot Potato Processing Plant and associated facilities immediately east and north of the cogeneration facility site;
- An agricultural field (owned by the J.R. Simplot Company) immediately adjacent to the site to the west and northwest;
- An agricultural field approximately 487.7 m (1,600 feet) north of the site, and agricultural fields west of the site;
- Agribusiness approximately 670.6 m (2,200 feet) northwest of the site;
- The Union Pacific Railroad Hinkle rail yards and Amtrak passenger station approximately 231.4 m (700 feet) north of the CT facility site;
- A residence approximately 0.8 km (0.5 mile) south of the site located on land designated for agricultural use; and
- The Umatilla River and riparian areas approximately 213.4 m (700 feet) south of the site.

Transmission Line Routes

Eastern 500-kV Alternative. This route would be composed of two sections, beginning at the cogeneration facility. The first section of line would be 8.6 km (5.4 miles) long and would be routed primarily along an existing Pacific Power and Light Corridor. The new transmission line would run from the cogeneration facility to the McNary Roundup Corridor and would consist of new single circuit, single pole transmission line with poles spaced between 152 and 244 m (500 to 800 feet) apart (Figure 1-1).

Land uses within 0.8 km (0.5 mile) of the new first section of transmission line include: industrial, commercial, aggregate resource, agribusiness, agricultural, and residential. There is currently one residence within 152 km (500 feet) of this reach of the proposed route of the Eastern 500-kV Alternative.

The second 13.7-km (8.5-mile) section would begin at the intersection of Canal Road and the McNary Roundup corridor. The transmission line would be located adjacent to and east of existing lines within the existing 76 m (250 foot) wide McNary Roundup ROW proceeding in a northwesterly direction to a point 1.4 km (0.9 mile) south of the McNary Substation. Land uses adjacent to the McNary Roundup corridor include: agriculture, industrial, and residential. There are 115 residences located within 152 m (500 feet) of this section of the proposed Eastern 500-kV Alternative route.

The Hermiston Power Project 500-KV line would leave the McNary Roundup corridor 1.4 km (0.9 mile) south of the McNary Substation, and follow the existing McNary-Lower Monumental transmission line route and would use its poles and conductors. The McNary-Lower Monumental 500-kV line would be rerouted approximately 200 m (656 feet) east of its present location. Land uses that occur along the new McNary-Lower Monumental route include agriculture, transportation (Highway 395), and industrial.

Along the McNary Corridor and relocated McNary-Lower Monumental portions, conductors would be supported by either steel towers or poles, spaced at 304.8 m and 365.8 m (1,000 and 1,200 feet, respectively).

Western 230-kV Alternative. This route would be primarily located in unincorporated Umatilla County. The route would also pass through the city of Umatilla, and the city of Umatilla urban growth boundary.

The Western 230-kV Alternative would use for the most part an existing 16-km (10-mile) transmission line route (the combined UCEA/Herimiston Generating Project 230-kV Corridor). Current land uses in and adjacent to the UCEA corridor include: agriculture; agribusiness; transportation; the Umatilla Ordnance Depot; and urban uses such as commercial, industrial, and residential. Three residences are located within 152 m (500 feet) of the route.

A new line would be required from the cogeneration facility site 3.5 km (2.2 mile) north and west to the Westland Substation. Current land uses in and adjacent to the corridor include: industrial, agribusiness, aggregate resource extraction, residential, and commercial. There are 13 residences within 152 m (500 feet) of this section of the route.

This alternative also requires relocation of a UECA 115-kV line from McNary Substation along Power Line Road. Most of the 13-km (8-mile) long route will be located in unincorporated Umatilla County. Approximately 3.2 km (2.0 miles) of the north end of the route will pass through the city of Umatilla. The routes will be located adjacent to other transmission lines, county roads, or both. The section of the line that will cross the Umatilla River and I-82 will use existing 115-kV structures. Land uses along the route include agriculture, light industrial, and residential. There are 36 residences located within 152 m (500 feet) of the proposed route.

Gas Line

There are two gas pipeline routes that will be used to supply natural gas to the site. One route would connect to a NWP lateral and the other to a PGT lateral. Each of these routes would require construction of new pipeline. Existing land uses within 0.8 km (0.5 mile) of the 13.6 km (8.5 mile) NWP route include industrial, agricultural, residential, and agribusiness. Land uses within 0.8 km (0.5 mile) of the 6.4 km (4 mile) long PGT route include industrial, agricultural, residential, school, and agribusiness.

Water Supply and Wastewater Lines

The 2-km (1.25-mile) water supply pipeline route would be located between the cogeneration facility and the Port of Umatilla water treatment facility north of Feedville Road. Land uses within 0.8-km (0.5-mile) of the water line corridor include industrial, agricultural, transportation,

agribusiness, and residential. The wastewater pipeline route would connect the cogeneration facility with the Simplot facility and pass entirely through industrial lands.

2.7.2 Comprehensive Plans and Policies

Project components would be located within two local jurisdictions: Umatilla County and the city of Umatilla. In addition, transmission routes cross the urban growth boundaries of the cities of Umatilla and Stanfield. Two adopted local comprehensive plans regulate land use in the project vicinity: the Umatilla Comprehensive Plan (Umatilla County 1987), and the City of Umatilla Comprehensive Plan (Umatilla City 1977).

Land uses outside of the cities' boundaries, but within the urban growth boundaries, are 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 urban growth areas, county zoning designations apply, while the city's comprehensive plan designations apply.

Figures 2.7-1a through 2.7-1c depict the land use designations that the project cogeneration facility, transmission line options, natural gas lines, and water lines routes would pass through.

Table 2.7-1 lists the jurisdictions in which the project components would be located, including the land use and zoning designations each project facility would be located in or pass through. The cogeneration facility site and the water supply pipeline are located entirely within Umatilla County's planning jurisdiction. The Western 230-kV Alternative route is located primarily within the county's jurisdiction, although a small portion of the UECA 115-kV Corridor relocation passes through the Urban Growth Area of the city of Umatilla.

The Eastern 500-kV Alternative route, while located mainly within Umatilla County, passes through the Urban Growth Areas of the city of Umatilla, the cities of Hermiston, Stanfield, and Umatilla.

The PGT gas line connection would be located primarily within Umatilla County's planning jurisdiction, with a small portion passing in the Urban Growth Area of the city of Stanfield. The NWP gas line connection would also be located primarily within the county's jurisdiction, although a small portion passes through the Urban Growth Area of the city of Stanfield.

2.8 Cultural Resources

The historic properties inventory undertaken for the proposed project components covered approximately 394 ha (973 acres), including 51.5 km (32 miles) of linear features (Oetting 1993). The facilities surveyed were the: (1) cogeneration facility site, (2) Eastern 500-kV Alternative route (including the BPA 500-kV Lower Monumental Relocation), (3) Western 230-kV Alternative route (including the UECA 115-kV Relocation), (4) NWP and PGT natural gas lines, (5) water supply

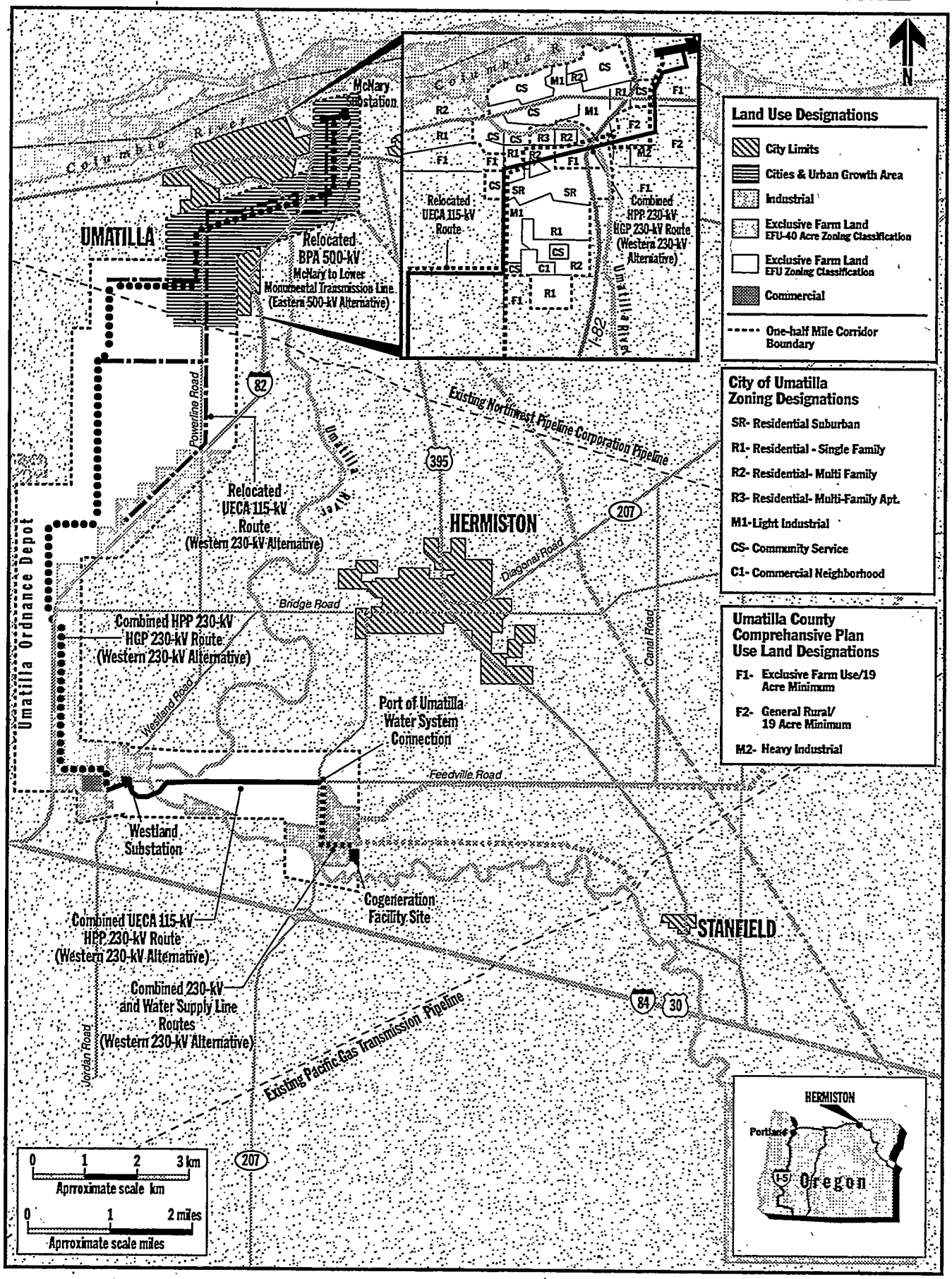


Figure 2.7-1a Land Use Designations in the Project Vicinity

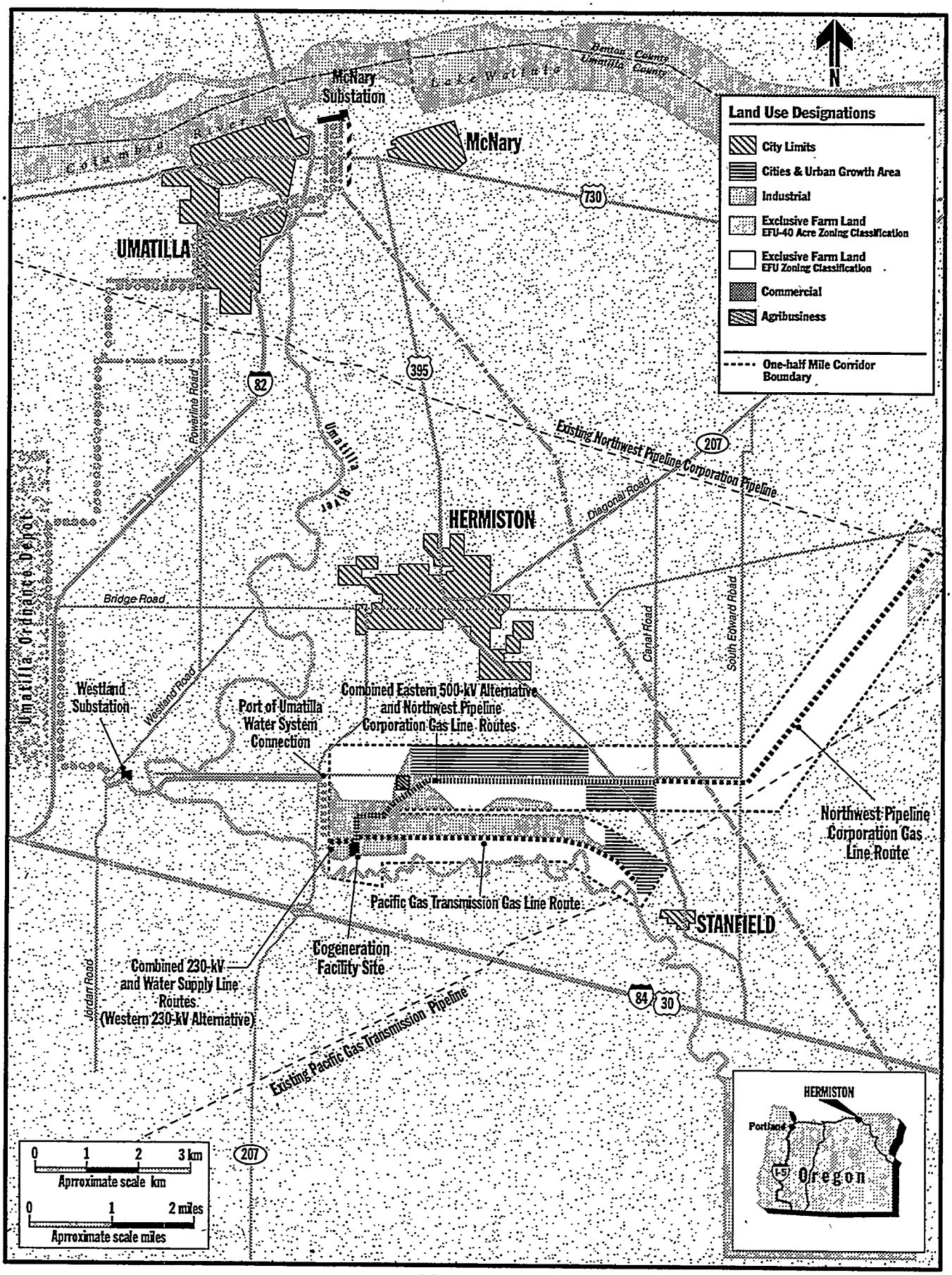


Figure 2.7-1b Land Use Designations in the Project Vicinity

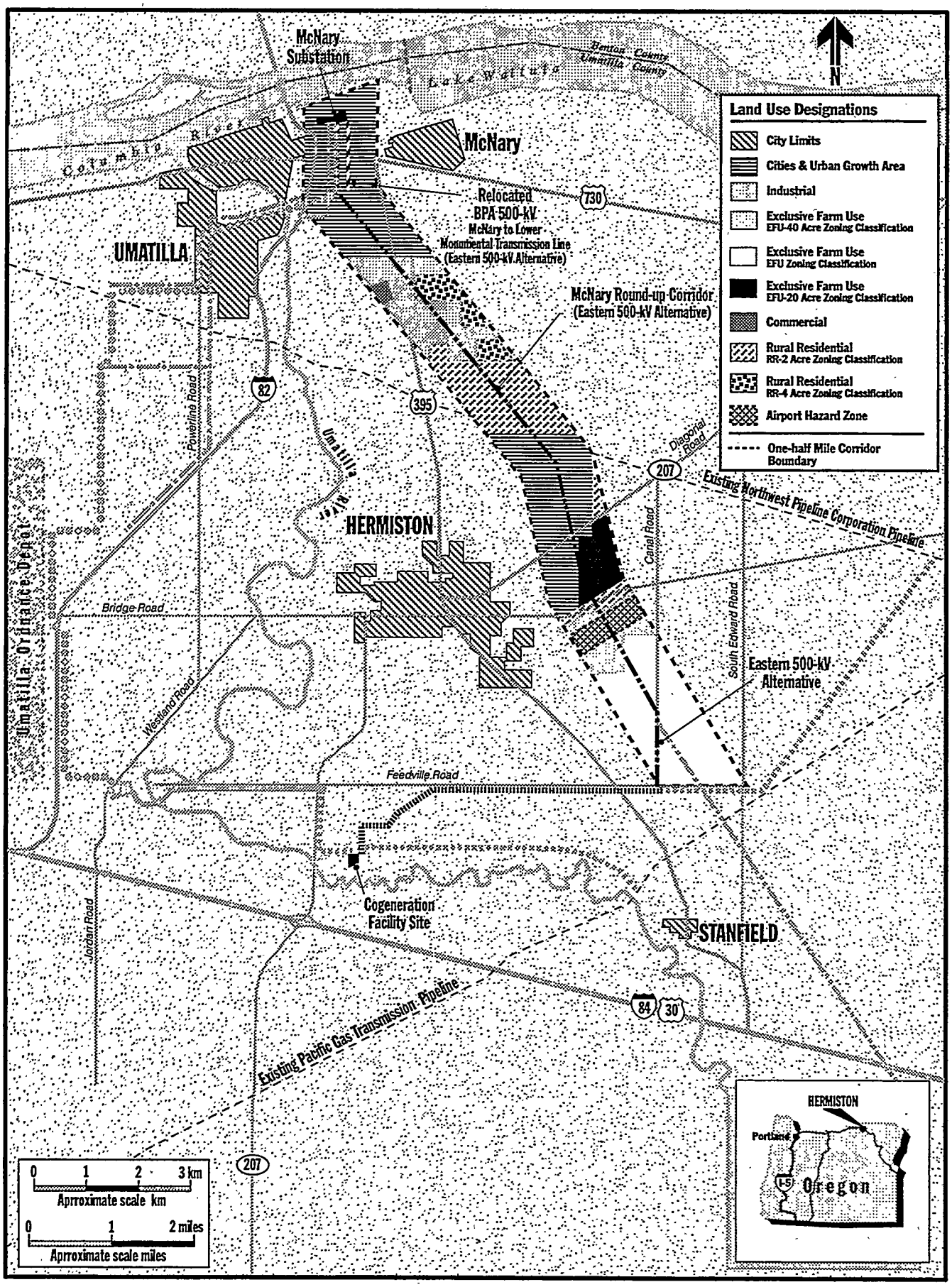


Figure 2.7-1c Land Use Designations in the Project Vicinity

Table 2.7-1. Land Use and Zoning Designations for Project Components

Land Use Plans/Designations	Cogen. Facility Site	East. 500-kV Alt.[1]	West. 230-kV Alt.[2]	Water/ Wastewater Lines	PGT Gas Line	NWP Gas Line
Umatilla County Comprehensive Plan						
Heavy Industrial	XP	XP	XP	XP	XP	XP
Light Industrial	—	XC	XC	—	—	—
Future Industrial Overlay Zone	—	XC	—	XP	XC	XC
Exclusive Farm Use	—	XC	XC	XP	XC	XC
Exclusive Farm Use—20-acre minimum	—	XC	—	—	—	—
Exclusive Farm Use—40-acre minimum	—	XC	—	—	XC	XC
Rural Residential—2	—	XC	—	—	—	—
Rural Residential—4	—	XC	—	—	—	—
City of Hermiston Urban Growth Area Designations						
Residential Medium Density Mobile Home	—	XC	—	—	—	—
City of Umatilla Urban Growth Area Comprehensive Plan Designations						
Commercial	—	XC	—	—	—	—
Industrial	—	XC	—	—	—	—
Single Family Residential	—	XC	—	—	—	—
Public Facilities	—	XC	XC	—	—	—
Natural Resource	—	XC	—	—	—	—
City of Umatilla Zoning Designations						
Suburban Residential	—	—	XC	—	—	—
Residential Single Family	—	—	XC	—	—	—
Residential Multi—Family	—	—	XC	—	—	—
Commercial Neighborhood	—	—	XC	—	—	—
Community Service	—	XC	—	—	—	—
City of Stanfield Urban Growth Area Designations						
Industrial Service Commercial	—	XC	—	—	—	XC
Exclusive Farm Use	—	XC	—	—	—	XC
Transportation Industrial	—	—	—	—	XC	—

X = Facility located in or goes through designation
— = Facility does not go through designation
P = Permitted use
C = Conditional use
[1] Includes BPA 500-kV Lower Monumental Relocation
[2] Includes UECA 115-kV Relocation

line from the Port of Umatilla Project treatment plant, and (6) wastewater effluent line connecting the proposed cogeneration facility with the J.R. Simplot Land application system.

The inventory resulted in discovery of nine cultural resources, including three historic era trash dumps and six canals. The surveyors determined the trash dumps to be ineligible for nomination to the National Register of Historic Places (NRHP). The canals that project components would cross are part of the Bureau of Reclamation's Umatilla Project. The Oregon State Historic Preservation Officer has determined portions of the Umatilla Project eligible for NRHP nomination.

Oral histories conducted by the Confederated Tribes of the Umatilla Indian Reservation (letter from G.F. Moura, Cultural Services Archaeologist, Confederated Tribes of the Umatilla Indian Reservation, Pendleton, Oregon, May 9, 1994) concluded that prehistoric and historic era Native Americans used the project vicinity, particularly the Umatilla River, for hunting, fishing, and gathering of medicinal and food plants. This investigation also identified an ethnographically known Umatilla fishing and campsite located where the Western 230-kV Alternative would cross the Umatilla River. The Indian names for the site are Miss-kha-low and Wanath-pa. It was used for salmon and eel fishing, and for salmon preparation.

HPP-H-1 is a small trash dump located along the existing McNary Roundup Corridor (Eastern 500-kV Alternative). It consists of a concentration of refuse approximately 3 m (10 feet) in diameter and a thin scatter of refuse outside of the corridor. The refuse includes rusty cans, miscellaneous metal pieces, wide-mouthed milk bottles, and glass fragments. The cans include condensed milk, baking powder, soup, coffee, syrup, paint, and beer cans.

HPP-H-2 is a small trash dump located within the combined Eastern 500-kV Alternative/NWP Gas Line route. It consists of a concentration of refuse approximately 2.4 by 4.6 m (8 by 15 feet) in dimension. The refuse includes rusty cans, an automobile fender, automobile body sheet metal, bedsprings, barbed wire, mesh fencing, an enameled bowl, ceramic fragments, an aluminum lawn chair, and pieces of fiberglass. Some of these artifacts may date to the 1930s; others are recent (such as the aluminum chair and fiberglass).

HPP-H-3 consists of two small concentrations of historic trash with a thin scatter of trash between them located along the NWP Gas Line route. The site, as a whole, covers about 39.6 by 39.6 m (130 feet by 130 feet). The small concentrations are each about 1.5 by 3 m (5 by 10 feet) in size. The refuse includes rusty cans, ceramics, glass, enameled pots and pans, bed springs, stove parts, kitchen and farm utensils, auto maintenance supplies, toys, and leather goods. One license plate, dated 1933, appears to date the earliest use of the dump. Some of the trash dates to the 1940s, and some appears recent. This trash dump also appears to have been moved from elsewhere, since older and recent trash are randomly mixed and the surrounding vegetation appears recently disturbed.

All three trash dumps are similar in that each contains material dating no earlier than the 1930s and each also contains recent material. Each appears to be the result of incremental dumping activity with no apparent connection to a nearby farm, residence, or other specific source. These dumps therefore do not contain information significant in local, regional, or national history and are not eligible for NRHP nomination.

The gas line routes and Eastern 500-kV Alternative route would cross six canals that are part of the Umatilla Project at a total of nine canal crossings. Section 3.8 lists the canal crossings and the project components they cross. Beginning in 1906, the Bureau of Reclamation constructed the Umatilla Project, consisting of the Cold Springs Reservoir, several smaller diversion dams, and a network of delivery canals, some earthen, and some concrete-lined. Construction of these facilities sparked a boom in settlement and agricultural activity in the Hermiston-Umatilla area. The Oregon State Historic Preservation Office (SHPO) has determined that the Cold Springs Dam and associated canals are eligible for nomination to the NRHP since it is a well-preserved example of early 20th century irrigation engineering (letter from S.J. Brawley, U.S. Bureau of Reclamation, Pacific Northwest Region, Boise, Idaho, August 2, 1991; letter from J.M. Hamrick, Oregon SHPO, Salem, Oregon, September 25, 1992. The Umatilla Project is one of the few projects of its kind still in operation, mostly unaltered since construction. All elements of the Umatilla Project are potentially eligible for NRHP nomination.

2.9 Socioeconomics and Public Services

2.9.1 Population and Housing

Population characteristics of Umatilla county and communities in the project vicinity between 1980 and 1992 are presented in Table 2.9-1. A breakdown of minority population from the 1990 Census of population and housing is presented in Table 2.9-2.

Table 2.9-1. Population Characteristics

Characteristics	*State of Oregon*	*Umatilla County*	*Hermiston*	*Stanfield*	*Umatilla*
Population					
1990	2,633,156	58,861	9,408	1,568	3,194
1980	2,842,321	59,249	10,075	1,570	3,050
Percent change					
1980-1990	7.9	0.7	7.1	0.1	-4.7

Source: Center for Population Research 1993

The permanent housing supply in the project vicinity is limited. Housing demand currently exceeds supply, resulting in low vacancy rates and long waiting lists for persons looking for housing. Current vacancy rates are less than 0.5 percent (BPA EIS 1994a). 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 (BPA 1994b).

Table 2.9-2. Minority Group Breakdown

Race and Hispanic Origin	State of Oregon	Umatilla County
White	2,636,787	52,743
Black	46,178	371
Percent of total population	1.6	0.6
American Indian, Eskimo, or Aleut	38,496	1,850
Percent of total population	1.4	3.1
Asian or Pacific Islander	69,269	533
Percent of total population	2.4	0.9
Other race	51,591	3,752
Hispanic origin (of any race)	112,707	5,307
Percent of total population	4.0	9.0

Source: U.S. Bureau of Census 1990

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 (BPA 1994b).

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 vicinity is approximately 874 units. Of this total, 149 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 (BPA 1994b). 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 and mobile home accommodations in the project vicinity are limited in Echo and Pendleton have a total of 39 spaces. Seven spaces are located in Echo, and 32 spaces are in Pendleton (BPA 1994b). A new RV park with between 50 and 100 spaces is proposed for the Hermiston area (BPA 1994a). At present, the four RV parks listed by the Tri-Cities Convention and Visitors' Bureau have in excess of 250 spaces. Vacancy rates are generally very low. In January 1994, there were approximately ten vacancies among the three RV parks (BPA 1994b).

2.9.2 Employment and Income

Employment during the 1970s expanded rapidly in Umatilla County. Then in the 1980s, the available labor force expanded at a rate faster than employment, resulting in a fairly high unemployment rate. Total 1992 employment in Umatilla County was 30,630 jobs with an available labor force of 33,860. This includes jobs that are not covered by unemployment insurance, which

typically are in the agricultural sector and are seasonal in nature. The stability of employment in the project vicinity is primarily dependent on the stability of the agricultural industry.

Employment in Umatilla County covered by unemployment insurance from the 1990 Census is shown on Table 2.9-3.

Table 2.9-3. Umatilla County Employment by Industry

Type of Work	*Number of Jobs*
Industry[1]	
Agriculture, forestry, and fisheries	3,362
Mining	55
Construction	1,066
Manufacturing, nondurable goods	2,678
Manufacturing, durable goods	1,718
Transportation	1,262
Communications and other public utilities	523
Wholesale trade	859
Retail trade	4,437
Finance, insurance, and real estate	988
Business and repair services	660
Personal services	773
Entertainment and recreation services	251
Health services	2,078
Educational services	1,887
Other professional and related services	1,305
Class of Worker	25,612
Employed person 16 years and over	25,612
Public administration	1,680
Private wage and salary workers	18,259
Government workers	4,549
Self-employed worker	2,575
Unpaid family worker	229

[1] Includes both government and private sectors
Source: U.S. Bureau of Census 1990

Table 2.9-4 summarizes per capita personal incomes in Umatilla County from 1982 through 1991. Both counties are below the state average for both per capita personal income and median household income.

Table 2.9-4. Per Capita Personal Income Morrow County and Umatilla County 1982 - 1991

	Per Capita Income ($)			1982 to 1991 % Change	1982 to 1991 Annual Average Change (%)
	1982	1986	1991		
State of Oregon	10,651	13,541	17,024	+59.8	+5.3
Umatilla County	9,393	11,728	14,266	+51.9	+4.7

Source: U.S. Bureau of Economic Analysis

2.9.3 Fiscal Budgets

The current Umatilla County tax base is approximately $1.2 billion, while the Hermiston School District tax base is approximately $500 million (Brookshier 1994). The 1993 revenues collected by Umatilla County amounts to $33 million. (Information is from the Umatilla County Tax Department.)

2.9.4 Law Enforcement

The cogeneration facility site is within the jurisdiction of the Umatilla County Sheriff's Department. Police protection would be provided by the department's West County Station, which has a total of four deputies patrolling a service area of about 389 square km (150 square miles) (pers. comm., D. Age, Umatilla County Sheriff's Department, December 1, 1993; ENSR Consulting and Engineering 1994a). The Oregon State Police (OSP) has an office in the McNary District of the City of Umatilla. Twenty officers are currently stationed there. The OSP, along with the Sheriff's Department, provide police services for the project vicinity.

The Hermiston Police Department provides police protection services within the city limits. The department maintains a staff of 15 police officers and 7 dispatchers. The Hermiston Police Department would provide second response capabilities for the energy facility site through its mutual aid agreement with the Sheriff's Department. The department coordinates 911 emergency response through the Hermiston Safety Center (pers. comm., G. Asher, Chief, Hermiston Police Department, December 7, 1993)

Police protection services in the city of Umatilla are provided by the Umatilla Police Department, which has a staff of seven police officers. Emergency 911 response is dispatched through the Hermiston Safety Center. The Police Department maintains mutual aid agreements with nearby police departments, the Umatilla County Sheriff's Department, and the State Police (pers. comm., B. Roxbury, Office Manager, Umatilla Police Department, December 1, 1993; ENSR Consulting and Engineering 1994a).

The Stanfield Police Department has a staff of 3 police officers. Emergency 911 response is provided by the Hermiston Safety Center (pers. comm., T. Wainwright, Secretary, City of Stanfield, December 1, 1993; ENSR Consulting and Engineering 1994a).

2.9.5 Fire Protection

Fire protection in the project vicinity is provided through the local communities and rural fire protection districts. The proposed project is within the Hermiston Rural Fire Protection District, and fire protection services would be provided by the Hermiston Fire Department. The department has a total of 10 full-time firefighters and 30 volunteer firefighters. The department is equipped to handle fire and medical emergencies and is in the process of mobilizing a hazardous materials vehicle (pers. comm., R. Larson, Hermiston Fire Department, December 2, 1993; ENSR Consulting and Engineering 1994a).

The fire departments in the project vicinity rely on mutual aid agreements. These agreements, common to fire departments, allow equipment and personnel to respond to large or unique fires outside of this district. In doing so, other fire departments provide coverage for departments that have their equipment and personnel committed to an emergency.

The Umatilla Fire Department has a paid fire chief and a volunteer department with 35 volunteers. The department operates two pumper trucks and two 4-wheel brush fire trucks. The department maintains mutual aid agreements with other fire departments, including Hermiston (pers. comm., D. Drayton, Umatilla Fire Department, February 2, 1994; ENSR Consulting and Engineering 1994a).

Fire protection services are provided by the Stanfield Fire Department. The staff is made up of 18 volunteer firefighters, with are no full-time firefighters. The Stanfield Fire Department maintains formal written mutual aid agreements with Echo, Hermiston, and Umatilla Fire Departments (pers. comm., J. Whelan, Stanfield Fire Department, December 2, 1993; ENSR Consulting and Engineering 1994a).

2.9.6 Medical Services

Emergency Medical Services (EMS) are provided by some of the police and fire departments that service the project vicinity. There are two large hospitals in the area, the Good Shepherd Community Hospital in Hermiston and St. Anthony Hospital in Pendleton. The 49-bed Good Shepherd Community Hospital would be the primary facility for the project (pers. comm., K. Loveland, Public Relations Director, Good Shepherd Community Hospital, December 7, 1993; ENSR Consulting and Engineering 1994a).

2.9.7 Transportation

The main transportation linkage to the cogeneration facility is from Interstate 84 (I-84) at the Exit 182 interchange, approximately 1.6 km (1 mile) south of the site via State Route (SR) 207. All of these highways are in good condition. SR 207 is a two-lane highway (each lane 3.6 m [12 feet] wide with 0.9-m (3-foot) shoulders) and was repaved between Umatilla to south of Hermiston within

the past 10 to 12 years. I-84 is a four-lane divided typical interstate and was repaved within the past 10 years. Highway 395 was expanded to 5 lanes within the past 5 years (pers. comm., D. Brice, Traffic Engineer, Oregon Department of Transportation (ODOT), Pendleton, Oregon, December 16, 1993; ENSR Consulting and Engineering 1994a).

According to the ODOT, 1991 average daily traffic (ADT) for all vehicles at SR 207 and the Umatilla River Bridge was 2,650. At SR 207 and just north of I-84, the 1991 ADT was 3,350 (ODOT 1993). The 1991 ADT along I-84, recorded approximately 0.4 km (0.3 mile) east of the I-84/SR 207 Interchange, was 5,200 (ENSR Consulting and Engineering 1994a).

Access to the cogeneration facility site would be from the existing access roads to the J.R. Simplot Potato Processing Plant. Currently, the J.R. Simplot facility generates approximately 800 daily employee vehicle trips (divided into three work shifts), and about 50 to 60 truck trips (ENSR Consulting and Engineering 1994a).

Access to J.R. Simplot is from two access roads intersecting SR 207. The main access is via an unsignalized intersection of Simplot's private road with SR 207 at the southerly end of their property. The intersection is channelized with a southbound to eastbound left turn bay that enables safe access for both Simplot employees and the 50 to 60 semi-trailer trucks that enter and exit the processing plant daily during peak operations. Secondary access is via a county road approximately 0.4 km (0.25 mile) to the north. A short north-south Umatilla County road links the northerly county road with Simplot's private road on the west side of the existing potato processing plant (ENSR Consulting and Engineering 1994a).

Additional transportation access is via the Union Pacific Railroad whose tracks run east-west along the north boundary of the potato processing plant, with a spur into the plant site. Simplot currently owns about 140 rail cars for shipment of potato products and is a key customer for Union Pacific. As the cogeneration facility construction would involve the transportation of large pieces of equipment, the proximity of the rail and Simplot's rail spur would facilitate movement of these components to the site by rail, reducing the need to transport large components by truck on I-84 and SR 207 (ENSR Consulting and Engineering 1994a).

2.10 Recreation Resources

2.10.1 Recreational Facilities

The regional setting includes a number of recreation areas that contribute to existing recreational opportunity, including Hat Rock State Park, located approximately 16 km (10 miles) northeast of the cogeneration facility; McNary Dam, approximately 16 km (10 miles) north of the cogeneration facility site; McNary Wildlife Nature Area, approximately 15.2 km (9.5 miles) north of the cogeneration facility site; and Umatilla National Wildlife Refuge and Hunting Area, approximately 25.7 km (16 miles) northwest of the cogeneration facility site (Figure 2.10-1).

Recreational opportunities within the project vicinity are limited. Informal recreational opportunities are available along the Umatilla River, which runs south of the proposed cogeneration

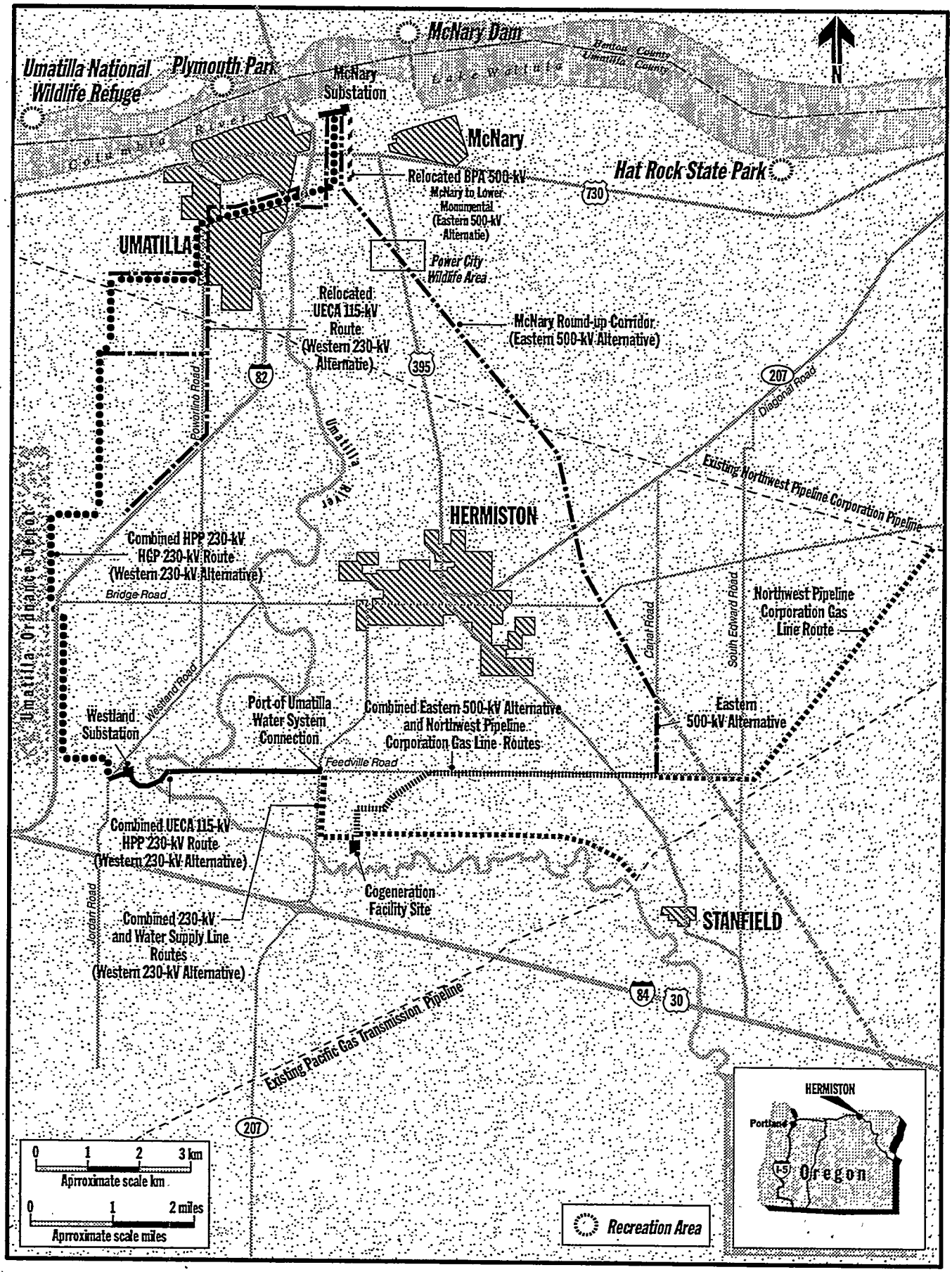


Figure 2.10-1 Recreation Facilities in the Project Vicinity

facility site and would be crossed twice by the electrical transmission Western 230-kV Alternative. The river provides opportunities for fishing, hiking, and wildlife viewing but no hiking trails or other developed recreational facilities. However, the river does not provide unique recreational opportunities or outstanding or unusual qualities. Recreational facilities along the Columbia River are more developed than those along the Umatilla River.

Recreational facilities in the city of Hermiston include the Umatilla County Fairground, a community recreational center, and ten city parks with a total of 30.8 ha (76 acres).

The city of Stanfield operates three city parks. Total park acreage developed and undeveloped is approximately 4.1 ha (10 acres) (ENSR Consulting and Engineering 1994b).

There are no existing or planned Federal, state, or county recreation areas or facilities within the project vicinity. There are no existing or planned recreation areas or facilities traversed by the gas pipeline or transmission line routes (ENSR Consulting and Engineering 1994b).

2.11 Public Health and Safety

2.11.1 Project Materials

The proposed project would involve the use of some products and processes during construction and operation that could affect public health and safety if improperly handled. For example, both natural gas and fuel oil would be used or stored on site, both of which are flammable and can be explosive under certain circumstances. They can also be environmental pollutants if released in an uncontrolled manner. Lubricating oils, hydraulic fluids, cleaning solvents, paint, paint thinners, wastewaters from cooling tower collection sumps, and other materials and process wastes would be found on site, and could pose a risk to public health and safety if not used and disposed of properly. Some materials are classified as hazardous and would need careful handling and disposal to protect human health. Specific materials that could be used during project construction and operation are discussed in Section 3.11.

A Phase I Environmental Site Assessment study was conducted in October 1993 to assess the possibility that hazardous materials exist in the soil or underlying groundwater at the proposed cogeneration facility site as a result of prior use, or migration of pollutants from an adjacent site (Squier Associates 1993). The study found no evidence of contamination at the site and concluded that the potential for environmental impairment was very low and that further investigations were not warranted at this time.

2.11.2 Electric and Magnetic Fields

Power lines, like all electrical devices and equipment, produce electric and magnetic fields (EMFs). Voltage (the force that drives the current) is the source of the electric field. Current (movement of electrons in a wire) produces the magnetic 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 distance.

EMF 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 2.11-1.

Table 2.11-1. Typical Electric and Magnetic Field Strengths 0.3 m (1-foot) from Common Appliances

Appliance	*Electric Field (kV/m)*	*Magnetic Field (mG)*[1]
Coffee Maker	.030	1 - 1.5
Electric Range	.004	4 - 40
Hair Dryer	.040	0.1 - 70
Television	.030	0.4 - 20
Vacuum cleaner	.016	20 - 200
Electric Blanket[2]	.01 - 1.0	15 - 100

1 By 1 to 1.5 m (3 to 5 feet), the magnetic field from appliances is usually decreased to less than 1 mG.
2 Values are for distances from a blanket in normal use, not 0.3 m (1 foot) away.
Source: Miller 1974, Gauger 1985

The average background magnetic field level measured in the center of rooms in 992 homes throughout the United States was 0.9 milliguass (mG) (Zafanella 1994). In 15 percent of the homes, the magnetic field level was greater than 2.1 mG. Fields very close to electrical appliances are much stronger than these levels, but appliance fields decrease in strength with distance very rapidly. Unlike electric fields, magnetic fields from outside power lines are not reduced in strength by trees and building material. Therefore, 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 2.11-2.

There are no national standards for electric or magnetic fields. Some states have established EMF standards. The state of Oregon has a standard of 9 kV/m maximum on the edge of the ROW.

2.12 Visual Quality

The project vicinity consist largely of open agricultural lands, but also include industrial, commercial, and residential. More intense industrial development is concentrated north of I-84 and Highway 395, in the area of the cogeneration facility site. South of I-84, the area is characterized predominantly by agricultural lands used for grazing and crops. Development is very limited and consists primarily of rural residences and farm buildings. I-84, Interstate 82 (I-82), and Highway 395 are the major roadways traversing the 8-km (5-mile) radius. These highways offer the primary vantage points from which the public would have views of the proposed cogeneration facility.

Table 2.11-2. Typical Electric and Magnetic Field Strengths from BPA Transmission Lines

Transmission Lines	Electric Fields	Magnetic Field	
		Maximum[1]	Average[2]
115-kV			
Maximum on ROW	1.0	63	30
Edge of ROW	0.5	14	7
60 m (200 feet) from Center	0.01	1	0.4
230-kV			
Maximum on ROW	2.0	118	58
Edge of ROW	1.5	40	20
60 m (200 feet) from Center	0.05	4	2
500-kV			
Maximum on ROW	7.0	183	87
Edge of ROW	3.0	62	30
60 m (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
Note: Above information obtained from BPA study to characterize nearly 400 transmission lines located in the Pacific Northwest.

Existing transmission lines and towers in the project vicinity are generally visible from a distance of 1.6 km (1 mile), but beyond this distance the lines and towers tend to fade into the background. Transmission lines and towers are currently a dominant feature in the northern portion of the project vicinity due to their convergence near the McNary Dam and McNary Substation.

The Umatilla County Comprehensive Plan identifies a number of sites and vistas that are considered key scenic areas in the project vicinity. Among the key scenic areas are: Lake Umatilla, Lake Wallula, Hat Rock State Park, Cold Springs Reservoir, Wallula Gap, McKay Reservoir, McNary Lock and Dam, and Umatilla County Scenic-Historic Road. None of the key scenic areas are in the viewshed of the proposed cogeneration facility.

The Umatilla County Scenic-Historic Road, consisting of a collection of county roads, city streets, and state highways, follows the general course of early wagon roads between Umatilla and the Blue Mountains. In the Umatilla/Hermiston area, the road traverses south from U.S. Route 730 along the Umatilla River Road into downtown Hermiston. There the road travels south along the Hermiston/Hinkle Road for approximately 3.2 km (2 miles) to the intersection with Feedville Road. The road turns east along Feedville Road (which the proposed Eastern 500-kV Alternative would parallel for approximately 3.9 km [2.4 miles]) to Highway 395 and then follows this highway into Stanfield. There are currently no signs or markers indicating the location of this historical resource within the project vicinity.

The proposed cogeneration facility site is located on a 6.9-ha (17-acre) parcel of land in an industrial area of unincorporated Umatilla County. The parcel is currently used for agricultural

production and is adjacent to the J.R. Simplot potato processing plant. Other industrial facilities and agricultural fields are near by.

The dominant existing visual elements of the landscape within an 8-km (5-mile) radius of the proposed cogeneration facility include the J.R. Simplot and Lamb-Weston food processing facilities, and two industrial stacks from other businesses. The J.R. Simplot and Lamb-Weston complexes each consists of a series of buildings and storage yards. The J.R. Simplot plant is located approximately 0.96 km (0.6 mile) east of SR 207, adjacent to the proposed cogeneration facility site. The Simplot plant and its steam plume are visible from portions of SR 207, and the plume is visible from Highway 395 and I-84. The Lamb-Weston facility is visible from I-84 and I-82, and its plume can be seen from SR 207. Two other industrial stacks are located east of Highway 395 near Stanfield and are visible from I-84 and Highway 395. Steam plumes rising from these stacks are highly visible.

Other existing strong vertical elements in the vicinity of the cogeneration facility include grain silos, grain elevators, and other structures used for agricultural purposes; electrical transmission and distribution lines; water towers; and stands of trees interspersed throughout the area, particularly along the Umatilla River and other water drainages.

The proposed transmission line alternatives would be located in land that is generally agricultural, commercial, or industrial. On lands near the routes are structures and facilities that give the lands agricultural, commercial, and industrial character. Vegetation is sparse along the routes and consists largely of agricultural fields, grasslands, and undeveloped lands. The proposed lines would generally follow or be located near some of the numerous existing transmission line routes that feed into the McNary Substation.

The proposed water supply line and gas lines would be primarily located in agricultural and industrial lands. Undeveloped open spaces around and between industrial and agricultural facilities, grasslands, and agricultural fields characterize the landscape the water supply and gas pipelines would pass through.

3.0 ENVIRONMENTAL EFFECTS, HERMISTON

3.1 GEOLOGY, SOILS AND FLOODPLAINS

3.1.1 Geologic Impacts

Landslides

The proposed cogeneration facility site is stable as are the two alternative electrical transmission line routes and gas pipeline routes. The one possible exception is a short segment of the relocated UECA 115-kV line (Western 230-kV Alternative) near the town of Umatilla, where there are some steep slopes of loose materials in and around a gravel pit. There is a remote chance that placing electrical transmission line poles near the cut slopes could promote slope failure or the poles could be damaged if the slopes fail. However, proper engineering and careful siting of transmission poles to avoid areas of steep slopes or areas prone to slope instability will reduce or eliminate the risk of damage to transmission poles.

Erosion

It is possible that during the 30- to 40-year lifespan of the project, the meanders of the Umatilla River will continue to migrate through lateral erosion. The extent of this migration is difficult to predict without detailed monitoring, field work, or modeling. However, the PGT natural gas line route passes close enough to the Umatilla River that significant bank erosion could eventually expose the pipeline. Routine periodic monitoring of bank erosion in the vicinity of the pipeline route would allow sufficient time to relocate the pipe, if necessary, and avoid any adverse impact from erosion.

Volcanic Activity

Eruptions from the Cascade 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 major ashfall. During a moderate eruption, the total ashfall at the cogeneration facility site would be less than 5 cm (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, although filters for industrial and car engines or other devices could get clogged.

Earthquakes

Earthquakes can affect project facilities through four mechanisms: liquefaction, groundshaking, differential settlement, and surface rupture.

Liquefaction is highly unlikely in the project vicinity. However, Holocene alluvium occurs where the electrical transmission line (Western 230-kV Alternative) crosses the Umatilla River. This alluvium is restricted to a narrow ribbon that follows the river channel and adjacent floodplain. These young river deposits are saturated and are probably susceptible to liquefaction.

The project vicinity 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. In general, sites underlain by loose man-made fill on unconsolidated sediments tend to suffer the greatest damage, while sites underlain at shallow depth by bedrock suffer considerably less damage.

The several feet of loose silt to fine-grained sand that blanket the cogeneration facility site and portions of the gas pipeline and electrical transmission line ROWs may be subject to differential settlement caused by earthquake-induced soil compaction.

Surface rupture is a possibility in the vicinity of the project. Final design for all project components will include seismic design and performance criteria to minimize the potential for seismic impact. Near its northern terminus, the 500-kV electrical transmission line crosses the axis of the Service anticline. Evidence of Holocene faulting has been reported on the north side of the Columbia River on the northern continuation of this anticline (Kienle 1980); therefore, there is some poorly defined risk of surface rupture in this area. The return period for surface rupture along this structure is unknown. The southern extension of the Service anticline comes within 0.8 km (0.5 mile) of the cogeneration facility site, and both gas line routes cross it. There are no apparent surface displacements in the vicinity of the site, and the anticline is concealed by flood deposits, indicating a minimum rupture age of about 13,000 years before present (BP).

3.1.2 Soils Impacts

The Quaternary sediments at the proposed cogeneration facility site and along proposed gas and electrical transmission line routes are up to 61 m (200 feet) thick. The soil profile within the sediments at the facility site is up to 2.1 m (7 feet) thick. The soil profile and the upper 0.6 to 0.9 m (2 to 3 feet) of Quaternary sediments could be subject to compaction during construction. Compaction causes a loss of fertility due to decreased aeration, infiltration, and water holding capacity. Disturbance of soils also impairs soil fertility. This occurs when a fertile topsoil layer is mixed with the relatively undeveloped subsoil. It is more difficult for native or ornamental plants to re-establish in compacted and disturbed areas.

Between 47.4 and 64.8 ha (117 and 160 acres) of soil could be affected by construction along the gas pipeline and electrical transmission line options, depending on the routes chosen. Table 3.1-1 shows the amount of soil disturbance, temporary and permanent, along with wind erosion potential, for the two gas routes and two electrical transmission line alternatives. Most disturbance would be temporary, assuming all topsoil is stockpiled and replaced after construction, and land along the proposed ROWs would not be taken out of production. Permanent disturbance along the proposed ROWs would be almost negligible (0.01 ha [0.03 acre]). Approximately 7 ha (17 acres) of soil would be permanently disturbed (taken out of potential agricultural production) at the proposed cogeneration facility site. A total of 2 ha (5 acres) of the soils is Adkins fine sandy loam (0 to 5 percent), which is considered prime farmland (SCS 1988). However, Adkins fine sandy loam is common in the region, and 2 ha (5 acres) is a relatively small area. Therefore, this does not represent a significant loss of prime farmland.

Table 3.1-1 Soils Impacts by Project Component

Project Component/ Alternative	Affected Soil Area (ha [acres])		Erosion Potential (ha [acres])		Prime Farmland (ha [acres])	
	Temporary disturbance	Permanent disturbance	Water[1]	Wind[1]	Temporary Disturbance	Permanent Disturbance
Cogeneration facility site	4.1 (17.0)	4.1 (17.0)	0.0	4.1 (10.0)	2.0 (5.0)	2.0 (5.0)
Waterline route	4.0 (9.8)	0.0	0.0	3.8 (9.3)	0.8 (1.9)	0.0
Western 230-kV Alternative[2]	43.3 (135.4)	0.0	2.4 (5.9)	37.8 (93.4)	3.0 (7.48)	0.0
			2.4 (5.9)	14.6 (36.1)	0.0	0.0
Eastern 500-kV Alternative[3]	33.8 (83.5)	0.0	1.1 (2.6)	33.8 (83.5)	16.0 (39.4)	0.0
NWP connection	21.4 (52.8)	0.0	0.0	21.1 (52.0)	9.72 (24.0)	0.0
PGT connection	9.7 (23.9)	0.0	2.3 (5.7)	9.7 (23.9)	0.0	0.0

1 Includes soils with moderate and high erosion potential
2 Includes UECA 115-kV Relocation
3 Included BPA 500-kV Lower Monumental Relocation
Source: SCS 1988

3.1.3 Floodplain Impacts

Impacts to flood plains would be limited to the temporary effects of constructing the transmission lines of the Western 230-kV Alternative. These effects would be minor ground disturbance during the stringing of the wires to the poles. No practical alternative exists to siting this transmission ROW across the floodplain. Since the poles would not be located in the floodplain (see below), no modification of the floodplain would occur. Table 3.1-2 shows the total area of floodplain affected by each of the project components for each alternative. The overall impact to the floodplains, due to the temporary and limited nature of construction within the floodplains, is negligible.

3.1.4 Mitigation

Many of the potential impacts associated with geological hazards and soils will be mitigated using current construction and design techniques. Specific mitigation measures include the following:

Table 3.1-2. Floodplain Area Affected

Project Component	*Floodplain area affected (ha [acres])*[1]
Cogeneration facility site	0.0
Waterline route	0.0
Western 230-kV Alternative[2]	0.19 (0.46)
Eastern 500-kV Alternative[3]	0.0
NWP connection	0.0
PGT connection	0.0

1 Note: All effects to the floodplain would be temporary, as the floodplain configuration would not be changed; assumes a 15.2-m (50-foot) construction ROW for electrical transmission lines
2 Including UECA 115-kV line Relocation
3 Including BPA 500-kV Lower Monumental Relocation

Geologic Impacts

- To avoid the risk of slope failure associated with the quarry east of the Umatilla River along a portion of the relocated UECA 115-kV route (Western 230-kV Alternative), placement of electrical transmission poles will include setbacks from cut slopes.

- Electrical transmission poles will be placed to avoid, to the greatest extent possible, the narrow strip of alluvium along the Umatilla River that may be subject to liquefaction. If this strip cannot be avoided, the transmission poles would be constructed so as to otherwise mitigate the risk of liquefaction.

Soils Impacts

- An Erosion and Sediment Control Plan (ESCP) has been developed that addresses all soils mitigation measures associated with construction of the project. This plan covers timing and sequencing of construction, placement of sediment barriers and runoff control features, and revegetation. Implementation of the ESCP will make the amount of sediment leaving construction sites negligible.

- To offset potential impacts from soil compaction, compacted areas that are left after construction will be scarified and aerated. After backfilling of the gas pipeline trench, the top 0.3 m (1 foot) of fill will not be compacted.

- Because of susceptibility of soils in the project vicinity to wind erosion, precautions will be taken during construction to minimize erosion. This will include watering all temporary and dirt/gravel access roads or covering with gravel. Also, a minimum working area will be established along the electrical transmission line and gas pipeline ROWs during construction to minimize soil exposure to wind. This will minimize the total exposed soil at any one time. Areas disturbed by construction that are not permanently occupied by plant equipment or are

used for plant operation and maintenance will be revegetated upon completion of construction. Revegetation will emphasize the use of native species.

- In areas with prime farmland, topsoils and subsoils will be segregated during construction of the pipeline to minimize impacts on soil fertility. The segregated topsoils and subsoils will be replaced in the proper sequence and location to preserve soil fertility.

Floodplain Impacts

- Transmission poles will be placed to avoid the 100-year floodplain.

3.1.5 Unavoidable Adverse Impacts

Unavoidable impacts include the loss of approximately 6.9 ha (17 acres) of farmland soil to the cogeneration facility. Some of this farmland (2 ha [5 acres] in Adkins fine sandy loam) is considered prime when slopes are less than 5 percent. However, the cogeneration facility site is currently zoned for heavy industry use. In addition, some wind and/or water erosion of soils at the construction site will occur, although proper erosion control measures will reduce this impact to negligible levels. Along the 500-kV Alternative transmission line route, a maximum of 0.013 ha (0.033 acre) of farmland would be lost because of pole/tower placement. Overall, unavoidable impacts to geology and soils from the project are considered low.

3.1.6 Cumulative Impacts

Cumulative impacts on geology can result from development on unstable ground. However, the proposed cogeneration facility would be located on a nearly flat site and the pipelines and electrical transmission lines would be located on gentle slopes, with negligible chance of landslides occurring. Although the proposed project is expected to contribute to growth in the region, most sites for development in the Umatilla/Hermiston area are not subject to slope instability. Therefore, the project is considered to have a minor contribution to cumulative impacts on slope stability or other geologic resources.

Cumulative impacts to soils can result from displacement of agricultural lands or loss of soils due to erosion. The proposed cogeneration facility site would be located on land zoned for industrial use and its agricultural use would not likely be continued. The pipelines and electrical transmission lines would be located primarily in agricultural areas, but these project components would have insignificant permanent loss of land for agricultural use. Another cogeneration facility is planned to be located 4.8 km (3 miles) to the west. This facility will not eliminate significant amounts of prime farmland; however, continued development over the next several decades could decrease the total amount of available farmland or cause a shift to farming more marginal areas. However, large areas of arable land are found throughout the region, and significant displacement of agricultural lands over the project lifespan is unlikely. The proposed project would, therefore, have a low cumulative impact on soils in the region.

3.2 WATER RESOURCES

3.2.1 Water Quantity Impacts

The average water demand for the project of 7,359 lpm (1,885 gpm) represents 2.8 percent of the Port of Umatilla's allocation of 4.4 cms (155 cfs) (263,346 lpm [69,569 gpm]). Although the Port of Umatilla is not yet withdrawing water from the Columbia under its existing water allocation, the quantity of water required for the proposed project (0.12 cms [4.2 cfs]) (7,359 lpm [1,944 gpm]) is minuscule compared to the 4,808 cms (169,800 cfs) (288,490,384 lpm [76,211,334 gpm]) flow in the Columbia River at McNary. The project would increase impervious surfaces at the proposed cogeneration facility, potentially increasing runoff from the site. To control increases in stormwater runoff from the cogeneration facility site, a stormwater management system has been designed. Stormwater runoff from these areas would be conveyed into a detention basin designed to handle the 100-year, 24-hour storm event. This could result in a very small decrease in groundwater recharge, but would have a minor effect on groundwater quantity.

3.2.2 Water Quality Impacts

Land application of the 553 lpm (146 gpm) project wastewater effluent would be managed during the non-growing season to prevent nitrogen build-up because of lack of plant uptake of nutrients, and runoff of effluent over frozen ground. During the period of intermittent freezing of soil surfaces (November 16 to March 15), process water effluent incorporated into the Simplot land application system would be temporarily stored in an existing 644-million l (170-million gallon) storage pond, capable of storing the combined process water for a maximum of 113 days. The pond would store process water during the late fall and winter for reuse during the growing season.

A recent study (Cascade Earth Sciences Ltd. 1994) has shown that there is "no significant negative effect associated with the discharge of cogeneration plant wastewaters to Simplot's process water agricultural recycle system or sanitary wastewater treatment system." Furthermore regarding groundwater, "process water discharged from the cogeneration plant to Simplot's process water agricultural recycle system will result in a decline of 1.2 percent in total salt concentrations and 14 percent in total nitrogen concentrations." Based on the study data, Oregon Department of Environmental Quality (ODEQ) has approved discharge of cogeneration plant wastewaters to Simplot's system, and no adverse impacts are anticipated.

The project would store and use a number of chemicals that, if spilled or otherwise accidentally released, could potentially contaminate local and regional surface waters and underlying aquifers. Mitigation measures included in project design and recommended in this EIS would protect surface and groundwater from spill contamination, as further discussed in Section 3.11 (Public Health and Safety).

Water quality in the Umatilla River at the two Western 230-kV Alternative river crossings could be adversely affected by erosion and sedimentation during construction. Mitigation measures and design features are further discussed in Section 3.1 (Geology, Soils, and Floodplains).

3.2.3 Mitigation

The following measures will be implemented to mitigate potential impacts to water quantity and quality:

- The project design will incorporate a number of water conservation measures including dry NO_x control, reduced cooling water drift, and effluent process water management.
- Effluent from the plant will be used for crop irrigation which will reduce the amount of water drawn from area aquifers for irrigation.
- A comprehensive construction stormwater management plan will be prepared to prevent erosion or sedimentation from potential construction runoff.
- The fuel oil, ammonia, and sulfuric acid tanks will have secondary containment using impermeable liners and surrounded by dikes. Additionally, The sulfuric acid storage area enclosed by the dike will be partially filled with coarse limestone to passively neutralize any leakage from the tank. Other chemicals stored outside in tanks will also have secondary containment to control any spills.
- In the event of a spill, all fluids in the containment area will be inspected to determine if they contain hazardous materials. If any hazardous materials are in the containment area, they will be removed and treated/disposed of in an appropriate manner according to applicable regulations.

3.2.4 Unavoidable Adverse Effects

The proposed project would require an average water withdrawal of 0.12 cms (4.2 cfs) (7,135 lpm [1,885 gpm]) from the Columbia River, already accounted for in the Port of Umatilla's water rights allocation. The average flow of the Columbia River at McNary is approximately 5,600 cms (200,000 cfs) (339,800,216 lpm [89,766,000 gpm]). Therefore, this withdrawal would have a minor impact on the quantity of water remaining in the river to support other uses. Properly managed land application of the project's wastewater (as planned) will likewise have a minor impact on surface or groundwater quality. Therefore, impacts to water resources are considered low.

3.2.5 Cumulative Impacts

The proposed project water use would contribute incrementally to local and regional cumulative impacts associated with water withdrawals from the Columbia River. Locally, two other power generation facilities are proposed: (1) the Coyote Springs Cogeneration Project in Morrow County near the town of Boardman, and (2) the Hermiston Generating Project 4.8 km (3 miles) east of the proposed project.

The proposed Coyote Springs project would consume approximately 0.16 cms (5.6 cfs) (9,513 lpm [2,513 gpm]), supplied by either: (1) Port of Morrow groundwater wells, which the Oregon Department of Water Resources has determined are hydrologically connected to Columbia

River flows (Energy Facility Site Council [EFSC] 1994); or (2) 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 Hermiston Generating Project would consume approximately 0.11 cms (3.8 cfs) (6,458 lpm [1,706 gpm], supplied from the Port of Umatilla's Columbia River allocation.

Permitted water rights in the vicinity of the three projects are not currently being used to the maximum extent. Actual water usage will increase if these plants come on line, and impacts to regional water resources beyond current conditions may result.

The Port of Umatilla holds a water right for withdrawing 4.4 cms (155 cfs) (263,346 lpm [69,569 gpm]) from the Columbia River. The cumulative impacts to the Port of Umatilla's supply from the Hermiston Generating Project and the proposed project's use of 0.229 cms (8 cfs) (13,593 lpm [3,591 gpm]) would be about 5 percent of the Port's allocation. This would be a low cumulative impact on the Port's water supply.

The withdrawal of an average 0.12 cms (4.2 cfs) (7,135 lpm [1,885 gpm]) for the proposed cogeneration facility could result in the potential 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, or about 0.0023 percent of the annual 32.8 million MWh output of the four projects. The generation foregone due to the withdrawal would need to 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 Hermiston Generating Project and Coyote Springs projects, and other water withdrawals. Each would very slightly reduce the quantity of water remaining in the river to support other uses.

3.3 Air Quality

3.3.1 Criteria Pollutant Emissions

The proposed cogeneration facility would include two natural gas fired turbines operating in combined cycle mode, with two HRSGs and two steam turbines. The HRSG would be a duct fired, natural circulation, three pressure, reheat design. The cogeneration facility would employ Best Available Control Technology (BACT) for NO_x, volatile organic compounds (VOCs), carbon monoxide (CO), particulate matter, and toxic compounds to minimize air emissions from the gas turbines. The duct burners would occasionally be used to add heat to the HRSG when additional steam or electricity production is required. Exhaust gas from each turbine would pass through the HRSG and the Selective Catalytic Reduction (SCR) unit, and would be vented to the atmosphere. The stacks would meet Good Engineering Practice (GEP) height requirements to eliminate the

potential for aerodynamic downwash of emissions caused by adjacent or nearby buildings. Cooling water for the condensers would be supplied from a cooling tower. Vendors for the cogeneration facility components have not yet been chosen.

The EPA and ODEQ require that all new sources of air emissions with the potential to emit significant quantities of air pollutants undergo a rigorous permitting process. Facilities classified as major new or modified sources (i.e., emitting more than 91 MTY [100 TPY] of any air pollutant) are subject to New Source Review (NSR). The ODEQ has regulatory authority responsible for review of Air Contaminant Discharge Permits and Prevention of Significant Deterioration (PSD) applications. The proposed project would emit NO_x in excess of 91 MTY (100 TPY) and is therefore subject to PSD review. The proposed project must demonstrate the employment of BACT through a control technology evaluation, demonstrate compliance with air quality standards and PSD increments, assess the project consequences on soils, vegetation, growth, and visibility in the PSD Class I areas, and perform a BACT and impact analysis for emissions of hazardous air pollutants.

The proposed project would generate air pollutants from the combustion of natural gas in each of two identical combustion turbines. The facility would at times be required to operate at less than full load. BPA has stipulated that the facility be able to operate at reduced load when the demand for electrical power drops. Reducing the load requires less fuel and reduces emissions of pollutants directly correlated with the quantity of fuel combusted (NO_x and particulate matter). However, at reduced load, emissions of pollutants related to efficiency (CO and VOCs) may increase.

In the event of natural gas curtailment, low sulfur No. 2 distillate oil would be used as a backup. Fuel oil would be used no more than 378 hours per year while operating both gas turbines at full load. Supplemental duct firing would not occur while fuel oil was being burned. During oil burning NO_x emissions would be controlled by the use of water injection and the SCR.

Best Available Control Technology

As a major new source of air emissions, the proposed project would be required to demonstrate that air emissions will be controlled to the extent which is economically and technologically feasible. The demonstration of this control is referred to as BACT. EPA recommends the "top down" evaluation process for BACT analyses. This approach ranks all available control technologies in descending order of control effectiveness. The most stringent or "top" alterative is examined first; this alternative is established as BACT unless the applicant demonstrates to the satisfaction of the permitting authority that technical, energy, environmental, or economic considerations justify a less stringent technology. If the most stringent technology is eliminated, then the process is repeated for the next most stringent alternative.

For the proposed project, BACT design information will be documented in the air permit application and reviewed by the ODEQ. The proposed controls for the project are summarized in Table 3.3-1.

The use of low-NO_x burners followed by SCR for additional NO_x reduction are considered BACT for the project. For steady state operations at full load, NO_x emissions will be limited to 4.5 parts per million by volume (ppmv). For changing loads and partial load operations, NO_x emissions will be limited to 6 ppmv. The use of SCR requires the use of ammonia. Secondary

Table 3.3-1. Proposed Control Technologies

Pollutant		Proposed BACT
NO_x	Natural Gas Firing	Low NO_x combustors with SCR
	Fuel Oil Firing	Water injection and SCR
CO		Good combustion control
SO_2		Low sulfur bearing fuel
VOC		Good combustion control
PM_{10}		Good combustion control, use of fuel with low ash content
Toxics		Good combustion control, use of fuel with low ash content

Source: EMCON 1994a and 1994b

emissions due to ammonia slip are guaranteed by the SCR manufacturer to be less than 10 parts per million by dry volume (ppmdv). Control of ammonia slip from the project will be accomplished with adequate mixing and proper combustion control. During oil combustion, water injection and SCR will be used to control NO_x emissions.

CO and VOC emissions will be minimized by controlling the parameters that affect formation of these pollutants, including the amount of excess oxygen, flame temperature, residence time, and combustion zone design. Good combustion control does not result in increased emissions of other pollutants and is considered BACT for the project. The use of natural gas as a fuel is considered BACT for particulate matter and sulfur dioxide (SO_2). Emissions of toxic air pollutants (TAPs) are related to particulate matter and VOC emissions and will be minimized by the same control techniques as these pollutants.

The proposed project will be operated with the control equipment in accordance with vendor recommendations and generally accepted practices to prevent excessive emissions and to minimize fuel consumption.

Modeling

Maximum air quality emission concentrations from the project were predicted using dispersion models that assumed, maximum emissions, and worst-case meteorology. (The project is currently gathering site-specific air quality and meteorological data which will be used in a permit application for backup fuel oil.) The COMPLEX1 and Industrial Source Complex Short Term (ISCST2) models were used in the analysis (EPA 1986, 1992). Dispersion is influenced by local terrain, short-term meteorological conditions, and the influence of buildings near the stack. The ISCST2 model was used to predict concentrations at receptors whose elevation is less than the height of the plume (1,300 feet msl). COMPLEX1 was used to predict concentrations at elevations greater than the elevation of the top of the stack (800 feet msl). Receptors located at elevations between the top

of the stack and the height of the plume were modeled with both ISCST2 and COMPLEX1, and the larger predicted concentration was used in the analysis. The COMPLEX1 and ISCST2 models address these features and their use is recommended by EPA (EPA 1993).

The models require emission rates as part of the input data. The modeled emission rates were based on the pollutant-specific potential to emit presented in Table 3.3-2. Additional input data, including the stack exit velocity and temperature, were based on engineering data. The modeling predicted project-related concentrations in simple, elevated, and complex terrain that surrounds the cogeneration facility site. The models predicted maximum 1-hour concentrations, which were converted to averaging periods corresponding to the AAQS by multiplying by the following factors (ODEQ 1993b):

Averaging Period	Simple Terrain	Complex Terrain
8-hour	0.7	0.75
24-hour	0.4	0.25
Annual Average	0.08	0.08

Table 3.3-2 Maximum Project Emissions (Potential to Emit)

	Pollutant (MTY [TPY])				
	NO_x	PM_{10}	CO	SO_2	VOC
Turbine					
Natural Gas	313.7 (345.8)	69.2 (76.3)	715.5 (788.8)	4.9 (5.4)	39.0 (43.0)
Fuel Oil	27.8 (30.6)	23.1 (25.5)	100.1 (110.4)	30.8 (34.0)	3.1 (3.4)
	341.4 (376.4)	85.6 (94.4)	815.7 (899.2)	35.7 (39.4)	42.1 (46.4)
Federal Significant Emission Rate	36 (40)	14 (15)	91 (100)	36 (40)	36 (40)

Source: EMCON 1994b

Maximum predicted criteria air pollutant concentrations resulting from project emissions are presented in Table 3.3-3 for emissions from both turbines. The predicted concentrations are less than the AAQS or the PSD Class II increments, and the De Minimis monitoring levels. The predicted concentrations are greater than the Oregon Significant Impact Levels (SILs) for PM_{10} and the Federal and Oregon NO_2. The predicted annual NO_2 concentration is above the SIL for only one of the four turbines under consideration. If the gas turbine is selected, the proposed project would restrict its operation in such a way that the annual NO_2 concentration would remain below

Table 3.3-3 Predicted Air Pollutant Concentrations

Pollutant	Maximum Concentrations ($\mu g/m^3$)	AAQS ($\mu g/m^3$)	PSD Increment (Class II) ($\mu g/m^3$)	De Minimis Monitoring Levels ($\mu g/m^3$)	Oregon SILs ($\mu g/m^3$)
PM_{10} (annual)	0.238	50	17		0.2[1]
PM_{10} (24-hour)	8.3	150	30	10	1.0[1]
CO (8-hour)	76	10,000		575	500
CO (1-hour)	108	40,000			2,000
NO_2 (annual)	1.002	100	25	14	1

1 Federal Significant Impact Levels are 1.0 $\mu g/m^3$ for the annual average and 5.0 $\mu g/m^3$ for the 24-hour average.
Source: EMCON 1994b

1.0 $\mu g/m^3$. The maximum predicted 24-hour and annual average PM_{10} concentrations are greater than the Oregon SILs for fuel oil firing. The maximum predicted 24-hour PM_{10} concentration is greater than the Oregon SIL for natural gas and fuel oil firing, and greater than the Federal SIL for fuel oil firing. Operational restrictions would be imposed to maintain the 24-hour PM_{10} concentrations less than the Oregon SILs. The proposed project will restrict its use of duct burners during periods when the ambient temperature is above 29°C (85°F).

Dispersion modeling was conducted for a number of combinations of ambient temperature and operating load. Maximum concentrations would occur for a variety of emission and ambient conditions. CO and VOC emissions would be greatest for reduced loads; NO_x, SO_2, and PM_{10} emissions would be greatest for full load. Annual average concentrations should be predicted for average meteorological conditions. Cooler temperatures produce greater exit velocity and higher plume rises, maximizing concentrations in elevated terrain. Summer conditions favor maximizing concentrations at lower elevations. Maximum concentrations were predicted for 100, 80, and 60 percent load, and temperatures that represent two winter conditions, an average daily condition, an annual average condition, and a summer condition. Annual average concentrations were predicted using the annual average temperatures, emission, and from natural gas and fuel oil firing for base load conditions. The location of the maximum predicted concentrations are in the elevated terrain to the east-southeast through the west-southwest from the proposed site, at distances of 9 to 14.5 km (5.6 to 9 miles) from the site.

The proposed project would also be a source of TAPs. Annual emissions of ammonia would be greater than 9.1 metric tons (10 tons). Therefore, dispersion modeling was required to determine the ambient concentrations of the TAPs. TAP emissions were modeled following the same methodology used for the criteria pollutants. The maximum possible emissions were modeled using worst-case meteorological data. The predicted concentrations were then adjusted by application of multiplication factors. The maximum 1-hour concentrations predicted by ISCST2/COMPLEX1 hybrid model BEEST-X were multiplied by 0.4 and 0.08 to obtain 24-hour and annual average

concentrations, respectively (ODEQ 1993b). Concentrations of representative TAPs were compared to the Oregon SILs. Maximum predicted TAP concentrations are less than the Oregon SILs (Table 3.3-4).

Table 3.3-4 Ambient Concentrations of Toxic Air Pollutants

Toxic Air Pollutant	Averaging Time	Concentration ($\mu g/m^3$)	
		SIL	Predicted
Gas Fired			
1,3-Butadiene	Annual	0.036	0.002
Ammonia	24-hour	360	4.33
Benzene	Annual	1.2	0.01
Formaldehyde	Annual	0.8	0.018
Sulfuric Acid	24-hour	10.0	2.46

Source: EMCON 1994b

Turbines and control equipment for four manufacturers are being evaluated for the Hermiston Power Project. Each of the turbines has different projected emission rates. To evaluate the consequences of operating the cogeneration facility on Hermiston air quality, maximum annual emission rates for each pollutant were chosen from four sets of emissions data. Maximum emissions for the project (Table 3-3.2) are based on the following assumptions:

- SO_2 emissions are based on a natural gas sulfur content of 2 grains per standard cubic foot, and fuel oil sulfur content of 0.05 percent by weight.
- All particulate matter are assumed to have an aerodynamic diameter of less than 10 microns (PM_{10}).
- The SCR reduces NO_x emissions by 76 percent.
- Annual NO_x emissions include 8,382 hours of natural gas firing at 100 percent load with supplemental duct firing, and 378 hours of oil firing without duct firing.
- CO emissions are based on firing at 100 percent load for 6,922 hours with duct firing, 60 percent load for 1,460 hours without duct firing, and fuel oil firing at 100 percent load for 378 hours without duct firing.

Estimated emissions would exceed the significant emission rates for NO_x, PM_{10}, CO, and VOCs. Thus, the project would be considered a major new source and is subject to PSD review. The air quality impact analysis considers only these criteria pollutants.

Construction of the project's buried and overhead transmission lines would result in the generation of fugitive dust and exhaust from the construction equipment. These short-term localized emissions are not subject to regulatory review and would result in small ambient air quality concentrations. The application of water to the access roadways during construction by spray trucks will minimize fugitive dust. There would be no direct emissions to the air resulting from the operating transmission lines.

3.3.2 Emissions of Toxic Air Pollutants

Toxic air pollutants are formed as part of the combustion process and are emitted in small quantities along with the exhaust flow. Small quantities of ammonia are also emitted as a result of ammonia slip from the treatment of NO_x in the SCR. If the quantity of TAPs emitted by the facility is greater than emission rates specified by ODEQ, dispersion modeling is required to demonstrate that ambient concentrations of the pollutants are less than threshold levels.

Toxic emissions from gas- and oil-fired turbines and the gas fired duct burners were estimated using VOC and particulate matter specification tables from the California Air Resources Board (CARB 1991). Maximum potential emissions of toxic air pollutants are based on base load with duct firing. Emissions of TAPs are presented in Table 3.3-5. Emission rates for ammonia, sulfuric acid, benzene, formaldehyde, and 1,3-butadiene are expected to be greater than the Oregon significant emission rates.

3.3.3 Effects on Class I Areas

Visibility

The visibility in the atmosphere may be affected by emissions of particulate matter directly into the air, by the presence of NO_2 gas, and by secondary aerosol formation from SO_2, sulfate (with two additional electrons; SO_4^{2-}), NO_x, and CO emissions. PSD air quality regulations also require the evaluation of visibility impairment for the Eagle Cap and Strawberry Mountain Wilderness Areas. Visibility impacts related to the project were also evaluated for the Columbia River Gorge National Scenic Area, located 180 km (112 miles) west of Hermiston.

Visibility degeneration resulting from project emissions was assessed using the EPA visibility model VISCREEN, following the guidance provided by EPA (1988) for a Level 1 analysis. The VISCREEN model estimates the contrast between the plume and the background, and the plume perceptibility (color difference) parameter, ΔE, which is a function of difference in brightness, color hue, and saturation. The contrast and ΔE parameters are calculated separately for sky and terrain backgrounds. The model considers different sun angles and plume/viewer angles, and determines the maximum possible visibility impact. The Level 1 analysis uses worst-case meteorology.

The visibility analysis used conservative estimates for all parameters, including maximum emission rates from the project, the minimum distance to each Class I area, and very stable turbulence conditions (stability class F, wind speed equal to 1 m/second). The emission plume was modeled with the following background visual ranges:

Table 3.3-5 Toxic Air Pollution Emission Rates

Pollutant	Units	Emission Rate	Significant Emission Rate
Ammonia	lb/8hrs	282	31.0
Sulfuric Acid	lb/8hrs	161	2.0
Benzene	lb/yr	3,366	3,100
Cyclohexane	lb/8hrs	0.61	1,920
Formaldehyde	lb/yr	6,309	2,000
Hexane (all isomers)	lb/8hrs	0.64	3,210
N-Butane	lb/8hrs	6.44	3,500
Pentane (all isomers)	lb/8hrs	9.67	3,300
Toluene	lb/8hrs	1.16	685
1,3-Butadiene	lb/yr	826	93.0
Antimony	lb/8hrs	0.01	0.9
Arsenic	lb/yr	0.62	6.0
Beryllium	lb/yr	0.62	0.8
Cadmium	lb/yr	0.62	14.0
Chromium	lb/8hrs	0.01	0.9
Cobalt	lb/8hrs	0.079	0.09
Copper	lb/8hrs	0.01	2.0
Lead	lb/yr	0.31	1,200
Mercury	lb/8hrs	0.01	0.09
Nickel	lb/8hrs	0.01	0.2
Selenium	lb/8hrs	0.01	0.4
Tin	lb/8hrs	0.03	0.09
Vanadium	lb/8hrs	0.03	0.09

Source: EMCON 1994b

Eagle Cap Wilderness Area	167 km (104 miles)
Strawberry Mountain Wilderness Area	175 km (109 miles)
Columbia River Gorge National Scenic Area	160 km (99 miles)

Visibility degradation resulting from project emissions was predicted for an observer within each Class I area viewing a vista inside the park or wilderness area, and for an observer inside each Class I area viewing a distant vista outside of the park or wilderness area. Results of the analysis predict no adverse impacts on visibility degradation within the Class I areas. In all cases, the largest impact was for a visitor looking outside the park, observing the plume from the cogeneration facility against a sky background. The largest impacts were for the Eagle Cap Wilderness Area (ΔE

= 0.671 and contrast = 0.007) and were much smaller than the screening criteria (ΔE = 2.0, contrast = 0.05).

Deposition

The Class I areas are most sensitive to the effects of sulfur and nitrogen compounds. Based on the available data, the maximum deposition rate for sulfur compounds that can be tolerated by most terrestrial ecosystems is 20 kilograms (kg)/ha/year (44.1 pounds/acre/year). Adverse effects are very unlikely below 5 kg/ha/year (11 pounds/acre/year) (U.S. Department of Agriculture 1992). For areas that contain sensitive lichen species, 5 to 15 parts per billion by volume (ppbv) is the annual average SO_2 concentration that is considered adverse. Injury from nitrogen deposition is not expected if NO_x deposition is less than 3 kg/ha/yr (6.6 pounds/acre/year) and the daily ambient NO_2 concentration is less than 15 ppbv.

The potential for sulfur and nitrogen deposition was evaluated by modeling emissions following the same methodology used for criteria air pollutants. Modeling was performed for receptors placed at the elevation of the plume at the Class I area boundary nearest to the project. Modeling predicted maximum 1-hour ambient concentrations that were converted to other averaging periods by multiplying by 0.25 and 0.08 to obtain 24-hour or annual average concentrations, respectively. Maximum predicted concentrations in the Eagle Cap and Strawberry Mountain Wilderness Areas resulting from project emissions are much less than the PSD Class I increments (Table 3.3-6).

Table 3.3-6 Maximum Predicted Concentrations in PSD Class I Areas

Location	Pollutant	Averaging Period	Maximum Predicted Concentration ($\mu g/m^3$)	PSD Class I Increment ($\mu g/m^3$)
Eagle Cap Wilderness Area	PM_{10}	24-hour	0.199	10
		Annual	0.006	5
	NO_2	Annual	0.025	2.5
Strawberry Mountain Wilderness Area	PM_{10}	24-hour	0.183	10
		Annual	0.005	5
	NO_2	Annual	0.021	25

Source: EMCON 1994b

Sensitive vegetation in the Wilderness Areas may be damaged by elevated concentrations of nitrogen, sulfur, or ozone. This aspect of the analysis compares concentrations of SO_2 and NO_2 in the Class I areas to limits suggested by the U.S. Department of Agriculture (1992). The proposed project would primarily combust natural gas, thus minimizing SO_2 formation. Total emissions of SO_2 and VOCs are below the significant emission limits and would not affect the Eagle

Cap and Strawberry Mountain Wilderness Areas. Only NO_x emissions from the cogeneration facility are appropriate for evaluating potential soils and vegetation impacts.

Maximum modeled 24-hour NO_2 concentrations in the Wilderness Areas (Table 3.3-7) are very small (less than 0.1 percent) and would have a negligible effect on trees and herbaceous plants. Because SO_2 and VOC emissions from the cogeneration facility would be below the significant emission levels, the effect on lichens and bryophytes would also be negligible.

Table 3.3-7 Predicted Concentrations in Class 1 Areas

Location	*Pollutant*	*Averaging Period*	*Maximum Concentration (ppbv)*[1]	*Suggested Limits (ppbv)*
Eagle Cap Wilderness Area	SO_2	Annual	-	5
	NO_2	24-hour	0.0128	15
Strawberry Mountain Wilderness Area	SO_2	Annual	-	5
	NO_2	24-hour	0.0105	15

Source: EMCON 1994a
1 ppbv - Parts per billion by volume

3.3.4 Cooling Tower Plume Effects

Unusable excess heat from the project would be dissipated to the atmosphere by the evaporative cooling towers. Air leaving the cooling tower is warmer than the surrounding air, and is saturated with as much moisture as it can carry. As the air mixes with the surrounding atmosphere, it cools and loses its ability to carry the moisture that it gathered in the cooling tower. The moisture then condenses into liquid water droplets that form a visible plume. As the plume is carried downwind, the liquid water droplets will evaporate and the plume will gradually disappear. If the ambient air is saturated, a fog or cloud will already exist and the cooling tower plume will not have a visible impact other than that which is already present.

The potential impacts from a cooling tower plume are as follows:

- The condensed water droplets are visible and can obscure or impair the view from locations in the vicinity of the cogeneration facility site.
- The plume can create a ground shadow that can create a loss of incoming solar energy for some croplands immediately adjacent to the facility.

- Some of the water droplets may contact the ground before being re-evaporated, causing a slight increase in precipitation at locations immediately adjacent to the combustion turbine facility site.

- During certain wind conditions, the cooling tower plume can become bent over and create a localized fog that may impair driving conditions.

- When a bent-over plume contacts the ground during freezing conditions, a layer of ice may form on surfaces including roadways and powerlines.

- A small quantity of droplets, referred to as drift, comprised of water that was not evaporated from the cooling tower and subsequently recondensed. The drift contains impurities found in the cooling water including dissolved salts, metals, and algae growth suppressants. These impurities will be deposited when the drift droplets evaporate in ambient air.

An evaluation of the impacts expected to result from the linear mechanical draft cooling tower plume was conducted (Heydarpour 1994). The analysis utilized the SACTI model (Argonne National Laboratory 1984) and 5 years of meteorological data from Pendleton, Oregon. The SACTI model predicted the visible plume length frequency, the number of hours of ground icing, the number of hours of plume fogging, and the amount of drift deposition.

The SACTI model predicted that visible plume would occur, but the frequency of long plumes would be very small (Figure 3.3-1). Maximum plume lengths would be on the order of 3,900 m (12,795 feet) with a frequency of 1 percent, and plume lengths less than 1,300 m (4,265 feet) would occur 90 percent of the time. Cooling tower plume lengths of 1,400 m (4,593 feet) or more would occur at a frequency of 10 percent of the hours per year. Pictorial examples of typical and worst-case plume lengths are presented in Figure 3.3-2 for winds parallel and perpendicular to the cooling towers.

The number of hours of fogging, and icing were also predicted by the SACT1 model. Fogging resulting from operation of the cooling towers affects an area located in the east-northeast through south directions from the site (Figure 3.3-3). Two hours per year would produce fogging conditions for the Simplot access roads. No fogging is predicted for major transportation routes in the area of the CT facility site. For the 5 years of meteorological data analyzed, no hours of icing were predicted for distances greater than 400 m (1,312 feet) from the cooling tower. Only a few hours of icing were predicted for 1 out of 5 years of data analyzed, for an area to the south of the towers (Figure 3.3-4).

Salt deposition patterns for the area surrounding the cooling tower were predicted by the SACTI model. Assuming a dissolved solids concentrations of 0.0052 g per gram of solution, The highest salt deposition rate occurs at a location 200 m (656 feet) east of the cooling tower, within 1 km (0.6 mile) of the cooling tower, and is equal to 0.287 g/square m per month (Figure 3.3-5). This level of deposition is not expected to have an adverse environmental impact.

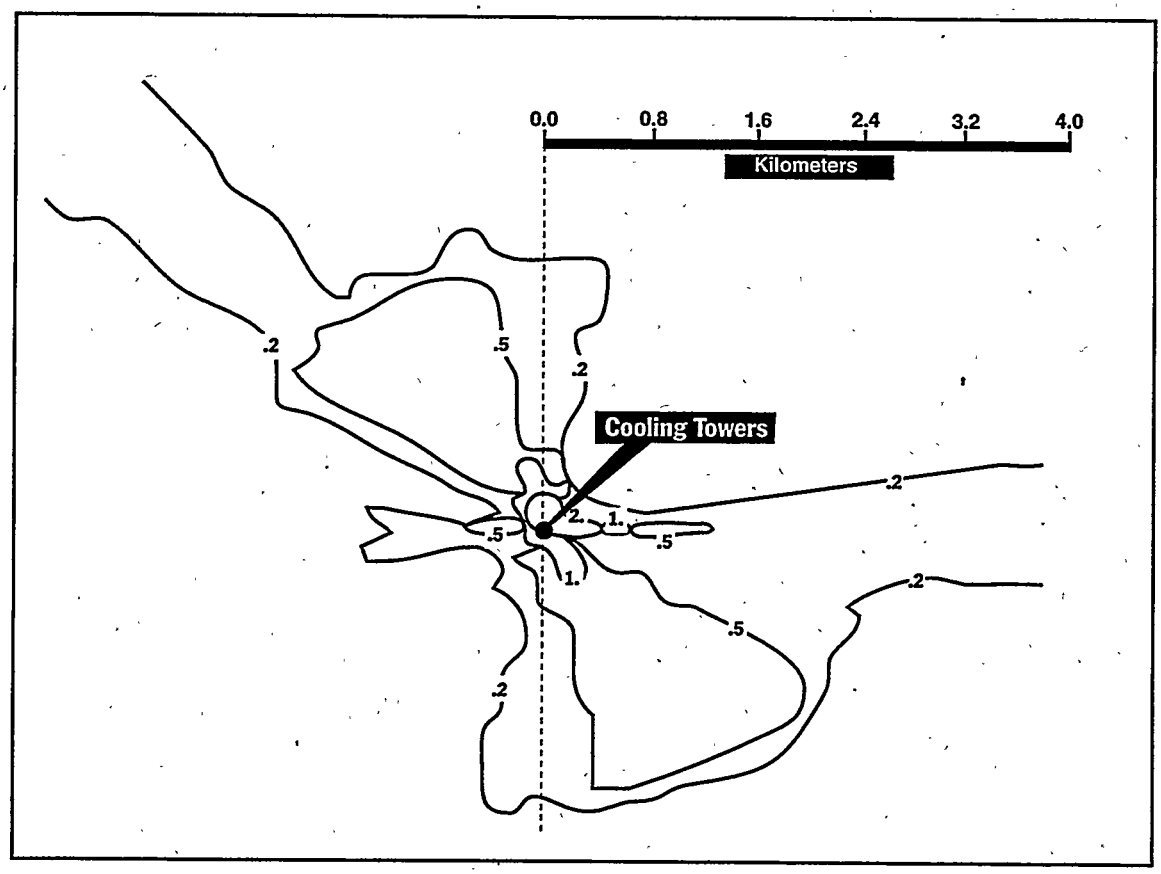


Figure 3.3-1 Plume Length Frequency (in percent), 1990 Meterology

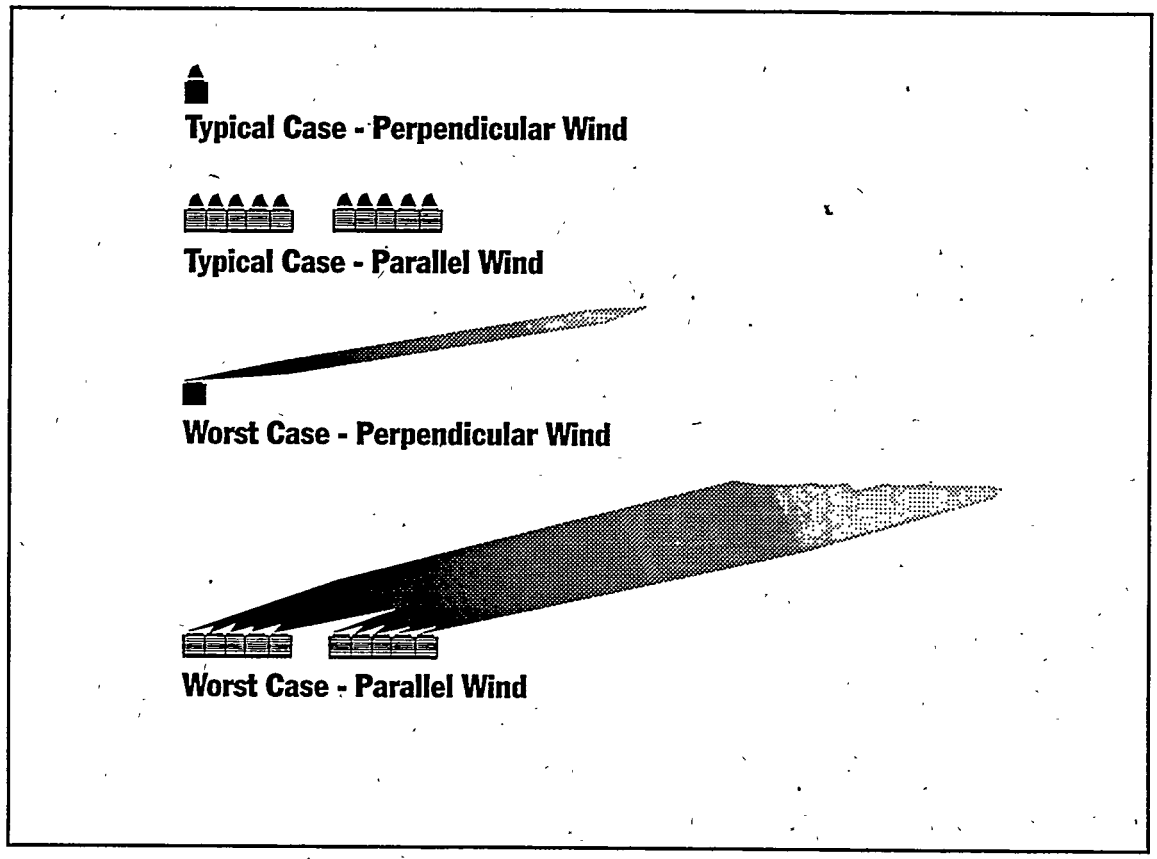


Figure 3.3-2 Typical and Worst-case Plume Length

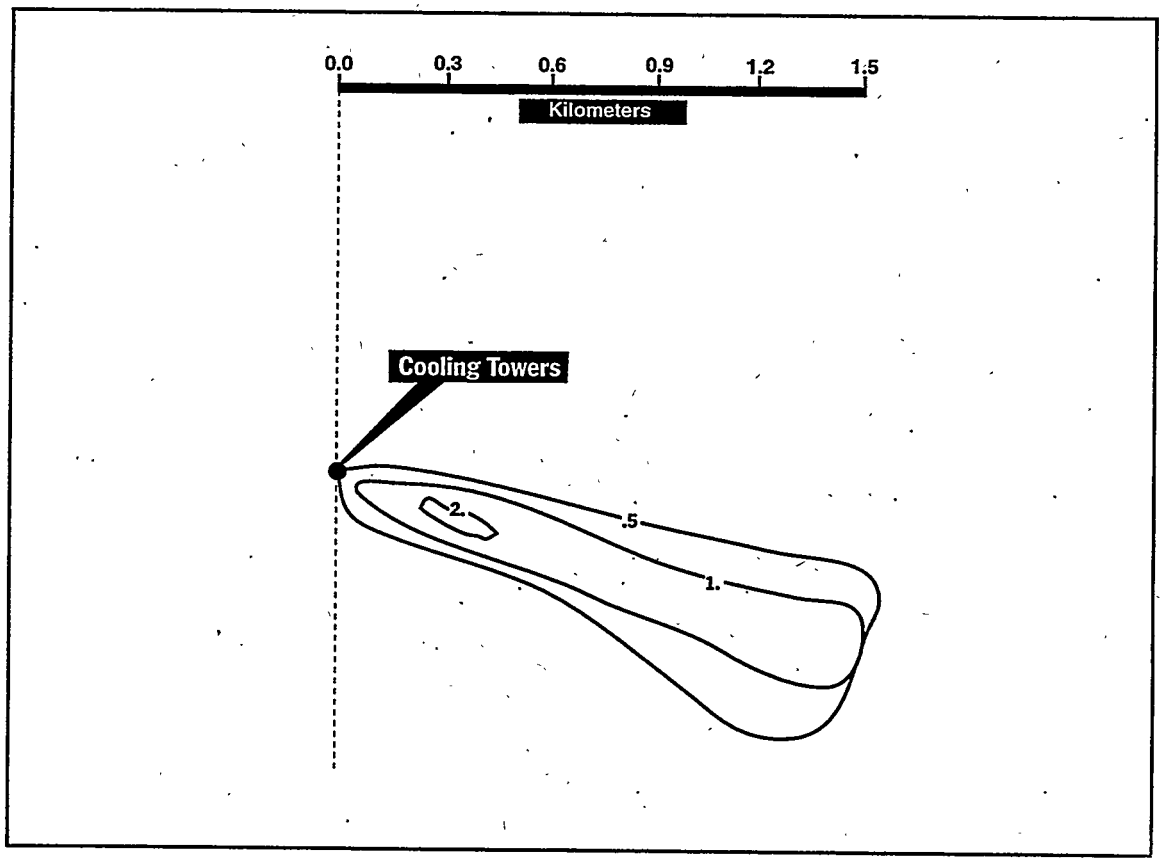


Figure 3.3-3 Number of Hours of Plume Fogging, 1986 Meteorology

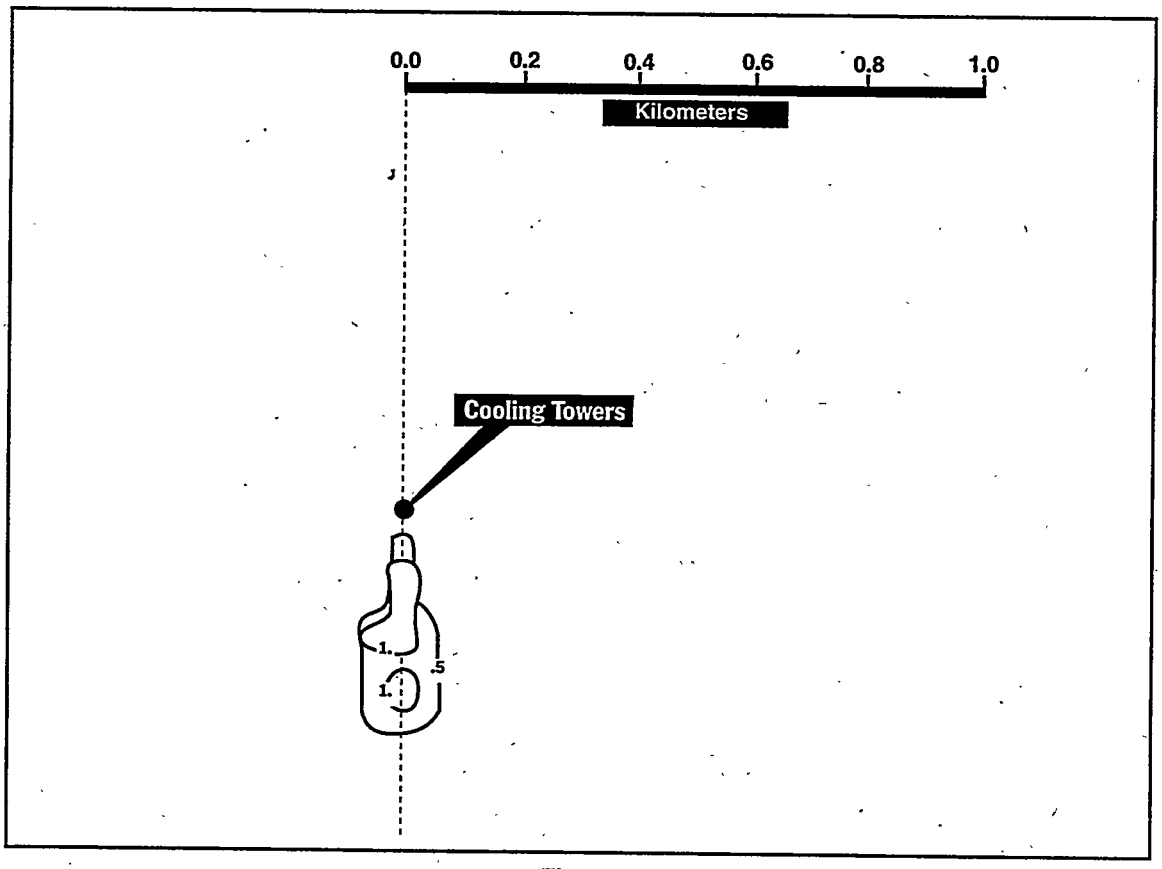


Figure 3.3-4 Number of Hours of Icing, 1990 Meteorology

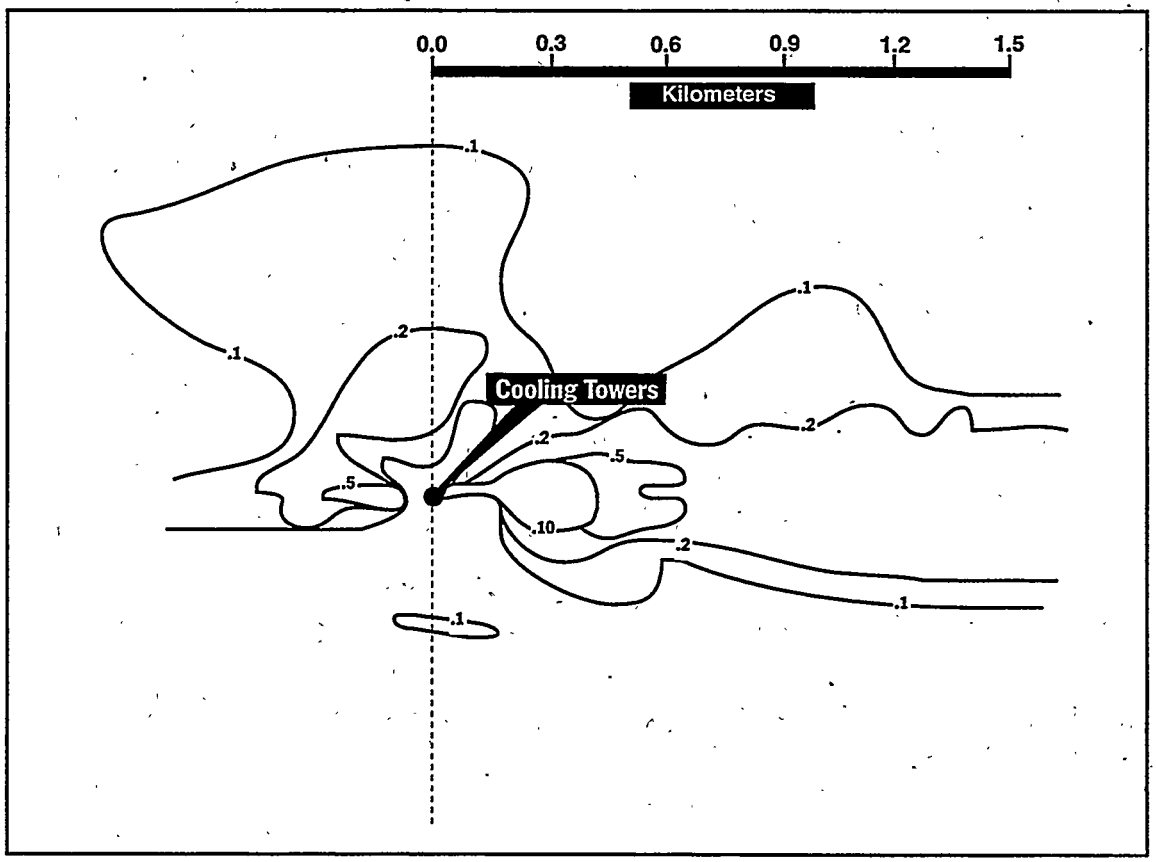


Figure 3.3-5 Plume Salt Deposition, 1990 Meteorology

3.3.5 Mitigation

The project will be required to demonstrate that emission controls meet the requirements for BACT. BACT is required in attainment areas for major new sources, and is the highest and most efficient control level consistent with energy, environmental, and economic factors for the facility. The method of evaluating BACT requires the developer to submit information on a complete range of technologies for each pollutant, and to choose the best technology unless substantial reason exists to preclude it (e.g., not commercially available). Control technologies in the proposed project design (described previously in Section 3.3.1) are among the most stringent emissions controls available for combustion gas turbines.

3.3.6 Unavoidable Adverse Impacts

The project would emit combustion by-products to ambient air. As stated in Section 3.3.1, concentrations resulting from project-related emissions would be less than applicable local, state, and national AAQS. Furthermore, project-related emissions would result in concentrations in the PSD Class I areas that are less than the guidance values. Table 3.3-5 indicated that the maximum 24-hour project-related PM_{10} concentration is greater than the ODEQ SIL. This concentration is predicted to occur during periods when the ambient temperature is greater than 32°C (90°F), and when the project is operating at less than 100 percent load. The developer is willing to limit operation of the project to 100 percent load without duct burners when ambient air temperatures reach or exceed 29°C (85°F). With these restrictions, emissions from the project are not expected

to exceed the SILs, and are less than the AAQS. Air quality impacts resulting from the proposed project are considered low.

3.3.7 Cumulative Impacts

The cogeneration facility would consist of two units, with no anticipated additional units. The Coyote Springs Cogeneration Project would be located near the city of Boardman, Oregon, and would emit up to 472 MTY (520 TPY) of NO_x and 465 MTY (513 TPY) of CO (BPA 1994a). The Hermiston Generating Project would be located 4.8 km (3 miles) southwest of the city of Hermiston, Oregon, and would emit up to 247 MTY (272 TPY) of NO_x and 406 MTY (447 TPY) of CO (BPA 1994b). Cumulative air quality impacts from the proposed project are considered low. Any additional sources of air emissions would be subject to regulatory review and would have to demonstrate that their emissions will result in ambient air pollution concentrations that are less than the AAQS. If concentrations resulting from these new sources are greater than the significance levels, the air quality impact analysis would have to include an evaluation of emissions from existing facilities, including the proposed project.

3.4 Noise

3.4.1 Construction Noise

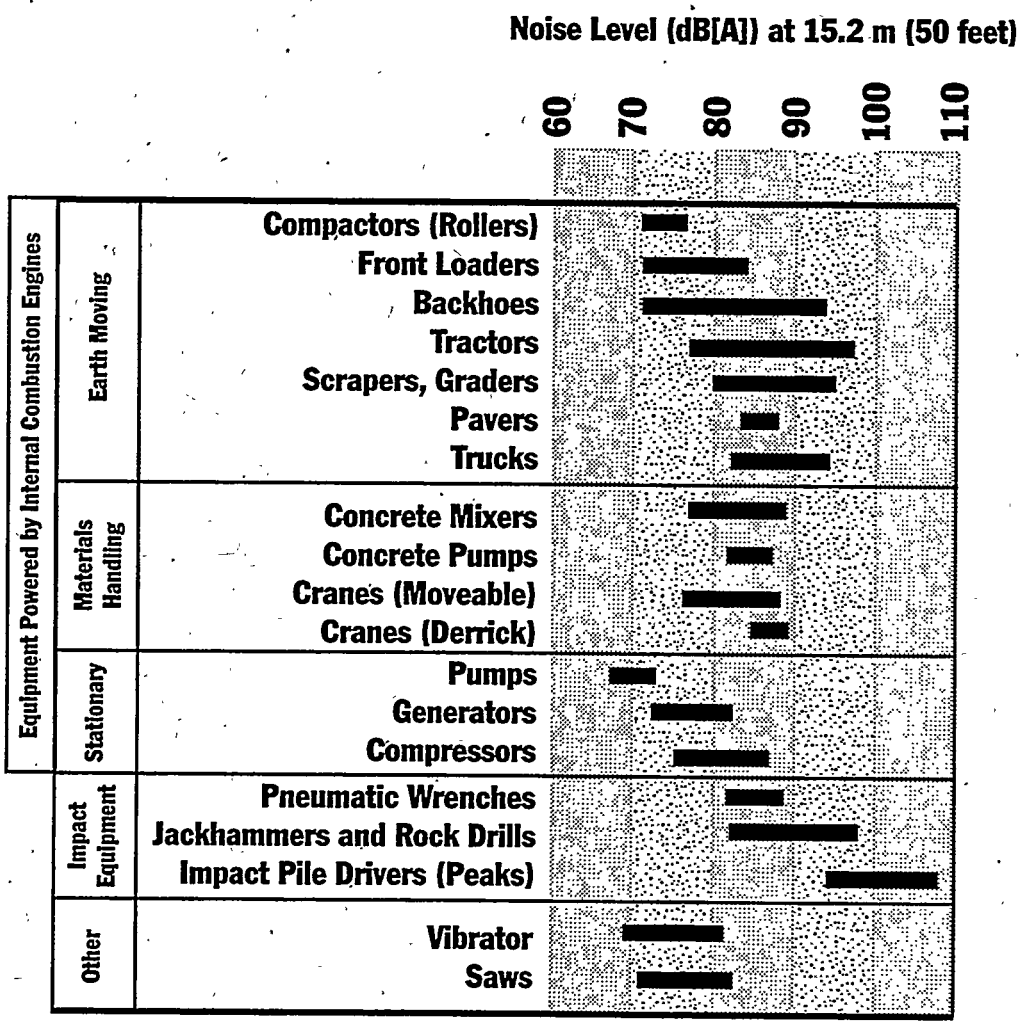
The noise levels produced by construction activities would vary widely, depending on the specific equipment being operated at the time. Construction activities are excluded from ODEQ noise ordinances (OAR-340-35-035). Figure 3.4-1 shows typical sound level ranges for construction equipment that may be used for this project.

3.4.2 Cogeneration Facility

Noise would emanate from the HRSG, stacks, generator building, cooling tower, and transformers. ODEQ has established allowable noise levels from industrial facilities. The nighttime L_{50} criteria would be the most stringent noise standard applicable to this project (Table 4.16-1). In addition, new industrial sources are limited to noise level increases at sensitive receptors to 10 dB(A) over the minimum hourly ambient levels. For the nearest residence, the minimum hourly ambient L_{50} is 44 dB(A). Sound modeling was performed to determine if project-related sound levels in the areas immediately surrounding the cogeneration facility would be less than ODEQ's limits.

The individual plant components that would contribute to the total project-related noise are the following:

- Gas turbine air intake
- Turbine building
- HRSG casing
- Stack outlet
- Cooling towers



Source: Oregon State Highway Division 1990

Figure 3.4-1 Typical Construction Sound Levels

- Electrical transformers

Modeling was based on the two-unit configuration (worst case). Combustion air cooling chillers are proposed for the facility, and would operate during periods of high ambient air temperatures. These units would not operate at night when the ambient temperature will be cooler, and were therefore not included in the modeling. Electrical transformer noise from the substation would be at least 10 dB(A) below the noise from the cogeneration facility, and would not contribute to the overall noise levels at the nearest residences. Electrical transformer noise was therefore not included in the modeling.

EPA does not have enforceable noise limits applicable to industrial operations, however, EPA Region 10 has published general guidance for noise assessments (EPA 1980). Increases in the L_{eq} above the existing conditions are evaluated by the following criteria:

- An increase of 0 to 5 dB(A) is considered a slight impact
- An increase of 5 to 10 dB(A) is considered a significant impact
- An increase of greater than 10 dB(A) is considered a very serious impact

Modeling was used to predict maximum noise levels at the nearest residence locations, south of the cogeneration facility site along Umatilla Meadows Road. The design ambient noise level is the minimum L_{50} noise level of 44 dB(A). The ODEQ nighttime L_{50} equal to 50 dB(A) would also apply to the project. This requires that the cogeneration facility noise does not exceed 48 dB(A). The maximum predicted plant noise level is 48 dB(A). The dominant components of the overall predicted noise are the turbine air inlet and the cooling towers.

Most of the recreational facilities within the project vicinity are located within the city of Hermiston, approximately 4.8 km (3 miles) north of the proposed cogeneration facility site. Because of the proposed project's distance from these facilities, noise from construction and operation of the proposed project would be inaudible.

Fishing and other informal recreational opportunities located within 0.4 km (0.25 mile) of the project, along the Umatilla River, would be within audible range of the cogeneration facility. However, the site is located in an existing industrial area with existing elevated noise levels, and is approximately 1.6 km (1 mile) north of I-84; therefore, project noise would not result in a significant increase in ambient noise levels at this location.

Transmission Line and Substation

The transmission lines and substation would generate some noise, but would not exceed existing background levels.

3.4.3 Mitigation

The developer will undertake the following noise mitigation measures to comply with the L_{50} nighttime noise limit of 50 dB(A) at all residential locations:

- Install silencers in the combustion turbine air inlet duct.

- Minimize low frequency resonance from the steam generator and stack through good engineering design.

- Include noise barriers in the cooling towers.

The following construction sound abatement measures will be included in the project construction specifications to mitigate construction sound impacts:

- Construction will not be performed on Sundays, legal holidays, or between 10 p.m. and 6 a.m. on other days, except when night construction is necessary for continuous construction processes.

- All construction equipment will have sound devices no less effective than those provided on the original equipment. Equipment will not be operated with unmuffled exhaust systems.

- Pile driving or blasting operations, if required, will not be performed on Sundays, legal holidays, or between 8 p.m. and 8 a.m. on other days.

3.4.4 Unavoidable Adverse Impacts

Although the modeled noise levels caused by the proposed project are lower than the ODEQ night-time limits and EPA Region 10 guidelines, it is possible that noise from the facility will be slightly audible at some of the residential areas at night when the background sound levels are low. The cogeneration facility could be audible above traffic noise only at locations immediately adjacent to the site. Because the planned mitigation measures would attenuate project-related noise to acceptable levels, unavoidable adverse impacts from noise are considered low.

3.4.5 Cumulative Impacts

Other proposed industrial projects in the Hermiston region would cause no significant cumulative noise impacts. The modeled noise increases caused by the cogeneration facility decrease rapidly with distance from the site. At present there are no other proposed industrial projects within 3.2 km (2 miles) of the Hermiston cogeneration facility. Cumulative noise impact from the project is considered low.

3.5 VEGETATION/WETLANDS

3.5.1 Cogeneration Facility

Because the proposed site of the cogeneration facility is currently cultivated cropland, no environmental effects involving upland or wetland/riparian resources are anticipated. Approximately 7.7 ha (19 acres) of cropland will be affected by construction of the facility (Table 2.6-1). Approximately 6.9 ha (17 acres) will be permanently converted to an industrial use by the facility.

Construction staging activities will temporarily disturb 0.8 ha (2 acres). The land will be restored to cropland once construction has been completed.

3.5.2 Gas Pipelines

Construction of the 1.7 km (4.1 mile) PGT pipeline could affect areas of shrub-steppe, grass/forb, riparian/deciduous, wetland, and open water habitats, and cropland (Table 2.6-1). Most of this construction would take place in or adjacent to existing gas transmission and road rights-of-way.

Construction of the 3.6 km (8.8 mile) NWP pipeline would affect areas of shrub-steppe vegetation and cropland (Table 2.6-1). Most of this construction would take place in or adjacent to existing gas transmission and road ROWs.

For both pipeline construction projects combined, less than a total of 0.4 ha (1 acre) of these habitats will be permanently affected. Permanent impacts will be associated with aboveground appurtenances such as corrosion test points and vent pipes. All temporarily disturbed locations would be revegetated at the completion of construction.

Though the placement of the PGT pipeline would be designed to avoid wetland areas, irrigation-ditch riparian habitats may be temporarily disturbed along the route. This disturbance could include vegetation clearing, trench excavation and backfilling, equipment trafficking, and water quality degradation (due to potentials for increased sedimentation and potential hydrocarbon spills). In all cases, these impacts will be temporary. Permanent impacts may involve altered hydrological patterns in shallow subsurface and surface water, as might be caused by slight changes in topography due to construction and disturbance activities. Such changes in surface or shallow groundwater flows could result in a change in vegetation or wetland functions.

Filling (that is, trenching) of riparian habitats during construction of the PGT route would result in a temporary loss of riparian functions and values. Riparian habitats would be restored as soon as construction is complete.

3.5.3 Electrical Transmission Line

Eastern 500-kV Alternative

Approximately 26.1 km (16.2 miles) of new transmission line construction will be required if the Eastern 500-kV Alternative is chosen. Approximately 21.9 km (14.8 miles) of this construction will be along existing roads and within existing BPA electrical transmission corridors, but will cross shrub-steppe vegetation and grass/forb, riparian, wetland, pasture, and cropland vegetated habitats (Table 2.6-1). Only 0.9 km (0.6 mile) will cross open vegetated terrain not associated with roads or existing ROWs. Temporary access roads will be used during construction, but all temporarily disturbed areas will be revegetated when construction is completed. No permanent access roads will be constructed. Routine maintenance and patrolling activities will be conducted from existing roads. Thus, permanent impacts for this alternative are also associated with the pole or tower placements. Total permanent impacts are expected to be less than 0.4 ha (1 acre) for steel poles, and 0.68 ha (1.69 acres) for towers. All attempts will be made to place poles or towers outside of wetland and

riparian habitats. However, a pole or tower may be required in Wetland No. 13, located 1 km (0.5 mile) south of the McNary Substation. However, because the locations of each pole or tower have not yet been determined, areal estimates of impacts to each upland vegetated habitats are not yet known. Impacts to wetlands will require consultation with the Corps regarding compliance with Sections 401 and 404 of the Clean Water Act and possibly Section 10 of the Rivers and Harbors Act, and with the ODFW and ODEQ.

Western 230-kV Alternative

Approximately 18.4 km (11.5 miles) of new transmission line construction will be required if the Western 230-kV Alternative is chosen. Approximately 17.6 km (11 miles) of this construction will be along existing roads, but will cross shrub-steppe vegetation and grass/forb, riparian, wetland, open water, pasture, and cropland vegetated habitats (Table 2.6-1). Less than 1 km (0.5 mile) will cross open terrain not associated with roads or existing ROWs. Temporary access roads will be used during construction, but all temporarily disturbed areas will be revegetated when construction is completed. No permanent access roads will be constructed. Routine maintenance and patrolling activities will be conducted from existing roads. Thus, permanent impacts are associated with the pole placements. Total permanent impacts are expected to be less than 0.4 ha (1 acre). Because poles will be placed outside of wetland and riparian habitats, no permanent impacts are expected to affect these resources. However, because the locations of each pole have not yet been determined, areal estimates of impacts to each upland vegetated habitats are not available.

3.5.4 Water Supply Pipeline

The water supply pipeline will be approximately 1.8 km (1.1 miles) long and will cross cropland and shrub-steppe vegetation (Table 2.6-1). All disturbed areas will be revegetated when construction is completed. No significant permanent or temporary impacts to upland vegetation or wetland/riparian habitats are expected from construction, operation, use, or maintenance of the water supply pipeline.

3.5.5 Mitigation

Most of the impacts associated with construction and maintenance of project components will be limited to terrestrial habitats. Because current Federal and state regulations require that impacts to wetland communities be avoided whenever possible, impacts to wetland and riparian habitats will be avoided, or minimized by the use of appropriate design, appropriate construction techniques, and revegetation practices. The following mitigation measures will be implemented.

- Wetlands near the PGT gas pipeline will be avoided by placing the pipeline away from the wetlands.
- Implementation of the project's ESCP will include erosion and sedimentation controls to protect water quality and sensitive areas.
- Temporarily disturbed areas will be restored to their near-original grade and seeded with desirable erosion control species.

- In wetland and riparian habitats, the construction ROW will be minimized to minimize impacts to these habitats. Construction will also be attempted during the dry season. Hydric soils will be stockpiled and then used to backfill the pipeline trench in the correct sequence. The revegetation plan in these habitats emphasizes the use of native plant species suitable for erosion and sedimentation control and desirable wildlife habitat.

- Construction of project components will comply with state and local permits that regulate construction in general, and those permits that specifically regulate construction in wetlands, riparian areas, and other sensitive areas.

- The project will be coordinated with EFSC, the Corps, and other appropriate agencies to develop additional acceptable mitigation measures.

3.5.6 Unavoidable Adverse Impacts

Approximately 6.9 ha (17 acres) of cropland will be permanently converted to an industrial use by construction of the cogeneration facility. In addition, less than 0.4 ha (1 acre) of non-wetland (but as yet undetermined) habitat would be permanently converted to an industrial use by above-ground appurtenances of the gas and water supply lines. This is considered an unavoidable, low impact. For the Western 230-kV Transmission Line Alternative, construction of new poles would permanently impact less than 0.1 ha (0.2 acre) of shrub-steppe, grass/forb, riparian, wetland, pasture, and/or cropland vegetated environments. For the Eastern 500-kV Alternative, construction of new poles would permanently impact less than 0.4 ha (1 acre) of vegetation, while new towers would about 0.68 ha (1.69 acres). These are considered unavoidable, but low, impacts.

Acreage estimates for temporary impacts to each habitat type caused by construction of project facilities are not yet available. Certainly, vegetation will be temporarily cleared during construction of the gas, electrical, and water transmission lines, and therefore functionally lost until sufficient time passes for similar vegetation to become established. Because no unique vegetation will be cleared, and because environmental restoration will be implemented, temporary vegetation clearing is considered an unavoidable, but low, impact.

These unavoidable impacts to upland vegetation are considered to be generally low because the upland vegetation to be disturbed or displaced (primarily disturbed shrub-steppe, grass/forb, pasture, and cropland habitats) is common in the vicinity of the proposed project and because habitat restoration measures will be implemented by the developer.

3.5.7 Cumulative Impacts

All of the habitat types disturbed by the project are prevalent throughout this portion of Oregon and in the vicinity of the project. Because of this, the project is considered to have a low cumulative impact on vegetation, riparian, and wetland resources. The temporary and permanent disturbances to these habitats are considered minor; locally and regionally.

3.6 WILDLIFE AND FISHERIES RESOURCES

3.6.1 Wildlife Habitat Disturbance and Conversion

Cogeneration Facility Site

Construction of the cogeneration facility would eliminate 6.9 ha (17 acres) of cropland (Table 3.6-1). Approximately 0.8 ha (2 acres) of adjacent cropland will be temporarily disturbed as a staging area. Upon completion, the facility will occupy 4 ha (10 acres), 2.8 ha (7 acres) will be landscaped and the 0.8-ha (2-acres) staging area converted back to cropland (letter from E. Clark, Hermiston Power Partnership, September 1, 1994). This would reduce foraging habitat for western meadowlarks, red-winged and Brewer's blackbirds, red-tailed hawks, and killdeer. Given the proximity to the heavily disturbed J.R. Simplot Potato Processing Plant, this impact is expected to be minor. Although no nesting was documented during field surveys (NWS 1994b), construction during the spring or summer could potentially eliminate nests of the ground-nesting species.

Electrical Transmission Lines

Eastern 500-kV Alternative. The Eastern 500-kV Alternative (including the BPA 500-kV Lower Monumental Relocation) would result in the permanent habitat loss of <0.1 ha (<0.2 acre) from placement of new poles spaced approximately 304.8m (1,000 feet) along the existing ROW, paralleling the "H" structure poles that are already present, and new poles on the relocated McNary-Lower Monumental ROW and between the cogeneration facility and Canal Road (Table 3.6-1). If towers are constructed instead of poles, the permanent loss of 0.68 ha (1.69 acres) would result. Most of the habitat affected by the project would be cropland, as 21.9 km (13.6 miles) of the 22.8-km (14.2-mile) newly constructed ROW would be in this type (letter from E. Clark, Hermiston Power Partnership, September 1, 1994). Although there are several wetlands on the ROW, including the McNary-Roundup route, impacts to wetlands would be minimized, as the developer plans to avoid all wetlands. However, the Eastern 500-kV transmission may potentially require a pole in wetland No. 13, located 1 km (0.5 mile) south of the McNary Substation (letter from E. Clark, Hermiston Power Partnership, September 1, 1994. An additional 4.5 ha (11 acres) of habitat (mostly cropland and degraded grassland) would be temporarily disturbed for work areas, staging areas, and access roads during construction; however, all disturbed areas would be revegetated immediately. The permanent and temporary loss of habitat would primarily affect species that rely on shrub-steppe, croplands and grasslands for foraging and nesting. These species include the long-billed curlew (documented on and near the ROW near the Power City Wildlife Area), killdeer, western meadowlark, horned larks, and grasshopper and savannah sparrows. Mammals that would be temporarily affected would include coyotes and northern pocket gophers. The two Swainson's hawk nests along this alternative would not be affected.

Western 230-kV Alternative. The Western 230-kV Alternative (including the UECA 115-kV Relocation) would utilize mainly existing poles, but will involve approximately 6 km (3.5 miles) of new construction between the cogeneration facility site and the Westland Substation (letter from E. Clark, Hermiston Power Partnership, September 1, 1994). Also, approximately 12.8 km (8 miles) of new construction would be required for the relocated segment of the UECA 115-kV route. Less than 0.1 ha (<0.2 acre) of wildlife habitat would be permanently eliminated, while an

additional 4.2 ha (10.5 acres) habitat would be temporarily disturbed (Table 3.6-1). Most of the habitat disturbance would occur in grasslands and croplands along roadways. This route crosses the Umatilla River; however, no impacts to the riparian and wetland wildlife habitat are expected. The 230-kV Alternative route would not affect the important long-billed curlew and grasshopper sparrow nesting and foraging area, located just west of the route, on the Umatilla Ordnance Depot since existing poles and conductors would be used. The relocated UECA 115-kV route would affect mainly cropland and degraded grassland habitat. This is considered a low impact.

Table 3.6-1. Effects on Habitats from Hermiston Power Project

	Disturbance Areas			
Project Component	*Total ha (Acres)*	*Temporary ha (Acres)*	*Permanent ha (Acres)*	*Habitat Types Affected*
Cogeneration Facility	7.7(19)	0.8(2)	6.9(17)	cropland
Western 230-kV Alternative[1]	4.49 (11.1)	4.25 (10.5)	0.04 (0.1)	cropland, grassland, sagebrush, rabbitbrush
Eastern 500-kV Alternative[2]	4.53 (11.2)	4.45 (11.0)	0.06 (0.16)	cropland, grassland, rabbitbrush, sagebrush, bitterbrush, pastureland
PGT Pipeline	7.98 (19.7)	7.94 (19.6)	0.02 (0.06)	sagebrush, grassland, cropland
NWP Pipeline[2]	16.1 (39.7)	16 (39.6)	0.02 (0.06)	grassland, cropland, rabbitbrush, sagebrush
Water Supply Pipeline[1]	1.9 (4.8)	1.9 (4.8)	0	cropland, sagebrush

[1] Includes the UECA 115-kV Relocation. If the 230-kV Transmission Line and Water Supply Pipeline are both selected, the shared ROW would reduce the total temporary disturbance area from 4.01 to 3.8 ha (9.9 to 9.3 acres) 20.3 to 19.5 ha (50.1 to 48.1 acres).

[2] Includes the BPA 500-kV Lower Monumental Relocation. If the 500-kV Transmission Line and pipeline to NWP are both selected, the shared ROW would reduce the total temporary disturbance area from 20,3 to 19.5 ha (50.1 to 48.1 acres).

All transmission lines would be designed with adequate spacing between insulators to reduct the potential collision and electrocution hazard for raptors.

Natural Gas Lines

PGT Gas Line. The PGT route extends along the top of an embankment to the north of the Umatilla River, and parallels a railroad track. This 6.6 km (4.1-mile) route would result in the permanent

loss of <0.1 ha (<0.1 acre) of habitat and the temporary disturbance of 7.9 ha (19.6 acres) of wildlife habitat, including mostly degraded sagebrush shrub steppe habitat (Table 3.6-1). Construction may affect sagebrush the small areas of grassland habitat (primarily non-native species) present along the route (NWS 1994b; letter from E. Clark, Hermiston Power Partnership, September 1, 1994). Small inclusions of native grass species present in the sagebrush habitat may be affected during construction. The route approaches several riparian areas and two wetlands along the river, but no construction activities would take place within these habitats; implementation of proper erosion and sediment control measures during and after construction would ensure that they are not indirectly affected. Construction would not affect the one osprey and two Swainson's hawk nests or the four bank swallow nesting colonies along the Umatilla River, which are all within approximately 0.4 km (0.25 mile) of the route. Wildlife species affected by habitat disturbance along this route include the western meadowlark, horned lark, and other sagebrush and grassland species commonly found in the vicinity.

NWP Gas Line. The NWP route, which would share the Eastern 500-kV Alternative ROW from the cogeneration facility to Canal Road, would permanently affect 0.2 ha (<0.1 acre) of wildlife habitat (Table 3.6-1). Construction would temporarily affect 16 ha (39.6 acres) which would be revegetated. Most of the wildlife habitat that would be disturbed is degraded grassland and cropland, although some rabbitbrush and sagebrush would also be affected. Construction of the pipeline may temporarily reduce habitat for long-billed curlews and grasshopper sparrows, both documented along the eastern 4.8-km (3-mile) portion of the ROW (NWS 1994b).

Water Supply Line

The water supply line would be placed in the same ROW as the Western 230-kV Alternative transmission line between the cogeneration facility and Feedville Road. Placement of the water supply line would temporary disturb 1.9 ha (4.8 acres) of wildlife habitat, primarily cropland and non-vegetated land adjacent to the highway. This temporary loss of habitat is not expected to cause any major impacts to wildlife due to the already disturbed nature of the area.

3.6.2 Construction and Operation Disturbance to Wildlife

The proposed project would create a notable disturbance to wildlife during construction and other ground-disturbing activities. General disturbance would be greatest during the construction period due to the use of heavy equipment, traffic, and increased human activity. These disturbances are likely to displace wildlife over the course of the activities. Additionally, required periodic vegetation maintenance along the gas pipeline ROW during project operation would also temporarily displace wildlife for a short duration (see Chapter VI, Appendix B, Biological Assessment).

3.6.3 Impacts to Sensitive Wildlife Species

Federally Listed Species

The bald eagle is the only Federally listed threatened or endangered species documented in the project vicinity. Potential effects to the bald eagle include: (1) loss of roosting or perching sites, (2) effects on food supplies, (3) disturbance to wintering eagles, and (4) electrocution from transmission lines (see Chapter VI, Appendix B, Biological Assessment).

The 1.6-km (1-mile) segment of the Umatilla River just upstream from the cogeneration facility site provides low quality roosting structures, and some foraging opportunities; however, the existing noise level is relatively high in this area. Bald eagle habitat quality increases and disturbance decreases farther upstream near the PGT gas connection point, 6.4 km (4 miles) upstream from the cogeneration facility site. Habitat along the river near the PGT connection point is rated as high quality (NWS 1994a). A small number of eagles use the river during the winter between the cogeneration site and the PGT connection point (NWS 1994c). Cottonwood and alder trees provide important perch sites and waterfowl, fish, and livestock carrion are important prey items during the winter. Eagles have also been observed along the Eastern 500-kV Alternative route near Power City Wildlife Area wetlands and in croplands/pasture near the Western 230-kV Alternative route 4.8 km (3 miles) south of Umatilla (NWS 1994c). In upland areas, eagles likely forage on carrion and small mammals, between November and March.

The small number of bald eagles, the only threatened or endangered species documented to normally occur in the project vicinity, would not be affected by the project for the following reasons: (1) no suitable roost or perch sites would be removed, (2) no food supplies would be affected, (3) wintering eagles would not be disturbed since construction will be minimized during the winter near suitable habitat along the Umatilla River and operation noise levels would be constant and just slightly greater than the ambient noise level near the existing potato processing plant, and (4) new transmission lines would be constructed have sufficient separation between insulators to minimize risk of electrocution.

Federal Candidates and State Species of Special Concern

The long-billed curlew (a Federal Candidate Category 3 and ONHP species of concern), Swainson's hawk (a Federal Candidate Category 3, ODFW state vulnerable), grasshopper sparrow (a species whose status in the state is undetermined), and pointed turtle (ODFW state critical) are the Federal candidate and state sensitive species potentially occurring in the project area near the construction ROW. The three bird species require open grassland, shrub-steppe, and croplands for foraging and have been observed throughout the area. Curlews and grasshopper sparrows require open grasslands and shrub-steppe for nesting, while Swainson's hawks nest in scattered trees in the area. Construction of the project would temporarily affect foraging habitat for curlews and grasshopper sparrows. However, impacts would be temporary and abundant habitat is available nearby. No Swainson's hawk nesting habitat and no painted turtle habitat would be affected.

3.6.4 Wildlife Mitigation

The following measures would be implemented to mitigate potential impacts to wildlife and habitat:

- Avoid all wetland habitats where possible.
- Retain native vegetation as much as possible in the impact areas to preserve wildlife habitat and provide a buffer of vegetation for surrounding habitat areas.

- Replant disturbed habitats with native vegetation to reduce duration of habitat disturbance. In areas requiring maintenance, plant native grassland species that need less-frequent maintenance than native pioneer shrubs.

- Minimize construction work in most sensitive areas (Power City Wildlife Area section of Eastern 500-kV Alternative, CRP section of NWP Gas Line, the entire PGT pipeline, and the Western 230-kV Alternative crossing of the Umatilla River) during the spring-early summer breeding season and the winter bald eagle season.

- Contact USFWS and ODFW prior to start of construction to update the list of endangered, threatened, or candidate species of wildlife. If there are any new species listed, coordinate any possible mitigation measures with the appropriate agencies.

3.6.5 Unavoidable Adverse Impacts to Wildlife

The amount of temporary disturbance and permanent conversion of wildlife habitats from project implementation depends on the chosen electrical transmission alternative. The Western 230-kV Alternative would result in the temporary disturbance of 4.3 ha (10.5 acres) and permanent conversion of 0.04 ha (0.1 acres) of cropland, grassland, sagebrush, and rabbitbrush (Table 3.6-1). The Eastern 500-kV Alternative would impact varying amounts of the same habitat types, but the total area impacted would be 4.5 ha (11.0 acres) of temporary habitat disturbance and 0.06 ha (0.16 acres) of permanent habitat conversion. However the total amount of temporary disturbance could be reduced, if the chosen electrical transmission corridor could be shared with another ROW (Table 3.6-1).

The largest single habitat to be effected by the project would be 6.9 ha (17 acres) of cropland at the cogeneration facility site. The PGT pipeline would impact a total of 7.9 ha (19.7 acres), whereas the NWP pipeline would impact a total of 16.1 ha (39.7 acres). As proposed, none of the project component options would impact any wetlands or riparian vegetation.

Temporary disturbance from project construction would likely displace wildlife during the period of those activities. These disturbances would most likely be short term, with the exception of the cogeneration facility where complete inundation of the wildlife habitat would permanently displace any species currently residing there. Displacement of wildlife would periodically occur along the gas and water pipeline ROWs because of required vegetation maintenance.

Overall, given the temporary nature of habitat disturbance, the relatively small amount of wildlife habitat that would be affected, and the planned mitigation measures, the proposed project is considered to have low impacts to wildlife and their habitats.

3.6.6 Cumulative Impacts to Wildlife

In the recent history of the project vicinity, the major impact to wildlife has been the conversion of shrub-steppe and grassland habitat to irrigated cropland. The amount of habitat available to wildlife has been decreasing and fragmenting, resulting in smaller populations and isolated gene pools. Because the cogeneration facility site is already cropland and other components as proposed

would result in only a small amount of habitat loss and temporary disturbance, the direct contribution of the proposed project to regional cumulative impacts on wildlife habitat would be low.

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

3.6.7 Fisheries Impacts

A withdrawal of 0.12 cms (4.2 cfs) (7,135 lpm [1,885 gpm]) represents 0.002 percent of the average annual flow of 4,808 cms (169,800 cfs) (288,490,384 lpm [76,211,334 gpm]) at McNary Dam and 0.004 percent of the average low flow of 3,030 cms (107,000 cfs) (181,793,116 lpm [48,024,810 gpm]). 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 cms (100,000 cfs) (169,900,108 lpm [44,883,000 gpm]); estimates of the benefits of even a 283 to 566 cms (10,000 to 20,000 cfs) (33,980,022 lpm [8,976,600 gpm]) change in flow are very small. The impact on fish of withdrawing 0.1 cms (4.38 cfs) (7,442 lpm [1,966 gpm]) in this region of the river would be so small as to be unmeasurable. It would constitute a negligible impact on the salmon and steelhead resources.

Of the two electrical transmission line alternatives, only the Western 230-kV Alternative involves stream crossings. This route crosses the Umatilla River in two locations: (1) where new 230-kV conductor will be added to existing UECA poles, from Feedville Road across the river to the Westland Substation; and (2) where the relocated UECA 115-kV route crosses the river just east of the city of Umatilla in the vicinity of Highway 82. The second crossing (UECA 115-kV relocation) may involve removing some riparian trees in the ROW where it crosses the Umatilla River. Riparian trees are important for providing shade to control water temperatures and supplying future large woody debris, an important component of stream fish habitat formation. However, the crossing is already disturbed from previous construction and the vegetation loss would be small, resulting in negligible impact to fisheries.

The endangered and threatened Snake River salmon stocks would be unaffected by this project. Although water would be withdrawn from the Columbia River, the quantity is too small to have any effect. Also, the National Marine Fisheries Service (NMFS) will require the Port of Umatilla to properly screen this facility to protect all anadromous stocks within the region. Therefore, no impingement or entrainment would occur from the proposed project's water requirements.

3.6.8 Fisheries Mitigation

Recommended mitigation includes ensuring that proper erosion and sedimentation control and hazardous substance control procedures are followed on the Umatilla River bank slopes during and following the transmission line construction.

3.6.9 Unavoidable Adverse Impacts to Fisheries

There would be no unavoidable adverse impacts on fisheries resources from the proposed project.

3.6.10 Cumulative Impacts to Fisheries

The proposed project is one of three combustion turbine projects currently proposed for development in the area. One of the two other projects (Hermiston Generating Project) would also purchase water from the Port of Umatilla's water supply system, at the rate of approximately 0.12 cms (4.2 cfs) (7,135 lpm [1,885 gpm]). The third project, the Coyote Springs project in Morrow County, would require approximately 0.2 cms (5.6 cfs) (9,513 lpm [2,513 gpm]), purchased from the Port of Morrow, which also draws from the Columbia River. The cumulative withdrawal from the proposed project would add slightly to the existing competition for water on the Columbia River, and therefore the impact from the proposed project is low.

3.7 Land Use

3.7.1 Impacts to Existing Land Uses

Cogeneration Facility Site

The cogeneration facility would be constructed on a 6.9-ha (17-acre) site currently used for alfalfa production. Construction of the cogeneration facility would permanently remove these lands from agricultural production.

The cogeneration facility would have the greatest effect on land use of all the project components, but would be consistent with adjacent industrial and agricultural land uses and comprehensive plan designations. The facility site is zoned heavy industrial, so the facility would be a permitted use by Umatilla County. During construction, the project would result in minor inconveniences caused by increases in noise, dust, and traffic; however, these effects are not considered significant. During operation, the plant, with mitigation, would not be expected to result in land use incompatibilities. Although the cogeneration facility would intensify the industrial character of the area near it, it would not cause significant land use conflicts with nearby uses, nor would it be adversely affected by the operations associated with these uses.

Transmission Line

Eastern 500-kV Alternative. Approximately 33 ha (83 acres) along the 26.4-km (16.5-mile) long route would be temporarily disturbed during the installation of the transmission line. Upon completion of the installation, all but 0.69 ha (1.7 acres) would be returned to the original

condition. There are 115 residences located within 152 m (500 feet) of the proposed transmission line route. These residences would experience minor and temporary impacts during construction, including noise and dust generated by construction vehicle activity, and possible minor travel delays from temporary closure of local roads in the immediate construction area. Longer term impacts (also of greater magnitude) to these residences would result from the visual intrusion of new steel towers (or poles) and conductor wires within the existing corridor. These impacts are discussed in Section 3.12, Visual Quality. The rerouted McNary-Lower Monumental transmission line would follow a new route approximately 1.6 km (1 mile) through agricultural lands, over Highway 730, and into the McNary Substation. Lands temporarily disturbed during construction would be returned to pre-construction conditions. There would be no long-term impacts to land use along the route. Transmission lines would be a conditional or permitted use in all land use designations crossed.

Western 230-kV Alternative. During construction of this route, approximately 24 ha (97 acres) of land within the ROW would be temporarily disturbed. After the transmission line installation was complete, all lands except 0.01 ha (0.03 acre) would be returned to the original condition. As illustrated in Figure 2.7-1, the transmission line would pass through a number of land uses. The line would have little effect on land use along the route. Transmission lines would be allowed in all the land use and zoning designations the lines would pass through as permitted or conditional uses. The UECA 115-kV line relocation would temporarily disturb 15 ha (38 acres) within the ROW during construction of the line. Upon completion of construction, all lands except 0.004 ha (0.01 acres) would be returned to pre-construction conditions. There would be no permanent impacts on land use along the route.

Gas Lines

The 13.6-km (8.5-mile) long NWP connection would temporarily disturb 16 ha (39.6 acres) during construction. Disturbance would be temporary and land would be returned to pre-pipeline conditions following construction. The pipeline would pass through several land uses, although it would primarily be located in agricultural lands (Figure 2.7-1b). The pipeline would be a permitted or conditional use in all the land use designations crossed.

The 6.4-km (4-mile) long PGT gas connection would also temporarily disturb 7.94 ha (19.6 acres) of mostly agricultural lands during the construction, in addition to industrial. Disturbance would be minimal because land would be returned to pre-pipeline conditions following construction. The pipeline would pass through several land uses, although it would primarily be located in agricultural lands (Figure 2.7-1b). The pipeline would be a permitted or conditional use in all the land use designations it would cross.

Water Supply Line

The approximately 2-km (1.25-mile) long water supply pipeline would disturb approximately 4 ha (10 acres) of land. A road and railroad crossing would have no permanent effect on use of the road or railroad. The effect on land use would be minimal because all lands the pipeline would be constructed through would be returned to their original condition following construction. The pipeline would pass through agricultural, agribusiness, and industrial lands. The pipeline would be a permitted use in the land use designations it would pass through.

3.7.2 Consistency with Local Comprehensive Plans and Policies

The proposed project would be consistent with local comprehensive plans and policies. All project components would be classified as either permitted uses or conditional uses in both Umatilla County (which also regulates land use decisions in the cities of Hermiston, Umatilla, and Stanfield urban growth boundaries), and the city of Umatilla.

3.7.3 Mitigation

The following measures will be implemented to mitigate potential land use impacts from project construction and operation:

- Standard construction management practices to minimize impacts associated with construction such as dust, noise, and increased traffic will be developed to reduce potential nuisances to nearby land owners.
- Stockpiling and replacement of topsoil (reducing agricultural land impact).
- To mitigate temporary impacts from construction on agricultural lands, contact will be made with land owners to coordinate planting and construction schedules.

3.7.4 Unavoidable Adverse Impacts

Approximately 3 ha (5 acres) of prime farmland would be lost at the cogeneration facility site as a result of implementing the project in an area that is already in industrial use. The project is consistent with all local comprehensive plans and policies. Therefore, unavoidable adverse impacts to land use would be low.

3.7.5 Cumulative Impacts

The cogeneration facility would be similar in scale and use to adjacent industrial and agribusiness in the vicinity and would add to the industrial character of the surrounding area. The transmission line options for the most part would follow existing transmission line routes, and would add to the number of transmission lines passing through the project vicinity to the McNary Substation. The proposed project would contribute to the industrial character of the area, and cumulative impacts to land use are considered low.

3.8 Cultural Resources

3.8.1 Impacts

Direct impacts from the project would involve physical modification of cultural resources during construction activities such as site and road grading, excavation for foundations and utility lines, and heavy equipment off-road traffic.

The proposed project's natural gas and electrical transmission lines have the potential to directly affect canals that are elements of the Umatilla Project (Oetting 1993). Table 3.8-1 lists nine potential canal crossings by these project components, all of which are eligible for NRHP nomination.

3.8.2 Mitigation

The following measures will be implemented to mitigate potential impacts to cultural resources from construction of the proposed project:

- If the natural gas pipeline crossing of the Feedville Canal uses a cut-and-fill construction method, the canal walls will be restored to a condition as near to original as possible. This would be done, for example, by refilling the canal crossing with concrete that matches the existing concrete or earth canal wall in color.

- Construction of the transmission towers will avoid direct placement of poles within or on the immediate banks of the canals.

- Archaeologists will conduct shallow shovel and auger tests in the Umatilla River floodplain and terraces at the transmission line crossing to determine whether remains of the ethnographically known village of Miss-kha-low are located there. The testing will take place where new transmission towers will be located, once these are planned.

- The developer will carry out the following emergency procedures if construction personnel encounter previously unrecorded cultural resources during construction or operation of the project:

  - The developer will immediately notify the SHPO upon encountering an unrecorded cultural resource.

  - The developer will halt construction in the immediate vicinity of the find until the developer and SHPO can determine whether the cultural resource is potentially eligible for National Register nomination.

  - If the developer and the SHPO determine the cultural resource eligible for the NRHP, they will implement avoidance or data recovery procedures.

- The developer will supervise the preparation and distribution of a pamphlet explaining to project construction workers the procedures to follow in case they discover cultural resources during construction.

3.8.3 Unavoidable Adverse Impacts

The two natural gas line routes (PGT and NWP) would cross the Feedville Canal along Feedville Road. The extent of impact this would cause depends on the method of crossing. Tunnelling entirely under the canal would have a negligible effect. Cutting through the canal walls to bury the

pipeline below the level of the canal bottom would cause a low level of impact. Crossing over the canal by attaching the pipeline to the Feedville Road bridge would also cause a low level visual effect.

Table 3.8-1. Umatilla Project Canals Crossed by Components

Project Components	*Canals Crossed*
Transmission Lines	
Eastern 500-kV Alternative	Z Canal; Hermiston Ditch; Maxwell Canal; A-Line Canal; Feedville Canal; Stanfield Branch of Furnish Ditch.
Western 230-kV Alternative	A-Line Canal
Gas Lines	
NWP Connector	Feedville Canal
PGT Connector	Feedville Canal

These impacts would be low. If construction were to cut through the canal walls, the walls would be refilled with concrete or dirt to appear as though there were no cut. Because the canal is a utilitarian feature, and because there is a large quantity of intact canal mileage belonging to the Umatilla Project in the project vicinity, the construction-related impacts of the project would not be significant. They would not damage the qualities of the canals that make them potentially eligible for NRHP nomination as elements of the Umatilla Project.

3.8.4 Cumulative Impacts

The project would not cause cumulative impacts to cultural resources.

3.9 Socioeconomics and Public Services

3.9.1 Workforce and Housing

Construction

The construction workforce would average approximately 150 workers over the 24-month construction period, with approximately 75 construction workers coming from outside the local area. The peak number of construction workers is estimated to be approximately 400, with approximately 200 of those coming from outside the local area.

Construction workforce projections for the proposed project could create a maximum demand for 200 housing units over part of the 24-month construction period. Average demand is estimated at 75 housing units. These estimates are based on a ratio of one worker to one housing unit (worst case). Time spent on the job site by individual construction workers would range from a few weeks

to the full 2-year period. A majority of the housing need during peak construction would be met by rentals and transient-type housing such as RV spaces, motel/hotel rooms, mobile home spaces or mobile home rentals. Currently, there are sufficient transient-type housing units available in the project vicinity to meet this demand.

Some demand for permanent-type, single-family homes or mobile homes may be generated during construction. Available permanent housing in the project vicinity is currently limited; however, there are plans to construct additional housing units within 1 to 2 years (BPA 1994b). Depending on the timing of construction of the proposed project and construction of the new housing units, there could be a temporary shortage of permanent-type accommodations during the peak construction period, and average income levels in the project vicinity not being able to support new construction, the future supply may remain somewhat limited.

Operation

During operation of the proposed project, 24 permanent full time personnel are expected to be employed at the facility. In accessing the impact of the operation labor requirements on local housing, a worst-case scenario is assumed whereby all operations personnel would be non-local and relocate to the project area. A majority would most likely prefer permanent housing. Availability of permanent housing in the project vicinity is limited; therefore, permanent employees relocating into the project vicinity may have some difficulty finding suitable accommodations, and the increase in housing demand they and their dependents create may have a low to moderate adverse effect on the local housing market.

3.9.2 Employment and Income

The local economy in the project vicinity would benefit from the short and long-term employment increases and income. It is estimated that 50 percent, or 200 employees (worst-case), of the peak construction force of 400 would come from the local area. At present, based on the high unemployment rate of 9.5 percent (approximately 3,230 workers) in the project vicinity for 1992, there is a substantial number of workers available locally for employment. Many workers may also be recruited from the Pasco, Kennewick, and Richland, Washington area (Tri-Cities). Workers from this area would most likely keep their residences in the Tri-Cities and commute the project site 48.3 to 64.4 km (30 to 40 miles).

Using an employment multiplier of 1.2, approximately 90 indirect jobs would be created during the construction period, of which 56 are projected to be filled by local area residents. The local economy would also benefit from the project's permanent employment and resultant indirect employment. Estimates of the total employment during the operations period indicate 24 new direct jobs and 18 new indirect jobs, for a total of 42 new jobs; based on an applicable multiplier of 1.74.

The regional economy would also benefit from construction and operation of the proposed project. Such benefits would be the "ripple effects" from the purchasing of goods and services in the local economy during construction and operation of the facility, as well as the distribution of salaries to construction as well as permanent facility operation staff. The proposed project would have an annual payroll of approximately $900,000, equating to an average salary of approximately $38,000 for the 24 permanent employees. This is higher than the per capita personal income and

median household income in the project vicinity. As wages and salaries are spent and re-spent throughout the local and state economy, potential benefits would be amplified. This cogeneration project has the added benefit of providing low-cost steam to the Simplot potato plant, which will help maintain a competitive position for the processing plant.

3.9.3 Fiscal Budgets

It is estimated that during its operational phase the project would generate approximately $100,000 in payroll-related taxes, and after 3 years of operation would begin contributing approximately $5 million annually in property taxes. This would result in a large increase in property tax revenue to schools with a negligible increase in school enrollment. Additionally, the state would experience a small (less than 1 percent) increase in business and occupation and brokered natural gas tax. During construction an increase tax revenue is expected from state payroll taxes levied against construction salaries and revenues. These increases would be temporary, therefore their impact, while positive, would be minimal.

3.9.4 Law Enforcement

The cogeneration facility site will be fenced and access controlled. The facility would operate 24 hours a day with personnel on site at all times. This would minimize opportunities for theft or vandalism. Police protection would be provided by the Oregon State Police and the Umatilla County Sheriff's Department. According to the Sheriff's Department, the facility is not expected to result in significant adverse effects to the department or its capability to provide adequate service to the area (pers. comm., T. Hamby, Secretary, Umatilla County Sheriff; ENSR Engineering and Consulting 1994a). In addition, second response calls for emergency services would be provided by the Hermiston Police Department through a mutual aid agreement with the Sheriff's Department. The Hermiston Police Department anticipates no problems with providing police services to the site (pers. comm., G. Asher, Chief, Hermiston Police Department, December 7, 1993; ENSR Engineering and Consulting 1994a). An increase in demand for police services as a result of new residents moving to the area due to the proposed facility is not anticipated. Any increase could be handled by the present police force.

3.9.5 Fire Protection

The cogeneration facility and associated elements will be constructed with fire hydrants and a sprinkler and deluge system. Company employees will be trained in emergency first aid procedures. According to the Hermiston Fire Department, if the facility is constructed with all fire protection equipment and facilities in accordance with the Oregon Fire Code, it will not be expected to result in significant adverse impacts to the department's existing capabilities (pers. comm., J. Stearns, Chief, Hermiston Fire Department, December 1, 1993; ENSR Engineering and Consulting 1994a).

There will be some permanent employees hired from outside the area who will relocate to the project vicinity. However, this number is not expected to increase demand for fire protection services; therefore, it would not adversely impact local fire protection services.

3.9.6 Medical Services

The project is not expected to adversely affect medical services in the project vicinity. Good Shepherd Community Hospital in Hermiston has ample capability to handle any emergency situation associated with the project (pers. comm., K. Loveland, Public Relations Director, Good Shepherd Community Hospital, December 7, 1993; ENSR Engineering and Consulting 1994a).

3.9.7 Transportation

Construction Traffic

Assuming a construction worker vehicle occupancy rate of 1.0 employee per vehicle (worst-case), 400 employee vehicles would be accessing and departing the cogeneration facility site during peak construction. In addition, an estimated 20 trucks per day would deliver supplies to and haul waste from the site for the facility as well as the connecting powerlines and pipelines. The portion of the truck traffic projection representing heavy haul loads is unknown at this time; however, the need for heavy haul loads may be reduced through the use of the adjacent railroad siding. Traffic impacts resulting from construction of any pipeline beyond the immediate vicinity of the project site would be dispersed and therefore be minimal.

Construction access for the cogeneration facility would be via SR 207 and the existing channelized intersection with J.R. Simplot's entrance road. Construction traffic would increase volume on SR 207. The existing channelized intersection has long site distances, and would facilitate the additional left-turning movements for southbound to eastbound vehicles. Construction traffic along this section of SR 207 would represent approximately a 15 percent increase in ADT over the 1991 ADT (2,650 to 3,350 daily trips) recorded for this same segment of highway (ODOT 1991).

Operations Traffic

Assuming a vehicle occupancy rate of 1.0 employee per vehicle (worst-case), the 24 employee vehicles accessing and departing the site each day would represent a negligible increase over the 800 daily employee trips and 50 to 60 truck trips currently occurring in connection with the J.R. Simplot plant and the approximately 2,650 to 3,350 trips occurring daily along this section of SR 207, discussed above.

3.9.8 Mitigation

The following measures would be implemented to mitigate adverse impacts to socioeconomics and public services:

- The developer proposes to establish a housing clearinghouse at the project site for construction workers. This clearinghouse will coordinate with local officials and housing owners to place workers needing lodging, if necessary.

- All deliveries of heavy equipment will be scheduled to avoid times of road weight restrictions.

- Delivery of heavy material to the site can, if necessary, be made by rail.
- Construction worker traffic patterns to the site, both egress and ingress, will be coordinated with the state, county, and J.R. Simplot.
- The sight distances could be improved and a left turn lane constructed on the County road.

3.9.9 Unavoidable Adverse Impacts

Because of the limited availability of permanent housing, the project could have a low unavoidable adverse impact on the socioeconomic environment of the project vicinity. However, construction and operation of the project would also have beneficial impacts on the economy.

3.9.10 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 project vicinity.

If two or more of the three combustion turbine generating plants proposed for the Morrow-Umatilla region (the proposed project, Hermiston Generating Project in Hermiston, and the Coyote Springs project near Boardman) were built at the same time, there could be significant 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 vicinity, which currently has low vacancy rates. Permanent workers associated with the projects would also increase cumulative adverse effects on available housing. Therefore, cumulative impacts from the project are considered moderate.

3.10 Recreation Resources

3.10.1 Effect on Recreation

There would be no direct impacts to any existing or planned recreational facilities or opportunities from construction and operation of the proposed project.

The proposed project is located in an existing industrial area with plans for expanded industrial uses. The project vicinity, therefore, has little potential for future development of recreational opportunities or facilities.

3.10.2 Mitigation

No adverse impacts to recreational facilities and opportunities from construction and operation of the proposed project are expected; therefore, no mitigation measures are necessary.

3.10.3 Unavoidable Adverse Impacts

No adverse effects on recreation facilities and opportunities have been identified.

3.10.4 Cumulative Impacts

Because no adverse impacts on recreation facilities, or opportunities from the proposed project were identified, cumulative impacts on recreation resources would be negligible.

3.11 Public Health and Safety

3.11.1 Cogeneration Facility

Regulated Fuel Substances

The cogeneration facility would burn natural gas as the primary fuel supply. A back-up supply of No. 2 fuel oil would be stored in two aboveground tanks each with a capacity of 3,785,400 l (1 million gallons). The tank would be surrounded by a concrete dike of sufficient size to contain the total volume of one tank, including the precipitation from the greatest storm event for the area as required by regulations. Fuel oil would be delivered to the facility via railroad tanker car using the existing Simplot siding to replenish the storage tanks during the relatively short duration of fuel oil firing. A 757 l (200 gallon) tank used to hold diesel fuel for the fire protection system would be on site and similarly protected. Direct impacts from use and storage of these regulated fuel substances could occur in the unlikely event of an accidental release of the products, which could increase the exposure of the fuel substances to the facility personnel. However, with adequate ventilation and prescribed emergency safety measures, the impact is expected to be low.

During construction of the cogeneration facility, the risk of a significant[1] fire or explosion is extremely low. Most of the building materials used in the construction of a cogeneration facility are nonflammable. Many of the major components (e.g., turbines and boilers) for a cogeneration facility are constructed off site. During the construction process, small quantities of flammable liquids and compressed gases would be used and stored on site and at the contractors laydown area. Flammable liquids may include fuels, paints, and cleaning solvents, compressed gases may include acetylene, oxygen, helium, hydrogen, and argon for welding. The storage and handling of these materials are regulated through the Oregon Occupational Safety and Health regulations for hazardous material (OAR, Division 2 General Occupational Safety and Health Rules, Subdivision H, Hazardous Materials: 1910.101–1910.120).

[1] Significant means a fire or explosion that engulfs or damages an area outside of its primary point of origin.

Operation of a cogeneration facility may have three primary materials that under certain conditions have the potential for explosion. These are natural gas, anhydrous ammonia, and hydrogen. Natural gas, which will be piped to the site, is the primary fuel for operating the turbines. None of the natural gas will be stored on site. Hydrogen (70,000 cubic feet storage capacity) will be used by the facility for cooling electrical generators. Ammonia, either anhydrous or aqueous, is used in air pollutant control equipment.

Natural gas and hydrogen are used for industrial purposes throughout the United States with a very low record of explosion as a result of its use. When explosions have occurred they have been the result of equipment failure or human error that released flammable gases into unsafe conditions. The combination of flammable gases, an ignition source, and oxygen may result in an explosion. To prevent or minimize the potential for an explosion the Uniform Fire Code (UFC) as well as Occupational Safety and Health Administration (OSHA) regulations have been developed to ensure the safe operation, handling, and management of these and other potentially explosive materials.

Regulated Non-Fuel Substances

The cogeneration facility may use and store the chemicals listed in Table 3.11-1. Indirect impacts from non-fuel substances such as adverse health effects could result if release were uncontrolled and of sufficient volume to affect off-site populations.

Secondary containment would accommodate the non-fuel substances in the unlikely event of an accidental release. The indirect impacts from such a release would be minimal due to the secondary containment and minimal amounts of non-fuel substances stored at the facility.

Solid Waste

Typical solid waste materials expected to be created by the cogeneration facility are listed in Table 3.11-2. The total annual volume of solid waste generated is estimated to be less than 191 cubic m (250 cubic yards) or 25.4 metric tons (25 tons).

The water supply and wastewater treatment processes would create sludges requiring disposal in a suitable facility. These sludges would be tested for potential hazardous characteristics and disposed of in an appropriately certified facility.

3.11.2 Gas, Water Supply and Waste Water Pipelines, and Electrical Transmission Lines

Hazardous substances used during the construction of the buried pipelines and overhead transmission lines include petroleum products, lubricants, and other substances associated with vehicle operation and maintenance. During construction, adverse environmental effects could be caused from the accidental release of controlled substances. Adverse environmental impacts include possible impacts to vegetation and/or wildlife due to exposure to controlled substances.

Table 3.11-1. Chemicals Likely to be Stored at the Cogeneration Facility

Item No.	Storage Method	Contents	Estimated Liters (gallons)
1	No. 2 Fuel Oil Storage Tank No. 1	Fuel Oil	3,785,400 (1,000,000)
2	No. 2 Fuel Oil Storage Tank No. 2	Fuel Oil	3,785,400 (1,000,000)
3	Fuel Tank	Diesel	757 (200)
4	Aqueous Ammonia Storage Tank	Ammonia	9,500 (35,961)
5	Shot Chemical Feed Tank (Closed Cooling Corrosion Inhibitor)	[1]	100 (378)
6	Shot Chemical Feed Tank (Closed Cooling Corrosion Inhibitor)	[1]	100 (378)
7	Phosphate Tank	NA_3PO_4	100 (378)
8	Phosphate Tank	NA_3PO_4	100 (378)
9	Oxygen Scavenger Tank	DEAE	100 (378)
10	Oxygen Scavenger Tank	DEAE	100 (378)
11	Neutralizing Amine Tank	Morpholine	100 (378)
12	Neutralizing Amine Tank	Morpholine	100 (378)
13	Bulk Phosphate Storage Tank	NA_3PO_4	2,000 (7,570)
14	Bulk Oxygen Scavenger Tank	DEAE	2,000 (7,570)
15	Bulk Neutralizing Amine Tank	Morpholine	2,000 (7,570)
16	Inhibitor Tank	Polyphosphate	500 (1,892)
17	Biocide Tank	NaOCl	8,000 (30,283)
18	Acid Tank	Sulfuric Acid	8,000 (30,283)
19	Inhibitor Tank	Polyphosphate	500 (1,892)
20	Biocide Tank	NaOCl	8,000 (30,283)
21	Acid Tank	Sulfuric Acid	8,000 (30,283)
22	Acid Batch Tank	Sulfuric Acid	500 (1,892)
23	Acid Storage Tank	Sulfuric Acid	7,000 (26,497)
24	Caustic Batch Tank	NaOH	500 (1,892)
25	Caustic Storage Tank	NaOH	7,000 (26,497)
26	Fuel Tank Fire Pump Pkg.	No. 1 Diesel	550 (2,081)
27	Acid Day Tank	Sulfuric Acid	500 (1,892)
28	Anti Scalant Day Tank	Sodium Tolyltriazole	500 (1,892)
29	Acid Day Tank	Sulfuric Acid	500 (1,892)
30	Anti Scalant Day Tank	Sodium Tolyltriazole	500 (1,892)
31	Lube Oil Tank, Comb. Turbine	Lube Oil	5,600 (21,198)
32	Lube Oil Tank, Comb. Turbine	Lube Oil	5,600 (21,198)
33	Lube Oil Tank, Steam Turbine	Lube Oil	TBD
34	Lube Oil Tank, Steam Turbine	Lube Oil	TBD
35	Stm. Turbine Control Fluid	Fryquel EHC	TBD
36	Stm. Turbine Control Fluid	Fryquel EHC	TBD
37	Liquid Alum. Storage Tank	$Al_3(SO_4)^3$	7,000 (26,497)

TBD = To be determined.

[1] Sodium metasilicate, sodium hydroxide, sodium nitrate, sodium tetraborate.

Table 3.11-2. Typical Solid Waste Materials Generated by a Cogeneration Facility

Waste Stream	Classification	Amount	Frequency	On-Site Treatment	Storage	Off-Site Treatment/ Disposal
Used Lead Acid Batteries	Hazardous	2-cells	Once Per Year	None	90-days	Recycle to Battery Vendors
Spent SCR Catalyst Material	Hazardous	170-230 cu. m (6,000-8,000 cu. ft)	Once Every 3-5 Years	None	None	Ship to Hazardous Waste Disposal Facility
Oil Rags, Oil Absorbent Material	Hazardous	<1 cu. m (20 cu. ft)	Once Per Month	None	90-days	Ship to Hazardous Waste Disposal Facility
Spent Cation Demineralizer Resins	Nonhazardous	48 cu. m (1,700 cu. ft)	Once Every 8-10 Years	None	None	Recycle to Resin Vendors
Spent Anion Demineralizer Resins	Nonhazardous	45 cu. m (1,600 cu. ft)	Once Every 4-5 Years	None	None	Recycle to Resin Vendors
Office Waste Materials (Trash and Garbage)	Nonhazardous	>9 kg/day (>20 lb./day)	Daily	None	None	Ship to Sanitary Landfill

3.11.3 EMF and Shock Hazard

EMF

Both electric and magnetic alternating-current (a-c) 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 EMFs 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, a number of subtle effects of unknown biological significance have been reported in some laboratory studies (Frey 1993).

Currently, much attention 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, National Radiological Protection Board [NRPB] 1992, Oak Ridge Associated Universities [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 EMFs and cancer. A review of some of the studies relating to EMF and possible biological and health effects are included in Chapter VI, Appendix D.

A magnetic field exposure assessment was done for the proposed project using industry-accepted computer modeling techniques by first estimating what future magnetic levels would be without the proposed project. This analysis served as a baseline measurement for engineers to 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 exist nearby.

Western 230-kV Alternative

UECA's Relocated 115-kV Transmission Line. In those areas of the proposed route where there are no existing transmission lines, buildings near the transmission corridor may be exposed to electric and magnetic fields from the proposed project. Figure 3.11-1 shows the magnetic field profile for this portion of the line.

Between Westland and McNary Substations. The transmission corridor currently contains an existing U.S. Generating/UECA double circuit transmission line. The proposed project will not be changed physically, but will be changed in the way it is operated electrically. As a result of changes in electrical phasing, the magnetic fields are expected to be less with the energization of the proposed alternative. Figure 3.11-2 shows the magnetic field profile for this portion of the line.

Between Westland and Hermiston Power Project Substations–Comparison between Single and Double Circuit Lines. There is very little difference between the single and double circuit alternatives at the edge of the ROW and beyond. However, there is no existing line, thus buildings near the transmission corridor may be exposed to EMFs from the proposed project. Figure 3.11-3 shows the magnetic field profile for this portion of the line.

Eastern 500-kV Alternative

Between Hermiston Power Project and McNary Substation. There is no existing transmission line. Thus buildings near the transmission corridor may be exposed to EMFs from the proposed project. Figure 3.11-4 shows the magnetic field profile for this portion of the line.

Adjacent to BPA's McNary-Roundup 230-kV Line. Buildings on the east side of the corridor may experience an increase in exposure to magnetic fields. The west side of the corridor contains an existing transmission line, thus there will be little difference in magnetic field exposure from the proposed project as compared to existing exposure for buildings near the transmission corridor. Figure 3.11-5 shows the magnetic field profile for this portion of the line.

Both the 230-kV Alternative and 500-kV Alternative will meet all state of Oregon standards for noise and electrical field standards.

Electrical Shock

Power lines, like electrical wiring, can cause serious electric shocks if certain precautions are not taken. These precautions include building the lines to minimize the shock hazard. All BPA lines are designed and constructed in accordance with the National Electrical Safety Code (NESC).

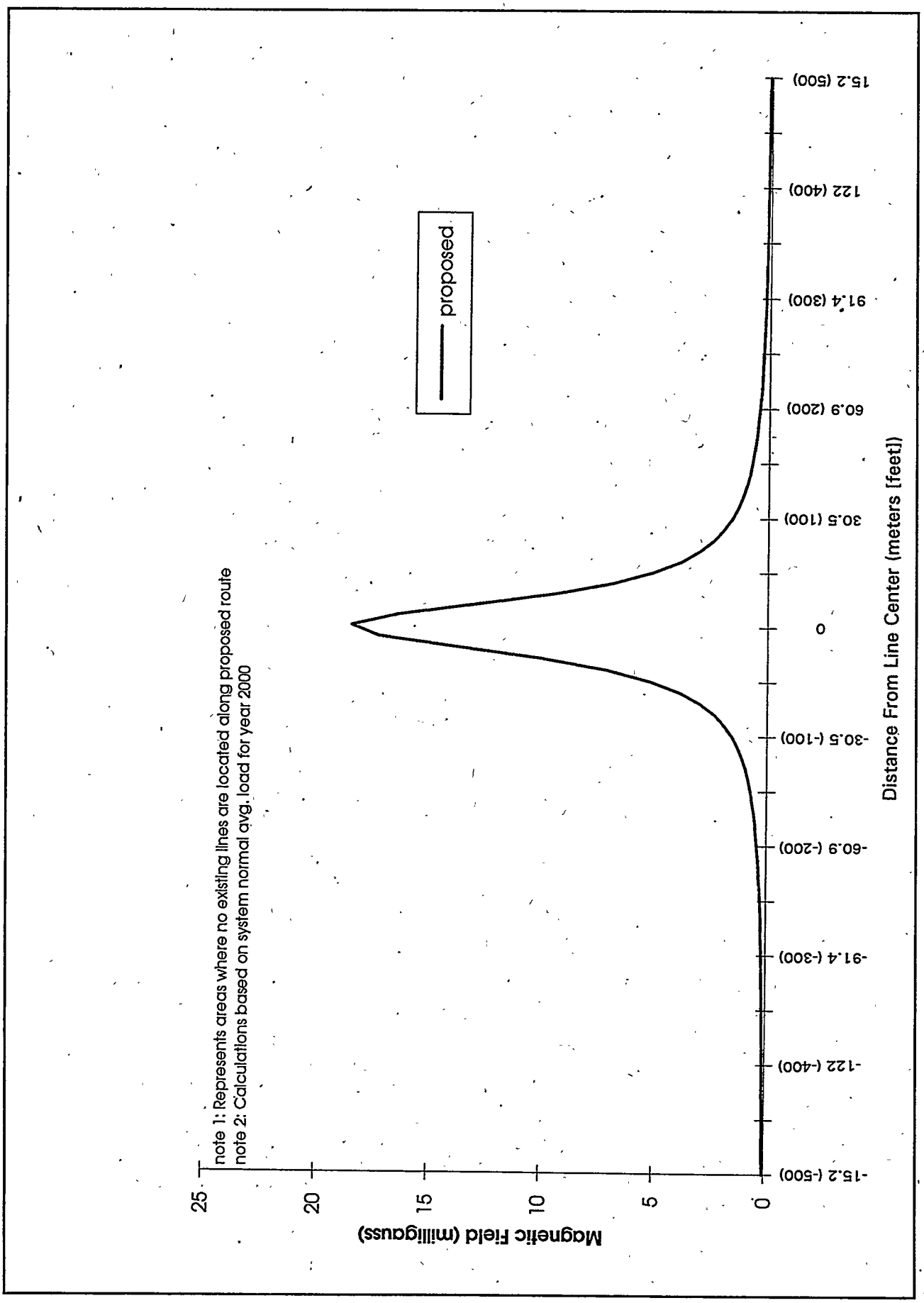


Figure 3.11-1 Western 230-kV Alternative: Magnetic Field Profile for UECA Relocated 115-kV Transmission Line

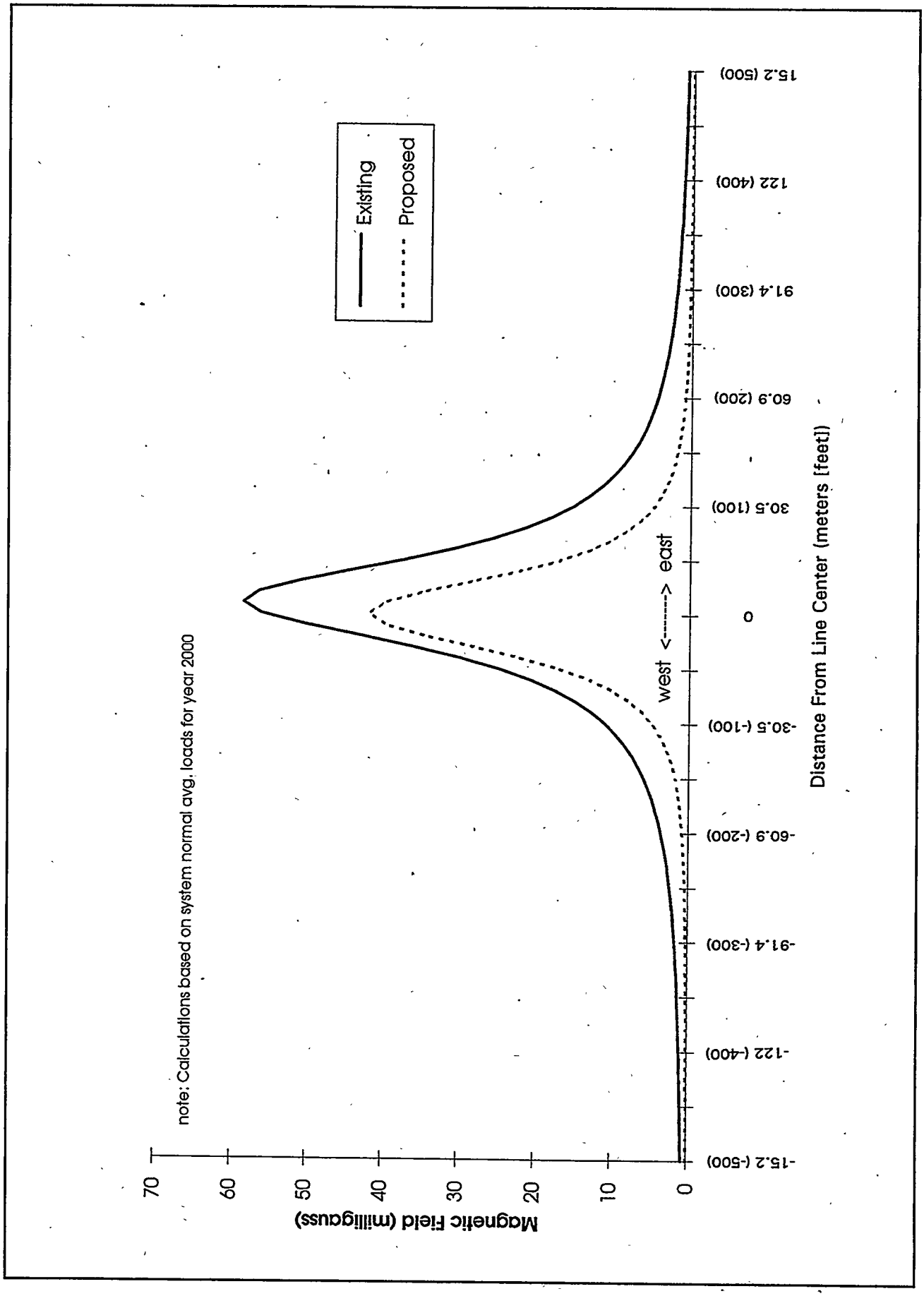


Figure 3.11-2 Western 230-kV Alternative: Magnetic Field Comparison Between Existing and Proposed Double Circuit 230-kV Transmission Line Configurations-Segment Between Westland and McNary Substations

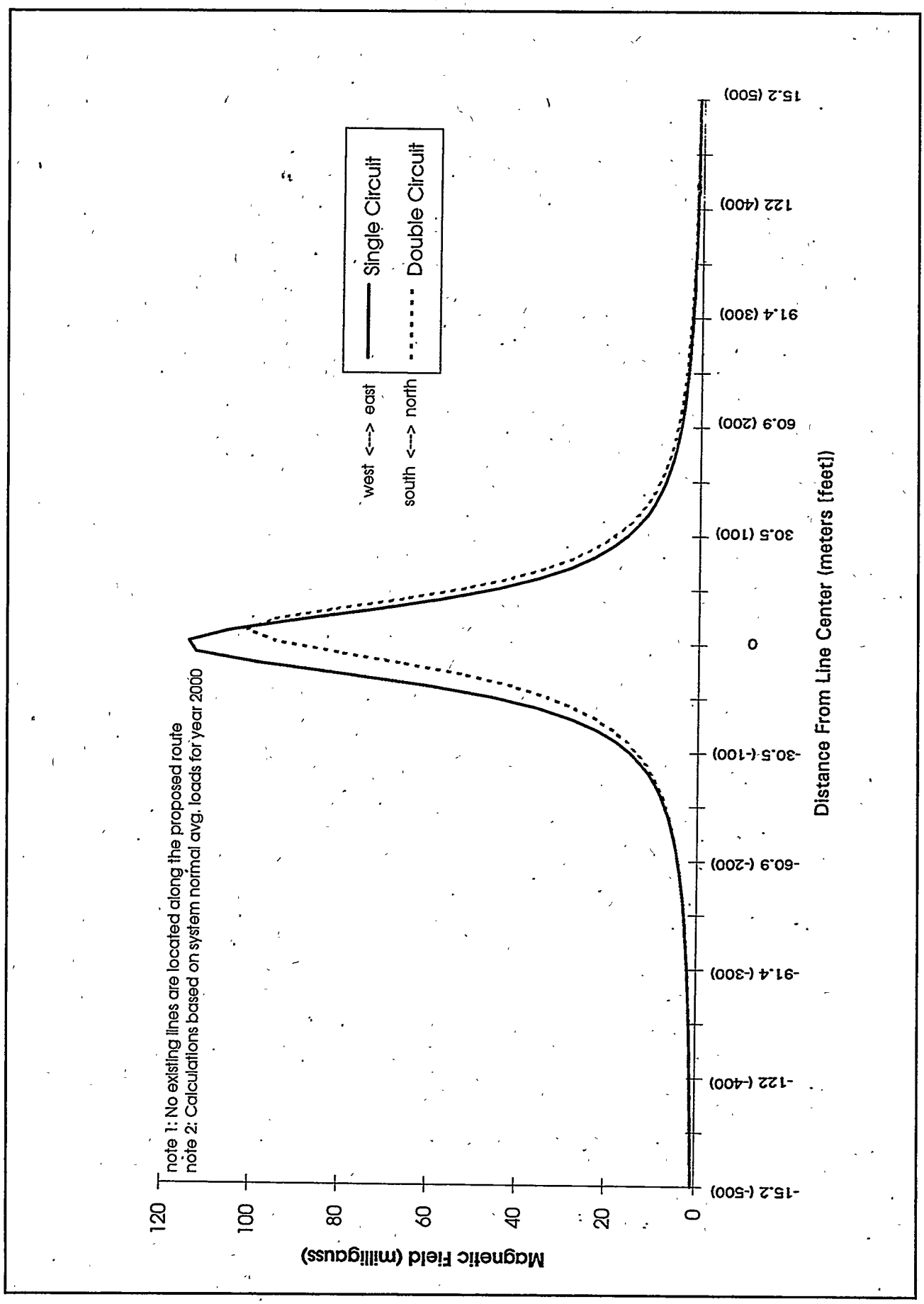


Figure 3.11-3 Western 230-kV Alternative: Magnetic Field Profiles for Proposed Single and Double Circuit Transmission Line Configurations-Segment Between Westland and Cogeneration Facility

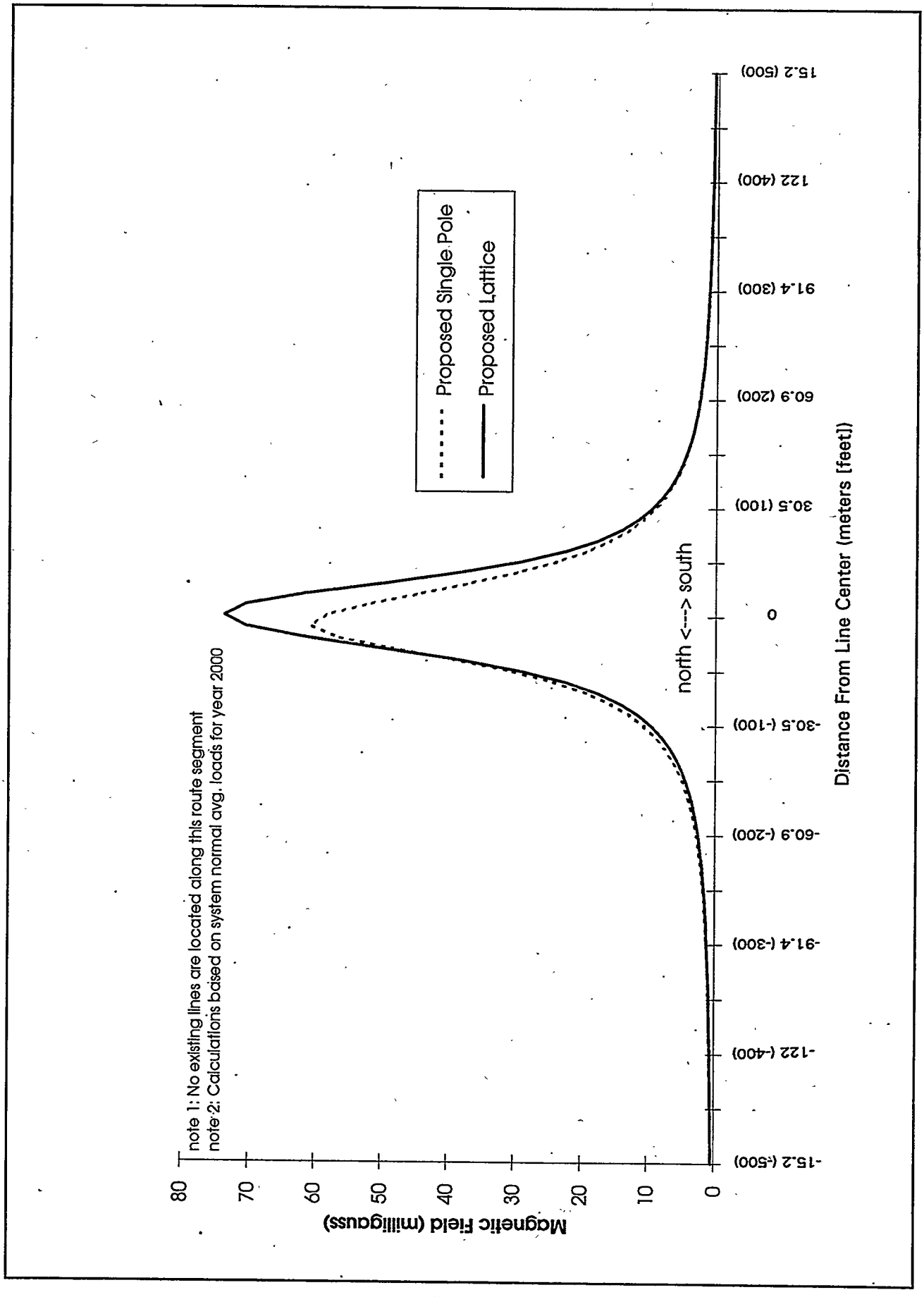


Figure 3.11-4 Eastern 500-kV Alternative: Magnetic Field Profiles for Proposed Transmission Line Configurations-Segment Between Cogeneration Facility and BPA's McNary-Roundup 230-kV Corridor

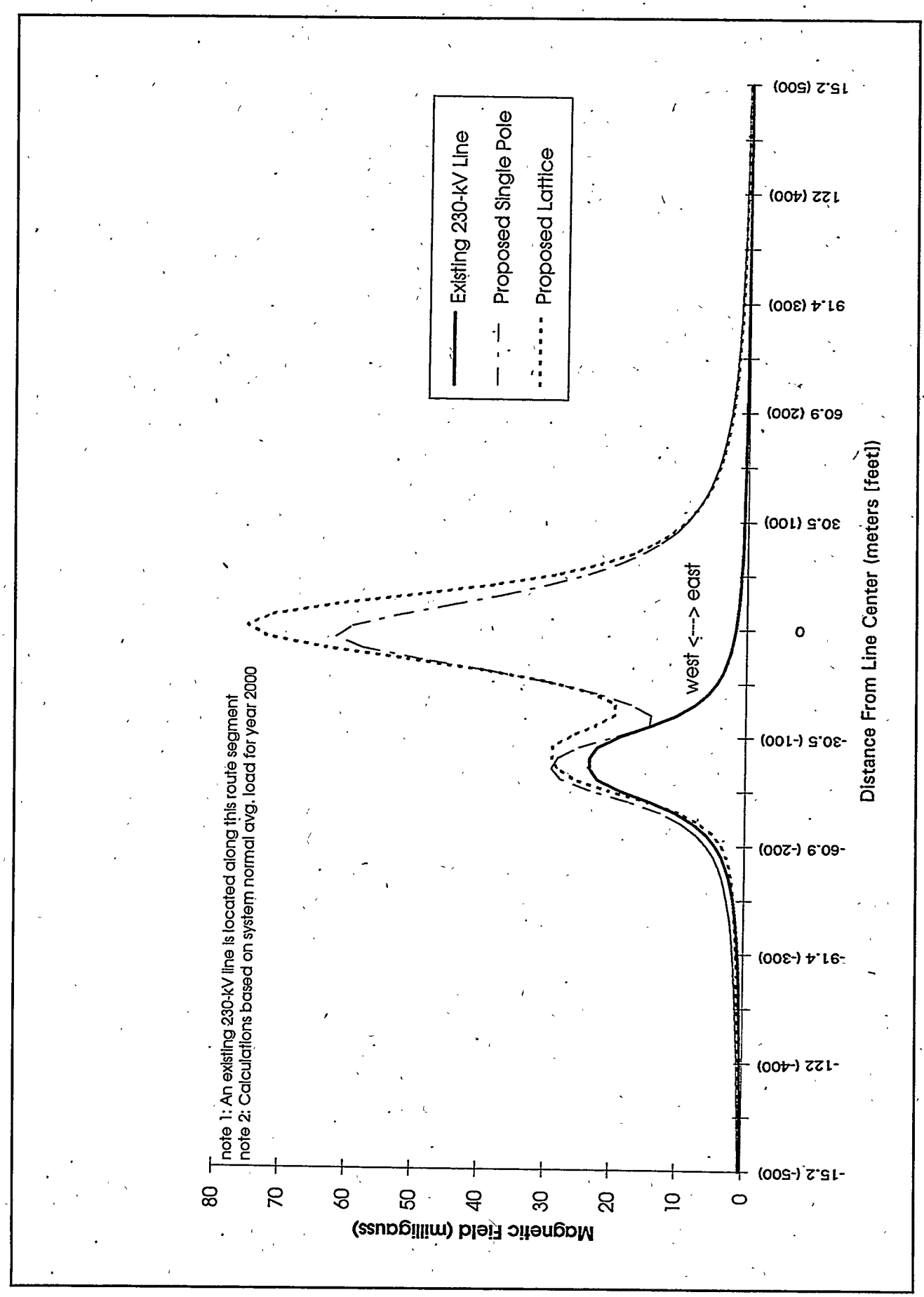


Figure 3.11-5 Eastern 500-kV Alternative: Magnetic Field Comparisons Between Existing Proposed Transmission Line Configurations-Segment Adjacent to BPA's McNary-Roundup 230-kV Line

NESC specifies the minimum allowable distances between the lines and the ground or other objects. These requirements basically determine the edge of the ROW and the height of the line (i.e., the closest point that houses, other buildings, and vehicles are allowed to the line) to limit electric field effects to acceptable levels.

People must also take certain precautions when working or playing near power lines. It is extremely important that a person not bring anything, such as a TV antenna or irrigation pipe, too close to the lines. BPA provides a free booklet that describes safety precautions for people who live or work near transmission lines (Living and Working Around High Voltage Power Lines).

Transmission lines can also induce voltages into objects near the lines. This effect can lead to nuisance shocks if a voltage is induced on something like wire fencing which is on wood posts and, therefore, insulated from ground. Usually, however, this becomes a problem only with lines of voltages above 230 kV. Should problems develop with either high- or low-voltage lines, they can be corrected by simple grounding techniques. For 500-kV lines, grounding of certain objects near the lines is a routine part of the construction process.

3.11.4 Mitigation

The following measures will be implemented to mitigate potential impacts to public health and safety from construction and operation of the proposed project.

- A final Spill Prevention, Control, and Containment (SPCC) Plan will be developed and in place prior to the arrival and storage of any chemicals to the proposed facility. The plan will meet all the requirements of 40 Code of Federal Regulations (CFR) Part 112.

- The storage and use of substances at the site will conform to the Federal UFC Article 80. In compliance with this regulation, a Hazardous Materials Inventory Statement and a Hazardous Materials Management Plan will be produced and filed with the Public Utilities Building Department prior to the arrival of any hazardous materials. These plans will include all the information as listed in the UFC Appendix II-E. In addition, the facility will adhere to the reporting requirements under Superfund Amendment and Reauthorization Act (SARA) Title III.

- A reuse and recycling plan will help reduce impact from solid waste generated by the project.

- A National Pollutant Discharge Elimination System (NPDES) Permit will be applied for prior to construction of the gas pipelines to address handling of storm water.

- A Storm Water Pollution Prevention Plan will be developed for the construction of the electrical transmission access roads, if needed.

3.11.5 Unavoidable Adverse Impacts

Steps and measures have been taken to ensure that the construction and operation of the proposed project would not have significant adverse effects on the health and safety of the public. Therefore, adverse impacts to public health and safety from the proposed project are considered low.

3.11.6 Cumulative Impacts

Operation of the project would increase the amount of solid waste generated in the region. In regard to hazardous materials, the potential for exposure to regulated fuel and regulated non-fuel substances would increase. However, all necessary control measures will be taken to minimize the likelihood of an accidental release. Therefore, cumulative impacts would be low.

3.12 Visual Quality

3.12.1 General Effects of Project Components

Cogeneration Facility Site

The cogeneration facility would be most visible at distances of up to about 3.2 km (2 miles) from the site. At distances greater than 3.2 km (2 miles), the facility would appear in the background and would blend with other similar features in the area. Therefore, beyond the 3.2-km (2-mile) range, the cogeneration facility would not constitute an intrusion into the viewshed.

The most visually dominant feature of the cogeneration facility would be the two 53.3-km (175-foot)-high emission stacks that would be visible from portions of the roadways in the vicinity and from nearby residences. In views from I-84 and SR 207, the stacks would be visible within the panoramic views of the vicinity. Other vertical elements such as water towers and grain elevators are also visible in this area. The stacks would be viewed as part of a group of industrial structures visible from the roadways. The proposed project would increase the industrial appearance of the area's overall visual character but would result in low adverse impacts on views from the roadways in the area.

Nearby residences located primarily south of the facility along Umatilla Meadows Road would have views of the cogeneration facility. Most of the views would be limited to the upper portions of buildings and the stack. These houses currently have similar views of the existing J.R. Simplot plant and other facilities in the area.

During cold temperatures, cooling tower emissions would also form steam plumes that would be visible for several miles. As steam plumes are already being generated by J.R. Simplot, Lamb-Weston, and other industrial users in the general Hermiston area, the effect of these additional plumes would not be significant.

The cogeneration facility would not be visible from the sensitive viewing areas described in the Umatilla County Comprehensive Plan, including Lake Umatilla, Lake Wallula, Hat Rock State Park, Cold Springs Reservoir, Wallula Gap, and McKay Reservoir. The cogeneration facility would be

visible from some portions of the Umatilla County Scenic-Historic Road, specifically to travellers along Feedville Road.

Because of intervening terrain and distance, the facility, with the possible exception of the upper portion of the two emission stacks, would not be visible from the city of Hermiston, where most of the recreational facilities and opportunities described above are located.

Portions of the project would be visible from the Umatilla River. However, because the proposed project would be located in an existing industrial area, it would not present significant additional visual intrusion at this location.

Water and Gas Pipelines

The only visual impacts associated with the water and gas pipelines would occur during construction activities. Construction activities (primarily dust) would be visible along some sections of the lines, but would be temporary. The lands the pipelines would be routed through would be revegetated or returned to their original conditions upon completion of construction activities.

Transmission Lines

The majority of either transmission line alternative follow existing transmission line ROWs and would have minor negative visual impacts on the adjacent landscape. Generally, new transmission lines would be built adjacent to an existing powerline within the existing ROW. Some of the proposed transmission line route options would require replacing existing utility poles with larger, taller poles or adding new poles that may be more dominant in the viewshed. However, it also means in most cases that poles would be farther apart.

Eastern 500-kV Alternative. The section of the Eastern 500-kV Alternative between the cogeneration facility and the BPA McNary Roundup Corridor would be new and would consist of 38.7 m (127 feet) high steel poles (or towers), running eastward along the south side of Feedville Road and then north along Canal Road. Viewers traveling along the 7-km (3-mile) Feedville Road section of the Umatilla County Scenic-Historic Road would observe the Eastern 500-kV transmission line. The negative visual impacts associated with the section of transmission line located adjacent to the Scenic-Historic Road would be not significant, because of the visibility of other transmission lines in the immediate area. The rest of the route would run within the existing BPA McNary Roundup Corridor.

The presence of the new (proposed) transmission line, although within the existing McNary Roundup Corridor containing transmission lines, would create a noticeable visual impact to travelers along the local roads intersecting with the corridor; and especially to the 115 residences within 152 m (500 feet) of the corridor. Although local residences and travelers are somewhat accustomed to viewing existing overhead transmission poles and lines, the new steel poles (or towers) would be noticeably higher than the existing wooden "H-Type structures." However, local travelers along the intersecting road would encounter the new transmission line for only brief periods as they approached and passed under the corridor. The residences adjacent to the corridor, on the other hand, would be subjected to a long term and more constant visual impact from the new line.

The rerouted McNary-Lower Monumental line would be located along a new route approximately 200 m (656 feet east of its present location and would cross over Highway 395. Because the number of transmission lines near the new route that converge on the McNary Substation, the addition of the rerouted McNary-Lower Monumental line would not have a significant impact on the visual quality of the area near the new route.

Western 230-kV Alternative. Most of the Western 230-kV line would utilize the existing UECA 115-kV/HGP 230-kV transmission line corridor from the Westland Substation to the McNary Substation. Along this section of the route, this alternative would cause no significant change in the current visual quality of the area along the route. The section of the line that would be placed between the Westland Substation and the cogeneration plant would be new involving adding conductor to an existing line, and constructing new poles and line. The section of the line that would be located next to Feedville Road for 3.2 km (2 miles) would be seen by people driving on Feedville Road. However, because of the presence of other transmission lines in the this area, the visual impact of the additional line along Feedville Road would be minor.

The 12.9-km (8-mile) long UECA 115-kV relocation would occur in an area that currently has several transmission lines passing though it on the way to the McNary Substation. The addition of the UECA 115-kV line would have minimal impacts on the visual quality of the area lines would pass through.

3.12.2 Effects on Key Viewing Areas

Primary viewers in the vicinity of the proposed project would consist of travelers on local roads, travellers on interstate highways, and to a lesser degree, viewers from residences. The greatest number of viewers of the cogeneration facility would be travelers on I-84 and SR 207, which are approximately 1.6 to 1.2 km (1 to 0.75 mile) away, respectively, from the cogeneration facility site. Project transmission lines would also be visible from roads and highways, and in some locations would pass over roads and highways.

To simulate effects of project components and transmission line alternatives on visual quality in the project vicinity, two key viewing areas (KVAs) were selected (Figure 3.12-1). The two KVAs were chosen to give an indication of how the cogeneration facility and two transmission line alternatives would affect viewers. KVA-1 is located at the intersection of I-84 and SR 207. It represents the views that travellers on local roads and interstate highways would have of the cogeneration facility. KVA-2 is located at the intersection of Highway 395 and Feedville Road. It was selected to represent a closeup view from roads primarily used by local traffic of the visual impacts associated with the Eastern 500-kV Alternative. The existing visual conditions near the two KVAs are discussed below, as are the visual impacts associated with the proposed project.

KVA-1 (Intersection of SR 207 and I-84)

Viewpoints from which the public might view the cogeneration facility are located along major roadways, including I-84, Feedville Road, and Umatilla Meadows Road. Because of the high speeds at which motorists travel along highways, views of the facility would be temporary and would be seen as background views within the context of a panoramic view of the landscape. Views

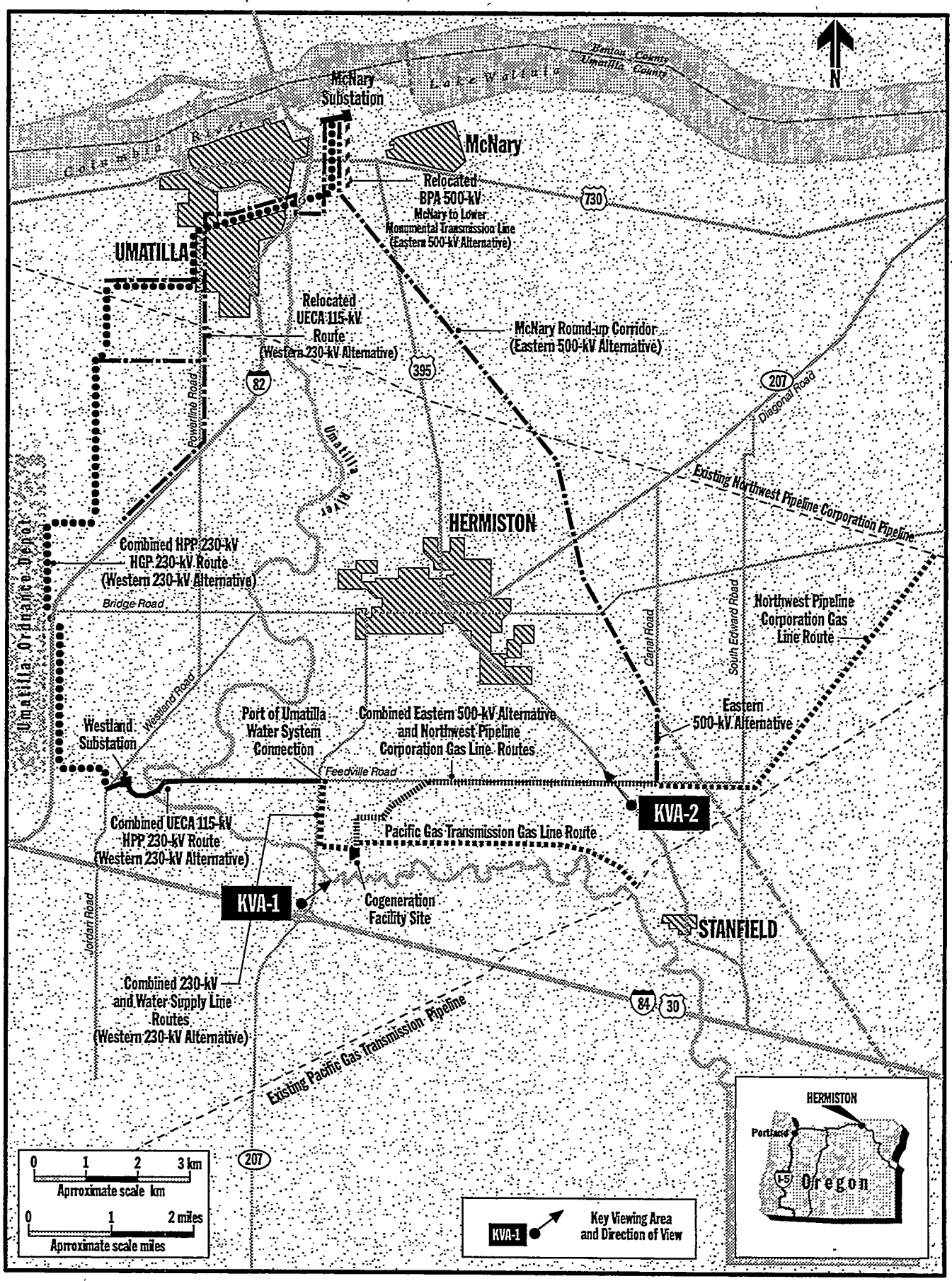


Figure 3.12-1 Key Viewing Area Locations

of the facility along Feedville and Umatilla Meadows roads would continue for a greater period of time and at closer distances.

The cogeneration facility site can be seen from KVA-1, which is located in the parking lot of a mini-mart on SR 207 adjacent to and to the north of I-84. The cogeneration facility site is approximately 1 km (0.75 mile) northeast of KVA-1. Figure 3.12-2a depicts the existing scene of the proposed project site and the J.R. Simplot facility as seen from KVA-1. Figure 3.12-2b is a photo-simulation that depicts what the scene would look like with the cogeneration facility in place.

KVA-2 (Intersection of Highway 395 and Feedville Road)

KVA-2 is located on Highway 395 at the intersection with Feedville Road. KVA-2 is situated in agricultural lands near the intersection of Highway 395 and SR 207. As depicted in Figure 3.12-3a, existing transmission lines parallel both Highway 395 and Feedville Road, which is a segment of the Umatilla County Scenic-Historic Road. Viewers from this KVA would be travelers on Highway 395 and Feedville Road.

The Eastern 500-kV Alternative would parallel the south side of this section of Feedville Road and would cross Highway 395. As depicted in Figure 3.12.3-b, the new poles and conductors would introduce another transmission line to the view from Highway 395.

Because of the presence of existing transmission lines along Highway 395 and Feedville Road, and the number of other transmission lines in the general vicinity, the visual impact of the Eastern 500-kV Alternative on viewers from KVA-2 would be low.

3.12.3 Mitigation

The following mitigation measures will be employed to minimize visual impacts:

- The two emission stacks will be painted in a matte-finished neutral color to prevent glare caused by reflective surfaces. Light colors such as light gray, gray-blue, or beige are most likely to blend with the surrounding area.

- Outdoor lighting at the cogeneration facility will be limited to the extent necessary to maintain safe conditions, and would consist of downward directional lights. Stair lighting would be manually engaged so that the stairs remain unlighted when not in use.

- A buffer zone of landscaping along the western and southern perimeter of the cogeneration facility site consisting of trees and shrubs will be constructed to enhance the visual qualities of the facility.

- All pipeline construction ROWs will be reseeded as soon as possible after burial of the pipe to reduce visual impacts associated with cleared ROW.

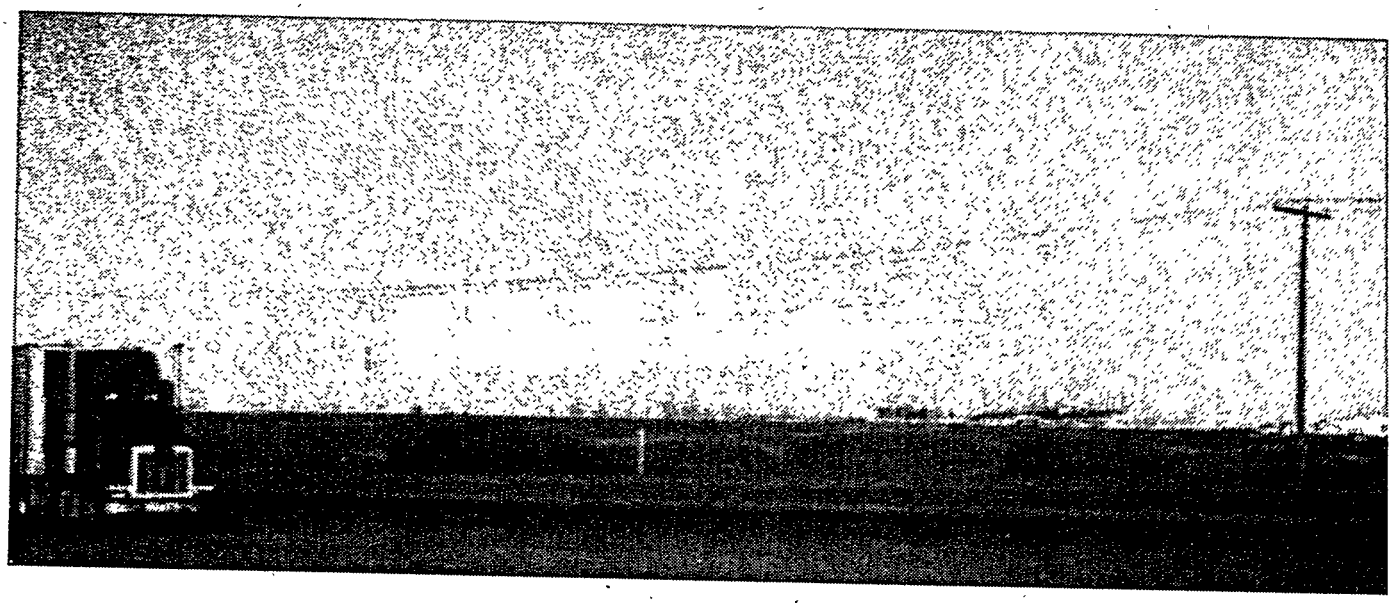


Figure 3.12-2a **KVA-1**—Photo taken from a mini-mart parking lot at the interchange of I-84 and State Route SR 207. View is approximately 0.75 mile from the site of the proposed facility.

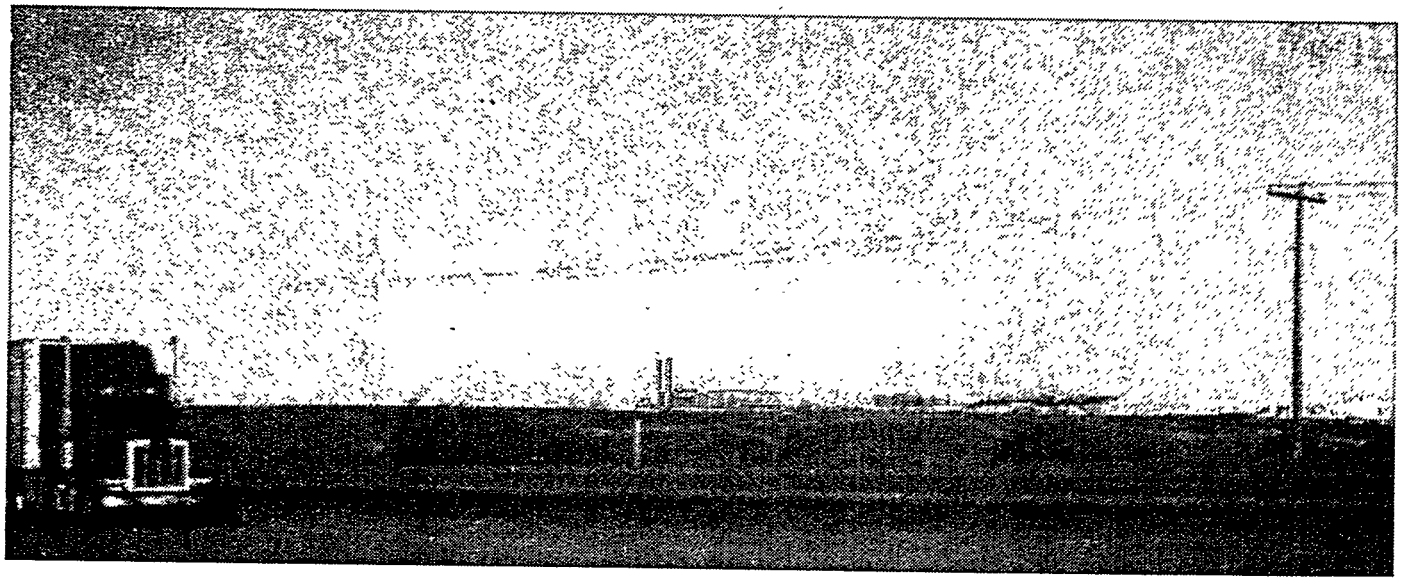


Figure 3.12-2b **KVA-1**—Visual simulation of the proposed facility from the same location as Figure 3.12-2a.

Figure 3.12-3a **KVA-2**—Photo of existing transmission lines crossing over Highway 395 at the intersection with Feedville Road. Photo is toward the northwest along Highway 395.

Figure 3.12-3b **KVA-2**—Visual simulation of the proposed transmission line crossing over Highway 395 at the intersection of Feedville Road. Note that this alternative replaces some smaller poles with larger transmission towers.

3.12.4 Unavoidable Adverse Impacts

The cogeneration facility and especially the emission stacks would be seen at times up to 8 km (5 miles) away. However, the cogeneration facility structures would be visually compatible with the nearby industrial and agricultural facilities, and would have a low adverse visual impact on the visual quality of the surrounding area.

Eastern 500-kV Alternative. The Eastern 500-kV Alternative transmission line along Feedville Road and the McNary Roundup Corridor, and Highway 395 would be seen by travellers on roads and highways in the vicinity and to residences close to the corridor. The visual impact to travelers would be considered low because of the brief time the transmission lines would be viewed. However, the visual impact to adjacent residences is considered moderate. Although the visual impact to adjacent residences is greater than the impact to local travelers, it is considered moderate rather than high because of the existence of other transmission lines in the immediate area. The McNary-Lower Monumental 500-kV Relocation would cross Highway 395. However, due to the presence of other lines crossing the highway as they converge at the McNary Substation, the visual impacts of the relocated transmission line would be low.

Western 230-kV Alternative. The only project component of the Western 230-kV Alternative that would have a visual impact would be the 3.2-km (2-mile) section of the line that would parallel Feedville Road. Because of the presence of an existing transmission line and industrial and agricultural facilities in the Feedville Road area, the impact of the line to the visual quality of the area near Feedville Road is considered low. The UECA 115-kV line relocation would occur in an area where other transmission lines are present. Thus, the 115-kV line would have low impacts on the visual quality of the area.

3.12.5 Cumulative Impacts

The cogeneration facility would cumulatively add to the industrial character of the area near the facility. It would be visually consistent with the industrial land use designation for the area, and would be similar in appearance with existing (and most likely future) agricultural and industrial facilities and is considered to have a low cumulative impact.

Eastern 500-kV Alternative. Because much of the Eastern 500-kV Alternative route would follow existing ROWs, the alternative's transmission line would have low impacts on the cumulative visual quality in the region. The section of the line that would follow Feedville Road would have a low impact on visual quality due to the presence of other transmission lines, and industrial and agricultural facilities that can be seen from Feedville Road. The rerouted McNary-Lower Monumental would be viewed by travelers on Highway 395 as they travel near the McNary Substation. However, due to the presence of other transmission lines that cross Highway 395, the cumulative visual impact of this route would also be low.

Western 230-kV Alternative. The Western 230-kV Alternative would also have low impacts on the visual quality of the areas along its route. Where the line would follow Feedville Road, it's visual impact would be low for the same reasons explained above for the Eastern 500-kV Alternative. The

UECA 115-kV relocation route would be located in and area that contains existing transmission lines, and thus would have low cumulative impacts on adjacent visual quality..

4.0 ENVIRONMENTAL CONSULTATION, REVIEW, AND PERMIT REQUIREMENTS, HERMISTON

4.1 NATIONAL ENVIRONMENTAL POLICY ACT

This EIS has been prepared by BPA pursuant to regulations implementing National Environmental Policy Act (NEPA) (42 United States Code [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 Power Project requires that BPA assess the potential environmental effects of the proposed project and describe them in an EIS.

4.2 THREATENED AND ENDANGERED SPECIES AND CRITICAL HABITAT

The Endangered Species Act (ESA) 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. BPA has consulted with the USFWS and NMFS pursuant to Section 7 of the ESA, as amended, 16 USC 1531 et seq., Public Law 97-304.

A letter was sent to USFWS requesting lists of threatened and endangered wildlife and plant species in the vicinity of the proposed project. Only one Federally listed wildlife species, the bald eagle, occurs in the vicinity of the project. Two listed fish species, the chinook salmon and the Snake River sockeye salmon, occur in the project vicinity (see Chapter VI, Appendix B, Biological Assessment).

The developer should consult with USFWS and appropriate state agencies close to the time of construction. Also, the developer should consult with BPA and appropriate agencies to determine if additional surveys are warranted for any Federally or state-listed species that are on the list at that time.

4.3 FISH AND WILDLIFE CONSERVATION

The Fish and Wildlife Conservation Act of 1980 (16 USC 2901 et seq.) encourages Federal agencies to converse 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 conserve or improve wildlife resources. Potential impacts to fish and wildlife from the project are discussed in Section 3.6.

4.4 CULTURAL RESOURCE (HERITAGE CONSERVATION)

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.

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 NRHP. The agency must consult with the SHPO regarding the inventory and evaluation of properties potentially eligible for NRHP nomination and to determine whether the undertaking would adversely affect them. The Hermiston Power Project would involve a permit or agreement with a Federal agency and is therefore a Federal agency undertaking. According to NEPA (40 CFR 1508.27), the project would have a significant impact on cultural resources if it would disturb or disrupt:

- a property of historic or cultural significance to a community or ethnic or social group;
- a property that is listed on or is eligible or potentially eligible to be listed on the NRHP; or
- a property state or local agencies have designated as historically important, such as a state historic landmark.

Potential impacts to Heritage Conservation (Cultural Resources) from the proposed project are discussed in Section 3.8.

4.5 State, Areawide, and Local Plan and Program Consistency

The project will 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. All project components (transmission lines, gas pipelines, and water and wastewater pipelines) are considered either permitted or conditional uses in all county or city land use designations they would be located in or pass through.

Construction of the cogeneration facility will permanently change existing land use at the site from agricultural to industrial. The other project components will not change the land uses of the lands they pass through, although they could temporarily (for one growing season) impact farming activities on agricultural lands.

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

Executive Order 11988 requires that floodplains be avoided to the extent possible. The proposed cogeneration facility, the water supply line, and the NWP gas supply line all lie above the 100-year floodplain designated by FEMA. One short section of the PGT gas pipeline encroaches on the 100-year floodplain. The Eastern 500-kV Alternative route does not cross any 100-year floodplain. The Western 230-kV Alternative route crosses the 100-year floodplain of the Umatilla River in two locations. However, because the transmission poles will not be placed in the floodplain, no significant impact is anticipated. The lines will be suspended above the floodplain high enough that they would be unaffected by floods.

4.8 WETLANDS

Construction is unlikely to impact wetland resources. However, the Eastern 500-kV Alternative may require that electrical transmission poles or towers be placed in one wetland. Additionally, the PGT gas supply line may cross the edge of one wetland. Should such construction be required, consultation with the Corps regarding compliance with Sections 401 and 404 of the Clean Water Act and possibly Section 10 of the Rivers and Harbors Act, and with the ODFW and ODEQ.

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.

Approximately 6.9 ha (17 acres) of prime farmland (based on soil type) would be permanently lost to agricultural production as a result of building the cogeneration facility. However, since this land is committed to urban development in the Umatilla County Comprehensive Land Use Plan, it is not protected under the Farmland Protection Policy Act. A maximum of 29 ha (71 acres) of prime farmland could be temporarily disturbed during construction of the water supply, wastewater, electrical transmission lines, and gas lines. However, soils would be stocked and replaced, and there would be no permanent loss of farmland.

4.10 RECREATION RESOURCES

None of the project components would be located near any existing recreation facilities or near any areas where dispersed recreation is known to occur. There would be no impacts to recreation from the project.

4.11 Global Warming

The Hermiston Power Project would emit the greenhouse gases carbon dioxide (CO_2) and methane. The burning of natural gas produces CO_2 as the primary combustion product. The proposed cogeneration plant would also emit small amounts of methane as unburned fuel.

Combined-cycle cogeneration plants burning natural gas, like the proposed project, emit less CO_2 per kilowatt of power generated than any other power generation method using fossil fuel. There are three main reasons for this. First, combustion turbines are the most efficient means of producing power from fossil fuels. For each British thermal unit (Btu) of fuel input, a combustion turbine can produce more kilowatts of power output than any other type of fossil fuelfired 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. Fourth, sending some of the steam produced by the heat recovery steam generator to the Simplot plant for potato processing allows the potato plant boilers to be shut down. This improves the overall energy use of the cogeneration plant. This greatly increases the amount of power generation per unit of fuel burned compared to a simplecycle power plant. From a global warming perspective, cogeneration plants like the Hermiston Power Project are the best method of power generation using fossil fuels.

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).

4.13 Permit for Discharges into Waters of the United States

Discharge of dredged or fill material into waters of the United States (including wetlands) is regulated by the Corps pursuant to Section 404 of the Clean Water Act. One Section 404 permit will possibly be required for the PGT natural gas pipeline. Permits for crossings of public lands will be required from the Bureau of Land Management (for the 500-kV transmission lines) and from the Bureau of Reclamation (for both the 230-kV and 500-kV transmission lines). There is no proposed discharge of dredged or fill materials into waters of the United States from the proposed project.

4.14 Permits for Right-of-Way on Public Lands

The project components will be constructed on privately owned land.

4.15 Energy Conservation at Federal Facilities

Not applicable.

4.16 POLLUTION CONTROL

4.16.1 Air

Emissions produced by the proposed project must meet standards established by the EPA. The Clean Air Act is the principal Federal law governing air pollution control. It was most recently amended in 1990. In the project vicinity, authority for ensuring compliance with the provisions of the Clean Air Act is delegated to the ODEQ.

The 430 MW Hermiston Power Project would be considered a major new source. Air quality permitting for sources that emit more than 91 MTY (100 TPY) of a regulated air pollutant is the responsibility of the ODEQ. ODEQ has established an air pollution control program to maintain acceptable air quality in areas where concentrations of criteria air pollutants are less than state and national AAQS. There is one nearby area (Eagle Cap Wilderness Area) that has been designated by Congress for special protection from air pollutants that might affect soils, vegetation, visibility, and other natural resources. These areas are designated as Class I under the Federal PSD program.

ODEQ has established regulations for new sources to ensure that ambient air quality remains acceptable and to protect Class I areas. These regulations and their supporting information are contained in the State Implementation Plan (SIP), a plan adopted by the state to ensure that air quality objectives are met. The SIP for Oregon has been approved by the EPA. An essential element of the plan is an engineering review process to ensure that new sources comply with all regulations (NSR). Sources constructed under the PSD program are required to maintain air pollution control equipment in proper working order and to periodically test the emissions to demonstrate compliance with emission limitations. ODEQ also administers a plan for controlling emissions of TAPs. New sources emitting toxic or carcinogenic air pollutants must also demonstrate that the concentrations resulting from these emissions are less than the SILs.

4.16.2 Water

Wastewater discharges to the water bodies of the United States are regulated under the Clean Water Act. The proposed cogeneration facility would discharge wastewater, not to a water body, but onto land for irrigation purposes. The J.R. Simplot Company intends to reuse this wastewater in their recycle system which irrigates nearby agricultural lands with process water from an existing year-round processing plant in Hermiston, Oregon. The Simplot recycle system operates under a WPCF permit which is issued by the ODEQ. This system would apply the cogeneration facility wastewater to the land during the growing season only.

4.16.3 Solid and Hazardous Waste

Solid waste generated at the proposed cogeneration facility 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 local landfill. The Resource Conservation and Recovery Act (RCRA), as amended, is designed to provide a program for managing and controlling hazardous waste by imposing requirements on

generators and transporters of this waste, and on owners and operators of treatment, storage, and disposal (TSD) facilities. Each TSD facility owner or operator is required to have a permit issued by EPA or the state. Construction and maintenance activities at the proposed project will generate small amounts of hazardous waste. These typically include: solvents, pesticides, paint products, motor and lubricating oils, and cleaners. Under EPA regulations, the amounts of these wastes generated by the proposed project would fall within the definition for a "small quantity generator." The developer will formulate a hazardous waste management program that meets all Federal and state hazardous waste requirements. 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 Noise

Oregon noise regulations prohibit a new industrial or commercial source from causing an increase in ambient statistical noise levels (L_{10} or L_{50}) in residential areas by more than 10 dB(A), or exceeding the levels shown in Table 4.16-1. Temporary, daytime construction activities are exempt from the regulations.

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 3.4.

Table 4.16-1 Allowable Noise Levels

	Measurement Period	
Statistical Noise Level	*7am to 10pm*	*10pm to 7am*
L_{50}	55 dB(A)	50 dB(A)
L_{10}	60 dB(A)	55 dB(A)
L_1	75 dB(A)	60 dB(A)

Source: OAR-340-35-035

4.16.5 Pesticides

The proposed project would not use or produce pesticides, and would not be affected by regulation regarding the purchase, use, storage, or disposal of pesticides.

4.16.6 Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) requires notification to EPA of new chemicals and regulates the production, use, and disposal of toxic substances. Of particular interest to the production of electricity is the regulation of polychlorinated biphenyls (PCBs). EPA banned the manufacture, processing, distribution in commerce, and use of PCBs on January 1, 1978 except in totally enclosed electrical equipment or under specific authorized uses. The proposed project would not involve the distribution, use, or disposal of PCBs.

4.16.7 Asbestos

There would be no asbestos used in the proposed project.

4.16.8 Comprehensive Environmental Response, Compensation, and Liability Act

A Phase I Environmental Site Assessment was completed for the proposed project site which indicated that no hazardous materials are present at the site.

4.16.9 Radon

There is no evidence to suggest that the proposed project vicinity 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).

CHAPTER IV — SATSOP CT PROJECT

1.0 PROJECT DESCRIPTION

1.1 SITE LOCATION AND CHARACTERISTICS

Most of the proposed Satsop Combustion Turbine (CT) Project components would be located in Grays Harbor County, Washington, at a site currently owned and operated by the Washington Public Power Supply System (Supply System) (see Figures 1-1 and 1-2). The site is zoned General Development 5, which permits energy facilities and their associated facilities. The site is located in Township 17 North, Range 6 West, Section 7. The CT facility site, natural gas pipeline, electrical transmission line, and water supply and wastewater lines would be in Grays Harbor County. The natural gas pipeline would also cross portions of Thurston County.

The 647-hectares (ha) (1,600-acre) Supply System complex was partially developed in the 1980s for two nuclear power plants (WNP-3 and WNP-5). WNP-5 was cancelled before either plant was completed, and in May 1994, Supply System voted to terminate the contractual agreement with Bonneville Power Administration (BPA) to complete and operate WNP-3. The proposed CT project is being developed independently of the nuclear projects.

The location of the proposed CT facility is a 5.3-ha (13-acre) site in an area formerly used as an equipment laydown area for the nuclear power plants. The majority of this site is graded and covered with a layer of gravel. Recent historical uses include storage of construction materials and equipment, and location of contractors' field offices. Portions of the site are currently used for storing concrete forms, steel rebar, and three active non-polychlorinated biphenyl (PCB) transformers that were used to supply construction power. These would be decommissioned to allow for the CT facility construction. Locating the new CT facility in the industrial area would enable Supply System to use existing infrastructure built for the nuclear plants.

1.2 PROJECT COMPONENTS

Major project components of the Satsop CT Project would include:

- One gas-fired 153 megawatt (MW) combustion turbine generator
- One heat recovery steam generator (HRSG)
- One 81 MW steam turbine generator
- A 77-kilometer (km) (48-mile) (between 40 and 51 centimeters [cm] [16 and 20 inches] in diameter) natural gas pipeline connecting the project to an existing Northwest Pipeline Corporation (NWP) mainline near Vail
- A back-up fuel oil system stored on site in an 8.2-million liter (l) (1.8-million gallon) tank
- Existing process water supply and wastewater treatment lines
- Cooling system
- Electrical interconnection to an exiting 230-kV substation 1,220 meter (m) (4,000 feet) east of the site and system modifications

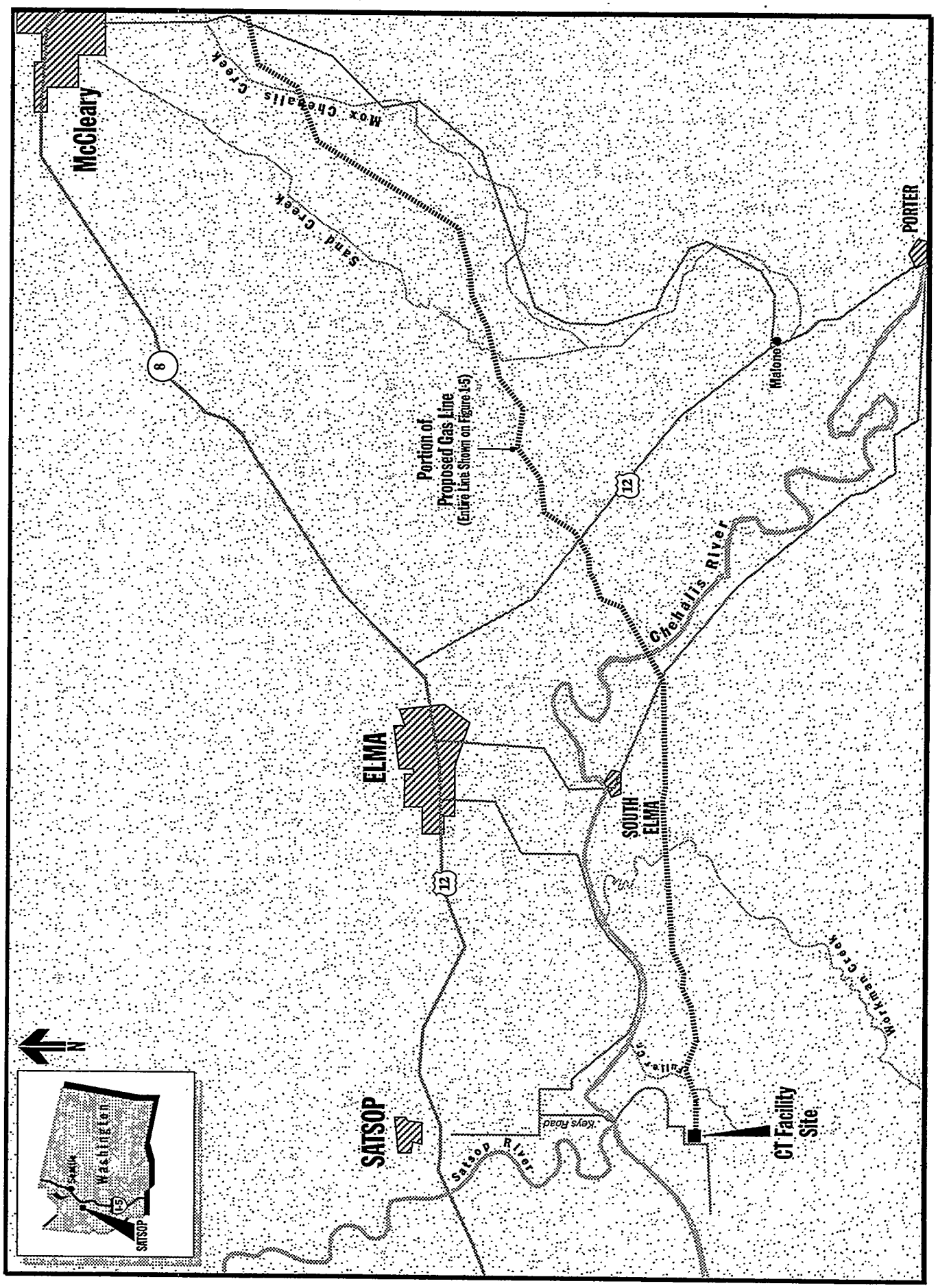


Figure 1-1 Project Location

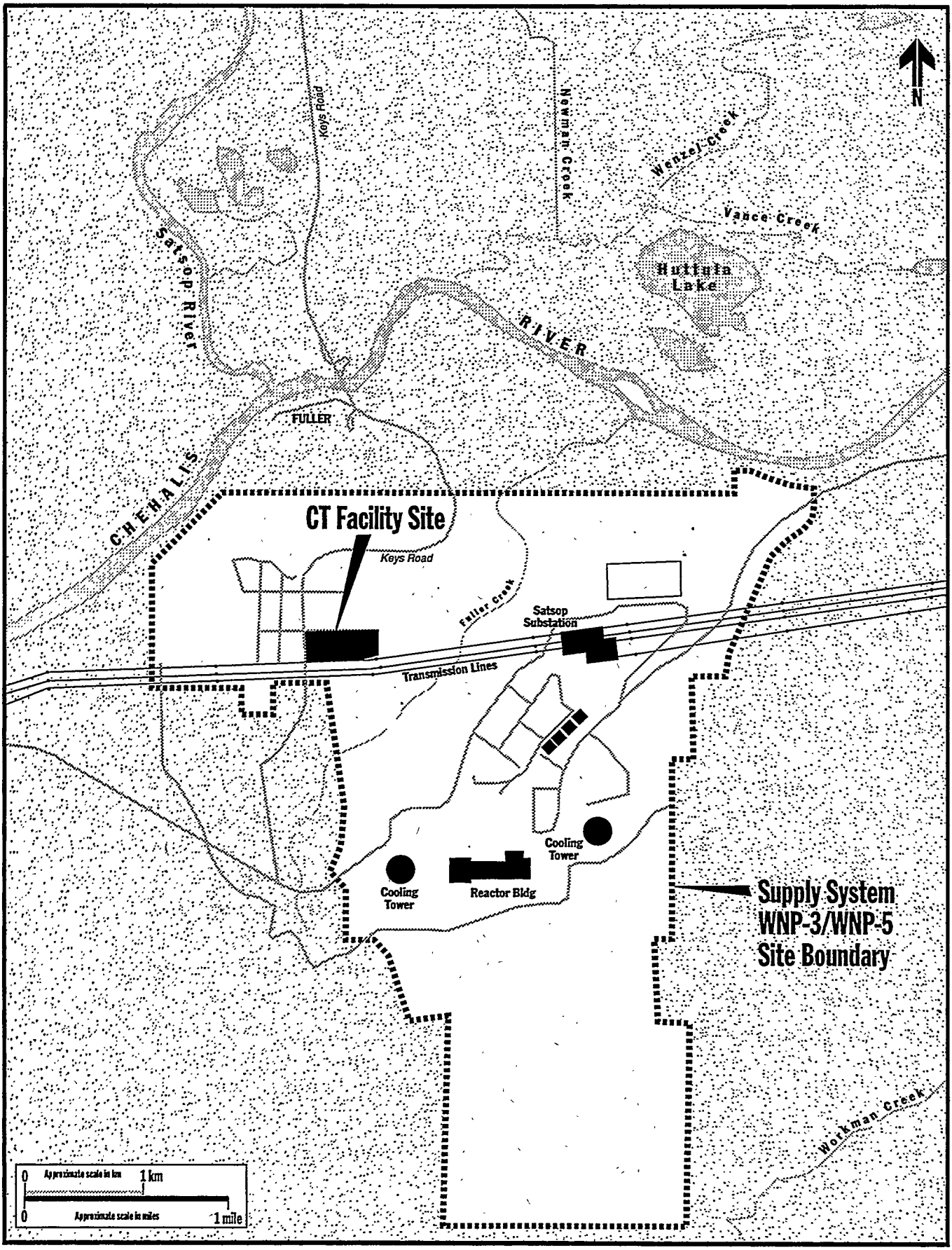


Figure 1-2 Supply System WNP-3/WNP-5 Complex

The proposed CT facility layout is depicted in Figure 1-3, with project components summarized below.

1.2.1 Combustion Turbine Facility

Supply System is proposing one natural gas-fired CT generator train with an expected capacity of approximately 153 MW. Exhaust from the combustion turbine would flow directly to a HRSG, which would create output steam to power a steam turbine generator with an expected capacity of 81 MW. Combining the outputs of the gas-fired combustion turbine and the steam turbine, the proposed project would generate 207 MW. A conceptual diagram illustrating the CT process is presented in Figure 1-4. In addition, the facility would include a 49-m (160-foot) high emission stack. To serve the condensing and cooling needs of these components, the facility design would include a steam turbine condenser and cooling tower, and a water circulation system. The cooling tower would consist of four cells in a single structure approximately 59 m (195 feet) long, 15 m (49 feet) wide, and 12.5 to 14 m (41 to 46 feet) high.

1.2.2 Fuel Supply

The facility's primary fuel would be natural gas, which would be delivered by a new gas pipeline connecting the eastern boundary of the project site to NWP's mainline near Vail, Washington (see Figure 1-5). Approximately 77 km (48 miles) of new pipeline would need to be constructed. The new pipeline would be between 40 and 51 cm (16 and 20 inches) in diameter, depending on the chosen gas pressure and applicable state and Federal regulations. A 15.5-m (50-foot) wide right-of-way (ROW) would be maintained over the underground pipeline.

The proposed route extends from the NWP Ignacio-Sumas line near Vail, Washington, to the CT facility site (see Figure 1-5). This route includes crossings of 24 watercourses, 18 roadways, and 3 railroad lines. Starting near Vail, the route runs northwest approximately 12.8 km (8 miles), adjacent to an exiting NWP Olympia pipeline. Southeast of Tumwater, the route heads west approximately 12.9 km (8 miles) adjacent to an existing NWP pipeline; this part of the route includes portions within the Fort Lewis Military Reservation. Shortly after crossing Interstate 5 (I-5), the route heads north approximately 4.8 km (3 miles) toward the northern tip of Black Lake. The route then runs northwest, through the Black Hills Capitol State Forest. It then runs roughly parallel to State Route (SR) 8 toward McLeary and Elma, crosses SR 12 and the Chehalis River, and then terminates at the proposed CT facility.

For the 77-km (48-mile) route selected, approximately 33.8 km (21 miles) are adjacent to and partially within existing pipeline ROWs, and approximately 20.9 km (13 miles) are located within existing BPA transmission line ROWs. In addition, approximately 4.8 km (3 miles) of the proposed route are located within or adjacent to logging roads, and approximately 1.6 km (1 mile) is adjacent to an existing roadway through agricultural land. Thus, nearly 80 percent of the proposed route would be within or adjacent to existing corridors.

In the event of a disruption in the natural gas supply, the project would be designed to burn low sulfur No. 2 distillate fuel oil. An 6.8-million l (1.8-million gallon) fuel tank, which would include a containment system in case of a spill, would be constructed for the project. The containment

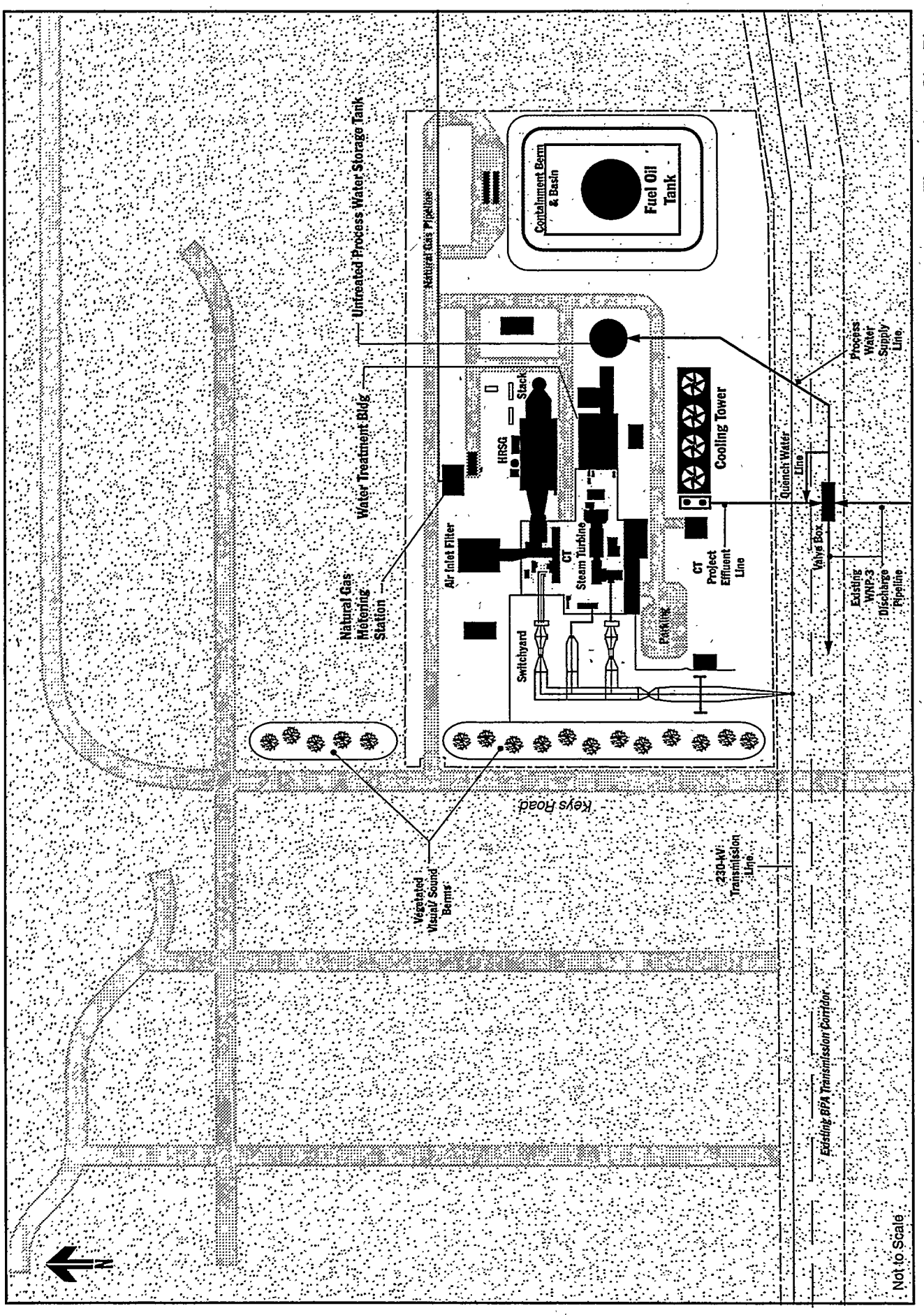


Figure 1-3 Site Plan

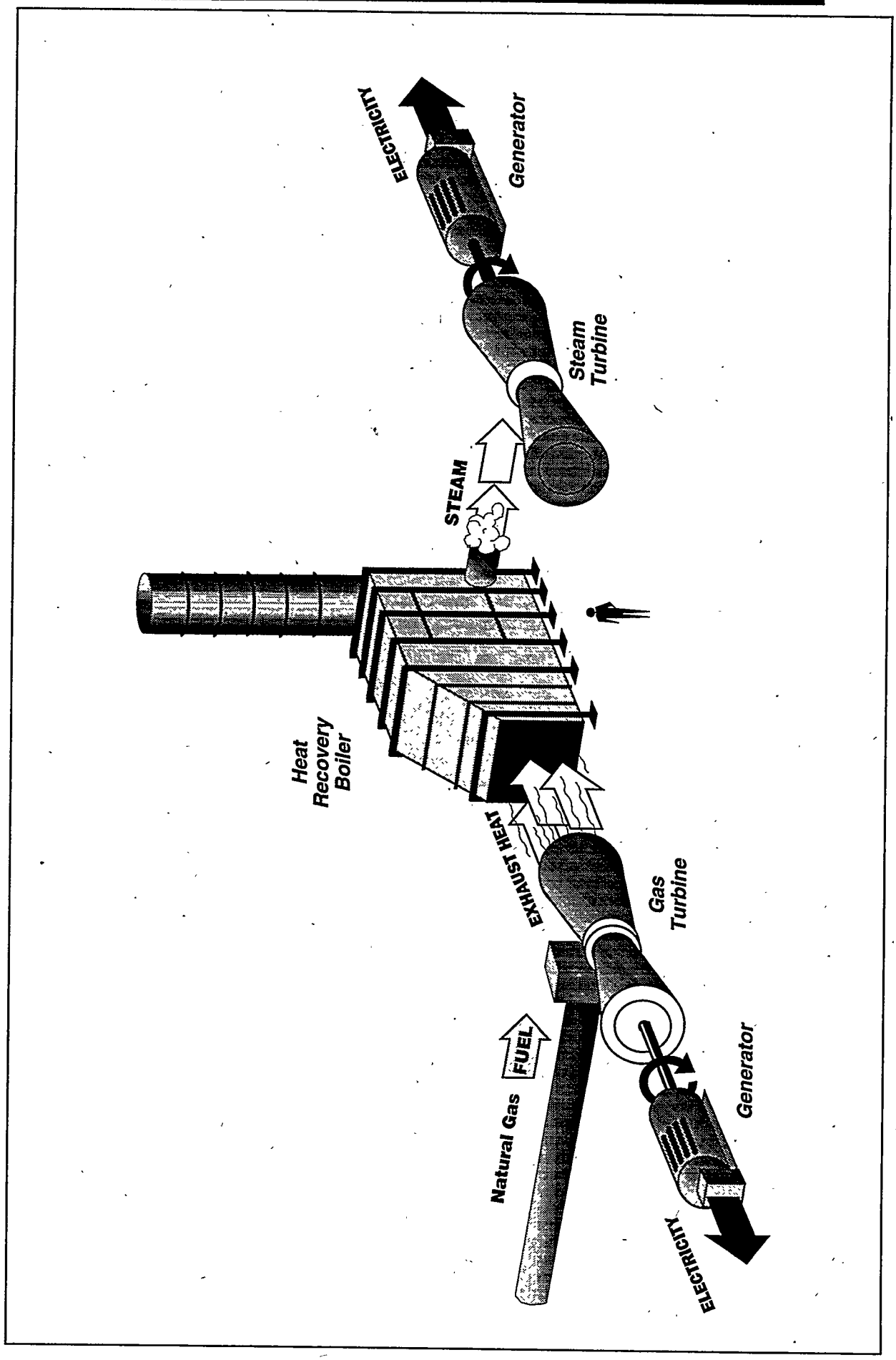


Figure1-4 Combined Cycle Combustion Turbine Process

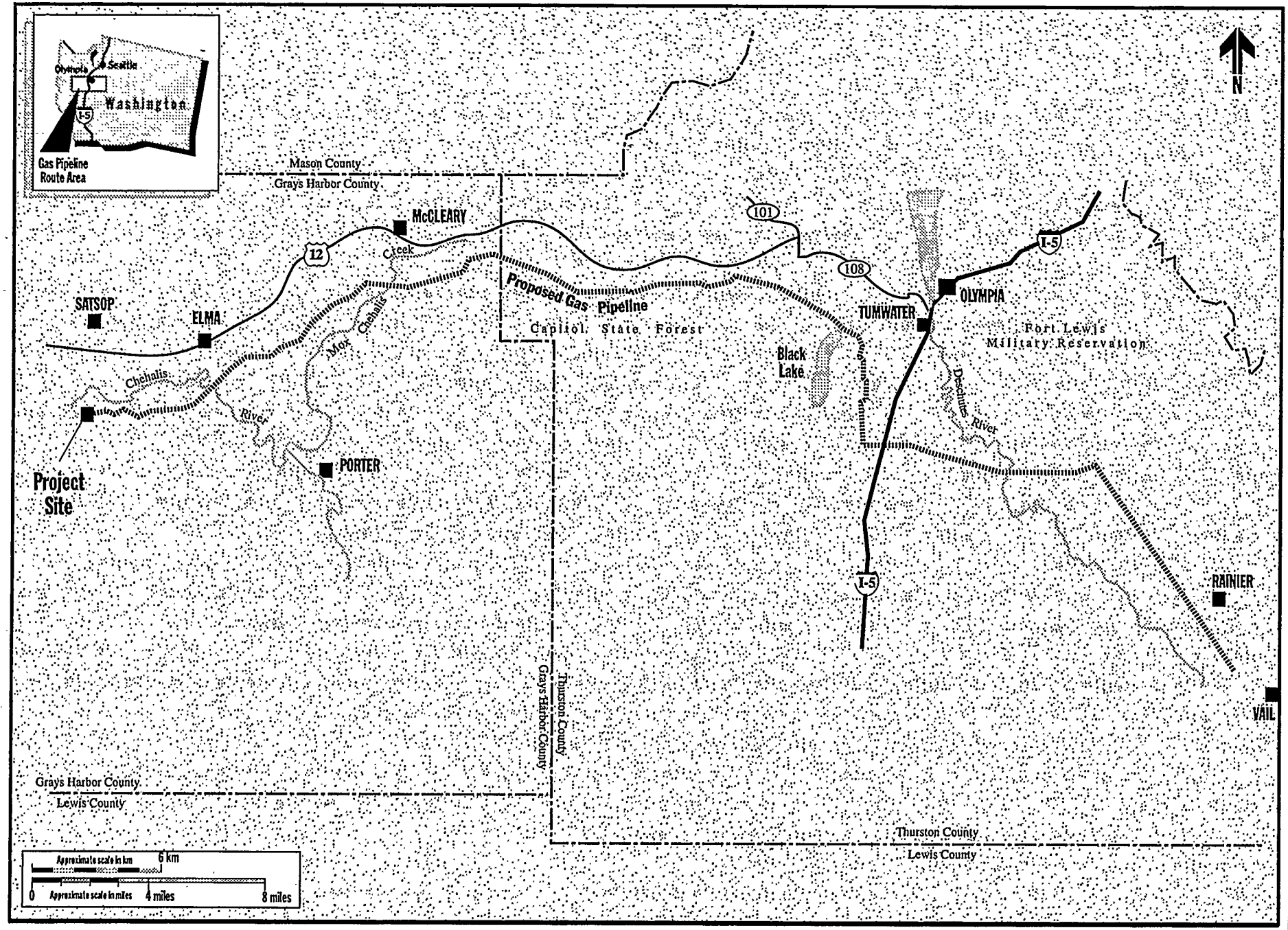


Figure 1-5a Project Gas Pipeline Map

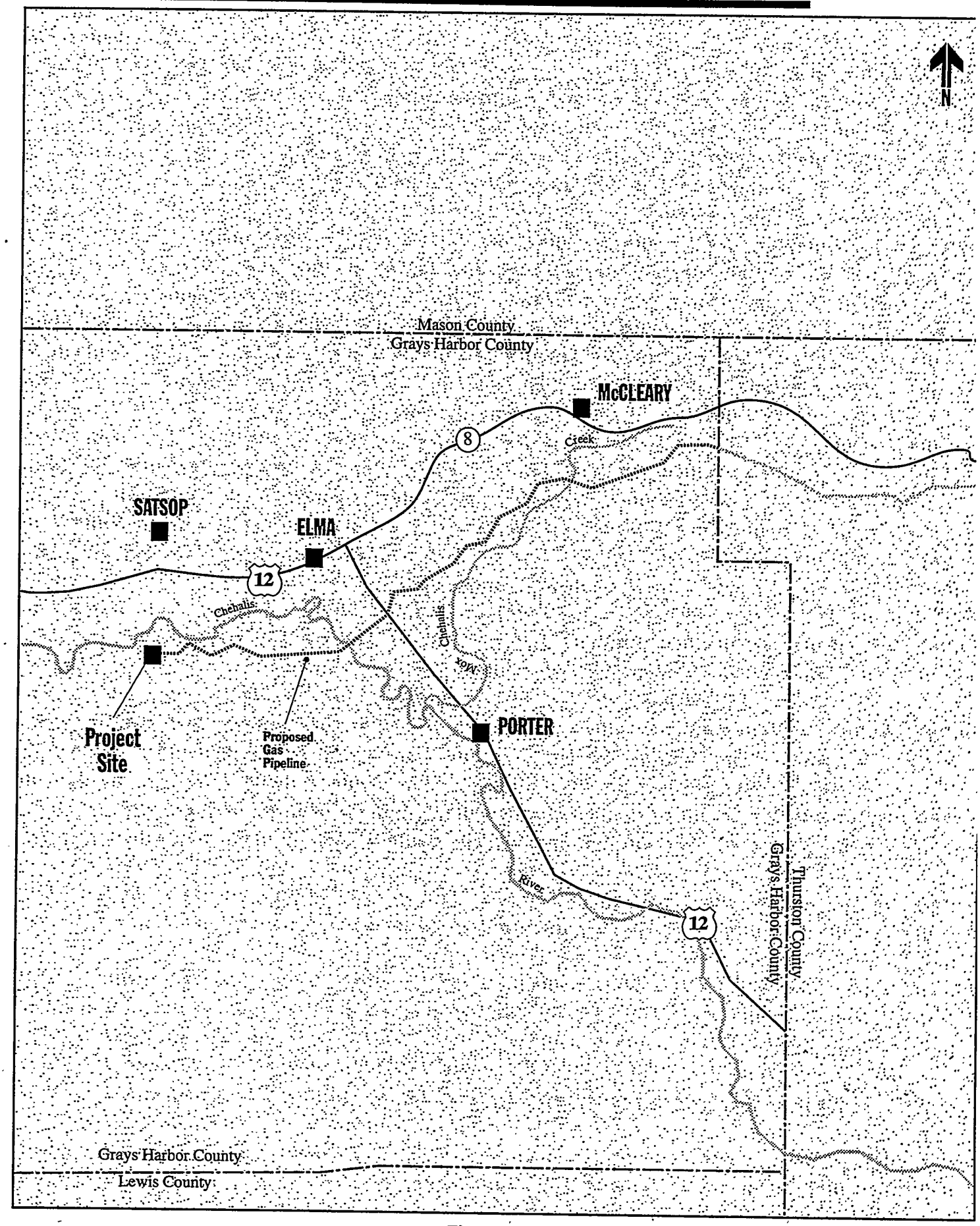


Figure 1-5b Grays Harbor County Proposed Gas Pipeline Route

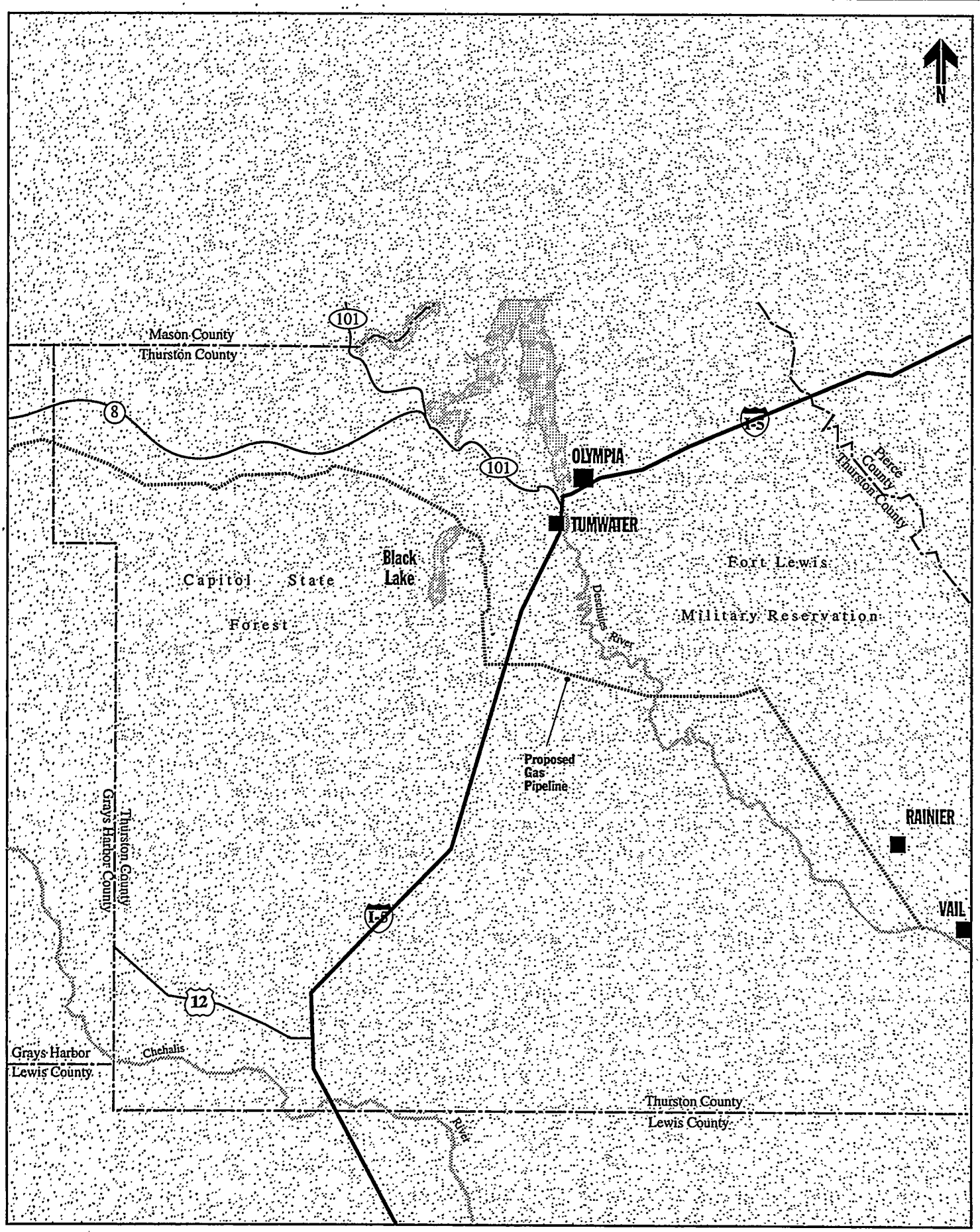


Figure 1-5c Thurston County Proposed Gas Pipeline Route

system would be designed to hold the entire contents of the tank, plus precipitation from the largest storm event for the area as required by regulations. Fuel oil would be supplied to the site by truck. The project would be permitted to operate by fuel oil for not more than 15 days per year.

1.2.3 Electrical Transmission Line and Substation Modifications

Power produced by the Satsop CT Project would be interconnected to the existing BPA system at the Satsop Substation, approximately 1,220 m (4,000 feet) east of the CT facility site. New transmission lines would be installed in the existing BPA ROW (on land owned by Supply System) from the CT facility to the substation. Existing wooden power poles in the ROW would be replaced with steel towers that would be similar in appearance to the existing transmission line towers that are adjacent to the wooden poles within the ROW (see Figure 1-6). BPA would design and construct modifications to the existing substations likely including a new 230-kV ring bus, breaker, intertie, meter, protective relay, and disconnect switches.

1.2.4 Water Supply

The project would require an average of 5,079 liters per minute (lpm) (1,342 gallons per minute [gpm]) all of which would be supplied by existing Ranney Wells adjacent to the Chehalis River. The wells were installed as part of the Supply System WNP-3 and WNP-5 water supply system (see Figure 1-7). Water supply from the Ranney Wells to the proposed project would be provided by agreement with the Supply System under an existing water withdrawal permit held by the Supply System. An existing outflow line from the WNP-3 cooling tower runs adjacent to the CT facility site, and a connection to this line would be made to supply water to the CT facility.

The pumps installed within the Ranney Wells have a minimum pump rate of 0.566 cubic meters per second (cms) (20 cubic feet per second [cfs]) (33,982 lpm [8,977 gpm]), and can pump at a rate as high as 2.265 cms (80 cfs which is the capacity of the wells) (135,919 lpm [35,906 gpm]). The Ranney Wells would pump to a reservoir which in turn will provide a steady flow rate to the CT Project. Under the existing WNP-3 Supply System SCA, availability of water to the Ranney Wells is subject to minimum flow restrictions in the Chehalis River at the wells. Under the SCA, when flow in the Chehalis River is below 15.57 cms (550 cfs) (934,452 lpm [24,857 gpm]), the Ranney Wells would not be able to operate.

The water requirement for the CT Project represents 0.7 percent of the minimum flow requirement (0.11 cms [3.9 cfs] [6,624 lpm {1,750 gpm}] compared to 15.57 cms [550 cfs] [934,452 lpm {246,857 pgm}]), which is below the 5 percent accuracy of the flow measurements for the river (U.S. Geological Survey [USGS], Water Resources Data - Washington, Water Data Report WA-92-1). The minimum pump rate for the Ranney Wells (0.57 cms [20 cfs]; 33,982 lpm [8,977 gpm]) is also below the 5 percent accuracy. For this reason, Supply System is proposing to EFSEC that the CT Project be allowed to operate during periods when the river flow is below minimum flow requirements.

If EFSEC does not allow the requested amendment to the SCA, then power generation curtailment, or additional sources of supply water for the CT facility would be necessary during Chehalis River low-flow periods.

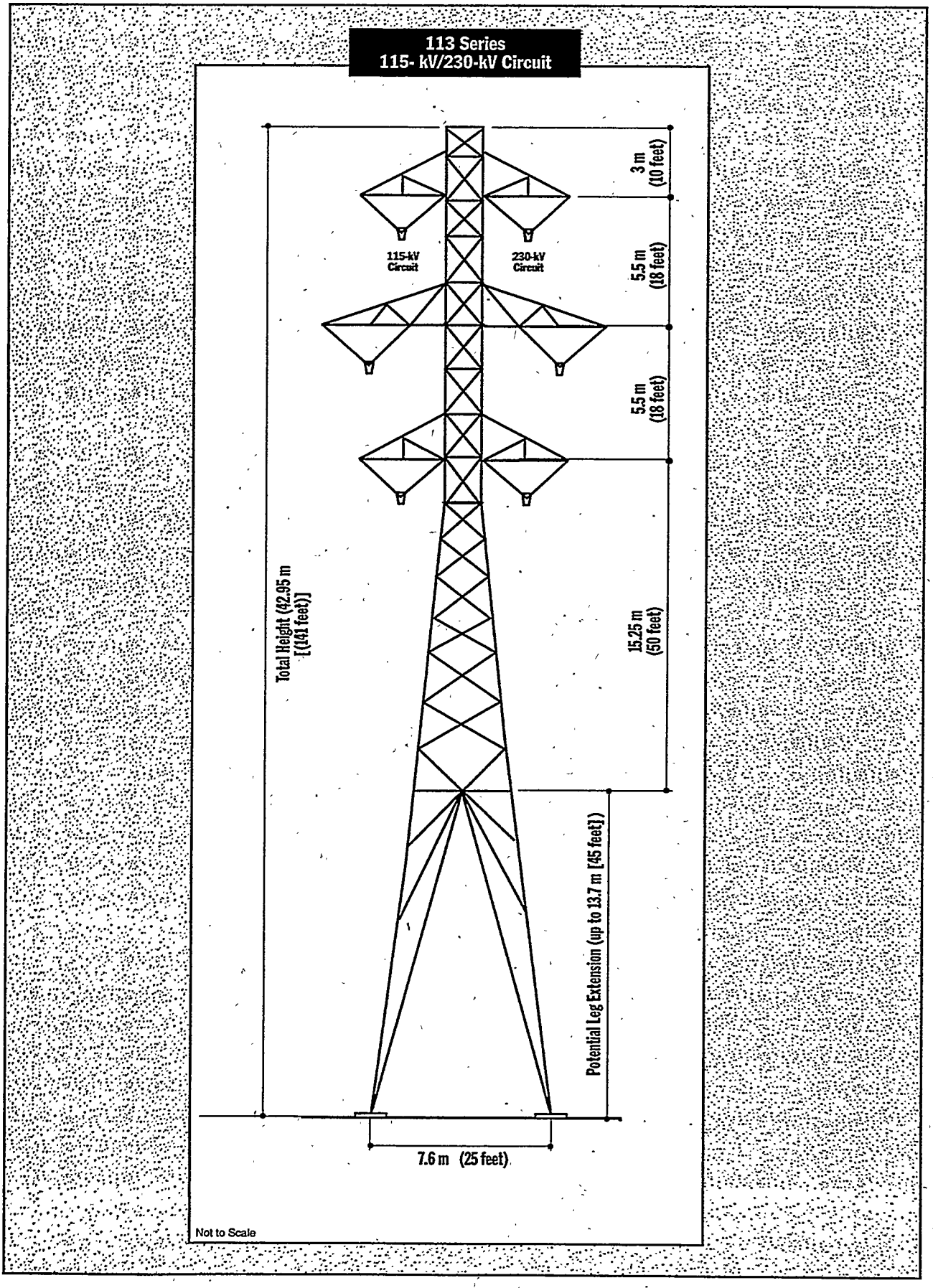


Figure 1-6 Proposed Transmission Tower Design

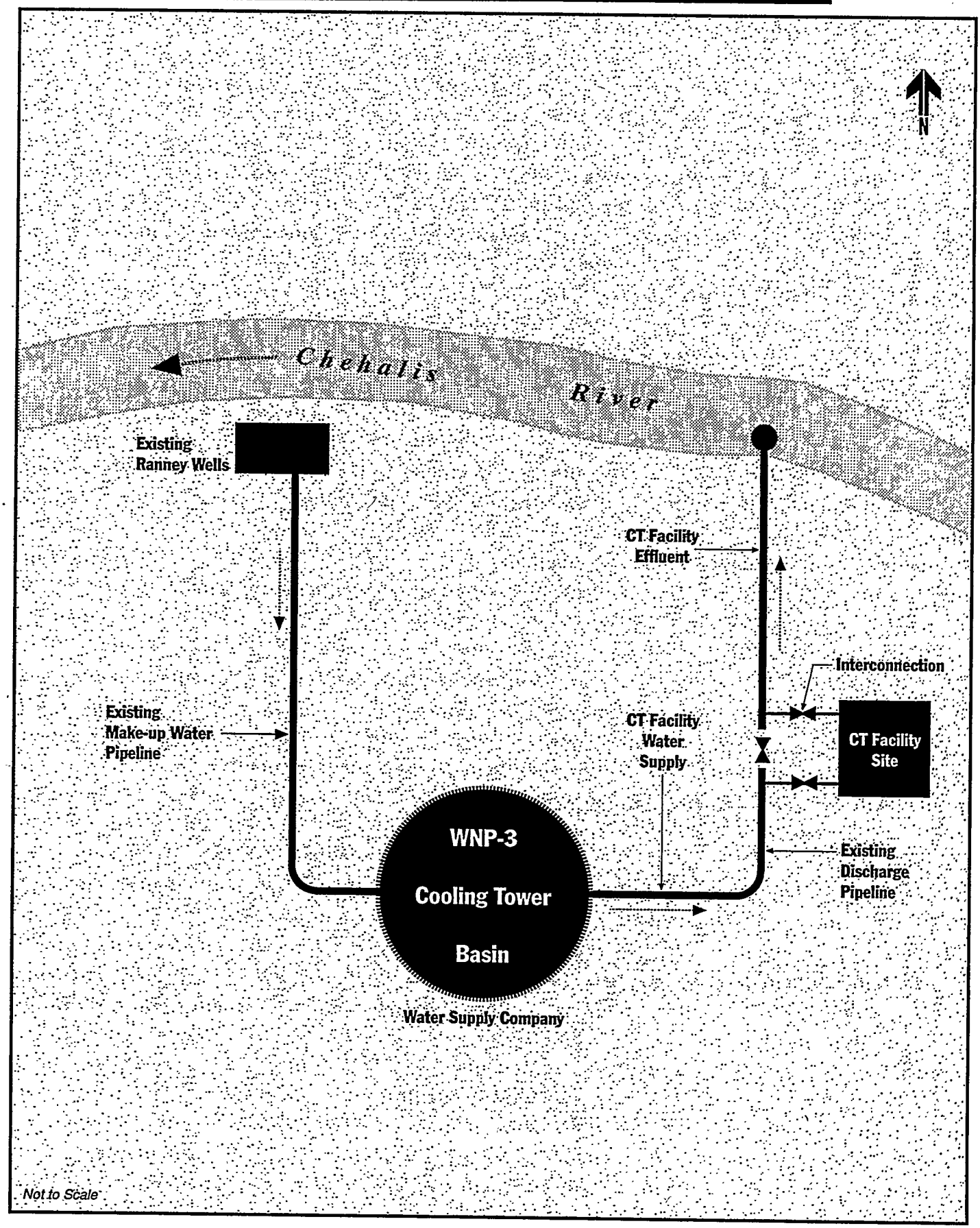


Figure 1-7 Process Water Conceptual Flow Diagram

1.2.5 Wastewater

The Satsop CT Project would discharge its process effluent back to the WNP-3 outflow line via a connection downstream of the project intake to the Chehalis River through the existing outfall structure (See Figure 1-7). Maximum effluent discharge would be approximately 1.38 million liters per day (lpd) (0.34 million gallons per day [gpd]). The proposed project would comply with the existing National Pollutant Discharge Elimination System (NPDES) permit, which is being amended to include the CT Project as an effluent stream.

1.3 Operating Schedule

The CT facility would operate as directed by the BPA dispatcher. The facility will be designed to be taken off line or run at reduced rates as needed to support BPA system requirements. To minimize BPA generation costs, the facility could be shut down when adequate lower cost hydroelectric power is available. The CT facility could operated between 60 to 100 percent of rated output to allow BPA to firm its hydroelectric system and match capacity loads. The facility's operating schedule would change seasonally and daily depending largely on the availability of water for hydroelectric generation in the region and changes in hydroelectric system operations made to enhance fish passage. For purposes of this environmental impact statement (EIS), environmental impacts from the proposed project are evaluated on the basis of operating scenarios that produce worst-case air emissions and effluent water quality.

1.4 Construction Schedule

Construction could begin between 1995 and 2005, depending on BPA's need for electricity. The CT facility would be constructed over a 24-month period, including a 5-month period for engineering and design. Site preparation would require conventional construction equipment, including bulldozers, front-end loaders, trucks, tractor-scrapers, and graders. After site preparation, the combustion turbines, generators, electrical and other equipment, and support facilities of the power plant would be installed. Electrical transmission lines, and wastewater and water supply lines would be installed during the 24-month construction period. In addition, screening earthen berms would be installed along the western site boundary. Once these facilities are in place, site landscaping would be initiated.

The gas pipeline would involve construction across land and under rivers and streams, roadways, and railroads. Pipeline construction would require approximately 7.5 months, including final cleanup and revegetation. Several construction units would be mobilized, with work entailing clearing and grading the ROW, hauling and stringing the pipe, pipe bending, pipe laying and welding, x-ray inspection, applying external coating to field welds, coating checks, trenching, lowering in, backfilling, hydrostatic testing, and cleaning and restoring the ROW.

1.5 DECOMMISSIONING

The Satsop CT Project would have a life expectancy of 30 to 40 years. If the proposed power plant were to reach the end of its useful life, it would be renovated or decommissioned. If the power plant were decommissioned, all structures and equipment at the power plant site would be dismantled and removed. Transmission interconnection lines and structures would also be dismantled and removed. The gas pipeline would be capped and abandoned or removed.

2.0 AFFECTED ENVIRONMENT, SATSOP

2.1 GEOLOGY, SOILS, AND FLOODPLAINS

2.1.1 Regional Geology

The proposed CT facility site is located in the Chehalis Lowlands section of the Willapa Hills physiographic province of western Washington. This region of low rolling hills and broad river valleys flanked by either river terraces or flat narrow bedrock benches is situated south of the Olympic mountains, west of the Puget Lowlands and Willamette Valley, and is the northern extension of the Coast Range. The Pacific Ocean lies to the west. The majority of the gas pipeline route lies in the Puget Lowlands, which is characterized by low flat land with numerous lakes and streams.

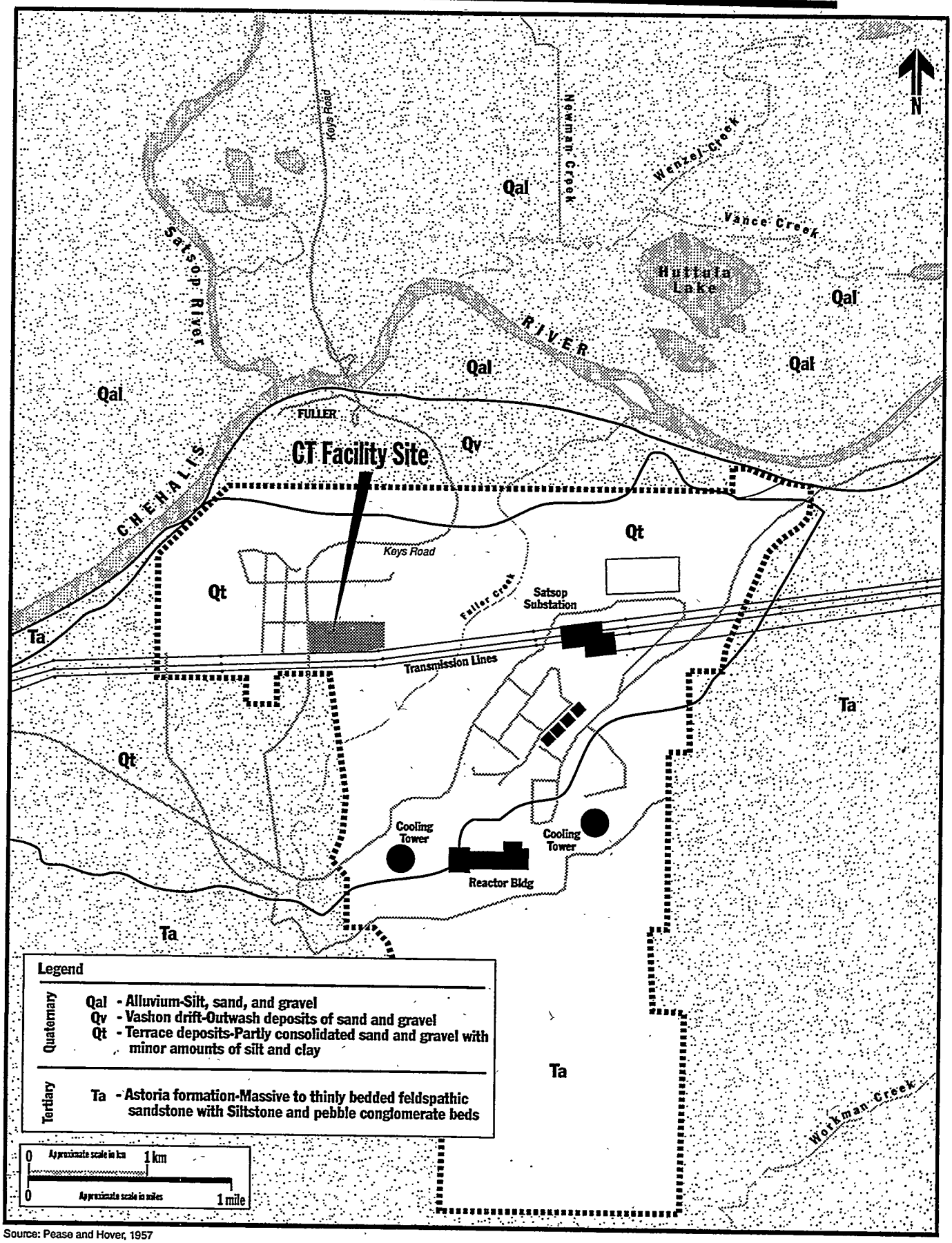
Exposed rocks of the area consist of several thousand feet of deltaic and submarine-fan sandstone interbedded with volcanic rocks of Cenozoic age (60 million years before present [m.y.BP] and younger). Alluvial outwash deposits of sand, silt, and gravel cover the bedrock in large river valleys reflecting Pleistocene (2 m.y.BP) glacial advances, which supplied sediments to rivers from the north and east. This region was not exposed to Pleistocene glaciers, Long exposure to heavy rainfall, deep weathering, erosion, and development of extensive drainage systems give the Willapa Hills their gently rolling, rounded expression. Younger deposits include alluvium along present-day rivers, soils developed by weathering of bedrock in-place (colluvium), and landslide deposits.

Collision of crustal plates have dominated the geologic development of the Pacific Northwest for the last 60 million years. Eastward subduction of the Juan de Fuca plate below the North American Plate along the Cascadia Subduction Zone (CSZ) produced the uplift that created the Willapa Hills in what is known as a fore-arc terrain. The plate boundary and its associated structures are the sources of the stresses that produce major earthquakes in this region.

2.1.2 Project Vicinity Geology

CT Facility Site, Electrical Transmission Line, Water and Wastewater Lines

The CT facility site, including electrical transmission line and waterlines and tie-ins, is on a flat terrace above the Chehalis River at about 93 m (305 feet) above mean sea-level and 91 m (300 feet) above the Chehalis River. The site elevation varies from a low of approximately 88 m (290 feet) in the northwest corner of the site to about 96 m (315 feet) in the southeast corner. Elevation steeply drops 73 m (240 feet) to a lower river terrace to the north. The land surface rises south of the site in a finely dissected drainage pattern to a topographic high of over 536 m (1,760 feet) at Minot Peak, 10 km (6 miles) to the southeast. The nearest surface drainage to the site is Fuller Creek, about 450 m (1,500 feet) to the southeast, which flows northeast to the Chehalis River in a 30-m (100-foot) deep valley (Figure 2.1-1).



Source: Pease and Hover, 1957

Figure 2.1-1 Site Geology

The facility site is a Quaternary (less than 2 m.y.BP) river terrace of flat-lying Helm Creek deposits (correlated with similar nearby 250,000 to 320,000 year old deposits [Supply System 1988]). The deposits are reworked, glacially derived material carried downstream by the ancestral Chehalis River. These are fine- to medium-grained sands, silts, and clayey silts that range from 30 to 60 m (100 to 200 feet) thick. Gravel lenses and a peat deposit are locally present. The Helm Creek deposit lies on the Miocene age (5 to 24 m.y.BP) marine sandstone, siltstone, and minor pebble conglomerate of the Astoria Formation, which is 800 to 900 m (2,500 to 3,000 feet) thick and includes volcanic tuff and tuffaceous sandstone (Pease and Hoover 1957). The Astoria Formation overlies the Oligocene (24 to 38 m.y.BP) Lincoln Creek tuffaceous sandstones. Figure 2.1-1 displays the geology of the site.

Deposits of loess or wind-blown glacial silt locally accumulated 1.5 to 5 m (5 to 15 feet) on the Helm Creek deposits. Recent alluvium, colluvium, and landslides are the youngest deposits in the area. Landslides appear to be located in the Astoria Sandstone.

The geological structure of the CT facility site includes broad, open uplifts, folds, and faults with generally northwest trending axes, interpreted as being the result of northeast directed compression caused by Cenozoic-aged subduction along the CSZ. Faults mapped in the vicinity of the CT facility are interpreted as being associated with basement uplifts (Minot Peak, Blue Mountain, and Black Hills). These block faulted domes often expose the oldest, hence basement, rocks in the area—the Eocene-age (38 to 55 m.y.BP) oceanic basalt of the Crescent Formation. No unmapped faults were discovered in the vicinity, nor were any faults discovered cutting the Quaternary deposits (Supply System 1988) (Figure 2.1-2).

Gas Pipeline Route

The proposed pipeline route crosses three distinct geologic terrains. From the start of the route outside the town of Vail (Milepost [MP] 0) to north of Black Lake (MP 21), the route crosses Pleistocene glacial outwash deposits of the Vashon Stade of continental glaciation (18,000 to 13,000 years before present [BP]). Relatively steep gradients over short distances are present where the route crosses old channels of outwash or where it climbs hills of old glacial till or tertiary marine deposits until MP 13.6. From MP 13.6 to MP 24.9 the grade is uniformly gentle, crossing outwash sand.

From MP 24.9 to the town of McCleary (MP 36.4), the route crosses mostly the basaltic lava flows of the Eocene Crescent Formation. This section has the highest elevation and steepest terrain of the proposed route. The route climbs over an outlier of the Black Hills, then drops to McLane Creek to rise again over the Black Hills proper (MP 31.5) before dropping to the Chehalis Creek valley for the remainder of this segment.

From McCleary to the CT facility site (MP 48.3), the pipeline crosses the Astoria and Lincoln Creek sandstones and Pleistocene glaciofluvial terraces similar to the geology of the CT facility site. The terrain along this segment consists of low-lying stream valleys and river terraces with locally short steep slopes (at MP 40.1, for example).

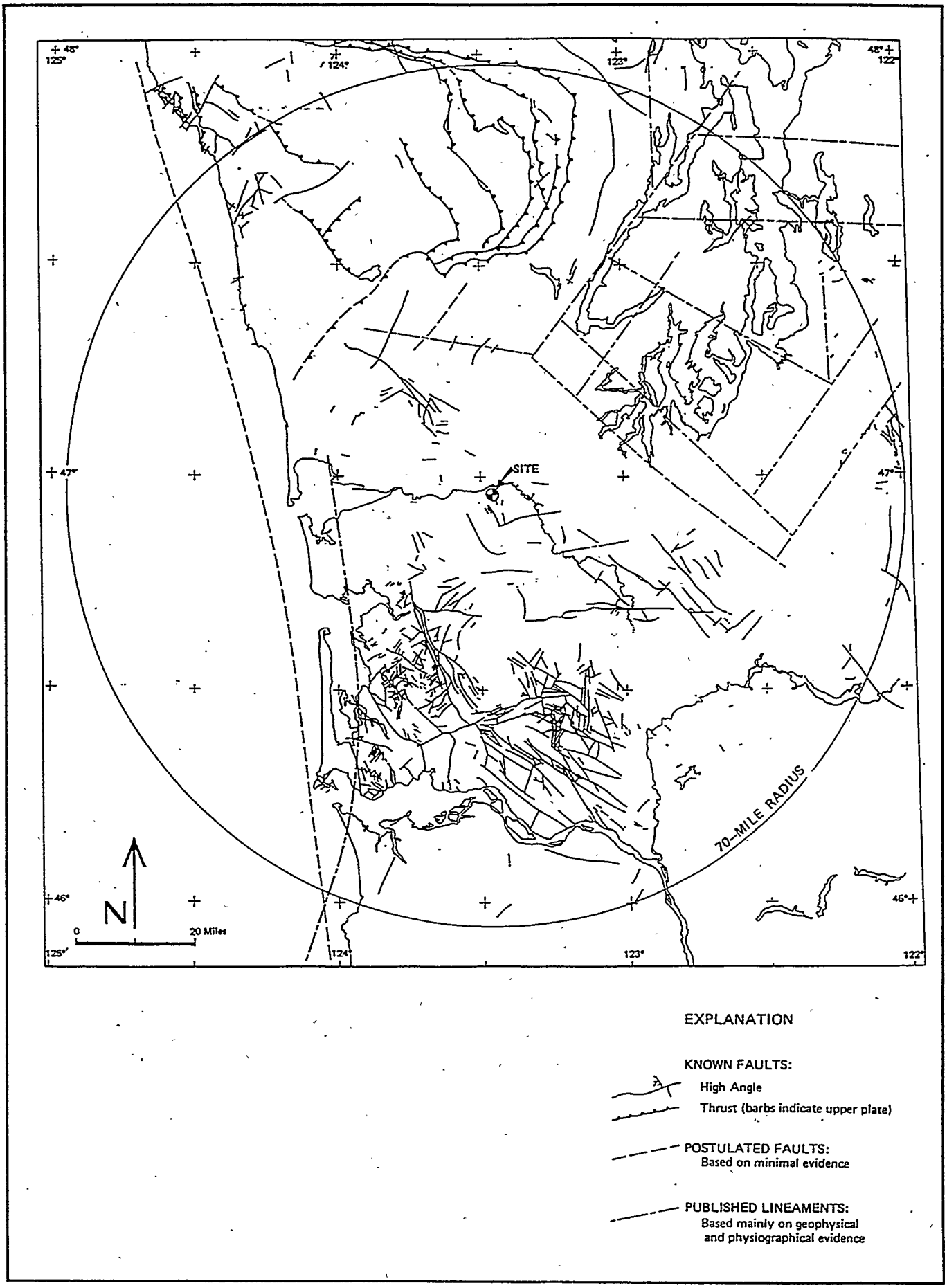


Figure 2.1-2 Known Faults, Postulated Faults, and Published Lineaments within 70 Miles of Site

2.1.3 Geologic Hazards

Landslides

Landslide deposits common to both the Astoria Formation and the Helm Creek deposit have been mapped in the project vicinity, ranging in size from 0.4 to 40 ha (1 to 100 acres). The largest appears to be located in the Astoria sandstone. These slides seem to be related to oversteeping caused by stream erosion at the toe of slopes. The landslide deposits nearest the site are two 0.4-ha (1-acre) failures located in Helm Creek deposits on Fuller Creek, approximately 450 m (1,500 feet) southeast of the site. No recent slope failures were identified.

The nearly flat slope of the CT facility site makes the potential for slope failure low. Adjacent areas, upslope to the south and the edges of the terrace on which the site rests, are steep and represent a potential for mass movement that can be handled with proper engineering design. The gas pipeline route crosses a variety of terrain. The majority of the route crosses areas of low risk to slope instability. Areas of steeper topography are at moderate risk and will require proper engineering design to ensure stability.

Volcanic Activity

Four volcanoes within the region have been active in the historic period. Mount Rainier and Mount St. Helens are the closest, lying within 128 km (80 miles) of the CT facility site and pipeline route. Lava flows, mudflows, pyroclastic flows, and ash fall may result from volcanic activity. Flows are unlikely to affect the project because of its distance, while ash carried aloft may be deposited at the site. Calculations of possible downwind accumulation from the two closest Cascade volcanoes are in the range of 15 to 30 cm (6 to 12 inches) uncompacted at the CT facility site. Lava, debris, and flood flows from an eruption of Cascade volcanoes would not reach the CT facility site. Drainages that the pipeline route crosses lie outside of watersheds draining from volcanic sources, and are therefore unlikely to be affected by river-borne muds and floods.

Earthquakes

Regionally, the site is located in a high seismic hazard zone because of the potential for strong earthquake ground motion. The Pacific Northwest region has recorded 26 historical moderate to large earthquakes. The largest and oldest of these was the 1872 North Cascade event estimated to be magnitude (M)=7.3. This century, three events greater than magnitude M=7 have occurred in this region: the 1918 M=7.0 and the 1946 M=7.3 central Vancouver Island events, and the 1949 M=7.1 event near Olympia, Washington centered about 60 km (37 miles) from the site. The most recent large event (M=6.5) occurred in 1965 between Seattle and Tacoma.

Several regional seismic sources are capable of generating moderate to large earthquakes in the project vicinity. These sources include: (1) the interplate and intraplate CSZ, and (2) structures within the crust of the North American plate. The interplate CSZ marks the boundary between the North American and Juan de Fuca plates and is approximately 100 to 150 km (60 to 90 miles) wide and located 10 to 40 km (6.2 to 25 miles) beneath the coastal areas of the Pacific Northwest. Based on geologic evidence, the interplate CSZ is capable of producing earthquakes of M=8 to 9+. Earthquakes associated with the intraplate CSZ occurred within the subducted Juan de Fuca plate at a depth of 35 to 90 km (22 to 56 miles). The intraplate CSZ, based on historic seismicity, is

considered capable of generating earthquakes as large as M=7.5. The 1949 Olympia and the 1965 Seattle-Tacoma earthquakes occurred on the intraplate CSZ and were M=7.1 and M=6.5, respectively. Seismic data indicate that intraplate earthquakes of M≥4 from 1970 through 1990 occurred at depths greater than 45 km (28 miles) (Weaver and Shedlock 1991).

Calculated peak ground accelerations (PGAs) from earthquakes associated with interplate and intraplate tectonics have been calculated for the site. Assuming an interplate event of M=8.25 at a distance of 33 km (20 miles) from the site, the Supply System (1988) computed a median PGA of 0.2 g (0.2 g indicates that the horizontal acceleration during a seismic event would equal 20 percent of the vertical acceleration because of the force of gravity). Assuming an intraplate event of M=7.5 at a distance of 70 km (44 miles) from the site, the Supply System (1988) computed median PGA of 0.1 g.

Several structures within the crust of the North American plate are capable of producing significant earthquakes and include the Olympia, Nisqually, Hood Canal, and Shelton lineaments; the Seattle fault; and the Mount St. Helens seismic zone (Supply System 1988, Rogers 1988, Buckman et al. 1992). Of these sources, the Olympic lineament is closest to the site (35 km [22 miles]) and is estimated to be capable of generating an earthquake of M=7.5 (Supply System 1988). Assuming an event associated with the Olympic Lineament of M=7.5 at a distance of 35 km (22 miles) from the site, the Supply System (1988) computed median PGA of 0.16 to 0.17 g.

Known faults within 113 km (70 miles) of the CT facility site were identified in the studies conducted for WNP-3. No previously unknown faults were discovered and no through-going faults were identified that could present an increase in seismic activity (Supply System 1988).

No known active faults cross the gas pipeline route. The southeastern portion of the pipeline route parallels the Olympic lineament, which is approximately 2 to 5 km (1 to 3 miles) to the east. Peak ground accelerations of 0.1 to 0.15 g were estimated to have occurred at the western end of the pipeline route from the 1949 Olympia Earthquake (based on equations of Crouse 1991a, 1991b). The same method applied to the eastern portion of the pipeline route yielded values of PGA between 0.15 and 0.26 g.

Liquefaction is a phenomenon in which loose to medium-dense, saturated granular soils lose their shear strength during dynamic loading (usually an earthquake) and behave as a fluid. Liquefaction can have adverse effects on building foundations, resulting in settlement and loss of structural integrity. Buried pipelines may be affected by the buoyant effect of the liquefied soil, causing the pipeline to rise or sink depending on whether the buoyant force on the pipeline is greater or less than the weight of the pipeline. The pipeline route passes through several areas susceptible to liquefaction. These include the Chehalis River valley, crossings of Chehalis Creek and other streams, and portions of the pipeline route east of Black Lake. Alluvium in these areas is composed of loose saturated sand; these types of deposits have liquefied during moderate to large earthquakes.

2.1.4 Soils

Soils of the project vicinity are generally thick and well developed, derived from weathering of bedrock and colluvium on hillsides and from more recent alluvial and glacial outwash deposits along

river and stream courses. Table 2.1-1 lists the acreages and relevant characteristics of soil types by project components.

CT Facility Site, Electrical Transmission Lines, and Water Lines

The CT facility site has been previously cleared, graded, and used as a staging area for the WNP-3 site. Consequently, native soils have been disturbed and the original Centralia silt loam appears to have been removed. Field examination of the proposed site revealed that a clean river gravel has been spread to a thickness of 1.2 to 2.4 m (4 to 8 feet) over the site. Engineering studies of the underlying Helm Creek deposit, made in conjunction with the WNP-3 site, revealed deposits of silty fine sand to sandy silt. Occasional gravely sand lenses and one peat horizon were observed in test borings. As much as 3.6 m (12 feet) of wind-blown loessal soils was in the upper portion of the borings.

The soils in the immediate vicinity of the CT facility site have been assigned K-values of between 0.15 to 0.32 at the depths expected to be disturbed during construction (Soil Conservation Service [SCS] 1986). The K-values of the Universal Soil Loss Equation, which relates to the texture, structure, and porosity; and increase with higher potential. K-values below 0.13 are low, in the range of 0.13 to 0.26 are moderate, and greater than 0.26 are high. These values correspond to a high potential for soil erosion (Table 2.1-1). The low slope of the CT facility site reduces the erosion potential.

Gas Pipeline Route

The segment of the pipeline route from Vail to Black Lake consists of soils of the Spanaway-Nisqually and Alderwood-Everett associations formed on the glacial-derived deposits. These gravelly loams to very gravelly sandy loams are moderately to very deep and somewhat excessively drained. Peat has been identified in many of the kettles (circular depressions caused by melting ice blocks in glacial deposits). These soils often overlie Vashon outwash sands along the pipeline route. Portions of the Nisqually series (fine loam, 0 to 3 percent slopes) are considered prime farmland (SCS 1990).

Spanaway-Nisqually soils are associated with the Mima Mounds, a unique soils feature of the state. These shallow mounds of uncertain origin are 1.2 to 1.5 m (4 to 5 feet) in diameter and exist in prairie lands. Mima mounds may occur along the gas pipeline route, although their occurrence has not been confirmed in the project vicinity. Because the route follows existing ROWs over areas of Spanaway-Nisqually soils, the potential for additional disturbance of these features is negligible.

The segment from Black Lake to McCleary consists of soils of the Olympic-Raught association. These soils have less gravel and a higher amount of silt and clay than the soils of the Vail to Black Lake portion of the route. The Olympic-Raught soils tend to be very deep, well to moderately drained, and found on upland slopes. They form on weathered surfaces of the Crescent basalt. Peat occurs locally near McLane Creek (MP 22.7).

The route segment from McCleary to the CT facility site consists of soils of the Chehalis-Skamo-Spanaway and the Buckpeak-Centralia associations. The Chehalis-Skamo-Spanaway soils are gravelly with a fines content in the range of 10 to 40 percent. Finer grained soils are locally present. These are very deep, moderately to excessively drained, and developed on level

Table 2.1-1. Soil Types Associated with Pipeline Component

Components	*Ha (Acres)*	*Prime Farmland*	*Water Erosion Potential*
CT Facility Site[1]			
Centralia[2]	5.3 (13)	No	High
Gas Pipeline			
Alderwood	6.31 (15.58)	No	Low
Bellingham	0.54 (1.34)	Yes	Low
Boistfort	6.63 (16.37)	Yes	Medium
Buckpeak	3.10 (7.66)	No	Medium
Buckpeak	2.16 (5.34)	No	High
Bunker	2.85 (7.04)	No	Medium
Bunker	2.94 (7.26)	No	High
Cathcart	0.49 (1.22)	No	Low
Centralia	28.96 (71.57)	Yes	Medium
Centralia	0.59 (1.46)	No	High
Chehalis	2.31 (5.70)	Yes	Low
Delphi	7.21 (17.81)	No	Low
Everett	13.98 (34.54)	No	Low
Everett	1.92 (4.75)	No	Medium
Everson	1.04 (2.57)	Yes	Low
Giles	2.12 (5.25)	Yes	Low
Godfrey	0.97 (2.41)	Yes	Low
Grove	3.01 (7.44)	No	Low
Indianola	3.25 (8.03)	No	Low
Indianola	0.12 (0.29)	No	Medium
Kapowsin	1.21 (2.99)	Yes	Low
Kapowsin	0.31 (0.77)	No	Medium
Lyre	0.52 (1.28)	No	Low
McKenna	0.21 (0.52)	No	Low
Mukilteo	1.29 (3.19)	No	Not Applicable
Mukilteo variation	0.18 (0.45)	No	Not Applicable
Nemah	0.10 (0.24)	Yes	Low
Newberg	0.81 (1.99)	Yes	Low
Nisqually	5.57 (13.76)	Yes	Low
Norma	5.16 (12.76)	Yes	Low
Olympic	13.12 (32.43)	Yes	Medium
Olympic	1.20 (2.96)	No	High
Raught	3.86 (9.53)	No	High
Rennie	0.19 (0.48)	Yes	Low
Salzer	0.55 (1.37	Yes	Low

Table 2.1-1. Soil Types Associated with Pipeline Component

Components	*Ha (Acres)*	*Prime Farmland*	*Water Erosion Potential*
Satsop	1.99 (4.91)	Yes	Low
Schneider	0.07 (0.18)	No	Low
Schneider	1.83 (4.53)	No	Medium
Skamo	0.51 (1.26)	Yes	Low
Skipopa	1.11 (2.74)	Yes	Low
Spanaway	12.38 (30.60)	No	Low
Sultan	0.46 (1.13)	Yes	Not Applicable
Tebo	1.37 (3.38)	No	Medium
Tenino	0.54 (1.33)	No	Low
Tisch	0.14 (0.35)	Yes	Low
Tumwater	11.36 (28.07)	No	Low
Wishkah	0.92 (2.27)	Yes	Low
Yelm	5.04 (12.46)	Yes	Low

[1] Includes CT facility site, electrical transmission lines, water and waterwater lines.
[2] The Centralia series has been removed from the facility site. Erosion hazard is based on the K-factor of materials underlying the site. The CT site cannot be considered prime farmland because of the removal of the soil.

floodplains and terraces. The Buckpeak-Centralia soils are fine-grained loams or silty loams with low organic content. They are deep, well-drained soils developed on sandstone bedrock with level to steep slopes. All of the Chehalis and Skamo series and the Centralia loam (1 to 8 percent slope) is considered prime farmland (SCS 1986). Further studies of the pipeline route are pending, which may affect its location.

The erosion potential of the proposed gas pipeline route has been characterized based on the soil erodability (K-value), rainfall, and slope (<5 percent-low, 5-15 percent-medium, >15 percent-high). The K-value of soil units along the pipeline route varies from 0.0 to 0.49. Low K-value soils make up 3 percent of the route, while moderate K values make 68 percent, and high values make up 29 percent of the proposed route (Table 2.1-1). Low slope area occurs along 56 percent of the route, while moderate and steep slopes occupy 25 and 19 percent of the route, respectively.

2.1.5 Floodplains

CT Facility Site, Electrical Transmission Line, Water and Wastewater Lines

The CT facility site is located on an ancient flat river terrace approximately 91 m (300 feet) above the Chehalis River. Fuller Creek, the nearest surface drainage to the site, is 450 m (1,500 feet) to the southeast and flows in a 30-m (100-foot) deep valley. Floodplains are not present at the CT facility site, which is located outside any flood hazard area listed on Federal Emergency Management Agency (FEMA) flood insurance maps. Additional studies were undertaken for the WNP-3 nuclear plant concerning maximum floods on nearby rivers and stream from precipitation, wind/wave activity, failure from a nearby dam, and tsunami flooding. These studies indicate the site is greater than 220 feet above the level of the probable maximum flood (Supply System 1984). As water supply and wastewater disposal routes are pre-existing, there would not be new activities on floodplains for these project components. The transmission line ROW, however, would cross the floodplain of Fuller Creek.

Gas Pipeline Route

The pipeline route crosses 21 perennial water courses, including the Chehalis and Deschutes rivers and three intermittent streams. Table 2.1-2 presents areas of floodplains crossed by the natural gas pipeline route at those streams crossings with FEMA identified floodplains.

2.2 Water Resources

2.2.1 Water Availability

Surface Water

The site of the proposed CT facility, water supply and wastewater disposal systems, and electrical transmission line are located approximately 0.8 km (0.5 mile) south of the Chehalis River, at river mile 20.3, where the Satsop River empties into the Chehalis River from the north. Other surface water features in the vicinity of the CT facility include two small creeks: Fuller and Workman creeks. Both creeks are less than 4.6 m (15 feet) wide, have good quality water, and drain into the Chehalis River about 2.4 to 3.2 km (1.5 to 2 miles) upstream of the confluence of the Satsop and Chehalis Rivers. The slopes immediately south of the CT facility site are the creek

Table 2.1-2. 100-Year Floodplains Crossed by Natural Gas Pipeline

Crossing	*Pipeline Milepost*[1]	*Ha (Acres)*
Unnamed/unmapped stream	9.0	NA
Deschutes River	11.5	NA: no floodplain in vicinity of pipeline crossing
Unnamed Tributary to Black Lake WRIA 23.0694	19.2	NA: no floodplain in vicinity of pipeline crossing
Unnamed/Unmapped Tributary to Black Lake	19.9	Not mapped
Black Lake Drainage Ditch	20.5	0.56 (1.38)
South Fork McLane Creek	21.2	0.21 (0.52)
McLane Creek	22.3	0.28 (0.69)
Cedar Flats Creek	22.6	NA: no floodplain in vicinity of pipeline crossing
Swift Creek	23.4	None
Unnamed	24.4	Not mapped
Unnamed	26.3	Not mapped
Kennedy Creek	27.3	None
Kennedy Creek Tributary	28.0	None
Kennedy Creek Tributary	28.5	None
Mox Chehalis Tributary	34.0	Not mapped
Mox Chehalis Creek	36.1	0.28 (0.69)
Sand Creek	39.9	0.56 (1.38)
Unnamed Tributary to Sarvinski Lakes	42.3	Not mapped
Chehalis River	43.3	4.74 (11.7)[2]
Chehalis River Tributary	43.9	None
Chehalis River Tributary	44.7	None
Workman Creek	45.2	None
Chehalis River Tributary	46.9	None
Fuller Creek	47.7	None

[1] Mileposts begin at the connection at Vail and end at the CT facility.
[2] Flood hazard level not defined; approximate elevation of Flood Hazard Area is below approximately 30.5 m (100 feet).
Souce: FEMA flood insurance maps.

headwaters. The Chehalis River watershed area near Satsop, Washington, is 4,566 square km (1,761 square miles).

Table 2.2-1 shows the estimated average, maximum, and minimum monthly streamflows in the Chehalis River at the CT facility site (below the confluence with the Satsop River). The USGS estimates flow in this reach by adding the combined flows of the Satsop River near Satsop (3.7 kilometers [2.3 miles] upstream) and the Chehalis River as measured at Grand Mound (40 kilometers [25 miles] upstream), and then multiplying by 1.5. The flow data, reported in cubic feet per second (cfs) represents the average, maximum and minimum daily flow for the month and years of record.

Table 2.2-1 Chehalis River Flow Characteristics 1929 to 1992[1] (CFS)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average	15,692	14,502	11,184	7,560	3,712	2,220	1,242	849	1,167	3,087	10,167	15,372	7,208
Maximum	35,246	29,306	23,559	20,738	4,288	5,812	3,101	1,716	4,620	4,674	24,876	42,866	11,028
Minimum	2,981	4,286	3,759	2,976	1,835	1,095	692	515	488	489	734	3,368	3,482

[1] Data estimated using Grand Mound gage and Satsop gage data.

The Washington Department of Ecology (Ecology) requires a minimum baseflow of 15.57 cms (550 cfs) (934,452 lpm [24,857 gpm]) in the Chehalis River near the proposed CT site. Using the flow statistics for the Satsop and Chehalis Rivers (USGS Open-File Report 84-145A, Streamflow Statistics and Drainage Basin Characteristics, Washington Volume 1), the 7-day average flow in the Chehalis River in the project vicinity would be expected to be at the minimum flow once each year. Average baseflows would be expected to be less than the minimum flow for up to 2 weeks with a recurrence interval of 5 years, and up to 30 days with a recurrence interval of 10 years. Minimum flows for August, September and October reported on Table 2.2.1 are below the minimum flow requirement. These minimum flows represent the lowest average monthly flows on record (63 years), and are less than the 50-year low flow for each month.

The proposed natural gas pipeline route crosses 21 perennial water courses, including the Chehalis and Deschutes rivers. These streams support both salmon and trout species within both the Chehalis River and Puget Sound Drainages, and are of good quality. The potentially affected environmental of these streams is further described in Section 2.6.3 (Fisheries).

Groundwater

The proposed CT facility site is located on the southern margin of the lower Chehalis River Valley on fluvial terrace gravel, sand, and silt deposits up to 15.2 m (50 feet) thick. The terrace deposits do not yield much water. The most productive water bearing soils are the 61-m (200-foot)

thick alluvial deposits next to the river. These alluvial deposits have high water yield because they are hydraulically connected to the Chehalis and Satsop rivers.

The Supply System constructed Ranney Wells in the alluvial deposits over 1.6 km (1 mile) downstream of the confluence of the Satsop and Chehalis rivers to supply water for the WNP-3 and WNP-5 projects. Two wells were built that potentially yield 1.133 cms (98 million lpd) (26 million gpd; 40 cfs) 67,959 lpm (17,953 gpm) (Supply System 1984, Dames & Moore 1993). These wells are 0.8 km (0.5 mile) from the proposed CT facility site (Figure 1-7). Pump tests of these wells indicate that the Chehalis River contributes 88 percent of total Ranney Well discharge.

2.2.2 Water Quality

Ecology, under WAC 173-201A requires water quality of the Chehalis River in the vicinity of the CT site to be Class A (excellent). Water quality in this class should meet or exceed requirements for all potential uses, including potable water supply. At times, usually during summer low flow periods, temperature and dissolved oxygen (DO) levels can exceed standards. The USGS has been monitoring water quality at the Porter Station since 1959. The Supply System monitored Chehalis water quality near the site from 1979 to 1981. The Porter gage is 40 km (25 miles) upstream of the site.

Table 2.2-2 shows water quality summary data from the Supply System. Parameters not measured by the Supply System were estimated from the Porter Station data. The water quality temperature standard is 18°C (64.4°F) for the Chehalis River in the project vicinity. Historical data show annual variation ranges between 0.6°C (33.1°F) to slightly greater than 22°C (71.6°F). Water temperatures measured at Porter can exceed the standard during May, June, August, and September.

The DO concentration at Porter has dropped below the Class A standard of 8 milligrams per liter (mg/l) on several occasions. The USGS records from the Porter station show that all six samples taken during 1987 had a DO concentration less than the Class A standard. Moreover, Chehalis River DO levels at the Porter station have dropped below the standard in at least 2 of the last 13 years, typically in July and August, and five times in the last 20 years (Pickett 1992).

Based on the water quality sampling records from the Supply System and the USGS, reported metals concentrations do not exceed EPA drinking water standards. However, background water quality in the river (as measured at Porter) indicate that several metals, including lead, occasionally exceed chronic aquatic toxicity levels as specified in WAC 173-201A. Because the WAC standards for lead are less than one half the minimum detectable concentration at the site, even the background Chehalis River water exceeds standards. The typical minimum ercury concentrations reported at or below the analytical detection limit may be in exceedance because the chronic toxicity level is below the detection limit; however, this cannot be verified.

2.2.3 Current Water Use

Existing surface water right appropriations in the Chehalis watershed are for domestic, municipal, irrigation and agricultural, power, commercial, and aquaculture uses. During the July

Table 2.2-2. Chehalis River Water Quality

Parameter	Mean		Minimum		Maximum	
	USGS[1]	Satsop[2]	USGS[1]	Satsop[2]	USGS[1]	Satsop[2]
Specific Conductance (μmhos/cm)	87.3	76	57	60	132	88
pH (S.U.)	7.4	7.4	6.9	7.3	8.6	7.4
Temperature (°C)	11.5	11.8	4	5.1	22	17.8
Turbidity (NTU)	4.6	--	0.3	--	19	--
Dissolved Oxygen (mg/l)	9.4	--	4	--	13.8	--
Hardness (mg/l of Ca+ and Mg+)	28.2	29	18	21	40	36
Alkalinity (mg/l of $CaCO_3$)	28.7	28	14	20	48	34
Total Dissolved Solids (mg/l)	64	--	44	--	90	--
Nitrites and Nitrates (mg/l)	0.59	--	<1	--	1.1	--
Phosphorus Dissolved (mg/l)	0.032	--	0.01	--	0.05	--
Suspended Solids (mg/l)	11.9	--	1	--	77	--
Sulfate (mg/l)	6.5	--	3	--	14	--
Chloride (mg/l as Cl)	5.2	--	1.6	--	9.7	--
Iron Dissolved (μg/l)	127	107	64	50	250	200
Copper Dissolved (μg/l)	2	1	1	1	5	2
Zinc Dissolved (μg/l)	9	<5	3	<5	14	<5
Lead (μg/L)[3]		<1				

[1] From USGS 1984-1991, Chehalis River at Porter
[2] From WPSS 1979-1981, Chehalis River below Satsop
[3] Envirosphere 1982

through October dry season, water diversions increase, whereas natural runoff and groundwater discharge into the Chehalis River decrease. Ecology has jurisdiction over water allocations and can control the demand aspect of water availability by closing streams to further water right appropriations. No streams in the proximity of the proposed CT facility are closed to appropriations. However, Ecology has set the minimum base flow in the Chehalis River, downstream of the confluence with the Satsop River, at 15.57 cms (550 cfs) (934,452 lpm [246,857 gpm]) from August 15 through October 1 and at 107.5 cms (3,800 cfs) (6,456,204 lpm [1,705,554 gpm]) from December 1 through May 1.

The Ranney Wells are subject to shut down if the base flow in the Chehalis River drops below 15.57 cms (550 cfs) (934,452 lpm [246,857 gpm]). This is because the wells have been determined by Ecology to be primarily supplied by the Chehalis River.

The radius of influence (i.e., the extent of drawdown) of the WPPS Ranney Wells, when pumping at its rated capacity of 49 million lpm (13 million gpm) is 609.6 m (2,000 feet). There are no private wells on the same aquifer as the Ranney Wells that are within 609.6 m (2,000 feet) of the Ranney Wells.

2.3 Air Quality

2.3.1 Existing Air Emission Sources

Emissions from existing sources largely determine the air quality of the project vicinity. Grays Harbor County is mostly rural with a timber-based economy. Large sources of air emissions (greater than 91 metric tons per year [MTY] [100 tons per year {TPY}] in the region include timber-related industries, mining operations, and power plants. Within 50 km (31.1 miles) of the CT facility site, there are only a few major sources with emission rates greater than 91 MTY (100 TPY) of any regulated pollutant (Table 2.3-1). All other sources in Grays Harbor County emit less than 91 MTY (100 TPY) of any regulated air pollutant. Two classes of small sources are often determined to cumulatively affect existing air quality. These are mobile sources (cars and trucks) and residential wood combustion. Based on available air quality data, wood smoke and vehicular traffic in the largely rural areas surrounding the CT facility site do not significantly contribute to the region's existing air quality.

2.3.2 Meteorology and Climate

Dispersion of emitted air pollutants is governed by wind direction, wind speed, temperature (which contributes to plume rise), and the turbulence of the lower atmosphere. The climate of the Pacific Northwest is dominated by the presence of the Pacific Ocean, the position of large scale pressure systems, and the presence of local and regional terrain. The two extreme seasons in western Washington, wet cool winters and dry warm summers, are separated by transition seasons. In the late fall and winter low pressure systems in the Gulf of Alaska intensify and control the weather systems entering the Pacific Northwest. The prevailing flow of air during this period is from the southwest and west (Figure 2.3-1). Air reaching the project vicinity is cool and moist. Wintertime flows entering the region are stable and have little or no vertical motion.

Table 2.3-1. Major Sources of Air Emissions within 50 km (31.1 miles) of the Satsop CT Site

Plant	Location	Emissions (MTY [TPY])					
		TSP	PM_{10}	SO_2	NO_x	VOC	CO
A.E. Erickson	Amanda Park	17.2 (19)	10 (11)		2.7 (3)	2.7 (3)	100 (110)
Centralia Mining	Centralia	549 (605)	217 (239)				
Crown Beverage	Olympia					238 (262)	
Hardel Plywood	Olympia	93 (102)	35 (39)	.9 (1)	23 (25)	22 (24)	33 (36)
ITT Rayonier	Hoquiam	620 (684)	432 (476)	389 (429)	454 (500)	4.5 (5)	629 (693)
Pacific Power	Centralia	2,489 (2,744)	2,485 (2,739)	53,931 (59,449)	21,536 (23,736)	164 (181)	1,411 (1,555)
Simpson Timber	Shelton	132 (146)	73 (80)	5.4 (6)	95 (105)	54 (60)	136 (150)
Simpson Timber	McCleary	95 (105)	72 (79)	1.8 (2)	26 (29)	14 (15)	37 (41)
Weyerhaeuser	Raymond	207 (228)	74 (81)	2.7 (3)	42 (46)	21 (23)	60 (66)
Weyerhaeuser	Cosmopolis	328 (361)	214 (236)	797 (878)	206 (227)	338 (372)	172 (189)

Source: Ecology 1991

In late spring and summer clockwise circulation of air around large high pressure systems over the north Pacific Ocean result in northwest and northerly flows of air into the Pacific Northwest. This flow is directed, by the influences of high terrain, south through the Puget Sound lowlands and toward the west through the Grays Harbor County area (Figure 2.3-1). During the summer, long periods of sunshine and warmer temperatures create more unstable conditions in the lower atmosphere, and thus provide greater dispersion. However, air flowing into the region is still marine in character, preventing the atmosphere from becoming very stable or very unstable for long periods of time.

During the winter, temperatures show little daily variation. Maximum temperatures are in the 40s (°F) and minimum temperatures are in the 30s (°F). Precipitation in the fall and winter averages 23 to 28 cm (9 to 11 inches) per month (Table 2.3-2). Daily precipitation totals of at least 0.02 cm (0.01 inch) can be expected on about 20 days during December. Fog, with visibilities less than 0.4 km (0.25 mile), frequently occurs during this period.

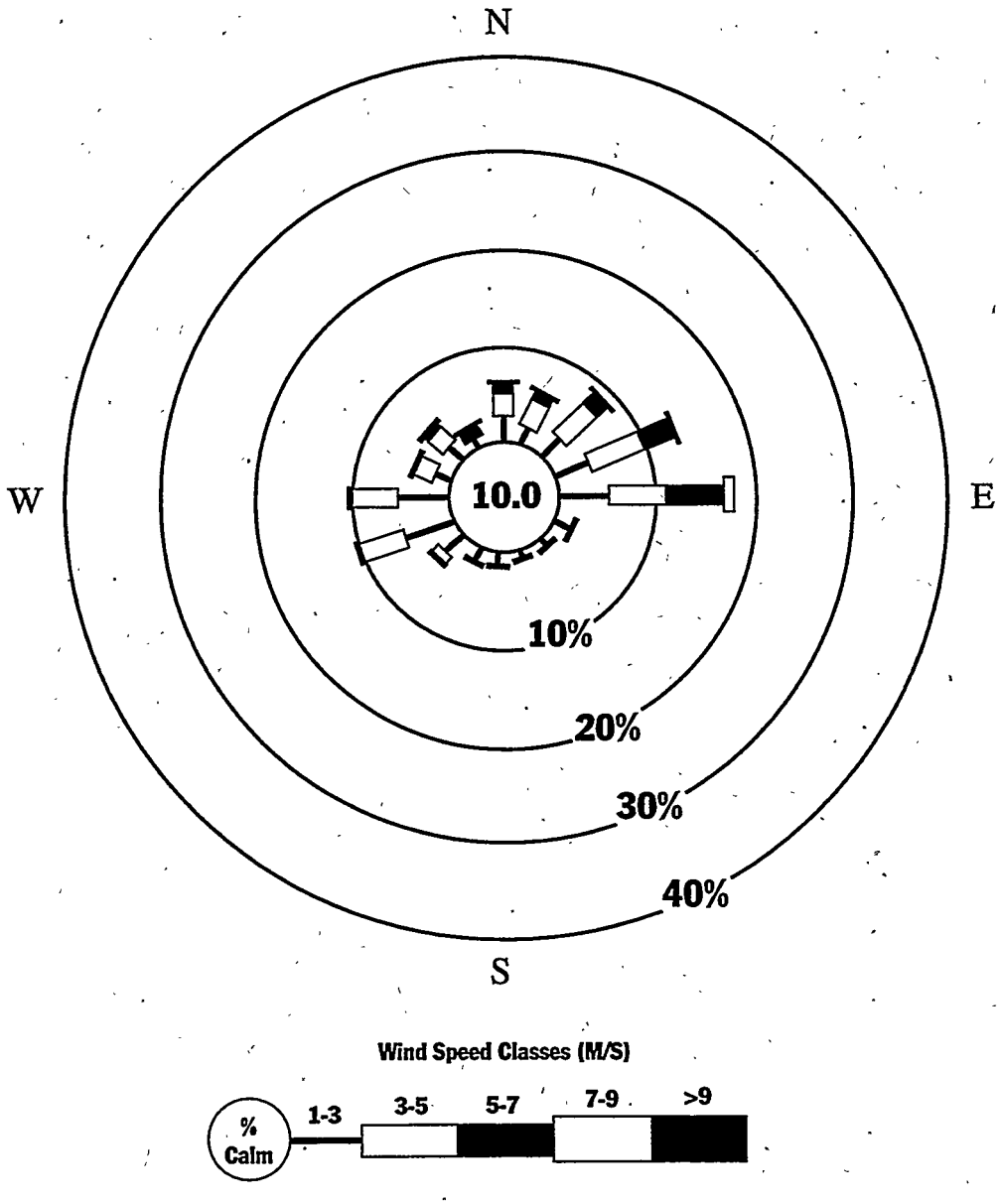


Figure 2.3-1 Wind Rose February 1, 1980-January 31,1981

Table 2.3-2. Monthly Average Precipitation and Temperature for Elma, Washington.

Month	*Total Precipitation [cm (inch)]*	*Average Temperature [°C (°F)]*
January	28.1 (11.05)	4.1 (39.3)
February	19.8 (7.79)	6.1 (42.9)
March	18.5 (7.30)	6.8 (44.3)
April	11.4 (4.47)	9.4 (49.0)
May	6.4 (2.52)	12.6 (54.7)
June	5.1 (2.00)	15.3 (59.5)
July	2.6 (1.02)	17.4 (63.4)
August	4.2 (1.66)	17.5 (63.5)
September	7.4 (2.91)	15.6 (60.0)
October	16.0 (6.31)	11.4 (52.6)
November	24.0 (9.43)	7.1 (44.7)
December	28.3 (11.14)	5.1 (41.1)
Annual	171.7 (67.60)	10.7 (51.3)

Source: National Oceanic and Atmospheric Administration (NOAA) 1990

Daily temperatures in the summer range from the 50s to the 80s (°F). Summer precipitation totals average about 2.5 cm (1 inch) or less per month (Table 2.3-2). Thunderstorms occur during the summer at a frequency of less than one day per month.

2.3.3 Existing Air Quality

The air quality in Grays Harbor County achieves all local, state, and national Ambient Air Quality Standards (AAQS). Ecology and Olympic Air Pollution Control Authority (OAPCA) base this conclusion on direct information from several air pollution monitoring stations that are operated within 50 km (31.1 miles) of the site (Table 2.3-3). The AAQS presented in Table 2.3-3 are the most restrictive of the local, state, or national standards. Some pollutants (nitorgen oxide [NO_x] and ozone [O_3]) are not monitored because of the low level of industrialization in the region. In general, the moderate temperatures and frequent cloud cover inhibit formation of photochemical O_3 (smog).

The monitoring stations are located near sources of air emissions (Aberdeen, Cosmopolis, Hoquiam, Olympia, and Shelton) and are not representative of air quality in the project vicinity. The air quality in the area surrounding the CT facility site is probably much better than the

monitoring data indicate. The monitoring data in the Satsop region indicate that ambient air quality concentrations are less than the AAQS.

Table 2.3-3. Regional Ambient Air Quality Concentrations

Pollutant	*Averaging Period*	*Location*	*Concentration*[1]	*Air Quality Standard*
PM_{10} ($\mu g/m^3$)	Annual average	Aberdeen	26	50
		Shelton	31	
		Olympia	27	
	Second Highest 24-Hour	Aberdeen	48	150
		Shelton	52	
		Olympia	52	
CO (ppm)	Second Highest 1-Hour	Olympia	8.6	35
	Second Highest 8-hour	Olympia	5.2	9
SO_2 (ppm)	Second Highest 1-Hour	Cosmopolis	0.127	0.4
		Hoquiam	0.354	
	Maximum 3-Hour	Cosmopolis	0.128	0.5
		Hoquiam	0.360	
	Maximum 24-Hour	Cosmopolis	0.059	0.1
		Hoquiam	0.055	
	Annual Average	Cosmopolis	0.005	0.02
		Hoquiam	0.006	

Source: Ecology 1993

[1] The monitoring stations are located near sources of air emissions (Aberdeen, Cosmopolis, Hoquiam, Olympia, and Shelton) and are not representative of air quality in the project vicinity. The air quality in the area surrounding the CT facility site is probably much better than the monitoring data indicate.

Locations where air quality concentrations are greater than the AAQS are referred to as nonattainment areas. There are several nonattainment areas in Washington State (Figure 2.3-2). King, Pierce, and parts of Snohomish and Clark counties have been designated as O_3 nonattainment areas. Parts of King, Pierce, Snohomish, Clark, and Spokane counties are nonattainment for carbon monoxide (CO). There are several particulate matter with aerodynamic diameter of less than 10 microns (PM_{10}) nonattainment areas in Washington State. The only nonattainment area within 50 km (31.1 miles) of the CT facility site is the PM_{10} nonattainment area surrounding Olympia. Grays Harbor is in attainment for all criteria air pollutants.

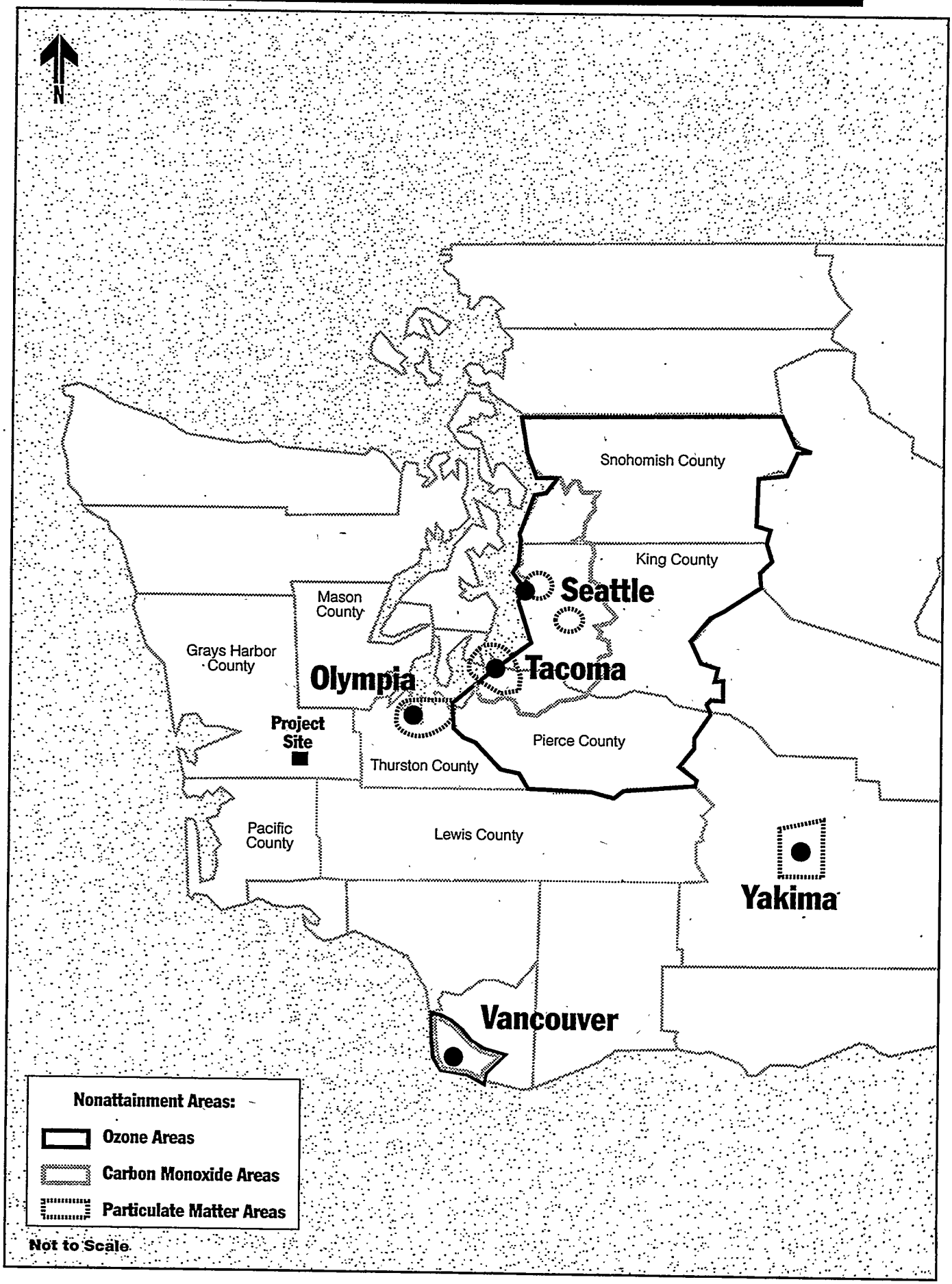


Figure 2.3-2 Washington State Nonattainment Areas

2.4 NOISE

2.4.1 Noise Measurement and Terminology

Noise is defined as unwanted sound that interferes with the normal activities of humans and the natural environment. Ecology regulates noise levels at various classes of properties (residential, commercial, or industrial). The noise generated by the project, when added to existing background noise, should not exceed the permissible environmental noise levels (see Section 4.16.4).

Noise is measured in decibels (dB), a logarithmic ratio between pressure caused by a given sound and the standard sound pressure. The human ear is not equally sensitive to all frequencies in the sound spectrum. Thus, it is standard to represent sound levels using the A-weighted scale [dB(A)] corresponding to the range and characteristics most consistent with the way humans perceive sounds. The dB(A) scale is logarithmic; small increases (less than 3 dB[A]) do not always result in direct increases in loudness and are not normally audible.

Sound levels at an average residence typically range from 45 to 55 dB(A). Sounds associated with nearby freeway and highway traffic are louder, ranging from 65 to 80 dB(A). Because sounds vary (depending on the type of monitoring equipment and the duration of use), the equivalent average sound level (L_{eq}) is used to represent the acoustical energy equivalent of the fluctuating sound over a specified period of time. Table 2.4-1 presents a sample of common sources of sound and their noise levels.

Table 2.4-1. Typical Sound Levels

Sound Source	*Distance from Source (m [feet])*	*dB(A)*
Soft whisper	5 (16.4)	30
Library	0	40
Normal conversation	1 (3.3)	60
Busy traffic	0	70
Heavy truck	15 (49.2)	90
Construction noise	3 (9.8)	110
Jet takeoff	60 (196.9)	120

Source: Lipscomb and Taylor 1978

For time varying noise sources, the statistical sound levels describe how often a given sound level is exceeded during the measurement period. 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 the lowest ambient noise levels of the noise environment.

Identifiable noise sources would be added to the background noise, forming the total noise environment. The L_{eq} is the sound of a steady non-varying noise which is equivalent in total acoustic energy to the noise level of time varying noise. The L_{eq} represents an average acoustic energy for the measurement.

2.4.2 Ambient Noise Levels

Sound levels were measured at six sites in the vicinity of the proposed CT facility site. Monitoring sites 1 through 3 were located near the existing laydown area fenceline and are considered representative of industrial receiving property (Figure 2.4-1). Site 1 was approximately 3 m (10 feet) west of the laydown area fenceline, just off of Keys Road. Site 2 was located on the south side of the laydown area fenceline, approximately 3 m (10 feet) from the fence. Site 3 was located on the north side of the laydown area fenceline, to the south of several existing warehouses.

Monitoring sites 4 through 6 were located at the three residences nearest the proposed CT facility site and were chosen to be representative of other nearby residences. The sound level meter at site 4 was almost 0.8 km (0.5 mile) from the proposed facility location and was located approximately 7.6 m (25 feet) from the northeast corner of the house and approximately 7.6 m (25 feet) from Keys Road West. Site 5 was located on an access road that runs parallel to Irwin Lane (private driveway). This site was approximately 61 m (200 feet) east of the residence, and approximately 0.6 km (0.4 mile) from the proposed facility location. After the second set of readings at this site, the noise monitor was moved about 30 m (100 feet) to the south to avoid disturbing a dog, which affected the sound level measurements. Site 6 was located approximately 0.8 km (0.5 mile) northeast of the facility, on Fuller Road. This site is representative of several residences and is separated from the proposed facility by a slight ridge and dense woods. The daytime ambient sound level at Site 6 was dominated by a small saw mill at the end of Fuller Road, approximately 152 m (500 feet) north of the monitoring site.

Sound level measurements were taken at five different time periods: 12 and 5 p.m. (daytime), and 11 p.m., 3 a.m., and 7 a.m. (nighttime). Monitoring was performed for 15 minutes at each site for each time period. Each monitoring period was up to 2.5 hours in duration (for example, the 12 p.m. measurements began at about 11 a.m., and were complete by 1 p.m.). The analytical capability of the sound level meter provided the ability to develop a frequency distribution for each measurement period. The L_{25}, $L_{8.3}$, and $L_{2.5}$ values were determined from the measured data for comparison to the regulatory standards.

Table 2.4-2 lists the L_{eq} measurements at each site for each monitoring time period. Only the 11 p.m. measurement at Irwin Lane (Site 5) exceeded the night-time regulatory standard [50 dB(A)]. This high level is attributed to a barking dog. The monitor was moved for the next reading to avoid disturbing the dog. Compared to other measured sound levels at this site, the 11 p.m. reading is not considered representative.

Table 2.4-3 lists the average daytime (12 p.m. and 5 p.m.) and night-time (11 p.m., 3 a.m., and 7 a.m.) L_{eq}, L_{25}, $L_{8.3}$, and $L_{2.5}$ values for each site. The applicable standards for each are also presented in this table. Sites 1 through 3 are considered industrial areas, and Sites 4 through 6 are considered residential locations. All monitored sound levels were less than the regulatory standards.

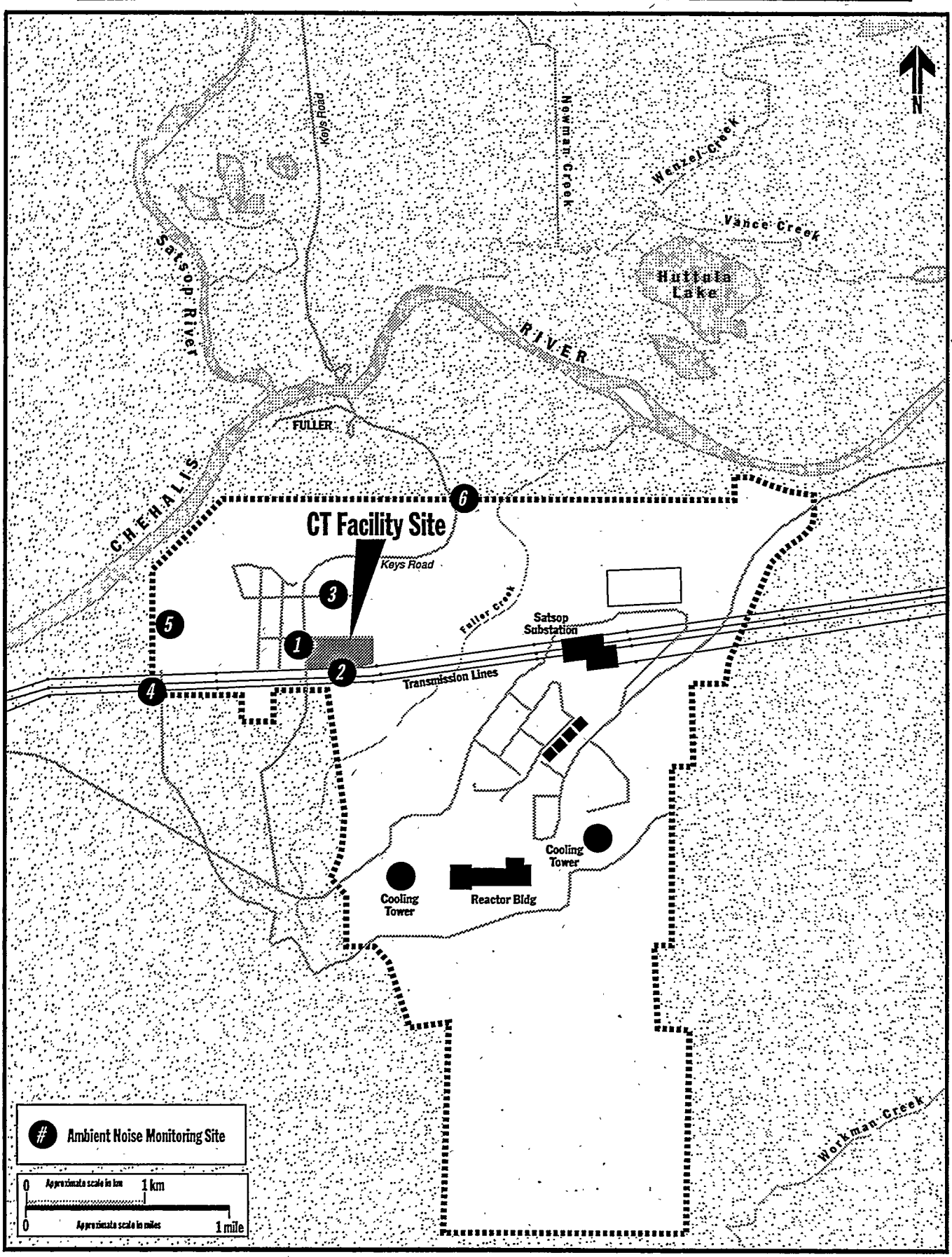


Figure 2.4-1 Ambient Noise Monitoring Sites

Table 2.4-2. Background Sound Levels

Site	Sound Levels, L_{eq} (dB[A])				
	12 p.m.	5 p.m.	11 p.m.	3 a.m.	7 a.m.
1	44	46	44	34	46
2	35	38	35	36	33
3	34	38	34	35	35
4	42	46	31	36	34
5	41	42	54	34	34
6	50	47	33	37	37

Source: Dames & Moore 1994

Table 2.4-3. Average Background Sound Levels

Site	Daytime Average (dB[A])				Nighttime Average (dB[A])			
	L_{eq}	L_{25}	$L_{8.3}$	$L_{2.5}$	L_{eq}	L_{25}	$L_{8.3}$	$L_{2.5}$
Industrial Sites								
1	45	36	45	54	42	32	42	49
2	37	36	39	43	35	35	36	39
3	36	34	37	43	34	34	36	39
Standard	70	75	80	85	70	75	80	85
Residential Site								
4	44	41	45	50	34	33	37	40
5	42	38	42	48	34	31	33	38
6	49	48	49	52	36	33	38	44
Standard	60	65	70	75	50	55	60	65

Source: Dames & Moore 1994

2.5 VEGETATION/WETLANDS

2.5.1 Vegetation

The Satsop CT Project lies within Washington's Chehalis Lowlands and Puget Trough physiographic provinces and within the Pacific Northwest's western hemlock vegetation zone (Franklin and Dyrness 1973). This zone is generally characterized by a mild, summer-dry climate. Soil and climatic variations result in a high diversity of plant communities within this zone, but vegetation within the project vicinity is generally forested and usually dominated by mixtures of several evergreen conifer species. Other plant communities potentially affected by the project include deciduous forests, mixed forests, regenerating coniferous forests, oak woodlands, shrub habitats, grasslands and agricultural plant communities, including pastures, prairies, vegetated developed areas, and wetland/riparian communities. These plant communities are discussed below in relation to the project components that would affect them.

CT Facility Site

The proposed site of the CT facility is a gravel pad currently being used as a lay-down area. Other than a few weeds, no vegetation exists on the proposed site.

Gas Pipeline Route

The proposed route of the gas pipeline will potentially affect at least 16 vegetation types. These are consolidated into six major types and briefly described below.

Forests. Forested plant communities include coniferous forests, regenerating coniferous forests, deciduous forests, oak woodlands, and mixed forests. Coniferous forests are most abundant along the route and are dominated by Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), and western redcedar (*Thuja plicata*). Some of these forests have been recently clearcut up to 20 years ago and are in various stages of regeneration, mostly being dominated by coniferous species such as Douglas-fir and western hemlock. Dominant vegetation of deciduous forests includes red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllum*), and cascara (*Rhamnus purshiana*). Garry oak (*Quercus garryana*) occasionally occurs on the Fort Lewis Military Reservation. Trees commonly found in mixed forests include Douglas-fir, western redcedar, western hemlock, red alder, and bigleaf maple. Understory species in these forested habitats typically include blackberry (*Rubus discolor* and *R. laciniatus*), salal (*Gaultheria shallon*), low Oregon holly-grape (*Mahonia nervosa*), and swordfern (*Polystichum munitum*).

Oak woodlands consist of contiguous or dispersed stands of Garry oak. Associated understory species include snowberry (*Symphoricarpos albus*) and native roses (*Rosa* spp.), or forbs (herbaceous annuals and perennials) and grasses associated with prairie and grassland communities. These habitats are notable in the ecology of the Puget Sound region because they support unique plant and wildlife species, comparatively high wildlife density, and high species diversity. In addition, these habitats are extremely vulnerable to urban and rural development and alteration.

Shrub Habitats. Plant communities dominated by shrubs are typically found within the BPA and NWP transmission ROW corridors, where vegetation is purposefully maintained to exclude trees.

This vegetation type includes Christmas tree farms. Commonly occurring shrubs include Scot's broom (*Cytisus scoparius*), salal, hazelnut (*Corylus cornuta*), and salmonberry (*Rubus spectabilis*).

Grassland/Agricultural Lands. This vegetation type includes pastures, croplands, hayfields, and untended fields. Such vegetation is dominated by non-native grasses such as redtop (*Agrostis* sp.), fescues (*Festuca* spp.), and ryegrass (*Lolium perenne*). Other species include clovers (*Trifolium* spp.) and ox-eye daisy (*Chrysanthemum leucanthemum*).

Prairies. Western Washington prairies are plant communities dominated primarily by native grass species such as Idaho fescue (*Festuca idahoensis*). However, a large number of forbs are usually present as well. Prairie vegetation occurs on and near the Fort Lewis Military Reservation and near Vail. Prairie habitats are notable in the ecology of the Puget Sound region because they support unique plant and wildlife species, comparatively high wildlife density, and high species diversity. In addition, these habitats are extremely vulnerable to urban and rural development and alteration, particularly to weed invasions. Most of the prairies along the route have been disturbed and or invaded by weeds such as Scot's broom and non-native grasses and forbs.

Vegetated Developed Areas. Most developed areas are unvegetated. However, some developments are vegetated, including parks and golf courses. These areas are typically dominated by non-native grasses, forbs, shrubs, and trees.

Wetland/Riparian Habitats. Wetland habitats are interspersed among the above terrestrial (upland) habitats and include palustrine emergent, palustrine scrub-shrub, and palustrine forested wetlands. The proposed route also crosses 24 watercourses (creeks, streams, and rivers), including the Chehalis and Deschutes rivers. These watercourses are associated with riparian zones of varying widths.

Palustrine emergent wetlands are characterized by erect, rooted, herbaceous plants tolerant of prolonged inundation or soil saturation, and include marshes and wet meadows. These habitats along the route are typically dominated slough sedge (*Carex obnupta*), small-fruited bulrush (*Scirpus microcarpus*), reed canarygrass (*Phalaris arundinacea*), redtop, and creeping buttercup (*Ranunculus repens*).

Palustrine scrub-shrub wetlands consist of areas dominated by woody vegetation less than 6.1 m (20 feet) tall. This includes stable communities or successional communities dominated by shrubs, young trees, and/or trees or shrubs that are small or stunted due to environmental conditions. Plant species found in these habitats include hardhack (*Spiraea douglasii*), redtwig dogwood (*Cornus stolonifera*), willows (*Salix* spp.), and red alder.

Palustrine forested communities are characterized by woody vegetation that is 6.1 m (20 feet) or taller. Plant species found in forested wetlands along the route include red alder, willow, Oregon ash (*Fraxinus latifolia*), and western redcedar. Shrubs and herbaceous vegetation mentioned for wetland habitats described above also occur in the understories of these forested wetlands.

Electrical Transmission Line

The existing cleared ROW is dominated by non-native grasses and low-growing native shrubs. Fuller Creek and its narrow zone of riparian and wetland vegetation intersects the proposed electrical transmission route, but is located under the transmission lines and away from utility pole locations.

Water Supply and Wastewater Lines

No upland or wetland/riparian habitats are expected to be disturbed from use of the Ranney Wells, which are existing well facilities. Well water would be delivered through the existing Supply System WNP-3/WNP-5 infrastructure.

2.5.2 Threatened, Endangered, and Sensitive Plant Species

The U.S. Fish and Wildlife Service (USFWS) indicated that tall bugbane (*Cimicifuga elata*) (a Federal candidate and state-listed threatened species) may occur in the vicinity of the project (letter from D.C. Fredrick, State Supervisor, USFWS, Olympia, Washington, February 28, 1994). The Washington Natural Heritage Program (WNHP) indicated that white-top aster (*Aster curtus*) (a Federal-candidate and state-listed sensitive species) may also occur in the vicinity of the project, specifically in the vicinity of the gas transmission line (Norwood 1994). The WNHP also indicated that a high-quality black cottonwood (*Populus trichocarpa*)/Oregon ash wetland community is known to occur in the vicinity of the proposed gas pipeline. This community was field-checked during the spring of 1994 and was determined to not be affected by construction of the pipeline.

Tall bugbane is an herbaceous perennial that occurs in moist coniferous and mixed woods at low elevations in Puget Sound. Site-specific surveys conducted in the spring of 1994 did not locate any populations of this species within or near the project vicinity.

White-top aster is a late-summer blooming herbaceous perennial that inhabits prairie communities within the Puget Trough. A vegetation survey conducted in late September 1994 on and near the Fort Lewis Military Reservation identified the plant at the south end of the Fort Lewis Military Reservation and in the pasture immediately south of the military reservation. The plant is abundant, with patches of varying size interspersed in the area of the proposed gas pipeline. Because of the abundance and distribution of the plant, it will not be possible to avoid the population with minor route revisions.

The rare plant surveys described above targeted specific areas of potential habitat for tall bugbane and white-top aster. The 77-km (48-mile) gas pipeline route has not been surveyed in its entirety. However, suitable habitat for these previously mentioned sensitive plant species, or other species, is not considered to exist within the project area beyond those areas that have already been surveyed.

2.6 WILDLIFE AND FISHERIES RESOURCES

2.6.1 Wildlife Habitat

Six habitat types were identified within a 2,371-ha (5,857-acre) mapped project study area consisting of the CT facility site, a 304.8-m (1,000-foot) wide corridor centered on the proposed 77-km (48-mile) gas pipeline ROW and the 1,220-m (4,000-foot) electrical transmission ROW. These types include forests (conifer, regenerating conifer, deciduous, and mixed conifer/deciduous), shrub habitat, prairie, agriculture/vegetated developed/grasslands, wetlands, and open water. Wildlife habitat types were grouped into the preceding six categories based on similar structural characteristics and relative degree of disturbance. Each of these types provides habitat for a variety of species, although some may be used only seasonally or provide habitat needed for only one life requisite (e.g., forage). Wildlife species represented in all, or nearly all, of the six habitat types of the ROW include the red-tailed hawk (*Buteo jamaicensis*), rufous hummingbird (*Selasphorus rufus*), violet-green swallow (*Tachycineta thalassina*), Steller's jay (*Cyanocitta stelleri*), dark-eyed junco (*Junco hyemalis*), opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), and black-tailed deer (*Odocoileus hemionus columbianus*) (Dames & Moore 1994). Habitat characteristics, and wildlife species associated with the developed/disturbed areas and the six habitat types are discussed in the following sections.

Developed/Disturbed

Lands within the mapped study area that are classified as developed/disturbed include rural, urban communities; industrial and commercial developments; and roads and highways. Varying levels of development impart different degrees of disturbance on wildlife; however, developed areas generally do not provide suitable habitat for species except for those that are highly adapted to human-modified environments, including the American crow (*Corvus brachyrhynchos*), European starling (*Sturnus vulgaris*), violet-green swallow, and raccoon (Dames & Moore 1994).

The proposed CT facility site occupies approximately 5.3 ha (13 acres) and is currently used as a construction laydown area; no vegetation providing forage and/or cover for wildlife is present. Only 53 ha (130 acres), or 2 percent, of the mapped study area comprises developed/disturbed lands. The majority of these lands (48 ha [119 acres]) are located along the 77-km (48-mile) gas pipeline (Table 2.6-1).

Forest

Approximately 1,443 ha (3,566 acres), or 61 percent, of the mapped study area is occupied by forest (Table 2.6-1). All forest habitats in the mapped area occur in the proposed gas pipeline ROW. Four forest types were identified: conifer, regenerating conifer, mixed conifer/deciduous, and deciduous.

Conifer forests, the most abundant forest type in the mapped area, occupy 801 ha (1,980 acres) (Table 2.6-1). Forest management practices in the region have created a mosaic of successional stages typically ranging from regenerating clearcuts to pole/young-sawtimber forest (Dames & Moore 1994). No mature (80+ years old) or old-growth (150+ years old) forest are within the mapped study area. However, the Supply System WNP-3/WNP-5 complex encloses approximately

170 ha (419 acres) of mature forests (Dames & Moore 1994). Approximately 270 ha (667 acres) of regenerating conifer forest stands occur in the mapped study area (Table 2.6-1). Wildlife species that typically occur in both second-growth and regenerating conifer forests include the roughskin newt (*Taricha granulosa*), ruffed grouse (*Bonasa umbellus*), band-tailed pigeon (*Columba fasciata*), northern flicker (*Colaptes auratus*), black-capped chickadee (*Parus atricapillus*), and opossum (*Didelphis virginiana*).

Table 2.6-1. Wildlife Habitat Types within the Mapped Study Area for the Satsop Project, by Component

Habitat Type[1]	*CT Facility Site/Water and Wastewater Lines*		*Gas Pipeline*	
	ha (acre)	*percent*	*ha (acre)*	*percent*
Developed/disturbed	5 (12)	<1	48 (119)	2
Forest				
Conifer	--	--	801 (1,980)	34
Regenerating conifer	5 (12)	<1	270 (667)	11
Mixed conifer/deciduous	5 (12)	<1	214 (529)	9
Deciduous	5 (12)	<1	158 (390)	7
Forest Subtotal	**5 (12)**	**<1**	**1,443 (3,566)**	**61**
Shrub	5 (12)	<1	321 (793)	14
Prairie	5 (12)	<1	46 (114)	2
Agriculture/vegetated developed/ grassland	5 (12)	<1	407 (1,006)	17
Wetlands	5 (12)	<1		
Palustrine emergent	5 (12)	<1	32 (79)	1
Palustrine scrub/shrub	5 (12)	<1	29 (71)	1
Palustrine forest	5 (12)	<1	33 (81)	1
Wetlands Subtotal	**5 (12)**	**<1**	**94 (231)**	**3**
Open water	5 (12)	<1	7 (18)	<1
TOTAL	**5 (12)**	**<1**	**2,366 (5,847)**	**100**

[1] Wildlife habitat types were identified and mapped 152 m (500 feet) either side of the proposed 77-km (48-mile) gas pipeline ROW. This area includes the 1,220-m-long (4,000-foot) transmission line corridor from the CT facility to the substation that overlaps the gas pipeline ROW.
Source: Dames & Moore 1994

The mixed conifer/deciduous forest type is characterized by well-developed overstory canopies with a shrub/forb understory, creating habitat conditions suitable for a variety of wildlife species, particularly those species common in second-growth forests in western Washington including the ruffed grouse, hairy woodpecker (*Picoides villosus*), chestnut-backed chickadee (*Parus rufescens*),

golden-crowned kinglets (*Regulus satrapa*), winter wren (*Troglodytes troglodytes*), and Douglas squirrel (*Tamiasciurus douglasii*) (Dames & Moore 1994). Mixed conifer/deciduous forests occupy approximately 214 ha (529 acres) within the mapped study area (Table 2.6-1)

Approximately 158 ha (390 acres) of deciduous forest occur within the mapped study area (Table 2.6-1). The riparian component of the deciduous forest type is associated with the Chehalis and Deschutes rivers. These stands provide important perching and nesting opportunities for birds that utilize riparian and open water habitats, including osprey (*Pandion haliaetus*), belted kingfisher (*Ceryle alcyon*), great blue heron (*Ardea herodias*), and bald eagle (*Haliaeetus leucocephalus*) (Dames & Moore 1994).

Several small stands of oak woodlands occupy approximately 7 ha (18 acres) of the upland deciduous forest in the mapped study area, primarily within the existing gas pipeline ROW (Dames & Moore 1994). Oak woodlands are classified as a priority habitat by the Washington Department of Fish and Wildlife—Non-Game Program (WDFW) and support species such as the western bluebird (*Sialia mexicana*), lazuli bunting (*Passerina amoena*), white-breasted nuthatch (*Sitta carolinensis*), and western gray squirrel (*Sciurus griseus*), a state-listed threatened species. See Section 2.6.2 for more information on sensitive wildlife species and priority habitats.

Shrub Habitat

The upland shrub habitat type occupies 321 ha (793 acres) in the mapped study area, primarily within existing ROWs (Table 2.6-1). This vegetation community, maintained by periodic vegetation maintenance along the ROW, provides forage opportunities for many passerines and small mammals. Raptors and other carnivores are also likely to forage on birds and small mammals in this habitat type. Bird species commonly observed in upland shrubs include the ruffed grouse, American robin (*Turdus migratorius*), black-capped chickadee (*Parus atricapillus*), song sparrow (*Melospiza melodia*), and Bewick's wren (*Thryomanes bewickii*). Reptiles noted in the upland shrub included the northern alligator lizard (*Elgaria coerulea*), rubber boa (*Charina bottae*), and garter snakes (*Thamnophis* spp.) (Dames & Moore 1994).

Prairies

The prairie habitat type occupies 46 ha (114 acres), or only 3 percent of the mapped study area (Table 2.6-1). Prairies provide relatively undisturbed habitats, as indicated by the relative dominance of native plant species, where grass and/or forbs from the natural climax plant community (Dames & Moore 1994). Prairies are classified as a priority habitat by the WDFW (see Section 2.6.2 for more information of priority habitats). This habitat type provides forage, cover, and nesting habitat for many wildlife species, including the common nighthawk (*Chordeiles gundlachii*), western bluebird, western meadowlark (*Sturnella neglecta*), and western kingbird (*Tyrannus verticalis*).

Agriculture/Vegetated Developed/Grasslands

The agriculture/vegetated developed/grassland habitat type includes croplands, pastures, orchards, golf courses, parks, cemeteries, and rural/suburban developed areas and occupies 407 ha (1,006 acres), the second largest habitat type in the mapped study area (Table 2.6-1). The relative frequency of vegetation maintenance to agricultural lands and parks precludes year-round habitat

for wildlife species; however, several bird species, including the red-tailed hawk, western meadowlark, northern flicker, and horned lark (*Eremophila alpestris*) use these lands for nesting and forage during seasons when cover and food availability are optimal (Dames & Moore 1994). In addition, mammals such as the opossum, coyote (*Canis latrans*), deer mouse (*Peromyscus maniculatus*), and bats (*Myotis* spp.) are commonly observed in this habitat type (Dames & Moore 1994).

Wetlands

Wetlands occupy a total of 94 ha (231 acres), or 4 percent, of the mapped study area (Table 2.6-1). Palustrine emergent, scrub-shrub, and forested wetlands account for 32, 29, and 33 ha (79, 71, and 81 acres), respectively. The terrestrial and aquatic components of emergent wetlands typically provide high-quality forage and cover habitat for a wide variety of amphibian and bird species, including the long-toed salamander (*Ambystoma macrodactylum*), marsh wren (*Cistothorus palustris*), and red-winged blackbird (*Agelaius phoeniceus*) (Dames & Moore 1994). In addition, some low-lying fields near the Chehalis River tend to be seasonally flooded during the winter and, therefore, provide forage and cover for a number of wintering waterfowl and shorebirds, including the mallard (*Anas platyrhynchos*), American wigeon (*Anas americana*), and common snipe (*Gallinago gallinago*) (Dames & Moore 1994).

Scrub-shrub wetlands provide nesting habitat for species such as the willow flycatcher (*Empidonax traillii*), Hutton's vireo (*Vireo huttoni*), and song sparrow (*Melospiza melodia*). Snags typically found in forested wetlands provide nesting habitat for cavity-nesting ducks such as the wood duck (*Aix sponsa*) and common goldeneye (*Bucephela clangula*).

Open Water

A total of 17 ha (18 acres) of open water habitat occurs within the mapped study area (Table 2.6-1). Rivers and creeks provide aquatic habitat for wildlife species such as the great blue heron, bald eagle, osprey, river otter (*Lutra canadensis*), and beaver (*Castor canadensis*). The riparian forests and shrubs associated with these waterways also provide habitat for species that use both aquatic and terrestrial elements (e.g., northwestern salamander [*Ambystoma gracile*], belted kingfisher, and raccoon). In addition to the watercourses within the mapped study area, Black Lake, which is located adjacent to the proposed gas pipeline ROW, provides abundant open water habitat for many waterfowl species including the double-crested cormorant (*Phalacrocorax auritus*), bufflehead (*Bucephala albeola*), and American coot (*Fulica americana*).

2.6.2 Sensitive Wildlife Species

The term sensitive wildlife is used to refer to all wildlife species that are protected by Federal and/or state regulations administered by the USFWS and WDFW. The USFWS identified eight species (three Federally listed and five candidate) that potentially occur in the vicinity of the project (Table 2-6.2). Additionally, WDFW identified several priority habitats and species that potentially occur in the vicinity of the project.

Table 2.6-2. Sensitive Wildlife Species Potentially Occurring in the Project Vicinity

Common Name	Status		Observed in Project Vicinity
	Federal[1]	State[2]	
Northern Red-legged Frog	Federal Category 2 Candidate		No
Tailed Frog		Monitor Species	No
Trumpeter Swan		Priority Species	No
Harlequin Duck	Federal Category 2 Candidate		No
Wood Duck		Priority Species	No
Black Tern	Federal Category 2 Candidate		No
Great Blue Heron		Monitor Species	Yes
Marbled Murrelet	Federal Threatened	State Candidate	No
Bald Eagle	Federal Threatened	State Threatened	Yes
Northern Goshawk	Federal Category 2 Candidate	State Candidate	No
Northern Spotted Owl	Federal Threatened	State Endangered	No
Mountain Quail	Federal Category 2 Candidate		No
Pileated Woodpecker		State Candidate	Yes
Western Bluebird		State Candidate	No
Oregon Vesper Sparrow		Monitor Species	No
Western Gray Squirrel		State Threatened	No

Sources: Letters from Nancy Gloman, USFWS, Olympia, Washington, February 28, 1994 and Lea Knutson, WDFW—Non-Game Data Systems, Olympia, Washington, October 15, 1993.

[1] **USFWS: Federal Endangered**—designated as an endangered species by the federal government. **Federal Threatened**—designated as a threatened species by the federal government. **Category 2 candidate**; need additional information to propose as threatened or endangered under the Endangered Species Act.

[2] **WDFW: State Endangered**—wildlife species native to the state of Washington that are seriously threatened with extinction throughout all or a significant portion of their range within the state.

State Threatened—wildlife species that are likely to become an endangered species within the foreseeable future throughout a significant portion of their range within the state without cooperative management or removal of threats.

State Candidate—wildlife species native to the state of Washington that WDFW will review for possible listing as endangered, threatened, or sensitive.

Monitor Species—wildlife species that are of interest because: (1) they were at one time classified as endangered, threatened, or sensitive; (2) they require habitat that has limited availability during some portion of their life cycle; (3) they are indicators of environmental quality; (4) further field investigations are required to determine their population status; (5) there are unresolved taxonomic problems which may bear upon their status classification; (6) they may be competing with and impacting other species of concern; or (7) they have significant popular appeal.

Priority Species—a species requiring protective measure for their perpetuation due to their population status, sensitivity to habitat alteration, and/or recreational importance.

Federally Listed Wildlife Species

Three Federally listed species, the bald eagle, marbled murrelet (*Brachyramphus marmoratus*), and northern spotted owl (*Strix occidentalis caurina*), were identified by the USFWS as potentially occurring in the vicinity of the project (letters from N. Gloman, USFWS, Olympia, Washington, December 16, 1993 and February 28, 1994) (Table 2.6-2). Those species identified by USFWS as threatened or endangered are discussed in the following sections; habitat requirements and use in the vicinity of the project are included in each discussion.

Bald Eagle. The bald eagle, a state- and Federally listed threatened species, potentially winters along the Chehalis and Deschutes rivers in the vicinity of the project; nesting activity has been documented near the Chehalis River. Two bald eagle nest sites are located in large cottonwood trees, approximately 610 m (2,000 feet) northwest of the proposed gas pipeline crossing of the Chehalis River (Dames & Moore 1994). One nest has been active since 1982. The second bald eagle nest was documented across the Chehalis River and probably served as an alternate. This second nest, however, was subsequently destroyed (pers. comm., M. Zahn, WDFW, Elma, Washington, January 20, 1994). A third bald eagle nest has been documented by WDFW near Black Lake, approximately 1.6 km (1 mile) southwest of the proposed gas pipeline route (Dames & Moore 1994).

Bald eagles typically winter in western Washington between October 31 and March 31. Wintering eagles in the Pacific Northwest most commonly perch on tall snags, ponderosa pine, and cottonwoods (Stalmaster and Newman 1979, Fielder and Starkey 1986); proximity to a food source is probably the most important factor influencing perch selection by bald eagles (Steenhof et al. 1980). Most perches selected by bald eagles provide a good view of the surrounding area, and eagles tend to use the highest perch sites available (Servheen 1975, Stalmaster 1976).

Mid-winter bald eagle surveys conducted by the Washington Department of Wildlife (WDW) in 1988 and 1989 indicated low numbers of bald eagles wintering in the vicinity of the project (Table 2.6-3). Although suitable perching habitat is present along the rivers and food stocks are readily available, areas in the vicinity of the Chehalis and Deschutes rivers are not considered to be high concentration areas for wintering bald eagles. Two bald eagles were observed during field reconnaissance in January 1994 (Dames and Moore 1994). Two additional bald eagle observations were reported by WDFW on January 19, 1994 at a location upriver from the proposed crossing (pers. comm., M. Zahn, WDFW, Elma, Washington, January 20, 1994).

Food stocks for nesting and wintering bald eagles in the vicinity of the project consist primarily of anadromous and resident fish in the Chehalis and Deschutes rivers and their tributaries. These waterways provide optimal spawning and rearing habitat for both anadromous and resident fish. In addition to the available fish, the wetlands along the Chehalis and Deschutes rivers support concentrations of wintering waterfowl, also major prey items for bald eagles.

Marbled Murrelet. The USFWS indicated that the marbled murrelet, a state- and Federally listed threatened species, potentially nests in the vicinity of the project between March 1 and mid-September. The marbled murrelet is a seabird that forages in the ocean; however, nesting habitat is associated with coastal mature/old-growth forests throughout most of their range (Forest

Ecosystem Management Team [FEMAT] 1993). Murrelets have been known to nest as far as 84 km (52 miles) inland in Washington (Hamer and Cummins 1990).

Table 2.6-3. Results of 1988 and 1989 Mid-Winter Bald Eagle Surveys in the Project Vicinity

Location	*1988*	*1989*
Satsop River	2 adult, 1 immature	0
Chehalis River between Satsop and Malone	2 immature	2 adult
Summit Lake	2 adult, 1 immature	1 adult
Budd Lake	0	1 adult
Nisqually River	2 adult, 1 immature	2 adult
Deschutes River	1 adult, 1 immature	4 adult

Source: Taylor 1988, 1989

Approximately 12.2 ha (30.2 acres) of old-growth forest are located within 152 m (500 feet) of the proposed pipeline route. Approximately 170 ha (419 acres) of mature forest stands are within the boundary of the Supply System WNP-3/WNP-4 complex (Dames & Moore 1994). No marbled murrelet nesting activity has been documented in the project vicinity by the USFWS or WDFW, and it is unlikely that this species occurs.

Northern Spotted Owl. The USFWS indicated that the northern spotted owl, a state-listed endangered and Federally listed threatened species, potentially occurs in the vicinity of the project. Studies of the spotted owl during the past 20 years have shown it to be strongly associated with mature/old-growth forests throughout most of its range (FEMAT 1993). Northern spotted owls nest in cavities or on platforms in trees and feed on a variety of forest mammals, birds, and insects (FEMAT 1993).

Although no old-growth forest occur in the project vicinity, the Supply System WNP-3/WNP-5 complex contains approximately 170 ha (419 acres) of potentially suitable spotted owl habitat. The WDFW did not identify any northern spotted owl sites in the vicinity of the gas pipeline ROW (letter from L. Knutson, WDFW—Non Game Data System, Olympia, Washington, July 26, 1994).

A Biological Assessment for these three Federally listed species is included in Chapter IV, Appendix C.

Federal Candidate Wildlife Species

Five species—the mountain quail (*Oreortyx pictus*), northern goshawk (*Accipiter gentilis*), black tern (*Chlidonias niger*), harlequin duck (*Histrionicus histrionicus*), and northern red-legged frog (*Rana aurora aurora*)—were identified as candidate species for Federal-listing status that potentially

occur in the vicinity of the project (letters from N. Gloman, USFWS, Olympia, Washington, December 16, 1993 and February 28, 1994) (Table 2.6-2). Federal candidate species are discussed in the following sections; habitat requirements and use in the project vicinity are included in each discussion.

Mountain Quail. Mountain quail, a Category 2 candidate species for Federal listing, occur primarily in chaparral, brushy ravines, and on mountain slopes (National Geographic Society [NGS] 1987). The vegetation composition and structure of the upland shrub habitat along the proposed gas pipeline ROW is potentially suitable for mountain quail; however, occasional use by this gamebird is not likely. The WDFW has no confirmed records of mountain quail in the vicinity of the project (letter from C. Ringo, Geographic Information System [GIS] Manager, WDFW, Olympia Washington, July 22, 1994).

Northern Goshawk. The northern goshawk, a Category 2 Federal candidate species and state-proposed candidate species, is primarily a forest dweller, usually using mature and old-growth conifers. During migration periods and in winter, goshawks can also be seen in habitats such as alpine areas, farmlands, prairies, and deserts (Palmer 1988). Goshawks forage within and below the forest canopy with prey items consisting primarily of medium-sized birds and mammals (Storer 1966). The mapped study area does not contain suitable goshawk habitat; however, the WDFW confirms a goshawk observation and the existence of suitable nesting habitat in the vicinity of the project (letter from C. Ringo, GIS Manager, WDFW, Olympia Washington, July 22, 1994).

Black Tern. Suitable habitat for the black tern, a Category 2 Federal candidate species, includes lakes and fresh marshes; coastal waters are also used during migration. Black terns nest primarily in eastern Washington. During migration, black terns rarely migrate through western Washington (Larrison and Sonneberg 1968). Therefore, black terns may occur in the vicinity of the project during migration, but are unlikely to nest in the area.

Harlequin Duck. Western populations of harlequin ducks, a Category 2 Federal candidate species, are found along the coasts of the northwestern United States, Canada, and Alaska. Harlequin ducks usually nest along rock shores adjacent to the rapids of turbulent mountain streams and leave these inland nesting areas to winter at sea (Bellrose 1976). Two rivers, the Chehalis and Deschutes, and 22 perennial streams cross the proposed gas pipeline ROW; however, these waterways do not provide suitable nesting habitat for the harlequin duck. It is unlikely that the harlequin duck occurs within the vicinity of the project.

Northern Red-legged Frog. During non-breeding seasons the northern red-legged frog, a Category 2 Federal candidate species, is highly terrestrial and frequently encountered in woodlands adjacent to streams (Leonard et al. 1993). Breeding habitat requirements include ponds (often temporary with little or no flow), sturdy underwater stems for egg attachments, and inundation length sufficient for metamorphosis (Nussbaum et al. 1983). Suitable breeding and non-breeding habitats occur in the vicinity of the project; however, the WDFW has no confirmed records of red-legged frog observations in the project vicinity (letter from C. Ringo, GIS Manager, WDFW, Olympia, Washington, July 22, 1994).

State-listed Wildlife Species and Priority Habitats

The WDFW identified 12 species of concern as potentially occurring in the vicinity of the project (Table 2.6-2). Three state-listed species—the bald eagle, marbled murrelet, and spotted owl—are also Federally listed threatened or endangered species and are discussed in the previous section. In addition, the northern goshawk is both a state and Federal candidate species and is discussed in the section on Federal candidate species. All other state listed species, with the exception of monitor species, are discussed in the following sections. The WDFW has also identified priority habitats; a discussion on these sensitive and unique habitats follows.

Trumpeter Swan. The trumpeter swan (*Cygnus columbianus*), a state priority species, is known to winters in the Pacific Northwest and has been documented by WDFW in waterfowl concentration areas in the vicinity of the project (letter from C. Ringo, GIS Manager, WDFW, Olympia, Washington, July 22, 1994). Trumpeter swans typically forage and loaf in ponds and lakes and have also been known to forage in agricultural fields (Bellrose 1976).

Wood Duck. The WDFW documents notable wood duck (*Aix sponsa*) nesting and rearing populations in the Chehalis Valley, in the vicinity of the project (letter from C. Ringo, GIS Manager, WDFW, Olympia, Washington, July 22, 1994). The wood duck typically occupies open woodlands near ponds or rivers where they nest in snags (dead, standing trees) (NGS 1987).

Pileated Woodpecker. The pileated woodpecker (*Dryocopus pileatus*) was observed during field surveys of the project vicinity (Dames & Moore 1994). A candidate for state listing, the pileated woodpecker typically occupies dense, mature conifer forests but also seems to be adapting well to human encroachment, becoming more tolerant of disturbed habitats and second-growth woodlands (NGS 1987). Both the mature conifer forest in the mapped study area and the Supply System WNP-3/WNP-5 complex contains suitable woodpecker habitat.

Western Bluebird. The western bluebird (*Sialia mexicana*), a candidate for state listing, forages and nests in open woodlands, farmlands, and orchards (NGS 1987). The bluebird typically nests in holes in trees and posts and nest boxes. The WDFW documents numerous successful nest boxes in the vicinity of the project (letter from C. Ringo, GIS Manager, WDFW, Olympia, Washington, July 22, 1994), and ample habitat for the species occurs in the area of the project; however, no observations were made during site visits.

Western Gray Squirrel. The western gray squirrel (*Sciurus griseus*), a state threatened species, was observed in the vicinity of the project in 1985 (letter from C. Ringo, GIS Manager, WDFW, Olympia, Washington, July 22, 1994). The gray squirrel typically inhabits fairly open oak forests (Burt and Grossenheider 1976). Approximately 7 ha (18 acres) of oak woodlands occur in the mapped study area and it is likely that the squirrel occurs in the vicinity of the project.

Priority Habitats. WDFW has identified priority habitat regions in the vicinity of the project, specifically those areas that regularly support large concentrations of wintering waterfowl (including trumpeter swans) and shorebirds; wood duck nesting and broods; mink habitat; and oak woodlands (letter from L. Knutson, WDFW—Non-Game Data Systems, Olympia, Washington, October 15, 1993). Waterfowl concentration areas occur near the gas pipeline ROW in seasonally inundated

floodplains of the Chehalis and Deschutes rivers and Black Lake. Additionally, scattered patches of oak woodlands occur near the eastern end of the gas pipeline route.

2.6.3 Fisheries

Streams in the Vicinity of the Project

Streams near the CT facility site, water supply and wastewater systems, and electrical transmission line include Elizabeth Creek (near the Ranney Wells and water intake line), Fuller Creek (adjacent to the CT facility site and crossed by the electrical transmission line), and the Chehalis River (the indirect source of water for the project and the cooling water discharge site). Elizabeth and Fuller creeks are two small (typically less than 4.6 m [15 feet] wide) streams that support limited runs of salmon and both resident and anadromous trout. The primary anadromous stocks in these streams are coho salmon (*Oncorhynchus Kisutch*); Elizabeth Creek may also support runs of chum salmon (Washington Department of Fisheries [WDF] 1975). Sea-run cutthroat trout may also be present, although not indicated in existing data. Elizabeth Creek also supports populations of the Olympic mudminnow (*Novumbra hubbsi*), a Federal candidate species. The reach of the Chehalis River occurring in the vicinity of the project is primarily a migration route for anadromous stocks; however, some rearing juvenile salmonids occur in this reach during the spring, while other game species (e.g., largemouth bass [*Micropterus salmoides*]) and the Olympic mudminnow may be present throughout the year.

The proposed 77-km (48-mile) gas pipeline route would cross 21 perennial and three intermittent streams. Nine of the perennial streams occur in the Chehalis River drainage and 12 in South Puget Sound drainage. All but two of the perennial streams support salmon or trout stocks downstream of the crossings. At most, seven streams do not have anadromous fish stocks occurring in the region of the crossing. Stocking of juvenile salmon and steelhead occurs in the Chehalis River, Mox Chehalis, Salmon Creek, and Workman Creek in the Chehalis basin, and in the Deschutes River and Kennedy Creek in the South Puget Sound basin. Fisheries resources and characteristics of perennial streams crossed by the proposed gas and electric transmission line routes or near the CT facility site are presented in Table 2.6-4, and discussed below.

Chehalis River Basin. The Chehalis River drainage supports populations of most major Washington anadromous fish stocks, including spring and fall chinook (*O. tshawytscha*), coho, and chum salmon; summer and winter steelhead (*O. mykiss*); and sea-run cutthroat trout (*O. clarki*). The Chehalis River is the largest of several rivers and streams entering Grays Harbor, which is the second largest estuary on the Washington coast. The Chehalis River drainage contributes to Grays Harbor's combined annual production of salmon and steelhead, which (including hatcheries) is typically in the range of 100,000 to 200,000 fish per year (WDF 1984, unpublished report, Washington Salmon Stock Inventory Appendices G-I). Coho is the most ubiquitous anadromous fish occurring at 8 of the 9 Chehalis River basin gas pipeline stream crossings. Chinook and chum salmon are likely to occur at the crossings of the mainstem Chehalis River although chum may also occur in Workman Creek. While the distributions of steelhead and sea-run cutthroat are not well documented for the drainage, it is likely that steelhead would be present at only a few streams (Chehalis and possibly Mox Chehalis), and sea-run cutthroat at many. Resident cutthroat trout and rainbow trout would also likely be present at many of the gas pipeline crossing areas.

Table 2.6-4. Fisheries Resources and Characteristics of Streams in the Project Vicinity

Stream Name	*Stream Mile at Crossing*	*Receiving Waters*	*Approximate Stream Width (m[ft])*[1]	*Anadromous, Game, and Special Concern Species Present*[2]	*Fisheries Issues*[3]
Elizabeth Creek	RW[4]	Chehalis River	(10-20)	CO, SCT, CCT, OMM	1
Fuller Creek	0.8	Chehalis River	(8)	CO, CCT	4
Purgatory Creek	0.3	Chehalis River	(7)	CO	4
Workman Creek	1.8	Chehalis River	(20)	CO, CH, SCT, CCT, OMM	1,3
Unnamed	0.7	Chehalis River	(3)	CO	--
Unnamed	0.6	Chehalis River	(10)	CO, SCT, CCT, OMM	1,3
Chehalis River	26.7	Grays Harbor	(115)	CO, CH, CK, SW, SCT, CCT, LMB, OMM	1,2,5
Unnamed	--[5]	Sarvinski Lakes	(5)	--	--
Sand Creek	1.1	Mox Chehalis Creek	(13)	CO, SCT, CCT	2,3
Mox Chehalis #1 crossing	10.0	Chehalis River	(26)	CO, SCT, CCT	2,3,4
Unnamed Tributary	0.6	Kennedy Creek	(3)	CO	--
Unnamed Tributary	0.01	Kennedy Creek Trib. 14.0018	(3)	CO	--
Kennedy Creek	10.3	Totten Inlet	(2)	CCT	3
Unnamed	--	Perry (possibly)	(5)		4
Swift Creek	1.5	McLane Creek	(8)	CO, CH, SCT, CCT	2,3,4
Cedar Flats Creek	0.5	McLane Creek	(7)	CO, CH, SCT, CCT	3
McLane Creek	1.0	Eld Inlet	(7)	CO, CH, SCT, CCT	2,3,4
Unnamed Tributary	0.1	McLane Creek	(<10)	CO, CH	--
Black Lake Outlet	2.2	Percival Creek	(33)	CO, CK, SCT, CCT	3

Table 2.6-4. Fisheries Resources and Characteristics of Streams in the Project Vicinity

Stream Name	*Stream Mile at Crossing*	*Receiving Waters*	*Approximate Stream Width (m[ft])*[1]	*Anadromous, Game, and Special Concern Species Present*[2]	*Fisheries Issues*[3]
Unnamed	1.2	Black Lake	(5)	SCT, CCT	3
Deschutes River	10.4	Capitol Lake	(59)	CO, CH, CK, SW, SCT, CCT	2,3,5
Unnamed (unmapped)	--	--	(4)	--	--

1 Stream width from Dames & Moore (1994) May survey.

2 Fish species codes—data taken from Dames & Moore (1994), based primarily on Washington Rivers Information System (WARIS) (1992), WDF (1975), and their personal communications; other species may be present. Only game, commercial, and listed species are presented.
CO = coho salmon
CH = chum salmon
CK = chinook salmon
SW = winter-run steelhead trout
SCT = sea-run cutthroat trout
CCT = coastal resident cutthroat trout
LMB = largemouth bass
OMM-Olympic mudminnow

3 Fisheries Issues
1. Protected Species (state or Federal).
2. Substantial run of salmon or steelhead.
3. Overall substantial resident fish habitat.
4. Good salmonid spawning habitat near crossing.
5. Primary migration route.
6. Designated by NWPPC as a protected stream.

4 RW - Near the Ranney well location, not crossed by new construction.

5 Unknown

Fish abundance within the Chehalis River basin varies by species and region. Annual escapement of coho stocks to the Chehalis River, excluding major lower river tributaries, is 6,000 to 47,000 fish (WDF et al. 1993). Next to the mainstem Chehalis River, the Mox Chehalis has the largest abundance of coho (based on spawning survey index counts, which do not represent total escapement) for all streams in the vicinity of the project. Chinook are also present in the Chehalis River, with estimated stock escapement ranging from 600 to 3,500 for spring chinook, and 5,800 to 47,000 for fall chinook (WDF et al. 1993). Neither of these chinook stocks are likely to be present in any of the tributaries crossed by the gas pipeline other than the Chehalis River (WDF 1975). While chum may occur in some of the streams, their abundance is low because most chum are produced in tributaries farther downstream (WDF et al. 1993, WDF 1975). Steelhead (mostly winter stocks, but some summer) are found in the basin. Estimates of annual steelhead winter stock escapement range from 2,500 to 4,200 fish in the system (WDF et al. 1993). Since 1987, annual sport harvest of winter and summer steelhead averaged 781 and 30, respectively (Dames & Moore 1994). Abundance of other stocks, such as sea-run cutthroat and resident trout, is not known.

Spring and fall chinook, coho, chum salmon, and winter steelhead found in the Chehalis River basin were considered healthy in 1992 (WDF et al. 1993), while the status of summer steelhead and other anadromous stocks is unknown.

Few of the gas pipeline stream crossings apparently include suitable spawning gravels or cobble at or near the crossings (Dames & Moore 1994). But some have excellent spawning habitat for coho, such as found along the Mox Chehalis and its many tributaries, including Sand Creek. However, the primary spawning area in Sand Creek is upstream of the pipeline crossing area. Index spawning surveys record over 1,000 coho spawners in the Mox Chehalis, over 300 in Sand Creek, and over 100 in the second tributary crossed after Workman Creek, which is a direct tributary to the Chehalis River crossed by the pipeline during high escapement years since 1987 (Dames & Moore 1994). Suitable coho spawning habitat also occurs in the vicinity of the Fuller Creek crossing. Up to 40 adult coho spawners have been observed during index surveys in recent years in Fuller Creek. Also, while no adult coho have been observed in Workman Creek during index counts in recent years, major spawning areas may occur outside the index survey area, and suitable spawning gravels appear to occur a short distance downstream of the crossing.

South Puget Sound Streams. Anadromous fish production in the South Puget Sound drainage probably exceeds 100,000 fish annually, only a moderate part of which is produced in streams potentially affected by the project (WDF 1984). The small streams crossed by the proposed gas pipeline in this region contain primarily resident cutthroat trout, anadromous cutthroat trout, coho, and fall chum salmon, although summer/fall chinook are found in Percival Creek (to which Black Creek is a tributary), and winter steelhead in at least Kennedy and McLane creeks (WDF et al. 1993, WDF 1975). The Deschutes River contains all of these stocks, with wild coho the most abundant (coho annual escapement ranges from 500 to 10,400 fish). Of the 11 gas pipeline crossings in this region, four had no anadromous fish access above the pipeline crossing. Of the stocks present in these streams, coho, fall chum, summer/fall chinook, and Deschutes steelhead are considered healthy (WDF et al. 1993). Status of other stocks is unknown.

Of the 12 crossings by the proposed gas pipeline in South Puget Sound, the Kennedy Creek drainage contains three. Currently a barrier at river mile (RM) 2.5 (well below the Kennedy Creek crossings), blocks all upstream migration, although both coho and sea-run cutthroat are stocked above the barrier (Dames & Moore 1994). Stream widths at the crossings are small (less than 0.9 m [3 feet] wide), are above the natural anadromous zone, have high percentage of fines (>50 percent) (Dames & Moore 1994), and contain suitable spawning gravel for resident trout. The lower reaches of this drainage, however, are productive anadromous areas, especially for chum salmon. Kennedy Creek is the major chum producer for Totten Inlet, which has a total annual escapement of 1,100 to 22,400 chum salmon (WDF et al. 1993). Steelhead production is very light. Sport harvest of summer and winter steelhead during the 1992 to 1993 season was only seven and nine fish, respectively (Dames & Moore 1994).

McLane Creek, and its tributaries Swift and Cedar Flats creeks, would be crossed four times by the proposed gas pipeline. Some of these crossings have suitable spawning gravel while others are high in fines near the crossing (Dames & Moore 1994). This creek is one of three major chum salmon producing streams in Eld Inlet (total chum escapement to Eld Inlet is 4,300 to 37,800 [WDF et al. 1993]). McLane Creek also supports steelhead, sea-run cutthroat, and coho salmon. Since 1987, the maximum annual index count of coho spawners was 157 (Dames & Moore 1994).

The Black Lake outlet is a very low gradient, artificial ditch, with bottom substrate consisting of 100 percent fines having no nearby spawning area. The location of the proposed gas pipeline crossing is an open, marshy region near a road. This outlet, now a tributary to Percival Creek, supports varied stocks of anadromous fish; however, the primary use of the crossing area may be for coho rearing and as a migratory corridor for other stocks. It also has trout habitat that has been quality rated as substantial (Table 2.6-4).

The Deschutes River is a major producer of anadromous stocks in South Puget Sound, especially with a large, natural run of coho usually between 2,000 and 4,000 fish. The installation of a fish ladder at a natural barrier falls near the mouth of the river in the 1930s allowed for the development of anadromous stocks. This system now also contains natural runs of chinook and chum salmon, sea-run cutthroat, and winter steelhead. However, sport harvest of steelhead from the Deschutes River was only 8 fish in the 1992 to 1993 season (WDW 1993). The proposed gas pipeline would cross the river downstream of most spawning habitat for chinook and coho salmon. The river near the crossing area is a long, wide, deep run with scattered pools with good rearing but poor spawning habitat for salmon.

Threatened and Endangered Fish Species

Two Federal candidate species, the Olympic mudminnow and bull trout, may be present in streams affected by the project (USFWS, Letter of Notification, December 16, 1993).

Olympic Mudminnow. The Olympic mudminnow is a Federal Candidate Category 2 and state candidate species. The natural known distribution of the Olympic mudminnow includes the north side of the Chehalis River corridor and, at times, the lower Deschutes River basin (Meldrim 1968, Wydoski and Whitney 1979). It is restricted to coastal lowlands, does not extend to the base of the Olympic mountains, and has limited distribution east of the Satsop River (Harris 1974). Records exist of the species' presence in the vicinity of the project at least in some low gradient areas along

the north side of the Chehalis drainage basin and in Elizabeth Creek on the south side of the drainage (Envirosphere 1979). Their presence in the lower Deschutes River appears to be related to high flows from the Chehalis River system occasionally spilling into this drainage (Wydoski and Whitney 1979).

Habitat characteristics of Olympic mudminnow are very specific. Mudminnows are only found in relatively deep water (at least several inches) with very slow or no flow, heavy aquatic vegetation, and soft mud bottoms containing organic matter (Harris 1974). The general habitat is characterized as marshy streams. They are not present in newly silted areas containing just inorganic sediment. While mudminnows are present in a wide range of water quality conditions, they are most often found in turbid water. Habitat limitations due to elevation are not indicated in the literature. However, based on their preferred habitat, mudminnows would not be found in high gradient stream areas at higher elevations of the Olympic Peninsula and Chehalis River watersheds.

Based on habitat characteristics and distribution of mudminnows, the species may be present at some of the low gradient streams crossed by the proposed gas pipeline. The likely areas where they may be present include all the stream crossings below the Mox Chehalis drainage, and the Black Lake outlet crossing. In addition, the WARIS database indicated their presence in Workman Creek and Chehalis River Tributary 22.0520. However, their presence in most of these areas is probably unlikely because of high stream gradient, lack of suitable substrate, and location outside the typical distribution range. Furthermore, extensive electrofishing surveys of the mouth and upstream areas of Elizabeth, Fuller, and Workman creeks between 1977 and 1979 found mudminnows only in Elizabeth Creek (Envirosphere 1978, 1979, 1980).

Bull Trout. The bull trout is a Federal Candidate Category 2 species but not a state candidate species. Only since 1978 have Dolly Varden and bull trout been classified as two separate species (Cavender 1978). More thorough analysis in later years established that specific characteristics were available to properly separate the two species (Haas and McPhail 1991). Washington bull trout are found throughout Washington State coastal and inland streams and lakes. In the streams draining into Puget Sound and the Washington coast, their distribution may overlap with Dolly Varden.

Bull trout are more often associated with cool, clear mountain streams and lakes. Highest abundance has been found in streams dominated by gravel and cobble (Bond 1992). In lakes, these fish prefer regions of temperature less than 15°C (59°F). They require cool streams for spawning, typically in high elevation headwater streams that are fed by snow melt or springs (Bond 1992). Although some bull trout may spend their entire life in a small segment of a stream, most are highly migratory, traveling between headwater spawning streams and larger stream reaches or lakes to rear as adults and larger juveniles. Consequently, part of their habitat requirement is interbasin migratory routes free of blockages (Pratt 1992). Because of the bull trout's characteristic of residing in the substrate or other protected areas as juveniles, they require clean, mostly sediment-free bottom areas, or an abundance of large woody debris for cover.

The presence of bull trout is unlikely in most streams associated with the project. Intensive monthly river sampling above and below the project outfall site (WNP-3) on the Chehalis River, the lower Satsop River, and Elizabeth, Fuller, and Workman creeks over a 3-year period found no bull trout/Dolly Varden (Envirosphere 1978, 1979, 1980). These data suggest that, at least in the

lower regions of the Chehalis River basin, this species is not present. Also, any anadromous form probably does not exist in the upper Chehalis River. However, their absence in the lower area does not eliminate their possible presence in the Mox Chehalis River basin. While the stream characteristics of the Mox Chehalis River do not match typical bull trout habitat, the habitat is more similar to typical habitat than the lower Chehalis River streams sampled. Composition of fish species in the Southern Puget Sound basins streams is not well documented. Bull trout could be present in some streams crossed in this area. However these crossing areas are fairly low elevation, developed stream basins, atypical of this species' habitat use. Consequently, bull trout could be present in some streams crossed by the proposed gas pipeline but are unlikely in most areas.

2.7 LAND USE

2.7.1 Land Use Characteristics

CT Facility (Including Electrical Transmission and Water Supply/Wastewater Lines

The CT facility, electrical transmission line, and water supply/wastewater disposal lines would be located within the property boundary of the existing Supply System WNP-3/WNP-5 complex. The 5.3-ha (13-acre) site proposed for the CT facility was previously developed for and used as a laydown area during construction of the two nuclear plants (WNP-3 and WNP-5). The facility site is now covered by a layer of graded gravel approximately 1.25 to 2.5 m (4 to 8 feet) over 1 m (3 feet) deep and surrounded by a chainlink fence topped with barbed wire.

Keys Road provides vehicular access to the project components from SR 12. South of the site, BPA maintains a 20-m (50-foot) wide transmission corridor as part of their Olympia-to-Aberdeen grid connection. Most of the other areas surrounding the site are forested. About 0.4 km (0.25 mile), southwest of the site, the Weyerhaeuser Timber Company manages an experimental forest that is approximately 20 ha (50 acres) is size. On the north side of this forest, about 0.8 km (0.5 mile) west southwest of the site, are about a dozen single-family houses. The Fuller Creek mitigation program is southeast of the site. The nuclear power plant facilities (WNP-3 and WNP-5) lie beyond this area, about 0.8 km (0.5 mile) southeast of the proposed CT facility site. Forested areas are located to the north of the site, where the grade drops rapidly down toward the Chehalis River, which is a little less than 1.6 km (1 mile) from the CT facility site.

Gas Pipeline Route

As described in Section 1.2.2, the proposed pipeline route extends eastward from the proposed CT facility site to a connection with an existing natural gas pipeline located near Vail, a distance of approximately 77 km (48 miles). Approximately 24 km (15 miles) of the route traverses eastern Grays Harbor County, and approximately 53 km (33 miles) are within adjacent Thurston County. About 70 percent of the proposed route is adjacent to or within existing pipeline or electrical transmission line ROWs. Approximately 8 percent is within or adjacent to existing roadway corridors. Figures 2.7.1a and 2.7.1b depict the location of the pipeline route, as well as zoning designations within 0.8 km (0.5 mile) of the pipeline.

The pipeline would pass through areas with a variety of land uses as illustrated in Figures 2.7.1a and 2.7.1b. The pipeline would pass through rural, residential, military (Fort Lewis Military

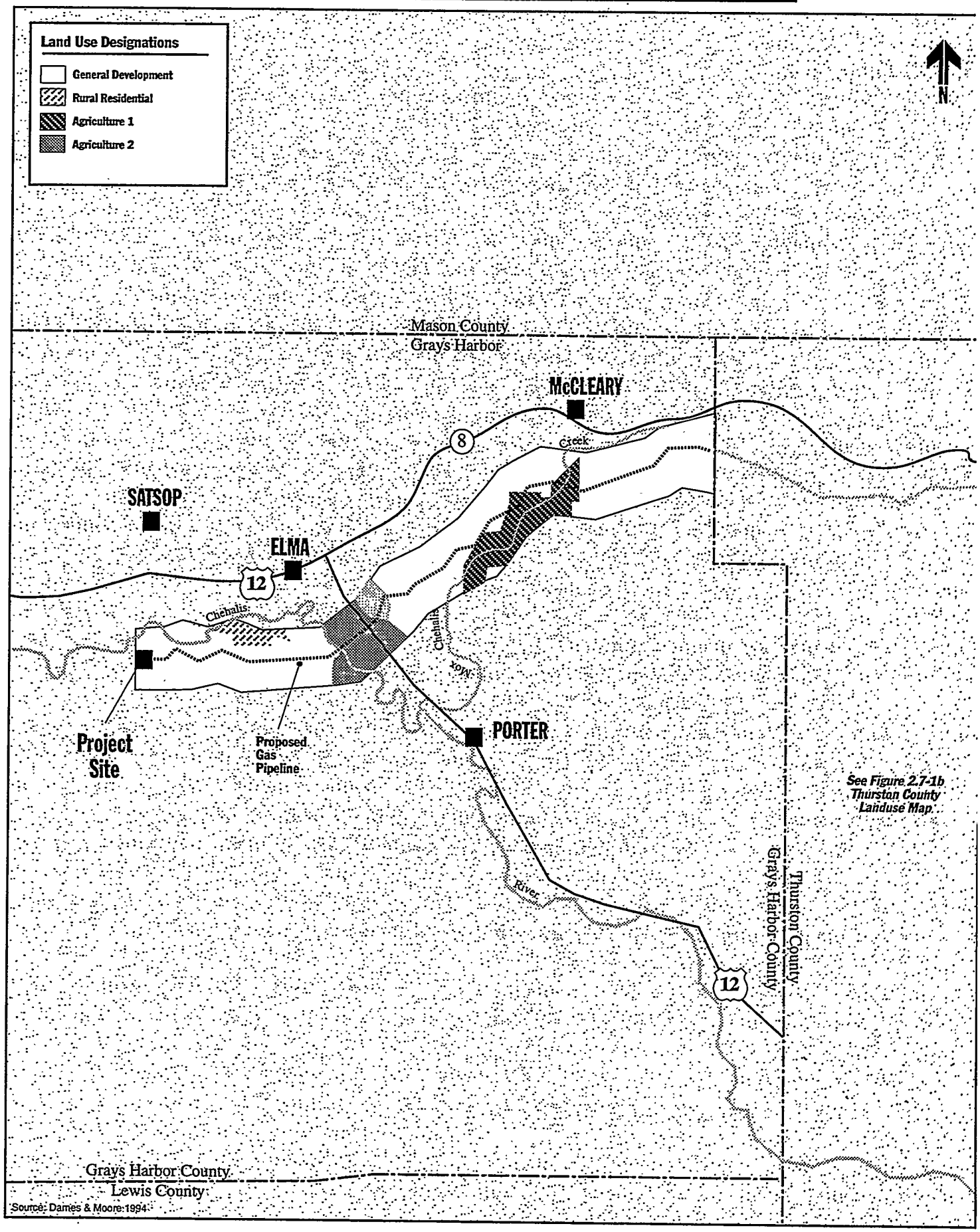


Figure 2.7-1a Grays Harbor County Land Use Map

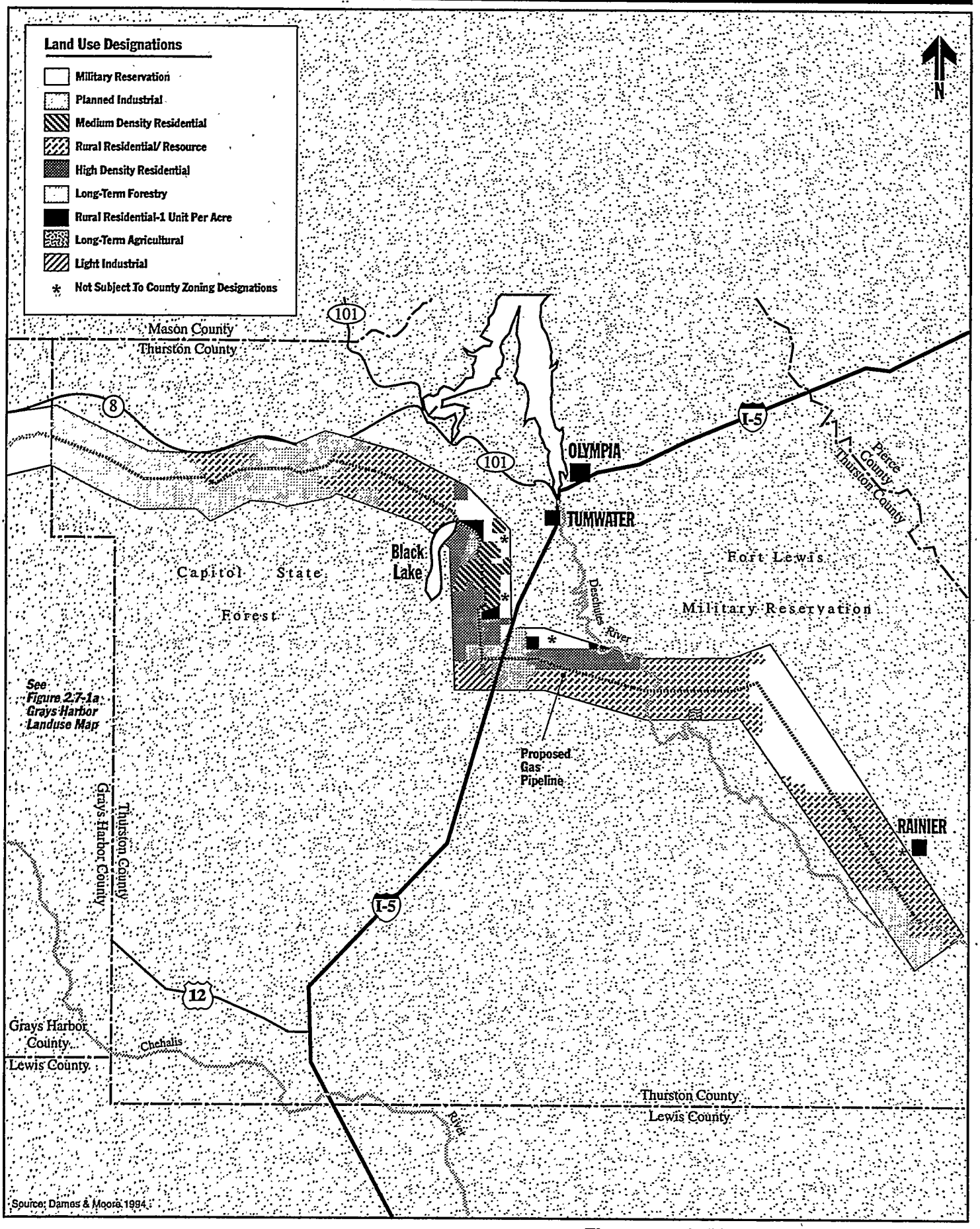


Figure 2.7-1b Thurston County Land Use Map

Reservation), State forest (Capitol State Forest), agricultural, and industrial areas, as well as near the small community of Lambert's Corner (in an existing ROW).

2.7.2 Comprehensive Plans and Policies

The main plans and policies that regulate land use activities in the two-county project area are listed in Table 2.7-1.

Table 2.7-1. Comprehensive Land Use Policies and Plans by Governmental Entity

Governmental Entity	*Plan or Policy*
Grays Harbor County	Grays Harbor County Comprehensive Plan Grays Harbor County Comprehensive Zoning Ordinance No. 38 Grays Harbor County Shorelines Management Master Program
Thurston County	Thurston County Comprehensive Plan Thurston County Zoning Ordinance No. 6708 Shoreline Master Program for the Thurston Region
Capitol State Forest (State of Washington)	Washington State Forest Resource Plan

Grays Harbor County

Grays Harbor County Comprehensive Plan. The CT facility and portions of the gas pipeline route, are located within the Rural Lands designation contained in the Rural Lands Element of the Comprehensive Plan. The Rural Lands Element provides the policy foundation to guide the county in allocating land for commercial and industrial uses, and also to protect the resources of the county's rural lands. Sections of the gas pipeline corridor in the vicinity of the Chehalis River are located within the Agricultural Lands designation contained in the Agricultural Element of the Comprehensive Plan. This element provides the policy basis to guide county decision-makers in allocating and protecting the county's agricultural lands.

Grays Harbor County Comprehensive Zoning Ordinance No. 38 (Title 13). Table 2.7-2 provides the zoning designations of the areas where the project elements are located. The CT facility and certain sections of the pipeline route are located within areas having Grays Harbor County's General Development District Five (GD-5) zoning designation (13.03.500). This designation permits "...a wide range of uses appropriate for rural areas at densities consistent with the level of available public facilities, public services and the physical characteristics of the areas included within the

District." Dams, electric power plants, flowage areas, transmission lines and stations, together with necessary accessory buildings, are permitted uses within the GD-5 zoning classification (13.03.510[3]). Other portions of the pipeline corridor cross areas having the zoning designation of Agricultural District One (A-1), and Agricultural District Two (A-2). The purpose of these districts is to "...conserve and protect agricultural land and to reserve areas for use by...", "...small to moderate scale farming activities" for the A-1 zone (13.03.200), and "...land extensive commercial farms" for the A-2 zoning designation (13.03.300). The remainder of the pipeline route within Grays Harbor County crosses areas having the zoning designation of General Development 1 District (GD-1). The purpose of this district is to "...encourage, strengthen and revitalize rural development centers as identified in the Comprehensive Plan." (13.03.400).

Table 2.7-2 Gray's Harbor and Thurston County Zoning Designation for Pipeline ROW and CT Facility

	CT Facility	*Gas Pipeline*
Grays Harbor County		
General Development 5 (GD-5)	P	P
General Development (GD)	P	P
Agricultural District One (Ag-1)	P	P
Agricultural District Two (Ag-2)	P	P
Thurston County		
Rural Residential/Resource (RRR 1/5)	NA	C
Rural Residential (RR 1/5)	NA	C
Rural Residential (RR 1/2)	NA	C
Rural Residential (RR 1/1)	NA	C
Medium Density Residential (MDR2-8/1)	NA	C
Light Industrial (LI)	NA	P
Planned Industrial District (PID)	NA	C
Long Term Forest (LTF)	NA	C
Military Reservation (MR)	NA	C
Agricultural District 2 (AG2)	NA	C
Natural Environment		N

P = Permitted Use
C = Conditional Use/Special Use
NA = Not Applicable
N = Not an Allowed Use

Section 13.08.230 Public Utility Facilities states that "Uses such as telephone relay stations, gas and water pumping and regulation stations, microwave and line of sight transmission stations, electrical substations, sewer pumping stations and other essential facilities of this nature, not including offices, may be allowed in any zone by conditional use..." subject to certain conditions.

The provisions of the section "shall not apply to overhead or underground distribution facilities contained within a public right-of-way or utility easement or to facilities which are on the property with and accessory to a permitted or authorized conditional use".

Grays Harbor County Shorelines Management Master Program. The gas pipeline corridor crosses several waterways in Grays Harbor County. Three of the waterways the pipeline would cross (the Chehalis River, Mox Chehalis Creek, and Workman Creek) are subject to the Washington State Shoreline Management Act of 1971 (SMA). Development along these shorelines of the state is guided by the policies of the Grays Harbor County Shorelines Management Master Program (SMMP).

The SMMP has designated the specific shoreline areas crossed by the gas pipeline corridor as being either Rural Environment or Conservancy Environment. The SMMP defines Rural Environment as "...intended for most forms of human use or activity which are appropriate shoreline uses or typically located along shorelines but at a lower density than the Urban Environment." Conservancy Environment is defined by the SMMP as "...intended to protect lands, wetlands, and water of economic, recreational, and natural value. Development for purposes which would be detrimental to resources capability and utilization is not permitted." In both of these SMMP shoreline designations, utility construction, such as a buried gas transmission line, is listed as a permitted use.

Thurston County

Thurston County Comprehensive Plan. In Thurston County, the intensity of land use varies along the gas pipeline corridor. The corridor crosses a total of six different Planned Land Use designations under the County Comprehensive Plan, including: Rural Areas, Long-Term Urban Growth Areas, Town Growth Areas, Industrial Areas, Environmentally Sensitive Areas, and Unmapped Open Space Areas. The Plan defines Rural Areas as regions where a rural lifestyle is to be maintained by directing urban levels of growth and associated public services into Growth Areas. Growth Areas are where most new growth is to be directed, and where higher density housing and commercial development may occur. These areas are also where expenditures will be focused for urban levels of utilities and other public services. Industrial Areas are defined as areas where several industrial land uses may be concentrated, usually where large amounts of land are available, near major transportation corridors, and where major utility services are available or the potential for utility extension exists. Industrial Areas are to receive primary attention for utility and road service, and promotional efforts. Open Space Areas and Environmentally Sensitive Areas are those regions having wetlands, steep slopes, floodplains, parks and recreation facilities, and public preserves.

Thurston County Zoning Ordinance No. 6708. The proposed gas pipeline corridor crosses lands having nine different zoning designations under the Thurston County Zoning Ordinance. Table 2.7-2 lists the zoning designations in Thurston County where the pipeline would be located. Construction and operation of a natural gas pipeline in the LI zone is permitted outright. Construction and operation of a natural gas pipeline in the RRR 1/5, RR 1/5, RR 1/2, RR 1/1, MDR2-8/1, LTF, and MR zones normally requires a Special Use Permit. The current Thurston County Zoning Ordinance does not specifically list natural gas pipelines among the permitted uses in the Planned Industrial Development zone. there is a provision in the ordinance, however, for

unclassified land uses. The ordinance states "In the event a use is proposed which is not listed in the Ordinance as permitted, the Planning Director shall determine whether the use should be treated as one of the listed uses. Such determination shall be based on: (a) Similarity to a listed use. (b) Consistency with the intent of the district."

Shoreline Master Program for the Thurston Region. The pipeline corridor crosses several waterways in Thurston County. Four of these waterways, the Deschutes River, McLane Creek, Kennedy Creek, and the Black Lake Drainage Ditch, are subject to the Washington SMA. Development along these shorelines of the state is guided by the Shoreline Master Program (SMP) for the Thurston Region policies, including: (1) routing proposed utilities along existing utility, natural drainage or transportation routes where feasible; (2) restoring the affected area to pre-development elevation and replanting with native or pre-existing species; (3) placing utilities underground where feasible; (4) designing utilities for minimal environmental and aesthetic impact; and (5) providing safeguards to ensure that no long-term damage will be caused to the adjacent or downstream environment should an accident occur involving the utility.

The SMP has designated the specific shoreline areas crossed by the pipeline corridor on the Black Lake Drainage Ditch as Natural Environment. The SMP defines Natural Environment as "...shoreline areas in which unique natural systems and resources are to be preserved or restored....are characterized by severely limited land and water use....and public access and recreation are limited to a degree compatible with the preservation or restoration of the unique character of this environment."

The areas crossed by the gas pipeline corridor on the Deschutes River, McLane Creek, and Kennedy Creek have been designated as Conservancy Environment. Conservancy Environment is defined by the SMP as "...shoreline areas for the protection, conservation and management of existing valuable natural resources and historic and cultural areas....are characterized by low-intensity land use and moderate-intensity water use....and public access may be limited by the capacity of the environment for sustained recreational use."

Capitol State Forest

Washington State Forest Resource Plan. The Capitol State Forest is part of the 850,000-ha (2.1-million-acre) Washington State Forest system managed by the Washington State Department of Natural Resources (WDNR). The Forest Resource Plan is the main planning document containing the plans and policies which regulate activities in these State Forests. The primary goal of the Forest Resource Plan is "to conserve and enhance the natural resources of state forest land while producing long-term, stable income from these lands." Forest Resource Plan, Policy No. 26: Granting Public Rights of Way, speaks to the location of the proposed pipeline in the State Forest. Policy 26 states, "The department will grant rights-of-way to private individuals or entities when there is an opportunity for enhancing trust assets and when any detriments are offset." This policy recognizes that others may need ROWs across state forest lands. Permanent and temporary ROWs include grants or easements for utility access, domestic use, timber hauling, and other uses. When reviewing requests for ROWs access on state lands, the WDNR considers both the short- and long-term effects of the proposed action on WDNR trust assets and the environment.

2.8 CULTURAL RESOURCES

Historic property inventories for previous projects have covered portions of the proposed Satsop CT Project. These surveys, listed in Table 2.8-1, have recorded 55 cultural resources within 1.6 km (1 mile) of the project components, though none that the project would directly or indirectly affect. The sites previously recorded include 23 archaeological sites, consisting of 11 prehistoric sites, 2 ethnohistoric sites, 7 historic archaeological sites, 1 site with both prehistoric and historic components, and 2 prehistoric burial sites. The 32 historic sites recorded include 13 homesteads, houses, farms, or barns; 7 sites associated with railroads (roadbeds and trestles), 3 schools, 2 industrial sites, and one each logging camp, road, cabin, mill, portage, cafe, and historical marker.

Table 2.8-1. Previous Cultural Resources Surveys Near the Project Area

Reference	*Date*	*Survey Area*
Ayers et al.	1979	WPPSS Nuclear Projects 3 and 5
Hollenbeck and Hollenbeck	1980	Satsop Integrating Transmission Project
Hollenbeck	1980	WPPSS Nuclear Projects 3 and 5
Hudson and Ayers	1980	WPPSS Nuclear Projects 3 and 5
Larson and Schalk	1984	Guerin County Park
Lindemann	1981	Satsop Integrating Transmission Project
McClure and Blukis Onat	1981	Keyes Road Bridge
Riordan and Hoff	1978	Fort Lewis Timber Sale
Tarver and Free	1963	Southern Puget Sound
Welch	1976	WPPSS Nuclear Projects 3 and 5
Welch	n.d.	Chehalis River Valley

Three inventories covered major portions of the project vicinity. The first of these was a 1980 survey of 11.1 km (6.9 miles) of the existing BPA electrical transmission corridor (Hollenbeck and Hollenbeck 1980). The second is a 1993 survey of 27.3 km (17 miles) of the gas pipeline route that Historical Research Associates (HRA) completed for NWP Expansion II Program. HRA did not prepare a report of this survey because NWP deleted the route from their expansion program (Dames & Moore 1994). HRA surveyed the remaining unsurveyed portions of the gas transmission line in June of 1994, except for 5.9 km (3.7 miles), which they did not survey because of hazardous conditions or because landowners denied access permission.

The HRA surveys recorded 2 archaeological sites, 11 roads, and 111 springboard-cut stumps at 9 separate locations. The springboard-cut stumps and most of the roads are associated with early 20th century truck logging. They are common features in western Washington and are not significant cultural resources. The two archaeological sites, HSN-1 and HSN-2, are historic-period building complexes.

HSN-1 consists of a house, barn, outhouse, two sheds, garage, and pumphouse. It is located approximately 9.1 m (30 feet) from the gas pipeline centerline. The barn and house date to 1934. The garage, one shed, and the pumphouse are recent additions. The house stands one and one-half stories tall, and is of wood-frame construction on a concrete block foundation. The barn is of wood frame construction on a post-and-pier foundation. These buildings are not good examples of western Washington's vernacular architecture from the Depression-era because recent modifications have damaged their integrity of feeling and association. This site is not eligible for National Register of Historic Places (NRHP) nomination as historic architecture.

HSN-2 is a deposit of historic-era refuse located in the southern half of the gas pipeline corridor near the Chehalis River. It contains square nails, flat glass, glass vessel fragments, and modern debris, including plastic and rubber. The deposit is about 20 cm (50 inches) deep, and extends beyond the southern boundary of the survey corridor.

2.9 Socioeconomics and Public Services

2.9.1 Population and Housing

Population characteristics in the project vicinity and the state are presented in Table 2.9-1. A breakdown of minority population from the 1990 Census of Population and Housing is presented in Table 2.9-2.

Table 2.9-1. Population Growth Trends and Projections for the Project Vicinity

			1980 - 1990			1990 - 2000	
Jurisdiction	*1980 Census*	*1990 Census*	*Number Change*	*Percent Change*	*2000 Forecast*	*Number Change*	*Percent Change*
Elma	2,720	3,011	291	10.7	N/A	N/A	N/A
Grays Harbor County	66,314	64,175	-2,139	-3.23	65,964	1,789	2.78
Thurston County	124,264	161,238	36,974	29.75	203,874	42,636	26.4
Washington State	4,132,353	4,866,663	734,310	17.77	5,611,216	744,553	15.3

Source: Washington State Office of Financial Management 1992a

Between 1980 and 1990, Grays Harbor County experienced a population decrease, which can be attributed to stagnant economic conditions. Over the same period, however, Thurston County's population grew significantly. Between 1980 and 1990, Thurston County posted the third largest population gain in percentage terms among all Washington State counties. Thurston County's population growth rate is projected to slightly decrease through 2010; however, it is expected to remain quite high. Over the same period, Grays Harbor County's population is expected to grow at a significantly lower rate than the state of Washington.

Table 2.9-2. Minority Group Breakdown

Race and Hispanic Origin	State of Washington	Thurston County	Grays Harbor County
White	4,308,937	148,221	60,230
Black	149,801	2,864	119
Percent of total population	3.1	1.8	0.2
American Indian, Eskimo, or Aluet	81,483	2,498	2,682
Percent of total population	1.7	1.5	4.2
Asian or Pacific Islander	210,958	6,101	712
Percent of total population	4.3	3.8	1.1
Other Race	115,513	1,554	432
Hispanic origin (of any race)	214,570	4,873	1,173
Percent of total population	4.4	3.0	1.8

Source: U.S. Bureau of Census 1990

Data from the 1990 Census on Housing Characteristics in Grays Harbor and Thurston counties, and in the state, are presented in Table 2.9-3. By the end of the first quarter of 1993, the total number of housing units in Grays Harbor County had risen to 30,832 (3 percent). In the same year, similar totals for Thurston County and Washington State had risen by 11.9 and 7.5 percent, respectively. These increases reflect the disparity in the pace of economic growth experienced by the two counties, as well as highlight the slow growth rate in Grays Harbor County during this 3-year period. The 1990 calculated vacancy rates are 14.8 percent for Grays Harbor County, 6.5 percent for Thurston County, and 7.9 percent for the state. Housing availability in the cities and towns along the proposed gas pipeline route, however, may be lower than these figures suggest since incorporated areas tend to experience higher housing demands than rural areas.

Table 2.9-3. Housing Characteristics in the Project Vicinity

Jurisdiction	Total Housing Units	Total Occupied Units	Owner Occupied	Renter Occupied
Grays Harbor County	29,932	25,514	17,088	8,426
Thurston County	66,464	62,150	40,226	21,924
Washington State	2,032,378	1,872,431	1,171,580	700,851

Source: Washington State Office of Financial Management 1992 for the 1990 Census.

2.9.2 Employment and Income

The Grays Harbor County economy has historically been dependent on manufacturing (including logging), services, and trade. In recent years, economic growth in Grays Harbor has been sluggish. Current environmental pressures to reduce logging operations in the Olympic National Forest are likely to further reduce the level of economic activity in the manufacturing sector. At present, the services and manufacturing sectors are the largest employers in Grays Harbor County.

Thurston County is home to Olympia, the state's capital, and its economy is dominated by employment in the government sector. In light of potential long-term reductions in the state government budget and workforce, the future economic stability of Thurston County may become increasingly dependent on growth in other economic sectors. Employment in the two counties covered by unemployment insurance from the 1990 Census is shown in Table 2.9-4.

2.9.3 Fiscal Budgets

The 1993 revenues collected by Grays Harbor county amounted to 36 million while the anticipated revenues for 1994 are 36.5 million.

The 1994 revenues collected by Thurston County, amounted to $52.8 million, while the anticipated revenues for 1994 are $58.9 million.

2.9.4 Law Enforcement

Eight separate law enforcement agencies provide police protection to communities in the project vicinity. Unincorporated regions in the area are served by the Grays Harbor County Sheriff's Department and the Thurston County Sheriff's Department. The nearby communities of Montesano, Elma, McCleary, Tumwater, and Rainier are each served by separate municipal police departments. Districts 1 and 8 of the Washington State Patrol provide police services along SR 8, Interstate 5 (I-5), and other highways in the vicinity of the project. Staffing levels for these police departments are shown in Table 2.9-5.

2.9.5 Fire Protection

The CT facility site lies within the boundaries of Grays Harbor County FPD No. 5 - Porter/ Elma/Satsop; the gas pipeline route either crosses or lies in the vicinity of several different fire protection districts and municipal fire departments. Many of these fire stations are relatively small and are staffed by volunteer firefighters. Table 2.9-6 presents data on the fire protection districts and departments that exist in the vicinity of the project.

2.9.6 Medical Services

Emergency medical services (EMS) are provided in the project vicinity by primary response ambulance units and area hospitals. In most cases, ambulance units are operated through local fire departments, although some private service providers exist along the two-county pipeline corridor.

Table 2.9-4. Grays Harbor and Thurston Counties Employment by Industry

Type of Work	Number of Jobs	
	Grays Harbor County	Thurston County
Industry[1]		
Agriculture, forestry, and fisheries	1,360	2,996
Mining	34	270
Construction	1,624	4,781
Manufacturing, nondurable goods	1,350	3,060
Manufacturing, durable goods	4,808	3,735
Transportation	1,051	2,525
Communications and other public utilities	342	1,486
Wholesale trade	617	2,372
Retail trade	4,415	12,073
Finance, insurance, and real estate	1,015	3,659
Business and repair services	800	2,818
Personal services	964	1,698
Entertainment, and recreation services	299	949
Health services	1,630	5,723
Educational services	1,857	6,934
Other professional and related services	1,059	4,929
Public administration	1,165	14,531
Class of Worker		
Employed person 16 years and over	24,390	74,539
Private wage and salary workers	17,712	42,683
Government workers	4,112	26,358
Self-employed workers	2,500	5,302
Unpaid family workers	66	285

[1] Includes both Government and Private Sectors
Source: U.S. Bureau of Census 1990

Table 2.9-5. Police Department Staffing Levels in the Project Vicinity

County/City	Number of Commissioned Officers
Grays Harbor	168[1]
Thurston	276[1]
Montesano	7
Elma	5
McCleary	5
Tumwater	20
Rainier	4

[1] These figures include state, county, and municipal police departments.
Source: Washington Association of Sheriffs and Police Chiefs 1993, Washington State Patrol 1994

Table 2.9-6. Fire Departments in the Project Vicinity

County	Fire Department	Paid Full-Time Personnel	Volunteer Personnel
Grays Harbor	Montesano Fire Department	6	31
	Elma Fire Department	1	25
	Grays Harbor County FPD #12 - McCleary/McCleary Fire Department	0	26
	Grays Harbor County FPD #2 - Montesano/Central Park/Brady	1	60
	Grays Harbor County FPD #5 - Porter/Elma/Satsop	0	70
Thurston	Tumwater Fire Department	21	20
	Thurston County FPD #5 - Black Lake	2	20
	Thurston County FPD #11 - Littlerock	2	35
	Thurston County FPD #4 - Rainier	0	29

Source: Washington Surveying and Rating Bureau 1992, pers. comm., from individual department fire chiefs and from the Washington State Fire Service Directory, 1993

In addition, the Supply System WNP-3/WNP-5 site also maintains its own Emergency Medical Response team, which is part of the Grays Harbor Emergency Medical System. Team members are classified as First Responders, and are equipped to give primary response to on-site medical

emergencies. Hospitals near the pipeline corridor are located in Aberdeen, McCleary, and Olympia. Hospitals in the vicinity of the project are listed in Table 2.9-7.

Table 2.9-7. Hospitals in the Project Vicinity

County	Name	Location	No. of Beds
Grays Harbor	Grays Harbor Community Hospital	915 Anderson Dr., Aberdeen	259
	Mark Reed Hospital	322 S. Birch St., McCleary	24
Thurston	Capital Medical Center	3900 Capital Mall Dr. SW, Olympia	110
	Saint Peter Hospital	413 N. Lilly Road, Olympia	340

2.9.7 Transportation and Traffic

SR 12 is the major highway serving the CT facility site (Figure 2.9-1). SR 12 is a four-lane divided highway providing east-west access that extends from Aberdeen on the west to its intersection with SR 8 near Elma, then southeasterly to connect with I-5 north of Centralia. SR 8 continues east from Elma until it becomes US Highway 101 and connects to I-5. South of SR 8, SR 12 continues as a two-lane highway with varying width shoulders. Keys Road is a two-lane county arterial providing direct connection to the proposed CT facility site. Keys Road is 7.3 m (24 feet) wide with varying shoulder width and stop signs at its intersection with SR 12. Traffic counts are presented in Figure 2.9-1 for the intersection of SR 12 and Keys Road.

The worst levels of congestion and delay to motorists generally occur during the afternoon peak period. Traffic operations at SR 12 and Keys Road were analyzed using the Federal Highway Administration 1985 capacity method with the NCAP software program. This program uses the techniques presented in the 1985 Highway Capacity Manual and produces a Level of Service (LOS) rating based upon a scale ranging from LOS A (free flow conditions) to LOS F (forced flow or jammed conditions), with LOS E indicating capacity conditions. LOS C generally is considered adequate for rural intersections. Table 2.9-8 presents the criteria used and definitions for levels of service at these types of intersections.

Using the criteria in Table 2.9-8, an LOS analysis for afternoon peak-hour traffic at the intersection of SR 12 and Keys Road was conducted. The eastbound left-turn lane at the intersection of SR 12 and Keys Road currently operates at LOS B, with a reserve capacity of 388 passenger cars per hour. The northbound and southbound left turn lanes operate at LOS E, with reserve capacities of 41 and 26 passenger cars per hour, respectively. All other movements operate at LOS A. Based on observations and a review of the total intersection analysis, the overall intersection is most likely operating at LOS B or better.

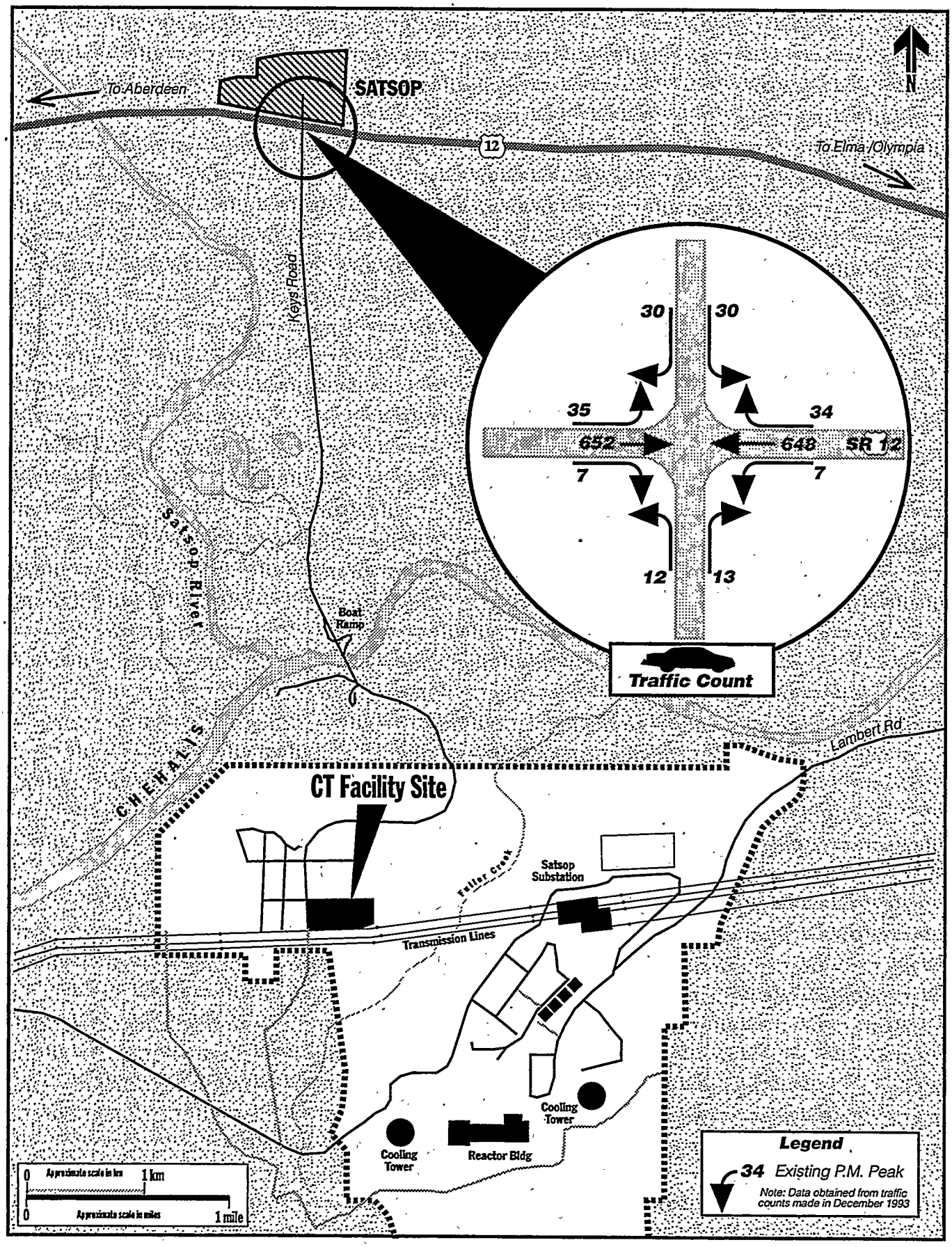


Figure 2.9-1 1993 Traffic Counts at Intersection of SR 12 and Key Road

Table 2.9-8. Level of Service Criteria for Unsignalized Intersections

Level of Service	*Reserve Capacity (Passenger Cars/Hour)*	*Expected Delay to Minor Street Traffic*
A	≥ 400	Little or no delay
B	300 - 399	Short traffic delay
C	200 - 299	Average traffic delay
D	100 - 199	Long traffic delay
E	0 - 99	Very long traffic delay
F	0	Demand exceeds capacity[1]

[1] When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queues that may cause severe congestion and may affect other traffic movements in the intersection.
Source: National Research Council 1985

The streets and highways serving the CT facility site have neither pedestrian nor bicycle facilities. Intercity transit currently operates along SR 12, providing service between Olympia and Aberdeen. Parking is not provided on the streets and roads serving the CT facility site. There are currently no planning studies or projects for the streets and highways that serve the CT facility site.

2.10 Recreation Resources

A variety of parks and recreation facilities are found in the project vicinity. Over 30 recreation sites have been identified in the general vicinity, but only 3 are within 1.6 km (1 mile) of the proposed CT facility site or the gas pipeline route. The pipeline route is located in a section of Capitol State Forest where off-road vehicles are ridden; Satsop River access and Black Lake access are the remaining two recreation areas within 1.6 km (1 mile) of project components.

Public parks and recreation facilities in the project vicinity are listed in Table 2.10-1, with locations illustrated in Figure 2.10-1. The majority of these facilities are located in incorporated cities and towns, or are associated with small unincorporated communities. All are accessible by public roads. Millersylvania State Park and the facilities at Capitol State Forest are the most intensively used public recreation facilities in the project vicinity due to size, range of facilities provided, and ease of access.

In addition to these public facilities, there are also several semi-public and privately owned recreational facilities in the vicinity of the project. These facilities include school playgrounds, ballfields, recreational vehicle parks, campgrounds, golf courses, museums, movie theaters, and restaurants.

Table 2.10-1. Public Parks and Recreation Facilities in the Project Vicinity

Figure 2.10-1 Reference Number	*Name*	*Amenities*	*Ownership*
1	Vessey Park	Baseball, soccer, concession stand, restrooms.	City of Montesano
2	Nelson Field	Baseball, play area, concession stand, restrooms.	City of Montesano
3	Crait Field	Softball, playfield, concession stand, restrooms.	City of Montesano
4	Fleet Park	Benches, landscaped areas, open space.	City of Montesano
5	Lake Sylvia State Park	Standard and primitive campsites, group overnight facilities, hiking trails, picnic tables, shoreline access, restricted boat launch, swimming, play area, trailer dump facility.	State of Washington
6	Lloyd Murray Field	Baseball, soccer, basketball court, horseshoe pits, swings small child play area, picnic tables, restrooms.	City of Elma
7	Triangle Park	Open space, passive area.	City of Elma
8	Stanley Park	Open space, trails, picnic tables, benches	City of Elma
9	Oakridge Public Golf Course	Public golf course, restrooms.	City of Elma
10	Vance Creek Park	Shoreline access, swimming, fishing, restricted boat launch, trails, play equipment, picnic tables, restrooms	Grays Harbor County
11	Satsop River Access	Shoreline access, fishing, restricted boat launch.	State of Washington
12	Schafer State Park	Standard and primitive campsites, utility campsites, shoreline access, fishing, picnic tables, restricted boat launch.	State of Washington
13	Chehalis River Access	Shoreline access, fishing, restricted boat launch.	State of Washington
14	Beerbower Park	Soccer, softball, little league, basketball, tennis, small child play area, picnic tables, benches, restrooms.	City of McCleary
15	Capital State Forest	Camping, group overnight facilities, hiking trails, equestrian trails, motorcycle trails, shoreline access, fishing, canoe	State of Washington

Table 2.10-1. Public Parks and Recreation Facilities in the Project Vicinity

Figure 2.10-1 Reference Number	*Name*	*Amenities*	*Ownership*
16	Summit Lake Access	Shoreline access, non-restricted boat launch, fishing.	Thurston County
17	Black Lake Access	Shoreline access, non-restricted boat launch, fishing.	Thurston County
18	Tumwater Historical Park	shoreline access, trails, picnic tables, scenic viewpoint, restrooms	City of Tumwater
19	Pioneer Park	Soccer, softball, restrooms (under development)	City of Tumwater
20	Tumwater Hill Park	Softball, trails, picnic tables, restrooms (under development)	City of Tumwater
21	Carlyon Park	Passive open space.	City of Tumwater
22	5th & Grant Park	Play equipment, scenic viewpoint, passive open space.	City of Tumwater
23	Overlook Point Park	Paved walkway, scenic viewpoint.	City of Tumwater
24	Palermo Park	Play equipment, basketball.	City of Tumwater
25	"V" Street Park	Play equipment, basketball, picnic tables.	City of Tumwater
26	Deep Lake Access	Shoreline access, restricted boat launch, fishing, swimming.	Thurston County
27	Millersylvania State Park	Standard and primitive campsites, utility campsites, group overnight facilities, shoreline access, swimming, fishing, picnic tables, restricted boat launch, trailer dump facility.	State of Washington
28	Munn Lake Access	Shoreline access, restricted boat launch.	Thurston County
29	Offutt Lake Access	Shoreline access, restricted boat launch, fishing.	Thurston County
30	Patterson Lake Access	Shoreline access, non-restricted boat launch, fishing.	Thurston County
31	Deschutes River Access	Shoreline access, restricted boat launch, fishing.	State of Washington
32	McIntosh Lake Access	Shoreline access, restricted boat launch, fishing.	Thurston County

Table 2.10-1. Public Parks and Recreation Facilities in the Project Vicinity

Figure 2.10-1 Reference Number	*Name*	*Amenities*	*Ownership*
33	Raintree Park	Basketball court, play equipment, picnic tables.	City of Rainier
34	Gehrke Park	Play equipment, picnic tables, open space.	City of Rainier
35	Wilkowski Park	Picnic tables, open space.	City of Rainier
36	Lake Lawrence Access	Shoreline access, non-restricted boat launch, fishing.	Thurston County

Sources: WDNR 1993, WDW 1993; Washington State Parks and Recreation Commission 1993; Grays Harbor County, Planning and Building Department 1993; Thurston County, Parks and Recreation Department 1993; City of Elma 1993; City of McCleary 1993; City of Montesano 1993; City of Rainier 1993; City of Tumwater 1994.

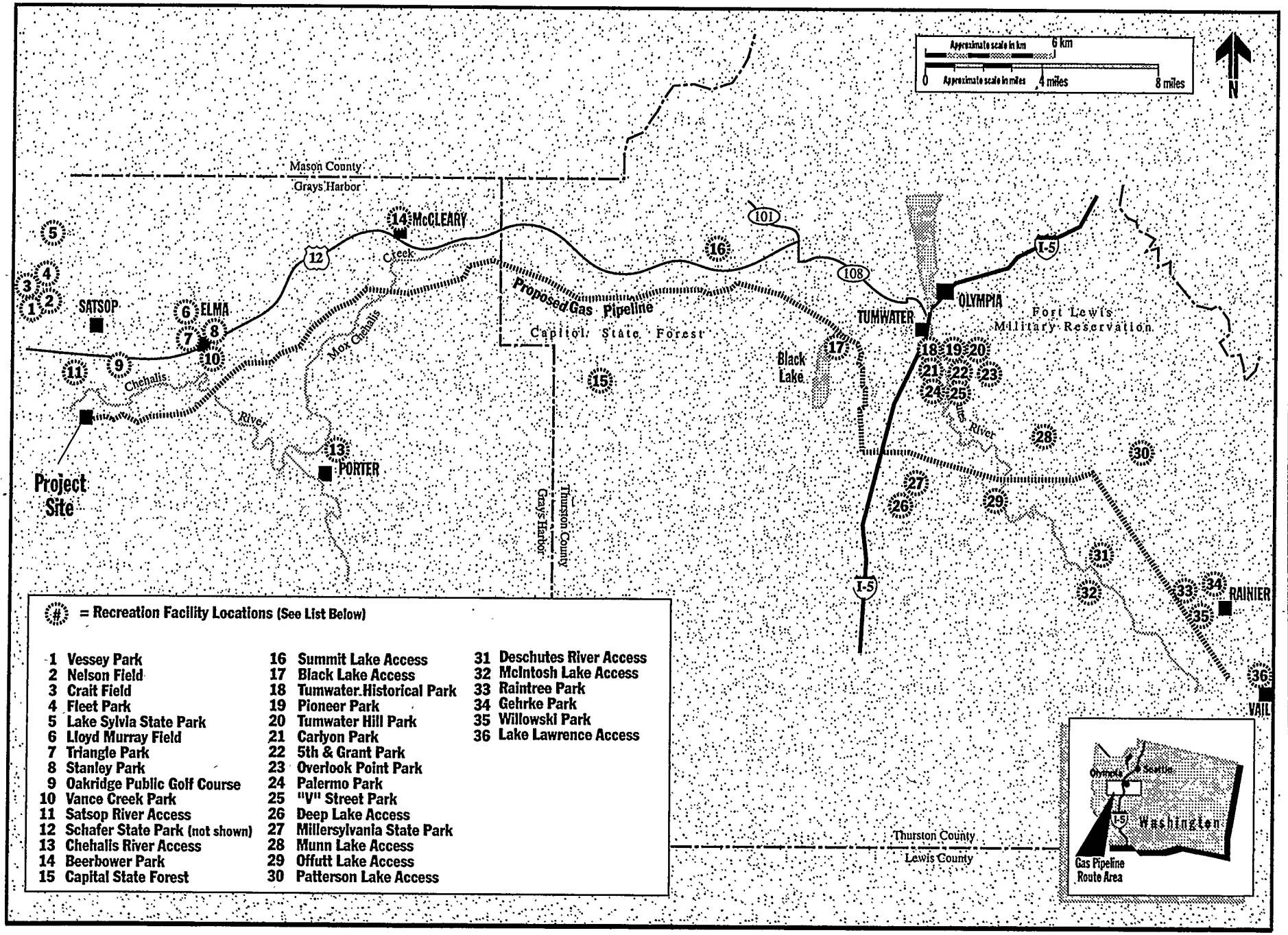


Figure 2.10-1 Recreation Sites in the Project Vicinity

2.11 PUBLIC HEALTH AND SAFETY

2.11.1 Project Materials

The proposed project would involve the use of some products and processes during construction and operations that could affect public health and safety. For example, natural gas and fuel oil would be used or stored on site, both of which are flammable and can be explosive under certain circumstances. They can also have adverse effects on the environment if released in an uncontrolled manner. Lubricating oils, hydraulic fluids, cleaning solvents, paint, paint thinners, wastewater from cooling tower collection sumps, and other materials and process wastes would be found on site, and could pose a risk to public health and safety if not used and disposed of properly. Some materials are classified as hazardous and would need careful handling and disposal to protect human health. Specific materials expected to be used at the facility are discussed in Section 3.11.

The CT facility would be constructed within the boundary of the Supply System WNP-3/WNP-5 site. The proposed location is a 5.3-ha (13-acre) site within an existing construction laydown area used for storage of construction materials, the contractor's field offices, and equipment storage. A Phase I Site Assessment (Dames & Moore 1994) was completed in April 1994. The study found no evidence of contamination at the site and concluded that the potential for environmental impairment was very low and that further investigations were not warranted at this time.

2.11.2 Electric and Magnetic Fields

Power lines, like all electrical devices and equipment, produce electric and magnetic fields (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.

EMFs 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 EMF strengths for some common electrical appliances are presented in Table 2.11-1.

The average background magnetic field level measured in the center of rooms in 992 homes throughout the United States was 0.9 milligauss (mG) (Zafanella 1994). In 15 percent of the homes, the magnetic field level was greater than 2.1 mG. Fields very close to electrical appliances are much stronger than these levels, but appliance fields decrease in strength with distance very rapidly. 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 EMF strengths for some BPA transmission lines are given in Table 2.11-2.

Table 2.11-1. Typical Electric and Magnetic Field Strengths 0.3 cm (1 foot) from Common Appliances

Appliance	*Electric Field (kV/m)*	*Magnetic Field[1] (mG)*
Coffee Maker	0.030	1 - 1.5
Electric Range	0.004	4 - 40
Hair Dryer	0.040	0.1 - 70
Television	0.030	0.4 - 20
Vacuum cleaner	0.016	20 - 200
Electric Blanket[2]	0.01 - 1.0	15 - 100

1 By 1 to 1.5 m (3 to 5 feet), the magnetic field from appliances is usually decreased to less than 1 mG.
2 Values are for distances from a blanket in normal use, not 0.3 m (1 foot) away.
Source: Miller 1974, Gauger 1985

There are no national standards for electric or magnetic fields. Some states have established electric or magnetic field standards. The state of Washington has not set a standard for either.

2.12 Visual Quality

The Chehalis River Valley, an important regional visual resource, is 1.6 km (1 mile) north of the CT facility site. The valley is bounded by hills rising approximately 165 m (540 feet) in elevation from the valley floor and is dissected by secondary water courses, including the Satsop River, Fuller Creek, Newman Creek, and Vance Creek. Much of the valley is used for agriculture and contains fields, crops, pasture, farm buildings, and groupings of trees.

SR 12 is the primary east-west travel route through the valley and connects valley communities. Views to the south of the valley from SR 12 and other locations in the valley are dominated by the two 151-m (496-foot) high cooling towers of the Supply System WNP-3 and WNP-5 facilities. The hills south of the valley and vegetation block views of most of the other WNP-3 and WNP-5 facilities. Views of the Supply System facility transmission lines that connect to the BPA transmission line, which parallels sections of the Chehalis River are also blocked from most locations in the valley.

The proposed CT facility water/wastewater (existing, buried pipelines) and electrical transmission lines are located within the Supply System WNP-3/WNP-5 site in a clearing that was formerly used as a construction equipment laydown area. The proposed CT facility site is removed from other existing WNP-3/WNP-5 facilities. The site is essentially a gravel-covered industrial storage yard enclosed by a 2-m (6-foot) high chain link fence topped by multi-strand barbed wire. Other site elements include light-colored storage buildings, circular tanks, and electrical distribution

Table 2.11-2. 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 ROW	1.0	63	30
Edge of ROW	0.5	14	7
60 m (200 feet) from Center	0.01	1	0.4
230-kV			
Maximum on ROW	2.0	118	58
Edge of ROW	1.5	40	20
60 m (200 feet) from Center	0.05	4	2
500-kV			
Maximum on ROW	7.0	183	87
Edge of ROW	3.0	62	30
60 m (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.
Note: Above information obtained from BPA study to characterize nearly 400 transmission lines located in the Pacific Northwest.

equipment. Keys Road provides vehicular and visual access to the site along its western perimeter. Residents on West Keys Road also have views of the site. No screening currently exists to block views from Keys Road and West Keys Road. The BPA transmission line passes adjacent to the southern boundary of the site and passes through a linear swath of cleared vegetation.

As described in Section 2.7 (Land Use), the 77-km (48-mile) proposed gas pipeline route extends from near Vail to the CT facility site, passing through a variety of land use and landscape types. Land uses along the route include agriculture, forestry, military reservation, residential, and industrial. The route crosses roads and railroads. Topography and vegetation along the route are also varied and include valleys characterized by agricultural fields, open spaces and rural residential development, and tree-covered and clearcut hills.

3.0 ENVIRONMENTAL EFFECTS, SATSOP

3.1 GEOLOGY, SOILS, AND FLOODPLAINS

3.1.1 Geologic Impacts

Landslides

Landslides have the potential to damage the facility site and gas transmission lines. The proposed facility site and its components are relatively isolated from landslides, thus the likelihood of any environmental effect resulting from damage to the facility is low. The gas transmission route crosses areas considered susceptible to landslide. Areas of steep slopes (19 percent of the route) represent a moderate potential for environmental effects should a landslide disrupt the pipeline. However, proper engineering during final project design will reduce the potential for environmental effect to low.

Earthquakes

The project area is subject to periodic ground movement from earthquakes. As noted above, earthquakes have the potential to damage the facility site and gas transmission lines. The potential environmental effects would result from rupture or leakage of gas from the facility or pipeline.

Liquefaction associated with earthquakes has the potential to affect the project, thus affecting the environment. The well drained and fine grained nature of the facility site soils makes liquefaction unlikely. The portions of the pipeline route that are susceptible to liquefaction damage from moderate to large earthquakes present a moderate hazard to the environment.

Volcanic Activity

Impact from renewed Cascade volcanic activity would be limited to ashfall at the CT facility site because of the distance from volcanic sources. Temporary facility shutdown may be needed and no environmental impacts are anticipated. Other project components are not expected to be affected.

3.1.2 Soils Impacts

Soil impacts associated with the proposed project include compaction and erosion during construction activities for all components, and loss of prime farmland along the 77-km (48-mile) gas pipeline route (Table 3.1-1). Operational impacts would be minimal for both the CT facility site and gas pipeline route.

Soil erosion by flowing water would be the principal impact of the project's construction-related activity. CT facility site soils (Centralia series) have been previously disturbed (covered by 1.2 to 2.4 m [4 to 8 feet] of gravel) but have the potential for accelerated erosion during and after construction. Soils along the gas pipeline route vary in erodability and the potential for erosion is naturally high in the steep sections along the route.

Table 3.1-1. Soils Impacts by Project Component

Project Component	Affected Soil Area (ha [acres])		Water Erosion Potential (ha [acres])[1]	Prime Farmland (ha [acres])	
	Temporary Disturbance	Permanent Disturbance		Temporary Disturbance	Permanent Disturbance
CT facility site including water and electrical hookups	5.3 (13.0)	5.3 (13.0)	5.3 (13.0)	0.0	0.0
Gas pipeline route	177.4 (438.13)	0.0	172.4 (425.91)	80.9 (200.0)	0.0

[1] Includes soils with moderate and high erosion potential.

Compaction reduces soil fertility due to decreased aeration, infiltration, and water holding capacity, which adversely affects the ability of vegetation to reestablish. This impact will generally occur along the gas pipeline route.

Soil fertility also may be reduced by mixing fertile topsoil with undeveloped subsoil during gas pipeline construction. Prime farmland soil is of special concern because of its high productivity. The pipeline route crosses several soils considered prime farmland.

3.1.3 Floodplain Impacts

Effects to floodplains include temporary disturbance of stream channels and banks at gas pipeline crossing sites (Table 3.1-2). No floodplains near the CT facility site and connecting water and electrical transmission lines would be impacted. The gas pipeline route crosses 22 streams and 2 rivers, and is located for much of its route in valleys of the Chehalis River, Chehalis Creek, and other low-lying areas subject to flooding. The natural gas pipeline will cross approximately 6.68 ha (16.5 acres) of floodplains. No practical alternative exists to crossing floodplains to interconnect with the existing NWP main supply line.

A certain amount of disturbance would occur during pipeline construction activities; however, impacts during construction are expected to be minimal. There would be no operational impact to floodplains as the pipeline would be buried and would not alter floodplain functions. Construction of the pipeline would occur during the dry season when it is unlikely that rivers and creeks would flood.

Table 3.1-2. Floodplains Crossed by Project Components

Project Component	*Floodplain Area (ha [acres])*
CT Facility Site[1]	0
Gas Pipeline	6.68 (16.5)

[1] Includes CT facility site, electrical transmission line, and water lines.

3.1.4 Mitigation

The following mitigation measures would be implemented to protect geologic, soils, and floodplain resources in this project vicinity:

Geologic Impacts

- Pipeline alignment will avoid steep slopes to the extent feasible, including avoidance of pipeline installation downhill from steep or potentially unstable slopes.
- Placement of electrical transmission towers will avoid unstable areas along the Fuller Creek gorge.
- Final design for all components will include conservative seismic design and performance criteria to minimize the potential for earthquake impact.
- Where the potential for liquefaction is encountered during engineering design studies for the pipeline, design methods will be included to minimize the risk of impacts due to liquefaction. These methods include the use of concrete collar weights or increased pipe wall thickness to maintain pipeline stability.
- Plant shutdown during significant ashfall from volcanic activity will provide adequate mitigation.

Soil Impacts

- A detailed Erosion and Sediment Control Plan (ESCP) for the project will be developed and incorporated as part of the existing ESCP for the Supply System WNP-3/WNP-5 Site. Erosion control measures include limiting construction activities; installing temporary sediment traps, silt fences, and diversion structures; and revegetation. Clearing, excavation, and grading will be limited to areas absolutely necessary for the project. Construction areas will be marked in the field and equipment restricted to these areas. Existing vegetation will remain undisturbed to the extent possible. Initiating ground disturbing activities during the dry season will reduce initial erosion and allow time to install erosion control measures before the rains begin.

- A detailed ESCP for the pipeline will be prepared during final route selection and design. This plan will conform to EFSEC guidelines. The plan will include many of the same features of the ESCP to be developed for the CT facility site, with the addition of temporary and permanent slope breakers, trench breakers, and revegetation along the entire route. Surface runoff will be diverted around and away from cut and fill slopes and conveyed in pipes or protected channels, and sediment traps will be used for runoff from disturbed areas. Vegetation will be re-established on all disturbed areas, and surfaces will be roughened prior to seeding to reduce compaction. Hydroseeding will occur during the growing season, with mulching to control erosion. Seed mixtures recommended by the SCS and the WDFW will be used. Slope and trench breaks will be used along the pipeline route at an interval determined by slope gradient and length, according to the erosion and sediment control plan.

- Topsoil will be segregated during pipeline construction on areas to be graded and along the ditchline, including areas of prime farmland and where landowners have requested topsoil segregation. Segregated topsoil will be replaced in its proper sequence during trench refilling, reducing the potential for loss of agricultural production.

- Development and adherence to site-specific waterbody crossing plans will mitigate impacts associated with pipeline crossings of rivers, streams, and wetlands. A Spill Prevention Control and Containment Plan (SPPC) will be developed and in place during construction to minimize the risk of oil or other hazardous materials spills.

Floodplain Impacts

- Site-specific waterbody crossing plans will be prepared to mitigate impacts associated with pipeline crossings of rivers, streams, and wetlands.

3.1.5 Unavoidable Adverse Impacts

Unavoidable adverse impacts to geology, soils, and floodplains are low. Temporary and minor soil erosion at the proposed CT facility site and along the gas pipeline route is expected during construction. Temporary and minor disturbance of lands used for agricultural production would also occur along the gas pipeline route. There would be a minor and temporary increase in sedimentation at waterbody crossings along the pipeline route.

3.1.6 Cumulative Impacts

Cumulative impacts in the region from the project are limited to possible accelerated erosion due to increased soil disturbance and the potential for the loss of agricultural lands, primarily along the gas pipeline route. However, Supply System and the contractors will follow the ESCP to minimize potential impacts. Supply System plans to add a second CT facility adjacent to the existing site. This would temporarily increase soil erosion during construction of the second facility. The ESCP would be modified accordingly to mitigate this activity. The gas and water pipelines have sufficient capacity for the second CT facility. Minor land disturbance would also be necessary to connect the second facility to water, gas, and electrical transmission lines. Cumulative impacts are considered low.

3.2 WATER RESOURCES

3.2.1 Water Quantity Impacts

CT Facility

Make-up water is required to replace water evaporated in the steam power cycle and in the condenser's cooling water cycle. The proposed CT facility would most likely require an average of 5,079 lpm (1,342 gpm).

The make-up water would be pre-treated before use by the proposed project, consisting of neutralization and demineralization. Pre-treatment chemicals comprised of caustic and sulfuric acid, chlorination chemicals, corrosion inhibitors, and dispersants would be stored long term at the site. Impervious containment dikes and pads will surround the chemical storage areas where needed to prevent ground and surface water contamination.

Water required for the project would be purchased from a company established by the Supply System for WNP-3/5 which has an existing water right. The water right for the Ranney Wells is fully permitted by the SCA issued to the Supply System by EFSEC. The Supply System has submitted a request to EFSEC to amend the SCA to allow the CT to be a user of Ranney Wells water. The maximum permitted discharge specified by the WNP-3 SCA for Supply System is 2.268 cms (80 cfs) (135,919 lpm [35,906 gpm]). The original SCA states that water withdrawals from the Ranney Wells would be discontinued when base river flow drops below 15.57 cms (550 cfs) (934,452 lpm [246,857 gpm]). EFSEC passed a resolution to allow for a withdrawal of 0.056 cms (2 cfs) (3,399 lpm [898 gpm]) for nuclear plant operations and maintenance when river flow is below 15.57 cms (550 cfs) (934,452 lpm [246,857 gpm]). This withdrawal rate was chosen because 0.056 cms (2 cfs) (3,399 lpm [898 gpm]) was needed for a "hot standby" condition for the nuclear plant.

The Supply System intends to propose to EFSEC that the Satsop CT Project be allowed to operate during periods when Chehalis River flow is less than 15.57 cms (550 cfs) (934,452 lpm [246,857 gpm]). During these periods, the Ranney Wells would be pumping at their minimum rate of 0.566 cms (20 cfs) (33,982 lpm [8,977 gpm]), but not continuously. The average daily pumping rate would be the 0.056 cms (2 cfs) (3,399 lpm [898 gpm]) permitted by EFSEC for the nuclear plants. Pumping at 0.566 cms (20 cfs) (33,982 lpm [8,977 gpm]) would be a measurable and significant withdrawal when the Chehalis River is below the required minimum.

The Ranney Wells would pump water from the alluvial aquifer underlying the Chehalis River to the CT facility. Figure 1-7 shows a schematic diagram of the existing and proposed water supply and discharge lines. Because of the strong river-aquifer hydraulic connection, 88 percent of the Ranney Well discharge is withdrawn from the river.

Existing and future surface water rights in the vicinity of the site are not expected to be affected. In addition to WNP 3/5's water right, two existing water rights specify Chehalis River surface water withdrawals of 0.028 cms (1 cfs) (1,699 lpm [449 gpm]) each in the vicinity of the Ranney Wells. Also, one surface water claim intended for stockwater and domestic and irrigation use is listed by

Ecology in the area. Ecology has not closed the Chehalis River from future water appropriations, and the 0.111 cms (3.9 cfs) (9.5 million lpd [2.52 million gpd]) (6,624 lpm [1,750 gpm]) proposed withdrawal of Chehalis River water via the Ranney Wells for process water supply is only 0.7 percent of the minimum Chehalis River base flow required by Ecology.

The estimated radius of groundwater influence for the Ranney Wells is 609.6 m (2,000 feet) after 30 days of pumping. Ecology's well records do not show groundwater wells within 609.6 m (2,000 feet) of either Ranney Well. Several domestic wells are located near the CT facility site, but they are not within the alluvial aquifer underlying the Chehalis River. These nearby wells have periodically gone dry, and the frequency of these wells going dry would not be altered due to Ranney Well pumping because they are not within the same aquifer.

If WNP-3 becomes operational, which is unlikely, the CT project would re-use the WNP-3 effluent as its own process water. The existing WNP-3 NPDES permit, which is also part of the SCA, requires WNP-3 effluents to be of the highest quality. The volume of WNP-3 effluent would be more than adequate to meet all the process needs of the CT project. Also, the SCA will be amended to ensure that water needed by the CT project would be provided in the event of a sale of WNP-3 to new owners.

The Supply System operates a raw water well at the confluence of the Satsop and Chehalis rivers that would supply potable water to the proposed CT facility. The raw water will be treated as necessary. The CT facility expects to use only 26.3 lpm (6.94 gpm) of this water. This withdrawal would produce no measurable effect on surface water or groundwater availability in the vicinity of the raw water well.

Gas Pipeline

Construction of the proposed gas pipeline would require temporary use of water for hydrostatic testing of pipe for river and stream crossings and acquisition of a temporary permit. Testing water would be withdrawn from the stream or river near the crossing site. After use, test water would be analyzed and treated if necessary, then discharged back into the water courses. A temporary water use and discharge permit will be obtained from EFSEC to conduct hydrostatic testing.

3.2.2 Water Quality Impacts

The CT facility would likely discharge 678 lpm (179 gpm), to the Chehalis River through the existing discharge pipeline and outfall that were constructed and permitted for the WNP-3 and WNP-5 plants. The wastewater discharge would be mostly composed of cooling tower water blowdown with periodic water pre-treatment wastes (filter backwash and demineralizer regeneration). The discharge would enter the river through the diffuser installed for WNP-3.

The water quality impacts of the anticipated cooling water quality and low volume waste discharges from WNP-3 and WNP-5 were thoroughly evaluated by Federal and state agencies in the licensing proceedings for those units. The proposed CT project effluent quality would be of the same nature as the nuclear plants and the flow would be a fraction of the approximate 10,608 lpm (2,803 gpm) that would have been discharged from the canceled WNP-5. Table 3.2-1 shows the

water quality constituent, NPDES limits and estimated CT project effluent concentrations. These estimated CT project effluent concentrations do not exceed the NPDES limits.

Table 3.2-1. NPDES and Effluent Concentrations

Parameters	CT Project Effluent (mg/L)	NPDES Limit (mg/L)
Chromium $^{+6}$	0.0037	0.1
Copper	0.0037	0.03
Iron	0.0592	1
Nickel	0.0037	0.065
Temperature	20°C (68°F)	20°C (68°F)
Zinc	0.0185	0.075

The NPDES permit does not cover all water quality constituents for which standards, monitoring data, and effluent concentration estimates exist. Lead and mercury are two heavy metal contaminants that may exceed Washington chronic water quality criteria in the Chehalis River downstream of the proposed CT facility because of current background exceedances of the metals in the river. Table 3.2-2 shows the standards and estimated Chehalis River concentrations.

Table 3.2-2. Lead and Mercury in Chehalis River

Parameters	CT Project[1] (mg/l)	Chronic Criteria (mg/l)	Chehalis River at Intake[3] (mg/l)
Lead	0.0005	0.00045	0.0005[2]
Mercury	0.0004	0.000012	0.0004

1 Concentration estimated for minimum baseflow.
2 Based on estimated values. Values calculated to equal 1/2 non-detectable analytical limit.
3 Envirosphere 1982

The maximum effluent discharge to the Chehalis River is about 0.1 percent of the minimum river baseflow required during the summer low flow months. The CT effluent quality will be within the existing NPDES waste discharge allowances for the WNP-3 facilities. The CT project will not alter total loading of regulated constituents to the river. However, due to the evaporative cooling process, compounds will be concentrated in the discharge. All NPDES criteria will be met at the point of CT discharge into the WNP-3 outfall line, with the exception of temperature. Temperature criteria will be met in the discharge by use of quench water, when necessary. The relatively cool

quench water (consisting of water pumped directly into the discharge line) will bring the temperature of the effluent to within standards.

The toxicity of metals and the water quality standards for metals are greatly influenced by hardness and pH levels in the receiving water (Chehalis River). When the receiving water has a low hardness (soft water), more metals can exist in a dissolved state, are more available for consumption by organisms, and therefore have greater toxicity potential. The Chehalis River is soft water, and is susceptible to potential metal water quality standard exceedances associated with wastewater discharges containing trace metals.

Concentrations of metals and other constituents not specified in the NPDES permit but regulated under WAC 173-201A are expected to be met within the allowed mixing zone in the river. Some ambiguity exists, however, because concentrations of some metals (such as lead and mercury) are listed as undetected and/or occur in the river at concentrations at or above chronic toxicity levels. WAC 173-201A indicates that under these conditions, the background river concentration should be the concentration criteria.

Increases in trace metals such as lead and mercury from the concentrating effect of the CT operation with subsequent dilution in the mixing zone will result in the metals concentrations at slightly higher than background levels, but below ability to detect the increase with standard analytical techniques. Because of these issues, it is unclear whether the metals constitute an exceedance. However, the CT project recognizes that selective metals treatment may be necessary, and that the need for treatment may be determined as a result of project monitoring.

Stormwater discharges from the proposed CT facility site are currently regulated under an existing NPDES permit issued for the Supply System WNP-3/WNP-5 complex SCA. The existing NPDES permit establishes water quality limits and monitoring schedules for suspended solids, settleable solids, and pH in collected stormwater runoff. Additionally, the SCA specifies that the Supply System site must abide by turbidity criteria for construction-related runoff as established in the state of Washington Water Quality Standards.

3.2.3 Mitigation

The following measures will be implemented or are recommended to mitigate potential impacts to water quantity and quality:

- The existing SCA requires mitigation that adjusts for potential loss to other existing water right holders if Supply System water withdrawals impair their water rights. Because the CT project would withdraw considerably less water than specified in the existing SCA, the requirement for this mitigation measure is unlikely.

- Ranney Well water will be added to the WNP-3 effluent discharge system prior to discharge to reduce the temperature of the cooling tower effluent. This quench water would be added in approximately equal proportions to the higher temperature wastewater effluent.

- Because the development of the CT facility may be several years away, and the water quality standards for dissolved metals are based on hardness levels in the Chehalis River, obtaining current metals, TDS, pH and hardness data nearer the time of construction is recommended. Water quality monitoring of these parameters in the surface and groundwater at the site is recommended for two years prior to anticipated construction. Furthermore, the proposed CT facility wastewater treatment system design should provide a level of metals removal based on pre-development water quality monitoring results.

- Supply System currently has an approved NPDES permit for stormwater discharges from the proposed site. According to the SCA, the CT project must comply with all pertinent industry standards for control of any unforeseen surface water runoff event during construction, and must notify EFSEC of surface water runoff problems. These limits are applicable for material storage runoff and construction runoff within the 100-year, 24-hour rainfall event (140 mm [5.5 inches] per 24 hours). Standard Best Management Practices should be employed to control stormwater quantity and quality.

3.2.4 Unavoidable Adverse Impacts

There would be a net loss of water from the Chehalis River from consumption by the proposed CT project. The maximum consumption is expected during the summer, which corresponds to the period of lowest Ecology required base flows. Significant and measurable withdrawals would be taken from the Chehalis River when its flow is less than or equal to the minimum required baseflow; due to the instantaneous 0.57 cms (20 cfs) (33,982 lpm [8,977 gpm]) minimum pumping rate of the Ranney Wells. However, the net summer consumption of the proposed CT facility is only 0.7 percent of the minimum required Chehalis River discharge at the point of withdrawal. Therefore, proposed CT facility water consumption would have a low impact on Chehalis River flows.

The majority of the water quality constituents in the proposed process wastewater discharge to the Chehalis River would be within the existing NPDES levels for WNP-3/5. However, existing background levels of lead and mercury, and the generally soft water in the river may cause these trace metal constituents to exceed Washington state criteria. This will require monitoring to ensure that proper mitigation measures can be applied. Stormwater discharges will be regulated to acceptable levels under the existing NPDES permit. Therefore, with the anticipated mitigation, impacts to water quality from the proposed project are considered low.

3.2.5 Cumulative Impacts

The current SCA specifies that if the instantaneous discharge in the river drops below 15.57 cms (550 cfs) (934,452 lpm [246,857 gpm]), then the Ranney Wells would cease pumping. Currently, the minimum mean weekly Chehalis River discharge near Satsop, Washington is expected to drop as low as 15.57 cms (550 cfs) (934,452 lpm [246,857 gpm]). Any additional appropriations of Chehalis River water, or groundwater withdrawals upstream of the proposed CT facility that result in Chehalis River flow reduction, may result in more frequent cessation of Ranney Well pumping. However, because the proposed CT facility net withdrawal is only 0.7 percent of the minimum required Chehalis River base flow, the cumulative impact is expected to be minor.

If WNP-3 were to become operational, the CT project would contribute no additional volume to the outflow from WNP-3. However, the additional Chehalis River withdrawals due to WNP-3 operations would have a greater cumulative impact on Ranney Well pumping during the period of minimum required base flows than the proposed CT project.

A second combustion turbine facility may be installed in the future. The water supply requirements and wastewater discharge will likely double. With both turbines operating, water supply requirements would still be met by Ranney Well pumping at its minimum rate of 0.57 cms (20 cfs) (33,982 lpm [8,977 gpm]). In addition, although discharge would be double, it would remain within existing WNP-3 permit requirements. Therefore, cumulative impacts to water quantity are considered low.

Total loading to the Chehalis River of constituents in the discharge would be increased by adding a second CT facility. Also, because of the concentrating effect of the cooling process, constituent concentrations would be increased. However, water quality of the wastewater discharge is expected to stay within existing permit levels, and cumulative impacts to water quality are considered low.

3.3 Air Quality

3.3.1 Criteria Pollutant Emissions

The primary emissions from the proposed project would be combustion byproducts from the Westinghouse 501F combustion turbine. The facility would be fueled primarily by natural gas. In the unlikely event of a natural gas supply curtailment, the Satsop CT facility would have the ability to use low sulfur No. 2 distillate oil (0.05 percent sulfur content) as a back-up fuel. In accordance with the air permit application and the Contingent Power Purchase with BPA, No. 2 distillate fuel oil would be used for no more than 360 hours in any given year, and only during the winter (December through February).

The project would operate under a power purchase agreement that will allow the CT units to be taken out of service for a portion of the year, if the demand for electricity is low. When burning natural gas, the CT facility would operate between 60 and 100 percent load. If backup usage is required, the CT facility would run at 100 percent load. Supply System will request exemptions for excess emissions during startup and shutdown.

Best Available Control Technology

Washington regulations (Washington Administrative Code [WAC] 173400-11-(3)(a)) require new sources to use Best Available Control Technology (BACT). EPA recommends the "top down" evaluation process for BACT analyses. This approach ranks all available control technologies in descending order of control effectiveness. The most stringent or "top" alterative is examined first; this alternative is established as BACT unless the applicant demonstrates to the satisfaction of the permitting authority that technical, energy, environmental, or economic considerations justify a less stringent technology. If the most stringent technology is eliminated, then the process is repeated for the next most stringent alternative.

For the Satsop CT Project, BACT information will be documented in the Prevention of Significant Deterioration (PSD) permit application and reviewed by Ecology. The proposed controls for the project are summarized in Table 3.3-1.

Table 3.3-1. Proposed Control Technologies

Pollutant	*Proposed BACT*
NO_x - Natural Gas Firing	Dry Low - NO_x combustors Selective catalytic reduction (SCR)
NO_x - Fuel Oil Firing	Dry low - NO_x combustors with water injection SCR
CO	Catalytic Oxidation
SO_2	Low sulfur fuels (backup fuel oil with a sulfur content of 0.005%, and natural gas)
VOC	Proper combustion (additional reduction by CO Catalyst)
PM_{10}	Proper combustion Limited fuel oil use Low sulfur fuels (backup fuel oil with a sulfur content of 0.005%, and natural gas)
Ammonia (from operation of SCR)	Proper combustion Adequate mixing
Other toxics	Proper combustion Limited fuel oil use

Source: Dames & Moore 1994

Based on information listed in the BACT/Lowest Achievable Emission Rate (LAER) Clearinghouse database, EPA considers the combined use of dry low-NO_x combustors and SCR, which have both been proposed as controls for the Satsop CT Project, to be the most stringent NO_x emission control technology available for combustion gas turbines. The use of SCR requires the use of ammonia. Secondary emissions due to ammonia slip are estimated to be less than 10 parts per million by dry volume (ppmvd). Control of ammonia slip from the project will be accomplished with adequate mixing and proper combustion control.

The use of catalytic oxidation, which has been proposed as the control of CO emissions for the CT facility, is typically accepted as the most stringent CO emission control technology available for combustion turbines. Toxic air pollutant (TAP) emissions would be minimized with proper combustion techniques.

Supply System will maintain and operate the control equipment in accordance with vendor recommendations and generally accepted practices to prevent excessive emissions and to minimize fuel consumption.

Modeling

Maximum air quality concentrations resulting from emissions from the project were predicted using dispersion models, maximum emissions, and on-site meteorology. Models used in the analysis included Industrial Source Complex Short Term (ISCST2) and COMPLEX I (EPA 1992a, 1986). Dispersion is influenced by local terrain, short-term meteorological conditions, and the influence of buildings near the stack. The models utilized addressed these features and are recommended by EPA (1993a). The ISCST2 model incorporates features that allow for plume rise due to momentum and buoyancy, the influence of building wakes, and the evaluation of stack-tip downwash. The COMPLEX I model includes algorithms for predicting concentrations at elevations greater than the elevation of the stack and the plume. Both models evaluate emissions from point sources, input sequential hourly meteorology, and predict concentrations for averaging periods of between 1 hour and 1 year. Concentrations predicted by ISCST2 and COMPLEX1 were post-processed by the All Terrain Dispersion Model (ATDM). ATDM contains an EPA approved algorithm that selects the highest predicted concentrations (modeled with ISCST2 AND COMPLEX1) at receptors located in intermediate terrain, elevations greater than the height of the stack and less than the plume height.

Representative meteorological data, including on-site, upper air, and turbulence data, were used as inputs into the model. Wind speed, wind direction, and temperature data were obtained from monitoring conducted at the Satsop site from February 1, 1980 through January 31, 1981 (see Figure 2.3-1). Upper air data from Quillayute, Washington were used to determine the height available for plume mixing. Stability class data, an indication of the turbulence of the lower atmosphere, were determined from on-site wind speed, and cloud cover and ceiling heights from Olympia Airport, according to Turner's method (EPA 1993b).

Use of a stack at least as tall as a Good Engineering Practice (GEP) stack height reduces the effects of building downwash, which can lead to enhanced ground level air pollution concentrations. The GEP stack height for the project is 49 m (160 feet). Supply System proposes to install a 49-m (160-foot) stack for the proposed project.

Maximum ground level concentrations of air pollutants were predicted at pre-specified receptors using maximum emission rates, stack data, representative meteorology, and the COMPLEX I and ISCST2 models and the ATDM processor. One full year of meteorology data was used to model emissions from natural gas and No. 2 oil firing. The annual average predicted concentrations are 8,400 hours of natural gas firing and 360 hours of fuel oil firing.

Predicted air quality concentrations resulting from project emissions must be less than the AAQS. The short-term (1-hour, 3-hour, 8-hour, and 24-hour) AAQS are concentrations that cannot be exceeded more than once a year. Therefore, the second highest predicted concentrations are compared to the standards. Also, the averaging period of the concentrations must correspond to the averaging period of the AAQS. Concentrations resulting from project emissions must be less than the available PSD increments, and should be less than de minimis monitoring levels (or preconstruction monitoring will be required) and the Significance Impact Levels (SILs). The

predicted concentrations must also be added to the background air quality concentrations (Table 2.3-3) before comparing them to the AAQS. Predicted concentrations greater than the SILs define the impact area. Existing sources of emissions, which are within the impact area, or which could result in significant concentrations inside the impact area, must be included in the modeling analysis for the purpose of PSD increment consumption determination and compliance with the AAQS. Ecology has indicated that there are no other emission sources which are located in the impact area of the Satsop CT Project, therefore, additional modeling is not required.

Highest and second highest predicted air quality concentrations are presented in Table 3.3-2, for emissions resulting from natural gas and fuel oil firing. All predicted concentrations are below the AAQS, the PSD increments, and the de minimis monitoring levels. Before comparison with the AAQS, predicted concentrations must be added to background air quality concentrations. When the project-related air quality concentrations are added to the background concentrations measured in the more industrialized regions to the east and west of the CT facility (Table 2.3-3), the total concentrations remain below the AAQS. Maximum predicted concentrations resulting from project emissions were predicted to occur in the elevated terrain located to the southwest, east, and northwest from the CT facility site.

Annual emissions of TAPs would be greater than the small quality emission rates. Therefore, dispersion modeling is required to determine the ambient concentrations of the TAPs. TAP emissions were modeled using the conservative SCREEN2 model (EPA 1992b). Emissions and stack data used for this aspect of the air analysis were identical to those used in the more refined modeling for criteria pollutants. The SCREEN2 model predicts maximum possible 1-hour concentrations from sources based on worst-case meteorological data. Predicted concentrations must then be adjusted by application of multiplication factors. The maximum 1-hour concentrations predicted by SCREEN2 were multiplied by 0.4 and 0.7 to obtain 24-hour and annual average concentrations, respectively (Brode 1988). Predicted TAP concentrations were compared to the ASILs in Table 3.3-3. The ASIL for each pollutant is the concentration that will limit the risk of an additional cancer case to one in one million. The annual average arsenic concentration was predicted using ISCST2 and COMPLEX1. Maximum 24-hour and annual average TAP concentrations were predicted to be located in the elevated terrain to the southwest and northeast of the CT facility site.

Stack exhaust concentrations and maximum emission rates were provided by Westinghouse Electric Corporation for natural gas and fuel oil combustion at ambient temperature of 32.2°C (90°F) and at -15°C (5°F), and for 60 and 100 percent load conditions (Table 3.3-2). The emission rates from the project are based on the following assumptions:

- All emission rates are based on only one CT unit.
- Emissions rates for NO_x, sulfur dioxide (SO_2), and particulate matter are based on an annual operating load condition for natural gas firing at 100 percent, which result in maximum emission rates for these pollutants (100 percent load).

- Emission rates for volatile organic compounds (VOCs) and CO are based on an annual operating load condition for natural gas firing at 60 percent, which result in maximum emission rates for these pollutants (60 percent load).
- Emission rates for fuel oil firing are based on 100 percent load conditions.
- The PM_{10} emissions from the CT facility have been conservatively assumed to be 100 percent of the total particulate matter emissions.
- All criteria pollutant emission rates are based on an ambient temperature of -15°C (5°F).

Table 3.3-2. Predicted Air Quality Concentrations for One Unit

Pollutant	Maximum Concentration ($\mu g/m^3$)			AAQS ($\mu g/m^3$)	PSD Increment (Class II) ($\mu g/m^3$)	De Minimis Monitoring Levels ($\mu g/m^3$)	Significant Impact Levels ($\mu g/m^3$)
	Natural Gas	Fuel Oil	Combined Fuels				
PM_{10} (annual)			0.035	50	17		1
PM_{10} (24-hour)	0.64	6.91		150	30	10	5
CO (8-hour)	15.8	12.9		10,000		575	500
CO (1-hour)	23.0	15.3		40,000			2,000
NO_2 (annual)			0.16	100	25	14	1
SO_2 (annual)			0.02	52	20		1
SO_2 (24-hour)	0.18	7.34		262	91	13	5
SO_2 (3-hour)	0.51	21.0		1,300	512		25
SO_2 (1-hour)	0.710	24.1		1,048			

Source: Dames & Moore 1994

Permitting and other regulatory rules require a proposed source to quantify the potential to emit. The maximum expected annual emissions "potential to emit" for the CT facility are presented in Table 3.3-4. The maximum annual emission rates were calculated from the maximum short-term emission rates and operating hours. The limitation on fuel oil usage and load capacities would be defined in the air permit application and therefore will be considered a federally enforceable limitation. Total PM_{10} emissions do not include an estimated 8.5 MTY (9.4 TPY) emitted from the cooling tower, and an estimated 0.059 MTY (0.065 TPY) of VOCs emitted from the fuel oil storage tank.

Table 3.3-3. Toxic Air Pollution Emission Rates for One Unit

Toxic Air Pollutant	Emission Rate (kg/hour [lb/hour])		Annual Emissions (kg/year [lb/year])	Small Quantity Emission Rates (kg/year [lb/year])
	Natural Gas	Distillate Oil		
Benzene	0.01 (0.024)	1.19 (2.63)	521.6 (1,150)	4.5 (10)
Formaldehyde	0.11 (0.237)	0	902.6 (1,990)	9.1 (20)
Ammonia	11.7 (25.8)	35.7 (78.7)	111,220 (245,200)	2,381 (5,250)
Lead	0	0.24 (0.525)	85.3 (188)	79.4 (175)
Arsenic	0	0.23 (0.505)	82.6 (182)	0.23 (0.5)

Source: Dames & Moore 1994

Table 3.3-4. Maximum Project Emissions for One Unit (Potential to Emit)

	Pollutant (MTY [TPY])				
	NO_x	PM_{10}	CO	SO_2	VOC
Turbine					
natural gas	180.6 (199.1)	27.9 (30.7)	246.5 (271.7)	7.6 (8.4)	39.6 (43.7)
fuel oil	14.8 (16.3)	15.5 (17.1)	10.4 (11.5)	16.5 (18.2)	2.4 (2.6)
Total	195.4 (215.4)	43.4 (47.8)	256.9 (283.2)	24.1 (26.6)	42 (46.3)

Source: Dames & Moore 1994

Emissions of NO_x and CO are greater than 91 MTY (100 TPY). Therefore, the proposed Satsop CT Project would be considered a major new source of these pollutants and subject to PSD review.

Construction of the proposed gas and electrical transmission lines would result in the generation of fugitive dust and exhaust from the construction equipment. These short-term emissions are not subject to regulatory review and would result in small ambient air quality concentrations. There would be no direct emissions to the air resulting from the operating gas or electrical transmission lines.

3.3.2 Emissions of Toxic Air Pollutants

Except for ammonia, emissions of TAPs were estimated using the methods presented in the CARB reports (CARB 1991a and 1991b) for an internal combustion electric generation turbine. The speciation profile lists the chemical composition of total organic gases and particulate matter. Speciation profiles for both natural gas and distillate oil firing were used. The volatile toxic emissions were estimated by multiplying the total hydrocarbon emission rate by the speciation fraction of the substances to be quantified. The toxic particulate matter emissions were estimated by multiplying the total particulate matter emission rate by the speciation fraction of the substances to be quantified. The estimates for ammonia emissions from the combustion turbine and ammonia slip from the Selective Catalytic Reduction (SCR) control technology were provided by Westinghouse. The estimated 24-hour and annual TAP emission rates are listed in Table 3.3-5. All fuel oil emissions are based on 100 percent load conditions. Maximum hourly benzene and formaldehyde emissions are based on 60 percent load with natural gas firing. Maximum ammonia emissions are based on 100 percent load conditions and natural gas firing. Annual emissions of TAPs are greater than the small quality emission rates. Therefore, dispersion modeling was required to determine the ambient concentrations of the TAPs. TAP emissions were modeled using the conservative SCREEN2 model (EPA 1992a). Emissions and stack data used for this aspect of the air analysis were identical to those used in the more refined modeling for criteria pollutants. The SCREEN2 model predicts maximum possible 1-hour concentrations from sources based on worst-case meteorological data. Predicted concentrations must then be adjusted by application of multiplication factors. The maximum 1-hour concentrations predicted by SCREEN2 were multiplied by 0.4 and 0.7 to obtain 24-hour and annual average concentrations, respectively (Brode 1988). Predicted TAP concentrations were compared to the Acceptable Source Impact Levels (ASILs) in Table 3.3-3. The ASIL for each pollutant is the concentration that will limit the risk of an additional cancer case to one in one million. The annual average arsenic concentration was predicted using ISCST2 and COMPLEX1. Maximum 24-hour and annual average TAP concentrations were predicted to be located in the elevated terrain to the southwest and northeast of the CT facility site.

Table 3.3-5. Ambient Concentrations of Toxic Air Pollutants for One Unit

		Concentration ($\mu g/m^3$)	
Toxic Air Pollutant	*Averaging Time*	*ASIL*	*Predicted*
Ammonia	24-hour	59.9	0.69
Lead	24-hour	0.2	0.0011
Benzene	annual	0.12	0.0015
Formaldehyde	annual	0.077	0.0016
Arsenic	Annual	0.00023	0.000065

Source: Dames & Moore 1994

3.3.3 Effects on Class I Areas

Visibility

Washington air quality regulations require the evaluation of visibility impairment for all Class I areas within 160 km (100 miles) of the proposed site. The visibility in the atmosphere may be affected by emissions of particulate matter directly into the air, by the presence of NO_2 gas, and by the secondary aerosol formation from SO_2, sulfate (with two additional elections; SO_4^{2-}), NO_x, and CO emissions. Visibility degeneration resulting from CT facility emissions was assessed using the EPA visibility model VISCREEN, following the guidance provided by EPA (1988).

The evaluation considered two source-observer geometrics: looking upwind away from the Class I area toward the source; and looking downwind into the Class I area and away from the source. Four optical conditions were assumed: with the sun behind and in front of the observer, with the plume viewed against a sky background and a terrain background. The VISCREEN model estimates the contrast between the plume and the background, and the plume perceptibility (color difference) parameter, ΔE, which is a function of difference in brightness, color hue; and saturation. The Level I visibility analysis used conservative estimates for all parameters, including maximum emission rates from the CT facility, the minimum distance to the Class I area, and very stable turbulence conditions (stability class F, wind speed equal to 1 m/second). Visibility impacts are considered significant if ΔE exceeds a value of 2.0, or if the contrast value exceeds 0.05.

Emissions from the Satsop CT Project resulting from combustion of natural gas are predicted to result in ΔE and contrast values that are below the screening criteria for all Class I areas within 160 km (100 miles). The use of fuel oil would be limited to no more than 15 days per year (360 hours). The use of fuel oil is predicted to result in ΔE and contrast values that are less than the screening criteria for the Goat Rocks and Alpine Wilderness Areas, and Mount Rainier National Park. The project would not result in significant visibility impacts when the observer was assumed to be looking within the park boundaries. For an observer outside the park looking into the Olympic National Park, the predicted ΔE value for backup fuel exceeded the suggested criteria. These results are considered conservative. The use of fuel oil would be limited to December through February when viewing conditions were poor because of the heavy cloud cover and precipitation. The overall impact on visibility in the Class I areas is considered insignificant.

Deposition

The Class I areas are most sensitive to the effects of sulfur and nitrogen compounds. Based on the available data, the maximum deposition rate for sulfur compounds that can be tolerated by most terrestrial ecosystems is 20 kg/ha/year (44.1 pounds/acre/year). Adverse effects are very unlikely below 5 kilograms (kg)/ha/year (11 pounds/acre/year) (U.S. Department of Agriculture 1992). For areas that contain sensitive lichen species, 5 to 15 parts per billion by volume (ppbv) of the annual SO_2 concentration is considered adverse. Injury from nitrogen deposition is not expected if NO_x (as nitrogen dioxide [NO_2]) deposition is less than 3 kg/ha/year (6.6 pounds/acre/year), and the daily ambient NO_2 concentration is less than 15 ppbv.

The potential for sulfur and nitrogen deposition was evaluated by modeling emissions from the CT facility using the ISCST2 and COMPLEX1 models and representative meteorological data. The

model predicted both ambient concentrations and deposition rates. Receptors were located at the closest park boundary of the nearest Class I area, Olympic National Park, located approximately 58 km (36 miles) to the northeast of the CT facility site. The model was run using the maximum hourly and annual average emission rates. The modeling methods for this analysis were identical to those used in the air quality impact analysis (Section 3.3.1.1). The maximum predicted SO_2 and NO_2 concentrations in the nearest Class I resulting from CT facility emissions are less than the limits suggested by the U.S. Forest Service (USFS) (Table 3.3-6).

Deposition rates may be determined by conservatively assuming that all of the ambient SO_2 is deposited at the park boundary, and that all of the NO_x is deposited as nitric acid (HNO_3) at the park boundary (EPA 1993c). Following this methodology, deposition rates at the Olympic National Park boundary were calculated from ambient concentrations predicted by ISCST2 and COMPLEX1 (Table 3.3-7). The predicted deposition rates are less than the limits suggested by the USFS.

PSD regulations require that concentrations of criteria pollutants resulting from emissions from the project be predicted for any Class I area within 160 km (100 miles) of the source. The Class I area closest to the CT facility, Olympic National Park, is much closer to the project than the other three parks. Maximum emissions from the CT facility were modeled using ISCST2 and COMPLEX1 and a year of meteorological data. Maximum predicted concentrations resulting from CT facility emissions result in concentrations in the Class I areas that are less than the PSD Class I increments (Table 3.3-8).

Table 3.3-6. Predicted Concentrations in Olympic National Park for One Unit

Pollutant	Predicted Concentration (ppbv)			Suggested Limits (ppbv)
	Natural Gas	Fuel Oil	Combined Fuel	
SO_2 (annual average)			6.72×10^{-10}	5.00
NO_2 (24-hour average)	8.71×10^{-8}	1.48×10^{-7}		15.00

Source: Dames & Moore 1994

3.3.4 Cooling Tower Plume Effects

Unusable excess heat from the CT facility would be dissipated to the atmosphere by the evaporative cooling tower. Water droplets from the tower form a white visible plume and may cause fogging and occasional icing of public roads. The plume generally evaporates within a short distance from the tower. During conditions of high humidity and low temperatures the plume will be visible for longer distances. Water used for cooling will have small quantities of impurities and salts that would be left behind as the cooling tower plume evaporates. About 8.5 metric tons (9.4 tons) of particulate matter is estimated to be emitted from the cooling tower each year. Episodes

of fogging and icing are expected to be infrequent with a total duration of perhaps a few hours per year. The effects of these conditions would be isolated to the area immediately surrounding the cooling towers. Because no major roadways lie within the area of potential impacts, no traffic hazard is expected.

Table 3.3-7. Pollutant Deposition Rates for the Olympic National Park for One Unit

Pollutant	Estimated Annual Deposition (kg/ha/yr [lb/acre/yr])		Suggested Limits (kg/ha/yr [lb/acre/yr])
	Natural Gas	Fuel Oil	
SO_4	0.0018 (0)	0.22 (0.5)	5.00 (11.0)
HNO_3	0.59 (1.3)	2.18 (4.8)	5.00 (11.0)

Source: Dames & Moore 1994

Table 3.3-8. Maximum Predicted Concentrations in PSD Class I Areas for One Unit

Pollutant	Averaging Time	Class I Increment ($\mu g/m^3$)	Predicted Concentration ($\mu g/m^3$)		
			Natural Gas	Fuel Oil	Combined Fuel
SO_2	Annual	2			0.0018
	24-hour	5	0.007	0.314	
	3-hour	25	0.04	1.67	
Particulate	Annual	5			0.003
	24-hour	10	0.026	0.296	
NO_x	Annual	2.5			0.014

Source: Dames & Moore 1994

3.3.5 Mitigation

The facility will be required to demonstrate that emission controls meet the requirements for BACT. BACT is required in attainment areas for new sources, and is the highest and most efficient control level consistent with energy, environmental, and economic factors for the facility. The method of evaluating BACT requires Supply System to submit information on a complete range of technologies for each pollutant, and to choose the best technology unless substantial reason exists

to preclude it (e.g., not commercially available). Control technologies proposed for the project (Table 3.3-1) are the most stringent emissions controls available for combustion gas turbines.

3.3.6 Unavoidable Adverse Impacts

The CT facility would emit combustion by-products. As stated in Section 3.3.1, concentrations resulting from project related emissions would be less than applicable local, state, and national AAQS. Furthermore, project-related emissions would result in concentrations and depositions in the PSD Class I areas that are less than the guidance values. Air quality impacts resulting from the CT facility are considered low.

3.3.7 Cumulative Impacts

Supply System may construct and operate a second CT plant on a site adjacent to the proposed project. The design and operation of the two plants would be identical. Air emissions from the second plant would be the same as previously described. The air quality analysis was repeated for the two adjacent CT units. The methodology used to evaluate emissions from two units was identical to that used for the single CT facility.

Because air emissions from each unit would be identical, the maximum emission rates and the potential to emit for the combined case are twice the rates for the single unit case (Table 3.3-9). The regulatory requirements for the two-unit case are the same; the second unit would be considered a major source of air emissions. In addition to NO_x and CO, particulate matter emissions are larger than the 91 MTY (100 TPY) limit, which defines a major source, for the two-unit case. The emissions of toxic emissions would also double for the combined case (Table 3.3-10).

Maximum emissions from the two CT facilities were modeled with one year of representative meteorology and the modeling methodologies presented in Section 3.3.1.4. Maximum predicted air quality concentrations are less than all applicable AAQS and the PSD increments, the De Minimus Monitoring Levels and the SILs. The 24-hour PM_{10} and SO_2 concentrations are the consequences of emissions during fuel oil combustion and were predicted using CTSCREEN, for a receptor located on a hill about 5 km (3 miles) to the northwest of the CT facility site. CTSCREEN incorporates algorithms to predict trajectories over and around hills. The CTSCREEN modeling results for the two unit case indicate that the 24-hour PM_{10} and SO_2 concentrations would be less than the De Minimus Monitoring Levels and the SILs (Table 3.3-11). Maximum predicted concentrations of TAPs emitted from the facilities are less than the ASILs for those pollutants (Table 3.3-12).

The consequences of emissions from the two CT facilities were evaluated for nearest PSD Class I area (Olympic National Park). Again, the methodology for this evaluation was identical to the methods employed for the single unit case. Maximum SO_2 and NO_2 concentrations were predicted for the nearest park boundary (Table 3.3-13) and were used to deposition rates of sulfate (SO_4) and HNO_3 (Table 3.3-14). Maximum predicted concentrations, resulting from emissions from the two CT facilities, are less than the PSD Class I increments (Table 3.3-15).

A visibility analysis was conducted for the two unit case. The results of the analysis are the same as the one unit case (Section 3.3.1).

Based on the anticipated design controls and mitigation, cumulative impacts to air quality from the project are considered low.

Table 3.3-9. Maximum Project Emissions for Two Units

	Pollutant (MTY [TPY])				
	NO_x	PM_{10}	CO	SO_2	VOC
Turbine					
natural gas	361.2 (398.2)	55.7 (61.4)	492.9 (543.4)	15.2 (16.8)	79.3 (87.4)
fuel oil	29.6 (32.6)	31.0 (34.2)	20.9 (23.0)	33.0 (36.4)	4.7 (5.2)
Total	390.8 (430.8)	86.7 (95.6)	513.8 (566.4)	48.2 (53.2)	84 (92.6)

Source: Dames & Moore 1994.

Table 3.3-10. Toxic Air Pollution Emission Rates for Two Units

Toxic Air Pollutant	Emission Rate (kg/hour [lb/hour])		Annual Emissions (kg/year [lb/year])
	Natural Gas	Distillate Oil	
Benzene	0.048	2.39 (5.26)	1,043 (2,300)
Formaldehyde	0.474	0	1,805 (3,980)
Ammonia	51.6	71.4 (157.4)	222,441 (490,400)
Lead	0	0.48 (1.05)	171 (376)
Arsenic	0	0.46 (1.01)	165 (364)

Source: Dames & Moore 1994.

Table 3.3-11. Predicted Air Quality Concentrations for Two Units

Pollutant	Maximum Concentrations ($\mu g/m^3$)			PSD Increment (Class II) ($\mu g/m^3$)	De Minimis Monitoring Levels ($\mu g/m^3$)	AAQS ($\mu g/m^3$)	Significant Impact Levels ($\mu g/m^3$)
	Natural Gas	Fuel Oil	Combined Fuels				
PM_{10} (annual)			0.07	17		50	1
PM_{10} (24-hour)	1.27	4.45		30	10	150	5
CO (8-hour)	35.8	25.3			575	10,000	500
CO (1-hour)	52.0	30.0				40,000	2,000
NO_2 (annual)			0.31	25	14	100	1
SO_2 (annual)			0.04	20		80	1
SO_2 (24-hr)	0.35	4.73		91	13	365	5
SO_2 (3-hour)	1.00	14.2		512		1,300	25
SO_2 (1-hour)	0.430	15.343				1,048	

$\mu g/m^3$ = micrograms per cubic meter.
Source: Dames & Moore 1994.

Table 3.3-12. Ambient Toxic Air Pollution Concentrations for Two Units

Toxic Air Pollutant	Averaging Time	Concentration ($\mu g/m^3$)	
		ASIL	Predicted
Ammonia	24-hour	59.9	1.38
Lead	24-hour	0 .2	0.0022
Benzene	Annual	0.12	0.0030
Formaldehyde	Annual	0.077	0.0033
Arsenic	Annual	0.00023	0.00013

Source: Dames & Moore 1994.

Table 3.3-13. Predicted Concentrations in the Olympic National Park for Two Units

Pollutant	Predicted Concentration (ppbv)			Suggested Limits (ppbv)
	Natural Gas	Fuel Oil	Combined Full	
SO_2 (annual average)			1.34×10^{-9}	5.00
NO_2 (24-hour average)	1.74×10^{-7}	2.96×10^{-7}		15.00

Source: Dames & Moore 1994

Table 3.3-14. Pollution Deposition Rates for the Olympic National Park For Two Units

Pollutant	Estimated Annual Deposition (kg/ha/year [lb/acre/year])		Suggested Limits (kg/ha/year [lb/acre/year])
	Natural Gas	Fuel Oil	
SO_4	0.0036 (0)	0.44 (1.0)	5.00 (11.0)
HNO_3	1.18 (2.6)	4.36 (9.6)	5.00 (11.0)

Source: Dames & Moore 1994

Table 3.3-15. Maximum Predicted Concentrations in PSD Class I Areas for Two Units

Pollutant	Averaging Time	Class I Increment ($\mu g/m^3$)	Predicted Concentration[1] ($\mu g/m^3$)		
			Natural Gas	Fuel Oil	Combined Fuels
SO_2	Annual	2			0.004
	24-hour	5	0.014	0.627	
	3-hour	25	0.077	3.32	
Particulate	Annual	5			0.006
	24-hour	10	0.05	0.59	
NO_x	Annual	2.5			0.029

Source: Dames & Moore 1994

3.4 NOISE

3.4.1 Impacts From Construction and Operation

Construction

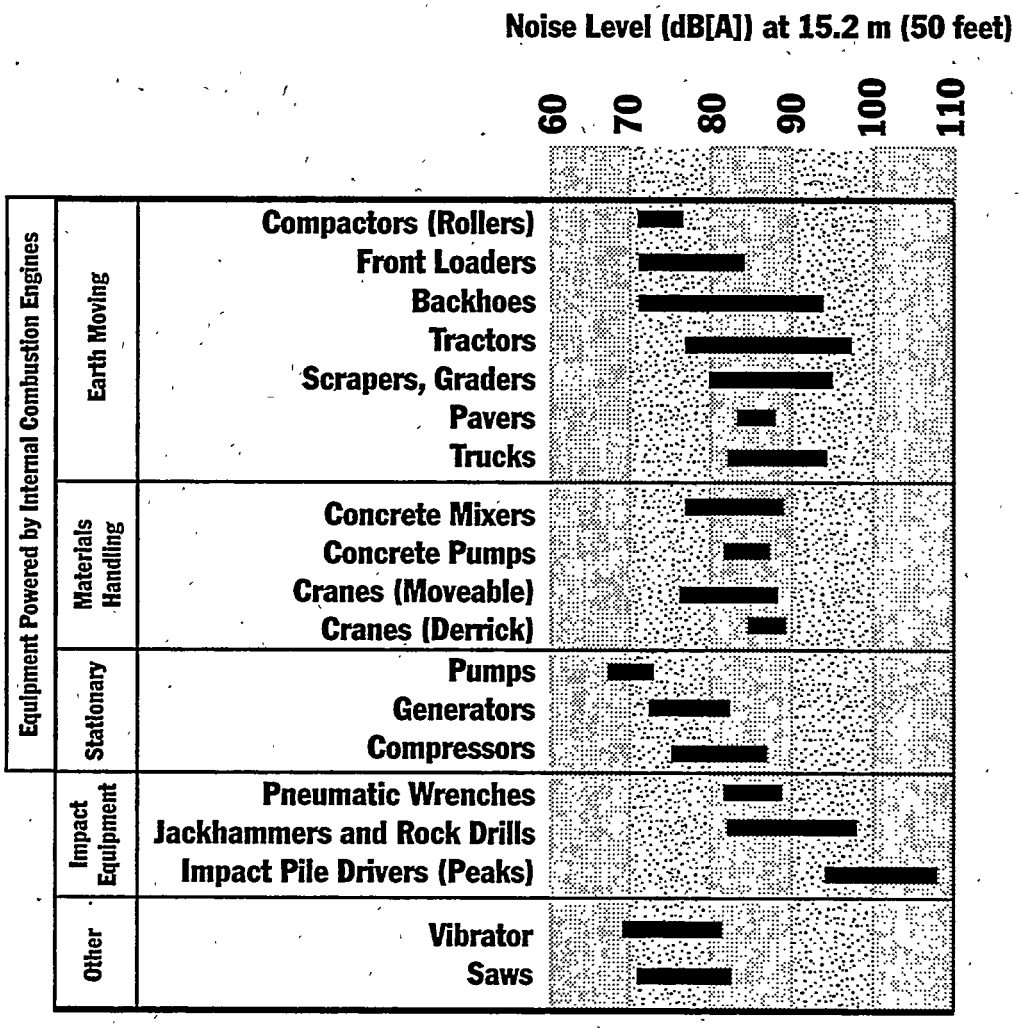
The noise levels produced by construction activities would vary widely, depending on the specific equipment being operated at the time. Construction activities are excluded from Ecology noise ordinances (WAC 173-60). Figure 3.4-1 shows typical sound level ranges for construction equipment which may be used for this project.

Operation

Noise from the operating CT facility would emanate from the HRSG, stack, combustion turbine air inlet system, generation building, cooling tower, transformers, and pumps. Ecology has established allowable noise levels from industrial facilities. To determine if project-related sound levels in the areas immediately surrounding the facility are less than Ecology's limits, sound modeling was performed using Westinghouse Acoustic Model (WAM) (Beeson and Schott 1994). WAM is a sound propagation model designed to estimate sound levels from stationary sources using or sound power levels from the source(s). The sound power levels of sources used in the model are listed in Table 3.4-1. The model also accounts for barriers, atmospheric attenuation, excess attenuation (such as vegetation and terrain), and the direction from the source to specific receptor locations. Model runs were conducted using both daytime and night-time background sound levels. The effects of excess attenuation to some receptor sites were also examined. A noise easement will be granted by the Supply System WNP-3/WNP-5 along the northern and southern boundaries of the proposed CT facility site.

WAM predicts sound levels at predetermined receptors. Receptors 4 through 6 are the same locations as the Monitoring Sites 4 through 6 shown on Figure 3.4-2. Background sound levels at each receptor were the average monitored values presented in Table 2.4-3. The model was run using weather conditions that are typical of calm summertime evenings (15°C [59°F], 70 percent relative humidity, and no wind), when people are most likely to either be outside or have their windows open.

Eight additional receptors, located at the project boundary including the easement, were included in the modeling. These receptors were positioned at locations nearest to equipment sound sources. The northern boundary (including the easement) lies 73 m (240 feet) north of the Inlet Filter Face. The eastern boundary lies 60.9 m (200 feet) east of the cooling tower. The southern boundary (including the easement) lies 60.9 m (200 feet) south of the southern face of the cooling tower. The western boundary lies 54.8 m (180 feet) west of the transformers. These receptors were assumed to have the same ambient background sound levels as measured at Sites 1 through 3. Because of the proximity of these receptors to the proposed facility, the background sound levels at these locations are insignificant, and the estimated sound levels are completely attributed to the CT facility sound.



Source: Oregon State Highway Division 1990

Figure 3.4-1 Typical Construction Sound Levels

Table 3.4-1. Preliminary Acoustical Data

Source	Sound Power Level (dB) by Octave Band Center Frequency (Hz)								
	31.5	63	125	250	500	1000	2000	4000	8000
HRSG	117	116	119	113	105	99	101	100	104
Stack Exit	114	108	101	92	86	74	78	80	75
Inlet System	120	114	106	96	98	103	93	96	95
Generation Building	114	115	111	96	90	80	75	70	63
Cooling Tower	117	115	111	105	101	100	98	97	93
Main Transformer #1	100	100	103	88	95	79	84	79	72
Main Transformer #2	100	100	103	88	95	79	84	79	72
Boiler Feed Pump #1	83	94	91	104	102	96	97	93	87
Boiler Feed Pump #2	83	94	91	104	102	96	97	93	87

Source: Letter from C. O'Brien, Environmental Engineering and Services, Westinghouse Electric Corporation, November 2, 1994.

The CT facility was evaluated both with and without excess attenuation. For Sites 4 and 5, an additional 4 dB(A) of attenuation resulting from vegetation and trees was assumed. Excess attenuation of 8 dB(A) resulting from topography was assumed for receptor Site 6. Receptor 6 is north of the proposed facility and on the opposite side of a hill.

The sound levels resulting from operation of the CT facility were estimated using the WAM model and the above methods. Table 3.4-2 presents the predicted levels, including background levels, at all of the receptor locations. The modeling indicated that noise resulting from the CT project at all of the receptors would be less than the industrial and residential standards.

EPA does not have enforceable noise limits applicable to industrial operations. EPA Region 10 has published general guidance for noise assessments (EPA 1980). Increases in the L_{eq} above existing conditions are evaluated by the following criteria:

- An increase of 0 to 5 dB(A) is considered a slight impact
- An increase of 5 to 10 dB(A) is considered a significant impact
- An increase of greater than 10 dB(A) is considered a very serious impact

Predicted noise levels, when added to monitored background levels at the three residential properties result in increases of 0, 1, and 0 dB(A) during the day, and 3, 5, and 2 dB(A) at night, for the single unit case. These increases are 5 dB(A) at the three sites, and according to the criteria above, represent slight impacts.

Table 3.4-2. Estimated Noise Levels, Including Background, for One Unit

Site	Estimated Sound Levels, L_{eq} [dB(A)]			
	Daytime, No Additional Attenuation	Daytime, Additional Attenuation	Nighttime, No Additional Attenuation	Nighttime, Additional Attenuation
Industrial Standard	70	70	70	70
North 1	65	65	65	65
North 2	65	65	65	65
East 1	65	65	65	65
East 2	65	65	65	65
South 1	61	61	61	61
South 2	61	61	61	61
West 1	63	63	63	63
West 2	63	63	63	63
Residential Standard	60	60	50	50
Site 4	45	44	40	37
Site 5	45	43	42	39
Site 6	50	49	43	38

3.4.2 Mitigation

Supply System has committed to a combination of the following noise mitigation measures to comply with the sound levels presented in this section.

- Locate major sources of sound inside acoustically treated building(s).
- Install acoustically absorptive silencers on the combustion turbine air inlet system, enclosure ventilation systems, and emergency relief valves.
- Install separate acoustical enclosures for major noise sources, including the combustion turbine and generator.
- Install acoustically absorbtive insulation in duct walls of the combustion turbine inlet air system and exhaust systems.

The following construction sound abatement measures will be included in the plant construction specifications to mitigate plant construction sound impacts:

- Construction will not be performed within 305 m (1,000 feet) of an occupied dwelling on Sundays, legal holidays, or between 10 p.m. and 6 a.m. on other days.

- All construction equipment will have sound control devices no less effective than those provided on the original equipment. Equipment will not be operated with unmuffled exhaust systems.

- Pile driving or blasting operations, if required, will not be performed within 914 m (3,000 feet) of an occupied dwelling on Sundays, legal holidays, or between 8 p.m. and 8 a.m. on other days.

3.4.3 Unavoidable Adverse Impacts

Although the modeled noise levels caused by the proposed project are lower than the Ecology night-time limits, it is possible that the noise from the facility will be audible at some of the residential areas at night when the background sound levels are low and when atmospheric conditions are favorable for sound transmission (e.g., high humidity, low wind speeds). Because the planned mitigation measures would attenuate project-related noise to acceptable levels, with slightly higher levels at the three nearby residences, overall unavoidable adverse impacts from noise are considered low. Noise levels at the three residential properties are predicted to increase by 0, 1, and 0 dB(A) during the day, and by 3, 5, and 2 dB(A) during the night. According to EPAs criteria, this would represent a slight impact.

3.4.4 Cumulative Impacts

Supply System may construct and operate a second CT facility on a site adjacent to the proposed Satsop CT facility. The second facility would be identical to the first and the character and level of sound emanating from the two would be similar. To estimate the cumulative sound levels of the combined facilities, noise was modeled using WAM. The same sensitive receptor locations (Sites 4 through 6) were modeled as for the proposed project. Ten additional receptors were placed along the property boundary encompassing both units to determine worst-case sound levels. Ambient daytime and nighttime background sound levels for Sites 4 through 6 were used as input to the model.

The estimated noise levels for the combined facilities are listed in Table 3.4-3. Estimated noise levels will not exceed the standard at the boundaries (including the north and south easements). All predicted sound levels are less than the daytime and nighttime standards. Therefore, overall cumulative noise impacts from the project are considered low. Noise levels at the three residential properties mentioned previously are predicted to increase by 1, 1, and 0 dB(A) during the day, and by 5, 7, and 4 dB(A) at night. According to EPA's criteria, this represents a slight impact to two of these residences, and a significant impact to one. The level of impact to that residence, without further attenuation, is considered moderate.

Table 3.4-3. Estimated Cumulative Sound Levels, Including Background, for Two Facilities

Site	Estimated Sound Levels, L_{eq} [dB(A)]			
	Daytime, No Additional Attenuation	*Daytime, Additional Attenuation*	*Nighttime, No Additional Attenuation*	*Nighttime, Additional Attenuation*
Industrial Standard	70	70	70	70
North 1	65	65	65	65
North 2	65	65	65	65
East 1	65	65	65	65
East 2	65	65	65	65
East 3	65	65	64	65
South 1	61	61	61	61
South 2	61	61	61	61
West 1	64	64	64	64
West 2	64	64	64	64
West 3	64	64	64	64
Residential Standard	60	60	50	50
Site 4	46	45	43	39
Site 5	46	44	45	41
Site 6	51	49	46	40

Source: Letter from C. O'Brien, Environmental Engineering and Services, Westinghouse Electric Corporation, November 2, 1994.

3.5 VEGETATION/WETLANDS

3.5.1 CT Facility Site, Water Supply and Wastewater Lines

Because the proposed CT facility site is not currently vegetated, no environmental effects involving upland or wetland/riparian resources are anticipated.

No impacts to upland vegetation or wetland/riparian habitats are expected from the use of the existing Ranney Wells, which are existing well facilities. Well water would be delivered through the existing Supply System WNP-3/WNP-5 infrastructure.

3.5.2 Gas Pipeline

Approximately 33.8 km (21 miles) (44 percent) of the 77-km (48-mile) pipeline would be constructed within or parallel to existing pipeline ROWs. About 20.9 km (13 miles) (27 percent)

of the new pipeline would be constructed within existing BPA power transmission ROWs. About 6.5 km (4 miles) (8 percent) of the new pipeline would be constructed either in or adjacent to logging roads or adjacent to an existing roadway through agricultural lands. Thus, approximately 80 percent of the proposed route would be within or adjacent to existing corridors.

Approximately 176.1 ha (435 acres) of terrestrial vegetation would be affected by the pipeline construction within a 22.9-m (75-foot) wide construction impact corridor. The majority of this affected area is forested (including regenerating forests), although shrub habitats, grassland, agricultural land, prairies, and developed land would also be affected (Table 3.5-1).

Table 3.5-1. Areal Impacts to Vegetation Affected by the Proposed Project

Habitat Type	*Acreage Within Impact Area (ha [acre])* [1]	*Percent of Total Impact Area*	*Permanent Impact*[2] *(ha [acre])*	*Temporary Impact (ha [acre])*
Coniferous Forest	60.7 (150)	34	60.7 (150)	0
Deciduous Forest	9.7 (24)	6	9.7 (24)	0
Mixed Forest	16.2 (40)	9	16.2 (40)	0
Regenerating Coniferous Forest	21.1 (52)	12	21.1 (52)	0
Oak Woodlands	0.4 (1)	<1	0.4 (1)	0
Shrub Habitats	19.8 (49)	11	0	19.8 (49)
Grassland/Agricultural	22.7 (56)	13	0	22.7 (56)
Prairie	4.0 (10)	2	4.0 (10)	0
Vegetated, Developed Areas	10.5 (26)	6	0	10.5 (26)
Emergent Wetland	3.2 (8)	2	0	3.2 (8)
Scrub-shrub Wetland	2.0 (5)	1	0	2.0 (5)
Forested Wetland	2.8 (7)	2	2.8 (7)	0
Rivers/Streams	< 0.4 (<1)	<1	0	<0.4 (<1)
Ponds/Lakes	0	0	0	0
Other (Barren, Developed Areas)	2.8 (7)	2	0	2.8 (7)
TOTALS	176.1 (435)	100	114.90 (284)	61.2 (151)

[1] The impact area is defined as the proposed CT facility site and the 22.9-m (75-foot) wide construction ROW along the proposed gas pipeline route. The construction ROW will likely be less wide through sensitive areas such as wetlands, riparian zones, and prairie habitats. Thus, the impacts included in this table for these sensitive resources can be considered to be derived from the worst-case scenario.

[2] Permanent impact primarily involves the conversion of forested habitats to shrub- or grass-dominated habitats. See text for further discussion.

Source: Table modified from Dames and Moore (1994).

Construction of the gas pipeline would temporarily disturb terrestrial plant communities dominated by herbaceous species such as those found in pastures and within existing ROWs, but these communities would be restored to a similar condition after construction. Construction in forested communities would permanently convert such vegetation to grass-dominated or low-shrub habitats because the new ROW would be maintained to eliminate trees. New pipeline corridors through forested habitats could result in increased windthrow potential for adjoining, undisturbed forested areas. Also, the loss or change of vegetation cover could allow the establishment or spread of invasive plant species, which in turn could alter vegetation composition in adjacent undisturbed areas.

Wetland, streams, creeks, and riparian habitats would also be disturbed along the gas pipeline route. This disturbance may include vegetation clearing, trench excavation and backfilling, equipment trafficking, and water quality degradation (due to potential for increased sedimentation and potential hydrocarbon spills). Except for the permanent clearing of forest vegetation, these impacts will be temporary. Filling (that is, trenching) of wetland habitats during construction of the gas pipelines would result in a temporary loss of wetland functions and values.

More permanent impacts may involve altered hydrological patterns in subsurface and surface water, as might be caused by slight changes in topography due to construction and disturbance activities. Such changes in surface or groundwater flows could result in a change in vegetation or wetland functions.

3.5.3 Electrical Transmission Line

Approximately 1,220 m (4,000 feet) of electrical transmission line would be strung on replacement transmission towers within an existing, cleared ROW. These towers would be constructed in new locations within the existing ROW. Small areas of permanent impacts to upland habitats are expected from construction of the replacement towers. Additionally, low levels of disturbance in existing shrub- and grass-dominated vegetation within the ROW may occur as a result of construction activities, but such impacts would be temporary and minor. Wetland and riparian areas associated with Fuller Creek (which intersects the electrical transmission route) would not be affected by replacement of the transmission line towers because construction would not occur in or near the creek. No permanent impacts to or net losses of upland vegetation and/or wetland/riparian habitats are expected from the installation, operation, use, or maintenance of the electrical transmission line or the replacement towers.

3.5.4 Mitigation

Essentially all impacts to vegetation, wetlands, and sensitive plants would be associated with construction and maintenance of the natural gas pipeline. Because current Federal and state regulations require that impacts to wetland communities be avoided whenever possible, the proposed pipeline route was selected based in part on minimizing impacts to these resources. As a result, 80 percent of the proposed route is located within or adjacent to existing utility and road corridors. Additional avoidance measures for high quality wetlands will be attempted during final design engineering of the pipeline route. The following mitigation measures will also be implemented.

- Implementation of the project's ESCP will include erosion and sedimentation controls to protect water quality. The plan also calls for the revegetation of all temporarily disturbed areas.

- Disturbed areas will be restored to their near-original grade and seeded with desirable erosion control species.

- Terrestrial forested habitats being permanently converted to maintained grass habitats within the new ROW for the proposed gas transmission line will be graded to their near-original grade and seeded with desirable erosion control species.

- In wetland/riparian and prairie habitats, the construction ROW will be reduced to minimize impacts to these habitats. Construction will also be attempted during the dry season. Hydric topsoils will be stockpiled and then used to backfill the pipeline trench in the correct sequence. The revegetation plan in these habitats emphasizes the use of native plant species suitable for erosion and sedimentation control and desirable wildlife habitat.

- Construction of electrical transmission lines will avoid any instream crossings of Fuller Creek.

- Construction of project components will comply with state and local permits that regulate construction in general, and those permits that specifically regulate construction in wetlands, riparian areas, and other sensitive areas.

- The project will be coordinated with EFSEC, the U.S. Army Corps of Engineers (Corps), and other appropriate agencies, as required, to develop additional acceptable mitigation measures.

For areas in which white-top aster (*Aster curtus*) will be impacted, the following additional mitigation measures will be implemented:

- The narrowest construction corridor possible will be used in known white-top aster locations.

- Topsoil excavated from the trench will be stockpiled separately from the subsoil. This will minimize impacts associated with pipeline installation because the topsoil, which may have the seed source to re-establish the plants, will be backfilled over the trench. Mats will be used in the construction lane and passing lane of known white-top aster locations to minimize topsoil disturbance and the amount of vegetation crushed by heavy machinery.

- The construction corridor will be revegetated with other plant species native to Tenalquot Prairie such as Idaho fescue (*Festuca idahoensis*). The plants used to revegetate the construction corridor will be native to the prairie so that the vegetation growing over the construction corridor resembles the naturally occurring plant composition of the prairie. A more detailed revegetation plan for this area will be incorporated into the project's ESCP.

- Undesirable, invasive plant species are adjacent to the pipeline corridor. Therefore, revegetation of the construction corridor will be conducted as soon as construction is complete to prevent invasive plants from becoming established in the disturbed areas.

- Prior to construction, Supply System will contact the Fort Lewis Military Reservation Biologist, the USFWS, and the WNHP to identify additional measures that will mitigate impacts to white-top aster on and outside the military reservation.

- An agency-accepted post-construction monitoring and contingency plan will be developed to ensure that the restoration of disturbed areas on the Tenalquot Prairie are revegetating with desirable native plant species.

- Consultation with WDNR will be held to further explore appropriate mitigation actions.

3.5.5 Unavoidable Adverse Impacts

In constructing the gas pipeline, it is not possible to completely avoid the loss of upland vegetation (Table 3.5-1). Approximately 107.7 ha (266 acres) of forested upland habitats will be permanently converted to shrub- or grass-dominated habitats. This is considered to be a low impact due to the abundance of these types of forested habitat in the project vicinity. Approximately 53 ha (131 acres) of non-forested upland habitats would be temporarily cleared during construction of the gas and electrical transmission lines, and therefore functionally lost until sufficient time passes for similar vegetation to become established. This is considered a low impact because the vegetation will be allowed to recover to near its original condition, and because there is a relative abundance of these habitats in the region.

These unavoidable impacts to upland vegetation are considered low because the upland vegetation to be disturbed or displaced is relatively common in the vicinity of the project and because habitat restoration measures will be implemented after construction. The significance of the forest conversion is primarily related to wildlife habitat, and is thus discussed in more detail in Section 3.6.

In addition, approximately 0.4 ha (1 acre) of oak woodland habitat would be permanently converted to shrub- or grass-dominated habitats. This is considered to be a moderate impact due to the extensive and severe cumulative impacts this habitat type has accrued historically in western Washington. Approximately 4 ha (10 acres) of native prairie habitat would be disturbed or permanently converted to shrub- or non-native grass-dominated habitats. This is considered to be a moderate impact due to the extensive and severe cumulative impacts this habitat type has accrued historically in western Washington.

Impacts to wetlands could result from filling, vegetation clearing, hydrologic modification, and temporary water quality modification. About 2.8 ha (7 acres) of forested wetland habitat would be permanently converted to grass- or shrub-dominated wetland habitats within the gas pipeline route. This is considered a moderate impact because of the functional values associated with these habitats and the extensive and moderately severe cumulative impacts this habitat type has accrued historically in western Washington. About 5.3 ha (13 acres) of palustrine scrub-shrub and emergent wetlands

would be temporarily cleared during construction of the gas pipeline, and therefore functionally lost until sufficient time passes for similar vegetation to become established. This is considered a low impact.

White-top aster occurs along the proposed gas pipeline route. A population was identified at the south end of the Fort Lewis Military Reservation and in a pasture immediately to the south of the military reservation. Because of the abundance and distribution of the plant, it will not be possible to completely avoid the population with minor modifications to the pipeline route. Some individuals will be adversely affected by installation of the pipeline. However, the white-top aster currently occurs in locations where pipelines have been previously installed. Therefore, it may be possible for the plant to become re-established if (1) disturbance to the topsoil (i.e., seed source) is minimized during construction, and (2) invasive species are prevented from establishing when construction is complete. However, for purposes of this environmental review, natural re-establishment of white-top aster in disturbed areas is not considered a plausible outcome. Supply System is working with WDNR to develop appropriate mitigation measures.

3.5.6 Cumulative Impacts

With the exception of oak woodlands and prairies, habitat types disturbed by the project are prevalent throughout western Washington and in the vicinity of the project. Because of this, the project is considered to have a generally low cumulative impact on botanical, vegetation, and wetland resources. The temporary and permanent disturbances to these habitats are not considered significant either locally or regionally.

However, impacts to oak woodlands and prairie habitats are considered moderate in light of the extensive and severe cumulative impacts these habitats have accrued historically in western Washington. Urban and agricultural development, afforestation (via fire suppression), weed invasions, mining, and other circumstances and land uses have significantly reduced the original extent of these habitats and have significantly altered the remaining acreages of these habitats. These cumulative impacts have reached a threshold whereby additional impacts to these habitats would be considered high, in the sense that the original ecological integrity and character of these habitats could be irreparably damaged. In addition, because white-top aster is endemic to oak woodland and prairie habitats, this sensitive plant species has similarly undergone significant declines in populations and their distribution in western Washington. This project proposes to add to the cumulative impacts to this species and these habitats by permanently converting about 0.4 ha (1 acre) of oak woodland to shrub- and non-native grass-dominated habitats, and by disturbing about 4.0 ha (10 acres) of prairie habitat.

3.6 Wildlife and Fisheries Resources

3.6.1 Wildlife Habitat Disturbance and Conversion

Disturbance and/or conversion of 176 ha (435 acres) of wildlife habitat would result from the proposed project, primarily from construction of the 77-km (48-mile) gas pipeline (Table 3.6-1). However, 80 percent of the proposed new pipeline are routed along or through existing gas and

electrical transmission ROWs and, therefore, habitat modification to undisturbed lands would be minimized.

Table 3.6-1. Effects on Habitats from the Project

	Amount of Habitat Types Affected			
Habitat Type[1]	*ha (acres)*	*Percent of Impact Area*[2]	*Temporary Disturbance (ha [acre])*	*Permanent Conversion (ha [acre])*
Developed/disturbed	2.8 (7)	2	2.8 (7)	0
Forest				
Conifer	60.7 (150)	34	0	60.7 (150)
Regenerating conifer	21.1 (52)	12	0	21.1 (52)
Mixed conifer/deciduous	16.2 (40)	9	0	16.2 (40)
Deciduous	9.7 (24)	6	0	9.7 (24)
Forest Subtotal		**61**		
Shrub habitat	19.8 (49)	11	19.8 (49)	0
Prairie	4.0 (10)	2	0	4.0 (10)
Agriculture/vegetated developed/grassland	33.2 (82)	19	33.2 (82)	0
Wetlands				
Palustrine emergent	3.2 (8)	2	3.2 (8)	0
Palustrine scrub/shrub	2.0 (5)	1	2.0 (5)	0
Palustrine forest	2.8 (7)	2	0	2.8 (7)
Wetlands Subtotal	**8.0 (20)**	**5**	**5.8 (14)**	**2.8 (7)**
Open Water	0	0	0	0
TOTAL	**176.1 (435)**	**100**	**87.2 (215)**	**89 (220)**

1 Habitat cover types were identified and mapped 152 m (500 feet) either side of the proposed 77-km (48-mile) gas pipeline ROW; this area includes the 1,220-m (4,000-foot) long transmission line corridor from the CT facility to the substation and the 5.3-ha (13-acre) CT facility site. Habitat types in the mapped area total 2,371 ha (5,857 acres).

2 The impact area is defined as the proposed 5.3-ha (13-acre) CT facility site and a 23-m wide (75-foot) construction ROW along the 77-km (48-mile) gas pipeline, including both temporary and permanent habitat loss. The 1,220-m (4,000-foot) long transmission corridor is also included in the estimated impact area.

Source: Dames & Moore 1994

Permanent habitat conversion would occur in forested upland and wetland areas along the proposed gas pipeline ROW as well as in the already disturbed CT facility site. A very small amount of habitat would also be lost permanently due to placement of transmission towers. A total of 87 ha (214 acres) of upland forested and 2 ha (6 acres) of wetland forest habitat would be permanently converted to a maintained gas pipeline ROW, most likely grassland or shrubland habitat in the upland areas and emergent or scrub-shrub wetlands in the wetland areas. This loss of forest

habitat equates to approximately 49 percent of the affected area, but only 6 percent of the forested habitat in the mapped study area as described previously in Section 2.6.1. Second-growth and regenerating conifer forests, the largest forest types affected, provide habitat to ruffed grouse, black-capped chickadee, and black-tailed deer. Deciduous forests, including oak woodlands, provide unique habitat characteristics for a number of species including the belted kingfisher, osprey, and bald eagle in deciduous forests and the western bluebird and western gray squirrel in oak woodlands. About 0.4 ha (1 acre) of oak woodland would also be permanently converted to grass- or shrub-dominated habitats.

The remaining 87 ha (215 acres) of impact area would experience only temporary habitat disturbance. A total of 6 ha (15 acres) of wetland habitat, including emergent and scrub-shrub areas, would be temporarily disturbed during construction of the gas pipeline (Table 3.6-1). Emergent and scrub-shrub wetlands provide important habitat for numerous species including the red-winged blackbird, marsh wren, willow flycatcher, and song sparrow. Likewise, approximately 4 ha (10 acres) of prairie habitat, commonly used by the western meadowlark and western kingbird, would be temporarily impacted. The largest habitat types to be temporarily disturbed would be 33 ha (82 acres) of agriculture/vegetated developed/grassland and 22 ha (53 acres) of forest habitat. No ponds or lakes would be affected. All of the disturbed areas within the construction easement would be revegetated after construction.

3.6.2 Construction and Operation Disturbance to Wildlife

The proposed project would create a notable disturbance to wildlife during construction and other ground-disturbing activities. General disturbance would be greatest during the construction period due to the use of heavy equipment, traffic, and increased human activity. These disturbances are likely to displace wildlife over the course of the activities. Additionally, required periodic vegetation maintenance along the gas pipeline ROW during project operation would also temporarily displace wildlife for a short duration.

3.6.3 Impacts to Sensitive Wildlife Species

Of the three Federally listed threatened or endangered species potentially occurring in the project vicinity—the bald eagle, marbled murrelet, and northern spotted owl—only the occurrence of the bald eagle has been documented. Both the marbled murrelet and spotted owl are not likely to occur in the project vicinity. Although suitable murrelet and spotted owl habitat (i.e., old-growth or mature forests) occurs within the Supply System WNP-3/WNP-5 complex, surveys for both threatened species indicate that neither is present in the vicinity of the project (pers. comm., V. Artman, Wildlife Biologist, Dames & Moore, Seattle, Washington, July 21, 1994) (see Chapter VI, Appendix C, Biological Assessment).

Bald Eagle. Potential effects to the bald eagle include: 1) nesting habitat loss or disturbance, 2) wintering habitat loss or disturbance, and 3) alteration to potential food stocks. Electrocution and/or collision with transmission lines and towers poses a threat to bald eagles. This hazard is discussed in Section 3.6.3.

Construction and operation of the proposed project would not result in the loss of bald eagle nesting habitat. One active bald eagle nest site and its alternate site is located approximately 610 m (2,000 feet) from the proposed gas pipeline ROW. A maximum width of 23 m (75 feet) would be cleared for construction of the ROW; an 18-m (60-foot) wide ROW would be permanently maintained. The nest location is well outside of the construction ROW and would, therefore, not be physically affected by the pipeline. The second active nest site is approximately 1.6 km (1 mile) southwest of proposed pipeline ROW, outside of the project vicinity and also outside of the 1.6-km (1-mile) activity buffer recommended by the USFWS for protection/disturbance issues related to the bald eagle. Bald eagles are generally intolerant of human activity during nesting season. Consequently, the WDFW recommends that no construction activities take place near nest sites between January 1 and August 15. Nesting activity of bald eagles in a given year is determined each April (pers. comm., M. Zahn, Wildlife Biologist, WDFW, Elma, Washington, January 20, 1994). Additional disturbance from vegetation maintenance along the ROW and sporadic increases in human activity could potentially affect the bald eagle during nesting.

Construction and operation of the proposed project also would not result in the loss of bald eagle wintering habitat. The timing and anticipated length of gas pipeline construction activities is such that the more intensive operations would be completed before wintering bald eagles would typically occupy the project vicinity, thereby reducing the disturbing effects to wintering bald eagles. Disturbance from periodic vegetation maintenance along the gas pipeline ROW and increased human activity could temporarily displace wintering bald eagles. However, the Chehalis and Deschutes rivers do not typically support concentrations of wintering bald eagles and most maintenance activities would be done at other times of the year; therefore, the project is not likely to affect bald eagles during winter.

Food stocks for bald eagles would not be affected by implementation of the proposed project. Fisheries resources would not be affected to a degree that would limit fish as a bald eagle food source, nor would waterfowl concentration areas be affected by project construction or operation.

Marbled Murrelet. Relatively large stands of mature timber occur in the project vicinity, particularly within Supply System WNP-3/WNP-5 complex. Marbled murrelet surveys conducted during 1994 confirmed the absence of murrelet nesting activity within the site (pers. comm., V. Artman, Wildlife Biologist, Dames & Moore, Seattle, Washington, July 21, 1994). Therefore, construction and operation of the CT project would not affect the marbled murrelet.

Northern Spotted Owl. Like the marbled murrelet, the northern spotted owl depends on mature or old-growth forests for nesting and foraging. Spotted owl surveys were conducted during 1994 and confirmed that no spotted owl reside in mature forest habitat at the Supply System WNP-3/WNP-5 complex (pers. comm. V. Artman, Wildlife Biologist, Dames & Moore, Seattle, Washington, July 21, 1994). Therefore, construction and operation of the proposed project would not affect the northern spotted owl or potential spotted owl habitat.

Federal Candidate/State Priority Species and Habitats. Of the five Federal candidate wildlife species identified by the USFWS, the northern goshawk is the only species that has been confirmed to occur in the vicinity of the project. Loss of forested habitat would impact the goshawk, a forest dweller. Additionally, the state-listed and candidate species, pileated woodpecker, western bluebird,

and western gray squirrel, would be impacted by the disturbance to their habitats. Portions of the proposed 77-km (48-mile) gas pipeline ROW parallel or intersect areas designated by the WDFW as priority habitats, including wintering waterfowl and trumpeter swan concentration areas; nesting habitat for the pileated woodpecker, wood duck, western bluebird, and Oregon vesper sparrow; oak woodlands; and prairies. Approximately 0.4 and 4 ha (1 and 10 acres) of oak woodlands and prairie, respectively, would be affected by construction of the project; no impacts to waterfowl concentration areas or nesting habitat are expected.

3.6.4 Wildlife Mitigation

Recommended mitigation measures for wildlife and habitat impacts include the following:

- Retain native vegetation as much as possible in the impact areas to preserve wildlife habitat and provide a buffer of vegetation for surrounding habitat areas.

- Replant disturbed habitats with native vegetation to reduce the duration of habitat disturbance. In areas requiring maintenance, plant native grassland species that need less frequent maintenance than native pioneer shrubs, thus reducing the frequency of human activity in the area.

- Evaluate bald eagle nesting activity in the vicinity of the gas pipeline route and adjust construction schedule appropriately.

- Design and construct transmission lines with insulators sufficiently separated to minimize the potential hazard of raptor collision and electrocution.

- Contact USFWS and WDFW prior to the start of construction to update the list of endangered, threatened, or candidate wildlife species. If there are any new species listed, coordinate any possible mitigation measures with the appropriate agencies.

- Relocate any nest boxes for western bluebirds and wood ducks that may be disturbed by construction of the gas pipeline ROW.

3.6.5 Unavoidable Adverse Impacts to Wildlife

Habitat loss/conversion and disturbance would be the most significant impact to wildlife in the project vicinity. A total of 176 ha (435 acres) would be affected by the proposed project; of that, 87 ha (215 acres) of upland and wetland forest habitat would be permanently converted to a maintained ROW and an additional 91 ha (225 acres) would be temporarily disturbed by construction, revegetation efforts, and periodic vegetation maintenance. Additionally, 0.4 ha (1 acre) of oak woodlands and 4 ha (10 acres) of prairies, both state priority habitats, would be impacted. The oak woodlands would be permanently converted to grassland or shrubland; whereas the prairie would be temporarily disturbed.

Temporary disturbance from construction of the proposed project would likely displace wildlife during the period of those activities. Additionally, periodic displacement of wildlife would occur along the gas pipeline ROW because of required vegetation maintenance.

Given the relative abundance of wildlife habitat in the project vicinity; the amount habitat that would be impacted by the project; and assurance that state and Federal guidelines for bald eagle protection, minimizing ground disturbing activities during nesting and rearing season, and timely revegetation of disturbed habitats, the proposed project is considered to have low impacts to wildlife.

3.6.6 Cumulative Impacts to Wildlife

In the project vicinity, the most significant impact to wildlife would be the conversion of 87 ha (215 acres) of forested upland and wetland habitat and the temporary disturbance of an additional 91 ha (225 acres) of various wildlife habitats from construction and maintenance of the CT facility and its associated gas pipeline and electrical transmission line (Table 3.6-1). Because the CT facility site is already extremely disturbed and the gas pipeline ROW would receive little disturbance after initial construction, the direct contribution of the proposed project to regional cumulative impacts on wildlife habitat would be low. This project would contribute marginally to the continued growth and development in the Satsop/Elma area and could contribute to loss of additional wildlife habitat and increased future disturbance to local wildlife.

3.6.7 Fisheries Impacts

CT Facility and Associated Components

No significant impacts would occur to fish resources from construction of the CT facility, associated electrical transmission line, and water supply and wastewater line connections. The proposed CT facility is flat, and potential for stream sedimentation from construction activities is very low, and readily controlled.

During the summer low flow periods in the Chehalis River (worst case), the anticipated project water requirement (5,079 lpm [1,342 gpm]) would account for only about 0.4 percent of the base flow requirement of the Chehalis River set by Ecology. This would have a minor and insignificant effect on fisheries in the Chehalis River. A maximum of 678 lpm (179 gpm) of process wastewater is expected to be discharged during operation of the proposed project. This represents only about 0.07 percent of the Chehalis River base flow requirement of Ecology. The regulations governing levels of pollutants and temperature allowed in the project effluent would ensure the protection of the fisheries resources in the Chehalis River. The resultant impacts to fisheries resources would be minor.

Gas Pipeline

Impacts to fisheries, such as effects of sedimentation and turbidity, acoustic shock, destruction of stream cover, introduction of water pollutants, or entrainment of fish, could result from pipeline construction activities. These potential impacts are described below.

Sediment and Turbidity. Salmonid spawning areas are especially susceptible to increased sedimentation of fines (e.g., sand, silt). The increased sediment may affect the survival of eggs and emerging fry from spawning nests. Any increase of fines less than 3 mm in size, or greater than 10 to 15 percent of the redd substrate, reduces survival of eggs and emerging fry (Canadian Department of Fisheries and Oceans [CDFO] 1983). Increases of only a few percent of fines less than 0.85 mm in size have been found to significantly reduce in-gravel fry survival (CDFO 1983).

During construction at stream crossings, the concentration of suspended solids would be relatively high for only short periods and short distances downstream from the crossing. Increased suspended sediment concentration levels would also increase invertebrate drift and reduce fish feeding for brief periods. Downstream settling of fines can also cause mortality of bottom-dwelling organisms. Increased turbidity would temporarily reduce primary production of benthic algae.

If the stream crossing area contains trout or salmon spawning habitat, the substrate would be directly disturbed for a width across the stream usually not exceeding 13.7 m (45 feet). Spawning areas directly downstream of these proposed crossing sites could receive increased fines in the substrate. Much of these fines would be washed away during subsequent fall, winter, and spring high flows, reducing the impact on spawning success during the following season.

Acoustic Shock. Some stream crossings may require blasting of bedrock, causing acoustic shock that could be harmful to fish in the immediate vicinity of the explosion. The degree of impact would depend on the type of explosive, blasting technique, fish species, and timing. Teleki and Chamberlain (1978) found for typical major stream crossing detonation techniques for fish of the type commonly found in the Chehalis and south Puget Sound (salmon and trout) that almost none would be affected beyond 61 m (200 feet) of the detonation.

Cover Loss. Streambank vegetation, in-stream logs, rocks and undercut banks provide important cover for fish. Some of the in-stream and shoreline cover, and riparian trees that would form future large woody debris in the streams, would be lost from ROW clearing and trenching. Fish that normally reside within the area directly affected by the pipeline crossing would be temporarily displaced.

Other Potential Effects. Other potential fisheries impacts include interruption of fish spawning migration, fish entrainment, and fish mortality from toxic substance (fuel) spills. Some fish, including salmonid species, migrate during spawning runs in the spring, summer, and fall and could be briefly interrupted during installation of pipelines across water bodies. Entrainment of fish would not likely occur during water withdrawal for hydrostatic pipeline testing, because state agencies require screening the intakes. Direct spills of construction related liquids into streams could be toxic to fish, depending on the type, quantity, and concentration of the spill.

3.6.8 Impacts to Sensitive Fish Species

Based on its habitat characteristics and distribution, the Olympic mudminnow may be present in some of the low gradient crossings along the pipeline route. Likely crossings include those below the Mox Chehalis drainage and the Black Lake outlet crossing. However, their presence in most of these areas is unlikely (see Section 2.6.3).

In areas where mudminnows may occur, some temporary minor impacts could occur. Possible impacts include increased sediment that could affect food supply and short-term loss of cover along the shoreline, which could displace any fish that may be in the immediate crossing area (less than 30.5 m [100 feet] wide per crossing).

3.6.9 Fisheries Mitigation

Most mitigation will occur in the form of requirements placed upon the developer through the permitting process. The mitigation will be mostly related to construction of the gas pipeline, as this activity has the largest potential for impacts to fisheries resources. Supply System has proposed several actions that will aid in preventing impacts to fisheries resources (Dames & Moore 1994), as follows:

- All staging areas will be located 15.25 to 30.5 m (50 to 100 feet) back from the stream bank to reduce loss of riparian vegetation.
- Trenched material will be stored above the stream bank and protected with silt fences, hay bales, and other facilities that will reduce sediment runoff into the stream.
- Placement or extension of culverts will follow stipulations set forth in the SCA or EFSEC Resolutions to avoid impacts resulting from wash-outs or fish migration barriers.
- Supply System will notify EFSEC and others regarding proposed construction activities.
- Crossings will be constructed perpendicular to the axis of the stream channel, as engineering and routing conditions permit.
- Clean gravel will be used for the upper 0.3 m (1 foot) of fill over excavations in streams.
- Downstream flow rates will be maintained at all times.
- Equipment pads, clean rockfill and culverts, or a portable bridge will be used for equipment crossing sensitive perennial streams.
- Instream construction in minor streams will be completed within 24 hours of initiation.
- Sediment filter devices will be installed and maintained at all streambanks.
- Daily inspections and repairs will be performed as needed.
- Streambank contours will be returned to their original state, where possible.
- Affected areas will be revegetated immediately after construction using vegetation that is fast to establish, and native plants such as willows and alder will be planted for long-term stabilization.

- Log deflectors will be used that create sediment deposition and banks will be stabilized with plants as soon as possible following construction.

- The use of riprap will be limited to areas where flow conditions preempt vegetative stabilization.

- On sensitive crossings, construction will be limited to the low flow period, which would occur between approximately June 15 and September 15. This time window could be adjusted depending on the resources present and conditions of the permit by state agencies.

- Staging areas, access roads, and temporary roads will be located at least 15.25 m (50 feet) away from streambank where topographic conditions permit.

- The size of areas disturbed will be limited when constructing a stream crossing.

- As stipulated in the SPCC Plan, the developer will avoid storing hazardous materials, chemicals, fuels, and lubricating oils, or perform concrete coating activities within floodplain (at least 30.5 m [100 feet] from bank).

3.6.10 Unavoidable Adverse Impacts to Fisheries

The potential for erosion from construction activity at the CT facility is low, and minimum ground disturbance for water supply and wastewater connection would be expected. The amount of water withdrawn from the Chehalis River (through the hydraulically connected Ranney Wells) would be very low compared to the available flow in the Chehalis River. Even at low summer flows the project would account for only about 0.4 percent of available flour. Water quality in the facility's effluent to the Chehalis River would be maintained to high standards through permits. Therefore, unavoidable adverse impacts to fisheries from the CT facility are considered low. Although 21 perennial and 3 intermittent streams would be crossed by the pipeline, no individual stream is crossed more than once. This reduces any additive effects of crossing a stream several times in a short region. Although some drainage basins would be crossed more than once (e.g., McLane four times and Kennedy three times), these crossings are widely distributed or in the headwater areas within each basin, and any impacts would be short term and localized. Temporary losses of benthic organisms which are important food sources for fish would occur at stream crossings where the pipelines are trenched across streams. This loss would be short term because new organisms would quickly recolonize the area. The increased suspended sediment from trenching would also cause a short-term reduction in downstream bottom organisms, temporary reduction in primary production of attached algae, and reduced feeding of fish. In most cases, the increased suspended sediment would be less than a day and remaining effects would be short term. Blasting at stream crossings could cause temporary loss of benthic fish food organisms and possibly minor direct loss of fish.

Clearing bank riparian vegetation would reduce nearshore cover for fish along a 13.7-m (45-foot) (usually) to 30.5-m (100-foot) band at each crossing. However, Supply System would immediately revegetate the riparian area using native vegetation. Some instream cover may temporarily be lost in crossing areas. Clearing riparian areas would reduce long-term input of large woody debris.

This input is important for pool habitat formation, which is important for fish rearing. However, the net loss would be very small because of small crossing area sizes relative to total stream riparian area lengths and the replacement of some these trees through revegetation. Therefore, unavoidable adverse impacts from the proposed gas pipeline are considered low.

3.6.11 Cumulative Impacts to Fisheries

Pipeline construction effects, as discussed above, would contribute to any other development that occurs along streams. Cumulative impacts from the proposed project would be low, because the area affected by the pipeline is small relative to any of the streams of concern. The possible future addition of a second turbine at the CT facility would have low cumulative impacts on fisheries resources because additional water withdrawal and discharge would be minor compared to available flow in the Chehalis River.

3.7 Land Use

3.7.1 Impacts to Existing Land Use

During construction at the CT facility and those portions of the gas pipeline route passing through populated areas, adjacent land uses may be affected by noise, dust, and construction-related traffic. Impacts are expected to be temporary and minor.

Approximately 54.4 km (34 miles) or 71 percent of the gas pipeline route would be adjacent to or in existing utility ROW, 4.8 km (3 miles) would be within or adjacent to existing logging roads, and approximately 1.6 km (1 mile) would be adjacent to an existing roadway in agricultural land. This would serve to decrease the overall impact of construction, because much of the activity would occur in and near previously disturbed areas that are generally away from populated areas. In areas where the pipeline does not use existing corridors, pipeline construction would result in tree clearing, possible temporary suspension of agricultural activities on agricultural land, and temporary disruption of the natural character of the area.

After completion of construction, the ROW would be restored to the extent feasible. As a result, impacts from the pipeline on adjacent land uses would be minor. Ongoing maintenance activities along the pipeline route could give local residents the feeling of intensified land use.

Placement of the new pipeline corridor within an existing utility corridor is considered to be an efficient use of the land. Although technically this would be a land use intensification, the uses are compatible, and long-term impacts are restricted to a narrow area. Similarly, in terms of land use, the presence of a new power plant at the project site would be compatible with the adjacent industrial structures and facilities. Nearby residents may also perceive the plant as an intensified land use.

3.7.2 Consistency With Local Comprehensive Plans and Policies

Grays Harbor County

The project is generally consistent with local Grays Harbor County land use plans, with respect to siting electrical generating facilities. In Grays Harbor County, development of electrical power plants in a GD-5 zone is permitted outright. In addition, siting the 1,222 m (4,000 feet) of electrical transmission line within the BPA ROW would be an appropriate use of this land, since this land is designated as a utility ROW. The gas pipeline, however, would require Conditional Use Permits from the county for construction in the GD-1, A-1, A-2 zones. Utility construction in the Conservancy and Rural Environments of the SMP is also listed as a Conditional Use. With appropriate design considerations, including placing the utilities underground, placing utilities along existing ROWs and easements, and restoring damaged areas, the project would be in conformance with the policies and regulations of Grays Harbor County.

Thurston County

In Thurston County, the project would be consistent with local plans in some areas but not in others. Specifically, construction of the gas pipeline in most areas would require a Special Use Permit. Near the I-5 crossing, the pipeline route enters a Planned Industrial District zone. Gas pipelines are an unclassified use in the Planned Industrial District zone and would require a special determination by the County Planning Director that it is similar to permitted uses within that zone. Most waterways crossed by the pipeline route are in designated shoreline environments in which utility construction is considered a Conditional Use.

The only instance in which the proposed pipeline may be in conflict with local designations is where the ROW crosses the Black Lake Drainage Ditch north of Black Lake. This area is designated as a Natural Environment in the SMP. Utilities are not permitted in the Natural Environment area, with the exception of utilities necessary to serve single-family residences and public recreation facilities. Supply System is undertaking negotiations with the county and EFSEC to attempt to obtain approval from the county.

Capitol State Forest

The project is generally consistent with the land use plans for Capitol State Forest. Approximately 9 km (5.5 miles) of the 16-km (10-mile) long proposed gas pipeline that passes through the state forest ROW would occur within or adjacent to the alignment of NWP's McCleary Line. NWP is permitted to operate the McCleary Line in the state forest under the terms of an exclusive use easement granted by the WDNR. Construction of an additional pipeline within this easement is permitted under the terms of this agreement. If additional ROWs outside this easement are required for construction of the proposed pipeline, the developer would apply for additional easements. Near both the eastern and western boundaries of the forest, the proposed pipeline does not follow an existing utility easement. New ROW easement would have to be acquired for installation and operation of the pipeline in these areas. Until a more precise final route is determined, it is not known how many hectares (acres) of timber production land located in the ROW would be taken out of production.

Supply System would coordinate with EFSEC to obtain easements from WDNR in the two sections of the Capitol State Forest according to the following procedure:

- Identify required easement location on the ground.
- Review location with WDNR field forester and calculate damages.
- Submit an easement application, accompanied by an approved plat to EFSEC.
- EFSEC coordinates with WDNR, and if the easement is approved, it would be incorporated into the SCA amendment.

3.7.3 Mitigation

To reduce impacts to residents living near the CT facility site, screening berms will be developed along Keys Road with landscaping between the residences and the facility. These buffers would reduce the visual and noise impacts of the facility on nearby residents. To reduce impacts along the pipeline corridor, ROW vegetative clearing, especially in the forested areas, will be reduced to the absolute minimum necessary for construction to ensure safety. Limits of clearing will be clearly marked, and large trees will be preserved whenever feasible without interfering with construction. Areas cleared for construction purposes will be replanted with native vegetation. Performance standards for replanting and survival will be established to ensure restoration of impacted shoreline areas, wildlife habitat, wetlands, and viewsheds, in the shortest possible time.

3.7.4 Unavoidable Adverse Impacts

Most potential impacts to land use would be restricted to temporary minor disruptions along the pipeline route. Therefore, overall impacts to land use from the proposed project are considered low. The only significant unavoidable adverse impact to land use occurs along the natural gas pipeline route where it crosses the Black Lake Drainage Ditch, which is designated as a Natural Environment in the SMP. Mitigation measures would be required to avoid or minimize any long-term adverse impacts to the Black Lake Drainage Ditch. Until mitigation measures are developed, the adverse impacts to the drainage ditch cannot be evaluated.

The gas pipeline route would also cross through Capitol State Forest. The pipeline ROW, which would be kept clear of trees, would take an as yet undetermined amount of land out of forested use. Therefore, the level of this impact cannot yet be evaluated.

3.7.5 Cumulative Impacts

Cumulative adverse impacts to land use from the proposed project are considered low. A proposed second turbine facility would be developed within the already developed Supply System WNP-3/WNP-5 project area, and although it would add to the industrial character of the area, it would be consistent with the Grays Harbor County Comprehensive Plan.

3.8 Cultural Resources

3.8.1 Impacts

Direct impacts of the project would include physical modification of cultural resources resulting from project construction activities. These activities would include site and road grading, excavation for foundations and utility lines, and heavy equipment traffic off road. Construction of the natural gas pipeline could cause a direct impact to HSN-2, an historic-era refuse deposit. Indirect impacts to cultural resources might include such effects as an increase in vandalism and unauthorized artifact collecting brought about by access improvement to archaeological sites.

3.8.2 Mitigation

The following measures will be implemented to mitigate potential impacts to cultural resources from construction and operation of the project:

- Avoidance of potential impact to HSN-2 by moving the centerline of the natural gas pipeline route 30.5 m (100 feet) to the north in the vicinity of this site will be investigated.

- If rerouting the gas pipeline is not feasible, Supply System will obtain from the Washington State Historic Preservation Officer (SHPO) a formal determination of National Registry eligibility for the site. If deemed eligible, the developer will then prepare and implement an approved cultural resources management plan.

- Supply System will carry out the following emergency procedures if construction personnel encounter previously unrecorded cultural resources during construction or operation of the project:

  - Supply System will immediately notify the SHPO upon encountering an unrecorded cultural resource.

  - Supply System will halt construction in the immediate vicinity of the find until Supply System and SHPO can determine whether the cultural resource is potentially eligible for NRHP nomination.

  - If Supply System and the SHPO determine the cultural resource eligible for the NRHP, they will implement avoidance or data recovery procedures.

- Supply System will supervise the preparation and distribution of a pamphlet explaining to project construction workers the procedures to follow in case they discover cultural resources during construction.

3.8.3 Unavoidable Adverse Impacts

The project would have low unavoidable adverse impacts to cultural resources as long as the mitigation measure is carried out.

3.8.4 Cumulative Impacts

The project would not contribute to cumulative impacts to significant cultural resources.

3.9 Socioeconomics and Public Services

3.9.1 Work Force and Housing

Construction

The construction period is estimated to last 19 months, with the peak construction workforce estimated at 135 for the CT facility and 206 for the gas pipeline. Over one-half of the construction workforce is expected to be hired from within Thurston and Grays Harbor counties. Workers hired from outside the two-county area are likely to commute to the site on a daily or weekly basis. Construction workers are typically willing to travel up to 96 km (60 miles) to a worksite on a daily basis rather than temporarily relocate their residences during the construction period (Weber and Howell 1982). Any non-local construction workers that chose to relocate would most likely leave when their task is completed. Therefore, a majority of the housing needs during construction would be for rentals and transient-type housing such as recreational vehicle (RV) spaces, motel/hotel rooms, mobile home spaces, or mobile home rentals. Currently, there are sufficient transient-type housing units available in the project vicinity to meet this demand.

Operation

During operation of the proposed project, approximately 21 full-time employees would be required. In assessing the impact of the operation labor requirements on local housing, a worst-case scenario is assumed whereby all operations personnel would be non-local and relocate to the two-county area.

Housing vacancy rates for the two counties were presented in Section 2.9.2. The vacancy rates in 1990 indicate adequate availability given expected future demand. Although housing vacancy rates fluctuate with shifts in economic trends, the influx of 21 employees and their dependents would not place an undue burden on the housing market in the two-county area, and these workers would be able to obtain suitable housing.

3.9.2 Employment and Income

The two-county area would benefit from increased short- and long-term employment opportunities and income. The influx of out-of-area construction workers would generate business for motels, recreational vehicle parks, and campgrounds. Restaurants and other service providers and retailers in these communities would experience an increase in business during construction. Many of the purchases and rental of construction materials and equipment would be made locally,

generating additional income for local suppliers. Local non-salary expenditures over the 19-month construction period are expected to total about $12.5 million, including $9 million for materials and supplies and $3.5 million for subcontracted services. These expenditures are expected to be made within a radius of 80 km (50 miles) from the CT facility site.

With more than one-half the construction labor expected to come from local sources, a large portion of the wages and salaries earned during construction would be spent locally or in other parts of Washington State. Total construction employment for the project is expected to generate approximately $8.8 million in pre-tax wages and salaries. This, in addition to the array of local and state taxes that would be generated by the construction activities (total sales taxes during construction are expected to be approximately $13 million), the project would provide a substantial injection of funds into the local economy of both Grays Harbor and Thurston counties. These positive impacts would be temporary, lasting until construction is complete.

Based on the facility's required operational work force of 21, and using an employment multiplier of 0.6 indirect jobs created for each operation employee (Weber and Howell 1982), an estimated 13 indirect annual jobs would be generated during the 30-year life of the facility. Total operating and maintenance costs would be approximately $7 million per year. Of that, the facility's permanent work force would annually earn approximately $904,000.

3.9.3 Fiscal Budgets

During construction, sales tax revenue would be generated by the local purchase of construction materials. Other forms of tax revenue would be generated from project operation annually. These include increases in business and occupation, and brokered natural gas taxes. During the construction phase, expenditures made within the state of Washington by construction workers and expenditures made for facility related materials and equipment would increase sale tax collection by the state. However, the level of any such increase in the context of total annual sales tax revenues collected by the state of Washington is considered negligible. Business and occupation taxes resulting from direct and indirect facility impacts are expected to total $1.1 million per year. Because Supply System is a public corporation, it would pay no annual property taxes.

3.9.4 Community Services

Up to 50 percent of the construction work force is assumed to commute from outside the two-county area (worst case). This influx could place a temporary increase in demand on local public service providers, and have a minor and temporary effect on local police departments, fire departments, and providers of emergency medical services. The impact of project construction on local schools would also be minor and temporary, as few of the non-local construction workers that would temporarily relocate into the project vicinity are expected to be accompanied by families. Travel times for public service providers, such as school buses, may increase due to detours and traffic controls at road crossing locations. However, the traffic control plan (see Section 3.9.5) would include consideration of emergency vehicle needs. Because of the short duration of the project's construction phase and the relatively small size of the proposed construction crew, the adverse impact on local public services caused by construction is expected to be negligible.

During operation, Supply System's existing on-site services would accommodate the proposed project. These services are provided by the Fire Brigade, the Emergency Medical Response Team, and the Security Force which operates 24 hours per day, 365 days per year. The use of these on-site services, coupled with the relatively small number of employees that would staff the facility, would make minimal additional demand on local public services. As a result, operation of the proposed project would have a negligible adverse impact on existing public services in the project vicinity.

3.9.5 Transportation

Construction Traffic

Table 3.9-1 presents the estimated traffic increases during project construction. These estimates were calculated based on the following assumptions:

- A peak construction workforce of 135 for the CT facility, and 206 for the gas pipeline.
- A three percent annual growth factor to predict future traffic volumes.
- The size of the construction workforce would peak in 1996.
- The auto occupancy rate would be 1.1 individuals per car.
- Approximately 6,096 m (20,000 feet) of pipe would be constructed per week from the initiation of ROW clearing through completion of backfill work (approximately 18 weeks).
- Construction of the pipeline would start in the vicinity of NWP's mainline near Vail and proceed westward toward the proposed site.
- The workforce for the pipeline would range from a low of one person to a high of 206 people (see Figure 2.1-9). As each different work crew progresses during construction (that is, from timber crews to ROW crews to ditching crews to cleanup crews), the workforce would generally be spread out over several miles along the route. The peak on any one access road is expected to be no more than about 100 workers for a 1- to 2-week period.
- The majority of pipeline construction in the vicinity of the plant site would be completed within approximately 2 weeks of initiation of pipeline work in that area.
- Pipeline workers would use the state or county roads nearest the pipeline section to which the workers are assigned.
- Parking for the pipeline workers would be available adjacent to or nearby the pipeline section to which the workers are assigned.
- Construction crews working on the power plant and on the western-most portion of the pipeline would park in the existing construction laydown area, including areas north and west

of the proposed power plant site. These are graveled areas with internal roadway and access to Keys Road.

Table 3.9-1. Anticipated Reserve Capacities for the Intersection of SR 12 and Keys Road

	Eastbound		Westbound		Northbound				Southbound			
					Left-turn		Right-turn		Left-turn		Right-turn	
Condition	LOS[1]	Reserve[2]	LOS	Reserve	LOS	Reserve	LOS	Reserve	LOS	Reserve	LOS	Reserve
Existing	B	338	A	434	E	41	A	596	E	26	A	571
1996 without construction	B	345	B	397	E	20	A	573	F	-1	A	541
1996 with construction of CT Project	B	345	B	397	F	-91	A	460	E	-9	A	541
1997 without CT Project	B	334	B	382	E	16	A	563	F	-4	A	534
1997 with operation of CT Project	B	334	B	382	E	5	A	554	F	-4	A	534

[1] See Table 2.9-9 for LOS criteria.
[2] Passenger cars per hour.
Source: Dames & Moore 1994b

These assumptions resulted in a conservative worst-case analysis of traffic increases. The presence of the construction workforce for the plant and pipeline would result in the addition of approximately 204 vehicular trips per day (round trips) to roads serving the project vicinity assuming that pipeline construction in the vicinity of the plant is concurrent with plant construction. However, this situation would last no more than approximately 2 weeks. Approximately 123 round trips would be associated with plant construction alone. In addition, during the peak of pipeline construction, approximately 187 round trips would be added to roadways in the vicinity of the pipeline segments under construction. Construction traffic to and from the site would represent only about 10 percent of the total afternoon peak-hour traffic on the roads in the area. The level of service on the roadways serving the site would not noticeably decrease, and any such decreases would be temporary. The gas pipeline would involve crossings at SR 12, SR 507, I-5, 15 county roads, and 3 railroads. The roads undergoing pipeline construction would experience temporary delays during construction. However, the construction contractors would provide adequate traffic control during construction to permit traffic to use the road to the extent possible or to safely detour. It is unlikely that the size of the workforce at the CT facility site and gas pipeline segments installed near the site would peak at the same time. The workforce at the plant is expected to be at its peak for a period of 3 months in 1996. The peak in the pipeline construction workforce would occur during a 1- to 2-week period.

Operations Traffic

Operation of the CT facility would involve 21 employees split into either two 12-hour shifts or three 8-hour shifts. The traffic analysis presented below is based on the assumption that the plant would be fueled by natural gas. Supply System does not expect the gas supply to be interrupted; however, the project permits would allow up to 15 days per year of operation using fuel oil. If fuel oil is used, there would be a temporary increase in traffic due to the presence of tank trucks used to transport fuel oil to the on-site storage tank. Up to four heavy trucks would access the site each hour to ensure an adequate source of fuel.

An LOS analysis for the intersection of SR 12 and Keys Road was conducted using the two-shift operating schedule as a worst-case scenario (Table 3.9-1). Overall, the LOS at this intersection would not substantially change with operation of the generating facility and would remain at LOS B. Thus, operation of the proposed project would result in a negligible adverse impact on traffic.

3.9.6 Mitigation

Mitigation would be required to offset increases in traffic during the construction phase. The developer will prepare a parking and traffic control plan that would address the temporary disruptions and traffic controls to be implemented to minimize impacts to traffic flow and safety during roadway crossings. The developer will submit this plan to EFSEC for review and approval by the transportation staffs of Thurston and Grays Harbor counties, as well as the state. To minimize impacts at the intersection during afternoon peaks, the developer could: (1) require their construction contractors to schedule shifts to end before or after the afternoon peak, (2) minimize pipeline construction in the vicinity of the CT facility site when the plant's workforce is at its peak, (3) install a traffic signal, or (4) construct a temporary or permanent turning lane at the intersection of SR 12 and Keys Road.

3.9.7 Unavoidable Adverse Impacts

This project would have no unavoidable adverse impacts on the socioeconomic environment of the two-county area; rather, the project would have beneficial impacts. However, taking into account short-term localized increases in traffic volume and disturbance due to construction activity (even though mitigated), overall project impact is considered low.

3.9.8 Cumulative Impacts

Supply System may construct and operate a second CT facility adjacent to the proposed CT facility, with gas obtained from the proposed gas pipeline. With construction of the two adjacent facilities, project employment for the construction of the two CT facilities will reach a maximum of 270 (assuming conservatively that the workforce would double) and result in more than $17 million in pre-tax wages and salaries. Total sales taxes generated by the two plants are projected to be approximately $26 million, and local expenditures would be about $20 million. Upon completion of a second generation unit, the combined value of the power plants is expected to rise to approximately $425 million (1997 dollars). Annual operating and maintenance costs would be approximately $14 million, while Generating and Business and Occupation taxes are expected to

exceed $2 million per year. Any increases in sales tax and Business and Occupation resulting from the construction of the second CT plant would be negligible in contrast to state-wide tax collection. The facility's permanent work staff may also experience a slight increase.

With the increased number of construction personnel and vehicular trips in the project vicinity, concurrent construction of both CT facilities at the Satsop site would likely have a slightly greater negative impact on public services than the proposed single CT project. However, the total impact on these services is expected to be low. Operation of two generating facilities would have a minor negative effect on the local availability of public services.

If construction of the second CT generator was to occur at the same time the proposed project was being constructed, there could be a noticeable increase in traffic on local roadways. However, concurrent construction is unlikely. These traffic increases may require additional mitigation measures, especially at the SR 12/Keys Road intersection. With adequate mitigation, adverse cumulative impacts are expected to be low.

Increased vehicular traffic resulting from the simultaneous construction of the two CT facilities would worsen anticipated traffic backups at the intersection of SR 12 and Keys Road for both north and southbound vehicles making left turns from Keys Road onto SR 12. Operation of the larger facility would also worsen conditions associated with these specific traffic patterns (Table 3.9-1).

3.10 Recreation Resources

3.10.1 Effect on Recreation

The proposed CT facility, water supply and waste water connections, and electrical transmission line would be constructed on a site within the 648-ha (1,600-acre) WNP-3/WNP-5 site, owned and operated the Supply System. The recreation site closest to the CT facility site is the Satsop River access. This site is owned and operated by the state of Washington and is located about 1.6 km (1 mile) north of the proposed CT facility site. The access site offers shoreline access, fishing, and boat launching on the Satsop River. There would be no direct impact on the river access site due to construction and operation of the CT facility or associated facilities. No other recreation sites or facilities would be affected by construction or operation of the CT facility.

Approximately 33.6 km (21 miles) of the proposed gas pipeline would be installed adjacent to an existing natural gas pipeline, approximately 21 km (13 miles) would be installed within the BPA transmission line ROW, and approximately 6.4 km (4 miles) would be constructed in or adjacent to existing roadways. The remaining 16 km (10 miles) would be constructed in a new corridor. None of the lands along the existing gas pipeline route, the existing transmission line route, or the proposed new pipeline route are currently used as public park land, nor are any planned for conversion to public park land. Therefore, pipeline installation would have no direct impact on recreational resources of the area.

In Capitol State Forest, the proposed pipeline route crosses mostly undeveloped forested areas managed by the WDNR. However, an off-road vehicle trail would be crossed three times within

the state forest boundaries. Since the pipeline would be buried and surface soil conditions returned to their original state, the presence of the pipeline is expected to have only a minor and temporary impact on these trails. Installation of the pipeline in the state forest is therefore expected to have an overall negligible impact on forest recreation resources.

During construction, there would be temporary and localized increases in noise, dust, and construction-related traffic, including detours associated with pipeline installation across roadways. These conditions may temporarily decrease the quality of the recreational experience at the recreational facilities near the active construction areas. Facilities closest to the pipeline construction area are: (1) an off-road vehicle recreation site and several associated off-road vehicle trails at the northern end of Capitol State Forest, and (2) a privately run recreational vehicle park with 45 sites at the northern end of Black Lake. As noted above, other than the off-road vehicle trail crossings, the pipeline would not be constructed within the borders of these facilities. The impacts on these facilities associated with pipeline construction in the vicinity is expected to be minor and short term.

Much of the pipeline construction workforce is expected to be from outside the local area. Many of these workers travel to their worksites in camping vehicles and may use parks and other camping facilities for the duration of construction. Assuming most construction would take place during summer, workers may compete with recreational users of park and recreational facilities at a time when western Washington parks and recreation facilities frequently operate near or above capacity. However, the number of individuals seeking temporary living accommodations at recreational facilities is not expected to be large. Similarly, the workforce at the CT facility site is not expected to significantly affect recreational facilities in the area.

Noise impacts at recreational facilities would be minimized by using properly muffled and maintained construction equipment; dust releases would be minimized by the use of dust suppression techniques; and traffic difficulties would be minimized by using proper traffic controls, including flaggers and signage where appropriate. As a result, the impacts associated with construction would be temporary and minor.

After installation, operation and maintenance of the proposed pipeline would not affect access to or usage of parks or recreation facilities in the vicinity.

3.10.2 Mitigation

To avoid potential injuries to off-road vehicle riders using the trail in Capitol State Forest, which would be crossed three times by the pipeline, the trail should be closed while construction occurred in and near the trail. In addition, signage would warn riders of construction activities.

3.10.3 Unavoidable Adverse Impacts

Impacts to recreational opportunities from the proposed project would be minor and temporary, and therefore are considered low.

3.10.4 Cumulative Impacts

If a second CT facility were constructed adjacent to the proposed project, any increased impact on recreational facilities would be minor and temporary. Effects would consist mainly of additional competition for camping and trailer park facilities if the two turbine facilities were built at the same time. If this were the case, incremental impacts on recreation opportunities would be considered low.

3.11 Public Health and Safety

3.11.1 Combustion Turbine Facility

Regulated Fuel Substances

The CT facility would burn natural gas as the primary fuel supply. No. 2 fuel oil to be used as a backup fuel would be stored in an above-ground tank with a capacity of 6.8 million l (1.8 million gallons). The tank would be surrounded by a concrete dike of sufficient size to contain 110 percent of the total volume of the tank, including precipitation from the greatest storm for the area as required by regulations. Fuel oil would be delivered to the facility using tanker truckers from local suppliers. Up to four trucks per hour to a maximum of 43 trucks per day would be required to replenish supply of oil during the 15-day per year maximum oil firing period. An additional aboveground 757 l (200 gallons) tank would be used to store diesel fuel to operate an emergency fire pump, and would be similarly protected.

In the unlikely event of an accidental release of the fuels, direct impacts could include an increase in the exposure of the fuel to the facility personnel. However, with adequate ventilation and emergency safety procedures, the impact would be low.

Regulated Non-Fuel Substances

The CT facility may use and store the chemicals listed in Table 3.11-1. Direct impacts to facility personnel could result from accidental release of the substances. Facility personnel could come into contact or inhale chemicals accidentally released. Indirect health impacts of non-fuel substances to off-site populations could result from uncontrolled release of large volumes of these substances.

Solid Waste

The operation and construction of the CT facility would increase the generation of solid waste. Table 3.11-2 presents a list of typical solid waste materials expected to be generated, and indicates the proposed disposal method for each.

The water supply and wastewater treatment processes would create sludges requiring disposal in a suitable facility. These sludges would be tested for potential hazardous characteristics and disposed of in an appropriately certified facility.

Table 3.11-1. Chemicals Likely to be Stored at the CT Facility

Item No.	Storage Method	Contents	Estimated Liters (gallons)
1	No. 2 Fuel Oil Storage Tank	Fuel Oil	6,813,000 (1,800,000)
2	Aqueous Ammonia Storage Tank	Ammonia	45,420 (12,000)
3	Shot Chemical Feed Tank (Cooling Tower Corrosion Inhibitor)	1	378 (100)
4	Oxygen Scavenger Tank	DEAE	378 (100)
5	Neutralizing Amine Tank	Morpholine	378 (100)
6	Bulk Oxygen Scavenger Tank	DEAE	7,570 (2,000)
7	Inhibitor Tank	Polyphosphate	1,893 (500)
8	Biocide Tank	NaOCl	30,283 (8,000)
9	Acid Tank	Sulfuric Acid	30,283 (8,000)
10	Caustic Storage Tank	NaOH	28,498 (7,000)
11	Fuel Tank Fire Pump Pkg.	No. 1 Diesel	2,082 (550)
12	Anti Scalant Day Tank	Sodium Tolyltriazole	1,893 (500)
13	Lube Oil Tank, Comb. Turbine	Lube Oil	21,198 (5,600)
14	Lube Oil Tank, Steam Turbine	Lube Oil	TBD
15	Stm. Turbine Control Fluid	Fryquel EHC	TBD

TBD = To be determined.
1 Tolyltrazole, phosphonocarboxylate, phosophonate.

3.11.2 Gas Pipeline, Water and Wastewater Connections, and Electrical Transmission Line

A 77-km (48-mile) gas pipeline and connections to the existing Supply System's water and wastewater pipelines would be constructed to provide for the project. Also, a 1,220-m (4,000-foot) 230-kV electrical transmission line would be constructed within an existing transmission corridor connecting the proposed CT facility to an existing BPA substation. Hazardous substances used during the construction of the buried and overhead transmission lines include petroleum products, lubricants, and other substances associated with vehicle maintenance. Also, adverse environmental effects could be caused by the accidental release of controlled substances during construction. Adverse environmental impacts include possible impacts to vegetation and/or wildlife due to exposure to controlled substances.

3.11.3 EMF and Shock Hazard

EMF

Both electric and magnetic alternating-current (a-c) 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, a number of subtle effects of unknown biological significance have been reported in some laboratory studies (Frey 1993).

Table 3.11-2. Typical Solid Waste Materials Generated by a CT Facility

Waste Stream	*Classification*	*Amount*	*Frequency*	*On-Site Treatment*	*Storage*	*Off-Site Treatment/ Disposal*
Used Lead Acid Batteries	Hazardous	2-cells	Once Per Year	None	None	Recycle to Battery Vendors
Spent SCR Catalyst Material	Hazardous	170-230 cu. m (6,000-8,000 cu. ft)	Once Every 3-5 Years	None	None	Ship to Hazardous Waste Disposal Facility
Oil Rags, Oil Absorbent Material	Hazardous	<1 cu. m (20 cu. ft)	Once Per Month	None	None	Ship to Waste Disposal Facility, launder or use as fuel for incinerator
Spent Cation Demineralizer Resins	Nonhazardous	48 cu. m (1,700 cu. ft)	Once Every 8-10 Years	None	None	Recycle to Resin Vendors
Spent Anion Demineralizer Resins	Nonhazardous	45 cu. m (1,600 cu. ft)	Once Every 4-5 Years	None	None	Recycle to Resin Vendors
Office Waste Materials (Trash and Garbage)	Nonhazardous	>9 kg/day (>20 lb/day)	Daily	None	None	Ship to Sanitary Landfill

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, National Radiological Protection Board [NRPB] 1992, Oak Ridge Associated Universities [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 EMFs and cancer. A review of some of the studies relating to EMF and possible biological and health effects are included in Appendix D.

A magnetic field exposure assessment was done for the proposed project using industry-accepted computer modeling techniques by first estimating what future magnetic levels would be without the proposed project. This analysis served as a baseline measurement for engineers to 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 exist nearby.

There are a few homes and businesses in the vicinity of the proposed transmission line. However, it is unlikely that any of them are close enough to experience any increase in magnetic field exposures from the new facilities.

Electrical Shock

Power lines, like electrical wiring, can cause serious electric shocks if certain precautions are not taken. These precautions include building the lines to minimize the shock hazard. All BPA lines are designed and constructed in accordance with the National Electrical Safety Code (NESC). NESC specifies the minimum allowable distances between the lines and the ground or other objects. These requirements basically determine the edge of the ROW and the height of the line (i.e., the closest point that houses, other buildings, and vehicles are allowed to the line) to limit electric field effects to acceptable levels.

People must also take certain precautions when working or playing near power lines. It is extremely important that a person not bring anything, such as a TV antenna or irrigation pipe, too close to the lines. BPA provides a free booklet that describes safety precautions for people who live or work near transmission lines (Living and Working Around High Voltage Power Lines).

Transmission lines can also induce voltages into objects near the lines. This effect can lead to nuisance shocks if a voltage is induced on something like wire fencing which is on wood posts and, therefore, insulated from ground. Usually, however, this becomes a problem only with lines of voltages above 230 kV. Should problems develop with either high- or low-voltage lines, they can be corrected by simple grounding techniques. For 500-kV lines, grounding of certain objects near the lines is a routine part of the construction process.

3.11.4 Mitigation

The following measures will be implemented to mitigate potential impacts to public health and safety from construction and operation of the proposed CT facility.

- A revision to Supply System's existing SPCC Plan will be developed to include the CT facility and be in place prior to the arrival and storage of any chemicals at the proposed facility. The plan will meet all the requirements of 40 Code of Federal Regulations (CFR) Part 112.

- The storage and use of substances at the site will adhere to the Uniform Fire Code (UFC) Article 80. In compliance with this regulation, a Hazardous Materials Inventory Statement and a Hazardous Materials Management Plan will be produced and filed with the Elma Fire Department, Grays Harbor County Emergency Management, and Ecology's Community Right-to-Know Unit prior to the arrival of any hazardous materials. These plans are in place for WNP-3 and will be revised to include the CT facility. They will include all the information as listed in the UFC Appendix II-E. In addition, the facility will adhere to the

reporting requirements under Superfund Amendment and Reauthorization Act (SARA) Title III.

- A reuse and recycling plan will help reduce impact from solid waste generated by the CT facility. The plan is currently in place as part of the existing NPDES permit and will be modified to include the CT facility.

- The existing Environmental Protection Control Plan, Spill Prevention and Countermeasure Plan, and Hazardous Waste Management Procedure include storm water prevention and will be modified to include the CT facility. These plans address the construction activities and handling of hazardous substances associated with construction of these buried and overhead components.

3.11.5 Unavoidable Adverse Impacts

Steps and measures have been taken to ensure that the construction and operation of the project would not have significant adverse impacts on the health and safety of the public. Therefore, adverse impacts to public health and safety from the proposed project are considered low.

3.11.6 Cumulative Impacts

Operation of the project would increase the amount of solid waste disposed of at a landfill. In regard to hazardous material, the potential for exposure to regulated fuel and regulated non-fuel substances would increase. However, all necessary mitigation measures would be taken to ensure that in the unlikely event of an accidental release, exposures would be minimal.

Currently, the proposed facility includes one combustion turbine. If a second turbine is added to the project, the plans would be amended accordingly. Regardless whether the proposed facility includes one or two combustion turbines, the cumulative impacts would be low.

3.12 Visual Quality

3.12.1 General Effects of Project Components

CT Facility

The CT facility would have an industrial appearance, with rectangular buildings ranging from 6 to 19 m (20 to 64 feet) in height. Ancillary elements would include fuel and liquid storage tanks, an electrical switchyard, 16 to 19-m (41 to 46 foot) high cooling towers, fencing, a HRSG, and a 49-m (160-foot) high emission stack with airplane warning lights.

Most of the CT facility and associated structures (except the emission stack) would not be seen from the Chehalis River Valley because of hilly topography and heavy vegetation between the site and the valley. Section 3.12.2 describes what views of project facilities would look like from the Chehalis Valley and West Keys Road. Residents and drivers on Keys Road and West Keys Road would have views of the facility.

Electrical Transmission Line

New transmission line towers for the project would be constructed within the existing BPA Olympia/Aberdeen ROW to connect a new transmission line between the CT facility site and the Satsop Substation (located approximately 1,219 m [4,000 feet] east of the project). Existing wooden poles in the ROW would be replaced with 57-m (141-foot) high steel towers similar to the two rows of steel towers currently in the ROW. The replacement transmission line towers would be constructed within the existing BPA ROW and would have low additional visual impacts.

Gas Pipeline

Because approximately 60.8 km (38 miles) of the proposed 77-m (48-mile) gas pipeline would be located adjacent to or in existing pipeline and transmission line ROW, construction and maintenance of the pipeline would not have significant effects on the visual quality of the landscape. Most of the route would be located away from where travelers on highways and roads would see the ROW.

The pipeline ROW would be visible to several residences near Rock Road in the Belmore area. The primary visual impact associated with the pipeline would during the construction phase of the project, when construction activities could be seen and heard. Upon completion of construction, the ROW would be reseeded. Some visual scarring from construction in the existing ROW that the pipeline would follow would be evident for a few years until replanted vegetation over backfilled trenches becomes established (Dames & Moore 1994).

3.12.2 Effects on Key Viewing Areas

Primary viewers in the project vicinity would include residents, travelers along SR 12, travelers on local roads, agricultural workers, and nuclear plant workers. The largest group of residential viewers would be residents near the town of Satsop located north of SR 12. The viewing distance of these residences to project facilities would be approximately 3 km (2 miles). Similar viewing conditions would exist for scattered residences throughout the valley. The closest and most sensitive residential views would be from several residences located along Keys Road and West Keys Road.

The highest concentration of travelers with views of the project would be people traveling on SR 12. Travelers on Keys Road would be fewer in number, but would have closer views of the project.

To simulate the effects of the project on visual quality, two key viewing areas (KVAs) were selected (Figure 3.12-1). KVA-1 is located at the intersection of Highway 12 and Keys Road. It represents views residents and travellers in the Chehalis Valley would have of the project. KVA-2 is located on West Keys Road under the BPA transmission line ROW, and represents views travelers and residents along West Keys Road would have of the facility.

KVA-1 (State Route 12 and Keys Road Intersection)

Currently, the two large 150-m (496-foot) high Supply System WNP-3 and WNP-5 cooling towers and a Supply System building can be seen from KVA-1 (Figure 3.12-2a). The proposed project would have minor effects on the visual quality of the landscape as seen from KVA-1.

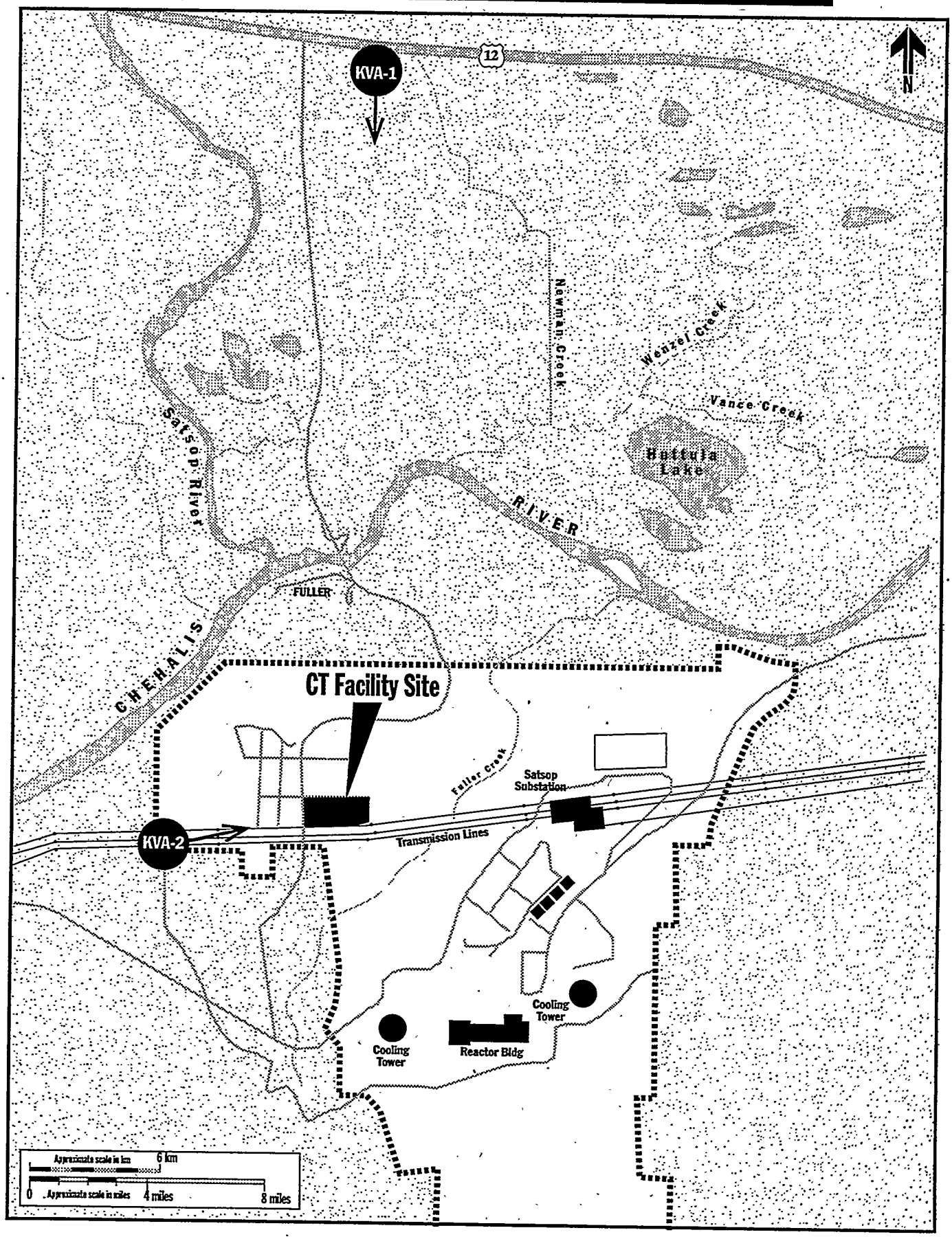


Figure 3.12-1 Location of Key Viewing Areas

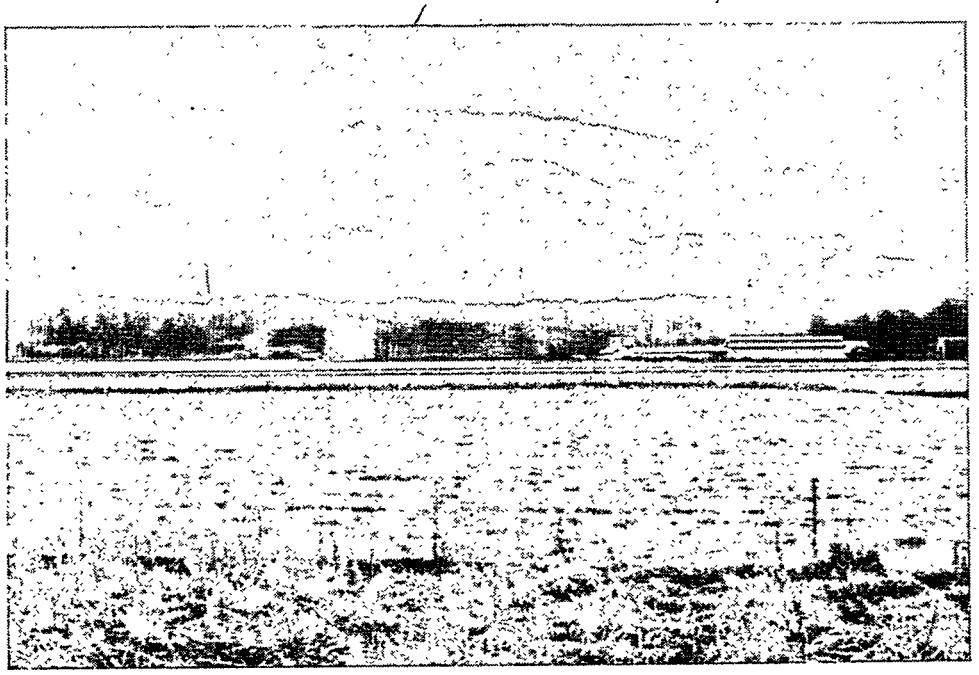


Figure 3.12-2a Existing View Looking South from KVA-1 (Intersection of State Route 12 & Keys Road) at Power Supply Cooling Towers and CT Facility Site (Hidden by Trees and Topography)

Topography and vegetation would block views of most of the project buildings and ancillary facilities. Only a portion of the 48-m (160-foot) high emission stack may be visible from KVA-1. The emission stack would be seen as an additional element between the two existing and taller WNP-3/WNP-5 cooling towers; however, the proposed emission stack would be lower and thinner, and would not appear to extend much above the surrounding treeline when viewed from SR 12. At night and during dark days, flashing airplane warning lights on the emission stack would be visible between the flashing lights of the two existing cooling towers.

Figure 3.12-2a is a photograph that depicts the existing view of the CT facility site from SR 12 and Keys Road (KVA-1). Figure 3.12-2b is a photo-simulation from the same location on SR 12 and Keys Road that depicts what the view from KVA-1 would be with the CT facility in place.

KVA-2 (West Keys Road)

Storage buildings and stored material at the proposed CT facility site can currently be seen from West Keys Road at KVA-2, which is approximately 697 m (2,300 feet) west of the site (Figure 3.12-3a). Although the number of residents near this location is small (estimated to be 8 to 15), the visual sensitivity of the viewers is relatively high because the KVA is located in a residential area and is relatively close to the site. The primary visual effects from the project would be that the CT facility would introduce a larger industrial form to the area. Although the 3.7-m (12-foot) high vegetated berm and perimeter plantings of trees would block views of the lower portion of the project and reduce visual impacts, the tops of the larger elements such as the CT building, cooling tower, emission stack, and electrical switchyard would be seen. Figure 3.12-3b depicts what the facility would look like from KVA-2.

3.12.3 Mitigation

The following measures will be implemented to mitigate potential visual impacts associated with the proposed project:

- At the completion of grading and exterior construction, the CT facility site will be hydroseeded.

- Two planted berms on the west side of the CT facility along Keys Road will be constructed and planted to screen views of the CT facility. Each berm will be 3.6 m (12 feet) high and 24 m (80 feet wide). One berm will be 134 m (440 feet) long and the other 169 m (555 feet) long. The berms will be vegetated with native shrubs, grasses, and forbs in a natural, random pattern.

- The screening berm will be formed and planted as early as possible in the construction process to provide screening during the later phases of construction.

- Exterior enclosure buildings, tanks, and other equipment visible from above the berms will be painted earth-tone brown to reduce visual contrasts with adjacent trees.

- The emission stack will be painted a lighter color to blend with the sky when viewed from the Chehalis River Valley.

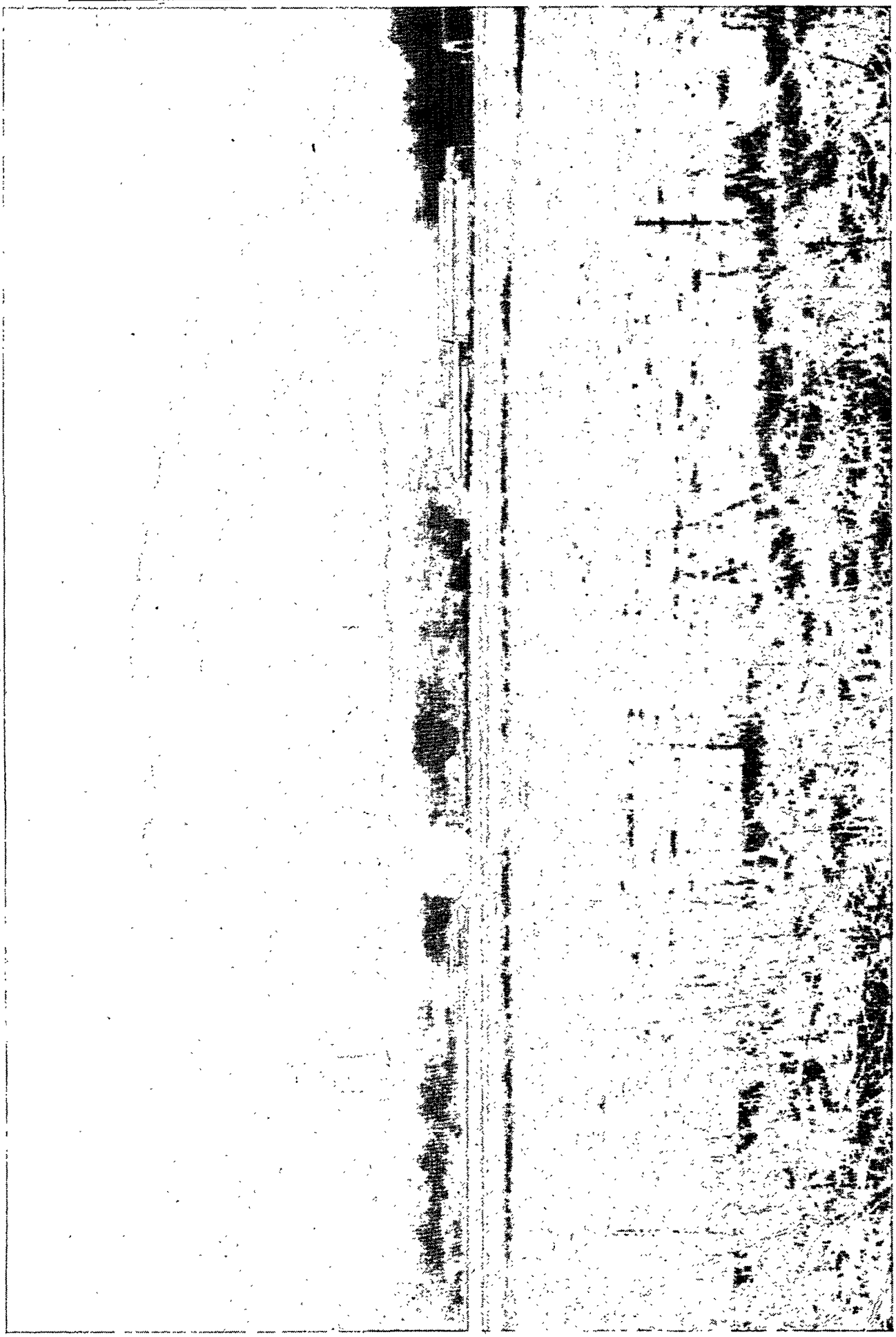


Figure 3.12-2b Simulation of View From KVA-1

Figure 3.12-3a Existing View Looking East of the CT Facility Site from KVA-2 on West Keys Road

Figure 3.12-3b Simulation of View of CT Facility from KVA-2 on West Keys Road

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

3.12.4 Unavoidable Adverse Impacts

The 48-m (160-foot) high emission stack (and condensate plumes at times) would be the only project element seen in the Chehalis River Valley. However, its impact on visual quality would be low because it would be located near the two taller and much more massive WNP-3/WNP-5 cooling towers.

Travelers and residents on Keys Road and West Keys Road would see project elements that would rise above the vegetated berm at the CT facility's Keys Road entrance. The CT facility would intensify the current industrial appearance of the site to viewers on Keys Road and West Keys Road. Construction activities associated with the gas pipeline would be somewhat noticeable from several locations along the route, but would only be during the construction phase. Any permanent negative effects attributed to the establishment of the ROW in forested area would be minor due to their remoteness and viewing distance. Overall impacts to visual quality from the project are considered low.

3.12.5 Cumulative Impacts

The project would incrementally add to the industrial character of the existing Supply System WNP-3/WNP-5 complex. The proposed project would have low impact on the visual quality of the Chehalis River Valley and other locations from which the project could be viewed. If a second turbine facility were built, it would be similar in design and size to the proposed project, and thus would have similar visual effects; a second emission stack visible in the Chehalis Valley would constitute a minor negative impact equal to the of the proposed project. A second facility would still have a low impact on the visual quality of the project vicinity.

4.0 ENVIRONMENTAL CONSULTATION, REVIEW, AND PERMIT REQUIREMENTS, SATSOP

4.1 National Environmental Policy Act

This EIS has been prepared by BPA pursuant to regulations implementing National Environmental Policy Act (NEPA) (42 United States Code [USC] 4321 et seq.), which requires Federal agencies to assess the impacts that their actions may have on the environment. BPA's potential acquisition of power from the Satsop project requires that BPA describe and 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 taken to protect, restore, and enhance the environment.

4.2 Threatened and Endangered 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. Letters were sent to USFWS, WDFW, WDNR, and National Marine and Fisheries Service (NMFS) requesting a list of threatened and endangered plant and animal species in the vicinity of the proposed project.

Because of the disturbed nature of their existing sites, construction of the combustion turbine and electrical transmission facilities is not anticipated to adversely impact endangered, threatened, or sensitive plant species. However, construction of the 77-km (48-mile) gas pipeline will impact one known population of white-top aster (*Aster curtus*), a Federal candidate for threatened status.

Field surveys were conducted in suitable habitats within the project vicinity in the spring and fall of 1994 to determine the presence of any of the listed species, potential impacts, and needs and opportunities to mitigate such impacts. White-top aster occurs along the proposed gas pipeline route. A population was identified at the south end of the Fort Lewis Military Reservation and in a pasture immediately to the south of the military reservation. Because of the abundance and distribution of the plant, it will not be possible to completely avoid the population with minor modifications to the pipeline route. Some individuals will be adversely affected by installation of the pipeline. Supply System will consult with the Fort Lewis Military Reservation, USFWS, and the WNHP to develop appropriate mitigative actions and a post-construction monitoring plan.

The USFWS indicated that three state- and Federally listed wildlife species, the bald eagle, marbled murrelet, and northern spotted owl, potentially occur in the vicinity of the project area. However, only the bald eagle has been recorded in the general area of the project vicinity (see Chapter VI, Appendix C).

The NMFS response of 4 February 1994 indicated that no listed anadromous fish species were present in the region. The USFWS, Olympia Office, was also consulted regarding Federally listed and proposed species under their jurisdiction. USFWS also indicated that the Federal candidate species, Olympic mudminnow *(Novumbra hubbsi),* and possibly bull trout *(Salvelinus confluentis)* may be present in some of the project area waters. Potential impacts of the proposed project on listed and candidate species are discussed in Section 3.6.

Supply System should consult with USFWS and appropriate state agencies close to the time of construction. Also, Supply System should consult with BPA and appropriate agencies to determine if additional surveys are warranted for any Federally or state-listed species that are on the list at that time.

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 habitat. 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. Potential impacts to fish and wildlife resources from the proposed project are discussed in Section 3.6.

4.4 Heritage Conservation (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.

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 NRHP nomination and to determine whether the undertaking would adversely affect them. The Satsop CT project would involve a permit or agreement with a Federal agency and is therefore a Federal agency undertaking.

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 disposition of the remains.

The Satsop Combustion Turbine Project includes 7.25 km (4.5 miles) of natural gas transmission route that is located on the Fort Lewis Military Reservation, which is Federal land. Any Native American graves found in this segment would be subject to the NAGPRA. Heritage conservation (cultural resources) impacts from the proposed project are discussed in Section 3.8.

4.5 State, Areawide, and Local Plan and Program Consistency

State of Washington, Energy Facility Site Evaluation Council

Chapter 80.50 Revised Code of Washington (RCW) (Energy Facilities - Site Locations) regulates the siting of energy facilities at the state and local levels through the EFSEC. RCW 80.50 operates as a state preemption of all matters relating to energy facility sites. Certification by EFSEC is given in lieu of any permit, certificate, or similar document that might otherwise be required. WAC 463-28 sets forth procedures to be followed by EFSEC in determining whether or not to recommend that the state preempt local land use plans or zoning ordinances for a site or portions of a site for an energy facility. Grays Harbor and Thurston counties provided sworn testimony to EFSEC on project compliance with land use plans, zoning ordinances, and SMPs. The applicant is required to make every effort, including changes to the project design, to comply with all local land use plans, zoning ordinances, and shoreline management plans in effect at the date of the application filing. An applicant unable to resolve specific noncompliance issues may file a written request for state preemption. The request is to show that: (1) the applicant has demonstrated a good-faith effort to resolve the noncompliance issues; (2) the applicant and the local authorities are unable to reach an agreement which will resolve the issues; (3) alternate locations within the same county and city have been reviewed and have been found less acceptable; and (4) interests of the state as delineated in RCW 80.50.010 have been addressed.

Thurston County/Grays Harbor County

The project would be located in two jurisdictions, Grays Harbor County and Thurston County. The CT facility, water line, wastewater line, and electrical transmission line would be located in Grays Harbor County. The gas pipeline would be located in both counties. Both counties' comprehensive plans govern development within each county. The proposed CT facility and associated structures and electrical transmission line would be located in Grays Harbor County's zone of General Development District 5. The plant would be a permitted use. The gas pipeline route would pass through a number of zones in both counties and would be allowed as either a permitted or conditional use, or in Thurston County, an unclassified use (which requires approval by the Planning Director).

Thurston Region Shoreline Master Program

The gas pipeline crosses four waterways (the Deschutes River, McLane Creek, Kennedy Creek, and the Black Lake Drainage Ditch) that are subject to the Washington SMA. The SMP guides development through sensitive shorelines. The only location where the proposed pipeline would not comply with local shoreline designations is where the line would cross the Black Lake Drainage

Ditch. The ditch is classified as a Natural Environment area where utility development is not allowed except to supply single-family residences and public recreation facilities. This is further discussed in Section 3.7.2.

Capitol State Forest

The project is generally consistent with the land use plans of the State Forest. The gas pipeline would follow the existing route of the NWP's McCleary Line through the northern end of the State Forest. Construction of an additional pipeline within the McCleary easement is permitted. If additional right-of-way outside the easement is required, a supplement to the original easement would be required.

4.6 Coastal Zone Management Program Consistency

The proposed project is within the coastal zone area covered by the Coastal Zone Management Act (CZMA; 16 USC 1451) of 1972. Therefore, as part of the EFSEC permitting, Supply System must demonstrate compliance with enforceable policies of the state's approved coastal zone management program. These policies include (1) the Clean Air Act, (2) the Clean Water Act, (3) the Shoreline Management Act, and (4) State Environmental Policy Act (SEPA).

4.7 Floodplains

Executive Order 11988 requires that floodplains be avoided to the extent possible in projects undertaken by or under contract with BPA. The proposed CT facility site, electrical transmission lines, and water lines are outside of the 100-year floodplain. The natural gas supply line crosses the Chehalis and Deschutes rivers and 19 other perennial streams. There are no practical alternatives to crossing floodplains in order to tie-in with existing gas supply. Because the pipeline would be buried, and the contours restored to their original configuration, the floodplains topography would not be altered. The pipeline would be buried at least 0.9 m (3 feet) deep, and should a 100-year flood occur, it is unlikely that the rivers and creeks would scour down to the pipeline. Construction of the pipeline would occur during the day season, when it is unlikely that the rivers and creeks would flood. As part of EFSEC permitting, compliance with floodplain requirements will be demonstrated.

4.8 Wetlands

Construction of the 77.4 km (48 mi) gas transmission pipeline would impact wetland, riparian, and stream resources. This construction would impact approximately 3.2 ha (8 acres) of emergent wetland, 2.0 ha (5 acres) of scrub-shrub wetland, and 2.8 ha (7 acres) of deciduous forested wetland. These proposed impacts will require consultation with the Corps regarding compliance with Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, and with the Ecology and WDFW. Supply System has submitted a permit application to the Corps for Section 404 and 10 permits. EFSEC will issue any water quality certification needed.

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.

No land at the CT facility site or along the electrical transmission line corridor is used or zoned for agriculture and there are no prime agricultural soils. Some of the construction right-of-way for the gas pipeline is located in land zoned for agricultural uses. Approximately 2.4 km (1.5 miles) of pipeline in Grays Harbor County would be located in land currently used for agriculture, and an additional 3.2 km (2 miles) would be located in land zoned for agriculture. The pipeline would pass through approximately 4.8 km (3 miles) of land currently identified as agriculture in Thurston County, although none of the land used for agriculture is zoned for agriculture. There are approximately 80.9 ha (200 acres) of prime farmlands located in the pipeline corridor. Construction of the pipeline would result in temporary disturbance to agricultural lands, and depending upon the time of the year, agricultural production. Prime agricultural soils along the pipeline would be stock-piled and replaced after construction, and there would be no permanent loss of prime farmland.

4.10 RECREATION RESOURCES

With one exception, construction of the CT facility and pipeline would have no direct effects on recreation in the project area. The only recreational facility within 0.81 km (0.5 mile) of the project is an off-road vehicle trail located in Capitol State Forest. There are no plans for any lands adjacent to or near the project to be developed as public parkland.

4.11 GLOBAL WARMING

The Satsop CT would emit the greenhouse gases carbon monoxide (CO_2) and methane. The burning of natural gas produces CO_2 as the primary combustion product. The new cogeneration plant would also emit small amounts of methane as unburned fuel.

Combined-cycle power plants burning natural gas, like the one proposed for the Satsop CT Project, emit less CO_2 per kilowatt of power generated than any other power generation method using fossil fuel. There are three 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 steam from the exhaust 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. From a global warming perspective, combustion turbine plants like the Satsop CT Project are the best method of power generation using fossil fuels.

4.12 Permits for Structures in Navigable Waters

Any activity, including required excavation, in navigable waters may require a Rivers and Harbors Act, Section 10 permit. This will include dredging at the Chehalis River crossings for the gas pipeline. The permit would be issued by the Corps. Supply System has submitted a permit application to the Corps for Section 404 and 10 permits.

4.13 Permit for Discharges into the Waters of the United States

A Section 404 permit regulated by the Corps is required for discharge of dredge material into waters (including wetlands) of the United States. Discharge could occur at many of the gas pipeline stream crossings, depending on crossing techniques used. Supply System has submitted a permit application to the Corps for Section 404 and 10 permits. EFSEC will issue any water quality certification needed.

4.14 Permits for Right-of-Way on Public Lands

The power plant would be constructed on private land, as would most of the gas pipeline. Approximately 17.7 km (11 miles) of the gas pipeline would be constructed on state land as it would pass through the Capitol State Forest, and would require a permit. The pipeline would also pass through approximately 6.4 km (4 miles) of the Fort Lewis Military Reservation, and a ROW permit would be required from the Corps.

4.15 Energy Conservation at Federal Facilities

Not applicable.

4.16 Pollution Control

4.16.1 Air

Emissions produced by the proposed project must meet standards established by the EPA. The Clean Air Act is the principal Federal law governing air pollution control. It was most recently amended in 1990. In the project vicinity, authority for ensuring compliance with the provisions of the Clean Air Act is delegated to the Ecology.

The Satsop CT Project would be a major new source of air emissions. The CT facility would be rated with a nominal annual average output of 227 MW. Major sources that emit more than 100 TPY of a regulated air pollutant are required to comply with New Source Review (NSR), BACT, New Source Performance Standards (NSPS), and PSD requirements, and will be required to obtain a Notice of Construction (NOC) from the OAPCA. However, the SCA replaces the requirement for a NOC from OAPCA. Once constructed, operational compliance will be administered by the OAPCA, the local air pollution control agency for facilities in Grays Harbor County, Washington. There are several Class I areas (Olympic and Mount Rainier National Parks, and Alpine Lakes and

Goat Rocks Wilderness Areas) that have been designated by Congress for special protection from air pollutants that might affect soils, vegetation, visibility, and other natural resources.

Ecology and OAPCA have established regulations for existing sources and new sources to ensure that ambient air quality remains acceptable and to protect Class I areas. These regulations and their supporting information are contained in the State Implementation Plan (SIP), a plan adopted by the state to ensure that the state air quality objectives are met. The SIP for Washington has been approved by the EPA. An essential element of the plan is NSR, an engineering review process to ensure that new sources comply with all regulations. Sources constructed under the PSD program are required to maintain air pollution control equipment in proper working order and to periodically test the emissions to demonstrate compliance with emission limitations. Ecology also administers a plan for controlling emissions of toxic air pollutants. New sources emitting more than the small quantity emission rates of toxic or carcinogenic air pollutants must demonstrate that the concentrations resulting from these emissions are less than the ASILs.

As part of EFSEC permitting, a Memorandum of Understanding from Ecology will be issued to EFSEC on the PSD permit. EFSEC will then issue the permit to the project.

The Satsop CT Project would comply with all applicable air quality standards as described in Section 3.3.

4.16.2 Water

Clean Water Act

A Federal Section 401 Water Quality Certification is normally required for both the operation and construction of this type of project. An EFSEC certificate will take the place of a Short Term Exception to Water Quality Standards for short-term effects of construction at stream crossings.

The 401 certificate is normally required for any discharge of wastewater into the streams; it is reviewed in conjunction with the NPDES permit. Both of these permits are typically administered by the Washington Department of Ecology. However, in this case the NPDES permit and 401 Certificate will be administered through the EFSEC 401 site certification agreement. Supply System already has an existing NPDES permit with certification under the EFSEC Site Certification Agreement for the WNP-3 nuclear plant. The existing permit will require modification to allow discharges by the proposed project.

Constituents of the discharge from the proposed project are expected to be within the requirements of the existing NPDES permit portion or the EFSEC certificate. Therefore, no additional impacts to the aquatic environment would be anticipated.

WNP-3 has an existing water right for the Ranney Wells under the existing WNP-3 SCA. WNP-3 will create a water company and sell the water to the Satsop CT Project. The existing SCA will need to be modified to include the combustion turbine plant as an additional end user.

The proposed project would require hydrostatic testing of the natural gas pipeline. The tests would occur at stream and river crossings, where water would be available. A temporary water use and discharge permit will be obtained from EFSEC to conduct hydrostatic testing.

WNP-3 has a NPDES permit (No. WA-002496-1) under the existing SCA for the outfall to the Chehalis River (the same outfall that will be used by the CT plant). The existing SCA will require modification to allow for CT plant use. Requirements include a description of any changes in the plant effluent such as quantity, temperature, chemical constituents, and a description of treatment proposed.

4.16.3 Solid and Hazardous Waste

Solid waste generated at the proposed project site would consist mostly of packing crates, wastes from maintenance, and wastes from normal employee activities. Solid wastes would be collected for disposal through an approved Grays Harbor County disposal system. The Resource Conservation and Recovery Act (RCRA), as amended, is designed to provide a program for managing and controlling hazardous waste by imposing requirements on generators and transporters of this waste, and on owners and operators of treatment, storage, and disposal (TSD) facilities. Each TSD facility owner or operator is required to have a permit issued by EPA or the state. Construction and maintenance activities at the proposed project will generate small amounts of hazardous waste. These typically include: solvents, pesticides, paint products, motor and lubricating oils, and cleaners. Under EPA regulations, the amounts of these wastes generated by the proposed project would fall within the definition for a "small quantity generator." Supply System will modify the existing a hazardous waste management program, which meets all Federal and state hazardous waste requirements to include the CT Project. 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 UFC, entitled "Stationary Tank Storage, Aboveground, Outside of Buildings."

4.16.4 Noise

Washington State has established noise regulations based on land use compatibility (Table 4.16-1). The proposed CT facility site and the area immediately surrounding the site are categorized as industrial. For a residential area the noise abatement criterion is an L_{eq} of 60 dB(A) when the noise originates from an industrial site. Between the hours of 10 p.m. and 7 a.m., the noise limitations in Table 4.16-1 are reduced by 10 dB(A) for a residential receiving property. Additionally, at any hour of the day or night, the applicable noise limitations may not be exceeded in any 1-hour period by more that 5 dB(A) for a total of 15 minutes, 10 dB(A) for a total of 5 minutes, or 15 dB(A) for a total of 1.5 minutes. These limits correspond to the L_{25} (25 percent of 1 hour), $L_{8.3}$, and $L_{2.5}$ sound levels.

The proposed project is subject to maximum allowable levels of noise by the state of Washington. 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 3.4.

Table 4.16-1. Maximum Permissible Sound Levels

Source of Noise	Maximum Permitted Sound Levels of Receiver [dB(A)]		
	Residential	Commercial	Industrial
Residential	55	57	60
Commercial	57	60	65
Industrial	60	65	70

Source: WAC 173-60

4.16.5 Pesticides

The proposed project may use or produce pesticides, and will comply with EPA and Washington State Department of Agriculture regulations regarding the purchase, use, storage, or disposal of pesticides.

4.16.6 Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) requires notification to EPA of new chemicals and regulates the production, use, and disposal of toxic substances. Of particular interest to the production of electricity is the regulation of PCBs. EPA banned the manufacture, processing, distribution in commerce, and use of PCBs on January 1, 1978 except in totally enclosed electrical equipment or under specific authorized uses. The proposed project would not involve the distribution, use, or disposal of PCBs.

4.16.7 Asbestos

There would be no asbestos used in the proposed project.

4.16.8 Comprehensive Environmental Response, Compensation, and Liability Act

A Phase I Environmental Site Assessment was completed for the proposed project site which indicated that no hazardous materials are present at the site.

4.16.9 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).

CHAPTER V — SUPPLEMENTAL MATTER

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CHAPTER VI — APPENDICES

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BIOLOGICAL ASSESSMENT FOR THE CHEHALIS GENERATION FACILITY

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ACRONYMS

aMW	Megawatt
BPA	Bonneville Power Administration
cm	Centimeter
CT	Combustioin turbine
EIS	Environmental Impact Statement
ESA	Endangered Species Act of 1973
ha	Hectare
HRSG	Heat recovery steam generator
km	Kilometer
kV	Kilovolt
m	Meter
NWP	Northwest Pipeline Corporation
RCP	Resource Continency Program
ROW	Right-of-way
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife

1.0 INTRODUCTION

The Bonneville Power Administration (BPA) has statutory responsibilities to supply electrical power to its utility, industrial, and other customers in the Pacific Northwest. In 1990, BPA initiated the Resource Contingency Program (RCP) that allows BPA to purchase options to acquire power in the future on an "as needed" basis. As part of this program, BPA has purchased options from three independent projects for power generation: the Chehalis Generation Facility in Chehalis, Washington; the Hermiston Power Project in Hermiston, Oregon; and the Satsop Combustion Turbine Project in Satsop, Washington. This Biological Assessment examines the potential effects of constructing this project to Federally listed wildlife species in the vicinity of the proposed Chehalis Generation Facility, as mandated by Section 7 of the Endangered Species Act (ESA) of 1973. Separate Biological Assessments have been prepared for the other two RCP power generation projects.

In compliance with the ESA, the objective of this Biological Assessment is to: (1) describe the proposed action; (2) provide site-specific information on Federally listed wildlife species potentially occurring in the vicinity of the project; (3) evaluate the potential effects of the proposed project on these species; (4) describe any conservation measures necessary to reduce or eliminate adverse effects; and (5) provide a determination of effect (beneficial, no effect, not likely to adversely affect, or likely to adversely affect) for the species. Information on Federal candidate species potentially occurring in the vicinity of the Chehalis Generation Facility is provided in the RCP Environmental Impact Statement (EIS).

2.0 PROJECT DESCRIPTION

The Chehalis Generation Facility would be located south of the Chehalis city limits in the southwest quarter of the southeast quarter of Section 10, Township 13 North, Range 2 West of the Willamette Meridian, Lewis County (Figure 1). Agriculture and residential properties dominate the area; however, some commercial and light industrial land uses occur as well.

2.1. PROJECT COMPONENTS

Project components include the combustion turbine facility, fuel supply, electrical transmission, and water supply and wastewater systems. Proposed locations and specifications of project components are highlighted in the following sections.

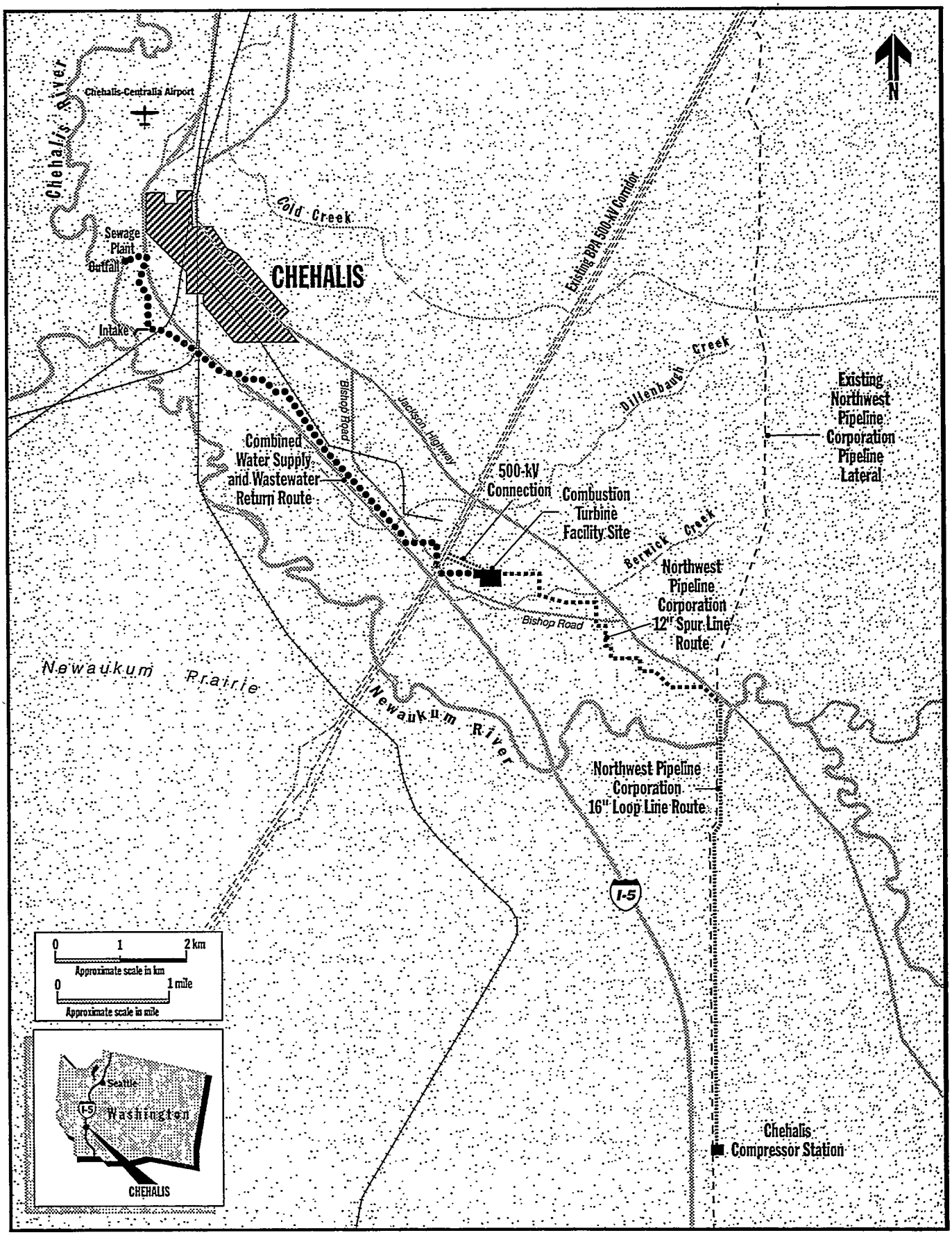

Figure 1 Project Vicinity Map

2.1.1 Combustion Turbine Facility

The Chehalis Combustion Turbine (CT) facility would be located on a 12-hectare (ha) (30.1-acre) parcel in the Chehalis Industrial Park. The site, accessed via Bishop Road, is currently used as part of a farm operation, with a small portion of the site dedicated to crop production. The CT facility would house two natural gas-fired combined-cycle combustion turbines, supplying a combined 456 average megawatts (aMW). In addition, the CT facility would include two 60-meter (m) (225-foot) high emission stacks, and required auxiliary equipment.

Several buildings would be constructed on site as part of the project: a turbine building (housing the gas and steam turbines, generators, and electrical room); water treatment building; a feed water pump building; a fire pump building; and an administration building (containing the control room, offices, maintenance shop, and warehouse).

2.1.2 Fuel Supply

The CT facility's primary fuel would be natural gas. To connect to the natural gas supply, the project would require an underground gas pipe line connecting the CT facility to the Northwest Pipeline Corporation's (NWP's) Chehalis Compressor Station 12.9 kilometers (km) (8 miles) south of the facility. The connecting line would consist of two sections (Figure 1). A 40.6-centimeter (cm) (16-inch) outside diameter steel loop line would be installed parallel to and within the right-of-way (ROW) of an existing NWP lateral from the Chehalis Compressor Station north for approximately 7.2 km (4.5 miles) to a point just south of Jackson Highway. Installation of the loop line requires a crossing of the Newaukum River and a tributary of Olequa Creek (a tributary of the Cowlitz River). From this point a 30.5-cm (12-inch) outside diameter steel spur line would connect the loop line with the CT facility covering a distance of about 4.8 km (3 miles) (Figure 1).

2.1.3 Electrical Transmission

Approximately 518 m (1,700 feet) of 500-kilovolt (kV) double circuit overhead transmission line and a new substation on the CT facility site would be necessary to electrically interconnect the project to BPA's adjacent 500-kV transmission system.

2.1.4 Water Supply and Wastewater Systems

Three 8-km (5-mile) water pipelines would be required for the CT facility: two for water supply and one for wastewater. All three water pipelines would be 41-cm (16-inch) diameter, laid parallel, and buried in a single 6.4-m (21-foot) wide by 1.2-m (4-foot) deep trench.

Water Supply

Water supply sources would include reclaimed water from the city of Chehalis wastewater treatment plant effluent, city of Chehalis municipal water from the Chehalis River, and well water. Availability of reclaimed water is lower in the summer than in the winter. Municipal water may also be less available in summer if surface and groundwater sources become depleted during an

extremely dry season. Therefore, a combination of water supply from the three sources would be necessary to meet project needs.

Wastewater System

The CT facility would discharge effluent from its on-site wastewater treatment system back to the city of Chehalis municipal wastewater collection system for discharge to the Chehalis River. Prior to discharge, the water from project operations (including cooling tower blowdown, demineralizer neutralization sump, and other processes) would be processed through a treatment system consisting of three connected retention ponds, yielding a combined retention time of 48 hours. In addition to process wastewater, the retention ponds would also collect wastewater from interior floor drains, equipment drains, and stormwater drainage. The first pond would be used for high temperature anaerobic treatment; the second would provide air injection for biological aerobic treatment; and the third would be used for radiational and convective cooling and effluent polishing. After treatment to remove any metals and other contaminants, and to regulate temperature, the water would be conveyed to the city wastewater collection system for discharge to the Chehalis River.

2.2 Construction Schedule

Construction of the project could begin between 1995 and 2005, depending on BPA's need for electricity. Once BPA gives the approval for facility construction, the project could be completed in approximately 2 years. Site preparation would require conventional construction equipment, including bulldozers, front-end loaders, trucks, tractor-scrapers, and graders. After site preparation, the combustion turbines, generators, electrical and other equipment, and support facilities of the cogeneration facility would be installed. Once these facilities are in place, the site landscaping would be initiated. Pipeline and electrical tansmission line construction would take approximately 24 months.

3.0 SITE SPECIFIC INFORMATION ON FEDERALLY LISTED SPECIES

The U.S. Fish and Wildlife Service (USFWS) has identified three Federally listed threatened species, the bald eagle (*Haliaeetus leucocephalus*), marbled murrelet (*Brachyramphus marmoratus*), and northern spotted owl (*Strix occidentalis caurina*), and one Federally listed endangered species, the peregrine falcon (*Falco peregrinus*), as potentially occurring in the vicinity of the Chehalis Generation Facility (letter from D. Frederick, State Supervisor, USFWS, Olympia, Washington, January 3, 1994). The following sections provide information on the occurrence of each species in the project vicinity and habitat availability as determined through surveys, consultation with local biologists and literature reviews. Information on the natural history of each species can be obtained from Stalmaster (1987), USFWS (1986), and other scientific literature.

3.1 BALD EAGLE

Current bald eagle use of the project vicinity was evaluated based on surveys conducted in 1988 and 1989, agency consultation, and field reconnaissance (Dames & Moore 1994).

Historically, bald eagles winter in large concentrations in Washington with over 2,000 birds reported during some years (Taylor 1988, 1989). Mid-winter bald eagle surveys near the Chehalis and Newaukum rivers were conducted in 1988 and 1989. The bald eagle wintering period is generally considered to be October 31 to March 31. Survey results indicate that these areas do not receive high bald eagle use in the winter; only two eagles were observed in each year (Taylor 1988, 1989). One bald eagle was recorded in the vicinity of the project during field reconnaissance in November 1993 (Dames & Moore 1994). The Washington Department of Fish and Wildlife (WDFW) has identified two bald eagle wintering areas in the project vicinity: one area is within 0.8 km (0.5 mile) of the city of Chehalis water intake location on the Chehalis River and the other is within 0.8 km (0.5 mile) of the southernmost segment of the gas spur pipeline (Dames & Moore 1994) (Figure 2). Wintering eagles in the Pacific Northwest commonly perch on tall snags, Ponderosa pine, and cottonwoods (Stalmaster and Newman 1978, Fielder and Starkey 1986). Proximity to a food source is probably the most important factor influencing perch selection by bald eagles (Steenhof et al. 1980).

One bald eagle nest site has been documented by the WDFW in the project vicinity. The nest is 1.6 km (1 mile) south of the proposed CT facility in a cottonwood tree next to the Newaukum River (Dames & Moore 1994) (Figure 2). The nest is visible from the eastern portion of the CT facility; Interstate 5 runs between the nest and the CT facility. This is a newly established nest that was not documented prior to the 1993 nesting season. The availability of a suitable nest tree, located near water, is critical to bald eagle breeding populations (USFWS 1986, Stalmaster 1987).

Bald eagles require large expanses of open water or land for foraging and feeding (Stalmaster 1987). Large expanses of scrub-shrub and emergent wetlands in the project vicinity that regularly support concentrations of wintering waterfowl, potential prey for bald eagles, have been identified by the WDFW (letter from L. Knutson, WDFW—Nongame Data Systems, Olympia, Washington, November 15, 1993). These waterfowl concentration areas occur along the Chehalis and Newaukum rivers and Dillenbaugh Creek. Nesting bald eagles in the vicinity are likely to forage on waterfowl and anadromous and resident fish stocks in these rivers.

3.2 MARBLED MURRELET

The marbled murrelet is not likely to occur in the vicinity of the Chehalis CT facility because there are no old-growth (150+ years) or mature (80 to 100 years) forest stands suitable for marbled murrelet nesting. The broad, horizontal limbs of older trees are generally needed to support the single marbled murrelet egg, which is laid on the limb, without benefit of a constructed nest (WDFW 1993). No WDFW-documented observations of the marbled murrelet have been made in the vicinity of the project, nor have WDFW prescribed surveys been conducted for the species (letter from Timothy Young, WDFW, Olympia, Washington, March 22, 1994).

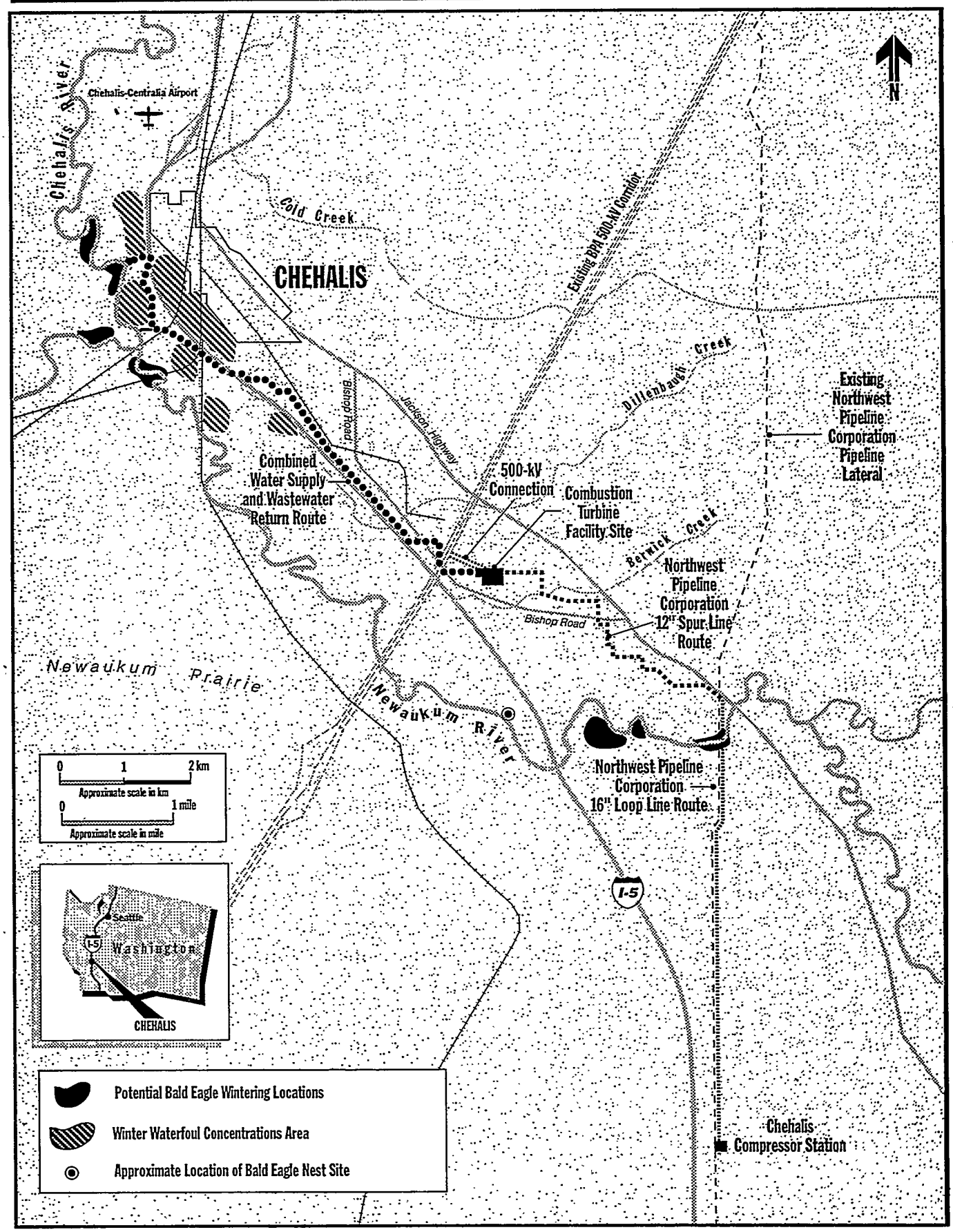

Figure 2 Locations of Bald Eagle Nesting and Wintering Habitat and Waterfowl Concentration Areas

3.3 Northern Spotted Owl

The northern spotted owl is not likely to occur because there are no old-growth or mature forest stands in the project vicinity. Studies show spotted owls select mature or older forest stands (USFWS 1992). In comparing documented nest sites with available habitat, studies suggest that the owls, in general, use forests with greater complexity and structure (i.e., forests with several tree species, several sizes and ages of trees, containing both standing and down dead trees, and with open spaces among the lower branches) (USFWS 1992). No observations of the spotted owl have been made in the vicinity of the project, nor have WDFW prescribed surveys been conducted for the species. The nearest WDFW-documented spotted owl location is greater than 3.2 km (2 miles) from the southern end of the gas loop pipeline (letter from Timothy Young, WDFW, Olympia, Washington, March 22, 1994). It is possible that dispersing owls may temporarily use second growth forests in the project vicinity.

3.4 Peregrine Falcon

The USFWS indicates that the peregrine falcon potentially migrates through the project vicinity in the spring and fall. Although numerous waterfowl and shorebirds, potential prey for the peregrine falcon, inhabit the large expanses of emergent wetlands located in the Chehalis and Newaukum river floodplains (Figure 2), no observations of the peregrine falcon have been made in the vicinity of the project (Dames & Moore 1994).

Characteristics of most peregrine falcon nesting territories in the Pacific Northwest include large cliffs with some vertical sections that have a good view of the surrounding landscape and proximity to water (Pacific Coast American Peregrine Falcon Recovery Team 1982). No suitable nesting habitat occurs in the vicinity of the project. It is likely that any occurrences of peregrine falcons in the project vicinity would be rare and transient.

4.0 EFFECTS OF THE PROJECT ON FEDERALLY LISTED SPECIES

The proposed project would have no effect on the northern spotted owl, marbled murrelet, or peregrine falcon as none of these species occur in the vicinity of the project. Approximately 3 ha (7.5 acres) of second-growth conifer forest would be permanently impacted from project construction; however, these lands do not constitute suitable murrelet and owl habitat. Additionally, no alteration of the prey base for these Federally listed species would occur as a result of project construction or operation. Therefore, discussion of the potential effects of the project on Federally listed species is limited to the bald eagle.

Potential effects to bald eagles include: (1) direct loss of roosting, perching, or nesting habitat, (2) effects to food supplies, (3) disturbance to wintering or nesting bald eagles, and (4) collision and electrocution from electrical transmission lines.

The cumulative effects of the project are expected to minimal, as the proposed project would only marginally increase the rate of residential and industrial development in the region.

4.1 Loss of Bald Eagle Habitat

The project will not affect any perching, roosting, or nesting habitat in the project vicinity. Approximately 3.3 ha (8.4 acres) of forested land would be impacted by the proposed project, primarily along the gas loop pipeline (BPA 1994). However, the majority of the forest types effected (3.0 ha [7.4 acres]) would be second-growth conifer forest that is typically not used by bald eagles for perching, roosting, or nesting. The proposed gas loop pipeline route crosses the Newaukum River; however, no loss of potential bald eagle habitat would result from construction of the pipeline. The pipeline crossing of the Newaukum River will be bored, thereby eliminating impacts to associated riparian habitat. Additionally, no suitable nesting or perching trees would be lost due to construction of the water supply intake and wastewater treatment facility. All temporarily disturbed land that potentially supports prey species would be revegetated, limiting the permanent forage habitat loss to 28 ha (69 acres), 24 ha (59 acres) of which is grassland/agriculture (BPA 1994).

4.2 Effects on Bald Eagle Food Supplies

Potential effects from the proposed project on food supplies include interference of new transmission lines with waterfowl use of the area; ground disturbance and project operation altering fish, small mammal, and waterfowl habitat; and alteration of fish and waterfowl populations as a result of water withdrawal. Approximately 518 m (1,700 feet) of new transmission line would be necessary to interconnect the CT facility with an existing BPA transmission corridor. The location of the new lines would be in a relatively disturbed agricultural area that does not typically receive waterfowl or bald eagle use.

The WDFW has identified wintering waterfowl concentration areas within 0.8 km (0.5 mile) of project components (Dames & Moore 1994). Construction and operation of the proposed project would not result in the loss of any wintering waterfowl habitat or create such a disturbance as to preclude waterfowl from the area.

Water supply sources would include reclaimed water from the city of Chehalis wastewater treatment plant effluent, city of Chehalis municipal water from the Chehalis River, and well water. The amount of water necessary for project operation is nominal with respect to the Chehalis River winter discharge, and in the summer, the net loss of river water would be augmented from wells. Therefore, the potential effect that water withdrawal would have on fish or waterfowl would be low.

4.3 DISTURBANCE

Ground disturbing activities, primarily construction of the water supply and natural gas pipelines would be confined to narrow construction corridors. Nevertheless, such activities would temporarily displace wildlife, including potential prey species of bald eagles, from the immediate area. The U.S. Forest Service and USFWS have jointly proposed guidelines to protect bald eagle nests, perches, and foraging and wintering areas from disturbance. 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 km (0.25 mile) of nest sites that are screened by vegetation; where bald eagles have line-of-sight vision, activity is prohibited within 0.8 km (0.5 mile).

The one documented bald eagle nest in the project vicinity is located 1.6 km (1 mile), line-of-sight, south of the proposed CT facility site. Because this nest is well outside of the 0.8 km (0.5 mile) activity buffer, disturbances from construction and operation of the project will not affect the nest site.

Construction would be scheduled beginning in mid- to late spring and continue through the fall, thus eliminating potential effects to wintering bald eagles or their prey availability. Disturbance from periodic vegetation maintenance along the gas pipeline ROW and increased human activity could temporarily displace wintering bald eagles. However, most maintenance activities would be done at other times of the year; therefore, the project is not likely to affect bald eagle wintering activity.

4.4 ELECTRICAL TRANSMISSION LINE HAZARDS

Raptors, including bald eagles, are generally not susceptible to collision with transmission lines, most likely because of their keen eyesight, nonflocking behavior, and flight maneuverability (Williams and Colson 1988). As planned, all new transmission lines would incorporate the guidelines presented by Olendorff et al. (1981), and would be separated by at least 4.3 m (14 feet) vertically and 3 m (10 feet) horizontally, a distance that would preclude electrocution of bald eagles.

5.0 MITIGATION MEASURES

Potential effects of the proposed project on bald eagles occurring in the vicinity could be minimized by:

- Avoiding construction activities within 0.4 km (0.25 mile) of active bald eagle nests, or 0.8 km (0.5 mile) if nest is has line-of-sight of construction activities;
- Avoiding construction in wetland and riparian habitats that provide potential perching, roosting, or foraging habitat;

- Ensuring that water quality is not affected by construction or wastewater discharge;
- Placing project facilities at least 1.5 km (0.9 mile) from known communal roost sites;
- Completing construction activities outside of the October 31 through March 31 wintering period;
- Revegetating all disturbed habitats with native plant species capable of supporting wildlife species; and
- Adhering to guidelines for design of transmission lines to avoid collision and electrocution of raptors.

6.0 DETERMINATION OF EFFECT

The proposed Chehalis Generation Facility project is not likely to adversely affect the marbled murrelet, northern spotted owl, or peregrine falcon as these species do not occur in the vicinity of the project. Additionally, no loss of potential suitable habitat would result from construction or operation of the project and disturbance would be nominal. Likewise, based on the description of the project and associated mitigation measures, construction and operation of the proposed project is not likely to adversely affect the bald eagle.

7.0 LITERATURE CITED

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ATTACHMENT A

AGENCY LETTERS

WASHINGTON STATE DEPARTMENT OF
Natural Resources

JENNIFER M. BELCHER
Commissioner of Public Lands

KALEEN COTTINGHAM
Supervisor

November 29, 1993

Gregory Green
Ebasco Environmental
10900 NE 8th St
Bellevue WA 98004-4405

SUBJECT: Chehalis Generation Facility and Pipeline Routes
(T13N R01W S07, T13N R02W S04,05,09-15, and T14N R02W S29-32)

We've searched the Natural Heritage Information System for information on significant natural features in your study area. Currently, we have no records for rare plants, high quality native wetlands or high quality native plant communities in the vicinity of your project.

The Washington Natural Heritage Program is responsible for information on the state's endangered, threatened, and sensitive plants as well as high quality native plant communities and wetlands. The Department of Wildlife manages and interprets data on wildlife species of concern in the state. For information on animals of concern in the state, please contact the Priority Habitats and Species Program, Washington Department of Wildlife, 600 Capitol Way North, Olympia, WA 98501-1091, or by phone (206) 753-3318.

The Natural Heritage Information System is not a complete inventory of Washington's natural features. Many areas of the state have never been thoroughly surveyed. There may be significant natural features in your study area that we don't yet know about. This response should not be regarded as a final statement on the natural features of the areas being considered and doesn't eliminate the need or responsibility for detailed on-site surveys.

I hope you'll find this information helpful.

Sincerely,

Sandy Norwood

Sandy Norwood, Environmental Review Coordinator
Washington Natural Heritage Program
Division of Land & Water Conservation
PO Box 47047
Olympia, WA 98504-7047
(206) 902-1667

EBASCO

March 10, 1994
EBEL-BPA/RCP-94-018

Ms. Lea Knutson
Nongame Data Systems
Washington Department of Wildlife
600 Capital Way North, GJ-11
Olympia, WA 98501-1091

Subject: **Request for Additional Threatened and Endangered Species Data for the Chehalis Generation Facility**

Dear Ms. Knutson:

Enserch Environmental has recently been notified of a change in the proposed gas pipeline route for the Chehalis Generation Facility. An RTE species data search for the entire project area was initially requested on November 2, 1993 and a response was received on November 29, 1993. We appreciate your timely response and request another database search for the modified project area. The legal description of the portion of the project not in the original request is as follows:

T 12 N, R 2 W, Sections 1, 12
T 13 N, R 2 W, Sections 24, 25, 36, 37, 38

Enclosed is a map detailing the proposed gas pipeline route. Not all sections of the route are listed above as we already have some of the information.

If you have any questions regarding this request, please call me at (206) 451-4296.

Sincerely,

Enserch Environmental Corporation
(formerly Ebasco Environmental)

Jennifer Rudd for

Greg Green
Principal Wildlife Biologist

cc: D. Broadfoot (w/o enclosures)
M. Clancy (w/o enclosures)
C. Antieau (w/o enclosures)

EBASCO

November 2, 1993
EBEL-BPA-93-083

Ms. Lea Knutson
Nongame Data Systems
Washington Department of Wildlife
600 Capitol Way North, GJ-11
Olympia, WA 98501-1091

Subject: Request for Threatened and Endangered Species Data for the Chehalis Generation Facility

Dear Lea,

As part of an Environmental Impact Statement, Ebasco Environmental is preparing an Environmental Report for Bonneville Power Administration on the Chehalis Generation Facility. This facility will be a combined cycle combustine turbine project located in Chehalis, Washington. We have enclosed a map indicating the location of the proposed project site, natural gas pipeline route, and the water pipeline route. Please conduct a search of the Nongame database and Priority Habitats and Species database for the project area. Enclosed is a Fish and Wildlife Data Order Form and a set of maps indicating the location of the corridor route.

When the database search is complete, please call me at 206-451-4296 and I will immediately disburse a check to cover search costs.

Thank you.

Sincerely,

EBASCO ENVIRONMENTAL

Gregory A. Green
Principal Wildlife Biologist

Enclosures

cc: Dave Broadfoot (w/o enclosures)
Rob Diffely (w/o enclosures)

EBASCO ENVIRONMENTAL *A Division of Ebasco Services Incorporated*
10900 NE 8TH STREET • BELLEVUE, WA 98004-4405 • (206) 451-4600 • FAX (206) 451-4691

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
3704 Griffin Lane SE, Suite 102
Olympia, Washington 98501-2192
(206) 753-9440 FAX: (206) 753-9008

April 21, 1994

Greg Green
Enserch Environmental Corporation
10900 NE 8th Street
Bellevue, WA 98004-4405

FWS Reference: 1-3-94-SP-381
X-Reference: 1-3-94-SP-124

Dear Mr. Green:

This is in response to your letter dated March 10, 1994 and received in this office on March 11. Enclosed is an updated list of listed threatened and endangered species, and candidate species (Attachment A), that may be present within the area of the proposed Chehalis Generation Facility in Lewis County, Washington. The list fulfills the requirements of the Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act of 1973, as amended (Act). We have also enclosed a copy of the requirements for Bonneville Power Administration (BPA) compliance under the Act (Attachment B).

Should the biological assessment determine that a listed species is likely to be affected (adversely or beneficially) by the project, the BPA should request Section 7 consultation through this office. If the biological assessment determines that the proposed action is "not likely to adversely affect" a listed species, the BPA should request Service concurrence with that determination through the informal consultation process. Even if the biological assessment shows a "no effect" situation, we would appreciate receiving a copy for our information.

Candidate species are included simply as advance notice to federal agencies of species which may be proposed and listed in the future. However, protection provided to candidate species now may preclude possible listing in the future. If early evaluation of your project indicates that it is likely to adversely impact a candidate species, the BPA may wish to request technical assistance from this office.

In addition, please be advised that federal and state regulations may require permits in areas where wetlands are identified. You should contact the Seattle District of the U.S. Army Corps of Engineers for federal permit requirements and the Washington State Department of Ecology for state permit requirements.

Your interest in endangered species is appreciated. If you have additional questions regarding your responsibilities under the Act, please contact Jim Michaels or Jodi Bush of this office at the letterhead phone/address.

Sincerely,

for / David C. Frederick
State Supervisor

jb/kr
Enclosures
SE/BPA/1-3-94-SP-381/Lewis
c: WDW, Region 5
WNHP, Olympia

ATTACHMENT A

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES WHICH MAY OCCUR WITHIN THE VICINITY OF THE PROPOSED CHEHALIS CONGENERATION FACILILTY IN LEWIS COUNTY, WASHINGTON (T12N R02W S1/12; T13N R02W S24-25/36-38)

FWS Reference: 1-3-94-SP-381

LISTED

Bald eagle *(Haliaeetus leucocephalus)* - wintering bald eagles may occur in the vicinity of the project from about October 31 through March 31.

Marbled murrelet *(Brachyramphus marmoratus marmoratus)* - may occur in the vicinity of the project.

Peregrine falcon *(Falco peregrinus)* - spring and fall migrant falcons may occur in the vicinity of the project.

Northern spotted owl *(Strix occidentalis caurina)* - may occur in the vicinity of the project throughout the year.

Major concerns that should be addressed in your biological assessment of project impacts to listed species are:

1. Level of use of the project area by listed species.

2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas and owl foraging, roosting, nesting, and dispersal habitat in all areas influenced by the project.

3. Impacts from project construction and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) which may result in disturbance to listed species and/or their avoidance of the project area.

PROPOSED

None

CANDIDATE

The following candidate species may occur in the vicinity of the project:

Bull trout *(Salvelinus confluentus)*
Harlequin duck *(Histrionicus histrionicus)*
Mountain quail *(Oreortyx pictus)*
Northern goshawk *(Accipiter gentilis)*
Northwestern pond turtle *(Clemmys marmorata marmorata)*
Northern red-legged frog *(Rana aurora aurora)*
Pacific fisher *(Martes pennanti pacifica)*
Spotted frog *(Rana pretiosa)*

ATTACHMENT B

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7(a) AND 7(c) OF THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED

SECTION 7(a) - Consultation/Conference

Requires:

1. Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2. Consultation with FWS when a federal action may affect a listed endangered or threatened species to ensure that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the federal agency after it has determined if its action may affect (adversely or beneficially) a listed species; and

3. Conference with FWS when a federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or an adverse modification of proposed critical habitat.

SECTION 7(c) - Biological Assessment for Construction Projects *

Requires federal agencies or their designees to prepare a Biological Assessment (BA) for construction projects only. The purpose of the BA is to identify any proposed and/or listed species which is/are likely to be affected by a construction project. The process is initiated by a federal agency in requesting a list of proposed and listed threatened and endangered species (list attached). The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the species list, please verify the accuracy of the list with our Service. No irreversible commitment of resources is to be made during the BA process which would result in violation of the requirements under Section 7(a) of the Act. Planning, design, and administrative actions may be taken; however, no construction may begin.

To complete the BA, your agency or its designee should: (1) conduct an onsite inspection of the area to be affected by the proposal, which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within the FWS, National Marine Fisheries Service, state conservation department, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures; and (6) prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevant information. Upon completion, the report should be forwarded to our Endangered Species Division, 3704 Griffin Lane SE, Suite 102, Olympia, WA 98501-2192.

---

* "Construction project" means any major federal action which significantly affects the quality of the human environment (requiring an EIS), designed primarily to result in the building or erection of human-made structures such as dams, buildings, roads, pipelines, channels, and the like. This includes federal action such as permits, grants, licenses, or other forms of federal authorization or approval which may result in construction.

WASHINGTON STATE DEPARTMENT OF
Natural Resources

JENNIFER M. BELCHER
Commissioner of Public Lands

KALEEN COTTINGHAM
Supervisor

April 11, 1994

Greg Green
Enserch Environmental Corporation
10900 NE 8th Street
Bellevue WA 98004-4405

SUBJECT: Chehalis Generation Facility Gas Pipeline Route Change (T12N R02W S01,12 and T13N R02W S24,25,36)

We've searched the Natural Heritage Information System for information on rare plants, high quality native wetlands and high quality native plant communities in the vicinity of your project. We have a record of a state sensitive plant, *Trillium parviflorum* (small-flowered trillium), occurring within about 1.25 miles of the proposed gas pipeline route in Sections 19 and 20, Township 13 North, Range 01 West. Any rare plant surveys done should include looking for this plant. I have enclosed a fact sheet on small-flowered trillium for your information.

The Washington Natural Heritage Program is responsible for information on the state's endangered, threatened, and sensitive plants as well as high quality native plant communities and wetlands. The Department of Fish and Wildlife manages and interprets data on wildlife species of concern in the state. For information on animals of concern in the state, please contact the Priority Habitats and Species Program, Washington Department of Fish and Wildlife, 600 Capitol Way North, Olympia, WA 98501-1091, or by phone (206) 753-3318.

The Natural Heritage Information System is not a complete inventory of Washington's natural features. Many areas of the state have never been thoroughly surveyed. There may be significant natural features in your study area that we don't yet know about. This response should not be regarded as a final statement on the natural features of the areas being considered and doesn't eliminate the need or responsibility for detailed on-site surveys.

I hope you'll find this information helpful.

Sincerely,

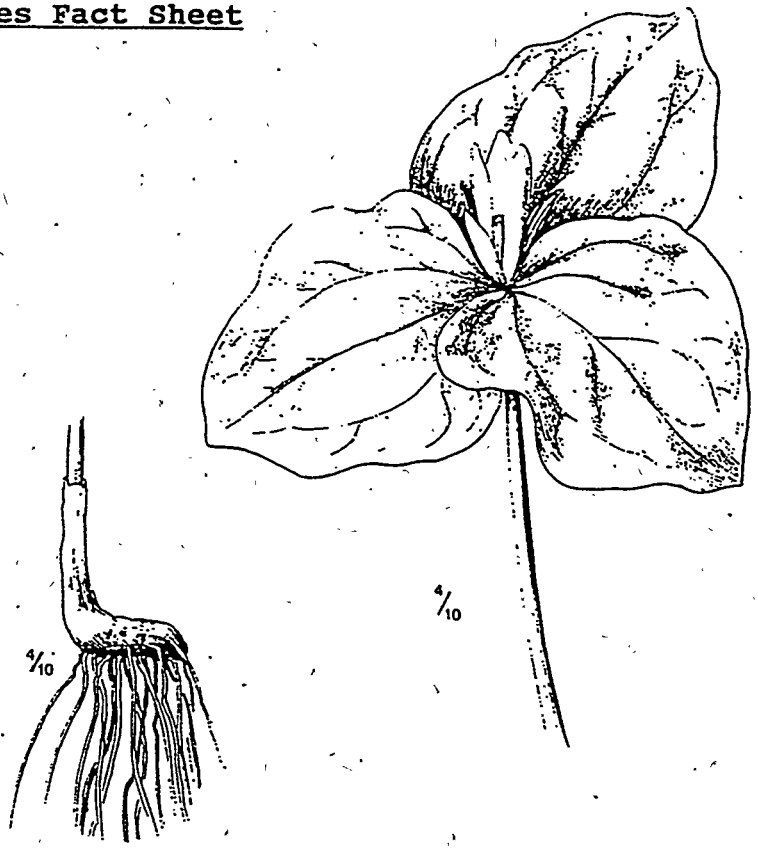
Sandy Norwood

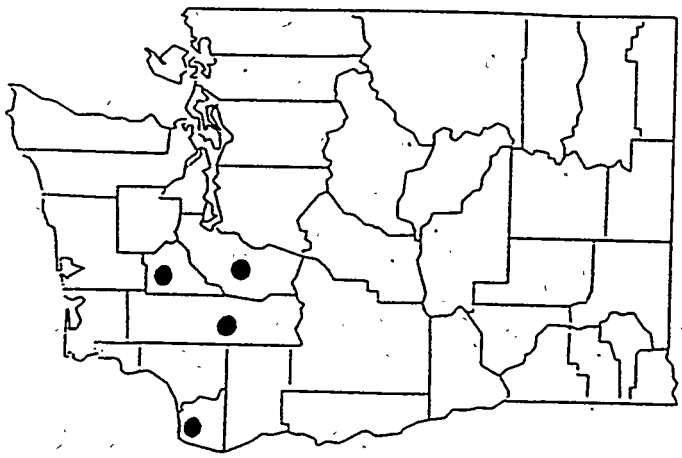
Sandy Norwood, Environmental Review Coordinator
Washington Natural Heritage Program
Division of Land & Water Conservation
PO Box 47047
Olympia, WA 98504-7047
(206) 902-1667

Enclosure

WASHINGTON STATE NATURAL HERITAGE PROGRAM
Plant Species Fact Sheet

NAME: *Trillium parviflorum* Soukup -small-flowered trillium
FAMILY: Liliaceae - Lily family
STATUS: State: Sensitive
PROMINENT CHARACTERISTICS: 1-3 dm. (4-12 in.) tall; large, mottled leaves (3) without stalks; flower resting atop leaves; petals lance-elliptic and larger than greenish sepals; petals white to pink. Identifiable April to June.
HABITAT: Moist woods, and along streams at lower elevations.
RANGE: Peripheral in WA, Pierce, Thurston, and Clark cos.; south through Willamette Valley to CA.
OCCURRENCE SUMMARY: About two dozen recent sightings are known.
THREATS: Logging, rural and suburban development, grazing, and overcollection by wildflower enthusiasts.
LAND OWNERSHIP/MANAGEMENT: FWS, DOD, DNR, PVT, WDW





Refer to *Trillium chloropetalum* in Vascular Plants of the Pacific Northwest, Part 1, by C.L. Hitchcock and M. Ownbey, 1969.
Adapted from:
An Illustrated Guide to the Endangered, Threatened, and Sensitive Vascular Plants of Washington. Washington Natural Heritage Program 1981.

EBASCO

November 2, 1993
EBEL-BPA-93-082

David C. Frederick
Field Supervisor
U.S. Fish and Wildlife Service
Office of Endangered Species
3704 Griffin Lane SE, Suite 102
Olympia, WA 98501-2192

Subject: Request for Threatened and Endangered Species Data for the Chehalis Generation Facility

Dear Mr. Frederick:

As part of an Environmental Impact Statement, Ebasco Environmental is preparing an Environmental Report for Bonneville Power Administration on the Chehalis Generation Facility. This facility will be a combined cycle combustine turbine project located in Chehalis, Washington. We have enclosed a map indicating the location of the proposed project site, natural gas pipeline route, and the water pipeline route. Please send a list of endangered, threatened, and candidate species of plants and animals that may occur in the vicinity of the project area. The legal description of the project area is as follows:

Township 14 North, Range 2 West, Sections 29, 30, 31, 32, 38
Township 13 North, Range 2 West, Sections 4,5, 9, 10, 11, 12, 13, 14, 15, 39, 41
Township 13 North, Range 1 West, Section 7

If you have any questions regarding this request, please do not hesitate to call me at 206-451-4296.

Thank you.

Sincerely,

EBASCO ENVIRONMENTAL

Gregory A. Green
Principal Wildlife Biologist

Enclosures

cc: David Broadfoot (w/o enclosures)
Rob Diffely (w/o enclosures)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
3704 Griffin Lane SE, Suite 102
Olympia, Washington 98501-2192
(206) 753-9440 FAX: (206) 753-9008

April 21, 1994

Greg Green
Enserch Environmental Corporation
10900 NE 8th Street
Bellevue, WA 98004-4405

FWS Reference: 1-3-94-SP-381
X-Reference: 1-3-94-SP-124

Dear Mr. Green:

This is in response to your letter dated March 10, 1994 and received in this office on March 11. Enclosed is an updated list of listed threatened and endangered species, and candidate species (Attachment A), that may be present within the area of the proposed Chehalis Generation Facility in Lewis County, Washington. The list fulfills the requirements of the Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act of 1973, as amended (Act). We have also enclosed a copy of the requirements for Bonneville Power Administration (BPA) compliance under the Act (Attachment B).

Should the biological assessment determine that a listed species is likely to be affected (adversely or beneficially) by the project, the BPA should request Section 7 consultation through this office. If the biological assessment determines that the proposed action is "not likely to adversely affect" a listed species, the BPA should request Service concurrence with that determination through the informal consultation process. Even if the biological assessment shows a "no effect" situation, we would appreciate receiving a copy for our information.

Candidate species are included simply as advance notice to federal agencies of species which may be proposed and listed in the future. However, protection provided to candidate species now may preclude possible listing in the future. If early evaluation of your project indicates that it is likely to adversely impact a candidate species, the BPA may wish to request technical assistance from this office.

In addition, please be advised that federal and state regulations may require permits in areas where wetlands are identified. You should contact the Seattle District of the U.S. Army Corps of Engineers for federal permit requirements and the Washington State Department of Ecology for state permit requirements.

Your interest in endangered species is appreciated. If you have additional questions regarding your responsibilities under the Act, please contact Jim Michaels or Jodi Bush of this office at the letterhead phone/address.

Sincerely,

for / David C. Frederick
State Supervisor

jb/kr
Enclosures
SE/BPA/1-3-94-SP-381/Lewis
c: WDW, Region 5
WNHP, Olympia

ATTACHMENT A

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES WHICH MAY OCCUR WITHIN THE VICINITY OF THE PROPOSED CHEHALIS CONGENERATION FACILILTY IN LEWIS COUNTY, WASHINGTON (T12N R02W S1/12; T13N R02W S24-25/36-38)

FWS Reference: 1-3-94-SP-381

LISTED

Bald eagle *(Haliaeetus leucocephalus)* - wintering bald eagles may occur in the vicinity of the project from about October 31 through March 31.

Marbled murrelet *(Brachyramphus marmoratus marmoratus)* - may occur in the vicinity of the project.

Peregrine falcon *(Falco peregrinus)* - spring and fall migrant falcons may occur in the vicinity of the project.

Northern spotted owl *(Strix occidentalis caurina)* - may occur in the vicinity of the project throughout the year.

Major concerns that should be addressed in your biological assessment of project impacts to listed species are:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas and owl foraging, roosting, nesting, and dispersal habitat in all areas influenced by the project.
3. Impacts from project construction and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) which may result in disturbance to listed species and/or their avoidance of the project area.

PROPOSED

None

CANDIDATE

The following candidate species may occur in the vicinity of the project:

Bull trout *(Salvelinus confluentus)*
Harlequin duck *(Histrionicus histrionicus)*
Mountain quail *(Oreortyx pictus)*
Northern goshawk *(Accipiter gentilis)*
Northwestern pond turtle *(Clemmys marmorata marmorata)*
Northern red-legged frog *(Rana aurora aurora)*
Pacific fisher *(Martes pennanti pacifica)*
Spotted frog *(Rana pretiosa)*

ATTACHMENT B

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7(a) AND 7(c) OF THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED

SECTION 7(a) - Consultation/Conference

Requires:

1. Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2. Consultation with FWS when a federal action may affect a listed endangered or threatened species to ensure that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the federal agency after it has determined if its action may affect (adversely or beneficially) a listed species; and

3. Conference with FWS when a federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or an adverse modification of proposed critical habitat.

SECTION 7(c) - Biological Assessment for Construction Projects *

Requires federal agencies or their designees to prepare a Biological Assessment (BA) for construction projects only. The purpose of the BA is to identify any proposed and/or listed species which is/are likely to be affected by a construction project. The process is initiated by a federal agency in requesting a list of proposed and listed threatened and endangered species (list attached). The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the species list, please verify the accuracy of the list with our Service. No irreversible commitment of resources is to be made during the BA process which would result in violation of the requirements under Section 7(a) of the Act. Planning, design, and administrative actions may be taken; however, no construction may begin.

To complete the BA, your agency or its designee should: (1) conduct an onsite inspection of the area to be affected by the proposal, which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within the FWS, National Marine Fisheries Service, state conservation department, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures; and (6) prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevant information. Upon completion, the report should be forwarded to our Endangered Species Division, 3704 Griffin Lane SE, Suite 102, Olympia, WA 98501-2192.

---

* "Construction project" means any major federal action which significantly affects the quality of the human environment (requiring an EIS), designed primarily to result in the building or erection of human-made structures such as dams, buildings, roads, pipelines, channels, and the like. This includes federal action such as permits, grants, licenses, or other forms of federal authorization or approval which may result in construction.

APPENDIX B

BIOLOGICAL ASSESSMENT FOR THE HERMISTON POWER PROJECT

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ATTACHMENT A AGENCY LETTERS

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ACRONYMS

BPA	Bonneville Power Administration
cfs	Cubic feet per second
cm	Centimeter
cms	Cubic meters per second
dB(A)	Decibels using the A-weighted scale
EIS	Environmental Impact Statement
ESA	Endangered Species Act of 1973
gpm	Gallons per minute
ha	Hectare
HRSG	Heat recovery steam generator
km	Kilometer
kV	Kilovolt
lpm	Liters per minute
m	Meter
NWP	Northwest Pipeline Corporation
NWR	National Wildlife Refuge
PGT	Pacific Gas Transmission
RCP	Resource Contingency Program
ROW	Right-of-way
SR	State Route
UECA	Umatilla Electric Cooperative Association
USFWS	U.S. Fish and Wildlife Service

1.0 INTRODUCTION

The Bonneville Power Administration (BPA) has statutory responsibilities to supply electrical power to its utility, industrial, and other customers in the Pacific Northwest. In 1990, BPA initiated the Resource Contingency Program (RCP) that allows BPA to purchase options to acquire power in the future on an "as needed" basis. As part of this program, BPA has purchased options from three independent projects for power generation: the Chehalis Generation Facility in Chehalis, Washington; the Hermiston Power Project in Hermiston, Oregon, and the Satsop Combustion Turbine Project in Satsop, Washington. This Biological Assessment examines the potential effects of constructing this project to Federally listed and proposed wildlife species in the vicinity of the proposed Hermiston Power Project as mandated by Section 7 of the Endangered Species Act (ESA) of 1973. Separate Biological Assessments have been prepared for the other two RCP power generation projects.

In compliance with the ESA, the objective of this Biological Assessment is to: (1) describe the proposed action; (2) provide site-specific information on the Federally listed species potentially occurring in the vicinity of the project; (3) evaluate the potential effects of the proposed project on these species; (4) describe any conservation measures necessary to reduce or eliminate adverse effects; and (5) provide a determination of effect (beneficial, no effect, not likely to adversely affect, or likely to adversely affect) for the listed and proposed species. Information on Federal candidate species potentially occurring in the vicinity of the Hermiston Power Project is provided in the RCP Environmental Impact Statement (EIS).

2.0 PROJECT DESCRIPTION

The proposed Hermiston Power Project would be located 4.8 kilometers (km) (3 miles) south of Hermiston, Oregon, in an industrial area adjacent to the currently operating J.R. Simplot Potato Processing Plant in Township 4 North, Range 28 East, Section 28 (Figure 1). The property is currently owned by the J.R. Simplot Company and the Hermiston Power Partnership. In addition to producing electricity from natural gas combustion and steam generation, the facility would provide steam from waste heat to the J.R. Simplot potato plant for processing operations.

2.1 PROJECT COMPONENTS

Project components associated with the Hermiston Power Project include the cogeneration facility, fuel supply, electrical interconnection and substation modifications, and water supply and wastewater systems. Proposed locations and specifications of project components are highlighted in the following sections.

2.1.1 Cogeneration Facility

The proposed location for the cogeneration facility is a 6.9-hectare (ha) (17-acre) agricultural site located immediately adjacent to the J.R. Simplot potato plant. Most of the surrounding land is also agricultural. The facility would consist of two identical side-by-side combustion turbine generators, two heat recovery steam generators (HRSGs), two steam turbines, two steam surface condensers, and related ancillary facilities. Equipment common to both units would include natural gas supply lines, electrical transmission lines, water supply and wastewater discharge lines, electric room, and control center.

The majority of the facility's equipment, including the turbine generators, would be located in a steel building covering approximately 5,575 square meters (m) (60,000 square feet). Separate rooms in the building would contain the electrical switches and plant controls. Equipment located outside the building would be two 53.3-m (175-foot) high exhaust stacks, cooling towers, HRSGs, electrical substation, and storage tanks for water, back-up fuel oil, and chemicals.

2.1.2 Fuel Supply

The cogeneration facility's primary fuel would be natural gas. Current plans are to have two supply sources: (1) an approximately 13-km (8-mile) long, 30-centimeter (cm) (12-inch) Northwest Pipeline Corporation (NWP) lateral pipeline; and (2) a 6.4-km (4-miles), 30-cm (12-inch) Pacific Gas Transmission (PGT) Company's lateral pipeline (Figure 1).

2.1.3 Electrical Interconnection and Substation Modifications

Electricity generated by the Hermiston Power Project would be transmitted to BPA's McNary Substation, approximately 14.5 km (9 miles) north of the proposed cogeneration facility site. Two alternatives are being considered for conveying electrical power generated at the cogeneration facility to the McNary Substation: the Western 230-kilovolt (kV) Alternative and Eastern 500-kV Alternative (Figure 1). These alternative routes, together with the modifications required at the McNary Substation to accommodate the new power source, are described below.

Western 230-kV Alternative (Preferred Alternative)

This alternative involves using, for the most part, an existing Umatilla Electric Cooperative Association (UECA) 115-kV transmission line corridor that generally runs parallel to the eastern boundary of the Umatilla Ordnance Depot from the Westland Substation at the Lamb-Weston potato plant north to the City of Umatilla, then east and north to the McNary Substation (Figure 1). The UECA 115-kV line is planned for upgrading to two 230-kV circuits to accommodate both the existing 115-kV UECA line and a 230-kV line required by the planned Hermiston Generating Project at the Lamb-Weston potato plant site 3.2 km (2 miles) west of the Hermiston Power Project. This upgrading will take place prior to, and is independent of, the Hermiston Power Project being developed.

The UECA 115-kV line would be relocated to a new wood pole transmission line (UECA 115-kV relocation) to be constructed along county ROW. The required 230-kV conductor and insulators

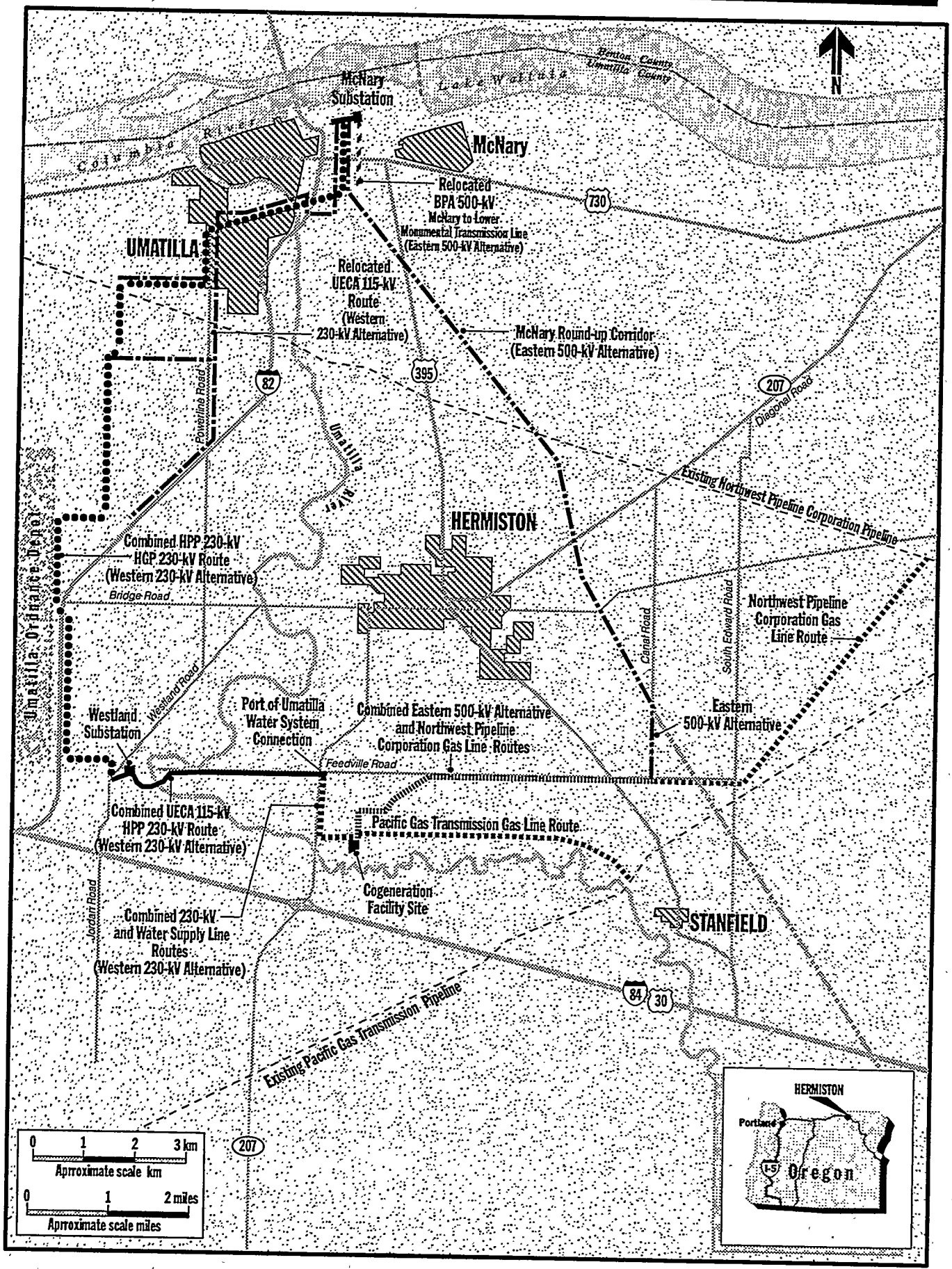


Figure 1 Project Vicinity Map

would then take the UECA position on the 230/230-kV transmission line, along with the Hermiston Generating Project, between the Westland and McNary substations.

The proposed project would be connected to the UECA line at the Westland Substation by constructing approximately 2.4 km (1.5 miles) of new 230-kV line from the cogeneration facility site west and then north to Feedville Road, then continuing approximately 3.2 km (2 miles) west along Feedville Road to the Westland Substation at the Lamb-Weston Plant. This portion of the proposed 230-kV line along Feedville Road across the Umatilla River would be constructed on the same poles supporting an existing UECA 115-kV line from Westland Substation to the Feedville Substation (Figure 1).

Eastern 500-kV Alternative

This alternative would require a new 500-kV single-circuit line to be constructed within a 13.7-km (8.5-mile) portion of the existing 76.2-m (250-foot) wide BPA McNary Roundup Corridor between Feedville Road and the McNary Substation (Figure 1). The new 500-kV line would be constructed on single-shaft steel poles or towers on the eastern side of the existing 230-kV McNary Roundup Line No. 1. It is anticipated that pole/tower spacing would range between 304.8 and 365.8 m (1,000 to 1,200 feet) within the existing corridor.

From the McNary Substation south for a distance of approximately 1.4 km (0.9 mile), the Hermiston Power Project would use the existing BPA 500-kV McNary-Lower Monumental transmission line's poles and conductors. At the southern end of that line segment, the Hermiston Power Project 500-kV line would depart from the McNary-Lower Monumental Corridor and continue south and slightly west along a new route for a distance of approximately 0.6 km (0.4 mile), at which point the line reaches the BPA 230-kV McNary Round-Up Corridor.

A new section of McNary-Lower Monumental 500-kV line would need to be constructed to replace that portion taken over by the project. This section, which is approximately 1.6 km (1 mile) long, would be located about 200 m (656 feet) west of its present location.

The connection from the cogeneration facility to the McNary Roundup Corridor (approximately 8.7 km [5.4 miles]) would be accomplished by constructing a new 500-kV line on steel poles or towers along the proposed NWP gas line route, most of which is along the south side of Feedville Road (Figure 1). Pole spacing is anticipated to range between 152 to 244 m (500 to 800 feet) along the new corridor.

2.1.4 Water Supply and Wastewater Systems

Process water and boiler make-up water would be obtained from the Port of Umatilla system. The water supply for the project would originate at the Port of Umatilla treatment facility north of Feedville Road and be transported to the cogeneration facility site by a 1.9-km (1.2-mile) pipeline (Figure 1). Potable water would be obtained from the J.R. Simplot Potato Processing Plant adjacent to the proposed cogeneration facility site.

Water for the cogeneration facility would be purchased from the Port of Umatilla regional water system, which would draw water from the Columbia River under an existing water right. The

Port's planned facilities would be constructed independently of the proposed Hermiston Power Project. The proposed cogeneration facility water supply pipeline would originate at the Port's proposed water treatment plant, which is located about 2.1 km (1.3 miles) north on State Route (SR) 207. The pipeline would parallel SR 207 to the cogeneration facility site (Figure 1).

The cogeneration facility's wastewater, including cooling tower blowdown, would be collected and routed to the existing Simplot potato plant land application system for use in crop irrigation. Sanitary wastes would be disposed of by routing to the J.R. Simplot Company sewer system.

2.2 Construction Schedule

Construction of the project could begin between 1995 and 2000, depending on BPA's need for electricity. Once BPA gives the approval for facility construction, the project could be completed in approximately 2 years. Site preparation would require conventional construction equipment, including bulldozers, front-end loaders, trucks, tractor-scrapers, and graders. After site preparation, the combustion turbines, generators, electrical and other equipment, and support facilities of the cogeneration facility would be installed. Once these facilities are in place, the site landscaping would be initiated. Pipeline construction would take approximately 12 months. The length of construction of the electrical transmission lines would depend on selected alternative; construction of either route would not exceed 12 months.

3.0 SITE SPECIFIC INFORMATION ON FEDERALLY LISTED SPECIES

The bald eagle (*Haliaeetus leucocephalus*), a Federally threatened species in Oregon, has been identified by the U.S. Fish and Wildlife Service (USFWS) as potentially occurring in the vicinity of the Hermiston Power Project (letter from R. Peterson, Field Supervisor, USFWS, Portland, Oregon, April 12, 1994). This section provides information on the occurrence of the bald eagle in the project vicinity and habitat availability as determined through surveys, consultation with local biologists, and literature reviews. Information on the species' natural history can be obtained from Stalmaster (1987), USFWS (1986), and other scientific literature.

Surveys were conducted between November 13, 1993 and April 10, 1994 to determine the use of habitats by bald eagles within an approximately 1.6-km (1-mile) radius of the project components (Northwest Wildlife Surveys [NWS] 1994). Areas within 1.6 km (1 mile) of the project were surveyed weekly, whereas areas between 1.6 and 8 km (1 and 5 miles) away from the project were surveyed bi-weekly. Surveys were conducted by vehicle and foot (plus one drift boat trip of the Umatilla River) during mornings and afternoons. Late afternoon to dusk surveys were conducted in areas with suitable roosting habitat. In addition, several biologists

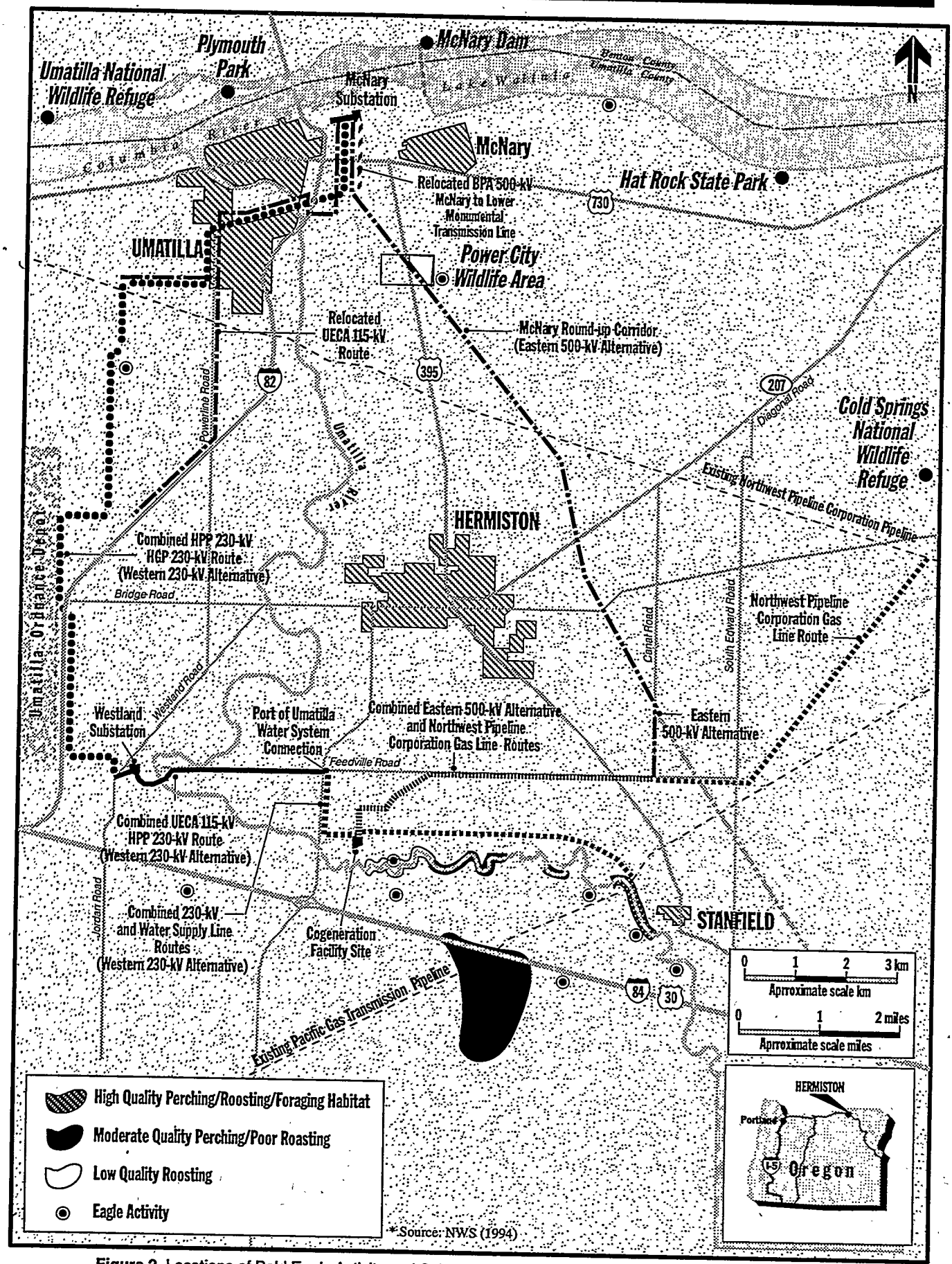
familiar with the area were consulted to determine the level of bald eagle use in the project vicinity.

Results of the surveys and agency consultation indicated that only wintering bald eagles occur in the project vicinity; no nesting activity is known to occur near the project (NWS 1994). The bald eagle wintering period is generally considered to be October 31 to March 31. Wintering bald eagles in the Pacific Northwest most commonly perch on tall snags, ponderosa pine, and cottonwoods (Stalmaster and Newman 1978, Fielder and Starkey 1986); proximity to a food source is probably the most important factor influencing perch selection (Steenhof et al. 1980).

Bald eagles winter in several locations in the project vicinity, most of which are greater than 1.6 km (1 mile) from any of the proposed project components (Figure 2). The most consistently used bald eagle wintering areas are the Cold Springs National Wildlife Refuge (NWR) located 6.4 km (4 miles) east of the existing 500-kV transmission line and the Umatilla NWR along the Columbia River, just west of Umatilla, Oregon. Both of these areas support a small number (3 to 5) of wintering eagles each winter. In addition to the NWRs, a day and night winter roost consistently used by a single immature eagle was identified approximately 5.6 km (3.5 miles) east of the McNary Substation, along the south shore of the Columbia River (NWS 1994). Other observations indicated regular but very localized, use by individual wintering bald eagles of riparian, wetland, and agricultural habitats within the proximity of the proposed project facilities. Most of the observations consisted of individual eagles foraging over agricultural areas and ponds or perching/roosting in riparian habitats along the Umatilla River, from just upriver from the cogeneration facility to beyond the eastern end of the PGT natural gas pipeline (Figure 2).

High quality bald eagle perching/roosting habitat occurs 5.6 km (3.5 miles) up the Umatilla River from the proposed cogeneration facility site. This area is approximately 402 meters (0.25 mile) from the eastern end of the proposed PGT natural gas pipeline (Figure 2). Forest stand structure (i.e., uneven-aged with at least a remnant of the old-growth component) is an important habitat component for selection of communal night roosts (Anthony et al. 1982). The upper reaches of the Umatilla River are bordered by cottonwood, willow, alder, and Russian olive trees, and other riparian vegetation that eagles can use for perching and roosting while foraging on waterfowl. Low and moderate quality riparian habitat, representing potentially suitable perching and limited roosting habitat, extends throughout the river reach from 0.8 km (0.5 mile) southeast of the cogeneration facility site upriver 402 m (0.25 mile) to just south of the eastern end of the PGT natural gas pipeline (Figure 2). Individual wintering bald eagles have been observed along the entire reach from south of the Hermiston Power Project facility to beyond the PGT route, as well as in agricultural fields to the south of the river. One eagle consistently used the higher quality habitat all winter long. No bald eagle use has been documented along the Umatilla River downriver from the proposed power generation facility.

Bald eagles require large expanses of open water or land for foraging and feeding (Stalmaster 1987). Wintering eagles in the vicinity of the project forage on waterfowl on the Umatilla and Columbia rivers and small wetlands and ponds from mid-December to early-February. They also feed on fish, including coho and chinook salmon and steelhead trout; domestic and wild animal carcasses; and livestock placentas. Potential foraging habitat exists at the Power City



*Source: NWS (1994)

Figure 2 Locations of Bald Eagle Activity and Suitability of Project Vicinity Habitat for Perching, Roosting, and Foraging

Wildlife Area wetlands along the Eastern 500-kV Alternative transmission line. One bald eagle was observed flying over the Power City Wildlife Area during the 1993-94 winter period. Foraging use by bald eagles, however, appears to be very low because the wetlands freeze, limiting waterfowl use during the winter. Foraging activity was also documented on one occasion when an eagle was observed circling over livestock calves in agricultural fields near the Western 230-kV Alternative transmission line route, northeast of the Umatilla Ordnance Depot (NWS 1994). Other foraging activity was documented in agricultural fields and ponds south of the Umatilla River and Interstate 84.

4.0 EFFECTS OF THE PROJECT ON FEDERALLY LISTED SPECIES

Potential effects to bald eagles include: (1) direct loss of roosting or perching habitat, (2) effects to food supplies, (3) disturbance to wintering bald eagles, and (4) collision and electrocution from electrical transmission lines.

4.1 Loss of Habitat

The project will not affect any perching or roosting habitat in the project vicinity; most of the land traversed by the pipeline and transmission line routes is agricultural or shrub-steppe. The Western 230-kV Alternative crosses the Umatilla River; however, it is not likely to impact any of the riparian habitat as the poles would be placed outside of this zone. Additionally, bald eagle use has not been documented in this river reach. The Eastern 500-kV Alternative would cross the Power City Wildlife Area, immediately adjacent to an existing transmission line passing over wetland/riparian habitat. No potential roosting or perching habitat would be removed and this wildlife area is rarely used by bald eagles.

4.2 Effects on Food Supplies

Potential effects from the proposed Hermiston Power Project on food supplies include interference of new transmission lines with waterfowl use of the area; ground disturbance and project operation altering fish, small mammal, and waterfowl habitat; and alteration of fish and waterfowl populations as a result of water withdrawal. Although the alternative for electrical transmission has not been chosen and exact pole locations are unknown, new lines would not interfere with waterfowl flight paths and would not be located within 1.5 km (0.9 mile) of any roost sites. The Eastern 500-kV Alternative route crosses the Power City Wildlife Area, which is used by up to 1,000 ducks during fall migration. This area, however, readily freezes in winter, precluding wintering eagles from foraging in the area.

The water supply source for the proposed Hermiston Power Project is the Columbia River, which has an average discharge of approximately 4,808 cubic meters per second (cms) (169,800 cubic feet per second [cfs]) (288,490,384 liters per minute [lpm] [76,211,334 gallons per minute {gpm}]) at McNary Dam approximately 14.5 km (9 miles) north of the site. It is estimated that withdrawal of approximately 0.12 cms (4.2 cfs) (7,135.9 lpm [1,885.1 gpm]) would be required to support the cogeneration facility. The amount of water necessary for project operation is nominal with respect to the Columbia River discharge; therefore, the potential effect that water withdrawal would have on fish or waterfowl would be low.

4.3 Disturbance

Ground disturbing activities, primarily construction of the natural gas pipelines and electrical transmission lines, would be confined to narrow construction corridors. Nevertheless, such activities would temporarily displace wildlife, including potential prey species of bald eagles, from the immediate area. Construction would be scheduled beginning in mid- to late spring and continue through the fall, thus eliminating potential effects to wintering bald eagle prey availability. All temporarily disturbed land that potentially supports prey species would be revegetated. The permanent habitat loss would be approximately 7 ha (17 acres), depending on which transmission line alternative is selected, and the majority of the lands are agricultural.

A noise assessment conducted by the project developer indicated that increases in noise levels caused by construction and operation of the Hermiston Power Project would not exceed 10 decibels (using the A-weighted scale; dB[A]) over existing noise levels within a 0.8-km (1-mile) radius of the proposed facility, indicating that project construction and operation would not likely affect bald eagles. Temporary disturbance to bald eagles and their prey could result from noise emitted during construction activities of the electrical transmission and natural gas pipeline right-of-ways (ROWs) and the cogeneration facility if construction occurs during the October 31 to March 31 bald eagle wintering period. The greatest potential for construction/noise disturbance would occur near the PGT gas pipeline route near the Umatilla River and the Eastern 500-kV Alternative near Power City Wildlife Area, both areas with documented bald eagle wintering use.

4.4 Electrical Transmission Line Hazards

Raptors, including bald eagles, are generally not susceptible to collision with transmission lines, most likely because of their keen eyesight, nonflocking behavior, and flight maneuverability (Williams and Colson 1988). As planned, all new transmission lines would incorporate the guidelines presented by Olendorff et al. (1981), and would be separated by at least 4.3 m (14 feet) vertically and 3 m (10 feet) horizontally, a distance that would preclude electrocution of bald eagles.

The cumulative effects of the project are expected to minimal, as the proposed project would only marginally increase the rate of residential and industrial development in the region.

5.0 MITIGATION MEASURES

Potential effects of the proposed Hermiston Power Project on bald eagles occurring in the vicinity could be minimized by:

- Avoiding construction in wetland and riparian habitats that provide potential perching, roosting, or foraging habitat;
- Placing project facilities at least 1.5 km (0.9 mile) from known communal roost sites;
- Completing construction activities, particularly facilities closest to the Umatilla River and Power City Wildlife Area, outside of the October 31 through March 31 wintering period;
- Revegetating all disturbed habitats with native plant species capable of supporting wildlife species;
- Ensuring that water quality is not affected by construction or wastewater discharge; and
- Adhering to guidelines for design of transmission lines to avoid collision and electrocution of raptors.

6.0 DETERMINATION OF EFFECT

Based on the description of the project and associated mitigation measures, no loss of suitable bald eagle habitat would result from construction or operation of the project and disturbance from the facility would be nominal. Therefore, construction and operation of the Hermiston Power Project is not likely to adversely affect the bald eagle.

7.0 LITERATURE CITED

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ATTACHMENT A

AGENCY LETTERS

EBASCO

December 14, 1993
EBEL-BPA-93-098

Mr. Josh Millman
U.S. Fish and Wildlife Service
2600 S.E. 98th Ave., Suite 100
Portland, OR 97266

Subject: **Request for Threatened and Endangered Species Data for the Hermiston Power Project**

Dear Mr. Millman:

As part of an Environmental Impact Statement, Ebasco Environmental is preparing an Environmental Report for the Bonneville Power Administration on the Hermiston Power Project. The proposed project is a combined cycle combustion turbine project located in Hermiston, Oregon. We have enclosed a map indicating the general location of the proposed plant and associated transmission lines and gas pipelines. Please send a list of endangered, threatened, and candidate species of plants and animals that may occur in the vicinity of the project area. The legal description of the project area and 5-mile radius is as follows:

T3N, R28E all sections
T4N, R28E all sections
T5N, R28E all sections
T4N, R27E sections 1, 2, 3, 10-15, 22-27, 34, 35, and 36
T5N, R27E sections 13, 24, 25, and 36
T4N, R29E sections 5-8, 19, 20, 21, and 28-33
T3N, R29E sections 5 and 6

All of these sections occur on the following USGS 1:24,000 quadrangles: Stanfield, Hermiston, Umatilla, Ordnance, and Service Buttes.

EBASCO ENVIRONMENTAL *A Division of Ebasco Services Incorporated*
10900 NE 8TH STREET • BELLEVUE, WA 98004-4405 • (206) 451-4600 • FAX (206) 451-4691

If you have any questions regarding this request, please do not hesitate to call me at 206-451-4296.

Thank you.

Sincerely,

EBASCO ENVIRONMENTAL

Gregory A. Green
Principal Wildlife Biologist

Enclosures

cc: D. Broadfoot
(without enclosures)

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Portland Field Office
2600 S.E. 98th Avenue, Suite 100
Portland, Oregon 97266
(503) 231-6179 Fax: (503)-231-6195

January 12, 1994

Ref: 1-7-94-SP-105

Gregory A. Green
Ebasco Environmental
10900 NE 8th Street
Bellevue, Washington 98004-4405

RE: EBEL-BPA-93-098

Dear Mr. Green:

This is in response to your letter, dated December 14, 1993, requesting information on listed and proposed endangered and threatened species that may be present within the area of the proposed Hermiston Power Project in Umatilla County, Oregon. The U.S. Fish and Wildlife Service (Service) received your letter on December 15, 1993.

We have attached a list (Attachment A) of threatened and endangered species that may occur within the area of the Hermiston Power Project. The list fulfills the requirement of the Service under Section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 USC 1531 et seq.). The Bonneville Power Administration's (BPA) requirements under the Act are outlined in Attachment B.

Should the BPA's biological assessment determine that a listed species may be affected by the project, the BPA should consult with the Service following the requirements of Federal Regulation 50 CFR 402 which implement the Act.

Attachment A includes a list of candidate species under review for listing. These candidate species have no protection under the Act but are included for consideration as it is possible candidates could become formal proposals and be listed prior to project completion. Therefore, if the proposed project may affect candidate species, the BPA is not required to perform a biological assessment or to consult with the Service. However, if early evaluation of the project indicates that it is likely to adversely impact a candidate species, the BPA may wish to request technical assistance from this office.

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Your interest in endangered species is appreciated. If you have questions regarding your responsibilities under the Act, please contact Diana Hwang at (503) 231-6179. For questions regarding anadromous fish, please contact National Marine Fisheries Service, 911 NE 11th Ave., Room 620, Portland, Oregon, (503) 230-5420. All correspondence should include the above referenced case number.

Sincerely,

for Russell D. Peterson
Field Supervisor

Attachments

cc: PFO-ES
BFO-SE
ODFW (Nongame)
ONHP

SP105

ONHP/DH/NP

ATTACHMENT A

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES THAT MAY OCCUR IN THE AREA OF THE PROPOSED HERMISTON POWER PROJECT
1-7-94-SP-105

LISTED SPECIES[1/]

Birds		
Bald eagle	*Haliaeetus leucocephalus*	LT
Documented occurrence on Cold Springs NWR (wintering area)		
Fish		
Chinook salmon	*Oncorhynchus tshawytscha*	**LT
Spring/summer and fall runs in the Snake River. (petitioned June 7, 1990; proposed June 27, 1991 in 56 FR 29542-29544; listed April 22, 1991 in 57 FR 14653)		
Snake River Sockeye salmon	*Oncorhynchus nerka*	**LE
Salmon River tributary to the Snake River; Idaho. (petitioned April 2, 1990; proposed April 6, 1991 in 56 FR 14055; listed November 20, 1991 in 56 FR 58619)		

PROPOSED SPECIES[1/]

None

CANDIDATE SPECIES[2,3/]

Mammals		
Pygmy rabbit	*Brachylagus idahoensis*	C2
Pacific western big-eared bat	*Plecotus townsendii townsendii*	C2
Birds		
Tricolored blackbird	*Agelaius tricolor*	C2
Documented occurrence at Manns Pond		
Ferruginous hawk	*Buteo regalis*	C2
Loggerhead shrike	*Lanius ludovicianus*	C2
Long-billed curlew	*Numenius americanus*	3C
Documented occurrences at McNary Potholes, Umatilla Meadows, Echo Meadows and Umatilla Ordnance Depot		
Mountain quail	*Oreortyx pictus*	C2
Plants		
Columbia cress	*Rorippa columbiae*	C2
Documented historical occurrence along Columbia River near Umatilla		

(E) - Endangered (T) - Threatened (CH) - Critical Habitat

(S) - Suspected (D) - Documented

(C1)- Category 1: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

(C2)- Category 2: Taxa for which existing information indicates may warrant listing, but for which substantial biological information to support a proposed rule is lacking.

(3A)- Category 3A: Taxa for which the Service has persuasive evidence of extinction.

(3B)- Category 3B: Names that on the basis of current taxonomic understanding do not represent taxa meeting the Act's definition of "species."

(3C)- Category 3C: Taxa that have proven to be more abundant or widespread than was previously believed and/or those that are not subject to any identifiable threat.

* *If a vertebrate or plant, a single asterisk indicates taxon is possibly extinct. If an invertebrate, a single asterisk indicates a lack of information for the taxon since 1963.*

** *Consultation with National Marine Fisheries Service required.*

1/ U. S. Department of Interior, Fish and Wildlife Service, July 15, 1991, Endangered and Threatened Wildlife and Plants, 50 CFR 17.11 and 17.12.

2/ Federal Register Vol. 56, No. 225, November 21, 1991, Notice of Review-Animals

3/ Federal Register Vol. 58, No. 188, September 30, 1993, Notice of Review-Plants

ATTACHMENT B

FEDERAL AGENCIES RESPONSIBILITIES UNDER SECTIONS 7(a) and (c) OF THE ENDANGERED SPECIES ACT

SECTION 7(a) - Consultation/Conference

Requires: 1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2). Consultation with FWS when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of Critical Habitat. The process is initiated by the Federal agency after they have determined if their action may affect (adversely or beneficially) a listed species; and

3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed Critical Habitat.

SECTION 7(c) - Biological Assessment for Major Construction Projects [1/]

Requires Federal agencies or their designees to prepare a Biological Assessment (BA) for construction projects only. The purpose of the BA is to identify any proposed and/or listed species which are/is likely to be affected by a construc- tion project. The process is initiated by a Federal agency in requesting a list of proposed and listed threatened and endangered species (list attached). The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the species list, the accuracy of the species list should be informally verified with our Service.. No irreversible commitment of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may be taken; however, no construction may begin.

To complete the BA, your agency or its designee should: (1) conduct an on- site inspection of the area to be affected by the proposal which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or for potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within FWS, National Marine Fisheries Service, State conservation departments, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures and (6) prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevant information. The BA should conclude whether or not a listed or proposed species will be affected. Upon completion, the report should be forwarded to our Portland Office.

[1/] A construction project (or other undertaking having similar physical impacts) which is a major Federal action significantly affecting the quality of the human environment as referred to in NEPA (42 U.S.C. 4332.(2)c). On projects other than construction, it is suggested that a biological evaluation similar to the biological assessment be undertaken to conserve species influenced by the Endangered Species Act.

APPENDIX C

BIOLOGICAL ASSESSMENT FOR THE SATSOP COMBUSTION TURBINE PROJECT

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ACRONYMS

BPA	Bonneville Power Administration
cm	Centimeter
CT	Combustion turbine
EIS	Environmental Impact Statement
ESA	Endangered Species Act of 1973
ha	Hectare
HRSG	Heat recovery steam generator
km	Kilometer
m	Meter
MW	Megawatt
NWP	Northwest Pipeline Corporation
RCP	Resource Contingency Program
ROW	Right-of-way
SR	State Route
Supply System	Washington Public Power Supply System
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife

1.0 INTRODUCTION

The Bonneville Power Administration (BPA) has statutory responsibilities to supply electrical power to its utility, industrial, and other customers in the Pacific Northwest. In 1990, BPA initiated the Resource Contingency Program (RCP) that allows BPA to purchase options to acquire power in the future on an "as needed" basis. As part of this program, BPA has purchased options from three independent projects for power generation: the Chehalis Generation Facility in Chehalis, Washington; the Hermiston Power Project in Hermiston, Oregon; and the Satsop Combustion Turbine Project in Satsop, Washington. This Biological Assessment examines the potential effects of constructing this project to Federally listed wildlife species in the vicinity of the proposed Satsop Combustion Turbine Project, as mandated by Section 7 of the Endangered Species Act (ESA) of 1973. Separate Biological Assessments have been prepared for the other two RCP power generation projects.

In compliance with the ESA, the objective of this Biological Assessment is to: (1) describe the proposed action; (2) provide site-specific information on Federally listed species potentially occurring in the vicinity of the project; (3) evaluate potential effects of the proposed project on these species; (4) describe any conservation measures necessary to reduce or eliminate adverse effects; and (5) provide a determination of effect (beneficial, no effect, not likely to adversely affect, or likely to adversely affect) for the species. Information on Federal candidate species potentially occurring in the vicinity of the Satsop Combustion Turbine Project is provided in the RCP Environmental Impact Statement (EIS) (BPA 1994).

2.0 PROJECT DESCRIPTION

Most of the proposed Satsop Combustion Turbine Project components would be located in Grays Harbor County, Washington, at an industrial site currently owned and operated by the Washington Public Power Supply System (Supply System) (Figure 1). The 647-hectare (ha) (1,600-acre) Supply System site was developed in the 1980s for two nuclear power plants; however, neither nuclear plant is complete or operational. Locating the new CT facility within the industrial area of the Supply System site would allow existing infrastructure built for the nuclear plants (e.g., electrical substation, water supply wells, etc.) to be used for power generation at the CT facility.

2.1 PROJECT COMPONENTS

Components associated with the Satsop Combustion Turbine Project include the Combustion Turbine facility, fuel supply, electrical transmission, and water supply and wastewater systems. Proposed locations and specifications of project components are highlighted in the following sections.

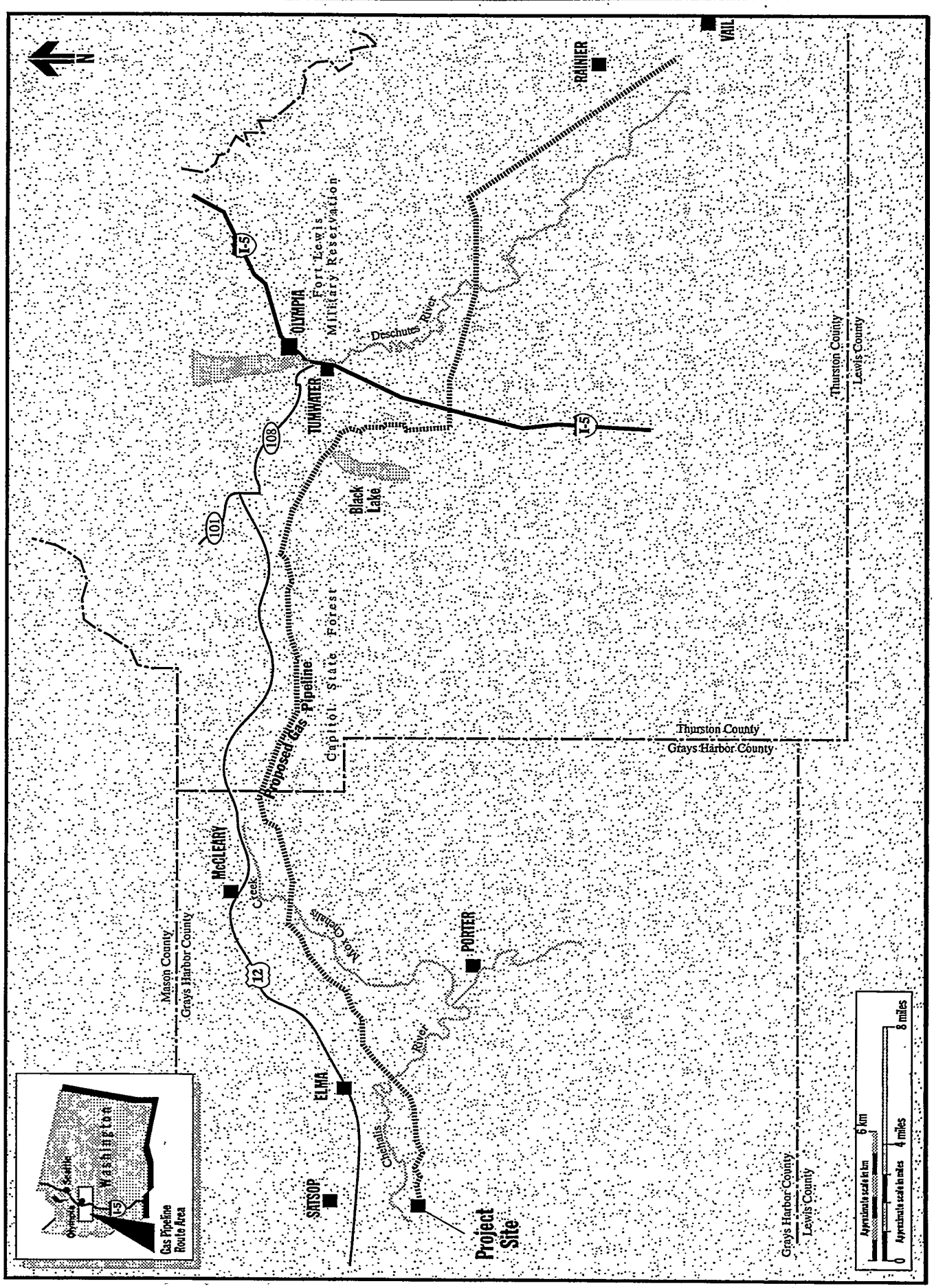

Figure 1 Project Vicinity Map

2.1.1 Combustion Turbine Facility

The CT facility would be located on a 5.3-ha (13-acre) parcel within the Supply System Site boundary, formerly used as an equipment laydown area. This area is virtually devoid of vegetation. The CT facility is proposed to house one natural gas-fired combined-cycle combustion turbine generator with an average output of approximately 207 megawatts (MW). In addition, the facility would include a 49-meter (m) (160-foot) high emission stack.

To serve the condensing and cooling needs of these components, the facility design would include a steam turbine condenser and cooling tower, and a water circulation system. The cooling tower would consist of four cells in a single structure approximately 59 m (195 feet) long, 15 m (49 feet) wide, and 11 m (35 feet) high.

2.1.2 Fuel Supply

Approximately 77 kilometers (km) (48 miles) of new pipeline would be needed to supply natural gas from Northwest Pipeline Corporation's (NWP) mainline near Vail, Washington, to the CT facility. The proposed pipeline would traverse both Grays Harbor and Thurston counties. The new pipeline would be between 40 and 51 centimeters (cm) (16 and 20 inches) in diameter and a 20-m (65-foot) wide right-of-way (ROW) would be maintained over the underground pipeline. Of the 77-km (48-mile) ROW route selected, approximately 33.8-km (21 miles) are adjacent to and partially within existing pipeline ROWs, and approximately 20.9 km (13 miles) are located with existing BPA transmission line ROWs.

The proposed route extends from the NWP Ignacio-Sumas main line near Vail, Washington, to the CT facility site (Figure 1). This route includes crossings of 24 watercourses, 18 roadways, and 3 railroad lines. Starting near Vail, the route runs northwest approximately 12.8 km (8 miles), adjacent to an exiting NWP pipeline. Southeast of Tumwater, the route heads west approximately 12.9 km (8 miles); this part of the route includes portions within the Fort Lewis Military Reservation. Shortly after crossing Interstate 5, the route heads north approximately 4.8 km (3 miles) toward the northern tip of Black Lake. The route then runs northwest, through the Black Hills Capitol State Forest. It then runs roughly parallel State Route (SR) 8 toward McLeary and Elma, crosses SR 12 and the Chehalis River, and then terminates at the proposed CT facility.

2.1.3 Electrical Transmission

Approximately 1,220 m (4,000 feet) of new transmission line would be necessary to connect the Satsop Substation lines to the existing BPA transmission lines. Existing 115-kV wooden power poles in the ROW would be replaced with double circuit 115-kV/230-kV steel towers that would be similar in appearance to the existing transmission line towers that are adjacent to the wooden poles within the ROW.

2.1.4 Water Supply and Wastewater Systems

All water required for operation of the CT facility would be supplied by the existing Supply System Ranney Wells adjacent to the Chehalis River. Water withdrawal from the wells would be accomplished under an existing water withdrawal permit held by Supply System. An existing outflow line from one of the nuclear plant cooling towers runs adjacent to the CT facility site; a pipeline connected to this water line would deliver process makeup water to the new CT project.

The Satsop CT Project would discharge its process effluent back to the nuclear plant outflow line via a connection downstream of the project intake. Process water from the CT facility would be discharged to the Chehalis River through the existing outfall structure.

2.2 Construction Schedule

Construction could begin between 1995 and 2005, depending on BPA's need for electricity. The CT facility would be constructed over 24 months, including 5 months for engineering and design studies. Site preparation would require conventional construction equipment, including bulldozers, front-end loaders, trucks, tractor-scrapers, and graders. After site preparation, the combustion turbines, generators, electrical and other equipment, and support facilities of the power plant would be installed. Electrical transmission lines, and wastewater and water supply lines would be installed during the 24-month construction period. In addition, earth berms would be installed along the western site boundary. Once these facilities are in place, site landscaping would be initiated.

The gas pipeline would involve construction across land and under rivers and streams, roadways, and railroads. Pipeline construction would require approximately 6.5 months, including final cleanup and revegetation. Several construction units would be mobilized, with work entailing clearing and grading the ROW hauling and stringing the pipe, pipe bending, pipe laying and welding, x-ray inspection, applying external coating to field welds, coating checks, trenching, lowering in, backfilling, hydrostatic testing, and cleaning and restoring the ROW.

3.0 SITE SPECIFIC INFORMATION ON FEDERALLY LISTED SPECIES

The U.S. Fish and Wildlife Service (USFWS) has identified three Federally listed threatened species, the bald eagle (*Haliaeetus leucocephalus*), marbled murrelet (*Brachyramphus marmoratus*), and northern spotted owl (*Strix occidentalis caurina*), as potentially occurring in the vicinity of the Satsop CT facility (letters from D. Frederick, State Supervisor, USFWS, Olympia, Washington, December 16, 1993 and February 28, 1994). The following sections provide information on the occurrence of each species in the project vicinity and habitat availability as determined through surveys, consultation with local biologists, species-specific and literature reviews. Information on

the natural history of each species can be obtained from Stalmaster (1987), USFWS (1986), and other scientific literature.

3.1 BALD EAGLE

Historically, bald eagles winter in large concentrations in Washington with over 2,000 birds reported during some years (Taylor 1988, 1989). Current bald eagle use of the project vicinity was evaluated based on surveys conducted in 1988 and 1989, agency consultation, and field reconnaissance (Dames & Moore 1994).

Mid-winter bald eagle surveys conducted by Washington Department of Fish and Wildlife (WDFW) in 1988 and 1989 and observations by WDFW in 1994 indicate that a low number of bald eagles winter in the vicinity of the project (Table 1; Figure 2) (Dames & Moore, 1994; personal communication, Max Zahn, Biologist, WDFW, Elma, Washington, January 20, 1994). Although suitable perching habitat and food stocks (including winter waterfowl and fish) is present along the Chehalis and Deschutes rivers, these areas are not considered to be high concentration areas for wintering bald eagles.

Table 1. Results of 1988 and 1989 mid-winter bald eagle surveys in the vicinity of the Satsop CT Project

Location	*1988*	*1989*
Satsop River	2 adult, 1 immature	0
Chehalis River between Satsop and Malone	2 immature	2 adult
Summit Lake	2 adult, 1 immature	1 adult
Budd Lake	0	1 adult
Nisqually River	2 adult, 1 immature	2 adult
Deschutes River	1 adult, 1 immature	4 adult

Source: Taylor 1988, 1989

Two bald eagle nests are located in large cottonwood trees approximately 305 m (1,000 feet) northwest of the proposed gas pipeline crossing of the Chehalis River (Dames & Moore 1994) (Figure 2). One nest has been active since 1982; the second nest was first documented in 1993 and probably serves as an alternate. This second nest, however, was subsequently destroyed (personal communication, M. Zahn, Biologist, WDFW, Elma, Washington, January 20, 1994). A third bald eagle nest has been documented by WDFW near Black Lake, approximately 1.6 km (1 mile) southwest of the proposed gas pipeline route (Dames & Moore 1994) (Figure 2).

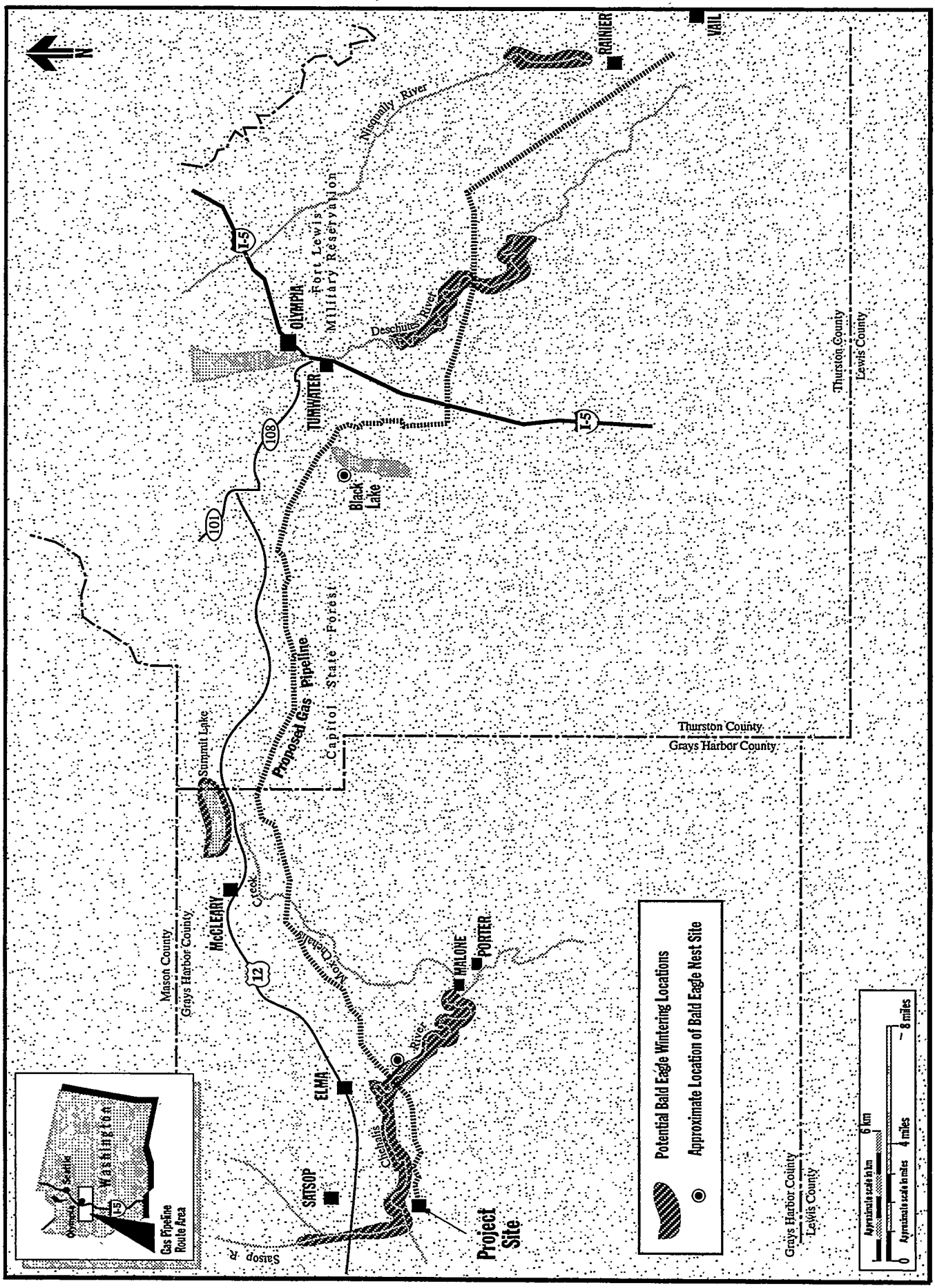

Figure 2 Locations of Bald Eagle Nest Sites and Potential Wintering Habitat in the Vicinity of Project Components

3.2 Marbled Murrelet

Surveys were conducted by the WDFW in 1994 to determine the status of the murrelet in the vicinity of the proposed project (Dames & Moore 1994). Approximately 12.1 ha (30 acres) of old-growth (150+ years) or mature forests occur along the 77-km (48-mile) proposed gas pipeline ROW. Approximately 170 ha (419 acres) of mature (80 to 150 years) forest stands, suitable for marbled murrelet nesting, occurs within the boundary of the Supply System site (Dames & Moore 1994). However, survey results, using the prescribed protocol set forth by the WDFW Marbled Murrelet Survey Training Workbook (WDFW 1994), did not document any marbled murrelet nesting activity within the Supply System boundary (pers. comm., V. Artman, Wildlife Biologist, Dames & Moore, Seattle, Washington, July 21, 1994).

3.3 Northern Spotted Owl

The WDFW also conducted northern spotted owl surveys in 1994 to assess the occurrence of spotted owls in the suitable habitat located in the Supply System boundary (Dames & Moore 1994). Survey results indicated that no spotted owls currently exist in the project vicinity (pers. comm., V. Artman, Wildlife Biologist, Dames & Moore, Seattle, Washington, July 21, 1994).

4.0 EFFECTS OF THE PROJECT ON FEDERALLY LISTED SPECIES

The proposed project would have no effect on the marbled murrelet or northern spotted owl as neither of these species occur in the vicinity of the project. No potential habitat would be lost and no alteration of the prey base for any of these Federally listed species would occur as a result of project construction or operation. Therefore, discussion of the potential effects of the project on Federally listed species is limited to the bald eagle.

Potential effects to bald eagles include: (1) direct loss of roosting, perching, or nesting habitat, (2) effects to food supplies, (3) disturbance to wintering or nesting bald eagles, and (4) collision and electrocution from electrical transmission lines.

The cumulative effects of the project are expected to minimal, as the proposed project would only marginally increase the rate of residential and industrial development in the region.

4.1 Loss of Habitat

The project will not affect any perching, roosting, or nesting habitat in the project vicinity. Approximately 108 ha (267 acres) of forested land along the proposed gas pipeline route would be impacted by the project (BPA 1994). The majority of the forest types affected (60 ha [150 acres])

would be second-growth conifer forest, stands not typically used by bald eagles for perching, roosting, or nesting. The proposed gas pipeline route crosses 21 mostly perennial streams; riparian forests associated with these streams may be impacted. Additionally, no impacts to the WDFW-designated wintering waterfowl concentration areas, which support potential prey for bald eagles, would result from the project.

4.2 Effects on Food Supplies

Potential effects from the proposed project on food supplies could result from ground disturbance and project operation altering fish, small mammal, and waterfowl habitat and alteration of fish and waterfowl populations as a result of water withdrawal. The WDFW has identified several wintering waterfowl concentration areas in the project vicinity (Dames & Moore 1994). Construction and operation of the proposed project would not result in the loss of any wintering waterfowl habitat or create such a disturbance as to preclude waterfowl from the area. Water supply for the CT facility would come from existing Ranney Wells adjacent to the Chehalis River. Water withdrawal from the wells would be accomplished under an existing permit held by Supply System and adhere to minimum flow requirements for the Chehalis River. Therefore, the project would not affect bald eagle fish and waterfowl food supplies.

4.3 Disturbance

Ground disturbing activities, primarily construction of the natural gas pipeline, would be confined to narrow construction corridors. Such activities would temporarily displace wildlife, including potential prey species of bald eagles, from the immediate area.

An active bald eagle nest site and its alternate is located approximately 305 m (1,000 feet) from the proposed gas pipeline ROW. These nest locations are well outside of the construction ROW and would, therefore, not be physically affected by the pipeline. However, these nests are within the 400 m (1,312 feet) buffer recommended by the USFWS for minimizing disturbances during the nesting season and, therefore, subject to construction season restrictions (USFWS 1986). The bald eagle nesting season is generally considered to be January 1 through August 15 in the Pacific Northwest (USFWS 1986), and nesting activity of bald eagles in a given year is determined each April by USFWS. The USFWS would likely require that pipeline construction within the 400-m (1,312-foot) buffer zone (or within 1.6 km [1 mile], if within line of sight) be held off until the activity level of these nests can be determined in April, and appropriate mitigation measures developed.

A second active nest site is approximately 1.6 km (1 mile) southwest of the proposed pipeline ROW, outside of the project vicinity and also outside of the 1.6 km (1 mile) activity buffer recommended by the USFWS for protection/disturbance issues related to the bald eagle.

The more intensive gas pipeline construction activities would be completed before wintering bald eagles would typically occupy the project vicinity, thereby reducing the likelihood of disturbing effects to wintering bald eagles. Disturbance from periodic vegetation maintenance along the gas pipeline ROW and increased human activity could temporarily displace a small number wintering

bald eagles. However, the Chehalis and Deschutes rivers do not typically support concentrations of wintering bald eagles and most maintenance activities would be done at other times of the year; therefore, the project is not likely to affect the eagle during the winter.

4.4 Electrical Transmission Line Hazards

Raptors, including bald eagles, are generally not susceptible to collision with transmission lines, most likely because of their keen eyesight, nonflocking behavior, and flight maneuverability (Williams and Colson 1988). As planned, all new transmission lines would incorporate the guidelines presented by Olendorff et al. (1981), and would be separated by at least 4.3 m (14 feet) vertically and 3 m (10 feet) horizontally, a distance that would preclude electrocution of bald eagles.

5.0 MITIGATION MEASURES

Potential effects of the proposed project on bald eagles occurring in the vicinity could be minimized by:

- Avoiding construction activities within 400 m (1,312 feet) of active bald eagle nests, or 800 m (2,624 feet) if nest is has line-of-sight of construction activities;
- Avoiding construction in wetland and riparian habitats that provide potential perching, roosting, or foraging habitat;
- Ensuring that water quality is not affected by construction or wastewater discharge;
- Placing project facilities at least 1.5 km (0.9 mile) from known communal roost sites;
- Completing construction activities outside of the October 31 through March 31 wintering period;
- Revegetating all disturbed habitats with native plant species capable of supporting wildlife species; and
- Adhering to guidelines for design of transmission lines to avoid collision and electrocution of raptors.

6.0 DETERMINATION OF EFFECT

The Satsop Combustion Turbine Project is not likely to adversely affect the marbled murrelet or northern spotted owl as these species do not occur in the vicinity of the project. Additionally, no loss of potential suitable habitat would result from construction or operation of the project and disturbance from the facility would be nominal. Likewise, based on the description of the project and associated mitigation measures, construction and operation of the Satsop Combustine Turbine Project is not likely to adversely affect the bald eagle.

7.0 LITERATURE CITED

BPA (Bonneville Power Administration). 1994. Resource Contingency Program—Preliminary Draft Environmental Impact Statement. U.S. Dept. Energy. August 1994.

Dames & Moore. 1994. Wildlife Report, Chehalis Generation Facility. Submitted to Bonneville Power Administration by Chehalis Power, Inc. Job No. 27379-001-020. January 1994.

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USFWS (U.S. Fish and Wildlife Service). 1986. Pacific Bald Eagle Recovery Plan. U.S. Fish and Wildlife Service. Portland, Oregon.

WDFW (Washington Department of Fish and Wildlife). 1994. Marbled Murrelet Survey Training Workbook. Washington Department of Fish and Wildlife, Wildlife Management Division. Olympia, Washington.

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ATTACHMENT A

AGENCY LETTERS

EBASCO

October 4, 1993
EBEL-BPA-93-068

David C. Frederick
Field Supervisor
U.S. Fish and Wildlife Service
Office of Endangered Species
3704 Griffin Lane SE, Suite 102
Olympia, WA 98501-2192

Subject: **Request for Threatened and Endangered Species Data for Satsop Generation Facility.**

Dear Mr. Frederick:

Ebasco is preparing an Environmental Impact Statement for the Satsop project. The proposed action is to build and operate a power generation facility and natural gas pipeline at the Satsop site. Enclosed is a set of maps indicating the project area. Please send a list of endangered, threatened, and candidate species of plants and animals that may occur in the vicinity of the project area.

If you have any questions regarding this request, please call be at 451-4296.

Thank you.

Sincerely,

EBASCO ENVIRONMENTAL

Gregory A. Green
Principal Wildlife Biologist

Enclosures

cc: Dave Broadfoot (w/o enclosures)
Venessa Artman (w/o enclosures)
Rob Diffely (w/o enclosures)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
3704 Griffin Lane SE, Suite 102
Olympia, Washington 98501-2192
(206) 753-9440 FAX: (206) 753-9008

December 16, 1993

Gregory A. Green
Ebasco Environmental
10900 N.E. 8th Street
Bellevue, WA 98004-4405

FWS Reference: 1-3-94-SP-011

Dear Mr. Green:

This is in response to your letter dated October 4, 1993, and received in this office on October 6. Enclosed is a list of listed threatened and endangered species, and candidate species (Attachment A), that may be present within the area of the proposed Satsop area power generation facility and natural gas pipeline construction, near Elma and McLeary, in Grays Harbor County, Washington. The list fulfills the requirements of the Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act of 1973, as amended (Act). We have also enclosed a copy of the requirements for Bonneville Power Administration (BPA) compliance under the Act (Attachment B).

Should the biological assessment determine that a listed species is likely to be affected (adversely or beneficially) by the project, the BPA should request Section 7 consultation through this office. If the biological assessment determines that the proposed action is "not likely to adversely affect" a listed species, the BPA should request Service concurrence with that determination through the informal consultation process. Even if the biological assessment shows a "no effect" situation, we would appreciate receiving a copy for our information.

Candidate species are included simply as advance notice to federal agencies of species which may be proposed and listed in the future. However, protection provided to candidate species now may preclude possible listing in the future. If early evaluation of your project indicates that it is likely to adversely impact a candidate species, the BPA may wish to request technical assistance from this office.

In addition, please be advised that federal and state regulations may require permits in areas where wetlands are identified. You should contact the Seattle District of the U.S. Army Corps of Engineers for federal permit requirements and the Washington State Department of Ecology for state permit requirements.

Your interest in endangered species is appreciated. If you have additional questions regarding your responsibilities under the Act, please contact Jim Michaels or Jodi Bush of this office at the letterhead phone/address.

Sincerely,

Carla V. Mendoza

For David C. Frederick
State Supervisor

jb/kr
Enclosures
SE/BPA/1-3-94-SP-011/G. Harbor
c: WDW, Region 6
WNHP, Olympia

ATTACHMENT A

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES WHICH MAY OCCUR IN THE VICINITY OF THE PROPOSED POWER GENERATION FACILITY AND NATURAL GASL PIPELINE PROJECT (Satsap), NEAR ELMA AND McCLEARY, GRAYS HARBOR COUNTY, WASHINGTON (T17N R04W/05W/06W; T18N R04W/05W/06W)

1-3-94-SP-011

LISTED

Bald eagle (*Haliaeetus leucocephalus*) - wintering bald eagles may occur in the vicinity of the project from about October 31st through March 31st.

There is a bald eagle nesting territories located in the vicinity of the project at T17N R06W S12. Nesting activities occur from about January 1 through August 15.

Marbled murrelet *(Brachyramphus marmoratus marmoratus)* - nesting murrelets may occur in the vicinity of the project from about March 1 through mid-September.

Northern spotted owl *(Strix occidentalis caurina)* - may occur in the vicinity of the project throughout the year.

Major concerns that should be addressed in your biological assessment of project impacts to listed species are:

1. Level of use of the project area by listed species.

2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas and owl foraging, roosting, nesting, and dispersal habitat in all areas influenced by the project.

3. Impacts from project construction and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) which may result in disturbance to listed species and/or their avoidance of the project area.

PROPOSED

None

CANDIDATES

Bull trout *(Salvelinus confluentus)*
Mountain quail *(Oreortyx pictus)*
Northern goshawk *(Accipiter gentilis)*
Northern red-legged frog *(Rana aurora aurora)*
Olympic mudminnow *(Novumbra hubbsi)*
Cimicifuga elata (tall bugbane)

ATTACHMENT B

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7(a) AND 7(c) OF THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED

SECTION 7(a) - Consultation/Conference

Requires:

1. Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2. Consultation with FWS when a federal action may affect a listed endangered or threatened species to ensure that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the federal agency after it has determined if its action may affect (adversely or beneficially) a listed species; and

3. Conference with FWS when a federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or an adverse modification of proposed critical habitat.

SECTION 7(c) - Biological Assessment for Construction Projects *

Requires federal agencies or their designees to prepare a Biological Assessment (BA) for construction projects only. The purpose of the BA is to identify any proposed and/or listed species which is/are likely to be affected by a construction project. The process is initiated by a federal agency in requesting a list of proposed and listed threatened and endangered species (list attached). The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the species list, please verify the accuracy of the list with our Service. No irreversible commitment of resources is to be made during the BA process which would result in violation of the requirements under Section 7(a) of the Act. Planning, design, and administrative actions may be taken; however, no construction may begin.

To complete the BA, your agency or its designee should: (1) conduct an onsite inspection of the area to be affected by the proposal, which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within the FWS, National Marine Fisheries Service, state conservation department, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures; and (6) prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevant information. Upon completion, the report should be forwarded to our Endangered Species Division, 3704 Griffin Lane SE, Suite 102, Olympia, WA 98501-2192.

---

* "Construction project" means any major federal action which significantly affects the quality of the human environment (requiring an EIS), designed primarily to result in the building or erection of human-made structures such as dams, buildings, roads, pipelines, channels, and the like. This includes federal action such as permits, grants, licenses, or other forms of federal authorization or approval which may result in construction.

EBASCO

October 4, 1993
EBEL-BPA-93-069

Ms. Lea Knutson
Nongame Data Systems
Washington Department of Wildlife
600 Capitol Way North, GJ-11
Olympia, WA 98501-1091

Subject: Request for Data for the Satsop Generation Facility

Dear Lea:

Ebasco is preparing an Environmental Impact Statement for the Satsop project. The proposed action is to build and operate a power generation facility and natural gas pipeline. Please conduct a search of the Nongame database and the Priority Habitats and Species database for the project area. Enclosed is a Fish and Wildlife Data Order Form and a set of maps indicating the location of the project area.

When the database search is complete, please call me at 451-4296 and I will immediately disburse a check to cover search costs.

Sincerely,

EBASCO ENVIRONMENTAL

Gregory A. Green
Principal Wildlife Biologist

Enclosures

cc: Dave Broadfoot (w/o enclosures)
Vanessa Artman (w/o enclosures)
Rob Diffely (w/o enclosures)

EBASCO

July 14, 1994

David C. Frederick
Field Supervisor
U.S. Fish and Wildlife Service
3704 Griffin Lane SE, Suite 102
Olympia, WA 98501-2192

Subject: **Modification to the Satsop Generation Facility Project—Request for Additional Data**

Dear Mr. Frederick:

Enserch Environmental (formerly Ebasco Environmental) requested a list of all endangered, threatened, and candidate wildlife species potentially occurring in the vicinity of a 50-mile gas pipeline component of the Satsop Generation Facility Project in a letter dated January 6, 1994. Your response was received on February 28, 1994 (FWS Reference 1-3-94-SP-196). Since that time, modifications have been made to the proposed pipeline route and, therefore, we must request additional species information to ensure complete coverage of the project area. The legal descriptions of the areas not included in the original data request are as follows:

T 17N, R 5W, Section 7
T 17N, R 6W, Section 7
T 18N, R 4W, Section 19
T 18N, R 5W, Sections 27 and 33.

Enclosed is a set of maps detailing the modified 50-mile gas pipeline route. If you have any questions regarding this request, please call me at (206) 451-4254. Thank you.

Sincerely,

Enserch Environmental Corporation
(formerly Ebasco Environmental)

Jennifer Rude
Wildlife Biologist

Enclosures

cc: D. Broadfoot (w/o enclosures)
J. Knutzen (w/o enclosures)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
3704 Griffin Lane SE, Suite 102
Olympia, Washington 98501-2192
(206) 753-9440 FAX: (206) 753-9008

October 7, 1994

Jennifer Rude
Ebasco Environmental
10900 NE 8th Street
Bellevue, WA 98004-4405

FWS Reference: 1-3-94-SP-709

Dear Ms. Rude:

This is in response to your letter dated July 14, 1994 and received in this office on July 15. Enclosed is a list of listed threatened and endangered species, and candidate species (Attachment A), that may be present within the area of the proposed Satsop Generation Facility Modification Project in Grays Harbor County, Washington. The list fulfills the requirements of the Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act of 1973, as amended (Act). We have also enclosed a copy of the requirements for Federal Energy Regulatory Commission (FERC) compliance under the Act (Attachment B).

Should the biological assessment determine that a listed species is likely to be affected (adversely or beneficially) by the project, FERC should request Section 7 consultation through this office. If the biological assessment determines that the proposed action is "not likely to adversely affect" a listed species, FERC should request Service concurrence with that determination through the informal consultation process. Even if the biological assessment shows a "no effect" situation, we would appreciate receiving a copy for our information.

Candidate species are included simply as advance notice to federal agencies of species which may be proposed and listed in the future. However, protection provided to candidate species now may preclude possible listing in the future. If early evaluation of your project indicates that it is likely to adversely impact a candidate species, FERC may wish to request technical assistance from this office.

In addition, please be advised that federal and state regulations may require permits in areas where wetlands are identified. You should contact the Seattle District of the U.S. Army Corps of Engineers for federal permit requirements and the Washington State Department of Ecology for state permit requirements.

Your interest in endangered species is appreciated. If you have additional questions regarding your responsibilities under the Act, please contact Jim Michaels or Kristi Swisher of this office at the letterhead phone/address.

Sincerely,

Lynn P. Childers

for David C. Frederick
State Supervisor

ks/mjr
Enclosures
SE/FERC/1-3-94-SP-709/Grays Harbor

c: WDFW, Region 6
WNHP, Olympia

ATTACHMENT A

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES WHICH MAY OCCUR WITHIN THE VICINITY OF THE PROPOSED SATSOP GENERATION FACILITY MODIFICATION PROJECT IN GRAYS HARBOR COUNTY, WASHINGTON (T17N R05W S07; T17N R06W S07; T18N R04W S19; T18N R05W S27/33)

FWS REFERENCE: 1-3-94-SP-709

LISTED

Bald eagle (*Haliaeetus leucocephalus*) - wintering bald eagles may occur in the vicinity of the project from October 31 through March 31.

Marbled murrelet (*Brachyramphus marmoratus marmoratus*) - may occur in the vicinity of the project.

Northern spotted owl (*Strix occidentalis caurina*) - may occur in the vicinty of the project.

Major concerns that should be addressed in your biological assessment of the project impacts to listed species are:

1. Level of use of the project area by listed species.

2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas and owl nesting, roosting and foraging habitat in all areas influenced by the project.

3. Impacts from project construction (i.e., habitat loss, increased noise levels, increased human activity) which may result in disturbance to listed species and/or their avoidance of the project area.

PROPOSED

None

CANDIDATE

The following candidate species may occur in the vicinity of the project:

Bull trout (*Salvelinus confluentus*)
Harlequin duck (*Histrionicus histrionicus*)
Mountain quail (*Oreortyx pictus*)
Northern goshawk (*Accipiter gentilis*)
Northern red-legged frog (*Rana aurora aurora*)
Olympic mudminnow (*Novumbra hubbsi*)
Cimicifuga elata (tall bugbane)

ATTACHMENT B

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7(a) AND 7(c) OF THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED

SECTION 7(a) - Consultation/Conference

Requires:

1. Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2. Consultation with FWS when a federal action may affect a listed endangered or threatened species to ensure that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the federal agency after it has determined if its action may affect (adversely or beneficially) a listed species; and

3. Conference with FWS when a federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or an adverse modification of proposed critical habitat.

SECTION 7(c) - Biological Assessment for Construction Projects *

Requires federal agencies or their designees to prepare a Biological Assessment (BA) for construction projects only. The purpose of the BA is to identify any proposed and/or listed species which is/are likely to be affected by a construction project. The process is initiated by a federal agency in requesting a list of proposed and listed threatened and endangered species (list attached). The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the species list, please verify the accuracy of the list with our Service. No irreversible commitment of resources is to be made during the BA process which would result in violation of the requirements under Section 7(a) of the Act. Planning, design, and administrative actions may be taken; however, no construction may begin.

To complete the BA, your agency or its designee should: (1) conduct an onsite inspection of the area to be affected by the proposal, which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within the FWS, National Marine Fisheries Service, state conservation department, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures; and (6) prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevant information. Upon completion, the report should be forwarded to our Endangered Species Division, 3704 Griffin Lane SE, Suite 102, Olympia, WA 98501-2192.

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* "Construction project" means any major federal action which significantly affects the quality of the human environment (requiring an EIS), designed primarily to result in the building or erection of human-made structures such as dams, buildings, roads, pipelines, channels, and the like. This includes federal action such as permits, grants, licenses, or other forms of federal authorization or approval which may result in construction.

EBASCO

October 4, 1993
EBEL-BPA-93-067

Ms. Sandy Norwood
Washington Natural Heritage Program
Department of Natural Resources
P.O. Box 47047
Olympia, WA 98504-7047

Subject: Request for Data for the Satsop Generation Facility.

Dear Ms. Norwood:

Ebasco Environmental is preparing an Environmental Impact State for the Satsop project. The proposed action is to build and operate a power generation facility and natural gas pipeline. Enclosed is a set of maps indicating the project area. The legal description of the project area is:

South Elma quad - T 17 N, R 6 W, Sections 1, 8, 9, 10, 11, 12, 17, and 18
Malone quad - T 17 N, R 5 W, Sections 3, 4, 5, and 6
McCleary quad - T 18 N, R 5 W, Sections, 13, 23, 24, 26, 34, and 35

Please conduct a search of the Natural Heritage Database for information on the occurrence of endangered, threatened, and sensitive plant species; high quality native plant communities; and high quality undisturbed wetlands for the project area.

When the data search is completed, please call me at 451-4296 and I will immediately disburse a check to cover search costs. Thank you.

Sincerely,

EBASCO ENVIRONMENTAL

Gregory A. Green
Principal Wildlife Biologist

Enclosures

cc: Dave Broadfoot (w/o enclosures)
Vanessa Artman (w/o enclosures)
Rob Diffely (w/o enclosures)

WASHINGTON STATE DEPARTMENT OF
Natural Resources

JENNIFER M. BELCHER
Commissioner of Public Lands

KALEEN COTTINGHAM
Supervisor

October 27, 1993

Gregory Green
Ebasco Environmental
10900 NE 8th Street
Bellevue WA 98004-4405

SUBJECT: Satsop Generation Facility Project (T17N R06W S01,08-12,17,&18; T17N R05W S03-06; and T18N R05W S13,23,24,26,34,&35)

We've searched the Natural Heritage Information System for information on significant natural features in your study area. Currently, we have no records for rare plants, high quality native wetlands or high quality native plant communities in the vicinity of your project.

The Washington Natural Heritage Program is responsible for information on the state's endangered, threatened, and sensitive plants as well as high quality native plant communities and wetlands. The Department of Wildlife manages and interprets data on wildlife species of concern in the state. For information on animals of concern in the state, please contact the Priority Habitats and Species Program, Washington Department of Wildlife, 600 Capitol Way North, Olympia, WA 98501-1091, or by phone (206) 753-3318.

The Natural Heritage Information System is not a complete inventory of Washington's natural features. Many areas of the state have never been thoroughly surveyed. There may be significant natural features in your study area that we don't yet know about. This response should not be regarded as a final statement on the natural features of the areas being considered and doesn't eliminate the need or responsibility for detailed on-site surveys.

I hope you'll find this information helpful.

Sincerely,

Sandy Norwood

Sandy Norwood, Environmental Review Coordinator
Washington Natural Heritage Program
Division of Land & Water Conservation
PO Box 47047
Olympia, WA 98504-7047
(206) 902-1667

EBASCO

January 6, 1994
EBEL-BPA-94-002

Ms. Sandy Norwood
Washington Natural Heritage Program
Department of Natural Resources
P.O. Box 47047
Olympia, WA 98504-7047

Subject: Modification to the Satsop Generation Facility Project—Request for Additional Data

Dear Ms. Norwood:

Enserch Environmental (formerly Ebasco Environmental) was recently notified of a proposed 50-mile extension to the gas pipeline component of the Satsop Generation Facility Project. A Natural Heritage Database search was initially requested on October 4, 1993; your response was returned to us on October 27, 1993. We appreciate your timely response and request another database search for the modified project area. The revised legal description of the project area is as follows:

T 17 N, R 6 W, Sections 1, 8, 9, 10, 11, 12
T 17 N, R 5 W, Sections 3, 4, 5, 6
T 18 N, R 5 W, Sections 13, 23, 24, 26, 34, 35
T 18 N, R 4 W, Sections 16, 17, 18, 21, 22, 23, 24
T 18 N, R 3 W, Sections 15, 16, 20, 21, 22, 23, 24, 25
T 18 N, R 2 W, Sections 29, 30, 32
T 17 N, R 2 W, Sections 5, 8, 14, 15, 16, 17, 23, 24, 37
T 17 N, R 1 W, Sections 19, 20, 21, 22, 23, 25, 26, 36
T 17 N, R 1 E, Section 31
T 16 N, R 1 W, Section 1
T 16 N, R 1 E, Sections 6, 7, 8, 16, 17, 21, 22

Enclosed is a set of maps detailing the project area. Please conduct a search of the Natural Heritage Database for information on the occurrence of endangered, threatened, and sensitive plant species; high quality native plant communities; and high quality undisturbed wetlands for the expanded project area.

EBASCO ENVIRONMENTAL, *A Division of Ebasco Services Incorporated*
10900 NE 8TH STREET • BELLEVUE, WA 98004-4405 • (206) 451-4600 • FAX (206) 451-4691

When the data search is completed, please call me at (206) 451-4296 and I will immediately disburse a check to cover the costs. Thank you.

Sincerely,

ENSERCH ENVIRONMENTAL
(formerly Ebasco Environmental)

Gregory A. Green

Enclosures

cc: Dave Broadfoot (w/o enclosures)
Vanessa Artman (w/o enclosures)
Rob Diffely (w/o enclosures)

WASHINGTON STATE DEPARTMENT OF
Natural Resources

JENNIFER M. BELCHER
Commissioner of Public Lands

KALEEN COTTINGHAM
Supervisor

January 25, 1994

Gregory Green
Enserch Environmental
10900 NE 8th Street
Bellevue WA 98004-4405

SUBJECT: Satsop Generation Facility Project - 50-mile Gas Pipeline Extension (Parts of T16-18N R01E-06W)

We've searched the Natural Heritage Information System for information on rare plants, high quality native wetlands and high quality native plant communities in the vicinity of your project. A summary of this information is enclosed.

The Washington Natural Heritage Program is responsible for information on the state's endangered, threatened, and sensitive plants as well as high quality native plant communities and wetlands. The Department of Wildlife manages and interprets data on wildlife species of concern in the state. For information on animals of concern in the state, please contact the Priority Habitats and Species Program, Washington Department of Wildlife, 600 Capitol Way North, Olympia, WA 98501-1091, or by phone (206) 753-3318.

The Natural Heritage Information System is not a complete inventory of Washington's natural features. Many areas of the state have never been thoroughly surveyed. There may be significant natural features in your study area that we don't yet know about. This response should not be regarded as a final statement on the natural features of the areas being considered and doesn't eliminate the need or responsibility for detailed on-site surveys.

I hope you'll find this information helpful.

Sincerely,

Sandy Norwood

Sandy Norwood, Environmental Review Coordinator
Washington Natural Heritage Program
Division of Land & Water Conservation
PO Box 47047
Olympia, WA 98504-7047
(206) 902-1667

WASHINGTON NATURAL HERITAGE INFORMATION SYSTEM
ENDANGERED, THREATENED AND SENSITIVE PLANTS
HIGH QUALITY NATIVE WETLANDS AND HIGH QUALITY NATIVE PLANT COMMUNITIES
IN THE VICINITY OF THE SATSOP GENERATION FACILITY
50-MILE GAS PIPELINE EXTENSION
INFORMATION REQUESTED BY ENSERCH (EBASCO) ENVIRONMENTAL

Data current as of December 1993

TOWNSHIP, RANGE AND SECTION	ELEMENT NAME	STATE STATUS	FEDERAL STATUS
T17N R01W S22 N2	Black cottonwood-Oregon ash cover type		
T17N R01W S25 SE T17N R01W S36 NE T17N R01E S30 SW T17N R01E S31 NW	*Aster curtus* (white-top aster)	S	C
T16N R01E S06 NW T16N R01W S01 NE	*Aster curtus* (white-top aster)	S	C

WASHINGTON NATURAL HERITAGE INFORMATION SYSTEM
ENDANGERED, THREATENED, & SENSITIVE VASCULAR PLANTS OF WASHINGTON

* STATE STATUS:

E =	***Endangered***	This status is assigned to each vascular plant taxon in danger of becoming extinct or extirpated in Washington within the near future if factors contributing to its decline continue. Populations of these taxa are at critically low levels or their habitats have been degraded or depleted to a significant degree.
T =	***Threatened***	A threatened vascular plant taxon is one likely to become endangered within the near future in Washington if factors contributing to its population decline or habitat degradation or loss continue.
S =	***Sensitive***	A vascular plant taxon is labelled sensitive when it is vulnerable or declining, and could become endangered or threatened in the state without active management or removal of threats.
X =	***Possibly Extinct or Extirpated in Washington***	Based on recent field searches a number of plant taxa are considered to be possibly extinct or extirpated in Washington (status of out-of-state populations were not considered). Taxa in this group are all high priorities for field investigation. If found, they will be assigned one of the above status categories.

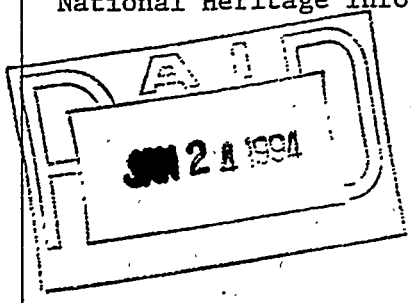
* FEDERAL STATUS:

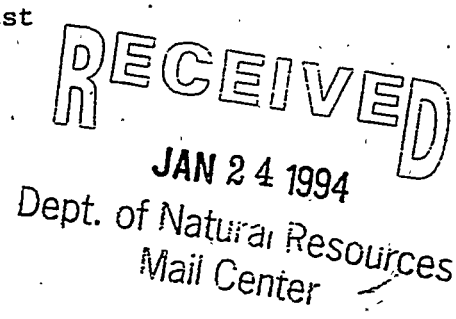
C =	***CANDIDATE***	This taxa is a candidate for listing as an Endangered or Threatened Species on the 1990 Federal Register, Notice of Review

BASCO SERVICES INCORPORATED
ELLEVUE, WA 98004-4405

DETACH AND RETAIN THIS STATEMENT
THE ATTACHED CHECK IS IN PAYMENT OF ITEMS DESCRIBED BELOW
IF NOT CORRECT. PLEASE NOTIFY US PROMPTLY. NO RECEIPT DESIRED

DATE	DESCRIPTION	AMOUNT
1/20/94	RCP-Satsop National Heritage Information Request	45.00





APPENDIX D

HEALTH AND SAFETY

A Summary of Biological and Epidemiological Studies Relating to EMF[1]

A study in Denver, Colorado, (Wertheimer and Leeper 1979) and one in Sweden (Tomenius 1986) first reported that some cancer risks were about 2 to 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 to 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[2] (1.5) in the new study was smaller (2 to 3) than that reported earlier. It was also on the borderline of statistical significance, which means that it could have been due to chance. Results of another study, from the Seattle, Washington, 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, which was statistically significant. Following adjustment for possible confounding variables, the odds ratio was still elevated (1.73), but it was no longer statistically significant. After adjustment, the trend for increasing risk of leukemia with the estimated increase in current capacity of the power lines remained statistically significant. Associations with actual measured electric and magnetic fields, however, were weaker and not statistically significant.

---

1 This information is intended to summarize briefly the large body of research on EMF. More detailed information can be found in two Bonneville Power Administration (BPA) publications incorporated here by reference: Electrical and Biological Effects of Transmission Lines: A Review (BPA 1993), and Electric Powerlines: Questions and Answers on Research into Health Effects (BPA 1994).

2 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.

A study done in Sweden found that the relative risk for leukemia in children living near transmission lines was 3.8, and statistically significant, where magnetic fields were greater than 3 mG (Feychting and Ahlbom 1993). In response to the study, Sweden's National Electrical Safety Board issued a document entitled Revised Assessment of Magnetic Fields and Health Hazards (National Board for Electrical Safety 1993). 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-frequency 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..." (National Board for Electrical Safety 1993.) This apparently is the first, and to date only, a time cause-effect association between EMF and cancer has been assumed by a national governmental organization.

A second report by the Swedish National Electrical Safety Board was issued in 1993 (Lindgren 1993). The Board concluded that, ". . . there is currently strong suspicion of a relationship between magnetic fields and child leukaemia, while the suspicion of a relationship between magnetic fields in the working environment and cancer is moderately strong." The Board believes that a strategy of caution is justified; this includes reasonable measures for reducing magnetic fields from new power facilities. The Board is actively investigating possible magnetic field standards for transmission lines in Sweden.

Two other government organizations in Sweden have apparently not determined that regulations for EMF are necessary at this time. These are the National Board of Occupational Safety and Health, and the Swedish Radiation Protection Institute.

Results of a larger study done in Denmark indicated no increased risk of leukemia for children living near transmission lines (Olsen et al. 1993). However, there was a statistically significant elevated risk of combined cancer. A Danish blue-ribbon panel examined the EMF issue and 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 1993).

The results of the child cancer studies in Sweden and Denmark were recently combined with results of another transmission line study conducted in Finland (Ahlbom et al. 1993). For child leukemia, the combined results of the three Nordic studies showed a relative risk of 2.1, which was statistically significant (based on 13 cases). No statistically significant risks were found for nervous system tumors, or for lymphoma.

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).

The results of 13 studies of cancer in children living near power lines were combined in an analysis by Washburn et al. (1994). The combined relative risks for leukemia and nervous system tumors were 1.49 and 1.89, respectively, and both were statistically significant. The authors of the

analysis concluded that the risks they found require further investigation, and should be interpreted cautiously.

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.

A large study of 223,000 electric utility workers in Canada and France found statistically significant elevated risks of up to threefold for certain leukemia types (Thériault et al. 1994). These risks were associated with cumulative magnetic field exposures above the median. However, there were inconsistencies in results among the three utilities involved in the study, and there was no clear indication of a dose-response trend between cancer risk and magnetic field exposure.

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 that more research is needed. The EPA's Science Advisory Board (SAB) also reviewed the issue and concluded: "Human epidemiologic data report an association between surrogates for electric and magnetic field exposure and an increased incidence of some types of cancer, but the conclusion of casualty is currently inappropriate because of limited evidence of an exposure-response relationship and the lack of a clear understanding of biologic plausibility." (SAB 1991). The SAB recommended that the EPA report should be rewritten to correct inconsistencies in the report (SAB 1991).

A few studies have investigated possible effects of EMF exposure on pregnancy. Wertheimer and Leeper (1986 and 1989) reported that fetal losses were more prevalent in women using electric blankets or heated water beds. Women who lived in homes with ceiling cable heat experienced higher fetal losses during the onset of the cold season, when field exposure was assumed to be increasing. A recent study from Finland suggested an association between early pregnancy loss and elevated magnetic fields in residences (Juutilainen et al. 1993). Authors of the study cautioned that their results should be interpreted cautiously because of the small number of exposed subjects.

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 1993). 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 bee hives not be placed directly on the transmission line right-of-way (ROW).

Wildlife respond to effects (e.g., changes in food supply) of cleared ROWs. How- ever, 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. A recent study of sheep found no effects of EMF from a 500-kV line on reproductive cycles, growth, stress, or on secretion of the hormone melatonin (Lee et al. 1993). However, a possible effect of EMF on one component of the immune system in sheep was found (Hefeneider et al. 1994). Levels of the hormone interleukin-1 (IL-1) tended to be lower in blood samples taken from sheep raised beneath the 500-kV line compared to sheep away from the line in a control area. There were no apparent effects of EMF on the health of the sheep, and the biological significance, if any, of the finding has not been determined.

LITERATURE CITED

Ahlbom, A. et al. 1987. Biological Effects of Power Line Fields. New York State Powerlines Project Scientific Advisory Panel Final Report. New York State Department of Health, Power Lines Project. Albany, New York.

Ahlbom, M. Feychting, M. Koskenvuo, J. H. Olsen, E. Pukkola, G. Schulgen, and P. Verkasalo. 1993. Electromagnetic Fields and Childhood Cancer. Lancet 343:1295-1296.

BPA (Bonneville Power Administration). 1993. Electrical and Biological Effects of Transmission Lines: A Review.

BPA. 1994. Electric Powerlines: Questions and Answers on Research into Health Effects.

Coleman, M. et al. 1985. Leukaemia and Electromagnetic Fields: A Case-Control Study. *In*, International Conference on Electric and Magnetic Fields in Medicine and Biology, pp. 122-125. Institution of Electrical Engineers. London and New York.

Coleman, M. and V. Beral. 1988. A Review of Epidemiological Studies of the Health Effects of Living Near or Working with Electricity Generation and Transmission Equipment. International Journal of Epidemiology 17(1):1-13.

EMF Health and Safety Digest. 1993. "Denmark: No EMF Regulations." Vol. 11, No. 6, pp. 4-5. June.

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