Chapter 3 Affected Environment, Impacts, and Mitigation Measures

This DEIS analyzes the effects of the Proposed Action on ten elements of the environment, as well as cumulative environmental effects and other environmental considerations. In some places Chapter 3 summarizes the more detailed information available in the Application for Site Certification 2006-01 and the technical reports that appear as appendices to the Application.

For some elements of the environment, further analysis was conducted in response to substantive issues raised by the public or reviewing agencies. The discussion in Chapter 3 has been supplemented to include these modifications.

3.1 Geology and Soils

This section discusses the impact of the Proposed Action in terms of geologic hazards and removal of materials for construction. The study area for geology and soils encompasses the regional geology, soils, and hazards that are near, underlie, or are located along the project area.

3.1.1 Affected Environment

The proposed PMEC and associated pipeline would be constructed within the North Port Marine Industrial Park at the Port of Kalama north of the City of Kalama, within Cowlitz County, Washington. Existing conditions, potential impacts, and, where appropriate, mitigation measures are discussed below.

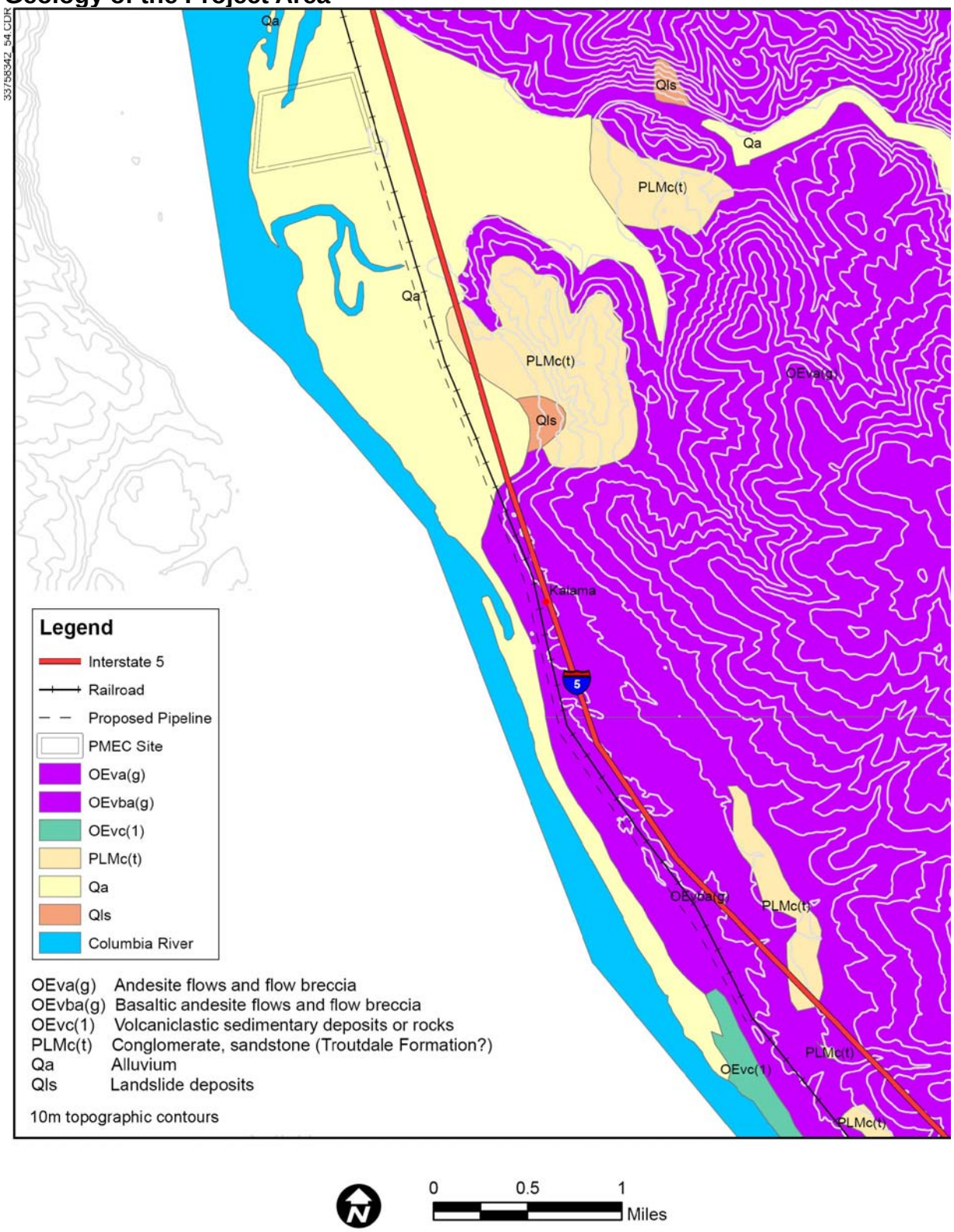
Regional Geology and Soils

The PMEC site is situated in a relatively narrow valley north of the Portland Basin in the Willamette Lowland. It is located on the alluvial terrace that forms the east bank of the Columbia River in the site vicinity. The low mountains bounding the valley to the east are underlain by Oligocene and Eocene andesite flows with younger Pliocene/Quaternary age continental sedimentary rocks present locally (Evarts 2002, Walsh et al. 1987). The valley floor in the site vicinity is underlain by Holocene alluvial deposits of silt, sand, and gravel. This unconsolidated alluvium has been deposited on flood plains, alluvial fans, and terraces of the Columbia River and its tributaries, including the nearby Kalama River. Quaternary landslide debris is also present in areas of steeper topography underlain by the Oligocene/Eocene volcanic rocks (Exhibit 3-1).

The overall geologic structure of the site vicinity is defined by gentle westerly dips (typically less than 20 degrees) in the Oligocene/Eocene volcanic rocks. Several northeast-trending faults lie between Kalama and Woodland and displace these rocks. The Kalama structural zone is inferred to underlie the Columbia River (Evarts 2002).

Exhibit 3-1

Geology of the Project Area



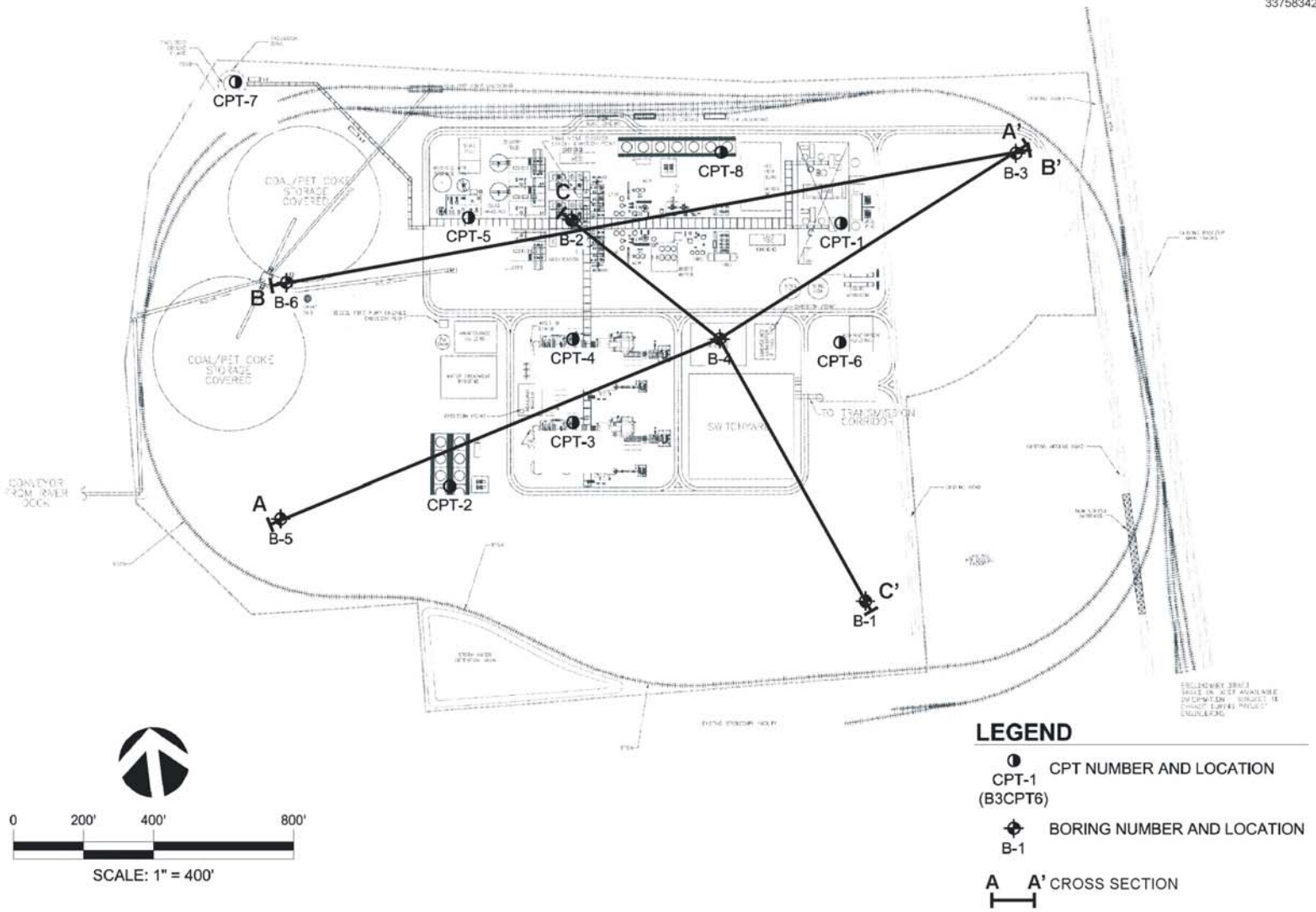
The subsurface stratigraphy beneath the site is characterized by a Holocene alluvial package capped by anthropogenic fill. Following the eruption of Mount Saint Helens in 1980, the USACE conducted emergency dredging of the Columbia River, and the spoils from this activity were deposited at the site as fill. The site has continued to receive spoils from regular maintenance dredging of the Columbia River for safe navigation (Hart Crowser 1995a). As of 1995, dredge spoils constituted a layer of fill ranging from approximately 6 to 16 feet thick draped across the site (Parametrix 1995, Hart Crowser 1995b).

The near-surface soils are an amalgamation of alluvium and dredged fill composed principally of silt with some clay and discontinuous, loose sand interbeds containing gravel, organic matter, pumice, and volcanic ash. The underlying native alluvium is characterized by a generally fining-upward sequence of loose to dense fine to medium sand with varying amounts of silt and gravel (Dames & Moore 1974, PBS 2006). The alluvium may be over 300 feet thick near the mouth of the Kalama River and is underlain by basalt bedrock of the Columbia River Group at depth (Evarts 2002, Parametrix 1995).

Geologic cross-sections of the site subsurface were generated based on the findings of a limited geotechnical investigation completed by PBS Engineering and Environmental in 2006. The location of the PBS Engineering and Environmental soil borings and lines of three geologic cross-sections across the site are presented in Exhibit 3-2, and the geologic cross-sections are presented in Exhibit 3-3. Hazardous materials are not expected to be present based on the description of soils encountered during the prior subsurface investigations and lack of prior commercial or industrial land use on the site (Parametrix 1995, Hart Crowser 1995a and b).

Exhibit 3-2
Site Plan and Cross Section Location Map

33758342_56.cdr

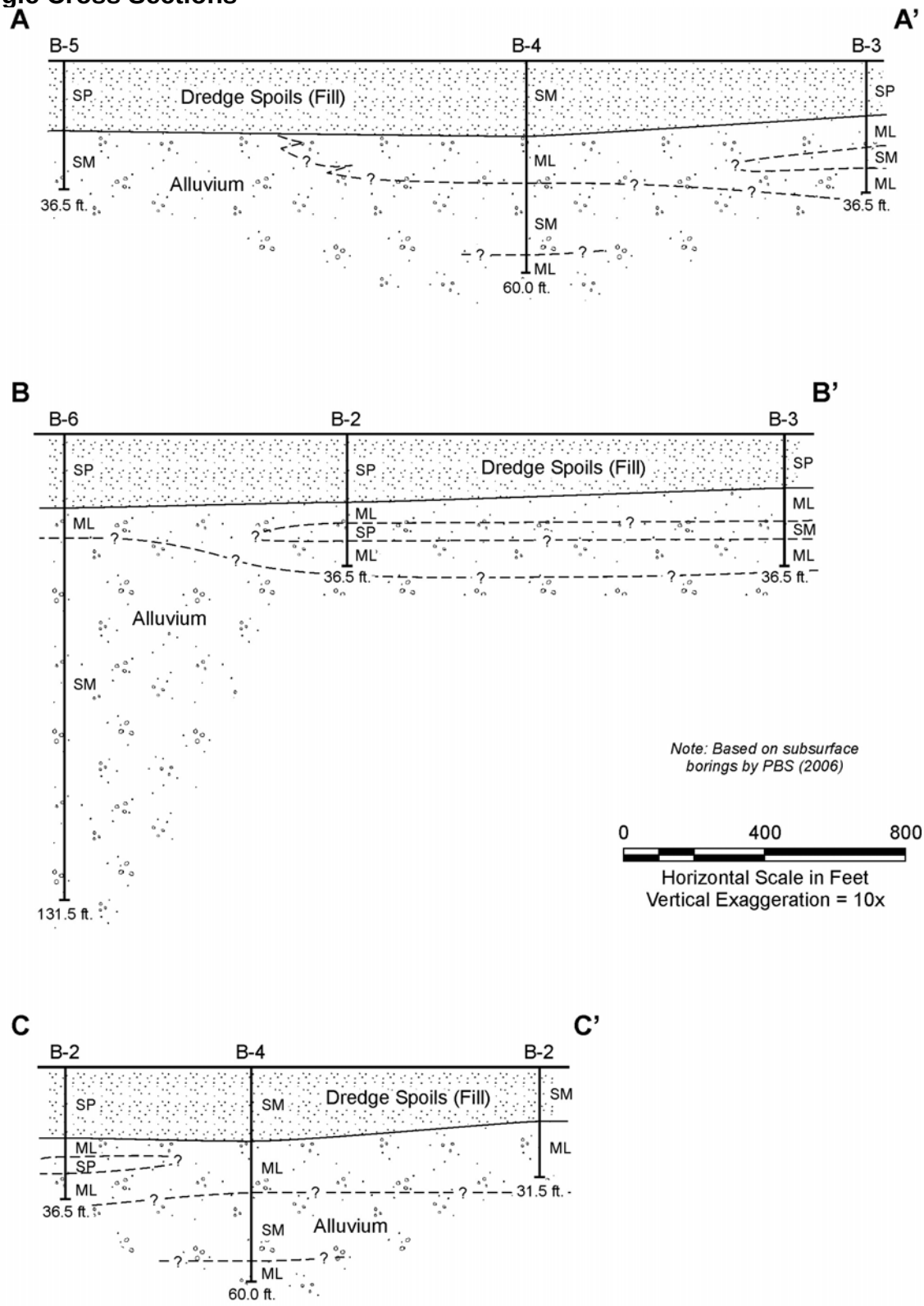


SOURCE: Plan and boring locations from PBS, 2006

Exhibit 3-3

Geologic Cross Sections

33758342_60.cdr



The current surface topography at the site is relatively flat, with an elevation ranging from approximately 20 to 25 feet except for the low area and designated wetland area in the northwest portion of the site, where the elevation is as low as 10 feet. As previously noted, the post-1980 placement of the dredged fill material has altered the natural ground surface and raised ground surface elevations across most of the site. The Port of Kalama intends to fill the northwest portion of the site, including the wetland area, to raise it to the surrounding grade regardless of whether the proposed project is constructed. (See Section 3.4 for information regarding planned wetland mitigation.)

The preliminary geotechnical analysis performed by PBS Engineering and Environmental indicates that the near surface soils up to a depth of 50 feet are potentially liquefiable under the design seismic event. Post-liquefaction vertical settlements were calculated to be on the order of 4 to 6 inches. Consolidation tests to evaluate the settlement characteristics of the near surface soft soils indicate the potential for large magnitudes and time required for the primary and on-going secondary consolidation settlements (PBS 2006).

Seismicity

Strong ground motions affecting the site potentially can be generated from earthquakes on several regional seismic sources. Earthquakes are the result of sudden releases of built-up stress within the tectonic plates that make up the earth's surface. The stresses accumulate because of friction between the plates as they attempt to move past one another. The movement can be between plates such as when one plate moves over another, as in subduction zones, or within the plates themselves.

Earthquakes in the Pacific Northwest can originate from four different types of sources: (1) interplate earthquakes on the Cascadia Subduction Zone, (2) intraplate earthquakes within the subducting Juan de Fuca plate as it sinks and breaks up below the North American plate, (3) shallow crustal earthquakes on faults within the North American plate, and (4) volcanic earthquakes such as those associated with the eruption

of Mount St. Helens. These sources are shown on Exhibit 3-4 and Exhibit 3-5. The largest historical earthquakes in Washington, southern British Columbia, and northern Oregon are shown on Exhibit 3-6 and summarized in Table 3.1-1 of the Application for Site Certification 2006-01, which can be found on page 3.1-10 of the Application.

Southwestern Washington and Northwestern Oregon, in which the PMEC is situated, is an area of low to moderate historical seismicity but characterized as one of high seismic hazard due to the potential for strong earthquake ground motion from regional potential seismic sources. These sources include the Cascadia Subduction Zone, located offshore of the west coast, and shallow crustal faults in the Puget Sound and Willamette lowlands.

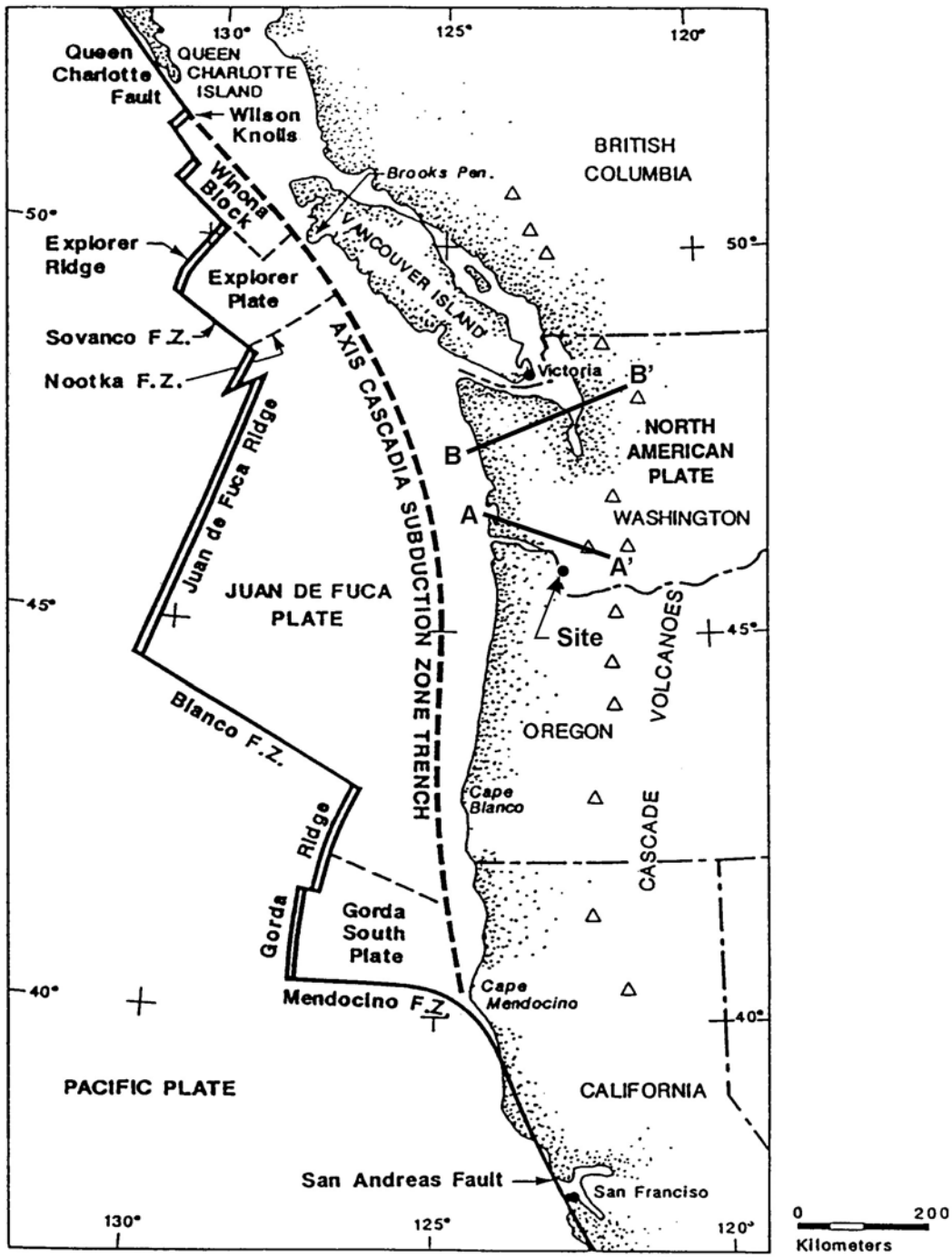
The known faults with Holocene (0 to 11,500 years before present) or late Pleistocene (11,500 to 1.8 million years before present) surface displacement within the Puget Sound and Willamette lowlands are distant from the site. No Quaternary faults have been previously mapped or inferred within the site boundaries and no surface fault movement has been recorded in Washington within historic time (Walsh et al. 1987, Noson et al. 1988, Rogers et al. 1996, and McCrumb et al. 1989).

Studies by Pezzopane (1993), Geomatrix Consultants (1995), and Wong et al. (1999), among others, show that numerous crustal faults with earthquake potential exist in southwestern Washington and Oregon (Exhibit 3-7). A decade ago, many of these faults were unknown or not recognized as being seismogenic. Although the largest known crustal earthquake in the site region is only about M6 (Wong et al. 1999), potential exists for events of M6.5 and greater along several recognized faults, including the Portland Hills fault in Portland (Wong et al. 2000).

Exhibit 3-4

Tectonic Setting of the Cascadia Subduction Zone

33758342_36.cdr

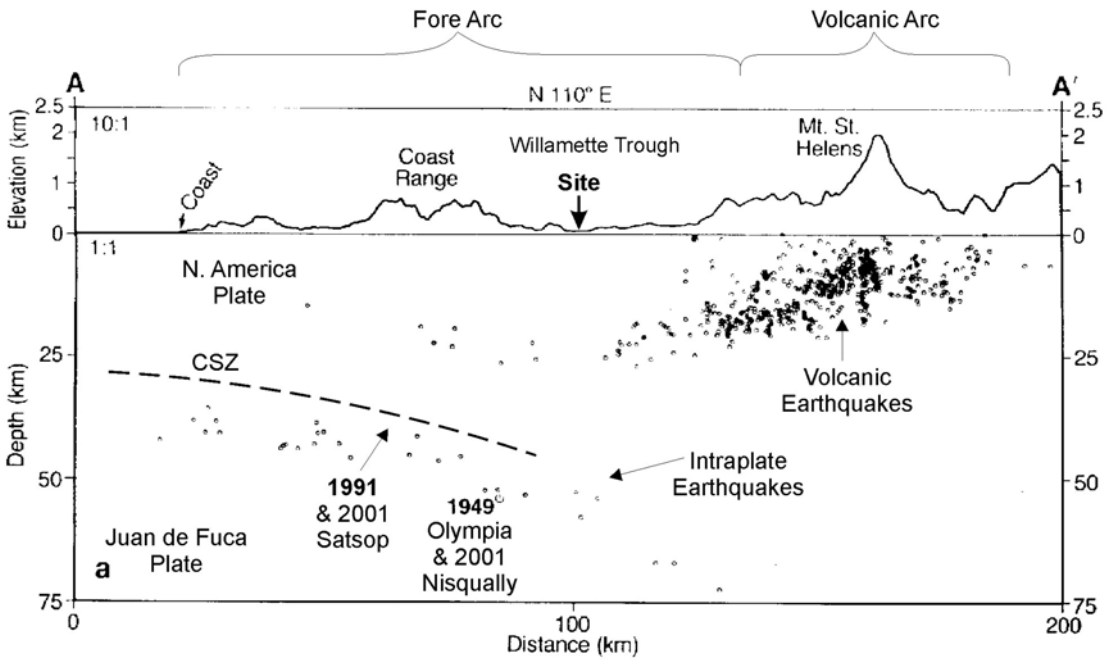


Modified from Washington Public Power Supply System (1988) (after Riddihough, 1984).

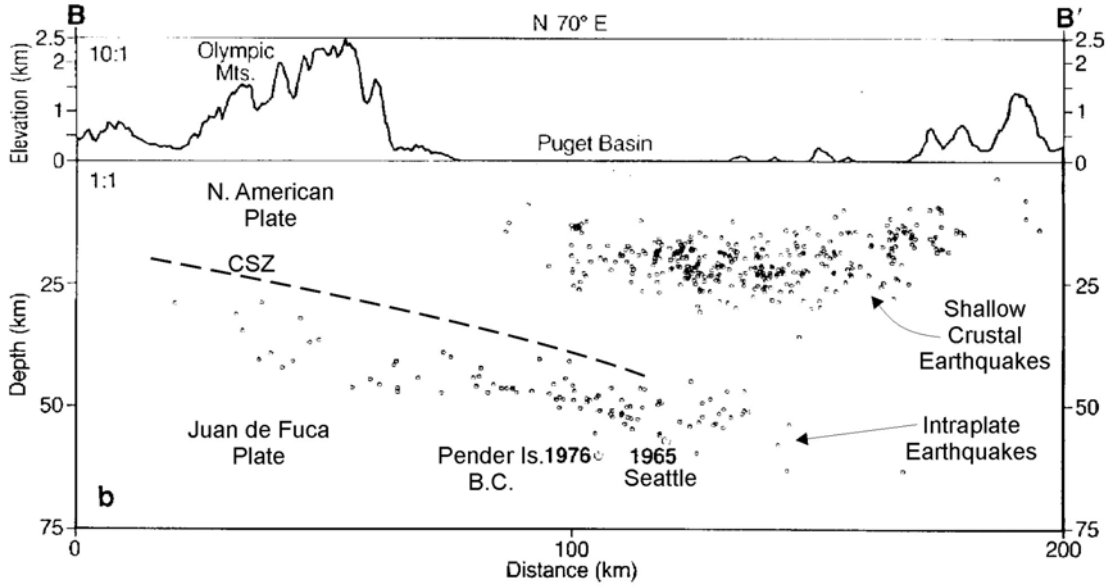
Exhibit 3-5

Cross Sections of Earthquake Hypocenters Beneath Western Washington

33758342_37.cdr



a. Southwestern Washington Cross Section A-A'



b. Northwestern Washington Cross Section B-B'

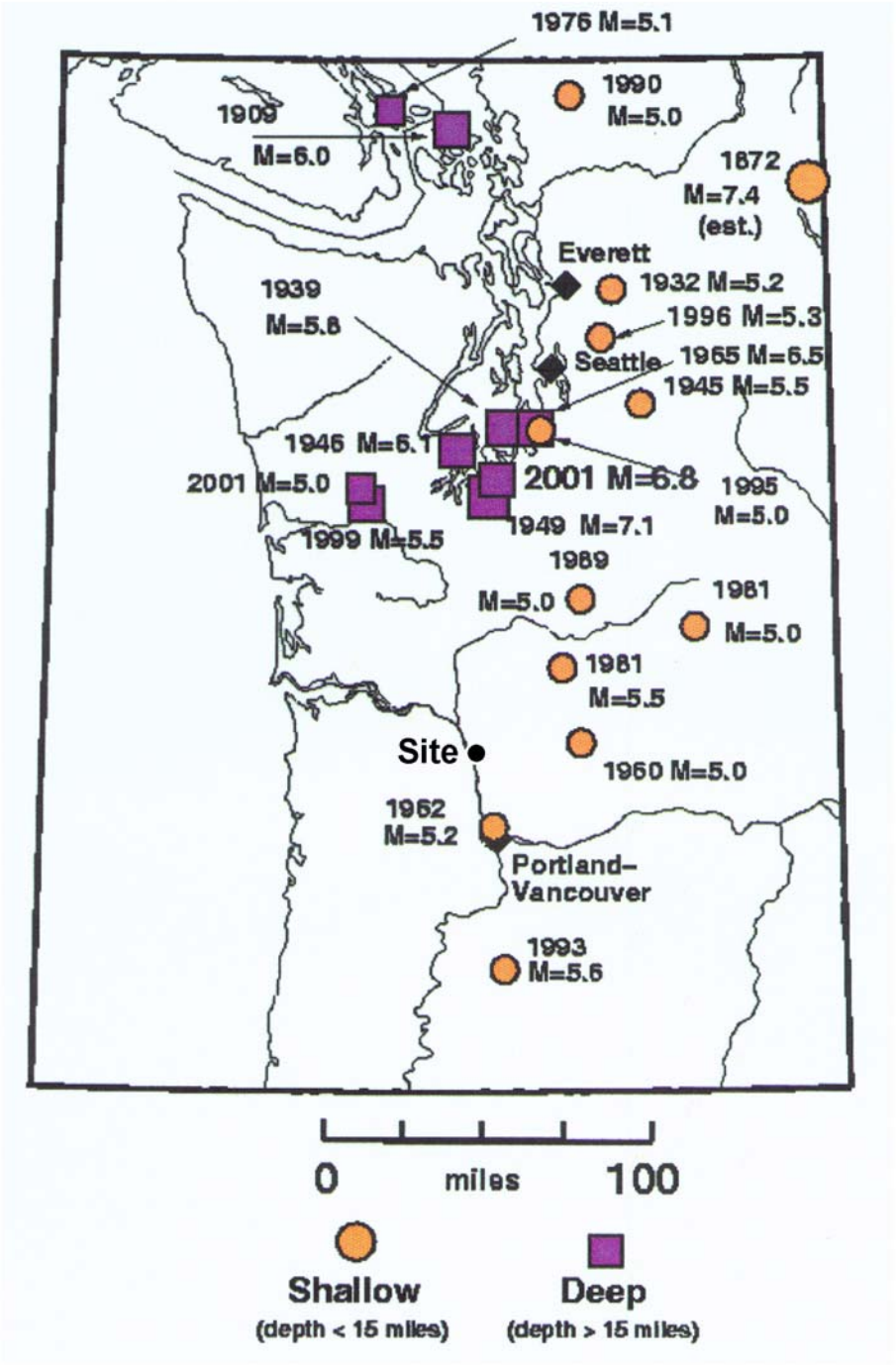
CSZ = Cascadia Subduction Zone

See Figure 3.1-5 for cross section locations.

Exhibit 3-6

Epicenters and Dates of M≥5.0 Pacific Northwest Earthquakes

337583342_38.cdr

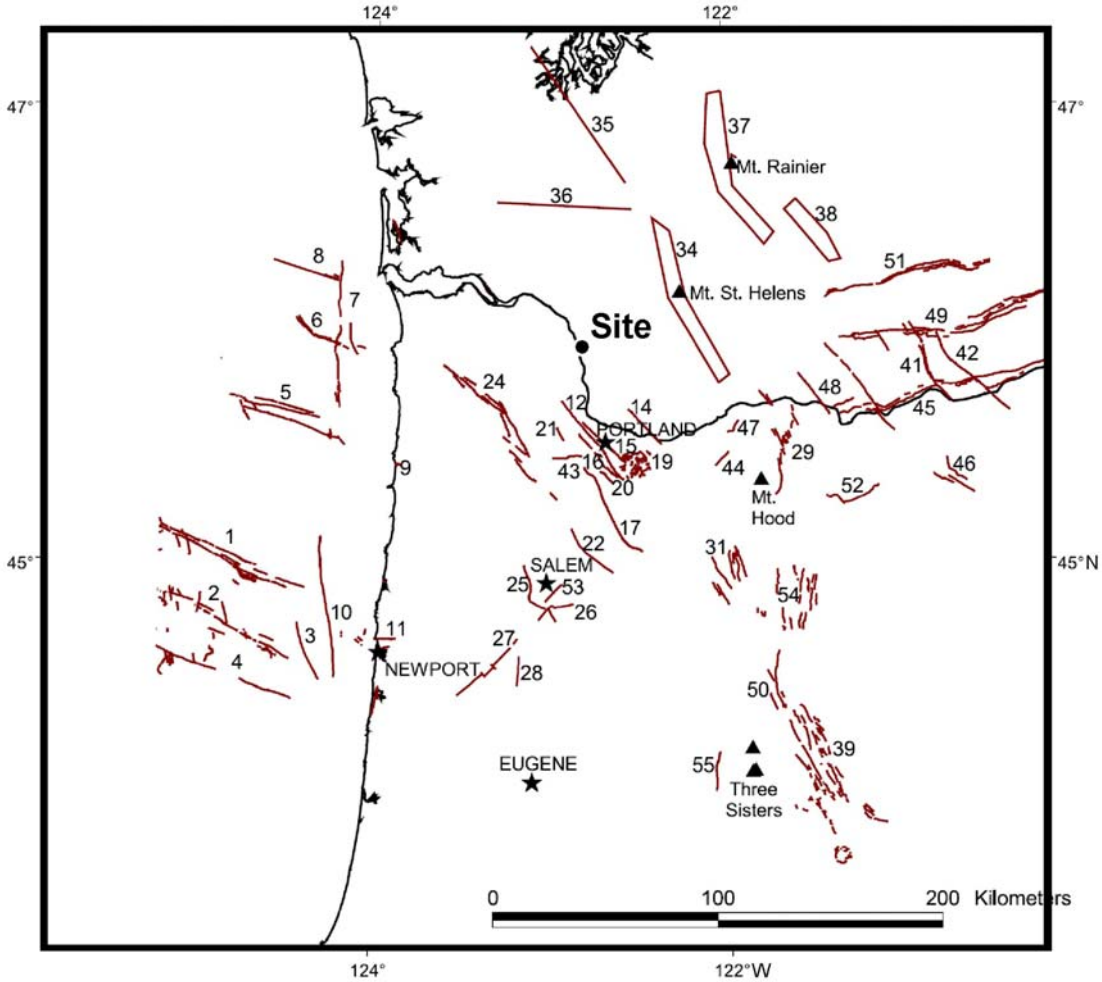


Source: University of Washington

Exhibit 3-7

Quarternary Faults and Seismic Source Zones in Northwest Oregon and Southwest Washington

33758342_39.cdr



01 - Wecoma Fault
02 - Daisy Bank Fault
03 - Stonewall Bank Fault
04 - Alvin Canyon Fault
05 - Fault G
06 - Fault H
07 - Nehalem Bank Fault
08 - Fault J
09 - Netarts Bay Fault
10 - Yaquina Bay Fault
11 - Waldport Fault
12 - Portland Hills Fault A
14 - Frontal Fault - Lacamas Lake
15 - East Bank Fault
16 - Oatfield Fault
17 - Mollala Canby Fault
19 - Grant Butte Fault
20 - Bolton Fault
21 - Helvetia Fault
22 - Mt. Angel Fault
24 - Gales Creek Fault
25 - Salem Hills Fault
26 - Mill Creek Fault
27 - Corvallis Fault
28 - Owl Creek Fault
29 - Hood River Fault
31 - Clackamas River Fault
34 - St. Helens Fault Zone
35 - Olympia Fault
36 - Doty Fault
37 - Western Rainer Zone
38 - Goat Rocks Zone
39 - Sisters Fault Zone
41 - Oak Flat Fault
42 - Arlington-Shutler Butte Fault
43 - Beaverton Fault
44 - Bull Run Fault
45 - Columbia Hills
46 - Condon Northwest Fault
47 - Eagle Creek Fault
48 - Fault Near Dalles
49 - Horse Heaven Hills Fault
50 - Metolius Fault
51 - Toppenish Ridge Fault
52 - Tygh Ridge Fault
53 - Waldo Hills Fault
54 - Warm Springs-Shitike Fault
55 - White Branch Fault

No recognized crustal faults occur in the vicinity of the PMEC that are either active or potentially active (Exhibit 3-7). No historical surface-rupture earthquake on any fault has occurred within northwestern Oregon and southwestern Washington and paleoseismic investigations of the regional faults have been limited to date. The closest Quaternary faults to the PMEC are the Doty fault north of the site in southwestern Washington (No. 36 in Exhibit 3-7) and the Portland Hills Fault A and Frontal Fault –Lackamas Lake faults to the southwest in the Portland Basin (Nos. 12 and 14 in Exhibit 3-7).

Tsunami waves may enter the Columbia River from distant circum-Pacific earthquakes, local offshore earthquakes on the Cascadia Subduction Zone, or submarine landslides in the adjacent Pacific Ocean offshore area. However, the historical data and numerical modeling estimates of runup wave height along the Columbia River inland from the river mouth indicate a low potential for inundation at the site (Priest 1995).

Erosion and Mass Wasting

Near-surface soils in the vicinity of the site have been mapped as described in the Soil Survey of Cowlitz County, Washington (USDA 1988). In general, soils in the site vicinity and along the proposed pipeline corridor are considered to have relatively low susceptibility to erosion.

According to the topographic map, the site consists of stable natural slopes with less than five percent grade. Based on this low topographic relief, slope failures and mass wasting processes are not expected to significantly influence the PMEC site or proposed pipeline corridor.

Flooding

Flow in the Columbia River is controlled upstream of the site by Bonneville Dam, but flood levels in the site area are also affected by tributaries downstream of the dam including the Willamette River. The US Geological Survey (USGS) stream gauge records for the Columbia River are available for Vancouver, Washington and Columbia Slough, Oregon near the confluence with the Willamette River in Oregon upstream of the site. The closest downstream gauges are located in a

tributary channel between Kalama and Kelso approximately two miles north of the site (Carrolls, Washington) and on the main channel downstream of Longview near Quincy, Oregon. None of these gauges has a complete historical record post-construction of Bonneville Dam in 1937. The maximum historical gauge heights recorded at these stations are summarized in Exhibit 3-8.

Exhibit 3-8
Historical Gauge Heights

Gauge	Gauge Height (feet, NGVD 1929)	Date	Recording Period
Vancouver, WA	29.42	12/25/1964	1963-1970, 1998-2007
Columbia Slough, OR	28.79	2/9/1996	1996-2007
Carrolls, WA	19.09	12/11/1955	1950-1970
Quincy, OR	12.33	2/9/1996	1986-2007

Source: US Geological Survey, National Water Information System:Web Interface

The PMEC site is located within the 100-year floodplain for the Kalama and Columbia rivers as currently mapped by the Federal Emergency Management Agency (FEMA) (1974). However, this map was based on 1980 elevations and shows the flood elevation at 19 feet. The current elevation of most of the PMEC site ranges from approximately 20 to 25 feet due to post-1980 placement of dredge soils. The low area and wetland are currently below the 100-year flood level but will be filled above this level by the Port of Kalama prior to and independent of the proposed project. The upland portion of the site was not flooded during the peak historical flood event (February 1996), which occurred subsequent to fill placement to the current elevation.

Is the site likely to flood?

No, the flood level is at 19 feet above sea level. Most of the site is approximately 20 to 25 feet above sea level.

Volcanoes

The Cascade Mountains of the Pacific Northwest region contain sixteen major volcanoes which extend from Mount Garibaldi in British Columbia to Mount Lassen in California (Harris 1980). Four of the volcanoes within Washington and Oregon have experienced activity within the historic time: Mount Baker, Mount Rainier, Mount Hood, and Mount St. Helens. Mount St. Helens is the closest volcano to the project

site, situated approximately 35 miles to the northeast (Exhibit 3-9).

Effects of volcanic activity may include lava flows, mudflows, pyroclastic flows, and ash-fall. Volcanic flows are typically limited to the flanks of the volcano and major drainage channels extending from the volcano. The USGS has estimated the areas most likely to be impacted from future eruptions of Mount St. Helens, and the PMEC site is not situated in an area identified as having a potential hazard from a pyroclastic flow or lahar (Wolfe and Pierson 1995).

3.1.2 Environmental Impacts of the No Action Alternative

No environmental impacts would occur as a result of the No Action Alternative

3.1.3 Environmental Impacts of the Proposed Action

Construction Impacts

PMEC Site. The primary impacts of the PMEC on geologic conditions and materials at the site are foundation construction, filling, excavation, grading, trenching, backfill and compaction associated with the site development. These activities result in densification of loose granular soils and consolidation of soft cohesive soils.

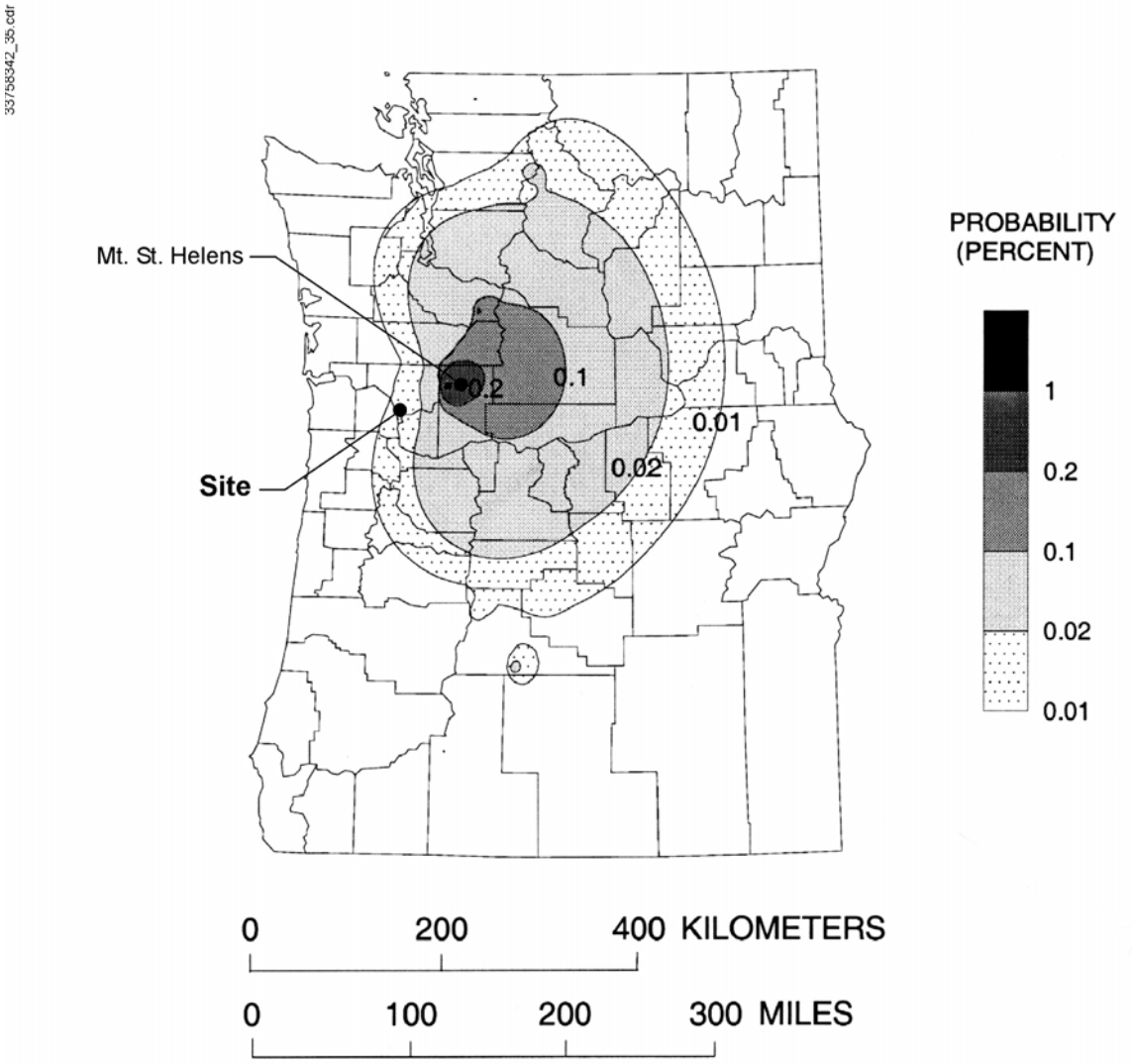
Foundations for the facility and the grading plan for the PMEC site would be determined during final design. Therefore, the net amount of excavated/fill material is not currently available. However, it is expected that grading activities for the plant would be limited in extent and only directly affect artificial fill soils already present after the Port of Kalama fills the northwest portion of the site independent of the PMEC (see Section 3.4). Fill will be required for construction of the railroad spur and suitable fill soils will be obtained from a commercial source or other construction site that generates suitable materials. The excavation and fill associated with PMEC would have no adverse effects on the geologic and topographic conditions at the site.

What are suitable fill materials?

Suitable materials are of an appropriate grain size and type without natural organic or anthropogenic debris or hazardous materials.

Exhibit 3-9

Annual Probability of ≥10 cm of Volcanic Ash



Explanation

Annual probability of accumulation of ten or more centimeters (four or more inches) of tephra in Washington and Oregon from eruptions throughout the Cascade Range. Probability distribution reflects the frequency of explosive eruptions at each major Cascade volcano, the variability in the thickness of tephra that could be deposited at various downwind distances, and the variability in wind direction.

SOURCE: Wolfe and Pierson, 1995

Preliminary geotechnical data (PBS 2006) indicate soils at the site may be susceptible to liquefaction. The soils may therefore need to be densified using typical ground improvement techniques available to the construction industry or deep foundations such as piles may be selected so that structural loads are carried to more competent soils below soils that are susceptible to settlement or liquefaction. Limited grading and/or placement of additional fill may be performed to obtain necessary grades. Because surface soils on the PMEC site consist of dredged soil fill, no adverse impacts on the site soil are anticipated from the grading and foundation construction activities.

Natural Gas Pipeline. Construction of the natural gas pipeline is not expected to significantly impact geology or soils in the vicinity of the proposed PMEC site. Excess soils would likely be generated as a result of the gas pipeline installation. The minimum volume of the excess soils would be slightly more than the volume of displacement by the pipe, due to the change in soil density resulting from the ground disturbance. Additional excess soils may be generated due to removal of unsuitable soils for backfill during trench excavation, and placement of base course or structural fill. After the installation of the pipeline, the ditch would be back-filled and regraded to approximately current topography.

The pipeline would be constructed within the existing road right-of-way for most of its length, following a proposed route north along Hendrickson Drive and a constructed levee west around the Kalama River's south shore. It would be either hung over the Kalama River using the existing Hendrickson Drive bridge or drilled under the river at the same location. From the bridge, the pipeline would continue along Hendrickson Drive to the PMEC site.

Horizontal drilling beneath the Kalama River has the potential to "frac out," or cause fractures in and allow migration of drilling fluids through, the overlying unconsolidated alluvium. A pipeline was constructed by Cascade Natural Gas along a route similar to the proposed PMEC pipeline corridor. Frac out

was observed in the wetlands adjacent to the Kalama River during drilling and may have occurred in the river itself (Sheldon Somers and Tom Wilson, personal communications). The potential water quality and biological impacts are discussed in Sections 3.3 and 3.4, respectively. Permanent impacts to site soils and geology from frac out are not anticipated.

Erosion and Mass Wasting. Soils disturbed and stripped of vegetative cover may be susceptible to wind erosion during the relatively short time of construction activity until vegetation has been reestablished.

Operation Impacts

PMEC Site. There would be no impacts to geology and soils as a result of PMEC operation.

Natural Gas Pipeline. There would be no impacts to geology and soils as a result of pipeline operation.

Seismicity. Earthquake-related damage to industrial facilities, such as the PMEC and associated gas pipeline, typically arises from surface fault rupture, liquefaction and lateral spreading of soils, slope failures, or ground shaking. In addition, tsunamis or seiches may impact facilities located near the Pacific Coast or adjacent to other water bodies in seismically active areas.

What is a seiche?

A seiche is the sloshing of a closed body of water such as a lake, pond, pool or reservoir caused by earthquake shaking.

Surface rupture is highly unlikely at the plant site or along the pipeline corridor because of the absence of known faults beneath the site and pipeline corridor and the absence of evidence of historical or geologically recent surface rupture in the Kalama site area.

According to the probabilistic Seismic Hazard Maps published by the USGS in 2002 (http://earthquake.usgs.gov/research/hazmaps/), the estimated peak ground acceleration for the site is on the order of 0.18g for a 475-year return period earthquake (10 percent chance of not being exceeded in 50 years). For a 2475-year return period earthquake (2 percent of not being exceeded in 50 years), the estimated peak acceleration for the site is on the order of 0.35g.

Liquefaction and/or lateral-spreading, and accompanying loss of strength and load bearing capacity of soil, is a potential hazard at this site. Liquefaction can occur in shallow loose saturated granular soils due to strong ground shaking during an earthquake. Liquefaction generally occurs in saturated soils at depths of less than 40 feet below ground surface (bgs). Lateral spreading may occur when liquefied soils flow laterally towards a slope or river bank. Geotechnical reports for the PMEC site and several existing facilities along the river to the south of the site of the proposed facility indicate the presence of loose to medium dense sand layers with the potential to liquefy.

Although seiches have been observed in the Pacific Northwest during the 1949 Queen Charlotte Islands, Canada, and the 1964 and 2002 Alaskan earthquake of approximately moment magnitude M8 or greater, seiches have not been reported in the Columbia River, except in the reservoir directly behind the Grand Coulee Dam farther upstream. In our judgment, the seiche potential in this river near the site is minimal, and the potential for damage from any seiche that might occur is considered remote.

Erosion and Mass Wasting. Some accretion by natural depositional processes is possible, particularly near the confluence of the Columbia and Kalama Rivers. During the dry season, soils that are disturbed and stripped of vegetative cover may be susceptible to wind erosion.

Flooding. The current elevation (20 to 25 feet) of most of the site is above the 100-year floodplain elevation of 19 feet. The Port of Kalama will be filling the northwest portion of the site that is currently less than 19 feet above sea level to greater than 19 feet independent of the proposed PMEC project. Therefore, additional mitigation measures for flooding are not planned.

Volcanoes. Of greatest impact in terms of area affected by an eruption is the tephra, or ash, carried aloft that subsequently falls to the land surface. Modern meteorological records show that both high altitude wind directions and speeds in

Washington have been more prevalent and stronger toward the east than toward the west in the site region. The USGS (Wolfe and Pierson 1995) estimates that there is between a 0.01% and 0.02% annual probability that there would be 4 inches (10 cm) or more of ash deposited at the site from eruptions throughout the Cascade Range (Exhibit 3-9). Therefore, no mitigation measures are proposed for direct volcanic hazards.

Secondary processes associated with volcanic eruption, such as lahars, flooding and sediment loading can result in more serious damage. Flooding may affect those areas on the modern floodplain of rivers within the watershed of the volcano. Despite the head of the Kalama River being on the flanks of Mt. St. Helens, the potential for significant deposition of volcanic material and debris at the mouth of the Kalama River is considered low (Wolfe and Pierson 1995). The 1984 eruption of Mt. St. Helens affected the nearby Cowlitz and Lewis Rivers, but flooding and lahars did not occur at the mouth of the Kalama River (Schuster 1989). Additional mitigation measures beyond those appropriate for potential rainfall/runoff induced flooding from the Kalama and Columbia Rivers are not proposed.

3.1.4 Mitigation Measures

Site-specific measures have been identified to mitigate potential hazards. With standard and site-specific mitigation measures, impacts on the natural earth environment from the construction and operation of the PMEC and associated pipeline are expected to be minor.

Geology & Soils

Site-specific geotechnical engineering evaluations have been and will be conducted prior to design of the PMEC to identify appropriate design methods and mitigation measures. The placement of fill consisting of moisture-sensitive soils would be limited to the drier months. If the construction schedule requires backfilling during other periods, additional mitigation measures would be used. A qualified geologist or engineer would monitor the fill placement during construction and

conduct appropriate field tests to verify proper compaction of the fill soils.

Seismicity

The impacts from a distant great earthquake on the Cascadia Subduction Zone or local moderate to large earthquake are potentially significant to the proposed plant facilities and to worker health and safety, but can be mitigated through standard seismic design and construction measures. The strong and/prolonged shaking may cause soil failure due to liquefaction and/or lateral spreading. The following measures can mitigate the earthquake hazard presented to the PMEC and gas pipeline:

- A more extensive site-specific geotechnical investigation program would be undertaken during design to further evaluate whether there are areas of potentially liquefiable soil layers in the proposed site of the facility and gas pipeline. Ground modification techniques and specialized foundations for power plants and other large structures can be and have been designed to mitigate liquefaction impacts in seismically active areas worldwide. Specific design criteria to address the risk of liquefaction would be developed as part of site-specific geotechnical studies to be performed prior to final design. These design criteria would consider appropriate earthquake-induced ground motion estimates.
- In the areas where saturated liquefiable soils are present, some form of in-place densification may be used to improve the liquefiable soils. Whenever depth to non-liquefiable soils is not too great, over-excavation and replacement with non-liquefiable soils may also be used. Alternatively, pile foundation support may be used to transfer loads to competent soils below the liquefiable layers or stone column foundations can be used to mitigate liquefaction effects.

In addition to the above mitigation measures during the design and construction of the plant and gas pipeline, visual inspection would be conducted following abnormal seismic activity.

These inspections would look for signs of incipient mass movement in those areas identified as potentially susceptible to such failures.

Erosion & Mass Wasting

The potential for erosion by wind and water, while considered low, would be minimized through the use of erosion control measures to be outlined in the Stormwater Pollution Prevention Plan, as described in Section 3.3.

Clearing, excavation, and grading would be limited to the areas necessary for construction of the PMEC, and would not be done far in advance of facility construction. Slopes would be graded to no steeper than 3 feet horizontal to 1 foot vertical, where practical. Steeper slopes may require additional slope and soil stabilization during and following construction.

Ground surface restoration would be completed within fourteen days of the area's final disturbance. Interim surface protection measures, such as erosion control matting or plastic sheeting, also may be required prior to final disturbance and restoration if warranted by the potential for erosion.

Sediment control measures used during construction would be based on a 10-year design storm. Water quality measures (other than sediment removal) would be based on the 6-month, 24-hour duration storm.

Flooding

The project site, at approximately 20 to 25 feet above sea level, is above the flood level of 19 feet, the 1996 highest recorded flood level. As a result, no mitigation measures are proposed for flooding.

Volcanoes

Due to the low probability of either direct or indirect impacts from a volcanic eruption, no mitigation measures are proposed for volcanic activity.

3.1.5 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts would occur as a result of the Proposed Action.

3.2 Air Quality

This section discusses the impacts of the Proposed Action on air quality. Air quality is discussed in terms of the area affected, the applicable air quality regulations, and the key air pollutants.

Further information on air quality impacts can be found in the Application for Site Certification, Sections 2.11, 3.2, and 5.1 (Application for Prevention of Significant Deterioration Permit). The Prevention of Significant Deterioration (PSD) permit application has been revised since the September 2006 submittal of the Application for Site Certification, and is expected to be submitted in March 2007.

Which public agencies regulate air quality standards in Washington?

Air quality in Washington is typically regulated by several agencies. In Kalama, the Southwest Region Clean Air Agency is the local authority for air quality permitting of industrial sources, and oversees the Notice of Construction permit process. Ecology retains the authority for air quality permitting of major industrial sources and major modifications of those sources through the PSD permit process. The Oregon Department of Environmental Quality is responsible for permitting of industrial facilities and maintaining acceptable air quality in Oregon. Although Oregon Department of Environmental Quality (ODEQ) has no regulatory authority over the PMEC permit process, the air quality analyses include evaluation of pollutant concentrations in Oregon to ensure compliance with ambient air quality standards across the border. The US Environmental Protection Agency (USEPA) also has a role in the PSD process and in ensuring all states have plans in place to maintain compliance with ambient air quality standards.

Because EFSEC has jurisdiction over power plants capable of generating 350 MW or more, EFSEC is the responsible permitting authority over the PMEC. EFSEC has adopted virtually all of the air quality regulations established by Ecology that apply to facilities such as PMEC. After issuance

of the air operating permit, the Southwest Region Clean Air Agency would likely to administer the permit through a delegation agreement with EFSEC.

The distinction between emissions and concentrations is important in the review of air quality issues. Emission regulations limit the amount of a particular air pollutant that can be emitted from a stack or facility (e.g., 10 pounds per hour of particulate matter). Ambient air quality standards limit concentrations of certain air pollutants in parts per million (ppm) or millionths of a gram per cubic meter of air ($\mu g/m^3$) in the outdoor air.

The Air Quality Impact Analysis developed as part of the PSD permit application in Section 5.1 of the Application for Site Certification determined that worst-case emissions from the PMEC would result in ambient concentrations far below Washington Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS), less than Oregon Ambient Air Quality Standards (OAAQS), and well within allowable PSD increments for Class I and Class II areas. Calculated concentrations of toxic air pollutants (TAPs) attributable to the PMEC also meet Washington ambient criteria.

What does WAAQS and NAAQS stand for?

WAAQS is the acronym for the Washington Ambient Air Quality Standards. NAAQS is the acronym for the National Ambient Air Quality Standards.

3.2.1 Affected Environment

What are the key potential pollutants?

Ambient air quality standards established by Washington, Oregon, and the federal government address nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter (PM_{10}), ozone (O_3), and lead. Except for dust generated when coal and petroleum coke are unloaded and transferred to storage domes, virtually all air pollutant emissions are attributable to combustion of natural gas or the syngas. The primary pollutants generated by combustion are NO_x, CO, and SO_2.

Washington also regulates more than 500 pollutants deemed to be TAPs. These TAPs have no established ambient standards, but are known or suspected to cause some level of acute or chronic health risk (cancer or non-cancer effects) to the general

public. The Application for Site Certification indicates that all TAPs emitted by PMEC meet state acceptability levels.

What are the applicable Air Quality Standards?

Ambient air quality standards have been established by USEPA, Ecology, and ODEQ (Exhibit 3-10). Some of the pollutants in Exhibit 3-10 are subject to both primary and secondary NAAQS. Primary standards are designed to protect human health with a margin of safety. Secondary standards are established to protect the public welfare from any known or anticipated adverse effects associated with these pollutants, such as soiling, corrosion, or damage to vegetation.

Existing Air Quality

Based on air quality monitoring information collected over a period of years, state and federal agencies designate regions as being attainment, non-attainment, or unclassifiable areas for regulated air pollutants. Attainment indicates that air quality in an area meets the federal health-based ambient air quality standards shown in Exhibit 3-10, and non-attainment status indicates that air quality in an area does not meet those standards. Unclassifiable status indicates that there are no relevant monitoring data for the area, in which case the area has attainment status. Cowlitz County is attainment for all air pollutants.

The USEPA maintains a database that contains air quality data from monitoring sites across the United States. Air quality measurement data were collected for 2004 and 2005 for monitoring sites located in Washington and Oregon. The air quality data search was narrowed to five monitoring sites: two sites in Vancouver, one site in Longview; one site in Seattle, and one site located in Portland. In general, these stations are located where there may be air quality problems, and so are usually in or near urban areas or close to specific large air pollution sources.

Exhibit 3-10

Ambient Air Quality Standards and PSD Increments

Pollutant	National Ambient Air Quality Standards		Washington	Oregon[h]
	Primary	Secondary		
Total Suspended Particulate				
Annual Geo. Mean ($\mu g/m^3$)			60	
24-hour Average ($\mu g/m^3$)[b]			150	
Inhalable Particulate (PM_{10})				
Annual Arithmetic Mean ($\mu g/m^3$)	50	50	50	50
24-hour Average ($\mu g/m^3$)[g]	150[b]	150[b]	150[b]	150[b]
Fine Particulate (PM_{25})				
Annual Arithmetic Mean ($\mu g/m^3$)[e]	15	15	15	
24-hour Average ($\mu g/m^3$)[f]	65	65	65	
Sulfur Dioxide (SO_2)				
Annual Average (ppm)	0.03		0.02	0.02
24-hour Average (ppm)[b]	0.14	0.50	0.10	0.10
3-hour Average (ppm)[b]			0.40[a]	0.50
1-hour Average (ppm)[b]				
Carbon Monoxide (CO)				
8-hour Average (ppm)[b]	9		9	9
1-hour Average (ppm)[b]	35		35	35
Ozone (O_3)				
1-hour Average (ppm)[c]	0.12	0.12	0.12	0.12
8-hour Average (ppm)[d]	0.8	0.8		
Nitrogen Dioxide (NO_2)				
Annual Average (ppm)	0.05	0.05	0.05	0.05
Lead (Pb)				
Quarterly Average ($\mu g/m^3$)	1.5	1.5	1.5	1.5

µg/m3 = micrograms per cubic meter; ppm = parts per million

a Also, 0.25 ppm not to be exceeded more than twice in seven days

b Not to be exceeded on more than once per year.

c Not to be exceeded on more than 1 day per calendar year as provided in Chapter 173-475 WAC.

d Based on the 3-year average of the annual fourth-highest daily maximum 8-hour average ozone concentration at each monitor.

e Based on the 3-year average of annual arithmetic mean PM2.5 concentrations.

f Based on the 3-year average of the 98th percentile of 24-hour PM2.5 concentrations at each monitor within an area.

g Based on the 99th percentile of 24-hr PM_{10} concentrations at each monitor.

h OAAQS are provided for informational purposes.

The 2004 and 2005 monitoring data from the five sites can be used to characterize existing air quality at the site. A summary of these data is presented in Exhibit 3-11.

Exhibit 3-11

Summary of Air Quality Data (2004 and 2005)

Pollutant	Averaging Period (hours)	Data Source	Maximum Concentration 2004	Maximum Concentration 2005	2004-2005 Average of Maximum Concentrations	Lowest of OAAQS, NAAQS or WAAQS
PM_{10} ($\mu g/m^3$)	24	A	39	77	58	150
	Annual	A	17	23	20	50
PM_{25} ($\mu g/m^3$)	24	B	45	34	39.5	65
	Annual	B	10.1	8.7	9.4	15
$SO_{2\ (ppm)}$	1	C	0.044	0.06	0.052	0.40
	2	C	0.028	0.045	0.037	0.50
	24	C	0.014	0.019	0.017	0.10
	Annual	C	0.004	0.003	0.0035	0.02
$SO_{2\ (ppm)}$	1	D	--	0.015	0.015	0.40
	2	D	--	0.012	0.012	0.50
	24	D	--	0.006	0.006	0.10
	Annual	D	--	0.002	0.002	0.02
Ozone (ppm)	1	D	0.087	0.072	0.080	0.12
	8	D	0.072	0.062	0.067	0.08[f]
$NO_{2\ (ppm)}$	Annual	D	0.010	0.011	0.011	0.05
CO (ppm)	1	E	6.4	7.2	6.8	35
	8	E	5.0	4.9	5.0	9

Ref: USEPA's AIRs database (http://www.epa.gov/air/data/info.html) Accessed February 2006.

A - Longview, WA (254 Oregon Wy)
B - Vancouver, WA (8205 E 4th Plain Blvd)
C - Seattle, WA (Beacon Hill, WA)
D - Portland, OR (5824 SE Lafayette)
E - Vancouver, WA (2101 E 4th Plain Blvd)

All observed pollutant concentrations at these monitoring sites are lower than the Oregon, Washington, and national ambient air quality standards.

- NO_2 was monitored in Portland, where the maximum annual concentration was less than 22% of the NAAQS.
- CO was monitored in Vancouver, where the maximum concentrations were less than 55% of the NAAQS.
- The data in Exhibit 3-11 indicate industrial sources do not contribute significant amounts of SO_2 in the area. SO_2 was monitored in Portland and Seattle and the maximum concentrations were less than 20% of the NAAQS.
- The maximum hourly ozone concentrations monitored in Portland were about 72% of the 1-hour NAAQS.

- PM_{10} concentrations (usually associated with wood smoke, fugitive dust, and combustion sources) were monitored in Longview, Washington, where maximum concentrations were less than 51% of the NAAQS.
- $PM_{2.5}$ was monitored in Vancouver, where maximum concentrations were about 69% of the annual and 67% of the 24-hour $PM_{2.5}$ standards.[1]

Alpine Lake Class I Area

As discussed above, existing air quality in the Kalama area is good. To ensure that areas with good air quality do not lose that valuable attribute, the Clean Air Act Amendments of 1977 established regulations that limit the allowable degradation of air quality in attainment areas. These regulations set PSD "increments" that limit the increases in SO_2, NO_2 and PM_{10} concentrations that may result from new or modified industrial source. The allowable incremental increase is especially stringent at certain international parks, national parks, and national wilderness areas.

As discussed below, detailed computer model simulations of emissions from PMEC were used to determine the incremental increases in pollutant concentration locally and regionally.

3.2.2 Environmental Impacts of the No Action Alternative

There would be no air quality impacts from the No Action Alternative.

3.2.3 Environmental Impacts of the Proposed Action

Construction Impacts

Fugitive Dust. Construction activities would produce fugitive dust due to wind erosion and the operation of construction equipment on exposed earth surfaces. Dust emissions depend on soil types and moisture. Fugitive dust releases generally constitute the largest source of PM_{10} during construction. Most

[1] This comparison ignores temporal and annual averaging that is a consideration with the $PM_{2.5}$ standards. Consequently, existing concentrations are probably a lower percentage of the ambient standards.

of the dust particles would settle out adjacent to construction areas, while a small fraction would be transported farther downwind. Air quality impacts caused by construction equipment emissions are short-term and would cease upon completion of construction activities.

Because the site is flat, there would be relatively little grading of the site prior to construction. Therefore, dust generated by excavation and grading would be short term. Dust from access roads would be controlled by applying gravel or paving the access road and watering as necessary.

Implementation of the BMPs described below in the Mitigation Measures would minimize fugitive dust emissions and would eliminate adverse air quality impacts.

Odors. Construction of the PMEC would include some activities that would generate short-term, localized odors. If oil-based paints are applied to structures or equipment at the site, paint odors may be perceptible nearby. Some of the site would be paved with asphalt, and asphalt fumes may be perceptible for a short period during the paving operation. These impacts are anticipated to be slight and of short duration.

Emissions from Construction Equipment. Mobile construction equipment and portable stationary engines would emit air pollutants from combustion, including NO_x, CO, SO_2, PM_{10}, and TAPs. Due to their temporary and intermittent nature, the concentrations of such emissions would be substantially lower than the applicable air quality standards.

Summary. The residences nearest the site are approximately half a mile west, southeast, and northeast away. Pollutant concentrations resulting from construction would be low as a result of dispersion of emissions over this distance. In addition, the predominant wind directions are consistent with the north/south alignment of the river value in this location; thus, winds carrying emissions from the site to the nearest residences are relatively rare.

Operation Impacts

Pollutant Emissions

The key components of the PMEC are three gasifiers and two combustion turbines. As described more completely in the project description, the gasifiers process coal or petroleum coke into a synthetic fuel gas referred to as syngas. The syngas, or natural gas from a pipeline, is burned in two combustion turbines and associated HRSGs. Except when a transition between natural gas and syngas is made in a combustion turbine, the gasifier emissions are minimal. The combustion turbines are the dominant emission sources.

Smaller sources of emissions include:

- A natural gas fired boiler used to assist with startup of the facility
- Cooling towers that assist in condensing steam.
- A "tank vent oxidizer" that oxidizes off-gases (such as air or nitrogen vent streams with trace amounts of hydrogen sulfide) from various tank and process vents associated with the gasification process.
- A flare use primarily to combust off-spec syngas during startup of the gasifier and on-spec syngas during transitions between firing natural gas and syngas in the combustion turbines. The flares are also available to combust syngas during a process upset.
- A diesel engine powered generator and a diesel engine-powered firewater pump, both of which will be operated only for testing unless there is an emergency.

Note that the flare is installed as a safety device. It safely combusts off-spec syngas as the gasifiers are started up. The flare is also available to combust the entire syngas feed to both combustion turbines if necessary. In the event of a transmission line or transformer failure, for example, the combustion turbine generators would suddenly "trip" and force the combustion turbines into a rapid shutdown. In that event, the syngas being produced by the gasifiers would be directed to

the flare. This is simply the reverse of the startup scenario, except that the quantity of syngas may be more than twice as much as during a normal startup. The flare is designed to accommodate up to 110% of the combined syngas needs of both combustion turbines. The design team indicates the gasifier output will be reduced to the quantity of gas used at 70% combustion turbine load within one hour.

During a flaring event, CO emissions would be higher than normal because the combustion would not be as carefully controlled as in a combustion turbine, and the NO_x emissions would be higher because the flare is not equipped with Selective Catalytic Reduction. However, the flaring event would be short-lived, and the greater plume rise would partially offset higher impacts that might result from higher emissions.

By federal and state law, PMEC must employ Best Available Control Technology (BACT)to minimize emissions. For the combustion turbines, PMEC proposes to use Selective Catalytic Reduction to reduce NO_x emissions to 3 ppm. This is equivalent to the emission rate deemed BACT for many natural gas fired combustion turbines, and far exceeds the emission control obtained by IGCC units to date. PMEC will also employ Selexol technology to remove sulfur from the syngas to a degree that far exceeds current IGCC facility performance. Emissions of CO, PM_{10}, and volatile organic compounds (VOCs) will be minimized by optimizing combustion and by combusting clean gaseous fuels.

Because mercury occurs naturally in coal, the PMEC syngas clean up process includes a system to control mercury that may remain in the syngas. Downstream of the acid gas removal system, the syngas passes through fixed beds of activated carbon that are specially impregnated to remove mercury. PMEC will *design* a dual activated carbon bed system to achieve a 95% removal of the mercury in the solid fuel feedstock, but can only *guarantee* a system that removes 90% of the mercury. For Powder River Basin coal, for example, the guaranteed 90% removal results in a maximum emission rate

of 0.0033 lb/hr per turbine, or a total of 58 pounds per year for both of the PMEC combustion turbines combined.

Emissions from virtually all the sources at PMEC will vary over time. For example, some pollutants are emitted at higher rates when burning syngas and others are higher when burning natural gas. Generally, pollutant emissions are higher when the unit is operating at maximum capacity rather than at some lesser capacity. For permitting, and for the purposes of this EIS section, we have conservatively considered the maximum emissions from each unit (i.e., the higher of natural gas vs syngas firing, and maximum operating rate). When addressing annual emissions, we also consider maximum emissions but take into account the hours of operation of some units.

Estimated short-term (pound per hour) emissions and annual (ton per year) emissions from PMEC sources are displayed in Exhibit 3-12 and Exhibit 3-13.

Exhibit 3-12

Short-Term Emission Rates (pounds per hour)

Source	24hr NOx	1hr CO	8hr CO	1hr SO_2	3hr SO_2	24hr SO_2	24hr PM_{10}	VOC	24hr NH_3
CTsyn-Dbsyn	67.5	252.2	252.2	103.2	86.0	51.6	55.0	32.6	41.6
CTsyn-DBng	67.8	268.7	268.7	94.5	79.7	50.2	55.2	33.1	41.8
CTng-DBng	56.1	228.9	228.9	43.2	43.2	43.2	47.2	31.8	34.5
CTsyn	60.0	196.0	196.0	88.5	73.8	44.3	48.0	18.0	37.0
CTng	48.2	156.0	156.0	37.3	37.3	37.3	40.0	18.0	29.7
Tank Vent Oxidizer	19.5	5.9	5.9	4.9	4.2	3.9	0.7	0.3	NA
Auxiliary Boiler	4.7	9.6	9.6	1.1	0.5	0.3	0.7	0.5	NA
Flare	0.1	1.1	1.1	0.0	0.0	0.0	0.0	0.0	NA
Emergency Diesel Generator	1.2	15.4	1.9	1.1	0.4	0.0	0.0	28.2	NA
Emergency Diesel Fire Pump	0.2	1.7	0.2	0.1	0.0	0.0	0.0	5.2	NA
Power Block Cooling Towers	NA	NA	NA	NA	NA	NA	1.8	NA	NA
Gasification/ASU Cooling Towers	NA	NA	NA	NA	NA	NA	1.0	NA	NA
Transfer point to storage dome	NA	NA	NA	NA	NA	NA	0.1	NA	NA
Storage dome ventilation	NA	NA	NA	NA	NA	NA	0.1	NA	NA
Ship unloading	NA	NA	NA	NA	NA	NA	0.4	NA	NA
Train unloading	NA	NA	NA	NA	NA	NA	0.1	NA	NA
Ship hoteling	12.0	0.9	0.9	5.3	5.3	5.3	0.6	0.3	NA

Exhibit 3-13
Annual Emissions (tons)

Source	NO_x	CO	SO_2	PM_{10}	VOC	NH_3
Combustion turbines	306	1,438	151	242	170	183
Tank Vent Oxidizer	19.7	5.9	16.5	0.7	0.3	NA
Auxiliary Boiler	5.1	10.5	0.5	0.7	0.6	NA
Flare	14.1	301.0	4.1	1.6	1.2	NA
Emergency Diesel Generator	1.4	0.8	0.1	0.0	1.4	NA
Emergency Diesel Fire Pump	0.3	0.1	0.0	0.0	0.3	NA
Power Block Cooling Towers (drift)	NA	NA	NA	7.7	NA	NA
Gasification/ASU Cooling Towers (drift)	NA	NA	NA	4.5	NA	NA
Transfer point to storage dome	NA	NA	NA	0.0	NA	NA
Storage dome ventilation	NA	NA	NA	0.0	NA	NA
Ship unloading	NA	NA	NA	0.2	NA	NA
Train unloading	NA	NA	NA	0.0	NA	NA
Ship hotelling	7.5	0.6	3.3	0.4	0.2	NA
Worst Case Total	354	1,756	175	258	174	183

Note: Annual emissions of SO2 are highest if the combustion turbines and duct burners fire syngas all year; annual emissions of the other pollutants are highest if the combustion turbines fire syngas and the duct burners fire natural gas.

Note that emissions from the combustion turbines, the largest source of emissions, are based on continuous operation every hour of the year at the maximum firing rate. For SO_2, the maximum emissions occur firing syngas in the combustion turbines and in the HRSG. For NO_x, CO, PM_{10}, VOCs, and ammonia (NH_3), maximum emissions occur firing syngas in the combustion turbines and natural gas in the HRSG.

Annual emissions are based on continuous operation at the maximum short term emission rates. Where startup emissions are higher than emissions during normal operation, startup emissions are substituted for the anticipated number of startup hours for each unit.

Because annual emissions exceed 100 tons per year, the PMEC project is subject to the PSD permit path. Consequently, the evaluation of impacts, below, include references to incremental increases in pollutant concentrations.

Would emissions be different if petroleum coke is processed instead of coal? The combustion turbines will usually fire

syngas, which may be produced from coal or petroleum coke feed stocks. Design engineers anticipate little or no difference in emission characteristics from the combustion turbines based on the different feed stocks because the syngas is largely carbon monoxide and hydrogen. Although petroleum coke has more sulfur in it than coal (as a percent of the weight), the sulfur removal system is expected to remove a higher percentage of sulfur from higher sulfur syngas. Consequently, the difference in sulfur oxide concentrations emitted by the combustion turbines is not expected to differ depending on feedstock. Consistent with this, combustion vendors do not offer different emission guarantees for the two feed stocks. Because the energy value of coal is lower than the energy value of petroleum coke, processing petroleum coke would reduce dust emissions compared with handling coal. However, the dust emissions are small, and Energy Northwest expects little or no difference in facility wide emissions from the two feed stocks.

Greenhouse Gas Emissions

The principal greenhouse gases are CO_2, N_2O, methane CH_4, PFCs, CFCs, and SF_6. The "greenhouse effect" refers to the trapping of solar radiation. Studies show that the gases impede re-radiation of solar energy from the earth's surface more efficiently than they impede incoming solar radiation. Because these gases are distributed throughout the atmosphere, it is believed that the net result is analogous to that of a global greenhouse.

What is a "tonne" and how does it relate to a "ton"?

Greenhouse gas emissions are commonly expressed in metric tons, or "tonnes." A tonne is 1000 kilograms, or 2205 pounds (1.1 **tons).**

Energy Northwest anticipates that CO_2-equivalent emissions will range from 4.8 to 6 million tonnes per year. PMEC would be designed to be carbon capture ready. This would be accomplished by modifying the design of the gasification systems, increasing piping systems, and upgrading the BACT acid gas removal system to a Selexol® or equivalent process that removes additional sulfur and enables bulk CO_2 removal. Through this design, the Selexol® or equivalent system would have a potential to provide approximately 20 to 25% of CO_2 removal. No removal would occur until technical and

regulatory issues relating to sequestration have been resolved. Future, additional removal capability would be addressed through inclusion in the PMEC facility design of the appropriate connection points, piping and vessel sizing, and equipment location areas, as well as production capacity that would enable (at some undefined future point in time) the addition of equipment needed to capture and compress the pre-combustion CO_2 produced by PMEC. This additional equipment would be required to support a future CO_2 treatment and transport system that would be needed to enable a carbon sequestration program.

Geological sequestration technology and science is being advanced. Advanced sequestration applications and technologies are the largest portion of the Department of Energy's greenhouse gas reduction plan. Energy Northwest is working closely with the Big Sky Carbon Sequestration Partnership, one of seven Department of Energy -funded research associations, to evaluate the PMEC site, develop a greenhouse gas sequestration capability assessment, and promote a potential sequestration project. Laboratory experience showed that CO_2 was converted to a solid, calcium carbonate, in four to six weeks. In 2007, a field test will be conducted to inject 3,000 tons of CO_2 approximately 3,000 feet down into the Columbia River basalt formation in Eastern Washington to determine if the basalt can permanently store CO_2. Energy Northwest is sharing technical and financial information to be used in Big Sky's research program. PMEC is a potential Department of Energy CO_2 sequestration pilot site. Several key geological formations have been identified at or near the PMEC site including mafic basalt formations, Deep Saline Aquifers, and unminable coal deposits. If proven viable, the basalts or other formations could create an opportunity to capture up to 90% of CO_2 emissions. In conjunction with Big Sky's efforts to determine technical viability, the State of Washington will need to develop and adopt policies regarding sequestration permitting and storage.

Washington's Department of Community, Trade & Economic Development has estimated that the state's greenhouse gas emissions totaled 88.3 million tonnes in 2004. Approximately half those emissions are attributed to the transportation sector, and 14 percent of those emissions are attributed to electric power generation. Unless other generating units are displaced when PMEC commences operation, annual state greenhouse gas emissions would increase by approximately seven percent (CTED 2007).

Odors

Operation of the facility would not generate odors that are perceptible off site. The threshold of perceptibility for ammonia is approximately 0.5 ppm, or about 350 $\mu g/m^3$ (National Academy of Sciences 1979). Up to 20 pounds of ammonia could "slip" through the NO_x control equipment and be emitted from each HRSG per hour. Based on the dispersion modeling results, this maximum emission rate would result in a ground-level hourly average concentration of approximately 4 $\mu g/m^3$. Therefore, ammonia attributable to PMEC would not be perceptible off site.

Visible Plumes

Energy Northwest anticipates that permit conditions will not allow visible emissions from PMEC sources, except for water vapor. However, water vapor plumes may be visible from HRSG stacks and cooling towers.

Two 6-cell and one 7-cell cooling towers will be constructed at PMEC. Cooling tower cells produce water vapor clouds that vary in size depending on meteorology and operational factors.

An analysis of potential cooling tower impacts was conducted using the Seasonal/Annual Cooling Tower Impact model and the same meteorological data that were used in the air quality dispersion modeling assessment for the facility. The conclusions of the modeling analysis are as follows:

- It is unlikely significant ground-level fogging or icing would occur on nearby roads from either cooling tower.

- Due to the moist climate of the region, long visible plumes may result during periods of high relative humidity (i.e., when the weather is already very damp, foggy, or rainy). However, these visible plumes would usually occur during conditions of already poor or obscured visibility. During daytime hours when local weather does not obscure the plume, typical visible plume lengths would be less than 40 meters long and less than 30 meters high for both cooling towers.

Appendix B-2 of the Application for Site Certification 2006-01, PMEC Cooling Tower Modeling, contains a more detailed description of the modeling analysis of potential cooling tower impacts.

Local Air Quality Impacts

Method for Evaluating Local Air Quality Impacts. The USEPA has developed a series of computer models tailored to various types of emission sources and topographic settings that are used to predict local pollutant concentrations. These models are generally known as "dispersion models" because they calculate local concentrations as the winds disperse pollutants emitted by a source (e.g., a stack or vent). Local concentrations are calculated based on the behavior of the winds in the area, the local terrain, and the nature of the source of the pollutants (e.g., the quantity of pollutant emitted, how tall the source is, the temperature of the exhaust, etc.).

The dispersion modeling techniques employed to predict ambient concentrations attributable to emissions from PMEC followed the USEPA's Guideline on Air Quality Models (Appendix W to 40 CFR Part 51 – hereafter, The Guidelines). The Guidelines include recommendations for model selection, data preparation, and model application, but allow flexibility on a case-by-case basis.

A USEPA- and Ecology-approved dispersion model (AERMOD) was used to calculate ambient pollutant concentrations attributable to emissions from PMEC at specific locations called receptors. Receptors are placed at regular

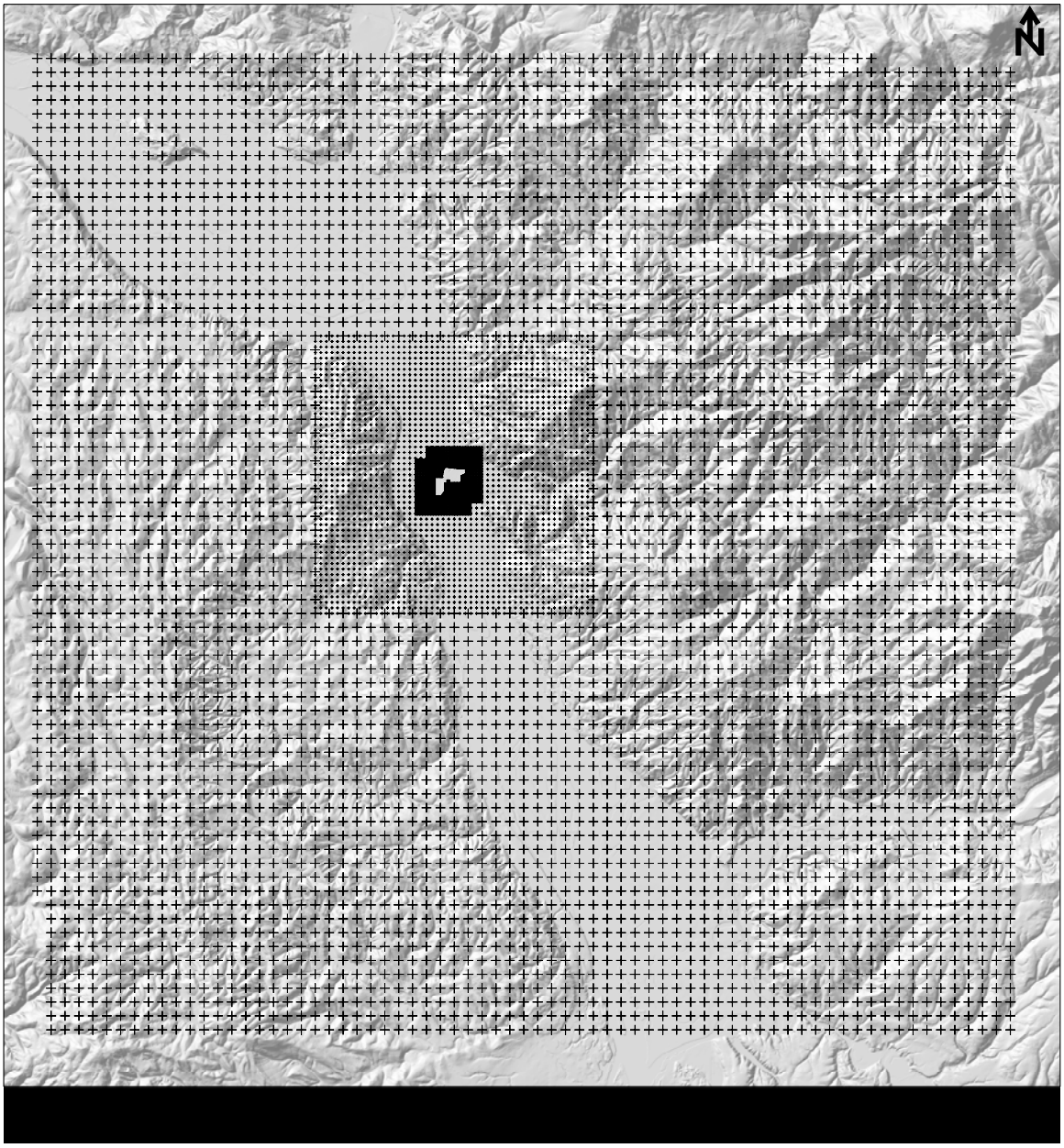
intervals called grids. Four nested grids were used to model PMEC, with the grid closest to the proposed facility having the closest spacing (25 meters or 82 feet), the next closest with 50-meter (164-foot) spacing, then a 200-meter (656-foot) grid, and, finally, an outer grid with receptors every 500 meters (1,640 feet). Also, receptors were placed every 25 meters (82 feet) along the property boundary. The receptors included in the model are shown in Exhibit 3-14.

The model accounts for the effects due the local winds using an entire year of meteorological data gathered at a nearby industrial facility. Although other meteorological data from Longview, St. Helens, and Vancouver were also considered, this meteorological data set was approved by Ecology's modeling expert because it is more representative of the PMEC site than more distant locations. The database includes hourly average wind speed, wind direction, temperature, as well as other parameters required by the model. Note that a three year data set based on numerous sources of meteorological data was used in the regional modeling, which also predicted air quality concentrations for the local area.

Impact Evaluation Criteria. As discussed above, ambient air quality standards have been established by both USEPA and Ecology for NO_x, CO, SO_2, PM_{10}, O_3, and lead. In attainment areas, such as the Kalama area, a screening approach for assessing air quality impacts is used. The screening approach compares the concentrations predicted by the model to pollutant concentration levels much lower than the standards, and, if the project impacts are lower than those levels, the project is assumed to be incapable of causing an impact to local air quality, regardless of the existing air quality. The pollutant concentration levels lower than the standards are called significant impact levels (SILs), and were established as part of the PSD permit program. If the concentrations predicted by the model for emissions from the project are found to be less than the SILs, PMEC does not need to consider background air quality or other area air pollution sources. The SIL for each criteria pollutant is used as a threshold to determine whether or

not PMEC has the potential to cause any significant air quality impacts for that pollutant.

Exhibit 3-14
Local Air Quality Receptors



If a pollutant concentration predicted by the model exceeds the SIL, further analysis is required to determine whether or not the impact of that pollutant is acceptable. For sources subject to PSD review, this further analysis must also include the cumulative impact of regional industrial sources. In addition to

the ambient standards discussed above, PSD review includes an incremental increase, the PSD increment, which limits the amount of additional pollutant that can be emitted after a certain date, regardless of whether the total emissions are below the standard. A cumulative modeling analysis that includes the proposed source as well as other industrial sources in the region must result in a maximum concentration increase less than the PSD increment.

In addition to criteria pollutants, Washington regulates emissions of TAPs from new and modified air pollution sources. This regulation establishes acceptable outdoor exposure levels, called acceptable source impact levels (ASILs) for each of more than 500 substances. Washington regulations require Ecology to set the ASILs conservatively to protect human health. For each known, probable, and potential human carcinogenic pollutant ("Class A" TAPs), the ASIL limits the risk to one additional cancer case in a million. The ASILs for other pollutants ("Class B" TAPs) have been set by dividing worker exposure limits by 300; this was done to protect public health in a community with multiple sources of a TAP. Most Class A ASILs are based on annual average concentrations, while most Class B ASILs are based on 24-hour average concentrations.

Washington requires permit applications to model a particular TAP and compare calculated concentrations with the appropriate ASIL if anticipated emissions of that TAP exceeds the Small Quantity Emission Rate established for that TAP. If the calculated concentrations for all TAPs whose emissions exceed the Small Quantity Emission Rates are less than the ASILs, a permit can be granted without further analysis. If not, the applicant must revise the project or submit a health risk assessment demonstrating that TAP emissions from the source are sufficiently low to protect human health. As is the case with criteria pollutants and SILs, TAP concentrations below the ASILs indicate that emissions from the source do not have a significant potential for adverse health effects from these chemicals.

Dispersion Modeling Results. As discussed above, local pollutant concentrations were calculated using a USEPA- and Ecology-approved dispersion model, local meteorological data, and maximum normal operation emission rates for the proposed facility. Because the facility would receive materials from ships docked at an adjacent port facility, the concentrations were calculated with a ship (and ship emissions) present.

For most criteria pollutants, the maximum predicted local concentrations were below the SILs, and no further analysis to demonstrate compliance with the ambient standards and the PSD increment is warranted. However, 24-hour average PM_{10} concentrations and 1-, 3-, and 24-hour average SO_2 concentrations were predicted by the model to exceed the SILs. Therefore, cumulative analyses were required to assess whether or not the impacts of those pollutants, when combined with regional industrial sources, would cause the ambient standards or PSD increments to be exceeded.

In order to determine which regional industrial sources to include in the cumulative analysis, emission data for more than 900 sources at 90 facilities were obtained from Ecology and the ODEQ and included in a screening analysis. The screening analysis employed the same USEPA- and Ecology-approved methods to determine which facilities had significant impacts at receptors where the proposed PMEC facility was also determined to be significant. Whether or not a source was significant was determined by comparing the concentrations calculated by the model for each facility with the SILs. If a given facility was determined to exceed one of the SILs at a receptor where PMEC was determined to exceed the same SIL, that facility was included in the cumulative analysis. From the entire regional source database, eight facilities were determined to have a significant impact along with the proposed PMEC facility:

- Boise Cascade in St. Helens, Oregon
- Georgia Pacific in Wauna, Oregon

- Kalama Export Company in Kalama, Washington
- Noveon in Kalama, Washington
- RSG Forest Products in Kalama, Washington
- Longview Fibre in Longview, Washington
- Northwest Hardwoods in Longview, Washington
- Weyerhaeuser in Longview, Washington

As shown in Exhibit 3-15, the concentrations attributable to PMEC, when combined with regional industrial sources, would not exceed the PSD increments. In other words, PMEC emissions would not result in significant deterioration of air quality using USEPA criteria.

Exhibit 3-15
Local Air Quality Impacts

Pollutant	Averaging Period	Max Project-Only Conc[a]	SIL[b]	Over the SIL?[c]	Max Cum Industrial Conc[d]	PSD Increment[e]	Over Increment?[f]	Bkgd[g]	Total Conc[h]	Ambient Std[i]	Over Ambient Std?[j]
CO	1-Hour	411	2,000	No				7,770	8,181	40,000	No
	8-Hour	98.5	500	No				5,710	5,808	10,000	No
NO_X	Annual	0.968	1	No		25		20.8	21.8	100	No
PM_{10}	24-Hour	7.14	5	Yes	8.41	30	No	58	66.4	150	No
	Annual	0.398	1	No		17		20	20.4	50	No
SO_2	1-Hour	154	30	Yes	692			135.2	827	1,050	No
	3-Hour	67.1	25	Yes	171	512	No	96.2	268	1,300	No
	24-Hour	6.26	5	Yes	11.3	91	No	44.2	55.5	262	No
	Annual	0.26	1	No		20		9.1	9.36	52	No

a The maximum concentration calculated by the model using the maximum normal operating emission rates for PMEC.
b2 Significant Impact Levels
c If the maximum project-only concentration is over the SIL, a cumulative analysis is required.
d The maximum concentration calculated by the model using the maximum normal operating emission rates for PMEC as well as emissions from the eight regional industrial sources determined to be significant in at least on of the same locations as PMEC.
e The maximum incremental increase allowed for all sources in the area that began emitting after the PSD minor source baseline date. PSD increments have not been established for CO and 1-hour average SO_2.
f Only pollutants requiring a cumulative industrial source analysis were compared to the PSD increment.
g The background concentrations were determined using data collected by USEPA, Ecology, and ODEQ.
h The total concentration is the maximum project-only concentration or the maximum cumulative industrial concentration combined with the background concentration.
i The most stringent ambient standards from USEPA, Ecology, or ODEQ are shown.
j The total concentration is compared to the most stringent ambient standard.

Exhibit 3-15 also shows that total concentrations (model predictions plus background concentrations) are less than the

most stringent applicable ambient standard. Furthermore, the TAPs modeling indicated that all predicted concentrations were less than the applicable ASILs.

Conclusion. Emission rates for criteria and TAPs emitted by the proposed PMEC facility operating at its maximum under capacity were modeled using USEPA- and Ecology-approved dispersion modeling methods. The results indicate that PMEC emissions will not exceed PSD increments or ambient air quality standards, alone or considered cumulatively.

Upset Conditions. Every industrial facility faces the possibility of an "upset" condition. While it is impossible to know that issues will arise, the most likely upsets at the PMEC facility are 1) a transformer problem or disruption of the transmission lines that carry electricity from the site, or 2) a problem with the gasifier technology.

Although the most common function of the flare is to safely combust off-spec syngas as the gasifiers are started up, the flare also is designed to serve as a safety device. At PMEC, the flare is designed to combust 110 percent of the syngas feed to both combustion turbines if necessary. In the event of a transmission line or transformer failure, for example, the combustion turbine generators would suddenly "trip" and force the combustion turbines into a rapid shutdown. In that event, the syngas being produced by the gasifiers would be diverted to the flare. This is simply the reverse of the gasifier startup scenario, except that the quantity of syngas may be more than twice as much as during a normal startup. The design team indicates the gasifier output will be reduced to the quantity of gas used at 70 percent combustion turbine load within one hour. Although the combustion turbines would be shut down, there would still be a net increase in emissions because the flare does not burn the syngas as cleanly as the combustion turbines. CO emissions would be much higher than normal because the combustion would not be as carefully controlled as in a combustion turbine, and NOx emissions would be higher because the flare cannot be equipped with Selective Catalytic Reduction. Little or no change in emissions from other units at

PMEC would occur unless the gasifiers were shutdown, in which case emissions would be lower.

It is also possible that some form of failure at the gasifier would direct syngas to the flare. The degree of failure is variable and, again, impossible to predict, but is most likely to be a relief valve or compressor malfunction. The modeling evaluation of a possible gasifier upset assumed both combustion turbines were operating at maximum load on syngas (with duct firing); with a gasifier problem, one combustion turbine is diverted to natural gas while the other remains on syngas. The modeling also allowed for the possibility of a problem with the Selexol (or equivalent) system by assuming average syngas sulfur concentrations ranging from 400 parts per million by weight (ppmw) in the first hour to 50 ppmw over the 24-hour period.

PMEC would operate under upset conditions only as long as needed to safely stabilize and transition to a normal operating or standby status. Although these scenarios do not represent desirable operating conditions, upsets are inevitable, and an investigation of the ambient air quality impacts of emissions from upset conditions is of interest. The same model used to evaluate normal operations was used to evaluate whether these upset conditions would cause ambient concentrations to exceed ambient air quality standards established to protect human health and welfare.

The dispersion modeling indicated that ambient concentrations attributable to PMEC, plus background concentrations, are less than the applicable ambient air quality standards.

Conclusion. Emission rates for criteria pollutants and TAPs emitted by the proposed PMEC facility operating at its maximum capacity and in upset modes were modeled using USEPA- and Ecology-approved dispersion modeling methods. The results indicate that PMEC emissions will not exceed PSD increments or ambient air quality standards, alone or considered cumulatively.

Regional Air Quality Impacts

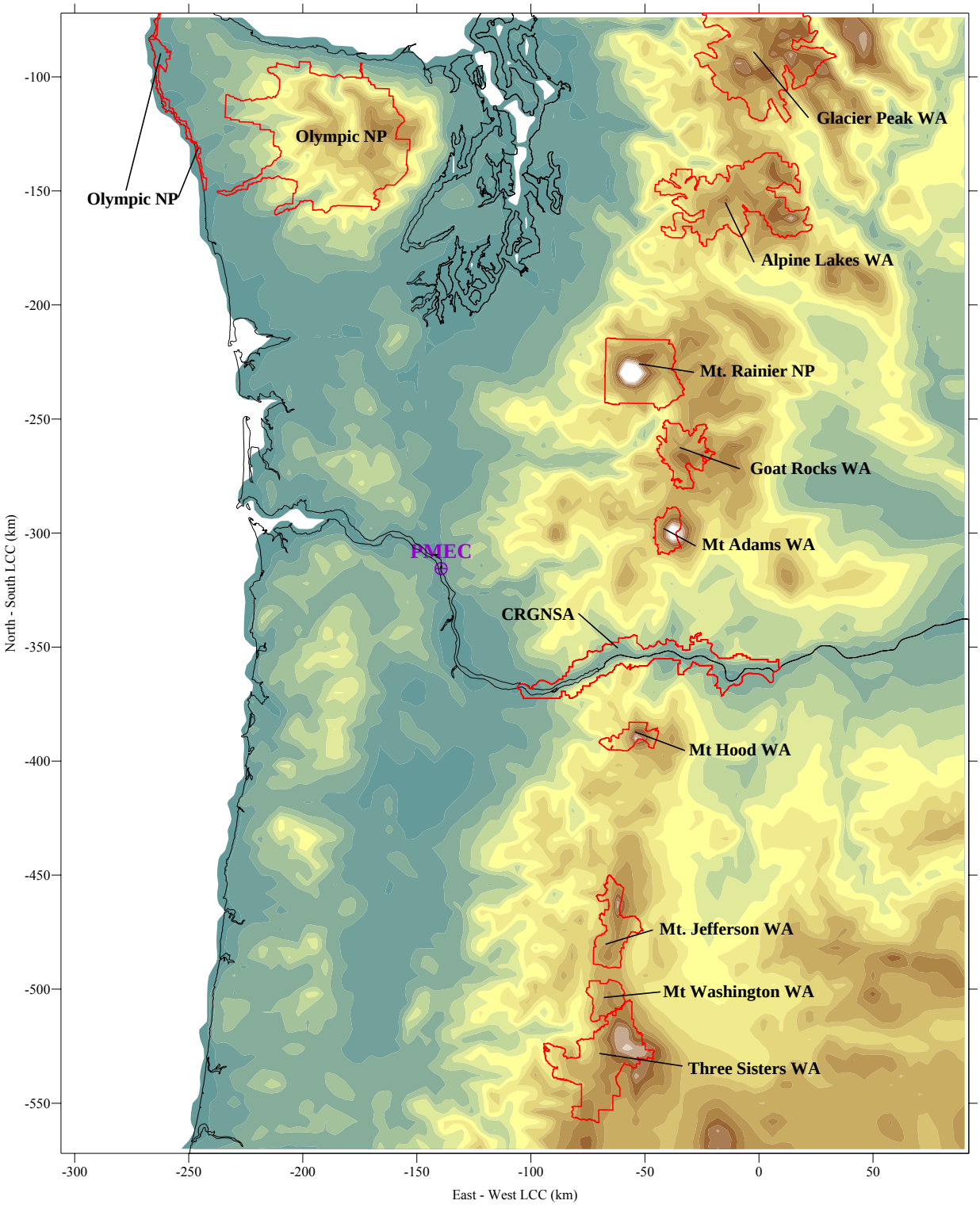
As required by the PSD permit path, regional air quality modeling analyses were conducted to assess the influence of future pollutant emissions from PMEC on air quality in National Parks and designated Wilderness Areas (Class I areas). The Clean Air Act provides special protection for Class I areas and the US Forest Service (USFS) and National Park Service (NPS) have the responsibility of ensuring air quality related resources in Class I areas are not adversely affected. At the request of Ecology and USFS, the regional modeling analysis also assessed potential impacts to the Columbia River Gorge National Scenic Area.

The regional air quality issues of concern include effects to visibility, soil, flora, fauna, and aquatic resources within the Class I areas. Potential impacts to these resources were characterized based on predictions of nitrogen deposition, sulfur deposition, change in light extinction for regional haze, and pollutant concentrations. The regional modeling study compares model predictions to screening levels established by the USFS and NPS to protect the air quality related resources. This remainder of this section summarizes the regional modeling study. Further details of the analysis can be found in Section 5.1.4 of the revised PSD permit application (March 2007, revision).

Modeling Techniques. The regional air quality study area shown in Exhibit 3-16 covers an area of 400 km-by-500 km and includes all Class I area within 250 km of PMEC. The Mt. Adams Wilderness is 95 km from PMEC and is the closest of the ten Class I areas. PMEC is about 60 km from the Columbia River Gorge National Scenic Area.

Exhibit 3-16

Regional Air Quality Modeling Domain



The regional air quality modeling study used the CALPUFF modeling system. The CALPUFF modeling system is Ecology's preferred model for long-range transport assessments and for evaluating potential impacts to Class I areas. The modeling procedures followed the recommendations of USEPA, Ecology and the Federal Land Managers for Class I area assessments.

The regional simulations were based on a three year meteorological data set from 2003 to 2005. A three-dimensional meteorological data set was constructed from a combination of weather observations within and near the study domain and predictions from a numerical meteorological model obtained from the University of Washington. The meteorological model complements the observations and provides the data necessary to consider the complex flows produced by weather systems from the Pacific Ocean interacting with the coastal mountain ranges and local circulations within the Columbia River Gorge.

Regional Pollutant Concentrations. In order to protect air quality, the USEPA has proposed a set of screening concentrations for pollutants of concern to ensure air quality within the Class I areas is not significantly degraded. USEPA specified both short-term and long-term screening criteria for SO_2, NO_2, and PM_{10}. When predicted concentrations attributable to emissions from a source are below these screening criteria, the pollutant emissions are expected to have an insignificant impact regardless of the potential cumulative impacts from existing air quality sources.

The CALPUFF modeling assumed PMEC sources emitted at their maximum normal operating rates. The simulations used to assess the short-term criteria assumed a ship was emitting at the maximum rate for the entire three-year period.

The highest Class I area concentrations were generally predicted in the Mt. Hood Wilderness and the Mt. Rainier National Park. Maximum predicted concentrations were less

than 26% of the USEPA Class I screening concentrations.[2] Predictions concentrations were somewhat higher in the Columbia River Gorge National Scenic Area, but were still well below the proposed USEPA Class I screening concentrations. The analysis concluded pollutant concentrations within the Class I areas and the Columbia River Gorge National Scenic Area would not significantly affect existing air quality resources.

Regional Sulfur and Nitrogen Deposition. The deposition of sulfur and nitrogen compounds can potentially affect soils, vegetation and aquatic resources in regional Class I areas. All combustion sources, including PMEC, directly emit both sulfur and nitrogen oxides, and contribute to the formation of secondary aerosols containing nitrates and sulfates. These gaseous and particle-based compounds are potentially deposited within Class I areas when the PMEC plumes interact with vegetation and soils. Precipitation processes can also depositing sulfur and nitrogen compounds on the surface.

Predicted sulfur and nitrogen deposition can be compared to Deposition Analysis Thresholds established by the NPS as screening levels to protect affect soils, vegetation and aquatic resources. Predicted annual deposition rates less than these NPS thresholds are considered insignificant.

Predicted annual deposition fluxes were highest within the Columbia River valley near the PMEC site with local maxima in the high terrain east of the PMEC site. The regional modeling study predicts sulfur and nitrogen deposition attributable to PMEC emissions would be less than 50% the NPS deposition screening levels within all Class I areas.

Westerly flow aloft and large-scale terrain channeling are predicted to sometimes transport PMEC source plumes to the Columbia River Gorge National Scenic Area. However, predicted nitrogen and sulfur deposition fluxes within the

[2] The screening criteria are also called “Significant Impact Levels” in the PSD process.

Columbia River Gorge National Scenic Area are less than the NPS screening criteria, suggesting emissions from PMEC sources would not significantly affect resources related to nitrogen or sulfur deposition.

Regional Haze. Visibility is an important resource in the Class I areas and the Columbia River Gorge National Scenic Area that can be affected by pollutant emissions from PMEC. Regional visibility degradation is primarily due to light extinction caused by scattering by fine particles and by light absorption from soot particles. Increased extinction can reduce visually range and detract from scenic vistas to and from the Class I areas. The humid Pacific Northwest climate can also enhance the effects of scattering from sulfate and nitrate particles when these particles grow in the presence of water vapor.

The regional air quality modeling study assessed potential affected visual resources by predicting the change to extinction caused by PMEC emissions. The NPS and USFS recommend that a 5% change in daily extinction be used to indicate a "just perceptible" reduction in visual range when viewing a distant object. The modeling analyses conservatively assumed PMEC sources would emit at their maximum normal operating every day for the entire three years. The study also assumed that existing viewing conditions were excellent and vistas were not obscured by weather. With ideal background conditions like those assumed in the analyses, emissions from new industrial sources are apt to have the greatest impact.

The regional air quality model simulations predicted that maximum daily changes to extinction would be less than 5% in all the Class I areas for all days in the three-year simulations. The visual resources were most affected within the Mt. Hood Wilderness, Mt. Rainier National Park, and the Mt. Adams Wilderness. However, using the USFS and NPS criterion, visibility degradation would not be perceptible within the Class I areas even on the days of the simulations with the highest PMEC aerosol concentrations under excellent viewing conditions.

The regional air quality simulations also assessed potential reduced visual range at locations within the Columbia River Gorge National Scenic Area. The model simulations suggest the potential for perceptible changes to visual range on two winter days in three years in a small area at the extreme west end of the Columbia River Gorge National Scenic Area. Note that the modeling procedures assume low background aerosol concentrations and excellent visibility; they do not consider weather obscuration often associated with high relative humidity and cold temperature in the Pacific Northwest. Overall, PMEC emissions are not expected to significantly degrade visibility in Columbia River Gorge National Scenic Area.

3.2.4 Mitigation Measures

Construction

Impacts from fugitive dust, odors, and engine emissions during construction would be intermittent and short-term. The following practices would reduce adverse air quality related construction impacts and would comply with Washington State regulations to minimize fugitive dust emissions:

- Watering active construction areas as required to control dust
- Covering trucks hauling soil, sand, and other loose materials, or requiring trucks to maintain at least two feet of freeboard
- Paving, applying water regularly, or applying nontoxic soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites
- Sweeping to control dust (with water sweepers) at all paved access roads, parking areas, and staging areas at construction sites
- Limiting traffic speeds on unpaved access roads to 15 mph

Operation

BACT would be incorporated into the PMEC design to reduce air pollution emissions.

Mitigation for Greenhouse Gas Emissions

Energy Northwest considers the selection of IGCC technology to be an important element of its CO_2 mitigation plan. While use of IGCC does not provide any credit toward meeting the quantitative mitigation requirements of chapter 80.70 RCW, Energy Northwest's selection of IGCC technology reduces CO_2 emissions by about 10% as compared to pulverized coal technology. Consequently, Energy Northwest's selection of IGCC technology helps to "preserve and protect the quality of the environment [and] to promote air cleanliness" (RCW 80.50.010[2]).

Energy Northwest proposes a combination of near-term and long-term efforts to both comply with the state requirements (80.70 RCW) for CO_2 mitigation and serve as a proving ground for capturing and sequestering CO_2 emissions. In the near term, Energy Northwest will make annual payments to a qualified third-party organization (e.g. Climate Trust).

For the long term, Energy Northwest will develop a specific proposal for mitigation, through sequestration, conversion or otherwise, to be implemented through a third-party qualified organization and/or through a direct investment project:

- PMEC would be designed to be carbon capture ready. No removal would occur until technical and regulatory issues relating to sequestration have been resolved.
- Energy Northwest is working closely with the Big Sky Carbon Sequestration Partnership, one of seven Department of Energy-funded research associations, to evaluate the PMEC site, develop a greenhouse gas sequestration capability assessment, and promote a potential sequestration project. PMEC is a potential Department of Energy CO_2 sequestration pilot site. Several key geological formations have been identified at or near the PMEC site including mafic basalt formations, Deep Saline Aquifers, and unminable coal deposits. If proven viable, the basalts or other formations could create an opportunity to capture up to 90% of CO_2 emissions.

3.2.5 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to local or regional air quality are anticipated.

3.3 Water Resources

3.3.1 Affected Environment

Water resources potentially affected by the project include surface water bodies and groundwater resources. Surface water bodies include the Columbia River and on-site wetlands. For a detailed discussion of wetlands, please refer to section 3.4. Groundwater resources include an alluvial aquifer from which the Port and City of Kalama currently withdraw water for domestic and industrial use. The Port proposes to withdraw an additional volume to provide for industrial use at PMEC.

The site is relatively flat and generally at an elevation of 22 feet (Anchor Environmental 2006). The site is adjacent to the Columbia River to the west. In the northwest corner of the site there is a backwater channel from the river that enters a wetland. This area is termed Wetland A by the Draft Wetland Mitigation Plan (Anchor Environmental 2006). This 2.1 acre wetland is planned to be filled by the Port of Kalama as part of the Port's long-range management plan for the North Port area. Impacts to the wetland and planned mitigation efforts are included in the Draft Wetland Mitigation Plan (Anchor Environmental 2006). The wetland and impacts to it are discussed in greater detail in Section 3.4.

The site soils are well-drained and very little runoff or sign of sheet and rill erosion were observed. Because of the lack of water features and observed signs of erosion, it is concluded that site surface water runoff is minimal with a significant portion infiltrating into the well-drained site soils. Excess surface water currently enters the Columbia River via sheet flow to the western property boundary or into the wetland located to the north.

The Western Regional Climate Center reports an average annual rainfall of 44 inches at the closest station to the Port of Kalama (St. Helens RFD, Oregon, Station #357466). Over the approximately 95-acre site, the total volume of precipitation would total approximately 350 acre-feet per year.

Surface Water Resources

The Columbia River would potentially be impacted by discharge of stormwater runoff during and after construction, and process wastewater during plant operations. Potential impacts include impacts to both water quantity and quality.

The Columbia River drains 219,000 square miles in seven western states and 39,500 square miles in Canada. The mean annual flow at the mouth, measured at The Dalles, is approximately 190,000 cubic feet per second (cfs) or about 120,000 cfs during a low water year (Anchor and Golder 2006). The river and its tributaries constitute the predominant river system in the Pacific Northwest and is the fourth largest in the United States, based on discharge. The river is the subject of intense management efforts, due to its central role in almost all aspects of the region's natural and economic life, including water supply, energy production, fish and wildlife habitat and recreation. The final Columbia River Water Management Program Programmatic Environmental Impact Statement (Ecology 2007) describes the nature of these resources.

Ecology has established instream flow requirements for several locations on the Columbia River. The closest location to the PMEC project site is The Dalles. Minimum instream flows at this location range from 20,000 to 50,000 cfs (WAC 173-563, effective 1980, revised 1997) (Anchor and Golder 2006).

Surface water quality in the Columbia River is influenced by natural geology and land cover, point and nonpoint contaminant sources, the quality of groundwater that discharges to surface water, and the natural flow regime (Ecology 2007). On June 2, 2005, Ecology submitted the 2004 federal Clean Water Act Section 303d list to the USEPA identifying surface waters that Ecology had determined to be out of compliance with water quality standards. The Columbia River from Water Resource Inventory Area (WRIA) 28, Salmon/Washougal (just upriver from WRIA 27 in which the project is located) to the Canadian border was listed for temperature, dissolved oxygen, fecal coliform and a number of

toxins, including total polychlorinated bipheyls (PCBs); some pesticides such as chlordane and 4,4'-DDT; and mercury (Ecology 2007).

Although the PMEC project site is outside the listed area, the total maximum daily load for temperature currently under development by USEPA in coordination with Washington, Oregon, Idaho and the Columbia Basin Tribes is being applied state-wide. Besides those parameters listed on the 303d list, high nutrient loading, with consequent effects on dissolved oxygen levels, have been noted in the Central Columbia Plateau (Ecology 2007).

Groundwater Resources

The hydrogeology of the Lower Kalama Watershed Administrative Unit is characterized by two major water-bearing units: sedimentary and volcanic bedrock, which is overlain by unconsolidated alluvial deposits (alluvial aquifer). The Columbia and Kalama Rivers have filled the Columbia bedrock trough with nearly 300 feet of recent alluvium comprised of gravel, sand and silt. Zones of highly permeable sediment in the alluvium give rise to semi-confined aquifers with potentiometric surfaces from 8 to15 feet bgs. Fluctuations in groundwater water level due to tidal influences are about 2.5 feet, with a lag time of 15 to 30 minutes.

Testing of production wells at the Port of Kalama has indicated yields of 1,000-2,000 gpm, a specific capacity of 58 gpm per foot of drawdown, and transmissivities in the alluvial aquifer from 200,000 to 240,000 gallons per day (gpd) per foot (CH2M Hill 2004). This testing indicated the presence of an "obvious hydraulic barrier" or recharge boundary, based on drawdown stabilization within 1-2 hours of pumping.

The PMEC property is located along the east side (right descending bank) of the Columbia River. The subsurface at the property is described according to boring logs from previous geotechnical reports and a groundwater monitoring investigation. From the surface to a depth of up to approximately 16 feet bgs, the property is composed of fill originating from dredged river sediment. This fill consists of

fine to coarse grained sand with traces of silt and fine gravel. Beneath the fill are alluvial flood deposits that are composed of silt and clayey silt, with interbeds of sandy silt, silty sand, and clean fine sand. This flood deposit is reportedly underlain by claystone (sedimentary bedrock) at a depth of approximately 325 feet bgs.

The groundwater table has been encountered on the PMEC property at reported depths ranging from about 10 to 20 feet bgs. Groundwater table elevations are strongly influenced by the stage of the Columbia River, due to the property's proximity to the Columbia River. Columbia River stage at this location is subject to tidal influence, and tidal influence is reported to extend up to River Mile 2.6 to 2.8 on the Kalama River.

The alluvial aquifer is currently the source of industrial and domestic water supply for the Port and City of Kalama. Information related to the City of Kalama water supply is taken from the City of Kalama Water System Plan (City of Kalama 2002).

Water Supply/Rights

The Port of Kalama and the City of Kalama each hold water rights to supply water. The Port uses water primarily for industrial purposes. The City provides domestic potable water and water for commercial purposes for its customers, including the Port of Kalama. The Port's potable water demands are included in the City's water supply planning. Exhibit 3-17 summarizes current and projected water rights and demand.

Exhibit 3-17

Pacific Mountain Energy Center Water Rights Summary

Rights Holder	Appropriated Annual Volume (acre-feet)	Current Use (acre-feet)	Current Surplus (acre-feet)	PMEC Demand (acre-feet)	Post-PMEC Surplus (acre-feet)
Port of Kalama	15,943	4,738[a]	11,205	9,397	1,808
City of Kalama	2,284	1,188	1,096	50[b]	1,046

a. Based on capacity of existing wells; not actual use

b. Estimated minor demand

Port of Kalama. The Port of Kalama holds three permits for water withdrawals: permit G2-30035 authorizes withdrawal of 350 gpm instantaneous and 565 acre-feet per year from an as yet unconstructed withdrawal point; permit G2-30036 authorizes withdrawal of 3,500 gpm instantaneous and 4,738 acre-feet per year from two existing wells on Port property; permit G2-30283, approved in December 2006, authorizes additional withdrawal of 6,600 gpm instantaneous and 10,640 acre-feet per year from a proposed new well (Ecology 2006a). Total permitted withdrawals are 10,450 gpm instantaneous withdrawal and 15,943 acre-feet per year annual withdrawal. Current Port water production is limited to that from the two existing wells operating under permit G2-30036.

The use of the new water appropriation under G2-30283 for "general industrial, manufacturing and commercial use in supplying Port's tenants with water" was determined by Ecology to be a beneficial use in accordance with RCW 90.54.020(3). No "change of use" proceeding on the appropriation would be required.

Water consumption by the PMEC facility would vary from month to month, mostly due to higher evaporation from the cooling towers at higher ambient temperatures. Average monthly water usage would vary between a low in the wet cool winter to a high in the warm dry summer. An average annual instantaneous demand of 5,826 gpm is assumed, as a conservative estimate.

The Port of Kalama has not released information about its estimated future water use over the next 20 years. The water demand for the PMEC facility is assumed to remain constant from year to year. PMEC would (conservatively) consume 9,397 acre-feet per year. The Port of Kalama has sufficient water to supply PMEC, and would have a surplus of 6,546 acre-feet per year for its other customers. This water surplus indicates that the Port of Kalama has a sufficient water supply to meet the PMEC water demand over the next 20 years, assuming that additional customers do not require more than 6,546 acre-feet per year.

City of Kalama. The City of Kalama provides water service to over 1,300 accounts (approximately 3,000 people) inside and outside the city limits of Kalama. The source of water is a Ranney Well installed in the alluvial aquifer adjacent to the Kalama River approximately 1.5 miles upstream from the PMEC site. The collectors are 10-diameter slotted steel pipes installed horizontally 10 to 20 feet below the riverbed. As the well is a "groundwater under the influence of surface water source," the City of Kalama has constructed a water filtration plant, which also includes chlorination, fluoridation, and pH adjustment. The City of Kalama is currently using its well field (along with thirteen water storage reservoirs) to satisfy all of the water demands of its system.

The City has two water right certificates: G2-22092C, priority date March 8, 1974, is for an instantaneous withdrawal of 1,800 gpm and an annual withdrawal of 784 acre-feet per year; G2-27279C, priority date February 16, 1988, is for an instantaneous withdrawal of 425 gpm and an annual withdrawal of 1,500 acre-feet per year. The total water right capacity is an instantaneous withdrawal of 2,225 gpm and an annual withdrawal of 2,284 acre-feet per year (average capacity of 2.04 mgd). The City has a water right application, G2-30000, priority date July 5, 2001, for an additional 775 gpm instantaneous withdrawal and 1,301 acre-feet per year annual withdrawal. If approved, the total City of Kalama water right would be increased to 3,000 gpm instantaneous withdrawal and 3,585 acre-feet per year annual withdrawal.

Current (2006, projected in 2002) City average daily production is at a rate of 1,060,000 gpd (736 gpm), of which 60% is for industrial uses, 35% is for residential uses, and 5% is for commercial uses. All of the industrial-zoned areas in Kalama are at the Port of Kalama. Current peak hour production is 2,200 gpm. The existing City Ranney Well pumps are operated so as to not exceed the instantaneous withdrawal limitation of the current water right. One 900 gpm pump is currently held out of service, for future reserve capacity. Annual water withdrawal in 2006 was projected to be

1,188 acre-feet. This represents a current water rights surplus of 1,096 acre-feet.

The City of Kalama Water System Plan reserves 2,284 acre-feet per year for the customers in the City of Kalama, Cowlitz County, the Port of Kalama, the PMEC facility, and non-billed water. Only a minimal quantity of the City's potable water would be required at PMEC. The plan estimates a 141% increase in water demand for its customers in the City of Kalama and Cowlitz County over the next 20 years, including Port of Kalama and PMEC domestic uses. This would result in an annual withdrawal of 1,675 acre-feet, reducing the surplus to 609 acre-feet. The City's water surplus indicates that the City of Kalama has a sufficient water supply to meet the PMEC potable water demand over the next 20 years without impacting the City's other water customers.

Private Wells. Ecology's well logs website was referenced to determine existing wells in the vicinity of the PMEC. Within Section 36, Township 7 North, Range 2 West of the Willamette Meridian, within one mile of the proposed Port of Kalama water supply well, eight wells were identified. Two water supply wells were identified north of the site adjacent to the back water wetland located to the north. Well depths range from 145 to 176 feet and are screened between 105 and 170 feet. Within and to the south of the site, two test wells and four resource protection wells were identified. All wells were drilled to an approximate depth of 100 feet, with values ranging from 94 to 105 feet. Static water levels measured in the northern wells range from 19.9 feet to 22.6 feet, while the southern wells range from 12 to 13 feet. A review of the Department of Ecology's on-line Water Rights Tracking System indicated no pending water rights applications in the vicinity of the PMEC wells.

For future conditions, the City's Water System Plan assumed that the City's water service area would not expand, but that increase in use would come from in-fill within the existing water service area. By 2021 (the last year projected), the City of Kalama's peak hourly water production is projected to be

3,292 gpm and its annual average water withdrawal is projected at 1,698 acre-feet per year. The future average annual withdrawal can be accommodated within the existing water rights. The projected future instantaneous withdrawal exceeds the current water right. The City has plans for a new water treatment plant that would initially treat the current peak pumping rate from the Ranney Well of 1,800 gpm, and would have the capacity to treat up to 2,700 gpm when the currently out-of-service 900 gpm pump at the Ranney Well is brought online. The future operation of the treatment plant at its full 2,700 gpm capacity is contingent on approval of the pending water right application. Additional pumping, treatment and/or storage capacity would have to be provided to meet the projected future 3,292 gpm instantaneous use rate.

Groundwater Quality

Previous investigations, as cited in the Record of Examination for the Port of Kalama water right application G2-30283, have noted naturally-occurring elevated levels of dissolved iron and manganese in groundwater in excess of USEPA secondary maximum contaminant levels for drinking water. The proposed withdrawal would be for industrial use. Domestic water supply would continue to be from the City of Kalama.

3.3.2 Environmental Impacts of the No Action Alternative

Under the No Action alternative, the PMEC facility would not be built. There would be no impacts to surface or groundwater other than the continuation of current conditions. The opportunity would be lost to replace some of the City of Kalama water currently used for industrial purposes at the Port of Kalama with the new water supply, thus freeing up the City water for commercial and residential domestic use.

3.3.3 Environmental Impacts of the Proposed Action

Impacts to Surface Water Quantity

The current site is not developed and is composed of well-draining soils. Following the construction of the PMEC, a portion of the site would be converted from pervious to impervious area. Impervious areas would consist of roads,

buildings, parking areas, and covered storage areas. As a result, site surface water runoff is expected to increase.

Within areas that would remain pervious, vegetated open space, surface water is expected to infiltrate as it currently does. Newly paved areas would route surface water to perimeter ditches or a storm drainage network consisting of inlets, catch basins and storm drain pipes that would collect and convey flows to the wet pond that has been preliminarily sited in the south-central portion of the site.

Because of the large relative flows of the Columbia River to the potential stormwater discharge from the facility, the facility is exempt from peak flow control requirements that apply to developments discharging to smaller water bodies (Ecology 2005b). The 6-month, 24-hour design water quality design runoff event has been estimated at 6.4 cfs. This represents 0.003 percent of the average flow at The Dalles of 190,000 cfs. This runoff rate is also negligible compared to the minimum instream flows set for The Dalles of 20,000-50,000 cfs.

Impacts to Surface Water Quality

Water quality of the Columbia River and on-site wetlands may be affected during both the construction and operation phases of the project.

Construction Impacts

Potential impacts include sediment discharge and discharge of other pollutants associated with construction, especially petroleum products. Stormwater quality control during construction would be achieved through compliance with a National Pollutant Discharge Elimination System (NPDES) stormwater discharge permit for construction activities, and application of construction stormwater pollution control methodologies and BMPs contained in Ecology's stormwater manual (Ecology 2005a).

The highest risk of construction-related impacts to surface water quality is expected to occur in the initial stages of construction, when native soils are stripped to allow for the compacted placement of surcharge piles and permanent fill

material. At that time, the highest priority would be to control erosion and sedimentation. Erosion would be controlled by temporarily stabilizing soils with seeding, plastic sheeting or erosion control blankets. Construction entrances with wheel washes would be provided to minimize erosion and reduce the potential for soils to be tracked off site. Perimeter controls such as rolled erosion control products and silt fences would be used to prevent sediment from leaving the site. Construction would be scheduled to limit the amount of disturbed area at any one time as much as is practical. In any new area to be disturbed, perimeter controls would be installed prior to land disturbance. Where practical, temporary site drainage would be installed at the location of the final drainage locations. Site grading during construction would be designed to direct runoff to the drainage system or to dispersal in the well-drained soils of the site, and away from perimeter controls and adjacent wetlands. A temporary sediment trap/pond would be installed at the location of the permanent stormwater pond to treat runoff during construction. Stormwater discharges from the temporary system would be monitored according to the terms of the construction stormwater discharge permit. A contingency plan would be developed to provide for temporary storage and treatment (flocculation/settling) of stormwater runoff that is too high in turbidity or sediment load. A Construction Stormwater Pollution Prevention Plan to address these issues in more detail would be prepared and submitted to EFSEC for review and approval prior to construction.

Construction of the wastewater outfall will present the risk of minor sediment impacts to the Columbia River. The wastewater outfall will be suspended from the already-permitted port wharf expansion in similar fashion to the existing port outfall at the existing wharf. No disturbance of river sediments will be necessary, because the outfall invert will be located several feet above the river bottom. Perimeter controls will be used to prevent sediments from disturbed soils along the outfall pipeline route from entering the river.

As construction proceeds, a permanent stormwater management system would be completed. The stormwater management system is being designed according to Ecology's stormwater manual (Ecology 2005a). The design and stormwater site drainage plan would be prepared and submitted for permitting through EFSEC.

The natural gas pipeline route would cross the Kalama River by drilling beneath the river. The method of crossing the Kalama River is to use HDD to install the pipeline below the river bed. The process includes drilling a pilot hole using a large drill bit and an injection of bentonite slurry under pressure to remove the cuttings and hold the hole open. After the pilot hole is completed, a reamer and bentonite slurry combination is used to enlarge the hole so that the preassembled string of pipe can be pulled back through the hole. This method requires the preparation of an entrance site and an exit site. Some types of substrate are unsuitable for drilling, such as hard fractured rock or sugar sand type soils. An evaluation of the geotechnical conditions along the pipe alignment would be necessary to determine the feasibility of a drilled installation at this site. The pipeline would be buried beneath Hendrickson Drive on either side of the bridge. The pipeline route includes no other water body or wetland crossings. Three other utility drillings exist in the general area. The pipeline would be aligned with the other utilities.

Hydrostatic test water for the natural gas pipeline would be acquired from the Port of Kalama industrial water system or from the City of Kalama municipal water system. The volume of hydrostatic test water needed is unknown at this time. If City water is used, the test water would be discharged to the Columbia River. When hydrostatic testing is complete, the test water would be analyzed and treated if necessary to make it suitable for discharge into area drainage ditches in compliance with water discharge permits issued for the PMEC. Hydrostatic test water which has been super-chlorinated for potable water disinfection would be discharged to a sanitary sewer following reduction in residual chlorine levels. If

industrial water is used, it would be tested for nitrogen content before determining its discharge point (surface water, storm sewer, or sanitary sewer). If an appropriate discharge location is not immediately adjacent to any facility being tested, the used test water can be trucked to an appropriate discharge point.

Operation Impacts

Process Water Impacts to Surface Water Quality. Water quality impacts to the Columbia River are associated with the potential presence of contaminants in the discharge. These contaminants were identified in the NPDES permit application submitted by PMEC, and are summarized in Exhibit 3-18. Exhibit 3-18 also presents a comparison with state water quality standards, where available. The potential contaminants listed in Exhibit 3-18 are associated with the process wastewater streams listed in Exhibit 3-19, along with their associated volumes.

PMEC's process wastewater would be combined with flows from the Port of Kalama system downstream of the Port domestic wastewater treatment plant. The Port of Kalama discharge currently includes domestic wastewater from the Port of Kalama wastewater treatment plant and industrial wastewater from Steelscapes, Inc. (manufacturer of zinc-coated steel coils and zinc rolling mill), a Port tenant. Based on the current Port of Kalama permit, the treated effluent from Steelscape Inc. and the Port of Kalama domestic wastewater treatment system are combined in a mixing vault prior to discharge into the Columbia River (Ecology 2003). The Port of Kalama discharges a maximum monthly flow of 20,000 gpd. Steelscape Inc.'s NPDES Permit No. WA0040851 (Ecology 2005b) allows discharges to a daily maximum of 180,000 gpd (125 gpm) at a maximum daily temperature of 35° C. The combined flow is discharged through a diffuser into the Columbia River. The existing outfall is located at the North Port Pier. The outfall extends 250 feet from shore and the diffuser has four 4-inch diameter ports. The discharge location is approximately 12.5 feet below ordinary low water. The

current mixing zone has a 32 foot radius and a chronic area of 600 feet by 420 feet.

Exhibit 3-18

Chemical Makeup of Pacific Mountain Energy Center Process Wastewater Discharges

			Water Quality Standard (mg/L)	
Chemical	**Concentration**	**Unit**	**Acute**	**Chronic**
pH	6.3	Standard	6.5-8.5	6.5-8.5
Hardness (as CaCO3)	1920	mg/L	NA	NA
Biochemical Oxygen Demand (BOD-5)	*<12*	mg/L	NA	NA
Bicarbonate (HCO3)*	720	mg/L	NA	NA
Carbonate (CO3)*	2.4	mg/L	NA	NA
Chemical Oxygen Demand (COD)	*160-260*	mg/L	NA	NA
Total Organic Carbon (TOC)	*60-110*	mg/L	NA	NA
Phenols, Total	*<0.02*	mg/L	NA	NA
Oil and grease	*<30*	mg/L	NA	NA
Surfactants	*<0.3*	mg/L	NA	NA
Phosphorus (as P)	*<13*	mg/L	NA	NA
Potassium*	1	mg/L	NA	NA
Total Dissolved Solids	2400	mg/L	NA	NA
Total Suspended Solids (TSS)	*<40*	mg/L	NA	NA
Ammonia (as N)	*<10*	mg/L	0.24 ***	0.04
Total Organic Nitrogen	*<8.0*	mg/L	NA	NA
Cyanide	*<0.5*	mg/L	0.022	0.0052
Nitrate (as N)**	3.6	mg/L	NA	NA
Thiocyanates	*<3.0*	mg/L	NA	NA
Formates	*<150*	mg/L	NA	NA
Sulfate**	30	mg/L	NA	NA
Sulfide	*<0.7*	mg/L	NA	NA
Sulfite	*<3.5*	mg/L	NA	NA
Thiosulfate (S_2O_3)	*<5.0*	mg/L	NA	NA
Bromide	*<6.0*	mg/L	NA	NA
Chloride**	30	mg/L	860	230
Chlorine, Total Residual	*<0.1*	mg/L	0.019	0.011
Aluminum	*<1.0*	mg/L	NA	NA

Exhibit 3-18

Chemical Makeup of Pacific Mountain Energy Center Process Wastewater Discharges

			Water Quality Standard (mg/L)	
Chemical	**Concentration**	**Unit**	**Acute**	**Chronic**
Antimony	*<1.2*	mg/L	NA	NA
Arsenic	0.06	mg/L	0.360	0.190
Barium	*<0.6*	mg/L	NA	NA
Beryllium	*<0.03*	mg/L	NA	NA
Boron	*35-70*	mg/L	NA	NA
Cadmium	*<0.035*	mg/L	0.002	0.0007
Calcium	492	mg/L	NA	NA
Chromium	*<0.06*	mg/L	0.357	0.116
Cobalt	*<0.15*	mg/L	NA	NA
Copper	*<0.15*	mg/L	0.010	0.0072
Iron	156	mg/L	NA	NA
Lead**	0.012	mg/L	0.025	0.001
Magnesium	*<130*	mg/L	NA	NA
Manganese	24	mg/L	NA	NA
Mercury**	0.006	mg/L	0.0021	0.000012
Molybdenum	*<0.2*	mg/L	NA	NA
Nickel	*<0.2*	mg/L	0.908	0.100
Selenium**	0.12	mg/L	0.020	0.005
Silica (as SiO2)*	132	mg/L	NA	NA
Silver**	0.012	mg/L	0.0014	NA
Sodium	108	mg/L	NA	NA
Thallium	*<0.9*	mg/L	NA	NA
Tin	*<3.0*	mg/L	NA	NA
Titanium	*<1.5*	mg/L	NA	NA
Vanadium	*<0.01*	mg/L	NA	NA
Zinc	0.072	mg/L	0.073	0.067

1 Bold shows values in exceedance or outside the range of state water quality standards

2 Italics refer to Wabash River IGCC plant data

*3 * Based on USGS measured Columbia River samples taken at Beaver Army Terminal, Oregon, 1990-2004*

*4 ** Parameter was not detected; value based on one-half of detection limit*

*5 *** Ammonia standard is based on receiving water temperature and pH. Calculated standard shown is based on maximum measured temperature in receiving water (22.1 C in Columbia River at Vancouver, Washington measured by the Department of Ecology, July 2003 data) and the pH for that sample (7.86).*

6 Standards for Cadmium, Chromium, Copper, Lead, Nickel, and Zinc are based on hardness of receiving water. Value of hardness used in computing standards for these metals was 58.9 mg/L, an average of twelve monthly samples taken by Ecology from the Columbia River at Vancouver, Washington.

7 NA = No state standard promulgated

Exhibit 3-19
Pacific Mountain Energy Center Process Wastewater Streams

Wastewater Stream	Annual Volume (acre-feet)	Peak Rate (gpm)
Cooling Tower Blowdown	1,984	1,230
Gasifier Blowdown	113	70

PMEC plans to discharge approximately 1,890,000 gpd (1,315 gpm), or approximately ten times the currently permitted discharge of process water. The current plan is to discharge process wastewater at 40° C, which is the maximum allowed to publicly-owned treatment works (Ecology 2003).

The capacity of the existing Port infrastructure to accommodate these increased flows were evaluated for an Engineering Report prepared for the NPDES wastewater discharge permit application (URS 2007a). This evaluation indicated that the existing infrastructure, a 6-inch diameter discharge line with four 4-inch diameter diffuser ports, is insufficient to accommodate the increase in combined flows. A 16-inch discharge line, with pump backup for high river level conditions, would be required to achieve the combined design discharge rates. Two alternatives are available for discharging the combined flows: a retrofit of the existing infrastructure and piping of PMEC flows to the re-built system, or constructing a new mixing vault and appropriately-sized discharge system closer to the PMEC facilty and piping the Port and Steelscape discharges to this system. Due to the relative sizes of the discharges, the second alternative is preferred. Under this scenario, a new 16-inch discharge line would convey wastewater to a discharge point and diffuser. The new discharge point and diffuser would be constructed and owned by the Port of Kalama and would be located on the 1,000-foot dock addition being built by the Port of Kalama. This dock addition would extend north of the existing dock. The new discharge line and diffuser would be constructed in a manner similar to the existing Port discharge line, and would be structurally supported by the dock extension.

This discharge scenario means moving the discharge point and boundaries of the mixing zone to the new location. The dimensions of the mixing zone are already at the maximum permitted by regulation, so no expansion of the mixing zone is contemplated. The Engineering Report (URS 2007a) also include a mixing zone analysis for the proposed conditions. The current Port of Kalama permit (issued October 2003) established acute and chronic dilution factors (150 and 46, respectively). The mixing zone study indicated that with the increased flows and composition of the flows due to PMEC, the acute dilution factor would be 5.9 and the chronic dilution factor would be 8.7. Applying these new dilution factors to the estimated concentrations in Exhibit 3-18 indicates the potential for exceedance of water quality standards for certain metals. The mixing zone analysis (URS 2007a) indicated that temperature criteria would be met at the mixing zone boundaries.

The Engineering Report (URS 2007a) identifies potential treatment processes that could be used to meet effluent limits to be set by the NPDES discharge permit and water quality criteria at the mixing zone boundary.

Stormwater Impacts During Plant Operation. Stormwater quality control during plant operation would be achieved through compliance with an NPDES stormwater discharge permit for industrial activities, and application of appropriate stormwater pollution control methodologies and BMPs contained in Ecology's stormwater manual (Ecology 2005a). Under the State General Permit for Industrial Stormwater Discharges, applying the pollution control guidance in Ecology's stormwater manual constitutes the "presumptive" approach to meeting state surface water quality standards.

Stormwater runoff would be managed separately from industrial process wastewater, with the exception of two stormwater streams with higher potential to be contaminated (the rail unloading area and slag pile). The Engineering Report for the NPDES application (URS 2007a) identifies practices to be employed and their anticipated performance.

Based on guidance in Ecology's stormwater manual, stormwater quality would be managed through the use of source controls, oil-water separators, and a wet pond. Storm drains would outlet to constructed channels which would convey runoff to the detention pond. Discharge from the pond to the Columbia River would be via subsurface drain. The outfall to the Columbia would be armored to control erosion of the river bank. This armoring would represent a surface area of the bank of approximately 100 square feet and would have minimal impact on existing habitat. Permanent vegetation would be established and other permanent BMPs would be used to control erosion and sedimentation. With all permanent stormwater BMPs in place, operation-related impacts to stormwater are expected to be minor.

The treatment wet pond, designed for the 6-month, 24-hour recurrence interval runoff event (1.72 inches precipitation, 6.52 cfs peak runoff) would have a total volume of 3.6 acre-feet of which a portion would be a permanent pool. If a storm greater than the 6-month, 24-hour storm occurs, excess stormwater would bypass the wet-pond at a flow splitter upstream of the wet pond and be discharged directly into the Columbia River.

Source controls would include prevention of exposure of raw materials to stormwater runoff, and isolation (using berms) of areas where spills could cause potential contamination. Stormwater runoff from areas with higher potential for contamination (the rail unloading area and slag pile) would be recycled to the process makeup water system. The anticipated impact on Columbia River water quality from stormwater runoff is minor.

Stormwater runoff from the PMEC facility may impact water temperature, since construction of the facility would result in creation of approximately 15 acres of impervious surface. An increase in stormwater temperature over the current conditions at the developed site could result from the following:

- Transfer of heat from impervious surface areas (pavement, asphalt, and roofs) absorbed from solar radiation

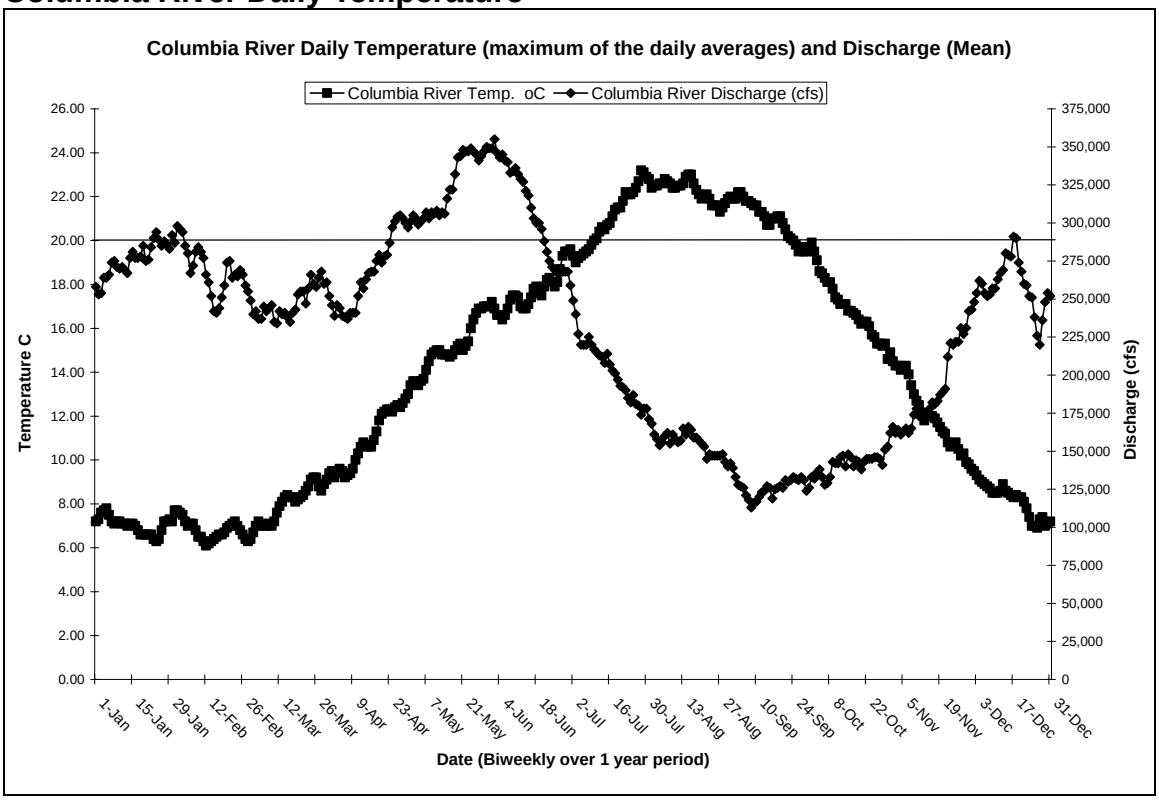
- Removal of vegetation, which removes the shading that can reduce the transfer of solar heat to the water
- Longer exposure of stormwater to ambient air temperature and solar heating in the wet pond

To evaluate the potential magnitude of this impact, a mixing analysis similar to that for the process wastewater was performed (URS 2007a). The analysis considered what are likely to be the worst-case conditions, as follows:

- Warm Columbia River temperatures – 22 degrees C assumed, based on Exhibit 3-20, which shows the USGS flow monitoring Station 14246900 at Beaver Army Terminal near Quincy, Oregon, approximately 20 miles downstream of the PMEC site.

Exhibit 3-20

Columbia River Daily Temperature



- Warm stormwater discharge – 24 C assumed, based on a study for the Thomas Wetland (approximately 30 miles away) (Hutton 2005). The Thomas Wetland study covers the summer months (July to September) coinciding with the

critical months for temperatures in the Columbia River. Stormwater water temperatures, measured at several different locations (channels, inflow, outflow, pond etc.) After a major storm temperatures ranged from approximately 55 ^{o}f (13 C) to approximately 75 ^{o}f (24 C).

- 6-month, 24-hour runoff rate volume and runoff rate (1.72 inches, 6.52 cfs), which is conservative for the months of July and August, in which the maximum daily rainfall is 1.10 and 1.39 inches, respectively (Western Regional Climate Center 2007)

The analysis indicated that the temperature in the mixing zone would reach 22.3 C within 1 foot of the diffuser outlet (maximum increase allowed by the water quality standards) and would be the same as ambient river temperature (22 C) at the downstream mixing zone boundary. The discharge would thus cause a negligible temperature increase at the edge of a hypothetical mixing zone of the same dimensions as the process wastewater mixing zone.

Impacts Under Upset Conditions

An upset condition is an exceptional incident in which there is unintentional and temporary non-compliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee (Ecology 2006b). An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

The key concern under an upset condition at the PMEC facility is the thermal impact of discharge on the Columbia River. Mixing zone modeling indicates that under normal operating conditions, neither process wastewater nor stormwater would have significant impacts on temperature in the river. Upset conditions would have no impact on temperature of the stormwater or process wastewater discharged from PMEC, so no temperature impact to the river is anticipated due to upset conditions.

Stormwater Upset Conditions. Under upset conditions, it is assumed that the wet pond is not operating, thus the 6-month, 24-hour storm is discharged into the Columbia River without treatment. The most likely cause of an upset condition would be the temporary blockage of the pond inlet. This would be unlikely to occur during the summer months. If occurring in the winter, such a blockage would result in the discharge of untreated stormwater directly to the Columbia River, with potential violations of surface water quality standards.

If the upset occurred during the summer, the potential thermal impact on the river also could be an issue. A worst-case scenario would occur in August when the Columbia River is warmest and when air temperatures are warmest, when heat transfer from impervious surface areas (pavement, asphalt, and roofs) absorbed from solar radiation to stormwater could result in heating of stormwater, to a temperature of about 24 C (Hutton 2005). The mixing zone analysis discussed previously indicated no violation of surface water quality standards under these conditions (URS 2007a).

Process Discharge Upset Conditions. Upset conditions for the process wastewater discharges imply that the wastewater is being discharged without treatment. As indicated in the previous discussion of the mixing zone analyses, discharge of untreated process wastewater could result in violation of water quality standards (especially related to certain metals and ammonia).

Impacts to Groundwater

Potential impacts to groundwater resources relate to impacts to the availability of water for other permitted and beneficial uses (water supply) and groundwater quality.

Impacts to Groundwater Supply

Given the general hydrogeologic conditions, the water resources of the PMEC site primarily consist of the annual rainfall and the Columbia River groundwater system. Construction on the property would affect the discharge fate of some portion of that water. Initially, this would be due to the

loss of vegetative cover, which would actually make more water available for runoff. As impermeable cover of the property increases, due to the construction of paved areas and buildings, the water available for initial recharge would decrease and total runoff for the site is expected to increase. Surface water runoff from the site would be treated in a water quality treatment facility (i.e., wet pond). Runoff volumes in excess of the design water quality treatment volumes would be routed directly to the Columbia River. Therefore, impacts to the hydrologic setting within the PMEC site are considered negligible.

Ecology assessed the potential for the new Port of Kalama water right to impair existing water rights. Ecology based its assessment on the results of hydraulic testing presented in a Collector Well Feasibility Study (CWI 2006) prepared for CH2M Hill and the Port of Kalama., on consideration of water permits, certificates, and claims within a 1.0-mile radius of the proposed Port wellhead. The 1.0-mile radius was considered conservatively inclusive of all potentially affected senior water rights. The only two permits within the 1.0 mile radius are the Port of Kalama's pre-existing permits. Eight claims to vested water rights are within the radius. Ecology's well log database also showed seven possible exempt water wells within the radius.

Based on governing Theis assumptions for groundwater flow (Theis 1935), and the hydraulic parameters presented in the Collector Well Feasibility Report, Ecology determined that no discernible drawdown (greater than 0.1 foot) is calculated to occur further than a distance of 3,400 feet from a single withdrawal point after 30 days of continuous pumping at 6,600 gpm (the maximum instantaneous rate under the new permit). This represents a worst-case scenario, because actual drawdown from the planned three wells, if well-spaced, should be less than from the modeled single point withdrawal. The 0.1 foot drawdown at 3,400 feet distance was considered negligible when compared to the 2.5 foot average tidal fluctuation observed in the test well during the CWI feasibility

study. Thus, withdrawals for PMEC would not impact the amount of water available to the Port of Kalama for other purposes.

Ecology concluded that the estimated drawdown does not represent impairment of the groundwater rights of the eight exempt wells within the 1.0 mile radius of the new well. By extension, the estimated drawdown does not represent impairment to the City of Kalama's groundwater withdrawal, located outside the 1-mile radius. Thus, withdrawals for PMEC would not impact the amount of water available to the City of Kalama.

The City of Kalama has projected its water needs through the year 2021. Meeting those needs would be contingent on approval of their pending water right application. Studies of the economic feasibility of IGCC plants such as the proposed PMEC facility use operating lives of 20-40 years (Excelsior Energy Inc. 2005, Rezaiyan et al. 2005). The negligible effect of the PMEC water demand on nearby water rights, as described above, is independent of the operating life of the plant. Whether the plant operates 20 years or more than 40, the recharge rate of the alluvial aquifer is sufficient to prevent any impact to the City's water supply.

Due to the proximity to and established continuity with the Columbia River, a "seemingly infinite" (Ecology 2006c) unregulated freshwater hydraulic recharge boundary, groundwater withdrawals from the shallow alluvial aquifer are not expected to impact long-term water levels in the aquifer. Thus, they would not affect either Port or City of Kalama water withdrawals.

Impacts to Groundwater Quality

The potential to impact groundwater quality derives from improper storage and handling or spillage of materials that might impact groundwater. Feedstocks (petcoke or coal) would be managed in a manner to prevent exposure to precipitation and potential leaching, or release to the ground.

In addition, a Spill Prevention, Control and Countermeasures (SPCC) Plan to protect ground water would be required. If a spill or other release were to occur to ground, impacted soil and groundwater would be remediated in accordance with the MTCA. With appropriate management practices, including bermed areas for the collection of incidental spills and oil-water separators as required, the potential for contamination of surface or ground water would be low.

3.3.4 Mitigation Measures

No Action Alternative

Mitigation measures would not be required under the No Action Alternative.

Proposed Action

Surface Water Mitigation Measures

Compliance with construction and operational stormwater permits and process wastewater discharge permits should obviate the need for any surface water mitigation measures.

Groundwater Impact Mitigation Measures

The potential to affect groundwater quality derives from improper storage and handling or spillage of materials that might impact groundwater. Feedstocks (petcoke or coal) would be managed in a manner to prevent exposure to precipitation and potential leaching, or release to the ground.

In addition, an SPCC Plan to protect ground water would be required. If a spill or other release to the ground were to occur, impacted soil and groundwater would be remediated in accordance with MTCA. With appropriate management practices, including bermed areas for the collection of incidental spills and oil-water separators as required, the potential for contamination of surface or ground water is low. Therefore, mitigation for groundwater quality impacts is not necessary.

3.3.5 Significant Unavoidable Adverse Impacts

No Action Alternative

There would be no significant unavoidable adverse impacts under the No Action Alternative.

Proposed Action

No significant unavoidable adverse impacts have been identified. This conclusion assumes that a wastewater treatment system and wastewater cooling system, in combination with a mixing zone developed in the NPDES permit process, can be devised to meet all applicable surface water quality standards. The mixing zone analysis indicated that the existing mixing zone dimensions (already the maximum size allowed by regulation) can meet water quality criteria with appropriate treatment prior to discharge. No expansion of the mixing zone would be necessary.

3.4 Habitat and Wildlife

URS biologists conducted a field survey of the biological resources in the vicinity of the proposed Energy Northwest PMEC and its associated project components. The survey assessed the presence of biological resources, priority habitats, non-listed, and listed species and their impacts attributable to the construction and operation of the PMEC. Background information was gathered using aerial photographs, the Port of Kalama staff in Kalama, Washington, project technical reports, and field investigations conducted on April 11 and 12, 2006, August 31, 2006, and December 13 and 28, 2006. Presence and distribution information related to special status species was obtained from National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS), US Fish and Wildlife Service (USFWS), Washington Department of Natural Resources (WDNR), and the Washington Department of Fish and Wildlife (WDFW).

3.4.1 Habitats and Vegetation

The vegetation and habitat survey consisted of investigating the PMEC site, the pipeline route, the railroad spur alignment, and the proposed wetland mitigation site. Major habitat types, locations, and plant species observations in or near the site were mapped and described. Five major habitat types occur in the site vicinity: industrial, open industrial, riparian, wetland, and aquatic.

These five habitat types are modified from those described in *Wildlife-Habitat Relationships in Oregon and Washington* (Johnson and O'Neil 2001) to provide a clearer description of the site conditions. The industrial and open industrial habitats are modified from Johnson and O'Neil's "Urban and Mixed Environs" classification. The riparian and wetland habitats are based on the "Westside Riparian – Wetlands" habitat description. The aquatic habitat resembles Johnson and O'Neil's "Lakes, Rivers, Ponds, and Reservoirs" description.

The **industrial habitat** type includes areas that are completely developed with buildings, parking lots, storage yards, and paved or graveled surfaces. There may be small areas of

artificial landscaping, but natural vegetation is limited to small roadside swales or shoulders in this habitat type. This industrial habitat type also includes railroad tracks, since these areas also contain very little vegetation.

The **open industrial habitat** type consists of a day use and RV park, heavily disturbed or graded vacant lots, and areas where Columbia River dredge spoils were deposited. Vegetation in these areas usually consists of non-native and invasive species. Common species include weedy species such as annual bluegrass (*Poa annua*), English plantain (*Plantago lanceolata*), common groundsel (*Senecio vulgaris*), Thale cress (*Arabidopsis thaliana*), horseweed (*Conyza canadensis*), and crane's bill (*Erodium cicutarium*).

The **riparian habitat** type includes uplands and wetlands directly associated with the Columbia, Coweeman, Cowlitz, and Kalama Rivers. The sections of these rivers located in the site vicinity are tidally influenced freshwater systems. Riparian habitats adjacent to these rivers may be dominated by black cottonwood (*Populus balsamifera*), red alder (*Alnus rubra*), Oregon ash (*Fraxinus latifolia*), snowberry (*Symphoricarpos albus*), red-osier dogwood (*Cornus sericea*), hardhack (*Spiraea douglasii*), willows (*Salix* spp.), Himalayan blackberry (*Rubus armeniacus*), reed canarygrass (*Phalaris arundinacea*) and/or other grasses, sedges, and rushes. The riparian habitat may include areas also defined as wetland habitat type.

The **wetland habitat** type consists of palustrine forested, scrub-shrub, emergent, and open water wetlands. Wetlands, also a WDFW priority habitat, are associated with drainage ditches, depressions, and the riparian zones of the Columbia, Coweeman, Cowlitz, and Kalama Rivers.

The **aquatic habitat** type is defined as both open water and flowing water within a confined channel. For streams and rivers, this would include the water within both the wetted and bankfull width of the channel to the bottom of the channel (depth). For large open water areas (such as an open water

wetland), it includes the water within the bank. The aquatic habitat type may support fish species including threatened or endangered salmonids. This habitat type is present as the Columbia, Cowlitz, Coweeman, and Kalama Rivers. It also is present in an 8.86-acre wetland east of the PMEC site adjacent to the railroad tracks and the I-5 freeway.

A query of the WDNR Natural Heritage database located one special status plant species in the site vicinity (WNHP 2006). Wheeler's bluegrass (*Poa nervosa*), a state sensitive species, occurs in the site vicinity, however, this species grows on rock outcrops, cliff crevices, and occasionally in talus near the base of cliffs or outcrops (WNHP 2000). While this habitat is present in the general vicinity of the site, it is not immediately adjacent to any of the PMEC component areas.

Affected Environment – Habitats and Vegetation

PMEC Site

The majority of the PMEC site is composed of the open industrial habitat type. The PMEC site, which is approximately 95 acres, has been disturbed and has been used to pile Mt. St. Helens ash and Columbia River dredge spoils. Common species on the PMEC site include weedy herbaceous species such as rabbit's foot clover (*Trifolium arvense*), crane's bill, velvetgrass (*Holcus lanatus*), chickweed (*Stellaria media*), and sheep sorrel (*Rumex acetosella*). Few woody species are present on the PMEC site, with Scot's broom (*Cytisus scoparius*) being the most common.

The PMEC site contains four species listed as Class B Weeds by the Washington State Noxious Weed Control Board: Scot's broom, Queen Anne's lace (*Daucus carota*), hairy cat's ear (*Hypochaeris radicata*), and ox-eye daisy (*Leucanthemum vulgare*). Class B Weeds are non-native species presently limited to portions of the state and are designated for control in regions where they are not yet widespread. None of these species are designated for control in Cowlitz County.

The site also contains five species listed as Class C Weeds by Washington State Noxious Weed Control Board: Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), St. Johns-

wort (*Hypericum perforatum*), common groundsel, and reed canarygrass. Class C weeds are already widespread in Washington, but may be designated for control at a local level. Of these species, only Canada thistle is designated for control in Cowlitz County.

The PMEC site also contains a 2.1-acre wetland area that is proposed to be filled by the Port of Kalama under a separate permit process. That wetland defines the upstream end of a Columbia River backwater channel and is a tidally influenced, freshwater emergent wetland with slough sedge (*Carex obnupta*) and reed canarygrass that provides habitat for wetland associated fish and wildlife. A sloping fringe of black cottonwoods surrounds the emergent community. This wetland is also identified as aquatic habitat because it supports various fish species and provides rearing and off-channel habitat for listed salmonids in the Columbia River. This wetland and aquatic habitat may be filled prior to the PMEC project's construction start. Since it is covered by separate and prior environmental review, it would not be part of the affected environment of the PMEC project but has been considered in the analysis of cumulative and secondary impacts.

Natural Gas Pipeline

The natural gas pipeline route mostly contains industrial and open industrial habitat dominated by non-native species. The pipeline, beginning at the Williams Pipeline metering station in the Port's South Port Industrial Area, would be constructed within the existing Hendrickson Drive ROW for most of its length. About 500 feet of the pipeline that would be constructed in the ROW would be buried adjacent to a wetland habitat that is present west of Hendrickson Drive and south of the existing Conagra Kalama Export rail yard. North of the Conagra rail yard the pipeline would be drilled under the Kalama River at approximately river mile (RM) 0.5 passing under wetland, riparian, and aquatic habitats. The pipeline would resurface from drilling and continue to be buried along the Tradewinds Road ROW to its terminus at the PMEC site.

The pipeline and its associated work zone would remain outside the fence that protects the wetland between Hendrickson Drive and the Columbia River just south of the existing rail yard. This wetland contains emergent, scrub-shrub, and forested communities. However, most of the wetland next to Hendrickson Drive is dominated by reed canarygrass.

The natural gas pipeline route vicinity contains seven Class B Weeds: Scot's broom, Queen Anne's lace, hairy cat's ear, ox-eye daisy, spotted knapweed (*Centaurea biebersteinii*), Dalmatian toadflax (*Linaria dalmatica*), and tansy ragwort (*Senecio jacobaea*). The route also contains two Class C Weeds: St. Johns-wort and reed canarygrass. Of these species, only tansy ragwort is designated for control in Cowlitz County.

Railroad Spur

The railroad spur site area contains wetland and open industrial habitat types. The open industrial habitat lies between the PMEC site and the wetland. The wetland is approximately 8.86 acres in size and lies between Tradewinds Road and the BNSF Railroad. This wetland is described in greater detail in Section 3.4.2.

The railroad spur site area contains one Class B Weed, tansy ragwort, and two Class C Weeds, reed canarygrass and yellow flag iris (*Iris pseudacorus*). Of these species only tansy ragwort is designated for control in Cowlitz County.

Transmission Line

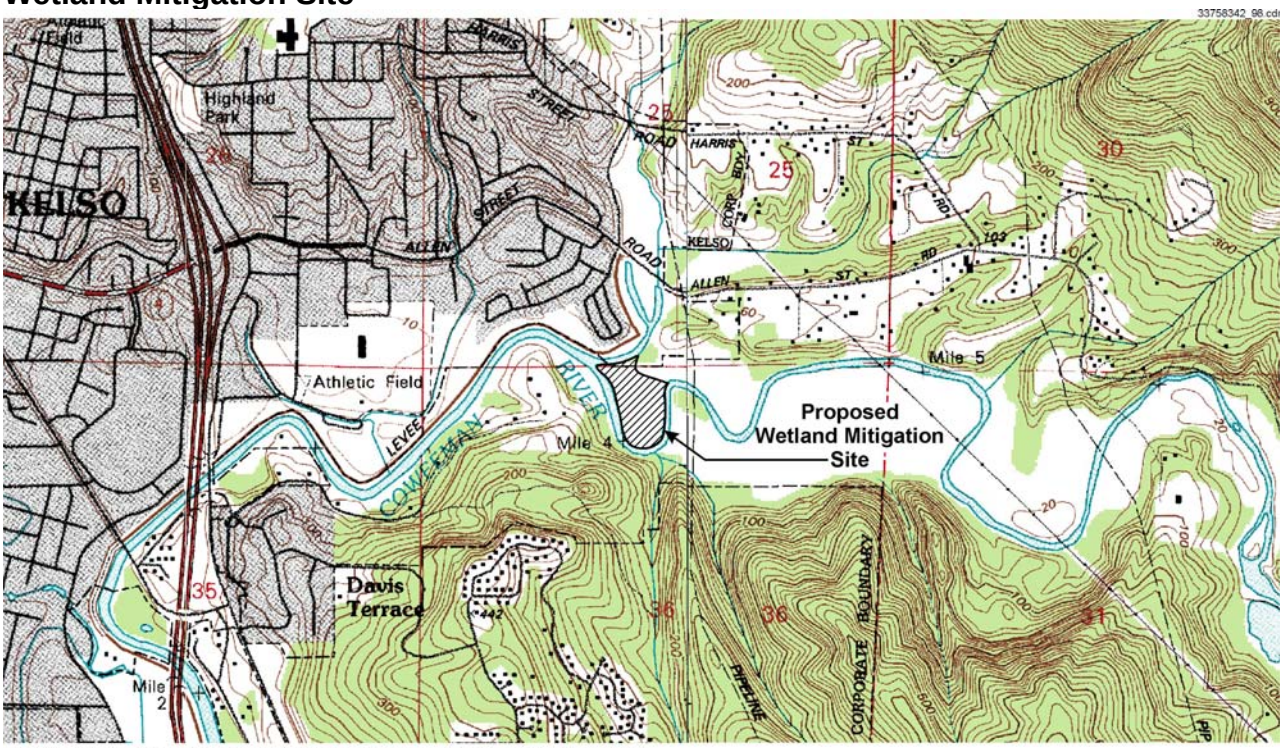
The proposed transmission line route would replace an existing transmission line that traverses each habitat type described above. The existing 115kV and 230kV ROWs are actively maintained by the utilities to be clear of trees and shrubs that could otherwise create a hazard if the taller vegetation intercepted the electricity cables. The existing transmission lines are built on either H-type wooden pole structures or on taller single pole steel towers.

Wetland Mitigation Site

In order to mitigate for the loss or approximately 1.3 acres of wetland, a wetland mitigation site of approximately 11 acres has been identified. The proposed wetland mitigation site is situated wholly in the Coweeman River floodplain and contains riparian, wetland, and aquatic habitat types (Exhibit 3-21). The aquatic habitat of the Coweeman River is contained within incised river banks about ten feet high above the winter flow stage. The riparian habitat includes a small wetland habitat and is dominated by reed canarygrass, red alder, Oregon ash, Himalayan blackberry, snowberry, scouring rush (*Equisetum* sp.) and bentgrasses.

Exhibit 3-21

Wetland Mitigation Site



SOURCE: USGS 7.5-minute topographic quadrangle, Kelso and Mount Brynion, Washington, 1990

0 0.25 0.5
Approximate Scale in Miles

The river periodically overtops its banks and floods the adjacent riparian uplands and wetlands of the mitigation site. Most of the proposed mitigation site is dominated by upland open space habitat. Soils are river derived silt loams and the dominant vegetation in the uplands consists of tall fescue,

bentgrasses, reed canarygrass in the wetland, scattered Oregon ash, and occasional creeping buttercup. The mitigation site was traditionally maintained as pasture to raise cattle or to grow hay and is currently mowed by the landowner.

Nearby WDFW Priority Habitats

The WDFW and WDNR identified wetlands and an oak woodland in the vicinity of the PMEC project. The oak woodland is located on Drays Mound, northeast of the railroad spur. Drays Mound is a distinctive rocky knob that lies between I-5 and the BNSF railroad. An Oregon white oak (*Quercus garryana*), common viburnum (*Viburnum ellipticum*), poison-oak (*Toxicodendron diversilobum*) community is present on this outcrop.

A large tidally influenced wetland complex is present directly north of the PMEC site (Exhibit 3-22). This wetland complex includes the 2.1-acre wetland that extends onto the PMEC site to be filled by the Port. Hydrology is controlled by the tidal and flow regime of the Columbia River. Vegetation includes black cottonwood, red alder (*Alnus rubra*), willows, and red-osier dogwood. Two invasive species, reed canarygrass and yellow flag iris, dominate the understory of this wetland.

Environmental Impacts of the No Action Alternative – Habitats and Vegetation

No new impacts to the habitats and vegetation in the project component areas would occur if the No Action alternative is selected. However, the Port intends to move forward with their development of the industrial site with or without the PMEC project, meaning that the 2.1-acre wetland will be filled as part of the No-Action Alternative. Existing land uses are anticipated to continue, which include mowing and ROW maintenance clearing, until other industrial projects occupy the site. Continued rapid regional growth may encourage other unrelated uses and impacts to the component areas if this project is not constructed.

Environmental Impacts of the Proposed Action – Habitats and Vegetation

Construction Impacts

PMEC Site. Construction of the PMEC site would have minimal habitat impacts by shifting the on-site habitat type from open industrial to industrial. The site is already very disturbed and dominated by non-native plant species. Noxious weeds are already present on the site and are not anticipated to spread further by the development. Instead, many of the on-site noxious weeds would be removed by the proposed construction.

Natural Gas Pipeline. The pipeline would be constructed using open-trench methods through industrial and open industrial habitats and using HDD under the Kalama River and its associated riparian habitat. The pipeline would not permanently impact wetlands, riparian or aquatic habitats. The only temporary impacts would be if the HDD fractured out and spilled bentonite into the habitat.

Noxious weeds are present along the natural gas pipeline. Only one of the species observed is designated for control in Cowlitz County. However, there is potential for the weed species to spread into areas where they are not currently present. For example, spotted knapweed is present at the southern end of the natural gas pipeline route, just south of the park. There is a potential to spread this plant further along the natural gas pipeline route during construction unless preventative measures are taken.

Railroad Spur. Construction of the railroad spur would impact open industrial and wetland habitats. The railroad spur would fill approximately 1.3 acres of wetland. The wetland impacts are discussed in Section 3.4.2. Noxious weeds are present in the railroad spur area, but are not anticipated to spread further since the spur is short and leads directly to the PMEC site.

Exhibit 3-22
Habitat Types

Transmission Line. Upgrading the transmission line may create some vegetation impacts from access, staging, and construction, but these impacts would be temporary. Disturbed areas would be revegetated with native plant materials once construction is completed.

Some limited permanent vegetation impacts may occur if existing vegetation clearance zones are narrower than required for 230kV lines. These areas will be identified during the design of the transmission corridor. Additional new permanent vegetation clearing and management would be minimal because the corridor already contains either multiple transmission lines that would be combined on single tower structures or they traverse fields and developed lands where no further tree removal is required.

The remaining few areas that may require additional new permanent vegetation clearing would be limited to those sections of the corridor where single tower 115kV lines traverse forested habitats. Single tower 115kv lines contain the narrowest corridors and higher voltage lines have wider corridors. Transmission line impacts also will be addressed and mitigated by the utility owners during transmission line design and permitting.

Wetland Mitigation Site. The wetland mitigation site is proposed as mitigation for permanent wetland impacts associated with the railroad spur wetland fill. Construction at the wetland mitigation site would alter the present wetlands and open space habitat to create improved habitat structure and species diversity. This would be achieved by creating additional wetland area, seeding or planting native grasses, sedges, and rushes, reducing invasive species presence, and creating scrub-shrub and/or forested communities interspersed across the site. Overall, the results of construction at the wetland mitigation site will be an improvement over existing conditions.

Operational Impacts

PMEC Site. No impacts are anticipated to occur to habitat or vegetation during operation of the PMEC site.

Natural Gas Pipeline. No impacts are anticipated to occur to habitat or vegetation during operation of the natural gas pipeline. There would be no areas where trees would have to be removed over the pipeline to maintain visibility for inspections.

Railroad Spur. No impacts are anticipated to occur during operation of the railroad spur. Periodic maintenance of the railroad spur is expected every several years based on railbed inspections. Temporary minor water quality disturbances could potentially occur in the adjacent wetland from the replacement of ballast or crossties.

Transmission Line. No additional impacts are anticipated to occur to habitats during operation of the transmission line. Vegetation clearance zones will continue to be maintained free of trees and tall shrubs.

Wetland Mitigation Site. No impacts are anticipated to occur to habitat or vegetation during operation of the wetland mitigation site.

Priority Habitats in Project Vicinity

The PMEC would not be constructed or operated in priority habitats except for the wetlands described above.

Mitigation Measures – Habitats and Vegetation

Proposed Action

The mitigation sequence is avoidance, minimization, and compensation. Many impacts to high quality habitats have been avoided by siting the development in an area that is already largely industrial. The development would also minimize impacts to the riparian habitat adjacent to the Kalama River by drilling the natural gas pipeline under the river.

To minimize the spread of non-native species all machinery would be washed before working in or adjacent to sensitive habitats (wetlands and riparian area).

Impacts to wetland habitats from construction of the railroad spur would require mitigation and is discussed below in Section 3.4.2.

Significant Unavoidable Adverse Impacts – Habitats and Vegetation

No Action Alternative

No significant unavoidable adverse impacts to habitats or vegetation would occur from selecting the No Action alternative.

Proposed Action

No significant unavoidable adverse impacts to non-wetland habitats or vegetation would occur from selecting the Proposed Alternative. Wetlands are addressed in Section 3.4.2.

3.4.2 Wetlands

Affected Environment – Wetlands

There are two wetland areas on the PMEC site and several others adjacent to the site. There is a wetland lobe containing a backwater channel of the Columbia River that the Port of Kalama is pursuing a permit to fill. There is one wetland that would be crossed by the proposed railroad spur. Additional wetlands were identified along the natural gas pipeline and electricity transmission routes.

A wetland reconnaissance was conducted at the PMEC site and along the proposed pipeline and railroad spur corridors. The transmission line corridor was not included in the reconnaissance because it will be permitted and upgraded independently by BPA and Cowlitz County PUD.

Wetlands to be filled or affected by the project also were delineated and rated according to USACE and Ecology guidelines. The wetland lobe at the PMEC site is described in further detail in the Port of Kalama North Port Site Development Project Draft Wetland Mitigation Plan (Anchor Environmental 2006). The Pacific Mountain Energy Center Wetland Delineation Report (URS 2007b) describes the wetlands in or adjacent to the project components, excluding the transmission line.

PMEC Site

One wetland lobe of a backwater channel of the Columbia River extends onto the PMEC site along the north edge of the

site (Exhibit 3-22). This delineated Category I wetland is a 2.1-acre palustrine emergent wetland dominated by slough sedge (*Carex obnupta*), reed canarygrass (*Phalaris arundinacea*), and yellow flag iris (*Iris pseudacorus*) (Anchor Environmental 2006). A sloping upland fringe of black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) is present around the edge of the wetland. The wetland's hydrology is controlled by the tidal elevation of the Columbia River. This wetland is a moderate to high functioning wetland for habitat, water quality, and flood/erosion control. The Port of Kalama submitted a permit application to fill this wetland independently of the PMEC. Therefore, the wetland presumably will not be there at the time PMEC construction begins.

Natural Gas Pipeline

The wetland reconnaissance located two wetlands adjacent to the natural gas pipeline (URS 2007b). Wetland delineations were not conducted because no impacts or fill are anticipated. The first wetland is situated between Hendrickson Drive and the Columbia River directly south of the existing Conagra Kalama Export rail yard (Exhibit 3-22). It contains palustrine emergent and palustrine scrub-shrub communities. The emergent community is dominated by reed canarygrass and the scrub-shrub community contains multiple species of willow (*Salix* spp.), reed canarygrass and yellow flag iris. The wetland sits in a depression surrounded by development to the north and south, Hendrickson Drive on the east, and a levee on the west that prevents flooding from the Columbia River. The wetland does not have a direct surface water connection with the Columbia River, and it is undocumented whether there may be a groundwater interaction related to tidal changes in the Columbia River. Port of Kalama staff explained this wetland has a culvert leading under Hendrickson Drive to a ditch that drains to the Kalama River, but no culvert or ditch connection could be located during field investigations. This wetland is a moderate functioning wetland for habitat and water quality but rates low for flood/erosion control.

The second wetland complex is in the riparian corridor associated with both shorelines of the Kalama River (Exhibit 3-22). On the north shoreline of the river is a large palustrine forested wetland dominated by black cottonwoods and Oregon ash (*Fraxinus latifolia*). This wetland is bordered by the BNSF railroad to the east, the Kalama River to the south and west, and West Kalama River Road to the north. Wetland hydrology is directly influenced by the high groundwater table and occasional flooding of the adjacent Kalama River. This wetland is a high functioning wetland for habitat, water quality, and flood/erosion control.

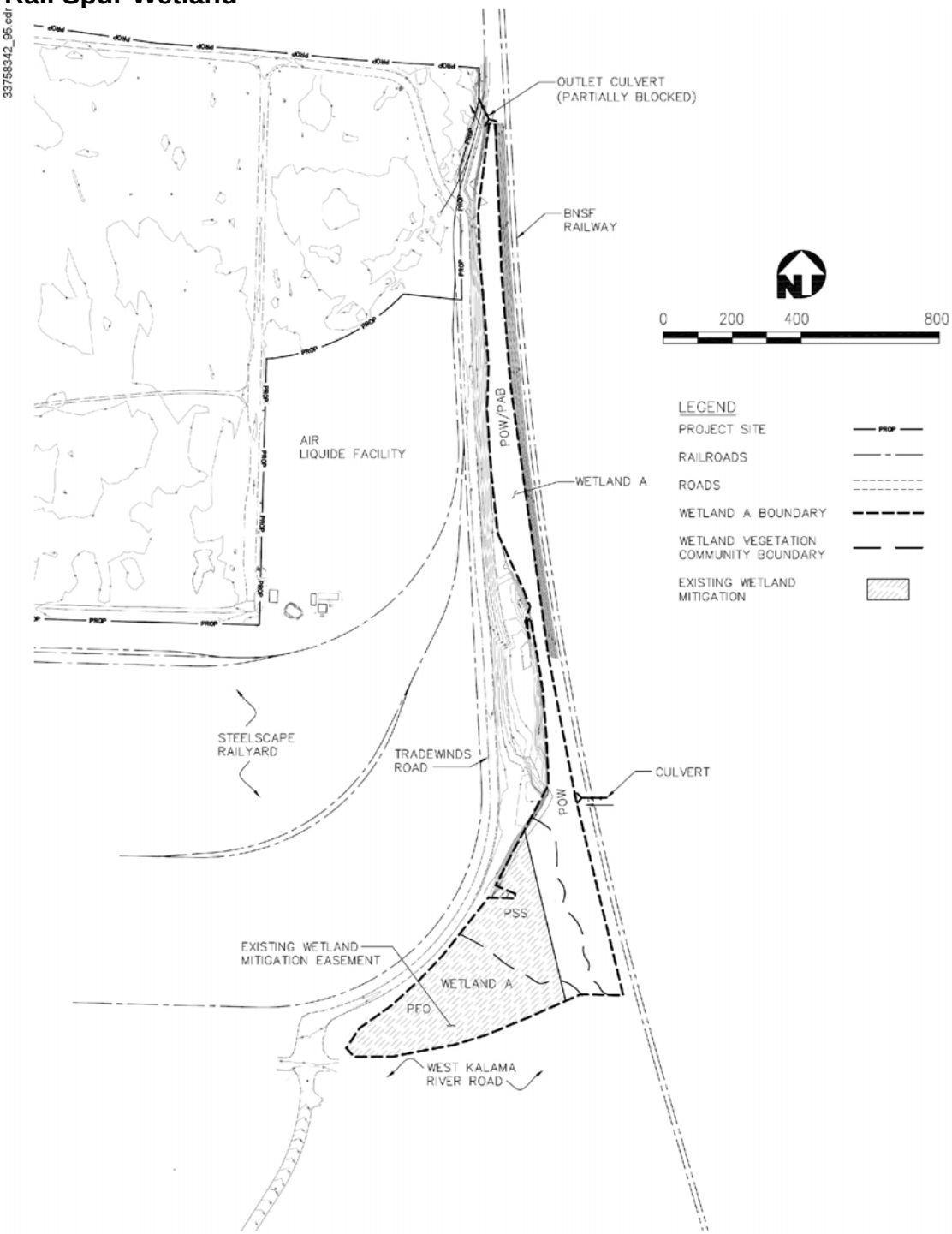
On the south shoreline is a crescent shaped wetland complex bounded by the river to the north and a levee to the south. The levee was built by the Port of Kalama to control the Kalama River's flood waters. This wetland is a palustrine emergent and scrub-shrub wetland dominated by black cottonwoods, red-osier dogwood (*Cornus sericea*), multiple willow species, hardhack (*Spiraea douglasii*), red elderberry (*Sambucus racemosa*), and reed canarygrass. The wetland's hydrology corresponds with the Kalama River's hydroperiod. This wetland is a high functioning wetland for habitat, water quality, and flood/erosion control.

Railroad Spur

One 8.86-acre Category II palustrine wetland complex is present within the rail spur alignment (URS 2007b). It is confined by developed lands to the west and north, the BNSF railroad to the east, and West Kalama River Road to the south (Exhibit 3-22 and Exhibit 3-23). At the north end, the water level appears to be controlled by a beaver dam.

Exhibit 3-23

Rail Spur Wetland



This seasonally to permanently flooded palustrine wetland (Cowardin et al. 1979) contains forested, scrub-shrub, emergent, aquatic bed, and open water communities. It is characterized as a depressional wetland using the hydrogeomorphic classification system. Based on its position in the landscape, this wetland most likely functioned as a palustrine depressional or palustrine riverine wetland on the Columbia and/or Kalama River floodplain before human activities altered the landscape.

The hydrology of this wetland has been altered by a blocked outlet at the north end that appears to be a beaver dam. Excess ponding of water in the wetland has altered the vegetation communities present in the wetland. Dead trees seen in historical aerial photos indicate that this wetland was previously dominated by a small palustrine emergent community and extensive palustrine scrub-shrub and palustrine forested communities. Current hydrologic conditions have resulted in large open water and aquatic bed communities, a smaller scrub-shrub community, and a limited forested wetland community.

The dominant plant species include reed canarygrass, red-osier dogwood, Sitka willow (*Salix sitchensis*), Pacific willow (*Salix lucida* ssp. *lasiandra*), black cottonwood, and Oregon ash. This wetland has a high functions rating for habitat and water quality but a low rating for flood/erosion control because of its position along the tidally influenced section of the Columbia River. A portion of the wetland is currently set aside in an existing wetland mitigation conservation easement for previous Port of Kalama land development (Exhibit 3-23). The conservation easement is located outside the proposed PMEC wetland impact footprint. This wetland is described in greater detail in the Pacific Mountain Energy Center Wetland Delineation Report (URS 2007b).

Transmission Line

A wetland reconnaissance and delineation were not conducted along the transmission line by PMEC. A review of available photos and maps, including the National Wetlands Inventory,

identified that the existing transmission line currently passes through several wetland complexes. Two large wetland complexes occur along the proposed transmission line route. The first is located between I-5 and the Cowlitz River and is mapped to contain palustrine emergent, scrub-shrub, and/or forested vegetation communities.

The second wetland is located east of the PMEC site, north of Kalama River Road and southwest of Old Pacific Highway South (Exhibit 3-22). The BPA's Cardwell Substation lies directly east of this large wetland complex. I-5 and the BNSF railway bisect this wetland complex. Palustrine emergent communities dominate these wetlands east of I-5. Palustrine scrub-shrub and forested communities dominate the wetlands between the PMEC site and I-5. The railroad spur wetland described above makes up the westernmost portion of this wetland complex between the PMEC site and the BNSF railroad.

Additional smaller wetlands are present at several locations along the transmission corridor. The transmission line corridor is already maintained to remain clear of trees as a utility ROW. The hydrology, soils, and functions of these wetlands vary depending on landscape position, hydrogeomorphic characteristics, habitat structure, and species use. The existing transmission lines are strung on single pole steel or on H-style wooden pole structures. Existing poles are located in wetlands and uplands along the proposed route.

Wetland Mitigation Site

The proposed wetland mitigation property is an approximately 15 acre bottomland parcel (11 acres of land and 4 acres of river) in the lower floodplain of the Coweeman River. The proposed mitigation property is situated on a relatively flat bend in the Coweeman River with the river surrounding three sides of the parcel (Exhibit 3-21). Hydrology is strongly influenced by the river. Periodic high water events overtop the river's banks with some floodwaters getting captured on the mitigation site when river flows subside.

The Coweeman River nearly dries up in the summer. Studies indicate, though, that the river continues to flow because the height of tide crests at RM 4, which coincides with the northwest corner of the proposed mitigation site at the confluence of the river with a large backwater channel.

Vegetation is dominated by tall fescue (*Festuca arundinacea*), bentgrasses (*Agrostis* spp.), reed canarygrass, and scattered Oregon ash trees. Reed canarygrass is present along the riverbanks and in a small area at the center of the site where surface water collects, but it does not dominate the site.

One palustrine emergent wetland less than 0.5 acre in size is located in the middle of the proposed wetland mitigation area. This wetland is dominated by the reed canarygrass and provides limited functions with the exception of periodic flood storage. Discussions with the regulatory agencies would confirm the suitability of this site for wetland mitigation. As part of the permitting consultation, a full delineation, wetland rating, and functions analysis would be completed for the wetland.

Other Nearby Wetlands

A large tidally influenced wetland complex is present directly north of the PMEC site (Exhibit 3-22). This wetland complex contains the 2.1-acre wetland that extends onto the PMEC site that will be filled by the Port. Hydrology of the wetland complex is controlled by the tidal fluctuation and the flow regime of the Columbia River. Vegetation includes black cottonwood, red alder (*Alnus rubra*), willows, and red-osier dogwood. Two invasive species, reed canarygrass and yellow flag iris, dominate the understory of this wetland.

Environmental Impacts of the No Action Alternative – Wetlands

No new impacts to wetlands in the project component areas would occur, beyond the Port's filling of the 2.1-acre wetland lobe, if the No Action alternative is selected. Existing land uses are anticipated to continue, which include mowing the wetlands along portions of the transmission line corridor. Continued rapid regional growth may encourage other

unrelated uses and impacts to the component areas if this project is not constructed.

Environmental Impacts of the Proposed Action – Wetlands

Construction Impacts

PMEC Site. No new construction or operation impacts to wetlands are anticipated for the PMEC site itself.

Natural Gas Pipeline. Construction of the natural gas pipeline is not expected to permanently impact wetlands. The pipeline would be constructed within the existing road ROW for most of its length. The pipeline and its associated work zone would remain outside the fence that protects the wetland between Hendrickson Drive and the Columbia River just south of the existing rail yard. The proposed route would follow Hendrickson Drive north and a constructed levee west around the Kalama River's south shore. It would be drilled under the Kalama River using HDD in the vicinity of the Hendrickson Drive bridge. After crossing the Kalama River, the pipeline would continue along Tradewinds Road to the PMEC site. This route would avoid any permanent wetland impacts to the riparian wetlands on either side of the Kalama River and the 8.86-acre wetland southeast of the PMEC site.

Temporary wetland impacts may occur incidental to using HDD technology to drill under the Kalama River. The lowest reach of the Kalama River is situated in the Columbia River floodplain, which is underlain by very deep sands at this location. If a frac-out occurred, temporary discharges of material into the wetlands would be limited to drilling slurry, used to maintain pressure and lubrication during the drilling, escaping through the sands and geologic fractures to the wetland surface. The location and quantity of drilling slurry that might escape are not known until it occurs. Any slurry that may escape during a frac-out would be removed from the wetlands and the wetlands would be returned to pre-existing conditions, unless those actions are judged by regulatory agencies to have more impacts than leaving the material for natural dissipation.

Railroad Spur. Construction of the railroad spur as proposed would permanently fill about 1.3 acres of Category II palustrine scrub-shrub, emergent, and open water wetland associated with the 8.86-acre wetland southeast of the proposed PMEC site. Permanently filling a portion of this wetland would not alter the hydrologic functions of the wetland. The existing inlets and outlets would not be altered. Culverts would be placed appropriately along the railspur that would continue allowing permanent hydrologic connections within the remaining wetland area. Some habitat functions may be reduced, including vegetation community interspersion. Overall, the habitat function would remain relatively similar to existing conditions because most of the wetland buffers, the significant habitat features, and habitat structure would not be affected by construction of the railspur through the wetland.

Temporary impacts may include dewatering an interior portion of the wetland slightly larger than the permanent impact area to create access for construction of the railroad spur. BMPs would be used to eliminate water quality problems, including turbidity, sediment escape, and invasive species control.

Transmission Line. When the final route is determined, a wetland delineation would be conducted to identify and map the locations of wetlands. Many of the wetlands along the proposed transmission line route are small enough that the towers can be positioned to avoid wetland impacts. The two large wetland complexes where the transmission line would cross I-5 at the north and south ends of the route are large enough that they may be impacted by placement of towers, depending on the extent of wetland conditions and the lengths of spans. Temporary and permanent wetland impacts would occur from construction of transmission line towers in wetlands.

Temporary impacts would include those that may be required for staging and construction of the new transmission line towers. All access would occur via an existing access road paralleling the current transmission line. Material staging and construction would be completed whenever possible in

uplands. Any temporary staging and construction zones proposed to be used in wetlands would require clearing woody vegetation to prepare a suitable work pad for assembly crews and cranes to operate safely. This work would be performed during the drier months to avoid and minimize water quality concerns from runoff. Any surface disturbance in temporary work areas in wetlands would be restored to pre-existing conditions when construction is complete.

Permanent impacts could result from the placement of upgraded or new transmission line towers in the largest wetlands where the distance between upland placed towers is too far. Each tower would have a footprint of less than one hundred square feet. A conservative estimate is that ten transmission line towers may be placed in wetlands for a total wetland fill of 1,000 square feet of permanent impact. This is a high estimate, assuming the largest wetlands do not contain upland patches where the transmission line towers can be constructed. Smaller wetlands would be avoided by spanning the transmission line over them.

Permanent vegetation clearing impacts within wetlands along the proposed transmission corridor would not occur because this corridor is already maintained to be clear of trees to protect the existing transmission lines.

Proposed Wetland Mitigation Site. Wetland mitigation construction at the proposed wetland mitigation site would affect one palustrine emergent wetland less than 0.5 acre in size. This wetland would remain a wetland but would be incorporated into a larger proposed wetland mitigation area to compensate for permanent wetland impacts associated with the PMEC project. This wetland would be permanently altered via removal of the dominant invasive species, grading and contouring of the soils, and replanting of native vegetation and habitat features as part of a proposed wetland mitigation. The wetland's functional values would be significantly increased by improvements to its habitat, water quality, and hydrologic functions.

Actual wetland mitigation design would be subject to requirements established by the permitting agencies during the permit consultation process.

Nearby Wetlands. No temporary or permanent impacts would be proposed to occur in nearby wetlands not already described above.

Operation Impacts

PMEC Site. No new construction or operation impacts to wetlands are anticipated for the PMEC site.

Natural Gas Pipeline. No impacts to wetlands are anticipated for operation of the natural gas pipeline.

Railroad Spur. No operational impacts to wetlands are expected because no discharges to wetlands are anticipated.

Transmission Line. No new impacts are anticipated for the operation of the transmission line. The current vegetation maintenance practices in the transmission corridor would continue to occur.

Proposed Wetland Mitigation Site. No new or unintended impacts are anticipated once the wetland mitigation site is constructed.

Nearby Wetlands. No temporary or permanent impacts would be proposed to occur in nearby wetlands not already described above.

Mitigation Measures – Wetlands

No Action Alternative

No mitigation measures associated with the PMEC are required for the No Action alternative. The Port of Kalama will be constructing wetland mitigation to offset impacts for 2.1 acres of wetland fill in the North Port Industrial Area.

Proposed Action

Wetland impacts associated with the construction of the PMEC would be mitigated by applying the mitigation sequence shown below. This sequencing approach to mitigation alternatives is described in a Memorandum of Agreement between USEPA

and USACE (USACE 1990). The actions listed below are in order of preference where all forms of the more preferred mitigation (i.e., avoidance) must first occur in the planning process before the less preferred forms of mitigation (i.e. compensation).

- ***Avoidance:*** The proposed PMEC site was chosen in part because it impacts fewer wetlands and waters of the US than other alternatives. The PMEC footprint was designed to avoid extensive higher quality wetlands to the north. The proposed pipeline route was chosen because it could be built along an already developed urban utility corridor and drilled under existing wetlands and waterways. Other pipeline alternatives would have to be constructed through wetlands, unstable or steep slopes, undeveloped forest lands requiring permanent ROW clearances, and residential communities. The proposed transmission line route would avoid and minimize wetland impacts by upgrading an existing electricity transmission line. This would allow the PMEC project to use existing impacted lands, eliminating the requirement to clear trees and shrubs that would reduce habitat functions in other unaltered wetlands.
- ***Minimization:*** The railroad spur was aligned to minimize its impacts on the wetland between the PMEC site and the BNSF railroad. The transmission line route would upgrade the existing smaller H-style wooden poles with taller single column steel towers. The steel towers can span greater distances, minimizing the potential number of structures built in wetlands.
- ***Rectification:*** Any authorized temporary impacts or unintentional, unauthorized impacts to sensitive areas that may occur during construction would be repaired and rehabilitated as appropriate. Temporary wetland disturbances associated with the PMEC construction may include dewatering an interior portion of the wetland where the railroad spur would be constructed, impacts from a possible frac-out in the Kalama River and its associated wetlands, or from access, staging, and construction of the

transmission line. Temporarily disturbed areas would be restored to pre-construction conditions.

- ***Compensation:*** Unavoidable impacts to wetlands would be compensated by Energy Northwest. The PMEC would establish a wetland mitigation conservation easement on about fifteen acres of floodplain along the lower Coweeman River in Kelso, Washington (Exhibit 3-21). The proposed mitigation would enhance existing and create additional wetlands at the proposed wetland mitigation site. The plan would include excavating one to four feet of soil material from the lowest part of the site, including the existing wetland to connect with the backwater channel north of the proposed mitigation site. This design would replace the habitat and water quality functions that would be permanently impacted by the PMEC project and provide additional hydrologic and habitat functions in excess of what would be lost by the project. The design would provide improved habitat for waterfowl, amphibians, and wetland mammals in the lower Coweeman River corridor and would provide seasonal off-channel fish habitat when salmonids most commonly use the Coweeman River during winter and spring. The proposed wetland would be designed to drain as tides and river levels recede so as not to trap fish, thus protecting listed species that may use the site. Actual wetland mitigation design, category, and ratings would be subject to requirements established by the permitting agencies during the permit consultation process.

Significant Unavoidable Adverse Impacts – Wetlands

No Action Alternative

One 2.1 acre wetland is proposed to be filled by the Port of Kalama under the No Action Alternative. Continued regional growth not associated with the PMEC would continue to impact wetlands and wetland functions under the No Action Alternative. No PMEC-related wetland impacts would occur by choosing this alternative

Proposed Action

No significant unavoidable adverse impacts to wetlands would occur from selecting the Proposed Alternative. All temporary and permanent wetland impacts would be mitigated as required by federal, state, and local regulations.

3.4.3 Terrestrial Species

URS biologists conducted a field survey on April 11, 2006 to locate and identify wildlife present in or near the proposed project. Biologists also investigated the habitat suitability of each project site for various listed and non-listed wildlife species. A walking and driving investigation was performed along the pipeline and railroad spur alignments and at the proposed PMEC site. Additional observations of the railroad spur wetland were made on August 31, 2006 and January 20, 2007. Detailed habitat descriptions for the PMEC site, the pipeline corridor, the railroad spur, and the proposed wetland mitigation site are presented above in the Habitat and Wildlife section.

Special Status Species

Presence and distribution information related to special status terrestrial species found in or near the project was obtained from USFWS and the WDFW. Columbia white-tailed deer (*Odocoileus virginianus leucurus*) is the only state endangered species documented to occur in the project vicinity. The bald eagle (*Haliaeetus leucocephalus*) is the only state threatened species documented to occur in the project vicinity. Bald eagles, purple martin (*Progne subis*), and Columbia white-tailed deer are the only federally listed endangered, threatened, or candidate species documented to occur in the project vicinity (USFWS 2005, WDFW 2006). None have been documented in any of the development areas of the project.

Affected Environment – Terrestrial Species

PMEC Site

Open industrial habitat and a small gravel pit in the northwest corner dominate the PMEC site. Song sparrows, crows, and osprey were the only species observed using the PMEC site during the April 11, 2006 site investigation. The sparrows use the Scot's broom for nesting and roosting. A pair of nesting

osprey uses a man-made nesting platform installed at the northeast corner of the PMEC site. Ospreys are observed to regularly use the Columbia and Kalama Rivers for foraging. No evidence of other bird species use was found at the PMEC site. Small mammals may use the site for nesting and foraging but no evidence was found to confirm this use. Large mammals may pass along the edges of the PMEC site but there is no suitable forage or cover compared with habitats to the north and east of the PMEC site. There is no suitable habitat at the PMEC site for amphibians or amphibian dispersal. Snakes may search the PMEC site for small mammal or avian prey, especially the project edges and the Scot's broom habitat in the west portion of the PMEC site.

WDFW documents this section of the Columbia River adjacent to the PMEC site between the mouth of the Kalama River at the south and the Columbia River channel east of Cottonwood Island to the north as active overwintering habitat for large concentrations of waterfowl, primarily diving ducks (WDFW 2006). WDFW documents at least five osprey nests in this same stretch of the Columbia River.

A large tidal wetland complex connected with the Columbia River is adjacent to the north boundary of the proposed PMEC site. It provides excellent foraging, migration, and nesting habitat for guilds of diving ducks, dabbling ducks, shorebirds, cavity nesting birds and other waterfowl. A small 2.1-acre lobe of this wetland complex extends into the PMEC site. This small lobe is the southern terminus of a backwater channel. It contains emergent vegetation, no open water habitat, and is flooded only during high tide. It provides some shelter, foraging, and nesting opportunity for mammals and birds. The Port under its long-range planning has proposed to fill this wetland under separate application. The impacts and mitigation associated with the Port's planned development are being analyzed under a separate SEPA action.

One bald eagle nest site is listed to occur about 0.8 mile north of the PMEC site on the east bank of Cottonwood Island in the Columbia River (WDFW 2006). The line of sight from the

nest to the PMEC site is obstructed by cottonwoods and red alders growing on the island and in the wetlands directly north of the project. Eagles are known to perch and forage on and near the PMEC site (Anchor Environmental 2006). The PMEC site contains a few cottonwoods that might be used for perching to view the Columbia River and wetlands north of the PMEC site. Eagles may stand on the ground along the Columbia River at the PMEC site when feeding on caught prey, but this is not likely because of the daily activities taking place at the Steelscape loading dock adjacent to the PMEC site.

The small wetland lobe is the only suitable habitat for Columbian white-tailed deer on the PMEC site. No Columbia white-tailed deer are documented to use the PMEC site or adjacent wetlands. No deer were observed during the April 2006 field investigation.

Natural Gas Pipeline

The pipeline is proposed to be buried in the Hendrickson Drive and Tradewinds Road ROWs. Properties along the Hendrickson Drive and Tradewinds Road ROWs are dominated by industrial and open industrial habitat types or the BNSF/Union Pacific rail mainline. These habitat types contain minimal forage, nesting, or roosting habitat to support wildlife. Species observed in these habitats during the field investigation include American robins, crows, sparrows, and killdeer.

The pipeline would be constructed adjacent to one wetland and drilled under the Kalama River riparian corridor. WDFW documents these wetlands and riparian areas as priority habitats containing nesting goldeneyes, wood ducks, other cavity nesting birds, great blue herons, redtailed hawks, band tailed pigeons, and geese (WDFW 2006). These wetlands also provide stopover or overwintering habitat for migrating birds and waterfowl. Species observed in the wetlands and riparian corridor during field investigations include Canada geese (multiple subspecies), mallards, great blue herons, Swainson's thrush, crows, and a red breasted sapsucker.

No endangered, threatened, or candidate species are documented to nest in or adjacent to the pipeline route. Bald

eagles are likely to forage and feed on the gravel bars and the riparian corridor of the Kalama River where suitable perch trees are present that provide locations for observation and predation along the river.

Railroad Spur

The railroad spur alignment is proposed to be constructed northwest from the BNSF rail mainline where it crosses under West Kalama River Road to the PMEC site. This alignment passes through wetland habitat that supports foraging, nesting, and over-wintering habitat for many wildlife species. The April 11 and 12, 2006 field investigations identified belted kingfishers, great blue herons, Canada geese, wood ducks, mallards, red-winged blackbirds, Swainson's thrush, a garter snake, and a bullfrog in the wetland. Evidence of pileated woodpeckers was noted by the common presence of their foraging cavities in standing snags.

WDFW documents the south half of the wetland as priority habitat containing cavity nesting birds (WDFW 2006). Field observations confirm the presence of active nesting by wood ducks, mallards, and Canada geese. These wetlands also provide stopover or over-wintering habitat for migrating birds and waterfowl.

No endangered, threatened, or candidate species are documented to nest in or adjacent to the railroad spur alignment (WDFW 2006). Bald eagles are likely to perch or forage in the wetland.

Electricity Transmission Line

The proposed approximately 12-mile transmission line would upgrade an existing two pole H-style wooden 115kV electricity transmission line that averages 60 feet tall with a 90-foot-tall single steel tower 230kV system for the PMEC project. The existing transmission line currently passes through industrial, open industrial, riparian, and wetland/open space habitats. The transmission corridor is maintained clear of trees and tall shrubs for a width of about 100 feet. A wildlife presence survey of the transmission line route has not been conducted,

but based on the habitats, it would be reasonable to expect the same species as found in the site areas that have been surveyed.

Wetland Mitigation Site

The proposed wetland mitigation property is an approximately 15-acre bottomland parcel (11 acres land and 4 acres river) in the lower floodplain of the Coweeman River dominated by wetlands, open space, and aquatic habitat. The proposed mitigation property is situated on a relatively flat bend in the Coweeman River with the river surrounding three and a half sides of the parcel (Exhibit 3-21). One palustrine emergent wetland less than about 0.5 acre in size is located in the middle of the proposed wetland mitigation area. The site's vegetation is dominated by tall fescue (*Festuca arundinacea*), bentgrasses (*Agrostis* sp.), reed canarygrass (*Phalaris arundinacea*), and scattered Oregon ash trees (*Fraxinus latifolia*). This wetland is dominated by reed canarygrass and provides limited functions except periodic flood storage and possibly some seasonal groundwater discharge.

There were no terrestrial species observed using the proposed wetland mitigation site during the December 13 and 28, 2006 site visits. There was evidence of use by Canada geese. On adjacent properties with similar habitat attributes, gadwalls, Canada geese, mallards, and buffleheads were observed individually and/or in large concentrations. There was no open water habitat, islands, standing snags, or other suitable nesting sites inaccessible from the proposed site to provide breeding or foraging (except geese) habitat for most waterfowl. Floodplain areas upstream from the wetland mitigation site are documented to be used by wintering elk. The wetland mitigation site contains similar suitable habitat, but adjacent development may prevent elk from using the site. Though none were observed during the field visit, other birds including sparrows, kingfishers, blackbirds, and various grassland and shrubland associated species may use the site at various periods during the year.

Environmental Impacts of the No Action Alternative – Terrestrial Species

No new impacts to the wildlife would occur in the project component areas if the No Action alternative is selected.

Environmental Impacts of the Proposed Action – Terrestrial Species

Construction Impacts

PMEC Site. Construction of the PMEC would have some impact on listed and non-listed species. Construction of the project would reduce the quantity of low quality foraging, perching, and other habitat for the present non-listed ground dwelling species but would create roosting and nesting opportunity for other species of birds that nest on buildings. The habitat being lost at the PMEC is low quality compared to the more abundant higher quality habitat available adjacent to the PMEC site or found up or down river.

Background conditions include the Steelscape manufacturing facility and shipping dock, the BNSF railroad, I-5, and other Port of Kalama manufacturing and shipping activities. Noise, light, and visual disturbance related to traffic and construction of the PMEC site would be temporary and would not exceed existing background levels currently observed at or adjacent to the PMEC site.

Increased traffic from construction would add additional activity and noise to the PMEC site, but is not likely to affect adjacent habitats. A very thick border of trees, shrubs, and vines effectively blocks the noise, light and visual disturbance from existing Port activities adjacent to the PMEC site.

Construction of the PMEC site would have no adverse impact on terrestrial endangered, threatened, or candidate species. Bald eagles would not be adversely affected by construction at the PMEC site. The nearest eagle nest is greater than 0.5 mile away with trees visually blocking the nest site from light glare and noise. The limited perching and roosting available in the wetland on site will be lost, but additional perching and roosting trees with views of the Columbia River backwater channels and a very extensive wetland complex are available

immediately north of the PMEC. There is no suitable bald eagle foraging habitat on the PMEC site. If eagles do feed on the Columbia River shoreline next to the existing Steelscape dock, they would be displaced by the PMEC construction, but extensive available feeding grounds are located immediately north of the PMEC site.

Columbia white-tailed deer do not use the PMEC site or the wetlands directly north of the PMEC site. Purple martins do not use the PMEC site, but may nest in cavities or forage over the Columbia River and wetlands north and east of the PMEC site.

Natural Gas Pipeline. Most pipeline work is expected to occur within the paved or gravel road ROW. Based on the depth and length required to drill under the Kalama River, drilling and staging stations would be placed at least several hundred feet outside of the Kalama River riparian corridor. Drilling also would avoid disturbing habitats or wildlife in the river and its shoreline habitats.

In addition, no trees are expected to be removed for construction of the pipeline. Therefore, impacts to migratory birds (under the Migratory Bird Treaty Act of 1918) are not expected from construction of the pipeline route.

No permanent loss of individuals or habitat would occur from construction of the pipeline. All construction would occur within the existing road ROW. Temporary loss of habitat from construction would displace some species of small mammals, garter snakes, and small birds that utilize these marginal quality roadside habitats. These temporary habitat losses would be replanted with native vegetation during the same growing season after construction is completed.

Construction of the pipeline would not adversely impact endangered, threatened, or candidate species. Bald eagles are the only listed species in the vicinity. Pipeline construction would be under the river, thereby avoiding disturbance to eagles using the river. No purple martin, deer, or suitable habitat for either species is present in or near the pipeline route.

Railroad Spur. Permanent impacts from construction of the railroad spur as proposed would fill about 1.3 acres of palustrine scrub-shrub, emergent, and open water wetland within the 8.86-acre wetland southeast of the proposed PMEC site. The alignment was designed to minimize wetland fill and avoid significant habitat features. Wetland impacts will be limited to open water and a small section of scrub-shrub wetland. Permanently filling this portion of the wetland and using culverts to maintain hydrologic connections would reduce the hydrologic functions and special habitat characteristics found in the rail spur wetland. The existing inlets and outlets would not be altered. Some habitat functions may be reduced, including vegetation community interspersion between the scrub-shrub and open water communities. Overall, the habitat function will remain relatively similar to existing conditions because the wetland buffers, significant habitat features, and habitat structure will not be affected by construction of the rail spur through the wetland. By not altering the habitat structure, hydrology, and significant habitat features, there would be limited impacts to breeding amphibians and nesting waterfowl, including wood ducks, mergansers, geese and other species of waterfowl and cavity nesting birds.

Construction of the railroad spur would not adversely impact endangered, threatened, or candidate species. Bald eagles, the only listed species in the vicinity that may use the wetland, would likely continue to use the wetland. Several cavity nesting snags are available in the railroad spur wetland suitable for purple martins. The proposed rail spur may remove some snags and live trees depending on the final alignment and width of the rail spur. The rail spur does fill a portion of the wetland that offers suitable forage habitat immediately adjacent to the cavity trees. No Columbian white-tailed deer or suitable deer habitat is present in or near the route.

Temporary construction impacts may include dewatering an interior portion of the wetland slightly larger than the permanent impact area to create access for construction of the

railroad spur. BMPs would be used to eliminate water quality problems, including turbidity and sediment escape, and to control invasive species.

Transmission Line. Transmission line construction would create no permanent impacts to wildlife. No additional vegetation or land clearing would be required since the proposed route would upgrade an existing transmission line. Temporary impacts would primary result from displacement of wildlife from the localized area where and when construction is occurring.

Wetland Mitigation Site. No permanent impacts to wildlife are anticipated to occur during construction of the proposed wetland mitigation site. Wildlife that may use the site for foraging, roosting, or loafing would be displaced to similar adjacent habitats immediately east and west of the mitigation site.

Operation Impacts

PMEC Site. Overall, noise disturbance and air quality related to operation of the PMEC would be similar to existing background levels already present in this industrial vicinity. Light and visual disturbance would locally increase once operation of the PMEC begins but not beyond the existing background levels. The PMEC site has limited use with random occasional vehicle traffic and periodic railroad traffic all concentrated at the east edge of the PMEC site near Tradewinds Road. Operational vehicle and railroad traffic would increase at the PMEC site, but the lack of suitable habitat would limit the potential for wildlife losses from vehicle collisions. In operation, the project would eliminate the open space buffer that the wetlands north of the project currently have from light and visual disturbance at the adjacent Steelscape facility.

Natural Gas Pipeline. No impacts are anticipated to occur to wildlife during operation of the buried natural gas pipeline.

Railroad Spur. The BNSF railroad runs up to 60 trains a day at high speed past the railroad spur wetland. The few trains a

week that would move slowly through the wetland would be within the background conditions for this wetland. Additionally, the scrub-shrub community that borders the proposed railroad spur would act as a visual and noise buffer for the wildlife using the larger southwest corner of the wetland. There is slight potential for coal and petcoke feedstock to spill from railcars while the train is passing through the wetland. The very small quantity of feedstock that might accidentally spill from a railcar over time would not provide enough impacts to impair water quality in the wetland beyond background levels.

Transmission Line. No operational impacts are expected to occur to wildlife using the transmission line corridor. The transmission line would be raised from about 60 feet to 90 feet above the ground, placing them further in the path of birds flying above the treetops. Although the increased height may put the line within flight paths, the impact may be offset by the larger diameter, more visible 230 kV line.

Wetland Mitigation Site. Overall, wildlife habitat structure and functions would improve from preconstruction conditions. The vegetation communities and structure would be improved by the addition of interspersed shrub and tree communities. The non-native herbaceous ground cover would be supplemented with various native sedges, rushes, and other herbs. The site would be graded to provide backwater habitat for salmon and steelhead migrating up the Coweeman River.

Mitigation Measures – Terrestrial Species

Proposed Action

Dust reduction measures would be implemented to reduce airborne particulate matter during construction. Permanent impacts related to light pollution during facility operation would be mitigated with the installation of shielded lighting fixtures that direct light away from the wetland north of the PMEC site.

Mitigation for losses associated with the approximately 1.3 acres of wetland habitat and habitat functions would be addressed in conjunction with required compensatory wetland

mitigation for the 1.3 acres of permanent wetland loss from the railroad spur construction. The wetland mitigation project would address the wildlife habitat quality and functions being lost by creating vegetative and habitat structure and diversity that would provide cover, forage, and breeding areas for amphibians, small and large mammals, and various guilds of birds.

Significant Unavoidable Adverse Impacts – Terrestrial Species

No Action Alternative

No significant unavoidable adverse impacts to wildlife would occur from selecting the No Action alternative.

Proposed Action

No significant unavoidable adverse impacts to wildlife would occur from selecting the Proposed Alternative. All temporary and permanent wetland impacts would be mitigated as required by federal, state, and local regulations.

3.4.4 Fisheries and Aquatic Species

The Columbia River, like many western US rivers, has far fewer native fish species than similar-sized rivers in the central and eastern United States (NRC 2004). Before the construction of dams, the native fauna was dominated by salmonids (salmon and trout), cyprinids (minnows), and cottids (sculpins), most of which are still present but often in reduced numbers (NRC 2004). The salmonid complex also included whitefishes and ciscoes. The largest cyprinid in the Columbia River is the northern pikeminnow (formerly known as the northern squawfish) (NRC 2004). The white sturgeon is usually anadromous (spending part of its life in fresh water and part in saltwater), but landlocked populations also inhabit the Columbia River basin (Lee et al. 1980). By the late twentieth century, the white sturgeon population had declined to a point at which they were no longer considered commercially viable in the lower Columbia River (Craig and Hacker 1940). Today, white sturgeon are common in the lower Columbia River and are found in small numbers in distinct landlocked populations (NRC 2004). Several species of lamprey also exist in the Columbia River. Counts of lampreys reveal greatly diminished

populations (Columbia River Inter-Tribal Fish Commission 1996), and there have been efforts to classify the species as threatened or endangered (NRC 2004).

Exotic or nonnative fish species have been widely introduced into the western United States, and the Columbia River basin is no exception. The striped bass and the American shad, native to the eastern United States, are nonnative anadromous species that inhabit the Columbia River. Other nonnative freshwater fish in the Columbia River system are largemouth bass, smallmouth bass, sunfish, crappie, walleye, carp, catfish, bullhead, brown trout, brook trout, and lake trout. Many of these species have thrived in the altered conditions of the Columbia River system; however, some may have been more productive in an undammed river. Many of these species prey on salmon eggs and fry, and some—especially larger individuals—eat salmon juveniles as well (Zimmerman 1999). Among nonnative species, walleye have particularly been implicated in connection with reduced salmon population productivity. Smallmouth bass and channel catfish also prey on salmon, and these predators are more abundant in the upper Columbia and Snake rivers than in the lower Columbia.

Many of these fish may be present in the lower Cowlitz and Kalama Rivers, as well as the Coweeman River (a tributary to the Cowlitz River).

Special Status Species

Endangered Species Act (ESA) and Magnuson-Stevens Act listed species records describing presence, critical habitats, and distribution, if available, were obtained from NMFS, USFWS, and WDFW.

Fourteen threatened or endangered fish populations were identified to occur adjacent to the PMEC site in the Columbia River. Of those populations, some may be present in the lower Kalama near the mouth, the lower Cowlitz River, and the Coweeman River at various times of the year. Exhibit 3-24 provides the list of evolutionarily significant units (ESUs) or distinct population segments (DPS) by species and identifies if they may be present near a proposed project component.

Exhibit 3-24

Threatened and Endangered Species Potentially Present Within Each Project Component

Common/ Scientific Name	Evolutionarily Significant Unit (ESU) or Distinct Population Segment (DPS)	Federal Status	PMEC Site[a]	Railroad Spur	Natural Gas Pipeline and Transmission Line	Wetland Mitigation Site
Chinook Salmon *(Oncorhynchus tshawytscha)*	Upper Columbia River Spring-run ESU	E	M	No	b	No
	Lower Columbia River ESU	T	M,R	No	M,R	M,R
	Upper Willamette River ESU	T	M	No	b	No
	Snake River Spring/Summer run ESU	T	M	No	b	No
	Snake River Fall-run ESU	T	M,R	No	b	No
Coho Salmon *(O. kisutch)*	Lower Columbia River ESU	T	M,R	No	M,R	M,R
Chum Salmon *(O. keta)*	Columbia River ESU	T	M,R	No	M,R	M,R
Sockeye Salmon *(O. nerka)*	Snake River ESU	E	M	No	b	No
Steelhead *(O. mykiss)*	Upper Columbia River DPS	T	M	No	b	No
	Middle Columbia River DPS	T	M	No	b	No
	Lower Columbia River DPS	T	M	No	M,R	M,R
	Upper Willamette River DPS	T	M	No	b	No
	Snake River Basin DPS	T	M	No	b	No
Bull Trout *(Salvelinus confluentus)*	Columbia River DPS	T	M	No	b	No

E=Endangered
T=Threatened
M=Migrating
R=Rearing
a. Under existing conditions, these species may use the 2.1-acre backwater channel on the property site (northwest corner) as refugia or foraging habitat while migrating (M) and/or rearing (R). However, this area of the property will be filled prior to the PMEC construction and is being permitted in a separate process by the Port of Kalama. In the absence of this wetland, there is no aquatic habitat on the PMEC site and therefore, no fish species.
b. Any of the 14 ESUs/DPSs may be present at any time in the Kalama and Cowlitz Rivers as drop-ins or strays. Drop-ins are defined as those species that are native to another basin, but enter a non-native basin temporarily (they do not stay to spawn). Strays are also native to another basin but stay and spawn in a non-native basin. Any of the fish from the above-listed ESUs/DPSs may be present in the Kalama River near the pipeline crossing or the Cowlitz River near the transmission line crossing depending on the time of year and water temperatures in the mainstem river. The most likely drop-ins are steelhead.

Critical Habitats

In the critical habitat final rule for salmon and steelhead, NMFS defined the six Primary Constituent Elements (PCEs) determined to be essential to the conservation of salmon and steelhead. All lands identified as essential, and designated as

critical habitat, contain one or more of the following PCEs: 1) freshwater spawning sites, 2) freshwater rearing sites, 3) freshwater migration corridors, 4) estuarine areas, 5) nearshore marine areas, and 6) offshore marine areas.

In the critical habitat final rule for bull trout, the USFWS defined the eight PCEs determined to be essential for the conservation of bull trout. All lands identified as essential, and proposed as critical habitat, contains one or more of the following PCEs: (1) water temperatures that support bull trout use; (2) complex stream channels, (3) sufficient substrates, (4) a natural hydrograph, (5) cold water sources such as seeps, springs, and groundwater, (6) migratory corridors with minimal physical, biological, or water quality impediments, (7) an abundance food base, and (8) permanent water of sufficient quantity and quality.

The Columbia River, adjacent to the PMEC site at RM 72, is used by anadromous salmonids primarily as a migratory route between upstream spawning areas and the Pacific Ocean, and also as a rearing area for certain species. This area has been designated as critical habitat for 12 of the 14 listed ESUs/DPSs present in the Columbia River, with only bull trout and the Lower Columbia Coho ESU excluded. Any of the species using the river may be assumed to use the 2.1-acre wetland (upstream end of a backwater channel) in the northwest corner of the PMEC site for rearing, refugia, and foraging. This wetland has been proposed to be filled by the Port of Kalama. In the absence of this wetland, there is no critical habitat located on the PMEC site. The open water wetland to the east of the site that will be partially filled for the railroad spur precludes anadromous presence due to a blocked culvert at the downstream end of the wetland.

The Kalama River at the proposed natural gas pipeline crossing, the Cowlitz River in the area of the transmission line crossing, and the Coweeman River in the area of the mitigation site are all designated critical habitat for Lower Columbia Chinook, Columbia River chum, and Lower Columbia River steelhead.

Affected Environment – Fisheries and Aquatic Species

PMEC Site

All of the aforementioned fish species would be present in the Columbia River adjacent to the PMEC site. There is only one area on the PMEC site potentially suitable for fish presence. Approximately 2.1 acres of wetland encroaches onto the PMEC site in the northwest corner. This wetland is the southern end of a large backwater channel of the Columbia River that supports native fish and salmon species with federal and state protected status (Cowlitz County 2005). There may be threatened and endangered salmonid species rearing in the backwater channel (wetland) at any time of the year or using the backwater channel during migration (Anchor Environmental 2006). This wetland would also be considered Essential Fish Habitat (EFH) for Chinook and coho salmon in the US Geological Survey Hydrologic Unit Code 17080003 (Lower Columbia-Clatskanie River).

As part of their long-range development plans, the Port of Kalama has proposed to fill the 2.1 acres of wetland located in the northwest corner of the PMEC site. The Port is planning to mitigate impacts by creating an off-site 4.5 acre forested, scrub-shrub, and emergent wetland habitat (with a surface water connection to another Columbia River backwater channel) north of the proposed PMEC site.

The PMEC would have an estimated peak instantaneous water demand of 6,650 gpm (9.5 million gpd). The annual water usage by PMEC would vary based on the feedstock used and the ambient air temperature, with higher water usage at higher ambient temperatures. The water for the PMEC would be supplied by the Port of Kalama from one of their collector wells. The well would be located approximately 95 feet bgs, just off the bank of the Columbia River, and north (downstream) of the Kalama River. Three additional points of withdrawal were authorized in the Port's December 2006 water application permit and each of these sites would be to a depth of 200 feet bgs (also along the bank of the Columbia River).

The collector well has the capacity to withdraw up to 15 million gpd.

Natural Gas Pipeline

The proposed gas pipeline would cross the Kalama River by HDD under the river approximately a half mile upstream from the mouth of the river. This portion of the river is designated as having Priority Anadromous and Priority Resident Fish Presence on the WDFW Habitats and Species Maps (Feburary 13, 2006). Any of the fish species identified in Exhibit 3-24 may be present in the Kalama River in the area of the pipeline crossing. Of the 14 ESU/DPS salmonids occurring adjacent to the PMEC site in the Columbia River, only five of those would be expected in the Kalama River: Lower Columbia River Chinook, Lower Columbia River Coho, Columbia River Chum, Lower Columbia River Steelhead, and Columbia River bull trout (Exhibit 3-24). The other species are expected to migrate past the PMEC site and not enter the Kalama River. However, as mentioned in Exhibit 3-24, any of the aforementioned listed species may be present at any time in the Kalama River as drop-ins or strays.

The pipeline would travel within Port land and under or alongside Hendrickson Drive. The adjacent land use is predominantly industrial, with a section of park including a marina. The majority of the route is within Cowlitz County, with a small portion within the boundaries of industrial lands of the City of Kalama. There is no other aquatic habitat crossed by the natural gas pipeline.

Railroad Spur

Construction of the railroad spur as proposed would permanently fill about 1.3 acres of palustrine wetland associated with the 8.86-acre wetland complex southeast of the proposed PMEC site. This large wetland contains an open-water community that was investigated for fish presence and accessibility during the field visit in April 2006.

The wetland is approximately 30 feet wide with an unknown depth. The temperature in the wetland at the time of the survey was 60°F (16°C). The substrate along the banks was muddy

sands with dead reed canarygrass. The wetland drains to an open water riparian area east of the large Columbia River backwater side channel immediately north of the PMEC site. The culvert that drains the wetland (and passes underneath both the railroad tracks and the road) is currently a fish passage barrier due to a large debris jam (apparently a beaver dam) at the upstream end consisting of large wood and leftover railroad ties. There is water flowing out of the wetland, over and under the beaver dam, and into the culvert. This beaver dam backs up water, thus creating a large open water area within the wetland. It is not completely preventing water flow, however, only restricting the flow volume and velocity.

A single fish species was observed in the wetland during the survey. The mosquitofish (*Gambusia affinis*) is a small guppy-like fish used to control mosquito larvae and has no federal or state protected status. The mosquitofish observed are likely the western mosquitofish (*Gambusia affinis*), rather than the eastern mosquitofish (*G. holbrooki*). Both of these species have been widely introduced throughout the USA to control mosquitoes. The eastern species is native to the southeastern United States, while the western species is native to the Southwest (i.e. California). Wydoski and Whitney (2003) consider the western mosquitofish as the only *Gambusia* species documented to occur in Washington and they consider it an introduced species in Washington State.

The beaver dam provides an approximately four-foot drop at the wetland outlet to a culvert and a tight screen of overhanging vegetation and debris. If the beaver dam was not there, the water depth in the seasonal open water habitat would decrease by about four feet. Under current conditions, this beaver dam and overhanging vegetation screen has created a barrier to upstream fish passage. There is no plunge pool present and therefore, no means for anadromous ESA-listed salmonids from the Columbia River to be present within this wetland.

Transmission Line

The Cowlitz River would be the only aquatic habitat crossed by the transmission line. No in-water structures are proposed. The transmission line would extend from the riparian area on the south end of the river across the aquatic habitat and continue north through the riparian habitat on the north side of the river until it enters industrial habitat in the City of Longview. Resident freshwater species, as well as listed salmonids are present in the Cowlitz River in the area of the transmission line crossing. Any of the fish species identified in Exhibit 3-24 may be present in the Cowlitz River in the area of the transmission line crossing. Of the 14 ESU/DPS salmonids present in the Columbia River, only five of those would be expected in the Cowlitz River: Lower Columbia River Chinook, Lower Columbia River Coho, Columbia River Chum, Lower Columbia River Steelhead, and Columbia River bull trout (Exhibit 3-24). The other species are expected to migrate past the mouth of the Cowlitz River and not enter the Cowlitz River. However, as mentioned in Exhibit 3-24, any of the aforementioned listed species may be present at any time in the Cowlitz River as drop-ins or strays.

Wetland Mitigation Site

The Coweeman River is a tributary to the Cowlitz River; therefore, any species present in the Cowlitz River may be present in the Coweeman River with the exception of bull trout. Historical stage-discharge records and a current flow gauge at RM 7.5 each indicate that the Coweeman River discharges over 1,000 cfs during winter but reduces to as low as 50 to 100 cfs during late summer. The tidal prism of the Coweeman River extends up to RM 4.0, which corresponds with the northwest corner (most downstream point) of the wetland mitigation site.

Resident freshwater species, as well as listed salmonids, are present in the Coweeman River in the area of the mitigation site. Any of the fish species identified in Exhibit 3-24 may be present in the Coweeman River near the mitigation site. Of the 14 ESU/DPS salmonids present in the Columbia River, only four of those would be expected in the Coweeman River:

Lower Columbia River Chinook, Lower Columbia River Coho, Columbia River Chum, and Lower Columbia River Steelhead (Exhibit 3-24). The other species are expected to remain in the Columbia River mainstem and migrate past the mouth of the Cowlitz River, thus migrating past the Coweeman River which enters the Cowlitz River 1.7 miles upstream from the confluence of the Cowlitz and the Columbia River. However, , any of the aforementioned listed species may be present at any time in the Cowlitz River as drop-ins or strays, thus they would have access to the Coweeman River.

Environmental Impacts of the No Action Alternative – Fisheries and Aquatic Species

No impacts to fisheries or aquatic resources would occur if the no action alternative is selected. However, the Port intends to move forward with their development of the industrial site with or without the PMEC project, meaning that the 2.1-acre wetland and its associated aquatic habitat will be filled as part of the No-Action Alternative.

Environmental Impacts of the Proposed Action – Fisheries and Aquatic Species

Construction Impacts

PMEC Site

The construction of the plant would have no direct effect on threatened and endangered fish species because none are present on the PMEC site. Treated stormwater discharged from the site could have an incremental indirect effect, but stormwater regulations imposed through the NPDES permitting process would provide a level of protection. Resident, EFH, and ESA-listed fish species are currently present in the 2.1-acre wetland (backwater channel of the Columbia River) on the northwest corner of the site proposed to be filled by the Port. This wetland fill is under a separate permitting process and impacts are being addressed by the Port of Kalama. Therefore, in the absence of this wetland, there is no aquatic habitat on the PMEC site and thus no resulting impacts from construction to any fish species.

Natural Gas Pipeline

The natural gas pipeline would cross beneath the Kalama River using HDD. The location of the proposed crossing is near a public boat ramp where vessel traffic is common (Exhibit 3-22). Potential impacts to fish species may occur during construction of the pipeline.

HDD is a method of installing a pipeline underground by drilling a slightly over-sized hole at a very shallow angle under surface features and pulling a pre-assembled string of pipe through that hole. This method requires the preparation of an entrance (i.e., drill) site and an exit site. The process includes drilling a pilot hole using a drill bit and an injection of bentonite slurry under pressure to remove the cuttings and hold the hole open. After the pilot hole is completed, a reamer and bentonite slurry combination is used to enlarge the hole so that the pipe can be pulled through. Some types of substrate are unsuitable for HDD, such as hard fractured rock or sugar sand type soils.

The entrance site requires an area that is approximately 150 feet to 200 feet long and 100 feet wide on level ground with all-weather road access. The exit site requires a rectangular area approximately 100 feet to 175 feet long and 50 feet to 100 feet wide. Similar access is required, and a pit must be excavated to collect the bentonite slurry discharged from the drill hole. These sites must be located at least 75 feet from the edge of the stream to achieve minimum adequate cover at the boundary of the aquatic feature. The pipeline corridor or other clear area of similar width must extend in a straight line beyond the exit site for a distance slightly greater than the length of the bore. This area is needed to assemble and test the pipe string prior to installation.

Potential impacts resulting from HDD include the temporary loss of upland vegetation from the entry and exit points and the risk of drilling mud entering into the aquatic habitat (Kalama River) that the HDD is attempting to avoid (frac-out). A frac-out occurs when the sub-surface ground fractures during the bore and the result is a release (discharge or vent) of drilling

mud (bentonite) into the stream channel. The Kalama River did experience a frac-out during a previous attempt by Cascade Natural Gas to cross the channel near this location with HDD. Impacts to the aquatic environment include the lethal smothering of all macroinvertebrates in the riverbed substrate, the lethal or sub-lethal impacts to fish species in the water column from either the increased turbidity plume in the water, or the subsequent clean-up method which involves the use of a suction vaccum to remove the bentonite from the water column. Bentonite itself is an inert substance, but when released during a frac-out it has a pudding-like consistency that coats the substrate and smothers the aquatic organisms that do not avoid or cannot avoid the plume.

Impacts from HDD can be minimized or avoided by analyzing the substrate prior to design, replanting cleared staging areas, and not staging in sensitive areas. Impacts to resident fish species, ESA-listed species, critical habitat, and EFH would not occur if the HDD process works as intended. However, if an unpredictable frac-out does occur, the impacts to species and their habitats would depend directly on the quantity of the bentonite released, the extent (area) of the spill, the effectiveness of the clean-up, and the presence or absence of the listed species in the affected area.

Railroad Spur

The railroad spur adjacent to the PMEC site would require partial fill of a large wetland located east of the PMEC site and between the road and the railroad tracks (Exhibit 3-23). This wetland does not contain ESA-listed fish species because of a beaver dam above a culvert, which is a migration barrier. The culvert is located beneath the road and railroad tracks (southeast of the PMEC site) and drains the southeast wetland into a larger wetland complex located directly north of the PMEC site. The large wetland complex on the north edge of the PMEC site is an open-water wetland and is directly connected to the large backwater channel of the Columbia River. ESA-listed fish species have access into this large wetland complex north of the PMEC site. Depending on the

extent of tidal inundation of the wetland complex to the north to which the blocked culvert drains, anadromous fish may be able to access the culvert. However, the constrictions at the culvert inlet make it impossible for fish to access the railroad spur wetland. It is unknown if ESA-listed fish ever used this southeastern wetland, and it is also unknown when the beaver dam was created, resulting in their exclusion from this area.

Impacts to EFH and ESA-listed fish from the fill of the southeastern wetland would be insignificant to minor and result from the temporary and isolated decreased water quality during construction activity due to sedimentation impacts from the associated fill. During the wetland fill, increased turbidity is expected and this plume of turbid water may flow out of the wetland through the culvert and into the open wetland on the north edge of the PMEC site where the ESA-listed fish species and EFH may exist. If the sedimentation resulting from the fill does not exit the wetland, there would be no impact to ESA-listed fish or EFH. The area potentially impacted from turbid water would be localized to the area immediately adjacent to the culvert outlet and would not extend into the backwater channel or the Columbia River.

Transmission Line

No construction or operation related impacts to aquatic habitats, fish species, or EFH are expected from the transmission line crossing. No in-water work is expected and all construction would occur in the adjacent upland and riparian areas near the Cowlitz River in the existing transmission line corridor.

Wetland Mitigation Site

The wetland mitigation activities would occur during the in-water work window for the Coweeman River as a protection measure, but no in-water work is proposed. The Coweeman River in this location almost dries up completely in the summer time. The wetland would be connected to the backwater north of the site by removing soil and vegetation according to the grading plan provided in the Pacific Mountain Energy Center

Conceptual Mitigation Plan (URS 2007c). The grading would be conducted using backhoes or dozers on the land. No construction impacts to fish are expected from these activities. Beneficial effects to all fish in the river would result after construction. The mitigation activities would provide additional rearing habitat and refuge during high flows. During low flows, the wetland area would drain such that no stranding would occur. The water would recede, drawing the fish back into the main channel, thus preventing stranding.

Operation Impacts

PMEC Site

The operation of the plant facility may have a minor impact on various fish species from the resulting operational activities: water use, process water discharge, stormwater discharge, and wake stranding resulting from shipping.

Water Use. The PMEC would have an estimated peak instantaneous water demand of 6,650 gpm (about 9.5 million gpd).

Water withdrawals and return flows may have a direct impact on aquatic habitats and fisheries resources. This includes potential impacts on water quality and quantities available for fish. Water withdrawal can reduce stream flows to levels unable to support fish populations. During the growing season this also reduces the ability of streambanks to support riparian vegetation and results in a direct loss of riparian habitat (Knutson and Naef 1997). Reduced water levels can result in inadequate stream flow for fish spawning, rearing, and migration (Sullivan et al. 1987). Redds (fish nests) can become dewatered, and pools and backwater areas can be eliminated, reducing available juvenile fish rearing habitat (Hicks et al. 1991). Upstream migration of spawning adults and downstream migration of juvenile salmon also could be delayed or blocked by reduced water levels. Withdrawals also contribute to increased stream temperatures, as low flow conditions tend to be warmer than natural flows (Rinella et al. 1992).

In granting the Port of Kalama's recent application for an additional 6,650 gpm (9.5 million gpd), Ecology conducted a hydrogeologic/hydrologic assessment and determined that the water withdrawals are not expected to impact long-term water levels in the alluvial aquifer. The collector wells are located nearly one mile downstream of the mouth of the Kalama River and along the banks of the Columbia River. The wells are intended to draw from the aquifer beneath the Columbia River. The location of the alluvial aquifer extends from the shoreline of the Columbia River to some distance upland (east), but no further than the indicated limit of backwater on the Kalama River at mile 1.9 to 2.2. Groundwater in this portion of the alluvial aquifer is in continuity with, and is controlled by, the stage of the Columbia River. The permit concluded that drawdown in the alluvial aquifer near the collector well laterals is quickly replenished by increased leakage from the adjacent Columbia River. In addition, it was determined that the groundwater withdrawn under the application would otherwise have discharged directly to the Columbia River and not the Kalama River.

In addition to the hydraulic relationship described in the preceding paragraph, some physical separation of the Columbia River and Kalama River influence may occur along the I-5 corridor. Drays Mound, a distinctive bedrock outcrop in the middle of the alluvial plain, may be an indication of a north-south trending structural feature (CH2M Hill 2002). If present in the subsurface, this feature could limit the degree of hydraulic interaction between the proposed point of withdrawal and groundwater (or the Kalama River) located east of I-5.

The lower Kalama River is not functioning properly for temperature or fish habitat access. A thermal barrier may exist near the mouth at certain times of the year. In addition, available adult holding pools near I-5 are reduced substantially with changes in tide and river flow. Habitat availability and access in sloughs and side channels downstream to the mouth is reduced with tidal and river fluctuations, and existing fish passage problems exist during low-flow/low tide conditions at

river mouth, resulting in adult and juvenile stranding (LCFRB 2006).

However, Ecology's analysis of the effects of pumping the additional water (Ecology 2006a) concluded that the drawdown at the maximum pumping rate would not exceed 0.1 foot at 3,400 feet from the wells. According to that study, there should be no significant effect on flow in the Kalama River. Therefore, fish or habitat in the Kalama River likely would not be affected.

There would be no impact to the Columbia River as a result of the well and subsequent withdrawals due to the large volume of water within the Columbia River and the replenishment rate.

Other than the Columbia and Kalama Rivers, there are no aquatic areas that may be impacted by water withdrawals specific to this project.

Process Water Discharge. Process water discharges are discussed in Section 3.3 of this DEIS. The Port's outfall would be modified by the Port to discharge water in a temperature range that will meet State water quality criteria. If the water quality temperature criteria were not being met, the discharge of hot water (especially during the low-flow summer months) could be lethal to fish and could also have lethal or sub-lethal effects by lowering the dissolved oxygen levels in the river in the immediate area of the outfall. However, this will be avoided completely by complying with the state water quality standards. Therefore, by meeting the thermal state water quality standards, the discharge of process water would have a minor impact on fish resources in the Columbia River.

Long-term discharges (in excess of 30 years) from the existing outfall during operation of the PMEC site may affect fish resources, particularly salmonids, depending on final water quality discharged. Although the discharges will meet state water quality standards for temperature and other pollutants, sublethal effects have been linked to low levels of certain compounds.

Recent water quality sampling of the Columbia River mainstem was conducted by the USGS in partnership with BPA. Samples were collected monthly on the Columbia River at RM 54 and RM 141, and RM 13 on the Willamette River. In addition, seasonally samples were collected at RM 4 and RM 82 on the Columbia River. None of the aquatic-life or human-health benchmarks based on the USEPA water quality standards were exceeded in either the Columbia or Willamette Rivers at sampling sites in the study (Morace 2006). Although concentrations of arsenic, copper, and lead were not present at levels of concern with regard to aquatic-life toxicity, sublethal effects and signs of endocrine disruption have been linked to low levels of these compounds. The median copper concentrations from each of the three monthly sampling sites was 1.0 microgram per liter, a level shown to have inhibitory effects on juvenile coho salmon.

Section 3.3 of the DEIS evaluates the outfall and proposed changes, including a mixing zone being permitted by the Port.

In assessing impacts to ESA-listed salmonids, it was determined that there would be no chronic effects because salmonids won't stay in the mixing zone area for long periods of time. Sub-yearling fall and summer Chinook and chum salmon stay close to the shore during rearing and migration. A portion of the largest sub-yearling Chinook and chum smolts out-migrate in the main river channels, but these fish predominately migrate within three meters (9.8 feet) of the surface. This migration area does not coincide with the outfall diffuser ports (where the effluent releases into the Columbia River). The outfall pipe would extend on the wharf structure past the nearshore region to where it would transition to the diffuser port, to be located in the deeper water about 250 feet from shore. Therefore, the effluent would not be discharged directly into the path of a rearing juvenile salmonid.

Once these juvenile salmon grow to over 55 millimeters (mm) they move out into mid-water (about 200 feet offshore), and migrate downstream within ten to thirty feet of the surface. In this exact location of the river, this would put them at or near

the location of the diffuser ports and at or above the effluent discharged from the outfall. Returning adult salmon using the deeper water of the main channel may swim through the mixing zone. These adults are heading to the spawning grounds upstream and can travel up to three kilometers (1.8 miles) per day. These fish may pass through the mixing zone, but would be moving through it, not residing in it for any length of time. Therefore, it was determined that the discharge of process water would have a minor impact on juvenile or adult salmonids. This determination is based on several factors: the physical location of the existing outfall in that it is located far enough from shore to be outside of the rearing and migratory corridor for juvenile salmonids (< 55mm); the effluent would be discharged deep enough in the water column to not impact sub-yearling Chinook or chum over 55 mm, that occur within the upper water column of the main channel; and although the discharge and corresponding mixing zone overlaps with the area used by returning adult salmonids, these fish are moving quickly through the river to the spawning grounds upstream and would not reside in the mixing zone area for any length of time.

Stormwater Discharge. Stormwater discharge is discussed in Section 3.3. There is little likelihood that any water quality effects would harm fish.

Wake Stranding. The plant requires a combination of petroleum coke (petcoke) or coal and oxygen as fuel for operation. Petcoke and/or coal may be delivered to the PMEC site via the Port of Kalama's extended dock located adjacent to the PMEC site. This dock is owned, permitted, and operated by the Port of Kalama. The operation of the PMEC could result in an increase in ship or barge traffic (up to 34 round-trips per year) in the lower Columbia River (up to the Port of Kalama). In 2004, there were 261 port calls for the Port of Kalama compared to 1495 for Portland, Oregon (Merchants Exchange 2004).

Stranding of small fish, particularly juvenile salmon, has been identified as a potentially significant cause of mortality in the

lower Columbia River. In 1994, Hinton and Emmett indicated that stranding was not a significant cause of juvenile salmonid mortality; however, they reiterated the WDFW recommendation that measures be implemented to reduce the potential for stranding. Pearson et al. (2006) conducted site-specific studies of three beaches and determined that the issue of wake stranding can be significant. They found that 46 stranding events occurred out of the 126 ship wakes observed during their study at three beaches.

As large displacement vessels pass through confined channels, they displace a significant portion of the volume of water within the Columbia River channel. This displacement causes a drawdown of water at the shoreline followed by a surge of water that runs along the shoreline at the speed of the vessel. The magnitude of the drawdown and surge depends on the channel and beach geometry, the speed of the vessel, distance from the vessel, and the size and shape of the vessel relative to the size of the channel (Pearson et al. 2006). When small fish and juvenile salmon, residing in nearshore habitats, are carried by ship wakes onto beaches above the normal water line, where the surge quickly subsides the fish become stranded (Hinton and Emmett 1994). Stranding typically results in mortality unless another wave quickly carries the fish back into the water.

It is a fact that not all ship wakes strand fish. Pearson et al. (2006) concluded that fish stranding occurred with larger vessels (bulk carriers, container ships, oil tankers, and car carriers), but was not observed with tug boats or smaller vessels. The amplitude of ship wakes also depends on the speed of the ship. For example, reducing the speed of a ship from 14 knots to 12 knots reduced the size of the wake by 57 percent according to Pearson et al. (2006). The drybulk carriers and barges delivering feedstock to the PMEC site are expected to travel the river at no more than 12 knots with assistance from the Columbia River Pilots.

Pearson et al. (2006) indicate that sub-yearling Chinook, chum, and coho juveniles are stranded during stranding events. Fifty

percent of the fish stranding species were sub-yearling Chinook, followed by threespine stickleback (22 percent), peamouth chub (15 percent), American shad (6 percent), yellow perch (2 percent), banded killifish (1.4 percent), and chum (1.6 percent). Other species were present in very small percentages (less than one percent).

The stranded juveniles were much smaller than steelhead and yearling Chinook that were present in the nearshore but not stranded by ship wakes. It is probable that the larger size or the behavior patterns of yearling Chinook salmon and juvenile steelhead were relevant to the lack of stranded individuals. Larger salmonids are stronger swimmers, do not rear in nearshore habitat, and out-migrate as smolts in deeper water. Therefore larger salmonid smolts (sockeye, steelhead, and yearling Chinook) are less likely to be stranded. In addition, yearling Chinook and steelhead are actively migrating to the ocean as opposed to juvenile coho, chum, and sub-yearling Chinook, which have been documented to rear as outmigrating smolts in estuary areas for days or weeks before finally migrating into the marine environment.

Reported wake strandings are sporadic, and comparisons between areas of reported strandings and other beaches cannot be made without detailed study. The results of the Pearson study cannot be extrapolated to other areas on the river because of the study design and the varying forces that affect the important variables from one location to another.

The additional vessel traffic expected from the PMEC project is a slight increase from what presently utilizes the Columbia River (the Portland Merchant Marine schedules an average of 160 escorted trips per month up the River). As barges are not deep draft vessels, fish stranding would not be expected to occur from their operation. The bulk carrier ships, having a blunter bow configuration would be expected to create less wake than other types of deep draft vessels. Average speed for vessels that will be traveling to the Port of Kalama dock at PMEC would be 12 knots or less. In addition, these ships

would be expected to travel at an even slower rate with less ship wake when entering the Port facility.

Natural Gas Pipeline

No impacts to resident fish species, ESA-listed species, critical habitat, or EFH would occur from the use of the pipeline once the PMEC is in operation.

Railroad Spur

No impacts to fisheries or aquatic species would be expected to occur during operation of the railroad spur.

Transmission Line

No construction or operation related impacts to aquatic habitats, fish species, or EFH are expected from the transmission line crossing. No in-water work is expected and all construction would occur in the adjacent upland and riparian areas near the Cowlitz River in the existing transmission line corridor.

Wetland Mitigation Site

The plan would include excavating one to four feet of soil material from the lowest part of the site, including the existing wetland to connect with the backwater channel north of the proposed mitigation site (Exhibit 3-21). The design would provide additional seasonal off-channel fish habitat for when salmonids most commonly use the Coweeman River during winter and spring. The proposed wetland would be designed to drain as tides and river levels recede so as not to trap fish, thus protecting listed species that may use the site. There would be no significant impacts to fish.

Mitigation Measures – Fisheries and Aquatic Species

PMEC Site

Other than the 2.1-acre northwest corner wetland to be filled by the Port, there is no aquatic habitat on the PMEC site, and therefore, no mitigation measures are necessary. Impacts from PMEC operations (i.e., water use, process water discharge, stormwater run-off, and ship/barge traffic) would be minor or insignificant and therefore would not require any mitigation

measures outside of meeting federal and state permit requirements.

Natural Gas Pipeline

Upland Construction

Excess soils may be generated as a result of the installation of pipeline and may require stockpiling prior to disposal or reuse. These would be protected from wind and water erosion prior to appropriate disposal or reuse. If reused, the backfill soils would be properly compacted to reduce the potential for post-installation erosion and settlement.

Site-specific BMPs would be designed and implemented for construction activities. These practices include limiting certain construction activities and installing control structures such as sediment traps, diversion ditches, and silt fences. The Stormwater Pollution Prevention Plan would include limits on the area to be disturbed, the retention of vegetation where feasible, drainage retention during construction, soil replacement, and replanting after construction.

After the contours have been re-established, the topsoil or roadbed subsurface materials that had been previously segregated would be redistributed across the surface of the ROW. As appropriate, the roadway would be repaved to Cowlitz County standards. For areas outside of the paved roadway area, native grasses or other native vegetation would be planted and fertilized in accordance with Port of Kalama and agency requirements. Temporary fencing that was installed at the beginning of construction would be removed and any original fences re-established where appropriate.

Kalama River Crossing

All staging and equipment will occur outside of the 100-foot setback distance set to protect the riparian area of the Kalama River. Silt fencing will be used to protect the river from sedimentation. Disturbed areas will be revegetated with native vegetation.

Activities that are potentially hazardous to aquatic habitats will not be permitted within the 100-foot restrictive area, including:

- Fueling or servicing of equipment.
- Storage of any petroleum products, chemicals, or other toxic or deleterious materials.
- Washing of construction equipment.
- Disposal of waste materials.
- NMFS and USFWS may recommend an in-water work window to reduce salmonid exposure to impacts from a potential frac-out during HDD. The in-water work window for the Kalama River is August 1 to August 31 (USACE 2006).
- Excess excavated material will be removed immediately upon completion of construction to an appropriate upland location away from stream channels or wetlands.
- Excavated materials will be stabilized in a manner to prevent degradation of State waters.

In the event of an unintentional release of drilling mud under pressure into perennial streams or wetlands, the following response plan would be implemented.

Pre-Drilling. Pipeline construction personnel and inspection staff would be adequately trained prior to construction to identify and use appropriate response materials. Prior to drilling, the following materials would be on site and available for transport to the HDD location quickly in the event of an unintentional release of drilling mud:

- Vacuum Truck with sufficient capacity for an immediate response; arrangements for additional trucks as needed prior to commencing bores
- Certified Weed Free Straw or hay bales
- Stakes to secure bales
- Silt fence

- Sand bags
- Leak-free hose(s) and pump(s)
- Straw logs (wattles, or fiber rolls)
- Heavy-duty push brooms
- 55 gallon barrels or salvage drums
- Light tower(s) (if necessary, deliver to site as soon as practicable)
- Boat with appropriate personal safety equipment, of sufficient capacity to safely conduct clean up from (if necessary, deliver to site as soon as practicable)

A sufficient pumping system would be in place to accommodate all drilling fluids at the bore entry and exit location to contain all drilling fluids within the bore entry and exit pits. During the drilling operations a spotter will be required to visually monitor the crossing at all times. In addition to the visual monitoring, the drill operator will monitor all mud pressure gauges and will immediately cease all operations and send additional crews to assist in the detection and clean up of a frac.

Event response. The following response measures would be implemented upon discovery of the loss of drilling fluid into streams or wetlands:

- Directional drilling would stop immediately.
- The drill fluids would be contained immediately. Types of containment may be straw bales, sediment fence, 55 gallon barrel, culvert, or sandbags. It is up to the Environmental Inspector to determine the appropriate containment method in order to best protect the site-specific resource.
- The following entities would be contacted by phone immediately, but no later than 24 hours: USACE, Ecology, WDFW, and the Washington State EFSEC.

- NMFS and USFWS also would be contacted in the event of impacts to federally listed species.
- Qualified fisheries biologists would be on alert to conduct fish salvage operations (under the appropriate permits to be acquired prior to construction) in the reach prior to any bentonite removal activities, and block nets would be employed to ensure no fish or other aquatic species reenter the affected area until after the sediments are removed.
- Before (and sometimes during) the dewatering of an isolated in-water work area, fish will be captured from the isolated area using trapping, seining, electrofishing, or other methods that minimize the risk of injury to fish. A work area isolation plan and written fish salvage plan will first be prepared and submitted with the application for a fish salvage permit from WDFW and NMFS. A fisheries biologist experienced with work area isolation and competent to ensure the safe handling of all ESA-listed fish will conduct or supervise the fish capture and release operation. If electrofishing equipment is used to capture fish, the capture team will comply with the most recent NMFS-approved electrofishing guidelines (NMFS 2000), and will handle ESA-listed fish with extreme care, keeping fish in oxygenated water to the maximum extent possible during seining and transfer procedures to prevent the added stress of out-of-water handling. Captured fish will be released in a location that will promote their safe recovery. ESA-listed fish will not be transferred to anyone except NMFS or USFWS personnel, unless otherwise approved in writing by the Services.
- Commercially available non-toxic polymers may be used in an attempt to seal the fracture.
- If a fracture cannot be sealed, where practical, the drill pipe would be removed from the existing drill hole to a point where a new drill path can be attempted by drilling out of the existing hole and creating a new hole. A team consisting of the Lead Environmental Inspector, the Chief

Inspector, and the Construction Manager will review all information pertaining to the frac and then make a decision whether to abandon the existing hole and initiate a new bore hole. If the original drill path cannot be utilized, the drill rig would be moved to a new, adjacent location, staff would verify that the new, adjacent location meets the requirements of all applicable project permits and approvals.

- If a frac-out occurs during pull-back, adjustments to the pull-back operations will be made to minimize inadvertent returns.

In flowing streams the following approach would generally be followed after the frac-out is stopped. Due to the unpredictable nature of the location and environment in which vents may appear, this description cannot encompass all possible approaches to clean up under all conditions. Agency staff and other experts would be consulted with to the extent practicable to develop ad hoc clean up techniques as needed. The following are standard response techniques that would be applied:

- If the bentonite material flows overland prior to entering the Kalama River, installation of silt fencing or sandbag dams at the point of entry would be used to reduce or stop the flow; if the vent is directly into the stream, other means to isolate the vent site from the flowing stream would be used.
- Using a vacuum truck, with a sufficient hose, personnel would remove the bentonite, working from downstream to upstream, to allow maximum visibility. Hand tools may be used to scarify the sediments and ensure removal to maximum extent practicable.
- If necessary, water may be diverted using a coffer dam to isolate the impact area. Only a portion of the stream would be diverted to minimize dewatering impacts. Water would be able to pass through the site in its natural condition.

- If it is impracticable to remove the drill fluid from the Kalama River, a clear, written explanation would be submitted to the USACE. The USACE would coordinate with USFWS and/or NMFS. Any fluids left in the stream channel would receive a written approval from the USACE.
- Any disturbed soils would be stabilized immediately.
- Exposed mineral soils would be seeded with native vegetation immediately.
- Disturbance of vegetation would be kept to a minimum and all disturbed vegetation would be restored and/or replanted with native species, to eventually recreate the functional values of the lost vegetation
- Damaged riffle and pool sediment strata would be re-contoured to the extent practicable under the direction of Agency personnel.

The loss of aquatic habitat would be compensated by mitigating at a minimum ratio of 2:1. A mitigation plan would be submitted to the USACE within seven days of a frac-out occurring. The mitigation plan would include detailed information about the frac-out, how the drill fluid was contained and removed, the amount, if any, of drill fluid left in the Kalama River, the impact area drawn on a map, the location of the mitigation site, type of mitigation to be performed, and types of plantings.

Railroad Spur

To reduce turbidity and downstream impacts from the fill of the southeastern wetland, BMPs and sedimentation minimization measures would be implemented to reduce muddy water from flowing through the culvert and discharging into the wetland complex north of the site. Hay bales, silt fencing, or other methods effective at filtering or diverting the turbid water from discharging through the culvert would be used.

To avoid accidental additional escape of mosquito fish from the wetland, temporary screening will be added upstream of the

culvert to prevent the mosquito fish from being released during railroad spur construction.

Transmission Line

No impacts to the aquatic habitat resulting from the transmission line crossing are expected; therefore, no mitigation measures are necessary. BPA and Cowlitz County PUD would obtain and comply with the terms and conditions of applicable federal and state permits.

Wetland Mitigation Site

Wetland mitigation activities at or adjacent to the Coweeman River would be timed to avoid threatened and endangered species impacts by constructing the project during the low flow summer months when water is not present in the backwater channel and listed fish species are least likely to be in this reach of the Coweeman River. Such timing would reduce or eliminate sediment runoff and other water quality issues because the mitigation site and the backwater channel would be dry.

Existing native vegetation will not be disturbed outside of the work area.

Stormwater at the wetland mitigation site will be controlled by the use of hay bales, silt fences or other appropriate methods

The mitigation site will be rehabilitated following the wetland mitigation planting plan, including monitoring and maintenance to ensure performance standards are met.

Significant Unavoidable Adverse Impacts – Fisheries and Aquatic Species

There would be no significant unavoidable adverse impacts on fish or aquatic species or their habitats.

3.5 Environmental Health

3.5.1 Noise

Affected Environment – Noise

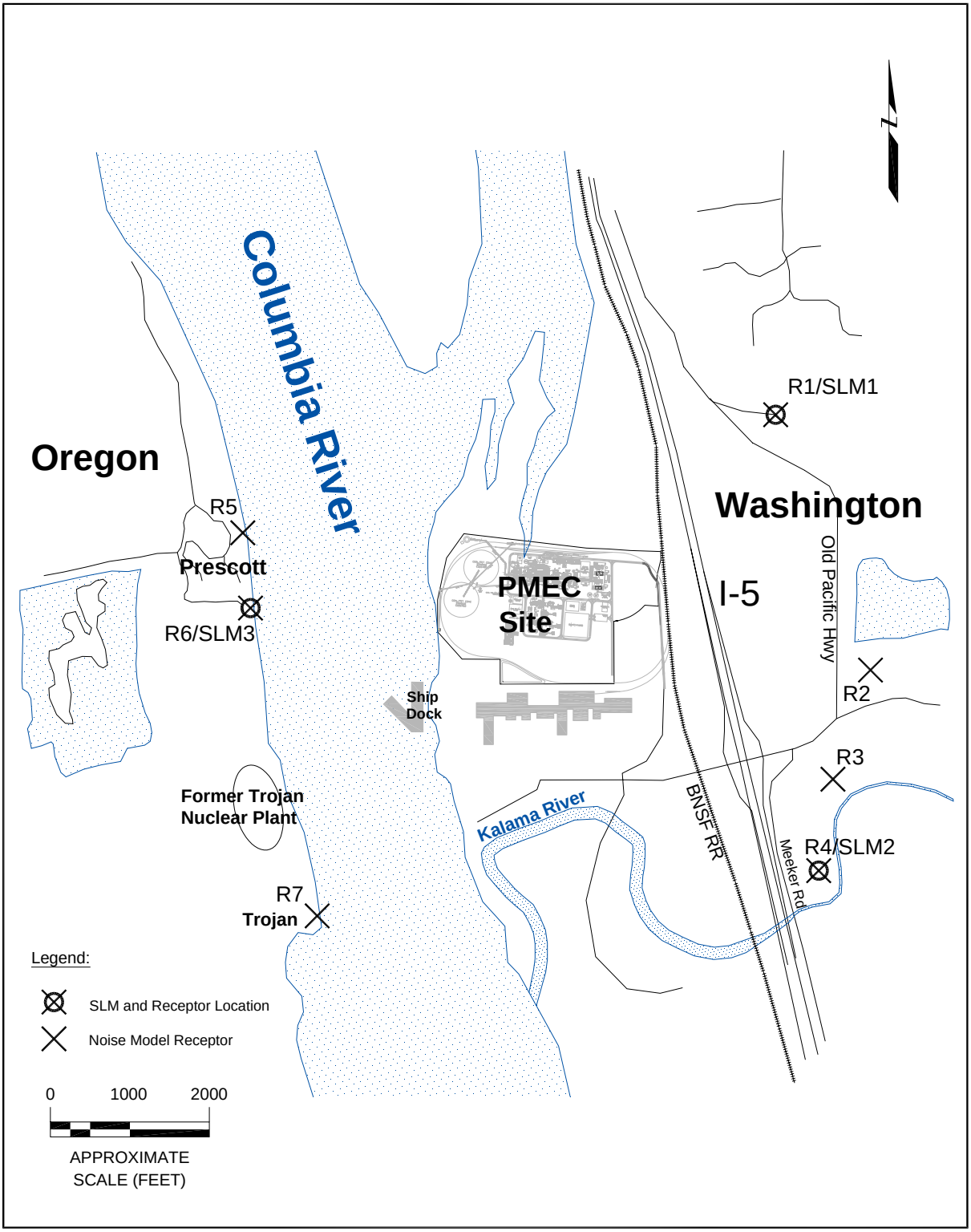
To characterize the existing noise environment, sound levels were measured at three locations near the PMEC site at the Port of Kalama in April 2006. Exhibit 3-25 shows the sound level measurement (SLM) locations. Three Larson Davis 820 Type I Integrated sound level meters were used to measure hourly sound levels for 52 continuous hours. The meters were field-calibrated prior to and immediately following the measurements. The microphones were placed on tripods in Larson Davis environmental shrouds about five feet above the ground and connected to the sound level meters with extension cables.

The sound level meters were placed at residential/sensitive locations anticipated to have the greatest potential noise impacts from the proposed plant:

- Sound level measurement location 1 (SLM1) was a residence at 72 Bluff Road. This location is east of I-5 in Washington and overlooks I-5, the PMEC site, and the Columbia River. The dominant noise source at this location was traffic on I-5. Other sources included trains and localized residential activities.
- Sound level measurement location 2 (SLM2) was at Camp Kalama, at 5055 N. Meeker Drive. This is a campground on the east side of I-5. The PMEC site is not visible from this location due to intervening terrain and the structure of I-5. The dominant noise source at this location was traffic on I-5. Other sources included trains, traffic on Meeker Drive, and localized campground activities.
- Sound level measurement location 3 (SLM3) was a residence at 33182 School Street in Prescott, Oregon. This residence is on the Columbia River and is directly across from the PMEC site. Background noise sources included traffic on I-5, occasional shipping activities on the Columbia River, and trains.

Exhibit 3-25

SLM and Receptor Locations



Source: Geomatrix

Although the meters were not attended for the entire measurement, noise sources were noted during setup and retrieval of the meters. A summary of the sound level measurement results is displayed below in Exhibit 3-26 and a brief description of the measurement locations and contributing noise sources are included at the bottom of the table.

Exhibit 3-26

Range of Measured Hourly Sound Levels (dbA)

Washington Location		L_{eq}	L_{max}	L_2	L_8	L_{25}	L_{dn}
SLM 1	Day	62-67	71-87	66-71	64-69	63-67	69
	Night	61-66	69-79	65-72	63-69	62-67	
SLM 2	Day	68-72	78-88	74-77	73-75	70-73	75
	Night	66-71	77-83	73-76	71-75	67-73	
WA Noise Limits		NA	75/65	70/60	65/55	60/50	NA
Oregon Location		L_{eq}	L_{max}	L_2	L_8	L_{25}	L_{dn}
SLM 3	Day	44-61	60-88	49-76	46-58	44-54	57
	Night	46-53	54-84	50-60	48-56	45-52	
OR Noise Limits		NA	NA	75/60	60/55	55/50	NA

Daytime hours are defined as between 7 am and 10 pm; nighttime hours between 10pm and 7 am
The Washington and Oregon noise limits are displayed as daytime/nighttime limits.
Source: Geomatrix Consultants, Inc., 2006

Some of the noise descriptors captured for the Oregon measurement location differ from the Washington descriptors because Oregon's noise regulations use different descriptors. For example, Oregon noise regulations use the statistical descriptors L1, L10, and L50 (where the sound levels are exceeded 1 percent, 10 percent, and 50 percent of the time, respectively) while Washington uses the statistical descriptors L2.5, L8.3, and L25 (where sound levels are exceeded 2.5, 8.3, and 25 percent of the time) in addition to the $L_{max,}$ where sound levels are exceeded by 15 A-weighted decibels (dBA).

Federal regulatory agencies use the equivalent sound level (L_{eq}) and the day-night sound level (L_{dn}) to evaluate noise impacts. The L_{eq} is the level of a constant sound that has the same sound energy as the actual fluctuating sound. As such, it can be considered an energy-average sound level. The L_{eq} is the basis for the principal quantity used to describe the total outdoor noise environment, the day-night sound level (L_{dn}). The L_{dn} is a 24-hour L_{eq} with a 10-decibel penalty added to

sound levels that occur between 10 pm and 7 am in consideration of potential disturbance of people trying to sleep.

Detailed information regarding the measured levels is included in Appendix D to the Application for Site Certification 2006-01.

Environmental Impacts of the No Action Alternative – Noise

Under the No Action Alternative, the PMEC would not be constructed. Existing sound levels from the undeveloped site are minimal. No known noise impacts currently occur from noise sources on the site, and none would be anticipated to occur in the future.

Environmental Impacts of the Proposed Action – Noise

Regulatory Overview

This evaluation includes noise criteria or guidelines established by EFSEC, the State of Washington, the State of Oregon, and federal agencies.

Washington's EFSEC. Energy facilities seeking permits from EFSEC are subject to WAC 463-62-352. The code states that applications should:

- Describe and quantify the background noise environment that would be affected by the energy facility
- Identify and quantify the impact of noise emissions resulting from construction and operation of the energy facility, using appropriate state-of-the-art modeling techniques, and including impacts resulting from low frequency noise
- Identify local, state, and federal environmental noise impact guidelines
- Describe the mitigation measures to be implemented to satisfy Washington Administrative Code (WAC) 463-62-030
- Describe the means the applicant proposes to employ to assure continued compliance with WAC 463-62-030

WAC 463-62-030 states that energy facilities shall meet the noise standards established in chapter 70.107 RCW, the Noise Control Act of 1974 as implemented in the requirements in 173-60 WAC.

Cowlitz County and Washington State Standards. EFSEC rules mandate that the PMEC shall comply with the noise standards established in the WAC 173-60. Cowlitz County also adopts the noise regulations set forth in WAC 173-60. WAC 173-60 establishes maximum noise levels permissible in identified environments pursuant to chapter 70.107 RCW. The state noise limits are based on the Environmental Designation for Noise Abatement (EDNA) of the noise source and the receiving properties. EDNAs are designated by class where Class A generally corresponds to residential areas, Class B EDNAs to retail and commercial areas, and Class C EDNAs to industrial and agricultural areas. The class of a property is typically determined by its predominant land use. The noise limits for each land use classification are presented in Exhibit 3-27.

Exhibit 3-27

Washington Maximum Permissible Sound Levels (dBA)

	EDNA of Receiving Property		
EDNA of Noise Source	**Class A (Residential)[a]**	**Class B (Commercial)**	**Class C (Industrial)**
Class A	55/45	57	60
Class B	57/47	60	65
Class C	60/50	65	70

Sound limits shall be reduced by 10 dBA between the hours of 10 pm and 7 am at Class A EDNAs

Source: WAC Chapter 173-60

The noise limits presented in Exhibit 3-27 can be exceeded for certain periods of time: 5 dBA for no more than 15 minutes in any hour, 10 dBA for no more than 5 minutes of any hour, or 15 dBA for no more than 1.5 minutes of any hour. Sometimes these exceptions are described in terms of the percentage of time a certain level is exceeded. For example, L_{25} represents a statistical sound level that is exceeded 25 percent of the time, or 15 minutes in an hour. Similarly, $L_{8.33}$ and $L_{2.5}$ are the sound levels that are exceeded 8.33 and 2.5 percent of the time, or 5 and 1.5 minutes in an hour, respectively. At no time can the

allowable sound level be exceeded by more than 15 dBA, represented by the L_{max}.

Because the operational noise generated by the PMEC would not vary significantly (i.e., there would rarely be short-term peaks), the allowances for short-term increases in the noise level limits would rarely apply. Thus, PMEC (a Class C source) may not generate a sound level (L_{25}) exceeding 70 dBA at nearby Class C EDNAs (i.e., industrial properties) during daytime and nighttime hours. At the nearest Class A EDNAs (i.e., residences), noise generated by the plant as measured at a residential property line would be limited to 60 dBA during daytime hours (7 am to 10 pm) and 50 dBA during nighttime hours. Because the proposed PMEC would operate 24 hours per day, it must be designed to meet the 50 dBA nighttime limit at any Class A EDNAs.

Traffic on public roads, waterborne vessels, and railroad traffic are exempt from the applicable environmental noise limits. Construction activities are also exempt from the noise regulations during daytime hours.

Oregon State Standards. The proposed PMEC facility is located across the Columbia River from the town of Prescott, Oregon. The estimated distance from the PMEC site to the Oregon side of the river is approximately 2,400 feet. Therefore, although not required by EFSEC regulations, the noise impact analysis also assesses the proposed facility's compliance with the Oregon noise standards.

Chapter 350, Division 35 of the Oregon Administrative Rules (OAR) 340-35 establishes statewide noise control regulations. OAR 240-35-035 identifies noise limits for new commercial and industrial uses on previously unused sites. The noise limits apply at "noise-sensitive property," which is defined as "real property normally used for sleeping, or normally used as schools, churches, hospitals or public libraries." Residences are the only noise-sensitive property identified in the project vicinity in the State of Oregon.

The noise limits in OAR 340-35-035 are presented as noise limits for the statistical levels L_{50}, L_{10}, and L_1 over any one-hour period, i.e., the sound levels exceeded 50 percent, 10 percent, and 1 percent of the time, respectively.

Exhibit 3-28 displays the allowable hourly statistical noise levels for two time periods, between 7 am and 10 pm (for protection of speech communication) and between 10 pm and 7 am (for protection of sleep at night). Because the PMEC would operate 24 hours a day, the stricter nighttime noise limits between 10 pm and 7 am are the most applicable to this noise assessment.

Exhibit 3-28
Oregon New Industrial and Commercial Noise Source Standards (dBA)

Statistical Level	Allowable Statistical Noise Levels in Any One Hour	
	7 am - 10 pm	10 pm - 7 am
L_{50}	55	50
L_{10}	60	55
L_1	75	60

The L50, L10, and L1 statistical noise descriptors are the sound levels exceeded 50%, 10%, and 1% of the time, respectively.
Source: OAR 340-35-035

In addition to the overall noise limits shown in Exhibit 3-28 OAR 340-35-035(1)(B)(b) specifies that new noise sources located on previously unused sites should not increase the ambient L_{10} or L_{50} noise levels by more than 10 dBA in any one hour. The resulting ambient statistical noise levels shall include all noises generated or indirectly caused by or attributable to the new source, even those otherwise exempt from the Oregon noise limits.

Similar to the Washington State noise standards, traffic on public roads, railroad traffic and equipment, and construction activities are exempt from the noise regulations (per OAR 340-35-035(5)).

US Environmental Protection Agency. While the USEPA has no regulations governing environmental noise, USEPA has conducted extensive studies to identify the effects of certain sound levels on public health and welfare. The USEPA

"Levels Document" identifies sound levels "requisite to protect the public health and welfare with an adequate margin of safety" (USEPA 1974). USEPA specifies an L_{dn} of 55 dBA for outdoor areas where quiet is a basis for use. Partly because the cost or feasibility of achieving these noise levels was not taken into consideration, these levels have the effect of guidelines, not regulations or standards.

Low Frequency Noise. Washington does not specify limits on low frequency noise or on sound levels in each octave band. In Oregon, sounds emitted by an industrial or commercial noise source may be regulated. The state of Oregon noise regulation (OAR 340-035-0035) limits octave-band noise levels in the low-frequency 31.5 Hz and 63 Hz octave bands to 65 dB and 62 dB, respectively.

Alternatively, a noise level limit of 70 C-weighted decibels (dBC) has been recommended in jurisdictions in the State of California, in various technical papers, and in previous EFSEC documents to protect against impacts from low frequency noise. C-weighting is a method of measuring very loud, low frequency sounds, often used to assess potential annoyance from structural rattling due to low frequency noise. Because the Oregon low frequency limits are not legally applicable to this project and because there is ample documentation in support of using a sound level limit of 70 dBC to protect against potential impacts from low frequency noise on workers[1] [2] [3], a 70-dBC limit is recommended in this EIS.

---

[1] The American National Standards Institute (ANSI), *Gas Turbine Installation Sound Emissions*, B133.8-1977 (R2001), identifies a sound level of 75 to 80 dBC as the approximate onset level for vibrations from low-frequency noise.

[2] EFSEC's 2004 *Site Certification Agreement Between the State of Washington and BP West Coast Products, LLC for the Cherry Point Cogeneration Project* identifies a sound level limit of 70 dBC at residences to protect against impacts from low-frequency noise.

[3] Hessler Associates, Inc's *Environmental Sound Survey and Noise Impact Assessment – Dairy Hills Wind Farm Project* (2006) identifies a level of 70 dBA as the absolute minimum level at which vibrations from low-frequency noise might be perceived.

Construction Impacts

PMEC Site. During the construction phase of the PMEC, noise from construction activities could add to the noise environment in the immediate vicinity of the site. Typical sound levels associated with such activities are displayed in Exhibit 3-29.

Exhibit 3-29

Typical Construction Equipment Noise – PMEC Site

		Range of Noise Levels (dBA)		
Activity	**Type of Equipment**	**At 100 Feet**	**At 2,500 Feet**	**At 5,000 Feet**
Material Handling	Concrete Mixers	68-81	40-53	34-47
	Concrete Pumps	75-77	47-49	41-43
	Cranes	70-82	42-54	36-48
Stationary Equipment	Pumps	63-65	35-37	29-31
	Generators	65-76	37-48	31-42
	Compressors	70-81	42-53	36-47
Pile Driving	Drop Hammer	75-82	47-54	41-48
	Vibratory Hammer	60-89	32-61	26-55
	Auger Boring	71-77	43-49	37-43
Land Clearing	Bulldozer	71-90	43-62	37-56
	Dump Trucks	76-88	48-60	42-54
Grading	Scraper	74-87	46-59	40-53
	Bulldozer	71-90	43-62	37-56

Source: USEPA 1971, modified by Geomatrix Consultants, Inc., 2007

Based on the typical attenuation of sound over distance (6 dBA per doubling of distance), construction noise levels at the nearest residences to the site (2,500 feet or greater from the site) would generally meet the Oregon State daytime noise limits (i.e., 55 dBA) and the Washington State daytime noise limits (i.e., 60 dBA) for residential receivers.

Construction noise is exempt from the Washington state noise limits during daytime hours and from the Oregon state noise limits at all times. Also, the large distances between the plant site and the nearest residential receivers, the temporary nature of construction noise, and the presence of existing noise from I-5 at the residences in Washington would serve to minimize potential noise impacts from PMEC construction activities.

At the end of the construction process and prior to operation of the steam turbine, steam blows would be used to clean the

steam piping of any dirt, debris, or rust accumulated during construction that could damage the turbine. This involves releasing high pressure steam through the piping system and venting it into the atmosphere. Steam blow sound levels are typically substantially louder than other construction activities, ranging from 117 to 128 dBA at a distance of 100 feet.

The nearest residence to the steam blow activity is approximately 3,500 feet away, across the Columbia River from the site. Several residences are within a mile of the plant. Sound levels at these residences could range from 86 to 97 dBA during each steam blow event. Sound levels in this range could be disruptive to nearby residents and to employees of neighboring industrial facilities. To minimize the short-term impacts, silencers providing at least 20 to 30 dBA of reduction would be installed on the piping vent.

Natural Gas Pipeline. The location and construction of the natural gas pipeline would occur primarily within the ROW of Hendrickson Drive (Exhibit 2-2). In some areas, this could put construction activities as near as approximately 350 feet from residences. As shown in Exhibit 3-30, noise from typical construction equipment at 350 feet could exceed the daytime noise limits.

Exhibit 3-30

Typical Construction Equipment Noise – Natural Gas Pipeline

		Range of Noise Levels (dBA)		
Activity	**Type of Equipment**	**At 100 Feet**	**At 350 Feet**	**At 5,000 Feet**
Material Handling	Concrete Mixers	68-81	57-70	48-61
	Concrete Pumps	75-77	64-66	55-57
	Cranes	70-82	59-71	50-62
Stationary Equipment	Pumps	63-65	52-54	43-45
	Generators	65-76	54-65	45-56
	Compressors	70-81	59-70	50-61
Land Clearing	Bulldozer	71-90	60-79	51-70
	Dump Trucks	76-88	65-77	56-68
Grading	Scraper	74-87	63-76	54-67
	Bulldozer	71-90	60-79	51-70

Source: USEPA 1971, modified by Geomatrix Consultants, Inc., 2007

However, the residences would be on the opposite side of I-5 from the construction activities, and I-5 would act as intervening terrain and would produce noise to mask the construction noise. In addition, the construction activity would not be in the same location for long periods of time. The limited timing of the construction activities, the presence of noise from I-5, and the restriction of construction activities to daytime hours would minimize any potential noise impacts from such activities. Therefore, no significant noise impact is anticipated from construction of the natural gas pipeline.

Operation Impacts – PMEC Site

Noise Sources

The PMEC would generate noise from a number of sources associated with fuel delivery and handling, the gasification process, and power generation. Some of these sources are relatively quiet compared with other sources, and these quieter sources would not be audible when the louder equipment is operating. Therefore, this evaluation focused on the loudest noise sources including the air separation unit, HRSGs, steam turbines, exhaust stack, cooling towers, flare, and train deliveries. Much of the activities and equipment would be located in buildings or enclosures, which can greatly reduce the contribution of noise from these sources.

Exhibit 3-31 summarizes the sound pressure levels associated with the dominant noise sources examined in this assessment. Octave band sound power levels for each source are provided in Appendix B.

Gasification Process. The loudest noise sources associated with the gasification process are large compressors required as part of the air separation unit. These would be housed in a building; and this analysis assumes that the walls and roof of the air separation unit building would be sufficient to meet the noise levels displayed in Exhibit 3-31 and that any air intakes or vents would utilize appropriate silencers.

Exhibit 3-31

Summary of PMEC Noise Sources

Source	Data Source	# Units	Approximate Sound Pressure Level at 100 ft (dBA)
Gasification Process			
Air Separation Unit (ASU) Building	1	1	70
ASU Cooling Tower	2	1	71
ASU Cooling Tower Fan	4	7	64
ASU Cooling Tower Pumps	1	1	67
ASU Building stacks/exhaust	1	2	64
Vent Oxidizer (VO) Stack	1	1	64
Enclosed Flare	3	1	70 (Adjacent to windscreen, 15 feet from outside wall of flare)
Sulfur Recovery Unit	1	2	68
SynGas Compressor	1	2	60
TailGas Compressor	1	1	64
SynGas Burner (Part of Tank Vent Oxidizer)	1	2	65
TailGas Burner (Part of Tank Vent Oxidizer)	1	1	65
Blowers	1	4	45 (or 85 dBA at 3 feet)
Power Generation			
Gas Turbine Exhaust Diffuser and Expansion Joint	2	2	70
HRSG Inlet Transition Duct	2	2	61
HRSG Wall	2	2	63
Stack Wall	2	2	42
Stack Exit	2	2	64
IP and LP Kettle Boilers	2	2	61
Gas Turbine Inlet Filter House	2	2	61
Gas Turbine Fuel Gas Systems	2	2	56
Gas Turbine Generator	2	2	56
Gas Turbine Lube Oil Package	2	2	64
Gas Turbine (in enclosure)	2	2	48
Steam Turbine	2	2	71
Steam Turbine Generator	2	2	57
Cooling Tower	2	1	71
Cooling Tower Fan	4	12	64
Recirc Water Pump	2	1	68
Boiler Feed Water Pump	2	6	68
Fuel Gas Conditioning Skid	2	2	65

Exhibit 3-31
Summary of PMEC Noise Sources

Source	Data Source	# Units	Approximate Sound Pressure Level at 100 ft (dBA)
Generator Step-up Transformer	2	4	67
Auxiliary Transformer	2	1	55
Steam Turbine Lube Oil Skid	2	2	64
Condenser	2	2	72
Condensate Pumps	2	2	62
Material Delivery/Handling			
Coal/Pet Coke and Flux Unloading (RR)	4	2	68
Slag and Sulfur Loading	4	2	61
Transfer Tower	1	1	57
Slurry Feed Building	1	1	54
Slurry Prep Building	1	1	54
Slag Handling Building	1	1	59
Rod Mill Building	1	1	59
Ship Unloading Crane	4	1	64
Locomotive	4	4	68

Sources:
1) Excelsior Energy Inc. (2006)
2) John Uber, personal communication
3) Robert Ferraro, personal communication
4) Data taken from previous Geomatrix sound level measurements
Please note that engineering and equipment selection has not been finalized and that the above equipment sound levels are speculative. They are used in this analysis to represent a reasonable estimate of overall future sound levels from the proposed facility.

The sound level for the proposed enclosed flare is shown only for long-term, typical pilot flare operation. Sound levels during start-up conditions, expected to occur up to 12 times per year, would be somewhat louder. Maximum operation, which might be required during emergencies or major upset conditions, could be substantially louder but would rarely, if ever, occur.

Blowers were assumed to be located near the fuel unloading and slag loading areas and at the tank vent oxidizer.

Combined Cycle Power Generation. The noise impact analysis initially used base sound levels for the HRSG and HRSG exhaust stack that assumed virtually no mitigation. When initial noise calculations indicated mitigation may be warranted, a minimum level of mitigation was assumed for both. Final design of the facility may result in a choice of

equipment that does not require the following specified mitigation. At the time of final design, Energy Northwest can ensure that the sound levels of the chosen equipment are comparable to the mitigated levels used in this analysis in lieu of prematurely agreeing to fully incorporate the following mitigation.

For the HRSG, the sound levels used assumed the thickness of the steel in the HRSG would be increased over the base standard design. The HRSG inlet transition duct would be ¾" thick, the first half of the HRSG body walls ½" thick, and the second half of the HRSG body ¼" thick. For the HRSG exhaust stack, the casing on the first half of the stack was assumed to be ½" thick. Additionally, the noise analysis assumed that stack baffles would be installed, which would produce a 12-dBA noise reduction from the stack exit when compared to the stack exit with no baffles.

Fuel Delivery, Handling, and Preparation. Fuel storage and much of the handling would occur inside two storage domes. These domes would contain loaders, stackers, reclaimers, etc. This analysis assumed that the outer shell of the storage domes would substantially reduce the sound levels from these interior sources, so these sources were not quantitatively considered in this analysis. This analysis also assumed that the fans proposed for installation in the roofs of the domes would be large, slow fans and would produce negligible levels of noise in comparison to the other on-site noise sources.

This analysis assumed that the barge/ship unloading would use a low-noise bucket unloader. Trains delivering the fuel would consist of four locomotives pulling train cars with fuel material on a perimeter track at a constant speed of 0.3 mph. Each delivery could take up to five hours. This assessment considered train noise by estimating the worst-case one-hour sound level for each residence. This would generally be due to the four locomotives operating on that portion of the track (approximately 1,500 feet long) nearest to each residence.

Cadna/A Noise Model

Noise anticipated to be generated by operation of the PMEC was evaluated at nearby residential receivers using the Cadna/A noise model. Cadna/A is a computer program that calculates sound levels after considering the noise reductions or enhancements caused by distance, topography, ground surfaces (including water), atmospheric absorption, and meteorological conditions in compliance with ISO-9613-2:1996. The modeling includes the following steps: (1) characterizing the noise sources, (2) creating 3-dimensional maps of the site and vicinity to enable the model to evaluate effects of distance and topography on noise attenuation, and (3) assigning the equipment sound levels to appropriate locations on the site. Cadna/A then constructs topographic cross sections to calculate sound levels in the vicinity of a project site.

Using Cadna/A, sound levels resulting from the PMEC were predicted at seven residential receivers in the general vicinity. Although there are no residential or sensitive receivers adjacent to or very near the proposed site (all are approximately 2,400 feet or farther from the site), some of the nearest residences east of I-5 and west of the Columbia River were considered in the analysis.

Predicted Sound Levels at Residential Receivers

Project-Related Sound Levels. Exhibit 3-32 identifies predicted sound levels at the nearest residential receiving properties to the proposed PMEC site. Predicted levels are shown both with and without railroad movement. Noise from railroad equipment and facilities is exempt from both the Washington and Oregon State noise limits. However, train noise is considered in order to assess the full potential impacts from the proposed PMEC facility. Both the “No Train” and “With Train” scenarios are displayed in Exhibit 3-32.

Exhibit 3-32

Project and Cumulative Sound Levels, Hourly and Daily (dBA, L_{25}/L_{50}, L_{dn})

	Existing Levels		No Train						With Train[a]					
			Project Only		Cumulative[b]		Increase		Project Only		Cumulative[b]		Increase	
Receptor	Hourly	L_{dn}	Hourly	L_{dn}	Hourly	L_{dn}	Hourly	L_{dn}	Hourly	L_{dn}	Hourly	L_{dn}	Hourly	L_{dn}
Washington Receptors[c]														
R1 (SLM1)	62-67	69	48	54	62-67	69	0	0	49	55	62-67	69	0	0
R2	62-67	69	45	51	62-67	69	0	0	47	52	62-67	69	0	0
R3	62-67	69	43	49	62-67	69	0	0	44	50	62-67	69	0	0
R4 (SLM2)	67-73	75	42	49	67-73	75	0	0	43	49	67-73	75	0	0
Oregon Receptors[c]														
R5	44-54	57	44	50	47-55	58	0-3	1	49	54	50-55	59	2-7	2
R6 (SLM3)	44-54	57	47	53	48-55	59	1-5	2	51	55	51-56	59	2-8	2
R7	44-54	57	46	52	48-55	58	1-4	1	47	53	49-55	58	1-5	1

a The Ldns were calculated assuming 5 hours of train noise during nighttime hours. The hourly sound levels shown are for those hours with a train.
b The cumulative sound levels include both the measured existing ambient sound levels and the predicted PMEC-related sound levels.
c The sound levels in Washington State are represented by the L25 noise descriptor; the sound levels in Oregon State are represented by the L50 noise descriptor. Please refer to Exhibit 3-25 for receptor locations.

Exhibit 3-32 indicates that predicted sound levels at all receptor locations with no train movement comply with the 50 dBA nighttime noise limit for industrial noise sources affecting residential receivers, and no significant adverse noise impacts are anticipated due to project-related sound levels.

With train movement noise, only one location, R6 in Prescott, Oregon, across the Columbia River from the site, would experience sound levels exceeding 50 dBA, and the overall project-related sound level would still be only 51 dBA.

The calculated project-related daily sound levels (L_{dn}s) are at or below the 55-dBA guideline suggested by EPA for protection of residential uses, with or without inclusion of the train noise. In is important to note that the overall sound levels at all residential and sensitive receivers are currently greater than 55 dBA and would likely continue to exceed 55 dBA in the future, with or without PMEC.

Sound Level Increases. As shown in Exhibit 3-32, with no train event the hourly sound level increases are all 5 dBA or less, with most locations experiencing virtually no increase in

levels. The projected daily sound levels (L_{dn}s) would not increase at residential locations east of I-5 but potentially could increase by 1 to 2 dBA west of the Columbia River in Oregon. The hourly increases at all locations also are less than the 10 dBA increase stipulated in the Oregon State noise rules.

With train activity at PMEC, there is virtually no projected increase in either cumulative hourly or L_{dn} sound levels at the residences and sensitive receivers east of I-5, and no noise impacts would be expected. At residences in Oregon west of the Columbia River, the highest predicted hourly sound level increase of 8 dBA could be readily noticeable. However, the increase is below the 10-dBA increase limit stipulated in the Oregon State noise rules, and no significant adverse noise impacts are anticipated due to increases in the cumulative sound levels.

Predicted Low Frequency Noise

The PMEC is still in preliminary design, and final equipment has yet to be determined. Therefore, accurate estimates of low frequency noise associated with the major on-site equipment are not yet available. However, preliminary data provided by equipment manufacturers and published data of similar sources were used to estimate potential low frequency sound levels and overall C-weighted sound levels in order to assess the potential impacts from low frequency noise.

The primary sources of low frequency noise are anticipated to be:

- HRSG transition duct
- HRSG wall noise
- Gas Turbine Exhaust Diffuser and Expansion Joint
- Air Inlet Filter House
- HRSG Exhaust stacks
- Steam Turbine
- Enclosed Flare

- Cooling Tower
- Locomotives

The predicted C-weighted sound levels (dBC) are displayed in Exhibit 3-33. As seen in the table, the estimated C-weighted sound levels with or without train activity are 70 dBC or lower, which would protect against undue impacts from low frequency noise. Therefore, no significant noise impacts from low frequency noise are anticipated.

Exhibit 3-33
Estimated C-Weighted Sound Levels (dBC) at Residential Receivers

Receptor	Without Train	With Train
R1 (SLM1)	66	67
R2	64	65
R3	64	65
R4 (SLM2)	64	64
R5	65	68
R6 (SLM3)	68	70
R7	64	69
Suggested Limit	*70*	

Operation Impacts – Natural Gas Pipeline

The pipeline would be located in the ground, and no noticeable noise would be emitted by the operation of the pipeline at aboveground locations. Therefore, no noise impact is anticipated from operation of the pipeline.

Mitigation Measures – Noise

No Action Alternative

Mitigation measures are not required under the No Action Alternative.

Proposed Action

Construction. Construction would generally occur only during daytime hours to reduce the potential for noise impacts from this activity. Construction noise is exempt from both Washington and Oregon noise limits during daytime hours.

Although the temporary nature of construction and the restriction of construction to daytime hours would reduce the potential for noise impacts, steam blows occurring near the end

of the construction period could produce levels of noise much higher than other typical construction noises. Silencers would be installed on the piping vents prior to steam blows to reduce the potential for impacts from this activity.

Operation. Several measures have been included in the noise modeling analysis in order to meet the Washington State noise regulations or to reduce noise impacts based on suggested noise impact guidelines for low frequency noise. The following measures that go beyond standard equipment designs have been assessed:

- Increased thickness of the steel walls of the HRSG sections and inlet transition duct
- Increased thickness of the stack walls
- Installation of sound baffles in the HRSG exhaust stacks to reduce noise from the stack exits
- Adequate design and construction of various enclosures and buildings on the site to achieve the sound levels displayed in Exhibit 3-32. The exterior sound levels would include sound emitted through the roof and walls and any intake or vent openings

Although the noise modeling analysis indicated that the above mitigation would be necessary to meet the Washington State noise limits or suggested low frequency guidelines, the PMEC is still in preliminary design, and final equipment has yet to be determined. Therefore, accurate estimates of overall and low frequency noise associated with the major on-site equipment are not yet available. Final decisions on the appropriate noise mitigation for this site should not be made until the specific equipment proposed for the site has been selected and the design is in its final stages. During final design, ongoing consideration will be given to minimizing noise with appropriate design and equipment selection of the facility to assure compliance with applicable noise standards, ordinances, or guidelines. Particular attention will be given to minimizing

sound levels in the low frequencies, particularly in the 31.5 and 63 Hz octave bands.

Significant Unavoidable Adverse Impacts – Noise

No Action Alternative

There would be no significant unavoidable adverse noise impacts under the No Action Alternative.

Proposed Action

There would be no significant unavoidable adverse noise impacts expected as a result of the project.

3.5.2 Hazardous Materials

Affected Environment – Hazardous Materials

PMEC Site. The majority of the site is occupied by materials dredged from the adjacent Columbia River, short vegetation, a sand and gravel quarry, and access driveways. The west approximately 1/3 of the site consists of dredged materials from the eruption of Mt. St. Helens in 1980, and the remaining portion consists of dredged river sediment. The dredged materials on the site are up to approximately fifteen feet thick.

Known past site use has been limited to agricultural operations, believed to be livestock grazing and, since the early 1980s, and deposition of materials dredged from the adjacent Columbia River by USACE. Documentation of sampling and analysis of the dredged materials did not identify petroleum products or hazardous substances in concentrations exceeding MTCA cleanup levels. Groundwater sampling data was not reviewed. However, based on the lack of contaminants in the soils, there is no reason to suspect groundwater contamination.

A small quantity of fill was deposited at the property and was believed to have been generated by grading operations associated with Cowlitz County road projects. The specific source of these soils is not known. However, the projects were reportedly screened by the Port of Kalama to avoid filling the site with contaminated materials.

Previous Phase I assessments; review of historical maps and photographs; reviews of county, state, and federal lists of contaminated sites; site visits; and communication with local

government agencies provided no evidence or information suggesting that the PMEC site has been adversely affected by current or past on-site use, storage, handling, and/or disposal practices involving hazardous materials/petroleum products. The current Phase I assessment of the site provided the following information:

- The site is supplied with electricity by the Cowlitz County PUD. An electrical transformer on-site is owned by the Cowlitz County PUD. Based on the reported installation date it is unlikely that the transformer contains PCBs. Staining or other evidence of release from this transformer was not observed. Additional dielectric or hydraulic fluid containing equipment such as elevators or large capacitors was not observed or reported at the site.
- No aboveground storage tanks or hazardous substance use or generation were observed at the site. Significant stains or suspicious odors were not observed that would have indicated release of hazardous substances to the subject property.
- The site is not connected to the City of Kalama municipal water supply; however, a water supply pipeline reportedly passes beneath the subject property. Two groundwater test wells installed by the Port of Kalama were observed along the north portion of the subject property.
- Current sources of wastewater on the site were not identified. The site is relatively flat with little topographic relief, and due to the permeability of the site surface soils, stormwater is primarily absorbed into the site soils. Stains or oily sheens that would have indicated releases to the subject property were not observed.
- Standing water was observed in two areas lower in elevation on the northwest portion of the property. The water appeared to be ponded stormwater or river water, and sheens or suspicious odors were not noted that would have indicated releases of petroleum products or hazardous substances. Pits, ponds, or lagoons associated with

hazardous materials or wastes were not observed at the subject property.

Property Vicinity. The Phase I assessment did not find evidence or information that the site had been adversely affected by current or past off-site use, storage, handling, and/or disposal practices involving hazardous materials/wastes or petroleum products.

The Steelscape and MG Industries facilities adjacent to the site were identified as large quantity generators of hazardous wastes and were observed with aboveground, exterior storage tanks. However, the facilities were not identified on lists of confirmed or suspected contaminated sites.

The adjacent railroad tracks, wastewater treatment plant, and Air Liquide facility have the potential to have adversely affected environmental conditions at the site. However, evidence of releases was not observed during the site reconnaissance, and these facilities were not identified on government databases.

Environmental Impacts of the No Action Alternative – Hazardous Materials

There would be no environmental impacts related to hazardous materials under the No Action Alternative.

Environmental Impacts of the Proposed Action – Hazardous Materials

Construction Impacts. During construction, chemicals and hazardous materials that may be stored on site include fuels (e.g., diesel, kerosene), gasoline, oil (e.g., lubricating, transformer), solvents and thinners, paints, antifreeze, coatings and sealants, water treatment chemicals, ammonia, corrosion inhibitors, pesticides, compressed gases, cleaning materials, and batteries. Although quantities of waste materials generated during construction cannot be known with any certainty at this time, Exhibit 3-34 provides information on anticipated construction waste streams from use of chemicals and hazardous materials based on experience at other projects.

Exhibit 3-34

Anticipated Construction Waste Streams During Construction

Waste Stream	Waste Stream Classification	Estimated Amount	Estimated Frequency of Generation	Frequency of Removal from Site	Quantity Shipped
Office and construction refuse (e.g., scrap wood, steel, glass, plastic, paper, garbage)	Non-hazardous	50 cubic yards	Weekly	1 per week	50 cubic yards
Used oil	Used oil	55 gallon drums	200 drums over life of construction	1 per 30 days (either in bulk or by drum)	250 - 550 gallons per shipment
Oily rags, oil absorbent generated during normal activities, oil filters	Non-hazardous (provided there are no free liquids)	Unknown	Weekly	Unknown	Unknown
Solvents and thinners	Hazardous	Unknown	Unknown	Unknown	Unknown
Oil based paints	Hazardous	Unknown	Unknown	Unknown	Unknown
Spent lead acid batteries	Recycled Hazardous	5 batteries	Yearly	1 per year	5 batteries
Spend nickel-cadmium batteries	Universal	100 batteries	Yearly	1 per year	100 batteries
Piping and equipment cleaning materials	Hazardous or non-hazardous	Unknown	Once per piping or equipment	Unknown	Unknown
Fluorescent, mercury vapor lamps	Universal	40	Yearly	1 per year	40 lamps
Ethylene glycol based antifreeze	Hazardous	Unknown	Unknown	Unknown	Unknown
Empty containers	Empty per definition in Dangerous Waste Regulations; Non-hazardous	Unknown	Unknown	Unknown	Unknown
Lab Pack (miscellaneous materials such as grease tubes)	Hazardous	Unknown	Unknown	Unknown	Unknown

During construction, the worst-case scenario for a major spill would be during transfer of materials from a delivery vehicle to equipment such as transformers or during equipment cleaning when hazardous materials are used. Other small spills could occur from machinery fluids, hydraulic fluids, antifreeze, diesel fuel, motor oil, and gasoline.

It is possible that hazardous materials may be uncovered during construction of the natural gas pipeline, given its linear nature and location, although the potential for this would be low. If any hazardous materials are found, appropriate mitigation measures would be taken before construction would proceed.

Operation Impacts. There will be four major waste streams from PMEC: inert slag, elemental sulfur, activated carbon that has been specially impregnated to remove mercury, and spent catalyst from the combustion turbines. Exhibit 3-35 summarizes the anticipated major waste streams.

Exhibit 3-35
Anticipated Major Waste Streams During Operations

Waste Stream	Classification	Estimated Amount per Year	Frequency of Removal
Inert Slag	Non-hazardous	130,000 tons	Weekly
Elemental Molten Sulfur	Hazardous	100,000 tons	Once or twice per week
Activated Carbon with Mercury	Non-hazardous	14 tons	Annually
Spent Hydrolysis Catalyst	Non-hazardous	42 tons	Annually

Estimates are based on a combination of the preliminary facility design information provided by Energy Northwest's design contractor, which is reflective of the Conoco Phillips technology employed in the Wabash River IGCC facility in Indiana, and feedstock information provided to Energy Northwest by prospective coal and petroleum coke providers.

PMEC will generate up to 130,000 tons per year, or approximately 400 tons per day, of slag. Slag is a vitrified glass-like granular substance that is generated from the ash content in the feedstock. The slag will consist primarily of silica, and, depending on the feedstock, traces of various non-volatile substances including metal ores. The slag is produced in the high-temperature reactor vessel during the solid feed-stock gasification process. The 130,000 tons per year is based on the maximum expected, which is continuous operation with 100% Powder River Basin coal with an ash content of 6.6 wt%. Continuous operation using 100% petroleum coke with ash content as low as 0.5 wt% would result in a much lower annual slag production on the order of 30,000 tons per year, or 100 tons per day. Since PMEC is designed to operate on a full range of blends of petroleum coke and coal, 100 to 400 tons per day is a reasonable envelope of slag production for the PMEC facility.

Because of its vitrified physical and chemical form, slag from PMEC will be environmentally inert, and therefore marketable as a substitute for sand. Likely commercial applications are road construction and land-fill cover. Contracts for the disposition of slag from PMEC will be in place prior to

commercial operation. Slag will be removed from the reactor vessel and collected in a hopper for temporary storage. From the hopper, it will be loaded directly into standard rail cars or truck-hauled trailers for transport to market. In the unlikely event that there is insufficient market for the slag, it can be transported to and disposed of safely in a standard landfill.

Utilizing standard rail cars with a capacity of 100 tons of slag, up to four rail cars per day will be filled with slag. Assuming a typical shipment of 30 rail cars, slag will be stored on site in rail cars for up to seven days. Should the use of truck-hauled trailers be the appropriate mode of transportation, trucks will be filled and proceed to their delivery point immediately. For a trailer capacity of 40 tons of slag, up to 10 truckloads per day would be required.

PMEC will generate up to 100,000 tons per year, or approximately 300 tons per day, of elemental molten sulfur. The sulfur will be extracted from the synthesis gas stream during the gas cleanup process. The 100,000 tons per year is based on the maximum expected, which is operation with 100% petroleum coke as the fuel feedstock, with a relatively high sulfur content of up to 6.6 wt%. Operation on Powder River Basin coal, which has a much lower sulfur content, will produce substantially less sulfur, or as low as 20,000 tons per year, or 60 tons per day. Since PMEC is designed to operate on a full range of blends of petroleum coke and coal, the above figures establish a reasonable envelope of sulfur production for the PMEC facility.

The sulfur that is extracted from the synthesis gas stream will be in molten form. The molten sulfur will be loaded directly from the gas cleanup facility into specialized railroad cars or truck-hauled tanker trailers. Both the loading equipment and truck-hauled tankers will utilize enclosed processes and equipment designed for the safe transfer and transport of the molten or solid sulfur. Once the tankers are filled, they will be transported to purchasers under contracts that will be in place prior to commercial operation. On-site storage while awaiting rail shipment will be in the rail tankers and will be short term,

typically no more than a week, or up to 20 loaded tanker cars parked on site. The sulfur loading area will be designed with containment features to contain spills and facilitate cleanup. Tankers, once loaded, will not maintain the sulfur in molten form, but will be equipped with heating coils to re-melt the sulfur at the point of delivery. In the case of rail cars, each sulfur tanker car will hold approximately 100 tons of sulfur. It is anticipated that shipments off site will entail 10 to 20 tanker cars. Therefore the frequency of shipment by rail will be typically one to two per week.

In the case of tanker trucks, each tanker trailer will hold approximately 40 tons of sulfur, and each trailer will likely be transported as it is filled. Therefore up to eight shipments per day by truck would be anticipated, to the extent that trucking is the preferred mode of transportation. If a sulfur purchaser locates very close to the PMEC site, all or a portion of the sulfur may be transported by pipeline to the customer, obviating the need for tankers.

Should the molten sulfur market become unreliable, there is an option of changing the form of the sulfur on or near the PMEC site. Using commonly available industrial equipment, the molten sulfur can be converted to granular form suitable for either domestic or overseas shipment.

Preliminary market research indicates that likely consumers of the sulfur will be fertilizer manufacturers and other chemical product manufacturers. Domestic mining of sulfur has been all but eliminated. Due to the favorable site characteristics, providing access to international shipping, the purity of the sulfur produced, and the multiple and diverse applications in the chemical industry and agriculture industries, it is reasonable to expect that, price notwithstanding, a market for the facility's sulfur will exist throughout its lifetime. The need to resort to a special landfill for the sulfur is extremely remote, and would occur only if there is a world-wide glut of sulfur in all forms, facing every domestic sulfur bi-product producer with the same challenge.

Syngas will be passed through fixed beds of activated carbon that are specially impregnated to remove mercury. Multiple beds would be used to obtain optimized adsorption of mercury. The activated carbon capacity for mercury ranges up to 20 percent by weight of the carbon. It is expected that the concentration of mercury from a Toxicity Characteristic Leaching Procedure test will be less than 0.2 mg/L. If that is the case, the activated carbon can be land filled. The quantity of carbon would depend on the concentration of mercury in the feed stock and the level of mercury removal from the feedstock. PMEC is proposing a 90% removal efficiency. Based on the experience at Wabash River IGCC facility, which uses activated carbon, it is expected that approximately 14 tons would be generated annually. Spent carbon will be stored in a secure covered location prior to being trucked offsite to a sanitary landfill. It is expected that shipment will occur shortly after material is removed from the carbon beds.

Spent hydrolysis catalyst will be generated from the combustion turbine process, with catalyst replacement occurring every one to three years. Approximately 42 tons is expected to be generated on an annual basis. This material will be non-hazardous and will be trucked to a sanitary landfill, shortly after being generated.

Mitigation Measures – Hazardous Materials

No Action Alternative

No mitigation measures would be required under the No Action Alternative.

Proposed Action

Construction. BMPs and Energy Northwest's EMS, including the pollution prevention program, will provide measures that minimize the risk from hazardous materials and spills. The EPC contractor will be required to follow Energy Northwest's program. No additional mitigation measures will be needed.

If hazardous materials are uncovered during construction activities, the Port, County, and/or BNSF Railroad would be contacted depending on where the contamination was found.

The hazard would be removed before construction would proceed.

Operation. Energy Northwest's EMS, plans, and procedures will be extended to include PMEC operations. No additional mitigation measures will be needed.

Significant Unavoidable Adverse Impacts – Hazardous Materials

No Action Alternative

There would be no significant unavoidable adverse impacts under the No Action Alternative.

Proposed Action

There would be no anticipated significant unavoidable adverse impacts from hazardous materials as a result of the project.

3.5.3 Electric and Magnetic Fields

Affected Environment – Electric and Magnetic Fields

PMEC's output will interconnect to either Cowlitz County PUD or the BPA transmission system at the busbar located on the PMEC site. The transmission system requires an upgrade to accommodate PMEC's output. Through two three-phase circuits, power will be delivered either to a new Cowlitz PUD double-circuit 230-kV transmission line or to a new BPA line. The transmission line would be constructed, owned and operated by either Cowlitz County PUD or by BPA. Depending on which agency builds and owns the line, the transmission line project would need to comply with a SEPA (in the case of the PUD) or NEPA (in the case of BPA) review.

Transmission Line

EMFs are a natural occurrence produced by the earth itself. EMFs are also produced by any device that consumes or conducts electricity, such as lights, televisions, appliances, radios, shavers, computers, wiring in houses and offices, and electrical transmission and distribution lines.

Some scientists believe that exposure to EMF fields 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 in other countries.

Powerlines and wiring in buildings and appliances generate 50 and 60 Hertz fields, sometimes referred to as "power frequency" fields. Hertz is the unit for measuring the frequency of fields in the number of wave cycles each second. The lower the frequency of a field, the lower its energy. Power frequency fields are low frequency fields and have low energy levels. Microwave and x-ray fields are high frequency fields and have high energy levels. Early scientific studies found a link between increased rates of cancer and closeness to certain kinds of power lines that can cause strong magnetic fields. Over the last two decades concern about the health effects of electric and magnetic fields has increased.

According to the California Department of Public Health (http://www.dhs.ca.gov/ehib/emf) (web site accessed 2/22/07):

"nobody knows for sure whether exposure to 50 and 60 Hertz fields is a health risk. Three kinds of studies have been done to explore this: 1) laboratory studies that expose human or animal cells or organs to fields, looking for biological changes: 2) laboratory studies that expose animals to fields, looking for changes in body function, chemistry, behavior or general health 3) "epidemiological" studies that observe people's health and evaluate whether groups that have high or unusual EMF exposure have a greater chance for developing a disease like cancer than groups with "normal" or usual exposures". The Department found that the studies do not show a clear pattern of health hazards. "Concern about possible health hazards from electric power use is supported by results of some scientific studies, but the evidence they provide is still incomplete and inconclusive and even, in some cases, contradictory."

According to the National Institute of Environmental Health Sciences, June 2002 (accessed 2/22/07) (http://www.niehs.nih.gov):

"The largest evaluation to date was led by two U.S. government institutions, the National Institute of Environmental Health Sciences (NIEHS) of the National Institutes of Health and the Department of Energy (DOE), with input from a wide range of public and private agencies. This evaluation, known as the Electric and Magnetic Fields Research and Public Information Dissemination (EMFRAPID) Program, was a six-year project with the goal of providing scientific evidence to determine whether exposure to power-frequency EMF involves a potential risk to human health.

In 1999, at the conclusion of the EMF RAPID Program, the NIEHS reported to the U.S. Congress that the overall scientific evidence for human health risk from EMF exposure is weak. No consistent pattern of biological effects from exposure to EMF had emerged from laboratory studies with animals or with cells. However, epidemiological studies (studies of disease incidence in human populations) had shown a fairly consistent pattern that associated potential EMF exposure with a small increased risk for leukemia in children and chronic lymphocytic leukemia in adults. Since 1999, several other assessments have been completed that show weak scientific support for an association between childhood leukemia and exposure to power-frequency EMF. These more recent reviews, however, do not support a link between EMF exposures and adult leukemias. For both childhood and adult leukemias, interpretation of the epidemiological findings has been difficult due to the absence of supporting laboratory evidence or a scientific explanation linking EMF exposures with leukemia."

As described in Chapter 2, Energy Northwest is examining two alternatives for the transmission of PMEC's electrical output approximately 11.5 miles to BPA's Longview Substation. The route is depicted on Exhibit 2-5.

Alternative 1: Cowlitz/BPA Line to Longview Substation. Under this alternative, the transmission line will follow a path in existing PUD ROW or easements from PMEC to BPA's Longview substation. The first 8.3 miles of the line from PMEC will extend to a point near BPA's Cowlitz substation and be designed, built, owned and operated by Cowlitz County PUD and will replace or be built adjacent to an existing 115-kV Cowlitz County PUD line. From a point beginning approximately 2.4 miles from the PMEC busbar north and northwest to the point near BPA's Cowlitz substation, the new 230-kV line will replace an existing, de-energized 69-kV Cowlitz County PUD line. The 230 kV line will extend another 3.2 miles northwest from the Cowlitz substation to the Longview substation in existing BPA ROWs or easements.

Alternative 2: BPA Line to Cardwell Substation. The transmission line will follow a path in existing Cowlitz County PUD ROW from PMEC to BPA's Cardwell substation (located about a mile east of PMEC) and then along BPA ROW to BPA's Longview Substation.

Existing EMF Levels

No measurements have been taken of existing EMF levels along the existing power lines; however, the National Institute of Environmental Health Sciences website (http://www.niehs.nih.gov) provides information on typical levels from 115 kV lines at 1 meter (3.3 feet) above the ground for power lines in the Pacific Northwest:

Typical EMF Levels for 115 kV Lines

Field	Under power line	Edge of ROW (50 feet)	100 feet	200 feet	300 feet
Electric Field (KV/m)	1.0	0.5	0.07	0.01	0.003
Mean Magnetic Field (mG)	29.7	6.5	1.7	1.4	0.2

In comparison, the magnetic fields of a color computer monitor, unless they are the new flat panel displays, are as follows:

Average Magnetic Fields from Computer Monitors (distance from monitor)			
Field	**6”**	**1’**	**2’**
Mean Magnetic Field (mG)	7-20	2-6	1-3

Environmental Impacts of the No Action Alternative – Electric and Magnetic Fields

Under the No Action Alternative, the existing EMF levels would continue.

Environmental Impacts of the Proposed Action – Electric and Magnetic Fields

Energy Northwest anticipates that use of either of the above alternatives would result in replacement of up to three 115 kV single-circuit lines with one double-circuit 230 kV line.

The new power lines have not yet been designed and no exact predictions have been made as to the EMF levels of the proposed 230 kV lines. The National Institute of Environmental Health Sciences website (http://www.niehs.nih.gov) provides information on typical levels from 230kV lines at 1 meter (3.3 feet) above the ground for power lines in the Pacific Northwest:

Typical EMF Levels for 230 kV Lines					
	Under power line	**Edge of ROW (50 feet)**	**100 feet**	**200 feet**	**300 feet**
Electric Field (KV/m)	2.0	1.5	0.03	0.05	0.001
Mean Magnetic Field (mG)	57.5	19.5	7.1	1.8	0.8

Because the line has not been designed other than the proposed location within existing PUD or BPA ROW, it is premature to determine exactly where the line would be located relative to residences or other uses. Should BPA be the owner of the new line, BPA design guidelines for limiting EMF are anticipated to be used.

Mitigation Measures – Electric and Magnetic Fields

No Action Alternative

Mitigation measures are not required for the No Action Alternative

Proposed Action

The line has not been designed and therefore no mitigation measures have been identified. The analysis of mitigation measures will be performed as part of the SEPA or NEPA review of the transmission line, depending on if the line is built by the PUD or BPA.

Significant Unavoidable Adverse Impacts – Electric and Magnetic Fields

No Action Alternative

There would be no significant unavoidable adverse impacts under the No Action Alternative.

Proposed Action

No significant unavoidable adverse impacts are expected as a result of the project.

3.6 Land Use, Recreation, and Visual Resources

3.6.1 Land Use

Affected Environment – Land Use

Existing Land Uses and Zoning

PMEC Site. The PMEC would be constructed within the North Port Marine Industrial Park at the Port of Kalama. The Port of Kalama is designated heavy industrial and is located north of the City of Kalama, in Cowlitz County, Washington. The development site is located on the east bank of the Columbia River. The BNSF rail lines lie immediately to the east of the site, between the site and I-5 (Exhibit 2-2). The rail lines are contracted for use by BNSF, Union Pacific and Amtrak. The site can be accessed from I-5 via exit 32.

The approximately 95-acre site has access to a dock with a 43-foot deep draft on the Columbia River. The dock is permitted to be expanded to approximately 1,600 feet in length. The Kalama River flows into the Columbia River approximately 1,700 feet south of the site but is separated from the site by Steelscape, a steel coil processing facility.

Properties adjacent to the development site are owned by the Port of Kalama and operated by lease holders. Energy Northwest would lease the development site from the Port of Kalama.

Land uses within and adjacent to the development site are unzoned but designated heavy industrial in the Cowlitz County Comprehensive Plan:

- ***North:*** service road (Eastwinds Road) and a forested site containing an undevelopable backwater channel of the Columbia River.
- ***South:*** local service road extension of Tradewinds Road, Steelscape, and the Kalama River. The Port of Kalama extends between the Columbia River and I-5 for 7 miles to the south.

- ***East:*** local service road, Tradewinds Road, wetland, BNSF\Union Pacific Railroads, large treed rock formation, and I-5.
- ***West:*** Port of Kalama river front property for Port activities, dock, the Columbia River and the community of Prescott across the river, the decommissioned Trojan Nuclear Plant, and forested areas.

There is limited space in the immediate vicinity for further development; however, development may include manufacturing and processing companies that could use energy generated by the PMEC facility.

Pipeline Route. The proposed natural gas pipeline would be approximately 5 miles long and would extend from the plant site south to the Deer Island Natural Gas Pressurization Station near Exit 27 on the west side of I-5 (Exhibit 2-2). The gas pipeline would be located within existing roadway ROW until reaching the Kalama River. The pipeline would cross under the Kalama River using HDD in the vicinity of the Hendrickson Drive Bridge. The pipeline would then follow the dike walking path along the river until it meets up with Hendrickson Drive.

The use of trails (walking paths) for pipeline corridors is not unusual. The current pipeline is placed within the dike complete with an open-for-use walking path above it. The pipeline would be located within Port land and under or along side Hendrickson Drive. The adjacent land use is predominantly industrial, with some recreational use including parkland and a marina. The pipeline would be constructed through a portion of the City of Kalama designated as an industrial area.

Railroad Spur. One or more rail sidings or spurs will be needed to connect the PMEC rail loop to the BNSF/Union Pacific rail line (Exhibit 2-2). These spurs would be constructed within the present rail ROW, requiring modifications to the existing rail spurs servicing the Steelscape plant. The loop track would ring the development site. A

wetland immediately to the east would be filled in order to accommodate the tracks.

Electrical Transmission Route. Electricity generated by PMEC would be transmitted to the BPA regional power grid utilizing either Cowlitz County PUD or BPA lines. Cowlitz County PUD or the BPA will construct approximately 12 miles of new transmission lines within the PUD/BPA existing transmission line ROW.

Land Uses within 25 Miles of the Site

The area encompassing a 25-mile radius from the site is transected north-south by the Washington/Oregon border, the Columbia River, I-5, and the BNSF Railway. East of the I-5 corridor, land use is predominantly forestry, with some agriculture, and residential uses in numerous unincorporated communities. The incorporated City of Kalama is approximately 2.5 miles south of the site. The Cowlitz County seat of Kelso and the City of Longview are about 7 miles north along the Columbia River. The incorporated cities of Castle Rock and Woodland are 17 miles north and 12 miles south, respectively. The aforementioned incorporated cities have mixed urban uses. Most of Cowlitz County is not zoned.

Across the Columbia River in Oregon to the west, land use is mostly agriculture and forestry. The unincorporated community of Prescott, Oregon, population 73 (US Census 2005) is on the opposite bank of the Columbia River from the plant site. St. Helens is the closest incorporated city in Oregon, 14 miles to the south.

To the east, the predominant natural features are the rivers draining from Mount St. Helens into the Columbia River, including the Toutle River (and Silver Lake), the Coweeman River, the Kalama River, and the Lewis River. Recreation facilities in the vicinity of the development are discussed in the Recreation section.

Land Use Plans and Policies

The proposed PMEC site is located within unincorporated Cowlitz County. The subject property is regulated based on

compliance with Cowlitz County Comprehensive Plan and Zoning Regulations, the Cowlitz County Critical Areas Ordinance, the Cowlitz County Shoreline Management Plan, and the Cowlitz County Floodplain Management Plan.

The natural gas pipeline alignment would be located primarily within unincorporated Cowlitz County, with a portion located within the boundaries of the City of Kalama and designated as an industrial area. Land use in the City is regulated based on compliance with City of Kalama Comprehensive Plan and Zoning Regulations, the City of Kalama Critical Areas Protection Ordinance, the City of Kalama Shoreline Management Program, and the City of Kalama Floodplain Management Ordinance.

Under the State Growth Management Act (GMA), the County and cities within the County are required to adopt critical area and natural resource land regulations. Cowlitz County is not required to fully plan under the GMA and has chosen not to do so. Therefore, the City of Kalama is not subject to most GMA requirements, with the exception of protection of critical areas and ensuring plan/regulation consistency. As an energy facility, the PMEC is regulated by the state EFSEC, which supercedes all local ordinances and regulations.

Environmental Impacts of the No Action Alternative – Land Use

The No Action alternative would not result in impacts to land use; however, the wetland immediately east of the proposed project site would still be filled.

Environmental Impacts of the Proposed Action– Land Use

Existing Land Uses and Zoning

The project would be compatible with other industrial uses in existence or planned for the Port of Kalama. The entire Port is designated heavy industrial in the Cowlitz County Comprehensive Plan. Impacts to residential uses are not expected due to the facility's distance from residences, noise protection, landscape screening, and design. The gas pipeline would be installed within an existing ROW and under

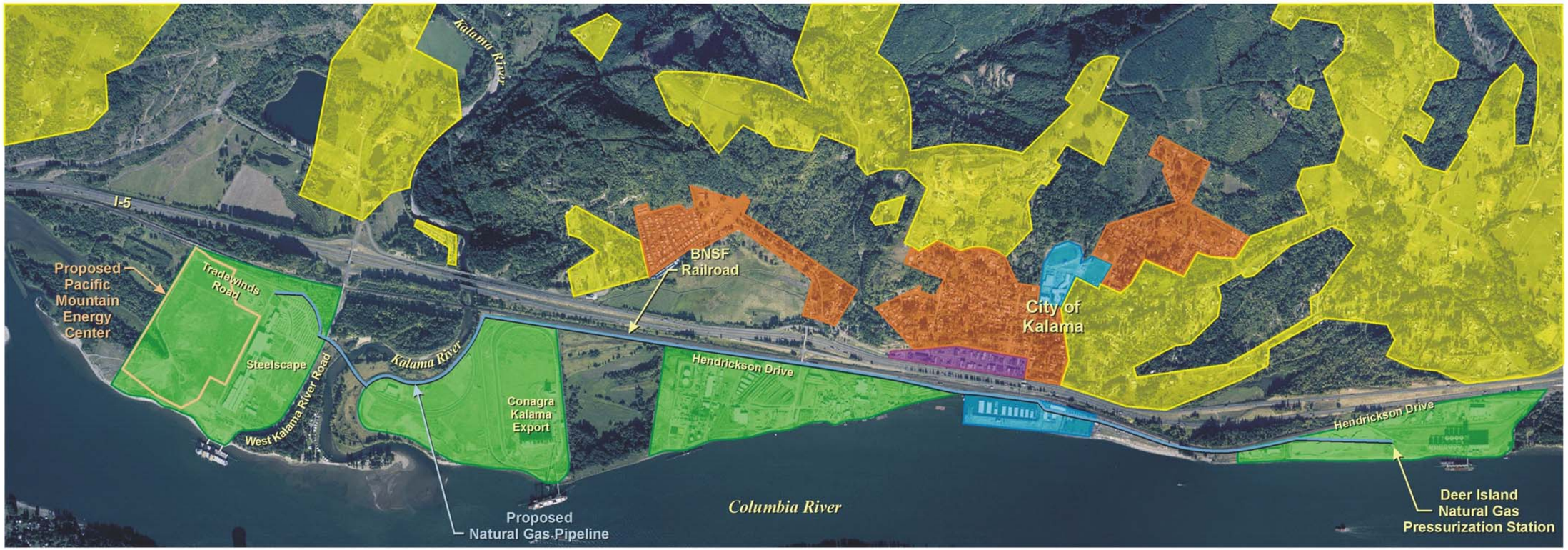
Hendrickson Drive. Existing land use is shown in Exhibit 3-36.

Impacts to land uses within and adjacent to the development site are:

- ***North:*** Eastwinds Road would experience increases in use, as would be expected for a service road dedicated to the project area. Eastwinds Road is not a main travel way and use of this road is not expected to impact emergency services. Impacts to an adjacent forested site containing a backwater channel of the Columbia River are not expected.
- ***South:*** the local service extension of Tradewinds Road will experience increased use. Modifications to the existing rail spur servicing the Steelscape plant would occur. No land use impacts are expected.
- ***East:*** no impacts to wetlands, the large treed rock formation, or I-5 are expected. One or more crossings of Tradewinds Road would be created to the project site. Traffic delays could occur due to the maneuvering of large vehicles carrying heavy loads and from additional vehicles on Tradewinds Road. The local service road would experience increased use.
- ***West:*** impacts to the land uses of Port of Kalama riverfront property, dock, the Columbia River, the community of Prescott, the decommissioned Trojan Nuclear Plant, and forested areas are not expected.

Exhibit 3-36
Proposed Project and Vicinity Existing Land Use

33759681_03.cdr



Legend

- Commercial
- Industrial
- Low density residential/rural
- Medium/high density residential
- Public/school/government

All Others

- Vacant/undeveloped/green space

Land Use Plans and Policies

State of Washington Siting Regulations. Siting of energy facilities such as PMEC is regulated at the state level by EFSEC. Applicants for energy facility certification are required to submit detailed information in a Site Certification Agreement (SCA) on the proposed development and the impacts the development may have on the natural and built environments. Under state law, the applicant is required to make every effort, including changes to the development design, to comply with all local land use plans, zoning ordinances, and shoreline management plans in effect at the date of the application filing. This project would comply with all local land use plans, zoning ordinances, and shoreline management plans currently in place.

Cowlitz County Comprehensive Plan and Zoning Regulations. The proposed development would be consistent with the Cowlitz County Comprehensive Plan, in that it allows power generating facilities as a recommended use in areas classified as heavy industrial.

The Cowlitz County Land Use Ordinance specifies zoning regulations for the County and is contained in the Cowlitz County Code. The proposed development site, rail spur, and sections of gas pipeline within Cowlitz County are located on lands that are unzoned. The proposed PMEC site is designated in the County's Comprehensive Plan as land for heavy industrial uses. The County, in a letter to EFSEC dated February 13, 2006, has determined that the proposed uses are consistent with the Comprehensive Plan designation.

Gas pipelines constructed through Cowlitz County are subject to review for compliance with the Cowlitz County Code. A general permit issued by the Board of County Commissioners would be required as well as a roadway crossing permit for each roadway crossing. As a permitted use, the proposed facility, railroad spur, and natural gas pipeline would be consistent with the Cowlitz County Land Use Ordinance.

A short section of the natural gas pipeline would travel under or within the ROW of a Cowlitz County road. This section

would be considered a franchise utility and a permit from the County Engineer would be obtained.

Cowlitz County Critical Areas Ordinance. Critical areas in Cowlitz County are wetlands, aquifer recharge areas, geologically hazardous areas, fish and wildlife habitat, and frequently flooded areas. As the project intersects with wetlands, aquifer recharge areas, and fish and wildlife habitat conservation areas, a critical areas permit would be required if the project were not subject to EFSEC jurisdiction. Potential impacts to the County's designated Critical Areas would be considered by EFSEC in its environmental review and as part of its recommendation on the SCA. Refer to Sections 3.1, 3.3, and 3.4 for more details on potential impacts to wetlands, aquifer recharge areas, geologically hazardous areas, fish and wildlife habitat, and frequently flooded areas.

Cowlitz County Shoreline Master Program. Cowlitz County's Shoreline Master Program governs activities within designated shorelines. Portions of the proposed site and natural gas pipeline and railroad spur are within the designated shoreline of the Columbia River and/or the Kalama River. As a result, the project would require a shoreline substantial development, which would be part of the SCA.

In addition, the proposed plant site and the natural gas pipeline are within shoreline areas categorized as Urban Districts, designated for intensive recreation, residential, industrial, and commercial development. As a result, the proposed plant, natural gas pipeline, and railroad spur would be consistent with the Shoreline Master Program.

Cowlitz County Floodplain Management Plan. All developments within the FEMA 100-year floodplain require a floodplain management permit, which would be part of the SCA, and must comply with development standards outlined in the Cowlitz County Code. Portions of the natural gas pipeline would be within the 100-year floodplain of the Columbia and Kalama Rivers. The project would comply with all design standards set by the County.

City of Kalama Comprehensive Plan and Zoning Regulations. The natural gas pipeline would pass through City of Kalama land with one portion designated as Industrial and another portion as Industrial with a Public/Quasi-Public component. Currently, there are no specific standards and regulations for the Public/Quasi-Public designation or specific policies limiting the siting of power generation facilities or associated infrastructure in the City of Kalama Comprehensive Plan. As such, the siting of the natural gas pipeline would be consistent with the Comprehensive Plan.

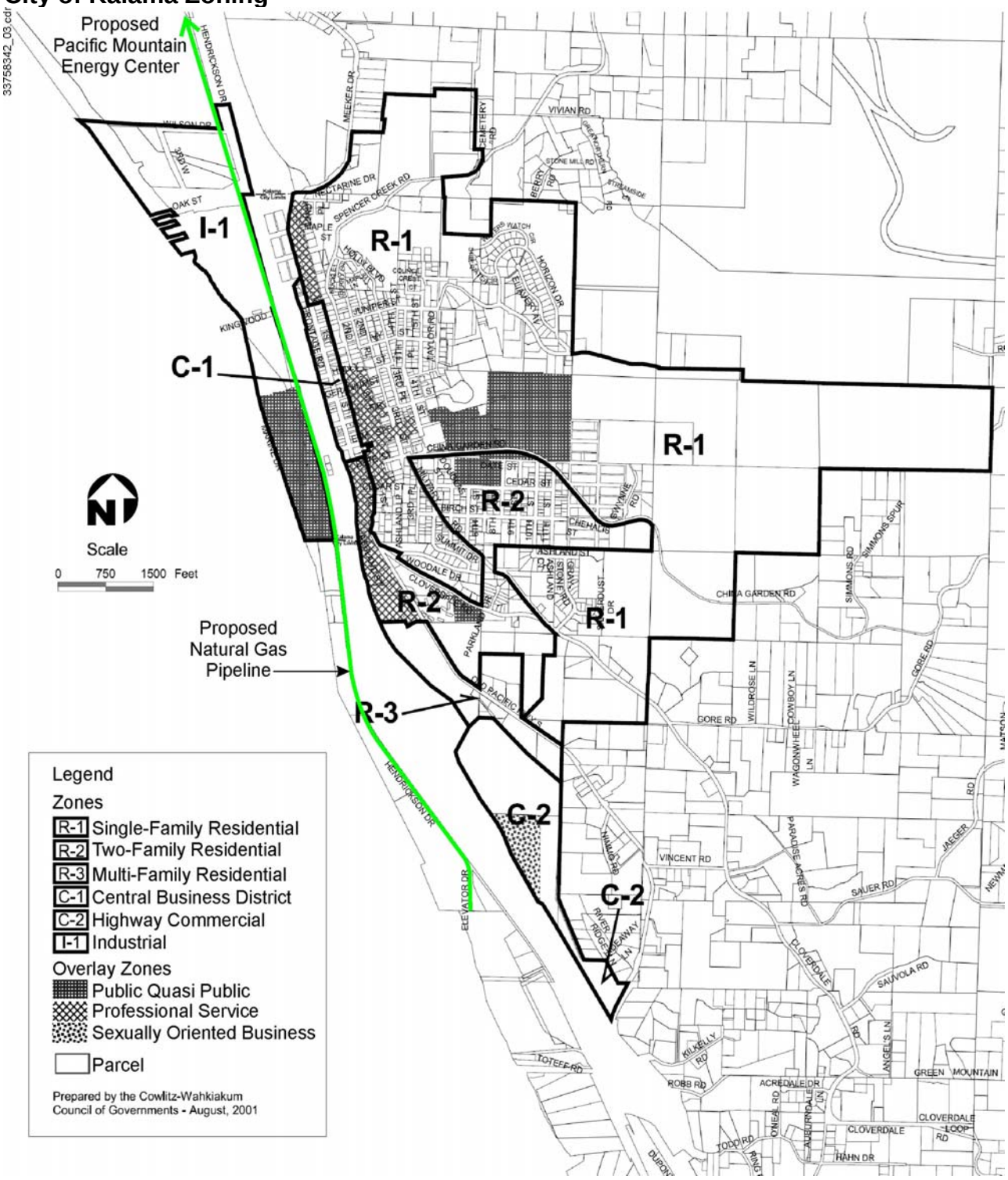
The City of Kalama Municipal Code defines permitted uses in the Industrial zoning district, which includes buildings and developments necessary for the operation of a public utility. While the City of Kalama Municipal Code does not specifically discuss gas pipelines, the City of Kalama has determined that the natural gas pipeline falls within the foregoing definition and is a permitted use in the Industrial zoning district. Exhibit 3-37 shows zoning within the City of Kalama.

City of Kalama Floodplain Management Ordinance. A portion of the natural gas pipeline alignment would be within a frequently flooded area of the Columbia River within City of Kalama jurisdiction. The project would comply with the City's Comprehensive Flood Hazard Management Plan.

City of Kalama Critical Areas Protection Ordinance. The City of Kalama has adopted ordinances to designate and classify critical areas consistent with the GMA and with the Environmental element of its Comprehensive Plan. The natural gas pipeline would intersect with aquifer recharge areas, fish and wildlife habitat conservation areas, and frequently flooded areas designated as critical areas.

Exhibit 3-37

City of Kalama Zoning



As a result, the project would be designed to comply with the requirements of the critical areas protection ordinance and EFSEC will consider potential impacts as part of its environmental review and in making a recommendation on the SCA. Refer to Sections 3.1, 3.3, and 3.4 for more details on potential impacts to wetlands, aquifer recharge areas, geologically hazardous areas, fish and wildlife habitat, and frequently flooded areas.

City of Kalama Shoreline Master Program. The City of Kalama adopted Cowlitz County's Shoreline Master Program as a small portion of city land is located along the Columbia River. However, the natural gas pipeline would not lie within the City of Kalama jurisdiction of the shoreline and would therefore not be subject to the City of Kalama Shoreline Master Program.

Mitigation Measures – Land Use

No Action Alternative

Mitigation measures would not be required under the No Action Alternative.

Proposed Action

To avoid or reduce impacts to adjacent land uses:

- Native vegetation would be retained as much as possible in the impact area
- Landscape buffers would be installed on the perimeter of the site

Significant Unavoidable Adverse Impacts – Land Use

No Action Alternative

There would be no significant unavoidable adverse impacts to land use under the No Action Alternative.

Proposed Action

No significant and unavoidable adverse impacts to land use as a result of the project are expected.

3.6.2 Recreation

Affected Environment – Recreation

Inventory of Facilities

The primary recreation activities within Cowlitz County are fishing, boating, and hiking due to the proximity of the Columbia River, numerous streams, and Mount St. Helens. Land based recreation opportunities in the immediate vicinity are limited due to the site being located between I-5, BNSF, and the Columbia River. The Columbia River is a popular location for water based activities, such as boating and fishing.

Prescott Beach County Park is located directly across the Columbia River in Columbia County, Oregon. This day-use park is open year-round and provides access to fishing and windsurfing as well as a covered picnic shelter, playground equipment, a horseshoe pit, and sand volleyball courts.

The closest public recreation facility to the proposed PMEC site is a WDFW boat launch located on the south bank of the Kalama River at the junction of Modrow and Kalama River roads approximately 0.25 mile south of the site. A private dock and recreation area owned by the Kalama Sportsmen's Club lies on the north bank of the Kalama River, at its confluence with the Columbia River.

The proposed natural gas pipeline alignment would be located along Louis Rasmussen RV Park, the Port of Kalama Marine Park, and the Port of Kalama Marina. The pipeline would also cross the mile-long graveled pedestrian and bicycle pathway through the Kalama industrial areas.

The recreation facilities near the site and the natural gas pipeline alignment are listed in Exhibit 3-38 and shown on Exhibit 3-39.

No Cowlitz County recreation facilities are within five miles of the proposed facility. The closest county facility is Finn Hall Wayside Park located near Woodland on SR-503, 13 miles south. It is a four-acre wayside picnic and open space area managed as a cultural and historic area. In addition, there are

no wild and scenic rivers or national trails located within five miles of the proposed facility.

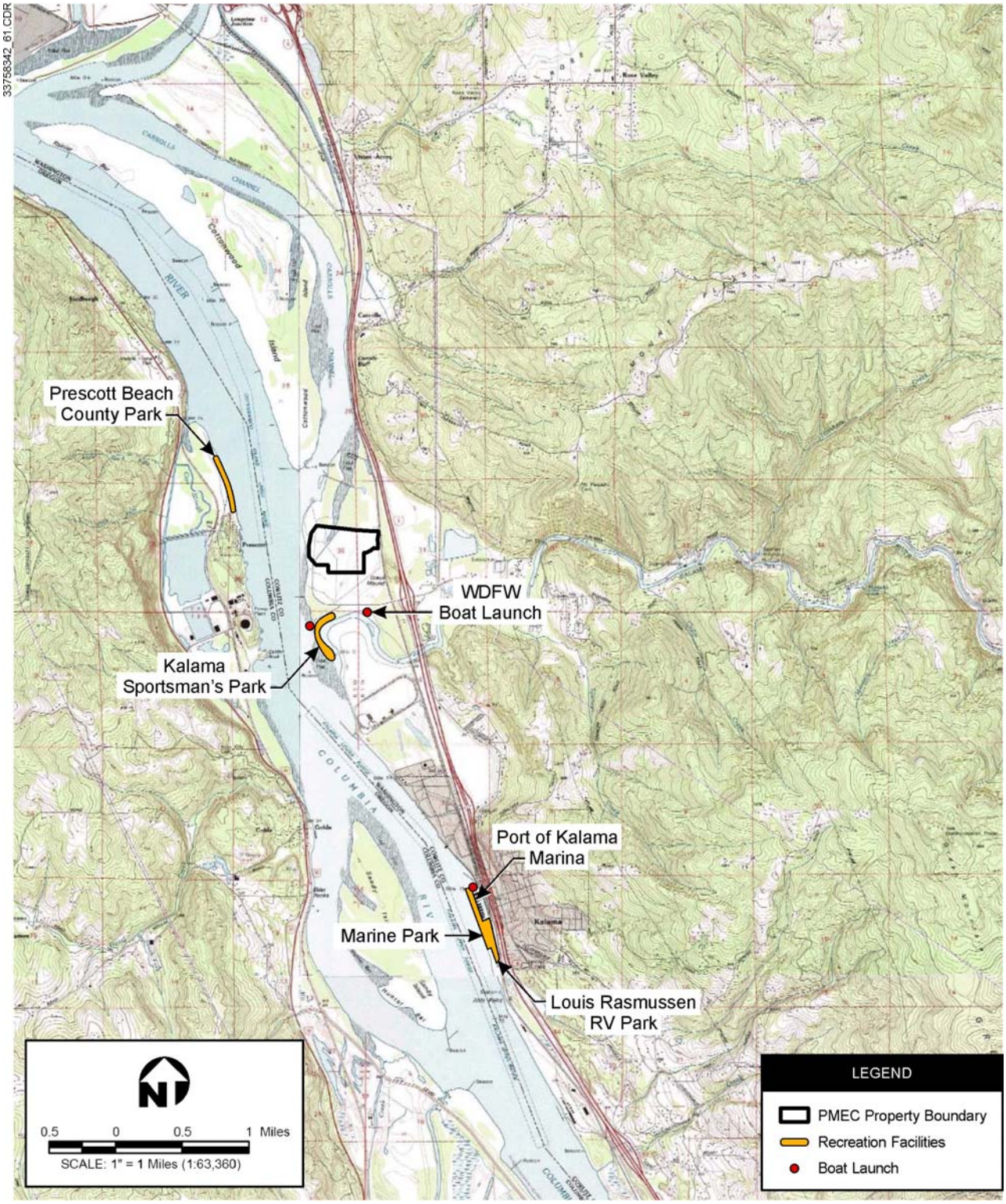
Exhibit 3-38

Public Park and Recreation Facilities Near the PMEC and Natural Gas Pipeline Alignment

No.	Name	Facilities	Owner
1	Louis Rasmussen RV Park	• 22 spaces with full hook-up • showers • pedestrian/bicycle pathway (approximately 2 miles) along the Columbia River	Port of Kalama
2	Port of Kalama Marine Park	• five acre day-use park • public beaches • covered picnic shelters, playgrounds, restrooms • baseball field • Totem Poles, Lewis & Clark Monument • bordered by a pedestrian/bicycle pathway along the Columbia River	Port of Kalama
3	Port of Kalama Marina	• public boat launch • 222-slip marina, marine fuel, long/short term moorage • showers, 1.8 miles paved and boardwalk • a large sand beach at Ahle Point (fishing, swimming, and windsurfing)	Port of Kalama
4	WDFW boat launch	• ¼ acre Kalama River access site • drift boat launch • portable restrooms	WDFW
5	Prescott Beach County Park	• 70 acre day-use park • 1-mile of river access • covered picnic shelter, playground equipment, horse shoe pit • sand volleyball courts	Columbia County Oregon
6	Kalama Sportsmen's Club	• RV spaces • boat launch	Kalama Sportsmen's Club

Exhibit 3-39

Recreation Facilities Near the Site



The Gifford Pinchot National Forest, which includes Mount St. Helens National Volcanic Monument, is located approximately 40 miles east of the site. The monument includes the Johnston Ridge Observatory and numerous information centers. Since the explosion of Mount St. Helens in 1980 and more recent volcanic activity, the monument has become a popular tourist destination. Cowlitz County and its Chamber of Commerce promote their community as the "Gateway to Mount St. Helens." Recreation activities in the national forest include hiking, backpacking, horseback riding, mountain biking, motorized trail biking and camping opportunities.

Established Plans and Policies

The City of Kalama completed a Parks and Recreation Plan in 2002 that serves as the Parks, Recreation and Open Space element of its 2005 Comprehensive Plan. This plan outlines goals, policies, objectives and important background information in order to guide recreational development in the Kalama area.

Environmental Impacts of the No Action Alternative – Recreation

The No Action alternative would not result in any impacts to recreation because the PMEC would not be constructed and existing recreation uses would remain unchanged.

Environmental Impacts of the Proposed Action – Recreation

Construction Impacts

PMEC Site. The majority of the PMEC construction workers are expected to be within a daily commuting distance of the site. At peak construction periods, some workers may seek temporary housing in apartments or motels, or may make private arrangements for recreational vehicles. Existing limits on the length of stay in public camping areas would minimize any potential impacts on park users. Minimal impacts to park or recreation facilities would be expected from construction workers.

The access road to the WDFW-managed boat launch and Kalama Sportsmen's Club is Kalama River Road, which would

also be used to access the site. Recreation access via Kalama River Road may be temporarily affected during construction. The proposed project site itself offers no recreation access, including no boat launch facilities.

Natural Gas Pipeline. The natural gas pipeline would run along the eastern edges of the Port of Kalama Marine Park, Rasmussen Louis RV Park, and Port of Kalama Marina. This would result in earth movement and construction-related traffic that would generate noise and dust which may temporarily disturb activities at and access to these parks.

Railroad Spur. Construction of the railroad spur would generate noise, dust, and traffic that may impact access to the WDFW-managed boat launch and the Kalama Sportsmen's Club.

Electrical Transmission Route. Electricity generated by PMEC would be transmitted to the BPA regional power grid utilizing either Cowlitz County PUD or BPA lines. Cowlitz County PUD or the BPA will construct approximately 12 miles of new transmission lines within the PUD/BPA existing transmission line ROW by replacing up to three existing 115 kV lines. It is expected that the new lines would require fewer poles and would be spaced farther apart than the existing lines. The transmission line would cross the Cowlitz River but not affect recreational resources.

Operation Impacts

PMEC Site, Natural Gas Pipeline, and Railroad Spur. There would be no impacts on terrestrial recreation related to use of the PMEC facilities, natural gas pipeline, or railroad spur during the operation phase of the project. The trail along the dike in which the existing pipeline runs would continue to be open during operation of the facility. Approximately three ships per month are expected to dock at the site to deliver feedstock. During arrival, docking and departure proceedings, recreations boaters along this portion of the Columbia River would be temporarily displaced.

Established Plans and Policies. There are no existing Cowlitz County or City of Kalama ordinances or regulations that would require a dedication of land for recreation facilities, or money in lieu thereof, as a result of the proposed development. Similarly, no federal recreation regulations would apply to the PMEC site or the gas pipeline route.

Currently there are no plans for new City, County, State, or federal parks or recreation facilities within a five-mile radius of the PMEC site or the natural gas pipeline corridor.

Mitigation Measures – Recreation

No Action Alternative

Mitigation measures would not be required under the No Action Alternative.

Proposed Action

During construction, impacts to recreation users would primarily result from dust and noise from construction equipment. See Sections 3.2 and 3.5 for mitigation measures proposed for air quality and noise during construction. No recreation access currently exists on the site. For security reasons, no recreation access is proposed.

Significant Unavoidable Adverse Impacts – Recreation

No Action Alternative

There would be no significant unavoidable adverse impacts as a result of the No Action Alternative.

Proposed Action

Significant and unavoidable adverse impacts involving recreation resources are not expected as a result of the project.

3.6.3 Visual Resources

The visual resource methodology for impact assessment of the PMEC was based on the Bureau of Land Management Visual Resource Management methodology. It was chosen as an acceptable standard and appropriate for the non-urban setting.

The methodology includes:

- Creating an inventory of existing viewpoints
- Identifying sensitive viewers and user attitudes and estimating their potential duration of view of the proposed facility (general visibility and distance zone)
- Describing visual changes introduced by the construction and operation of the facility
- Assessing visual impacts from sensitive viewpoints
- Recommending visual impact mitigation measures

The methodology for preparing the visual simulations for the aesthetics portion of this DEIS consisted of the following steps:

1. Viewpoints were identified from which the development would be visible. This was undertaken using professional judgment and nearby public viewpoints.
2. Photographs were then taken of the existing topographic and vegetative features. A record was made of all photos taken, including the photo viewpoint and focal length.

Field reconnaissance was conducted to determine the general visibility of the development facilities from the identified sensitive viewpoints, such as residences and travel routes. Visual impacts were assessed based on the visibility of changes from sensitive viewpoints as a result of construction and operation of the PMEC facilities. Levels of visual impact were documented as high, moderate, or low.

Visual quality is described as the visual patterns created by the combination of rural character landscapes and industrial and man-made features. Visual quality was evaluated using the following descriptions:

- ***Urban/Industrial:*** Landscape is common to urban areas and urban/industrial fringes. Human elements are prevalent or landscape modifications exist that do not compatibly blend with the natural surroundings (low visual intactness and unity).

- ***Rural:*** Landscape exhibits reasonably attractive natural and human-made features/patterns, although they are not visually distinctive or unusual within the region. The landscape integrity of the area provides some positive visual experiences such as natural open space with some existing agricultural areas, such as farm fields, or well-maintained and landscaped urban areas.
- ***Unique/Distinctive:*** Landscape exhibits distinctive and memorable visual features, such as landform and rock outcrops, and vegetation and open space patterns that are largely undisturbed—usually a rural or open space setting. Few if any man-made developments are present.

Viewer sensitivity depends on viewer types and exposure (number of viewers and view frequency), view orientation and duration, and viewer awareness and sensitivity to visual changes. Levels of viewer sensitivity were:

- ***Low:*** Viewer types representing low visual sensitivity include agricultural and industrial/warehouse workers. Compared with other viewer types, the number of viewers is generally considered small and the duration of view is short. Viewer activities typically limit awareness and sensitivity to the visual setting immediately outside the workplace. Views may be screened by landscaping or adjacent buildings.
- ***Moderate:*** Viewer types representing moderate visual sensitivity consist of highway and local travelers. The numbers of viewers vary depending on location; however, on average, they tend to be moderately large based on overall densities of surrounding areas and highway commuters. Viewer awareness and sensitivity are also considered moderate because destination travelers often have a focused orientation.
- ***High***: Residential viewers, recreational viewers, and viewers that congregate in public gathering places such as churches and schools are considered to have comparatively high visual sensitivity. The visual setting may in part

contribute to specific building orientation or the enjoyment of the experience. Views may be of long duration and high frequency. In some cases, views may contribute to property value.

Affected Environment – Visual Resources

Visual Quality

PMEC Site. The PMEC would be located in an industrial area characterized by heavy industrial development. Steelscape Inc., which produces cold-rolled, metallic-coated and painted steel coils, lies directly south of the proposed development site (Exhibit 3-40). This facility consists of one main large building and a railroad spur.

The Trojan Nuclear facility site, decommissioned in April 2005, lies across the Columbia River to the west. The 499-foot parabolic cooling tower was imploded in May 2006. The cooling tower was the dominant vertical element in the area and could be seen for miles along the Columbia River. The waste storage and associated facilities remain, including the reactor building, which dominates the view and is easily seen from I-5 and by BNSF railroad train riders. The Longview Fibre paper mill is clearly visible on the river side and surrounding hills.

Overall, visual quality of the landscape setting is classified as rural. The landscape contains reasonably attractive natural features and patterns are reasonably attractive and interesting, although they are not visually distinctive or unusual within the region. However, the industrial features are dominant and do not blend well with the natural setting. Visual integrity is low, because it is moderately altered.

Visual unity is generally low. Landscape alterations such as industrial buildings are large and not particularly well-integrated with undisturbed conditions. Travelers along Tradewinds Road, for example, view industrial warehouses and equipment, railroad corridors, commercial signs and structures, utility lines, and roadside vegetation. Additionally, limited vegetation screening exists around the industrial development.

Exhibit 3-40

Existing Site Conditions

33758342_57.CDR

Legend

- Water test well
- Fence
- Subject property

The PMEC site is a vacant industrial site covered primarily with low grasses. The northern boundary of the site is bordered by deciduous trees, a wetland, and a backwater channel of the Columbia River. No large shrubs, trees, or previously existing buildings are centrally located on the site. The visual quality of the site is classified as urban/industrial. The site is topographically featureless and non-distinctive. Visual unity with the surrounding area is moderate.

Ambient lighting levels at the site are moderate and primary light sources are from the neighboring industrial use (Steelscape), street lighting and headlights along the I-5 corridor, and trains along the BNSF railway. Industrial sites south of the Kalama River contribute to existing ambient lighting levels. Private residences and the City of Kalama commercial area are minor sources of light because of their distance from the site and low density.

Pipeline Route. The proposed natural gas pipeline would extend from the plant site south to the Deer Island Natural Gas Pressurization Station near Exit 27 on the west side of I-5. The adjacent land use is predominantly industrial, with a section of park including a marina.

Railroad Spur. The loop track would ring the plant site. A wetland immediately to the east of the site would be filled to accommodate the tracks.

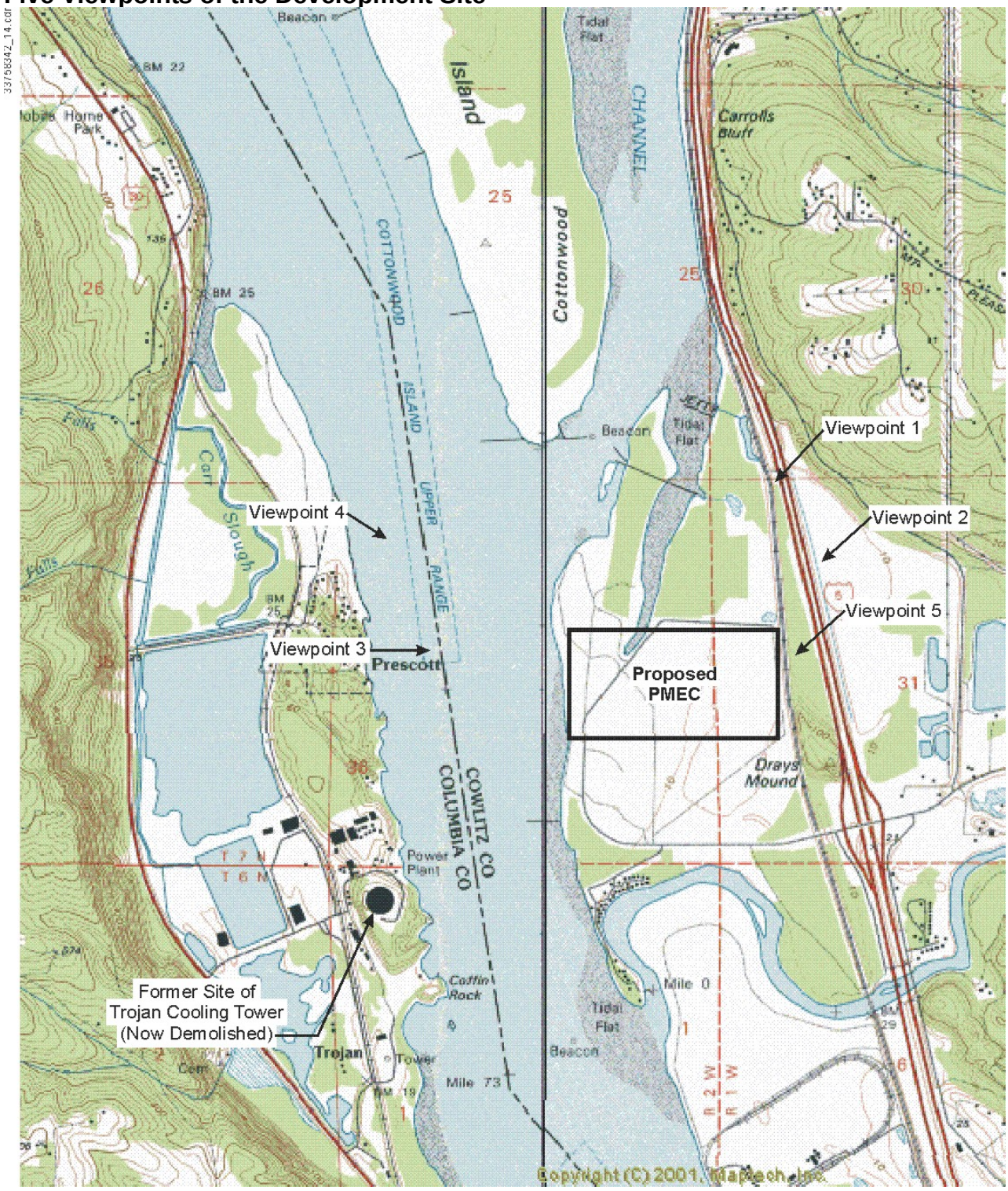
The remainder of the area has no large shrubs, trees or buildings. The visual quality of the site is classified as urban/industrial. The site is topographically featureless and non-distinctive. Visual unity with the surrounding area is moderate.

Viewer Types and Sensitivity

Primary viewer types in the PMEC vicinity include industrial workers, residents, local or business travelers. Exhibit 3-41 identifies five viewpoints of the development site.

Exhibit 3-41

Five Viewpoints of the Development Site



Bluff Road and Topeka Lane Residents. This low-density residential area is approximately 2,400) feet to the northeast on a hillside overlooking the site. From homes in this area, some of the viewpoints look southwest toward the PMEC site. Intervening trees would screen some of the PMEC elements, and some screening could be provided by trees planted along the PMEC boundaries if there is adequate room along the rail line. However, some of the facilities would protrude above the treeline and become a dominant feature of the view. At the time of the field survey, these viewers had a view of Steelscape and the Trojan Nuclear facility. (The Trojan Nuclear facility parabolic cooling tower was imploded in May 2006). Overall visual sensitivity for elevated residential viewers is moderate due to the close viewing distance and elevated viewpoint (Exhibit 3-42).

Exhibit 3-42
Existing View, Viewpoint 1 - Bluff Road

Residents along Old US 99. There are a few residences along Old US 99 which face south-west towards the site. These houses are approximately2400 feet to the north-east and at a slight elevation. Currently, their view is mostly blocked by existing deciduous and some evergreen trees along the I-5 corridor, especially in the summer. However, taller features such as the steam generators and flare enclosures would be visible above the trees. Visual sensitivity of residents along this road would be rated moderate (Exhibit 3-43).

Exhibit 3-43

April 19, 2006 View, Viewpoint 2 - Old Highway 99 (before Trojan cooling tower demolition)

I-5 Corridor. I-5 is the primary north-south route through Washington and Oregon. Travelers would have a limited view of the proposed site, as the highway is not oriented towards the site, so views would be sideward glances. Northbound travelers would be oriented slightly towards the proposed facility and southbound slightly away. Viewers would see industrial facilities and an elevated railroad. This view is blocked in many areas by deciduous trees, but taller features

would be visible above the treeline. At the closest point, I-5 passes within approximately 600 feet of the railroad spur, which runs around the outside of the site. Based upon the viewer type, highway orientation, and viewing range, visual sensitivity for travelers along I-5 is estimated to be low.

BNSF Railroad corridor. Travelers on the BNSF railroad (Amtrak Cascades) would have views of the proposed site. Views are occasionally screened by trees. However, due to the proximity to the project site, elevated railroad, and additional height provided by the railcar, viewers would see the project's industrial facilities while passing the site. The orientation of the railroad does not allow for forward facing views; passengers would have sideward views only. Based on limited vegetation screening and available views, as well as visual orientation and viewer type, the visual sensitivity for train riders is estimated to be moderate.

Riverfront Residents of Prescott, Oregon. Prescott is approximately 3,000 feet north-west of the site on the opposite bank of the Columbia River. Prescott is a small community of less than 100 people located just north of the decommissioned Trojan nuclear facility adjacent to the P&W railroad and Highway 30. Residents along Riverview Road, Ivy Lane, and the eastern end of School Street who have houses with a view of the Columbia River would also have a view of the PMEC site as well as a heavy paper mill facility to the north in Longview and a Port facility to the south. Visual sensitivity would be rated as high. Residents currently have a view of the industrial park and affiliated docks to the south of the proposed site. At the proposed site, there is no vegetation that would provide screening to residents (Exhibit 3-44).

Exhibit 3-44
Existing View, Viewpoint 3 - Prescott, Oregon

Visitors to Prescott Beach County Park. Prescott Beach County Park is a 71-acre day use park with one mile of beach access on the west side of the Columbia River approximately 4,000 feet northwest of the PMEC site. This day-use park was developed in conjunction with the Trojan Nuclear plant and is open year round. It provides fishing access to the Columbia River as well as a covered picnic shelter, playground equipment, a horse shoe pit, and sand volleyball courts. Visual sensitivity would be moderate. The view from Prescott Beach County Park would be very similar to that of residents with riverfront property in the town of Prescott to the south (Exhibit 3-45).

Exhibit 3-45
Existing View, Viewpoint 4 - Prescott Beach County Park

Columbia River. Travelers on the Columbia River are recreational boaters, fishers, and those working on shipping vessels. Viewers in small vessels could get quite close to the site; whereas viewers from large ships would tend to travel along the center line. Visual sensitivity would be low for viewers working on vessels, as they would be focused on work activities. However, visual sensitivity for recreational users would be high, because they would have a high concern for scenery and would be able to travel close to the site.

Tradewinds Road. The highest concentration of nearby industrial workers would be at Steelscape, Inc. The distance between this facility and the railroad spur which runs around the outer edge of the proposed PMEC site is approximately 100 feet. Topography in the area is flat and there is currently a road between the two sites. Visual sensitivity is expected to be low because observers in the area will be focused on work activities and will thus have a limited awareness of peripheral visual conditions. For the same reasons, the visual sensitivity of other

industrial workers in the area is expected to be low (Exhibit 3-46).

Exhibit 3-46
April 19, 2006 View, Viewpoint 5 – Tradewinds Road (before Trojan cooling tower demolition)

Environmental Impacts of the No Action Alternative – Visual Resources

The No Action alternative would not result in any visual impacts because the PMEC would not be constructed and future views would be the same as the existing views.

Environmental Impacts of the Proposed Action – Visual Resources

Construction Impacts

PMEC Site. In general, visual impacts to the overall landscape setting resulting from construction of the PMEC are expected to be low. The size of the site is relatively similar to existing and on-going land disturbances created by other industrial development. During construction, viewers will observe earthwork equipment, construction trailers, building construction, and cranes. No interim screening will be

provided, but construction duration will be short and exposed soil will be reseeded within several months of construction completion. Most construction would occur during daylight hours; however, minimal lighting would be used on the site at night for safety purposes. Impacts would be minimal and temporary.

Pipeline Route and Railroad Spur. Temporary visual changes introduced by construction of the proposed natural gas pipeline and railroad spur would include vegetation clearing, filling of a wetland, trenching, and placement of pipe sections and rail road tracks by heavy equipment. Low-growing vegetation would be removed during trenching operations. A wetland located between the eastern edge of the proposed site and the BNSF railroad would be filled.

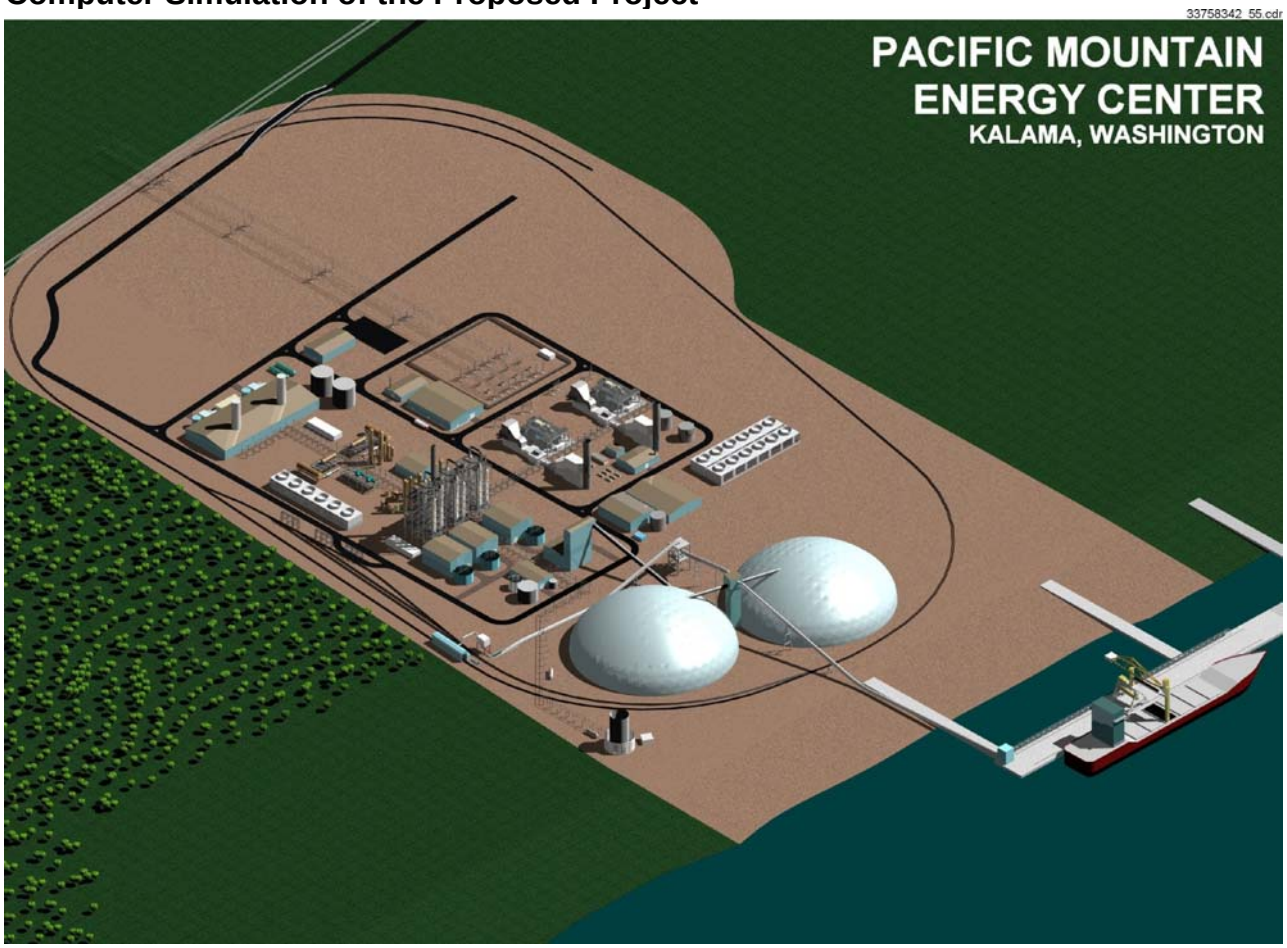
Along the proposed natural gas pipeline route, there would be temporary short-term impacts limited to the construction phase. Visual impacts are estimated to be moderate and short term. Local travelers will observe pipeline construction at many locations, but the duration of impacts will be short and disturbances in or adjacent to road ROWs are typical. The disturbances would also occur primarily in an industrial area and viewers are accustomed to construction activities.

Operation Impacts

PMEC Site. When completed, the viewer would see gasifiers, a water pretreatment/office complex, two 80-foot-tall domes used for fuel storage, conveyors, a rail loop, a cooling tower, an air separation unit, a feedstock preparation area, a waste treatment facility, a switchyard, a gas cleaning area, inert slag storage, gas turbines, heat recovery steam generators, steam turbines, and a dock. The domes would be predominantly visible to sensitive viewers because they visually contrast with the existing rectangular buildings of the adjacent industrial use. Exhibit 3-47 presents a computer simulation of the proposed complex showing the major components of the complex.

Exhibit 3-47

Computer Simulation of the Proposed Project



Heights of development components are presented on Exhibit 3-48. PMEC components will be painted predominately earth tones, including hues of gray. These colors reduce surface glare from sunlight and minimize visual impacts. A short plume of water vapor would be visible from the cooling towers on most days. Emissions would be more visible on cooler and moister days when the air is already saturated. There is also the potential to see water vapor emissions from the exhaust stacks.

The property to the north of the site has many trees which would provide screening from the north. Vegetation along the I-5 corridor would also provide screening from the east. Close viewers would also observe a chain-link fence surrounding the site.

Exhibit 3-48
Estimated Height of PMEC Components

Structure	Height (feet)
Combustion Turbine Generators	20
Steam Turbine Generators	40
Air Separation Unit Building	30
Heat Recovery Steam Generators	80
Feed Stock Feed Bins	80
Cooling Towers	40
Gasification Block	200
Exhaust stacks	120
Feedstock Storage Buildings	80
Flare Enclosure	80

Once constructed, the PMEC is expected to introduce low to high visual impacts, depending on the viewer type and viewing distance. When the landscaping fully matures (in approximately 10 years), the visual impact will be reduced to moderate. The facility would be visually compatible with the industrial development already existing in the area. The form, color, and scale of buildings will be similar to nearby industrial/warehouse development. Visual impacts from each representative viewpoint are summarized in Exhibit 3-49.

Exhibit 3-49
Summary of Visual Impacts from Representative Viewpoints

Location	Visual Quality	Visual Sensitivity[a]	Visual Impact[a]
Residences along Bluff Road and Topeka Lane	Urban/industrial	M	M
Residences along Old US 99	Urban/industrial	M	M
I-5 Corridor	Rural	L	L
BNSF Railroad	Rural	M	M
Riverfront Residents in Prescott, Oregon	Rural	H	H
Visitors to Prescott Beach County Park	Rural	M	M
Columbia River	Rural	H and L	M
Tradewinds Road	Urban/industrial	L	L

a. H = high, M = moderate, L = low

As an industrial land use, the PMEC facility is expected to make a moderate contribution to overall ambient light levels in the immediate vicinity. Residents across the Columbia River in

Prescott, Oregon and neighboring Prescott Beach County Park are within one mile of the site and may be affected by lighting. Residents on Bluff Road on the hillside east of the site would also have a good view of the site and may be affected by lighting.

Light and glare impacts on neighboring properties are expected to be minimal. During the day, potential glare impacts would be minimal because of the planned use of non-reflective earth-tone/light paint colors on exterior surfaces. The potential for adjusting light directions and the use of supplemental light shields/vegetation to provide additional screening, if necessary, would minimize light spillover at night. There would be no anticipated glare impacts to vehicular drivers using I-5.

Plant lighting would include low level lighting around exit areas (minimum 2 footcandles) and general outside area (0.2-5 footcandles) including ground level operating areas, stairs and platforms, roadways, fuel storage areas, and parking areas. This lighting would be provided for purposes of general operator access and safety under regular operating conditions. Precise and detailed placement of lighting fixtures has not yet been determined, but outdoor lights would be a combination of pole-mounted and structure mounted lights and likely would be standard street light height (20-40 feet). Outside lighting around the exterior of buildings and ancillary equipment likely would be placed above doorways. Generally, lighting angles would vary, determined by economic evaluation of fixture wattage, light patterns, and light levels. No high-mast, wide area lighting is planned.

Spotlighting would be provided for illumination level enhancement where needed around operating equipment. This lighting would be higher in intensity than general outside lighting (up to 10 foot candles), but would be limited to specific areas and occasional usage. This lighting could be adjusted to minimize light spillover or direct glare in response to specific site conditions.

Emergency lighting would be provided for purposes of personnel egress and continuance of critical activities during failure of the normal power source or during emergency conditions. These instances are anticipated to be infrequent. Emergency lighting would be incandescent. Emergency lighting fixtures would be provided in the control room and other operations buildings. The gas turbine packages have self-contained direct current lights.

Pipeline Route and Railroad Spur. After construction is completed, the disturbed pipeline corridor would be returned to its original state of road surfacing or reseeded with grasses and low vegetation. There would be no visual impacts from the pipeline corridor during pipeline operation.

The rail road spur tracks would not be visible from off-site. Trains running on the spur would be visible from most viewpoints; however, they would be a minor visual impact relative to the PMEC itself and the existing mainline train activity.

Mitigation Measures – Visual Resources

No Action Alternative

No mitigation measures would be required for the No Action Alternative.

Proposed Action

Construction. Most construction would occur during daylight hours and visual impacts would be minimal due to existing trees screening the site from portions of I-5.

Operation. Lights that would remain on during the night time hours would be directed towards the site and would be the minimum wattage required for safety. Development elements will be painted with earth tones. These colors will reduce surface glare from direct sunlight and minimize visual impact.

To avoid impacts to the nearest residences, located northwest of the site:

- Existing trees will be used as landscape buffers and will remain on the perimeter of the site to reduce the visual

presence of the PMEC itself and increase its visual compatibility with the context of the surroundings

- If needed to mitigate the view of the plant site from residences, Energy Northwest would plant native specimen trees to screen the view of the plant site to the extent possible, as well as plant fast-growing trees, such as poplars, to expedite the development of a mature vegetative screen
- Landscaping will be provided in parking lots and along access roads
- The facility will be painted with earth-tone colors

In addition, the following measure may be included if needed:

- Construct screening walls around ancillary elements. Wall treatments could include aesthetic material and texture patterns.

Significant Unavoidable Adverse Impacts – Visual Resources

No Action Alternative

There would be no significant unavoidable adverse impacts to visual resources under the No Action Alternative.

Proposed Action

Unavoidable adverse impacts to visual resources in the form of nighttime lighting would occur as a result of the project. Residents from across the Columbia River in Prescott, Oregon as well as visitors to Prescott Beach County Park would have views of the PMEC site and would view the change from open undeveloped land to an industrial use. While the increase in nighttime lighting and the change from undeveloped land to an industrial use would be adverse to existing conditions, the overall impact would be less than significant when viewed as part of the industrial park.

3.7 Socioeconomic Impact

3.7.1 Affected Environment

The PMEC would be located in Cowlitz County in southwestern Washington. The PMEC site is located at the Port of Kalama in unincorporated Cowlitz County, and portions of the gas pipeline would extend through City of Kalama property located within the designated Port. The area for which information is presented includes Cowlitz County, the City of Kalama, and the surrounding area, depending on the resource and the available data for that resource. Data for the State of Washington are presented for comparison.

Demographic Characteristics

The PMEC would be located at the Port of Kalama in Cowlitz County, near Kalama. The Port of Kalama provides tenant space to over 30 companies, employing over 1,060 people as of May 2006 (www.portofkalama.com). The population of Cowlitz County in 2005 was 95,900 individuals and represented 1.5 percent of the statewide population of 6.4 million.

As shown in Exhibit 3-50, a greater percentage of Cowlitz County residents live in incorporated cities (58 percent) than in unincorporated communities.

Exhibit 3-50
2005 Population Distribution in the PMEC Vicinity

Jurisdiction	Population, April 1, 2005
Cowlitz County	95,900
Unincorporated	40,290
Incorporated	55,610
Castle Rock	2,140
Kalama	1,980
Kelso	11,820
Longview	35,430
Woodland *part*[a]	4,240
Washington State	6,256,400
Unincorporated	2,438,882
Incorporated	3,817,518

Source: WOFM 2006a

a. The remaining 90 residents of the City of Woodland are located in Clark County

Within the incorporated area, 85 percent of the population lives in the cities of Longview and Kelso, which are also the economic centers of the County. The populations of the cities of Longview and Kelso represent 37 percent and 12 percent of the total County population, respectively. The PMEC site is located on Port of Kalama property, part of which is located in the City of Kalama. Approximately 1,980 people lived in the City of Kalama in 2005.

The 2000 Census provides information for Kalama, which represents the demographics of the residents nearest to the facility. Exhibit 3-51 presents the geographic distribution of the population within Kalama and Cowlitz County, compared to the State of Washington.

Exhibit 3-51
2000 Population Distribution in the PMEC Vicinity

Jurisdiction	Population, April 1, 2000
Cowlitz County	92,948
Kalama	1,980
Washington State	5,894,121

Source: WOFM 2006a

Exhibit 3-52 shows the age distributions of Cowlitz County residents and State of Washington residents. Age distribution illustrates the ratio of working-age persons to younger and older residents, which affects both the supply of labor and the level and distribution of income.

Exhibit 3-52
Population Age Distribution in the PMEC Vicinity, 2000

	Age 14 and Under		Age 15 to 64		Age 65 and Over	
Jurisdiction	Number	Percent	Number	Percent	Number	Percent
Kalama	342	19.02	1165	64.79	291	16.18
Cowlitz County	20,695	22.27	59,922	64.47	12,331	13.37
Washington State	1,254,599	21.29	3,977,360	67.48	662,162	11.23

Source: WOFM 2006b

In Kalama, 35.2 percent of the population is of non-working age, i.e., either age 14 or under, or age 65 and over. In Cowlitz County, 35.64 percent of the population is of non-working age, i.e., either age 14 or under, or age 65 and over. These

percentages are slightly higher than the same measure for the state (32.52 percent).

Exhibit 3-53 shows that Kalama and Cowlitz County, similar to the state as a whole, have slightly more women than men, and racially are predominantly white. The number of residents in Kalama and Cowlitz County who live below the poverty level as a percentage of total population was higher than the same measure for the State of Washington in 2000 (Exhibit 3-54).

Exhibit 3-53
Race and Sex Composition in the PMEC Vicinity, 2000

		Sex %		Race (%)					
Jurisdiction	**Population**	**Male**	**Female**	**White**	**Black**	**Native American**	**Asian and Pacific Islander**	**Two or More Races**	**Hispanic**
Kalama	1,798	49.8	50.2	94.2	1.2	1.8	.07	1.5	2.3
Cowlitz County	92,948	49.3	50.7	91.7	0.4	1.6	1.5	2.7	4.5
Washington State	5,894,121	49.7	50.3	81.7	3.1	1.5	5.8	3.9	7.5

Source: WOFM 2006c

Exhibit 3-54
Population Living Under the Poverty Level, 2000

Jurisdiction	Population For Whom Poverty Level is Determined[a]	Persons Living Below Poverty Level	Percentage of Persons Living Below Poverty Level
Kalama	1,798	244	13.7%
Cowlitz County	91,364	12,765	14.0%
Washington State	5,765,201	612,370	10.6%

Source: US Census 2000a
Poverty status was determined by dividing the population living below poverty by the population for whom poverty status is determined, which excludes those living in institutional housing.

Population Growth Trends

Population growth in Cowlitz County was slower than the state during the period 2000 to 2005, but is expected to surpass the state rate during both periods 2005 to 2010 and 2010 to 2025, as shown in Exhibit 3-55. The County estimated 136,114 residents in 2025, reflecting a growth rate of 1.6 percent per year on average for the period 2010 to 2025. Washington State's population is forecast to grow by approximately 1.2 million individuals, or 4.3 percent per year, between 2005 and

2010. Between 2010 and 2025, the state is expected to grow by an additional 1.3 million individuals, or 1.2 percent per year.

Exhibit 3-55
Population Growth Trends and Projections for the PMEC Vicinity

			2000-2005			2005-2010			2010-2025	
Juris-diction	2000 Census	2005	Number Change	Annual Average Rate of Growth	2010 Fore-cast	Number Change	Annual Average Rate of Growth	2025 Fore-cast	Number Change	Annual Average Rate of Growth
Cowlitz County	92,948	98,764	5,816	1.2%	107,903	9,139	1.8%	136,114	28,211	1.6%
City of Kalama	1,783	1,980	197	2.1%	NA[a]	NA[a]	NA[a]	NA[a]	NA[a]	NA[a]
Washington State	5.1 M	6.2 M	1.2 M	4.3%	6.6 M	0.4 M	1.3%	8.0 M	1.3 M	1.2%

Source: WOFM 2006d

a. Population forecasts by city are not available from the Washington State Office of Financial Management (Berg 2006).

The City of Kalama population grew by 197 people during the period 2000 to 2005, at a rate of 2.1 percent per year. This rate was higher when compared to Cowlitz County in general, but lower when compared to the state for that period.

Housing Characteristics

Exhibit 3-56 presents housing characteristics in Cowlitz County, the City of Kalama, and Washington State from the 1990 Census and the 2000 Census. Exhibit 3-56 also presents housing forecasts made by Washington Office of Financial Management (WOFM) in 2002 for 2005 and 2010. The number of housing units that existed in the City of Kalama in 1990 (491) increased to 842 by 2000, representing an average annual rate of growth of 5.5 percent, a rate that is higher than the same rates for Cowlitz County (1.5 percent) and the state (1.9 percent). Occupancy rates declined during the 1990s, while the percentage of occupied units that were owner-occupied increased in the 1990s. During the period 2005 to 2010, average annual rates of growth in the number of housing units are expected to be 1.9 percent per year for Cowlitz County, and 1.6 percent per year for the State of Washington, indicating faster growth in the County.

Exhibit 3-56
Housing Characteristics in the PMEC Vicinity, 1990 and 2000

Year	Total Housing Units	Occupancy Rate (%)	Occupied Housing Units That Were Owner-Occupied (%)	Average Household Size
City of Kalama[a]				
1990	491	97	57	NA
2000	842	89	64	2.39
Cowlitz County				
1990[a]	33,304	95	62	NA
2000[b]	35,850	93	68	2.55
2005[b]	38,540	NA	NA	2.53
2010[b]	42,392	NA	NA	2.51
State of Washington				
1990[a]	2,032,378	92	58	NA
2000[b]	2,271,398	93	65	2.53
2005[b]	2,442,435	NA	NA	2.50
2010[b]	2,642,598	NA	NA	2.46

Source: US Census 1990 and 2000b; WOFM 2006e

Between 2000 and 2005, the population of Cowlitz County grew by approximately 1.2 percent per year, while the number of housing units in the County was expected in 2002 to grow by 1.5 percent. These rates suggest that vacancy rates have increased during this period, similar to how they increased during the 1990s, indicating relatively less demand for housing. Also for the period 2000 to 2005, average household sizes are expected to decrease in Cowlitz County and the State of Washington as a whole. Housing prices in Cowlitz County are lower when compared to some other areas in Washington State (Exhibit 3-57). Median gross rent is 22 percentage points lower in the County when compared to the state, and median housing value is 23 percentage points lower in the County when compared to the State.

Exhibit 3-57
Housing Values, 2000

Jurisdiction	Median Gross Rent	Median Value for Owner-Occupied Housing Units
Cowlitz County	$518	$129,900
Washington State	$663	$168,300

Source: US Census 2000c

To the east of the proposed PMEC site, beyond Interstate 5 and the BNSF railroad tracks, the closest residences are along Old US Highway 99, approximately 0.5 mile from the site. These homes are likely between 15 and 25 years old. Old Highway 99 runs along the bottom of a hillside, beneath and west of Bluff Road. Bluff Road has several newer homes, which appear to have been built in the last few years. The houses overlook the proposed PMEC site, and are located approximately one mile from the site.

Temporary Lodging

Approximately 650 hotel rooms and 555 RV campsites exist within 12 miles of the proposed PMEC site (Exhibit 3-58). Another 241 hotel rooms and 908 RV campsites are located between 12 and 36 miles from the site. In total, 891 hotel rooms, 1,463 RV camping sites, and 92 RV campsites/motel rooms exist within 36 miles of the site. This total does not include any lodging facilities in Portland, which is approximately 40 miles south of the site. Assuming average occupancy rates of 70 percent, a minimum of 362 hotels rooms and 372 RV campsites are available at any one time.

Exhibit 3-58

Temporary Lodging Units

Type of Lodging	Units within 12 Miles of PMEC Site	Units 12-36 Miles from PMEC Site	Total Units
Hotel or Motel	650	241	891
RV Camping	555	908	1,463
RV Camping/Motel	-	92	92
Total Units	1,205	1,241	2,446
Units Available Assuming 70% Occupancy	362	372	734

Sources: Woodall 2006, TravelWashington 2006

Employment and Income

Sources of income and types of employment in an area often provide the most comprehensive indicators of the health and direction of the local economy. These factors also play a part in determining the overall welfare and quality of life of the individuals inhabiting the area. Exhibit 3-59 presents 2004 income and employment levels for Cowlitz County.

Exhibit 3-59

Employment and Income Data for Cowlitz County, 2004

	Employment		Personal Income Earnings	
Sector	**Jobs**	**Percent**	**Income ($)**	**Percent**
Total employment	46,192	100.0	2,433,903	100.0
Wage and salary employment	39,017	84.5	1,301,506	53.5
Proprietors employment	7,175	15.5	172,140	7.1
Farm employment	715	1.5	13,392	0.6
Nonfarm employment	45,477	98.5	1,789,974	73.5
Private employment	39,316	85.1	1,523,414	62.6
Forestry, fishing, etc.	1,314	2.8	47,775	3.1
Mining	182	0.4	8,281	0.5
Utilities	ND[a]	—	ND[a]	—
Construction	2,884	6.2	204,318	13.4
Manufacturing	7,633	16.5	493,318	32.4
Wholesale trade	ND[a]	—	ND[a]	—
Retail trade	5,836	12.6	144,039	9.5
Transportation and warehousing	1,793	3.9	78,233	5.1
Information	471	1.0	19,028	1.2
Finance and insurance	1,288	2.8	49,156	3.2
Real estate and rental and leasing	1,254	2.8	15,920	1.0
Professional and technical serv.	1,394	3.0	41,687	2.7
Management	47	0.1	2,140	0.1
Administrative and waste services	1,530	3.3	24,047	1.6
Educational services	403	0.9	6,655	0.4
Health care and social assistance	5,320	11.5	207,254	13.6
Arts, entertainment, and recreation	895	1.9	13,446	0.9
Accommodation and food services	2,967	6.4	44,134	2.9
Other services	2,806	6.1	55,426	3.6
Government	6,161	13.3	266,560	11.0

Source: BEA 2006

Number is not disclosed in order to protect firms' privacy

The major employers in the region surrounding the PMEC site include those listed in Exhibit 3-60 (WSP 2006). In 2004, employment in Cowlitz County averaged 46,192jobs, of which 39,017 (84.5 percent) were held by wage and salary workers and 7,175 (15.5 percent) by proprietors. Place of work earnings (wages, salaries and proprietors' earnings) accounted for about three-fifths of total personal income in the County,

with income from property (dividends, interest and rent) and transfer payments (mainly Social Security) making up the balance. The principal sources of employment were government, retail trade, and health care and social assistance.

Exhibit 3-60

Major Employers in Cowlitz County

Company	Employees
Longview Fibre Company	1755
PeaceHealth/St John Medical Center	1605
Weyerhaeuser	1500
Longview School District	941
J.H. Kelly	900
Kelso School District	900
Foster Farms	850
Lower Columbia College	745
Safeway	553
Cowlitz County	550
NORPAC	447
City of Longview	325
Steelscape	305
WalMart	301
Kaiser Permanente	300
Fred Meyer	250
RSGForest Products	238
PNE Corporation	225
Koelsch Senior Communities	200
Noveon Kalama	158
Cadillac Ranch Casino & Entertainment	150
Columbia Analytical Services	140

Immediately south of the proposed PMEC site is Steelscape, a manufacturer of steel coil. The remainder of the Port of Kalama is primarily in industrial use, with several lumber operations, a rail yard, a large grain elevator and a chemical company. There are also some small recreational areas within the Port property. East of the site, between Interstate 5 and Old Highway 99, land is primarily industrial, rural residential, or forest. Businesses on Port of Kalama property include a gas station and a drive-thru espresso stand, located at the corner of

Oak Street and Hendrickson Drive. The proposed site itself is vacant land, void of any economic activity. Over 1,060 employees worked at the Port of Kalama in May 2006.

3.7.2 Environmental Impacts of the No Action Alternative

Under the No Action Alternative, the PMEC facilities would not be constructed. As a result, there would be no direct, indirect, or induced socioeconomic benefits in terms of jobs and income generated by the construction and operation of the project.

3.7.3 Environmental Impacts of the Proposed Action

This section describes the expected impact of the PMEC on local socioeconomic resources. The PMEC would generate new local employment, additional business for local service and materials providers, and additional tax revenues to Cowlitz County and the state. The overall permanent socioeconomic impact of the PMEC would be positive. Impacts were estimated through a detailed review of the proposed action against existing conditions.

Construction Impacts

Local Economy. Based on the anticipated permitting schedule and issuance of a Notice to Proceed, construction would begin in mid 2008 with nine months of design and site preparation. After site preparation, construction would last approximately forty months. Construction of the power island and balance of plant would be completed in 2010. Construction of the process plant would be completed in late 2011, with commercial operations beginning in the first half of 2012. During construction, the construction workforce would peak at approximately 1,400 workers over the construction period and average 400 workers over the 14 quarters. Exhibit 3-61 presents the expected average composition of the construction work force.

Exhibit 3-61
Estimated Quarterly Construction Personnel

Year	Quarter	Estimated Number of Construction Personnel
2008	1	0
	2	50-100
	3	100-200
	4	150-250
2009	1	200-300
	2	600-800
	3	1,200-1,400
	4	1,100-1,300
2010	1	900-1,100
	2	1,200-1,400
	3	900-1,100
	4	405-400
2012	1	200-300
	2	100-200
	3	50-100

Construction trades would be broken down as shown in Exhibit 3-62. Most of the construction labor force would likely be hired from the Longview-Kelso area, the Portland-Vancouver metropolitan area, and the Seattle-Tacoma metropolitan area. An estimated 10 percent of the workers would be residents of Cowlitz County, and would commute on a daily basis to and from the jobsite (Laura Schinnell, personal communication). This estimate is based on the relative size of the labor force in Cowlitz County compared to larger labor forces in metropolitan areas that are slightly further away. Other construction personnel would also likely be hired from the Portland-Vancouver area (approximately 60 percent), and next from the Seattle-Tacoma area (approximately 20 percent) (Laura Schinnell, personal communication). The construction workers hired from the Portland-Vancouver metropolitan area (60 percent) are expected to commute on a daily basis due to the 30-40 mile distance to the site. The majority of workers commuting from Seattle-Tacoma would likely commute on a weekly basis, staying in RV parks and motels near the PMEC site during the workweek.

Exhibit 3-62
Average Power Plant Construction Workforce Composition by Occupation

Occupation	Percentage Compostion
Boilermaker	11.7
Carpenter	11.7
Electrician	18.8
Ironworker	7.0
Laborer	7.0
Millwright	11.7
Operator	4.7
Painter	2.3
Pipefitter	23.5
Sheetmetal	1.4
Total	100

To ensure that the applicant uses the local labor pool to the greatest extent possible, construction contractors would be required to advertise positions locally and to employ local workers to the greatest extent possible. Top hiring priority for construction would be given to qualified in-county and in-state construction workers, and a prevailing wage rate would be paid. Some of the more specialized skills required for certain plant construction activities may not be available in the local or state labor pools; therefore a small percentage of the workforce may have to be brought in from outside of both Washington and Oregon states. These workers (estimated based on power plant experience at 10 percent of the workforce, or 50 individuals, depending on the phase of construction) would likely be employed for a short period of time, and would reside in motels in the PMEC area for the duration of their assignments.

The average of approximately 50 specialized out-of-state workers, and 100 weekly-commuting construction workers[1] would generate additional business for the operators of transient accommodations, such as motels, recreational vehicle

[1] These estimated 100 weekly commuting construction workers include those workers who live in Seattle or Tacoma.

parks, and campgrounds, as well as for other businesses near the PMEC area. Also, a portion of the construction materials and services needed for the PMEC would be procured from local vendors, thus generating additional income for local suppliers.

Population and Housing. The approximately 10 percent of the PMEC construction workforce who would be specialized craftsmen originating outside of Washington and Oregon would likely have relatively short assignments, so few are expected to bring their families with them when they arrive to work on the PMEC. The population increase in the PMEC area and elsewhere in Cowlitz County would therefore be limited mainly to these workers for a temporary period of time, plus, during the workweek, the non-local workers who would temporarily commute on a weekly basis from the Seattle-Tacoma area.

The total estimated number of workers requiring transient housing would be 150 (average) and 420 (peak) over the four-year construction period, assuming that all of the workers from Seattle-Tacoma would commute on a weekly basis and the specialized, temporary staff would also require lodging. These construction workers are expected to seek temporary accommodation in the general vicinity of the PMEC site, and to use motels, trailers, campers, and other forms of transient housing. Exhibit 3-58 shows that over 1,200 hotel rooms or RV campsites exist within 12 miles of the PMEC site. Assuming 70 percent occupancy, approximately 362 of these units (195 hotel rooms) would be available at any one time. Assuming a worst-case scenario that workers would want hotel or motel lodging, the peak demand of 420 rooms (assuming, again a worst-case scenario that no workers would share rooms) would stress the lodging facilities within 12 miles. However, between 12 miles and 45 miles, Vancouver and Portland lodging faculties and RV campsites are available. At the very least, an additional 372 hotel rooms or RV campsites would be available. Due to the PMEC site's proximity to the I-5 corridor and the Portland/Vancouver metropolitan area, and

the amenities offered by a large metropolitan area such as Portland/Vancouver, a portion of the workers' temporary housing needs would likely be met in the Portland/Vancouver area. Construction of the proposed PMEC is not expected to result in a significant impact on transient accommodation availability in the PMEC area.

Local Business Effects. PMEC non-salary local procurements for construction materials, services and equipment leasing associated with construction are projected to total approximately $3 million. These procurements would augment the revenues of many construction-related businesses in Cowlitz County. In addition, the consumption spending of local PMEC workers and their households out of their wages and salaries would stimulate the retail trade and services sector of the regional economy. Total payroll costs for the PMEC construction, including fringe benefits and other labor overhead costs, are projected to be approximately $433 million, of which approximately $43 million is expected to be earned in Cowlitz County. A portion of that income would become household spending, and would benefit area businesses.

An analysis of the primary and secondary effects of these construction spending streams within Cowlitz County reveals that indirect and induced value added from construction would be $18 million, and the number of indirect and induced jobs attributable to construction is 328. The total economic impacts in terms of value added and jobs are estimated to be $74.2 million and 375 jobs. The direct, indirect, and induced economic effects of construction of the PMEC in terms of its contribution to gross regional product (value added) and creation of employment (number of jobs) equals approximately 375 new jobs outside of the jobs at the site. The estimates in this table were calculated using the IMPLAN economic input-output model specific for Cowlitz County and the PMEC. Local expenditures related to PMEC construction would affect the Cowlitz County economy *directly*, through the purchases of goods and services in the region, and *indirectly*, as those purchases, in turn, generate other purchases of intermediate

goods and services from related sectors of the economy. In addition, the direct and indirect increases in employment and income enhance the overall purchasing power of residents, thereby *inducing* further consumption and investment. The number of jobs is the full-time equivalent of person-years of construction employment.

Sales Tax Revenues. The total cost of construction is estimated to be over $1 billion. In addition to the local area procurements mentioned above, which would be subject to state and local sales taxes, PMEC would be purchasing large amounts of power generation and transmission-related equipment from various domestic and foreign suppliers. State use tax would be levied on these out-of-state procurements. Together with the in-state purchases of taxable goods and services, total taxable purchases would be on the order of $867 million. The procurements would generate an estimated $65 million in sales and use taxes for state and local jurisdictions.

The Cowlitz County sales and use tax rate is 7.5 percent, meaning that after the state government's share of 6.5 percent, the remaining 1.0 percent is divided between the County and the other incorporated communities, depending on where the purchases are made. According to the state tax code, the County government gets 15 percent of the first one percent of local sales tax levied in incorporated areas, with the city keeping the other 85 percent of the first one percent. The County keeps all the local sales and use tax revenues for taxable purchases in unincorporated areas. These positive fiscal impacts to the cities, County and the state would be a one-time occurrence resulting from PMEC construction activities.

Property Values. Because the PMEC site is located in a purely industrial zone, construction activities are not likely to adversely affect property values in residential and commercial areas of Kalama.

Operational Impacts

Local Economy. Operation of the PMEC would result in a positive economic impact to Cowlitz County and the state due to increased tax revenues, employment, and local expenditures. Operation of the PMEC would require 80 to 100 full-time employees working in two 12-hour shifts. Exhibit 3-63 shows the labor force by type of labor during operation. Efforts would be made to hire local individuals to staff the PMEC as much as practicable.

The estimated gross payroll (including fringe benefits and other payroll overheads) for the operational workforce is $12.9 million, or an average annual labor cost of $162,000 per employee. This is approximately 40 percent higher than the standard industrial wage for this industry in Cowlitz County. In addition to the regular operational workforce, a temporary workforce with appropriate skills would be utilized during major maintenance or other non-routine operational work.

Using IMPLAN regional economic modeling software for the power generation and supply industry in Cowlitz County, a power plant employing 80 full-time workers would have a gross annual value of output valued at $57 million, including $25 million in purchases from suppliers (including fuels, maintenance supplies and services, retail goods and professional services). Sales, use and other indirect business taxes on that level of output are estimated at $4 million per year, which would accrue to state and local government jurisdictions. Employee spending from wages and salaries is estimated at around $11 million per year, assuming an average local expenditure rate of 85 percent of compensation.

Taxes to be assessed on the PMEC and associated facilities have not been determined, but could amount to several million dollars per year in view of the PMEC's projected total cost of over $1 billion.

Exhibit 3-63

Operation Staff Breakdown

Position	Number of Operating Personnel
Gasification and ASU	
Plant manager	1
Manager, Services/Projects	1
Manager, Production	1
Production, Eng - Mechanical Reliability	3
Production Eng - Process Optimization	1
Production Eng - Air Separation	1
Control Engineer	1
Buyer	1
Accounting Clerk	1
Shift Supervisor - Production	4
Shift Supervisor - Training	1
Inventory Supervisor	1
Maintenance Supervisor	1
Environmental & Safety Controller	1
Shutdown Coordinator	1
Permit Coordinator	1
Material Controller	1
Maintenance Planner	1
Administrative Assistants	3
Laboratory Technicians	2
I/E/A Technicians	4
Operating Technicians (Level 3 - Field)	19
Operating Technicians (Level 5 - Control)	17
Gasification and ASU Subtotal	69
Power Block Plant	
Maintenance Engineer	1
Maintenance Planner	1
I/E/A Technicians	1
Operating Technicians (Level 3 - Field)	4
Operating Technicians (Level 5 - Control)	4
Power Block Total	11
PMEC Total	**80**

This shows the direct, indirect, and induced economic effects of operation of the PMEC in terms of its contribution to gross regional product (value added) and creation of employment (number of jobs) is approximately 58 jobs outside of the 80 jobs at the PMEC. The estimates in the table were calculated using an IMPLAN economic input-output model for Cowlitz County. Expenditures related to PMEC operation would affect the Cowlitz County economy *directly*, through the purchases of goods and services in the region, and *indirectly*, as those purchases, in turn, generate other purchases of intermediate goods and services from related sectors of the economy. In addition, the direct and indirect increases in employment and income enhance the overall purchasing power of residents, thereby *inducing* further consumption and investment. Number of jobs is the full-time equivalent of person-years of employment.

Population and Housing Effects. Operation would require a minimum of 80 permanent employees. For the IMPLAN model, an estimated 30 employees were assumed to originate from the local area (Cowlitz County), based on experience with other power plants. The remaining 50 employees could migrate to the area from other locations outside the County. Assuming an average household size of 2.5 persons, the population in the area could increase by approximately 125 people, and 50 households. Assuming the most recent housing vacancy rates available (2000) of 11 percent for the City of Kalama and 7 percent for Cowlitz County, approximately 90 households in Kalama and over 2,500 in Cowlitz County would be available. Also, the Portland/Vancouver metropolitan area has over 900,000 housing units with a vacancy rate of approximately 6 percent. Assuming that 20 of these 50 new households choose to locate in Kalama, the population increase in Kalama would represent a 2.5 percent increase, which would not represent an adverse impact on population or housing demand in the area.

The PMEC would not displace any minority or low-income populations, or result in any disproportionately high and adverse effects on minority or low-income populations.

Property Values. Because the PMEC site is located in the industrial zone, operational activities are not likely to adversely affect property values in residential and commercial areas of town.

3.7.4 Mitigation Measures

No Action Alternative

Mitigation measures are not required under the No Action Alternative.

Proposed Action

Socioeconomic impacts are expected to be beneficial in the form of additional jobs, increased sales, and increased tax revenues. Temporary increases in population due to worker relocation during construction are likely to be less than significant in view of the level of nearby urban development and abundance of transient accommodations available in the region.

3.7.5 Significant Unavoidable Adverse Impacts

No Action Alternative

There would be no significant unavoidable adverse socioeconomic impacts under the No Action Alternative.

Proposed Action

There would be no significant unavoidable adverse socioeconomic impacts expected as a result of the project.

3.8 Cultural Resources

This section summarizes and adds to information contained in Section 4.2.5 of the Application for Site Certification 2006-01. Please see the Application for additional information on prehistoric times.

The area of potential effect is identified on the USGS 7.5 minute series Kalama and Deer Island Washington-Oregon quadrangles (Exhibit 3-64 and Exhibit 3-65). The area of potential effect includes a cumulative total of approximately 110 acres for the plant site and pipeline; each development component is addressed separately.

3.8.1 Affected Environment

National Historic Preservation Act

Section 106 of the National Historic Preservation Act defines historic properties as:

> *…any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria. The term eligible for inclusion in the National Register includes both properties formally determined as such in accordance with regulations of the Secretary of the Interior and all other properties that meet the National Register criteria [36 CFR 800.16].*

A traditional cultural property is defined as a location whose "significance is derived from the role the property plays in a community's historically rooted beliefs, customs, and practices" (National Register Bulletin 38).

Therefore, historic properties being evaluated for the PMEC could include archaeological sites, historical sites, and traditional cultural properties.

Exhibit 3-64

Area of Potential Effect for the PMEC Site

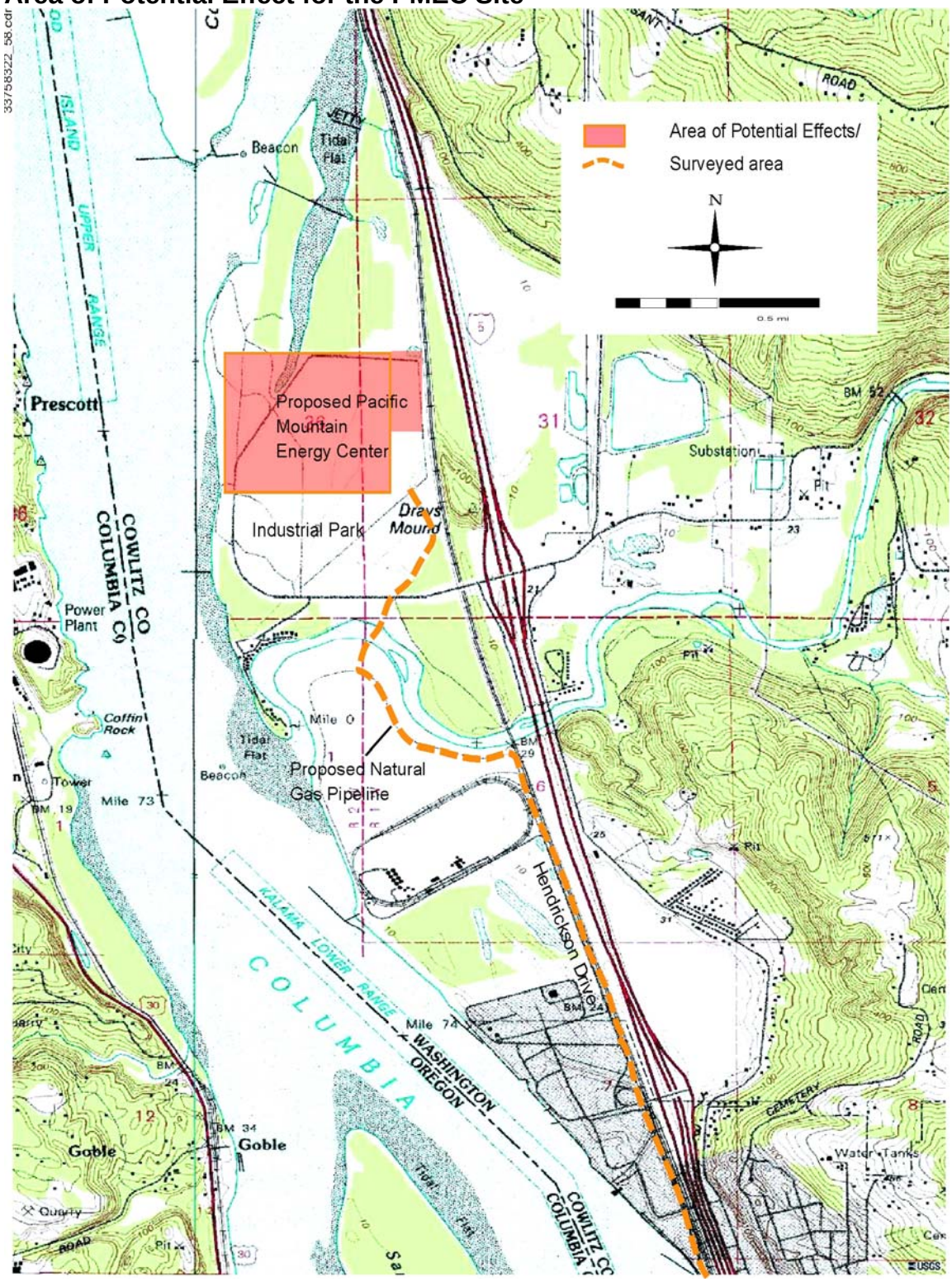
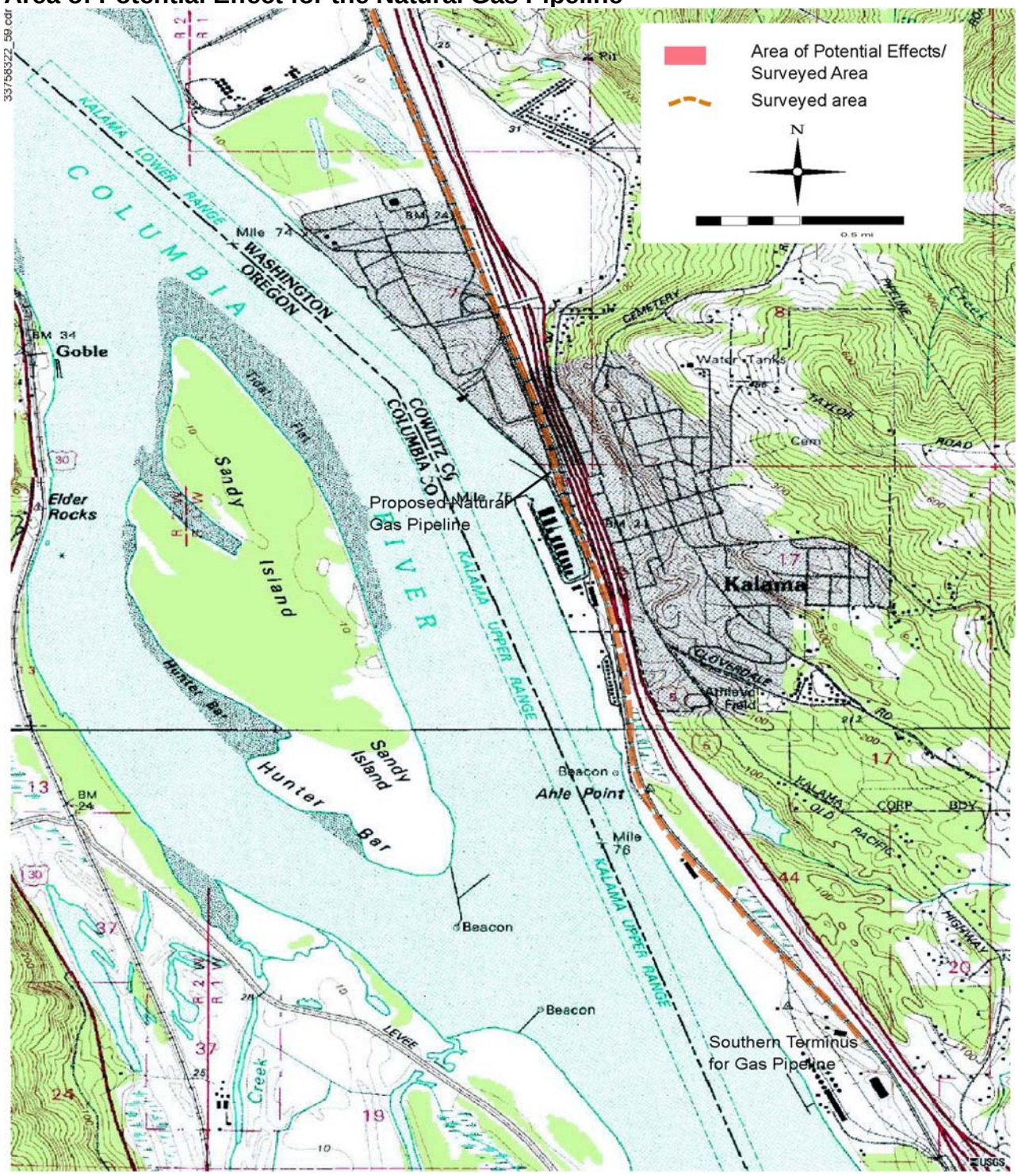


Exhibit 3-65

Area of Potential Effect for the Natural Gas Pipeline



Archaeology and Ethnohistory

Kalama falls within the territory traditionally occupied by the Cathlamet, an Upper Chinookan-speaking people who resided along the Columbia River, east of the Lower Chinook and west of the Multnomah groups. The Cathlamet lived along the Columbia River between Grays Bay and Kalama. Two ethnographic villages are reported at the mouth of the Kalama, including *Tlakalama*, and *Cath la haws* (Silverstein 1990).

Cathlamet subsistence was based primarily on salmon, supplemented with seasonal plant and animal resources including berries, camas, wapato, deer, elk, bear, and waterfowl. Houses were constructed from cedar planks; longhouses were located along the Columbia River and tributaries. The deceased were often placed in canoes elevated on trees or posts; one important burial place was Coffin Rock near the mouth of the Cowlitz River. The Kalama River was a reported gathering place for the harvesting of smelt among the Nisqually, Cowlitz, and Klickitat (Forsman et al. 2000, Bureau of Indian Affairs 1995).

The Cathlamet were signatories to a treaty that ceded their lands in 1851. Lewis and Clark estimated the Cathlamet population to be about 300 in 1805-1806; by 1849 there were only 58 remaining according to territorial estimates. The Cathlamet are no longer considered a tribal entity (Ruby and Brown 1992).

The first non-native group to record travels to the area was a 1792 British expedition led by Lieutenant Broughton under the command of George Vancouver, which explored from the mouth of the Columbia River to the Washougal and Sandy rivers. Following Vancouver's expedition, no direct contact was recorded until the overland Lewis and Clark expedition camped opposite the Kalama River, noting an abandoned village at the mouth of the river (Urrutia 1998).

The origin of the name Kalama has various possibilities. One is that it was a native word; a second is that it was named for native Hawaiian John Kalama, who worked for the Hudson's Bay Company and married a Nisqually woman in the 1830s,

becoming a respected resident of the Kalama region; a third is based on the journal of Gabriel Franchere, Pacific Fur Company explorer, who in 1811 recorded the village at the mouth of the Kalama as *Thlakalamah* (Urrutia 1998). Silverstein (1990) attributes the word to *galakalama*, “those of the rock,” with variants *Tlakalama* and *Klakalama*.

Within five years of the Lewis and Clark expedition, fur-traders began exploring the area. David Thompson of the North West Company traveled from the source of the Columbia to the mouth in 1811 and noted a long row of Indian houses at the mouth of the Kalama River (Urrutia 1998). The Hudson’s Bay Company established a trading post near the Cowlitz River, the Caweeman Post, and later the Puget Sound Agricultural Company, with a farm in the Cowlitz Valley, by 1839 (Urrutia 1998). Many other traders, missionaries, and explorers traveled through the Kalama area throughout the early nineteenth century; however, extensive permanent settlement by Euroamericans did not occur until the 1840s as Oregon Trail emigrants began to arrive.

The first American settlers were the Jonathan Burbee family, who settled briefly near the mouth of the Kalama in 1847. The first to file a claim in Kalama was the Ezra Meeker family, who arrived in 1853, but whose stay was also shortlived (Urrutia 1998). Nearly two decades would pass before the town of Kalama was established. In 1870, the Northern Pacific Railroad began constructing the town with the intent of building the western terminus of a transcontinental rail line. The railroad erected a number of buildings, and within a few months the population exploded to over 3,500 people. Kalama was anticipated to rival Portland because of its proximity to the Pacific Ocean. The track was completed to Tacoma by 1873; shortly thereafter, Northern Pacific moved its headquarters to Tacoma and the economy of Kalama suffered. The Kalama ferry was constructed in 1883 and freight cars could be transported to Portland via crossing the Columbia River to the Oregon Railway and Navigation Company railroad. Ferry transportation became obsolete when the rail was continued

from Kalama to Vancouver and the railroad bridge from Vancouver to Portland was constructed in 1908 (Urrutia 1998).

Logging and lumber production emerged as the primary industries after the railroad was completed. Kalama became the Cowlitz County seat in 1872, and remained so until Kelso won the vote in 1922. The Port of Kalama was established in 1920, and primarily leased land for sawmill operations (Urrutia 1998). During World War II, Kalama and nearby towns aided the war effort by salvaging ships. The town was flooded in 1948, when water from the Columbia washed over the railroad tracks and into downtown (Urrutia 1998). After World War II, the construction of Highway 99 through Kalama allowed for better access. Kalama has emerged as a bedroom community for Vancouver and Portland commuters, and continues to be a stopping point for travelers along the I-5 corridor.

Native American Consultation

Tribal consultation has been initiated with cultural resource representatives of the Cowlitz Indian Tribe and the Chinook Nation.

Field Survey

During field survey conducted in March 2006, portions of the development corridor were subject to intensive pedestrian survey utilizing transects spaced at average intervals of 30 meters or less. However, the majority of the pipeline corridor consisted of asphalt roadway on raised, filled levees. Areas excluded from pedestrian survey include: 1) a 1,500-foot-long segment of the proposed pipeline at the northern terminus of the development from the PMEC site south to West Kalama River Road, since this area lies within a fenced, active industrial park, and 2) the proposed pipeline corridor extending from the southern terminus north along Hendrickson Drive; this portion of the corridor consists of an asphalted roadway on a raised levee and was subjected to a windshield reconnaissance only. Occasional cut bank exposures were inspected where the road runs nearest the Columbia River in the vicinity of the existing wastewater treatment plant. No subsurface probing was conducted as part of this inventory.

PMEC Site

The development area for the PMEC consists of a fenced enclosure located on a bench above the Columbia River, situated about 300 feet from the shoreline, that has been leveled and filled with dredge spoilings by the Port of Kalama (Exhibit 3-66 and Exhibit 3-67). Geotechnical tests confirm the presence of fill to depths of 10 to 15 feet throughout the plant site.

Exhibit 3-66

Overview of the proposed PMEC site, facing southwest toward the Columbia River

The subject property was undeveloped bottomland until 1979, when the Port purchased the property and began filling it in with dredged sediments from the Columbia River. Surrounding properties to the north and west have remained undeveloped and used for agricultural purposes since the 1930s, while properties to the south have been developed for industrial use in the Port of Kalama (Hart Crowser 1995a, 1995b). The ground surface is moderately covered with low-growing introduced weeds and grasses. Ground surface visibility was moderate to good and confirmed the presence of fill throughout the industrial site. No cultural resources were observed. Significant cultural deposits would not be expected to be identified given the extent of fill placed over the site area.

Exhibit 3-67
Overview of the proposed PMEC site, facing south toward the existing industrial area at the Port of Kalama

Natural Gas Pipeline

The proposed pipeline corridor traverses a variety of settings, and consequently, ground visibility was variable. In general, the pipeline corridor would be constructed adjacent to or within existing roadways, railways, and/or levees. Most of this corridor has been developed, and is in most places constructed of fill and covered with asphalt or gravel. Non-developed areas are limited to the proposed Kalama River crossings; intensive pedestrian survey was conducted in these areas.

A bridge was constructed circa 2000 at the Kalama River Crossing and the associated road approach is located near or within site deposits associated with 45CW5, a previously recorded site. The US Army lately surveyed the area, but found no archaeological materials (Martin 1985). This area was investigated intensively; however, no archaeological deposits could be located. Ground visibility in the site area was generally poor given the amount of dense grass vegetation, with the exception of the immediate Kalama River shoreline. Silt deposits were visible on the ground surface. The area appears to be frequently inundated. Its potential archaeological materials may have been buried by flood events.

South of the bridge, which includes a raised fill bed for the road approach, the development would follow an existing levee along the south bank of the Kalama River until reaching Hendrickson Drive. The levee was constructed in the 1970s (Mark Wilson, personal communication) and is therefore not considered to be of historic age. No cultural resources were noted along the levee during the site survey.

The pipeline would parallel paved Hendrickson Drive and the BNSF/Union Pacific Railroad, located immediately east of the road. Both are constructed on a raised, fill levee about 10 to 12 feet in height. Archaeological sensitivity appears low for the remainder of the pipeline corridor south of the Kalama River. Occasional cutbank exposures were examined along the Columbia River shoreline where Hendrickson Drive is closest to the water's edge. No cultural resources were noted.

3.8.2 Environmental Impacts of the No Action Alternative

There would be no impact to cultural resources under the No Action Alternative.

3.8.3 Environmental Impacts of the Proposed Action

Construction Impacts

PMEC Site. The proposed PMEC would be located in an area that has undergone considerable modern disturbances, including the placement of dredge spoils and grading. The presence of dredge spoils to depths of 10 to 15 feet precludes efforts for shovel testing of native soils where *in situ* archaeological deposits would be most likely to occur. No previously recorded sites are located in this area. Modern industrial development has likely affected any potentially significant resources within the PMEC site. However, it is possible that deeply buried archaeological deposits still may be present underneath the fill material. If proposed construction of the PMEC would not exceed the depth of the fill, then no further investigations are recommended. Should development components include substantial disturbance to native soils, additional efforts are recommended given the archaeological sensitivity of the Columbia River, and the historic record,

which demonstrates considerable use of the area near the Kalama River confluence with the Columbia River. Such efforts may include mechanical trench excavation prior to construction, archaeological monitoring during construction, and/or implementation of an Unanticipated Discovery Plan during construction.

Pipeline. Subsurface probing is recommended in the vicinity of the Kalama River along the alignment for the proposed gas pipeline if development components cannot avoid impacts to native soils. Two important prehistoric archaeological sites have been documented near the proposed pipeline river crossings. Furthermore, the historic record provides several accounts documenting the presence of at least two villages at the mouth of the Kalama River. If construction of the proposed pipeline, including ancillary activities such as bore entrance/exit pits and equipment staging areas, would occur outside of areas of previous disturbance, such as existing roadbeds, levees, bridges, or railroads, then subsurface investigations are recommended given the cultural sensitivity of the area, as well as the dense ground vegetation that precluded site identification during surface survey.

If the project components were not confined to areas of previous disturbance, archaeological site 45CW5, located on the south side of the Kalama River, would require evaluation and application of the Secretary of the Interior's Standards for the Treatment of Historic Properties to determine whether there would be an adverse effect on the site, and possible mitigation. The effect of the new construction on the archeological site would have to be evaluated using the adverse effect criteria relating to "physical destruction of or damage to all or part of the property," "change of the character of the property's use or of physical features within the property's setting that contribute to its historical significance," and "introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features." If none of these criteria are met, it is possible that new construction that conforms to the applicable Secretary's Standards could be

treated as a no adverse effect situation. Subsurface reconnaissance probing is recommended for the north side of the Kalama River at the West Alternate Kalama River Crossing given the cultural sensitivity of the immediate vicinity, if appropriate areas are identified that exhibit limited prior disturbance.

Operational Impacts

PMEC Site. There would be no impacts to cultural resources as a result of PMEC operation.

Pipeline. There would be no impacts to cultural resources as a result of pipeline operation.

3.8.4 Mitigation Measures

No Action Alternative

No mitigation measures would be required with the No Action Alternative.

Proposed Action

If cultural resources are encountered, work would halt immediately and the State Archaeologist would be notified. A plan for mitigating the effects on the site would be developed and implemented prior to continuation of construction.

If foundation construction for the PMEC results in substantial disturbance to native soils (beneath the layer of dredge spoils), additional investigation is recommended. Such effects may include mechanical trench excavation prior to construction, archaeological monitoring during construction, and/or implementation of an Unanticipated Discovery Plan during construction.

Pipeline

If the pipeline cannot feasibly be constructed completely within areas of previous disturbance, mitigation measures would be implemented. These measures may include site avoidance, subsurface reconnaissance probing, site evaluation, data recovery, and monitoring during construction.

If the pipeline can be constructed completely within areas of previous disturbance, no cultural resources are expected to be encountered.

3.8.5 Significant Unavoidable Adverse Impacts

No Action Alternative

There would be no significant unavoidable adverse impacts as a result of the No Action Alternative.

Proposed Action

It is not expected that significant and unavoidable adverse impacts to cultural resources would result from the proposed action.

3.9 Traffic and Transportation

3.9.1 Affected Environment

Roadway Transportation

The existing roadway system in the site area is shown on Exhibit 2-2. The major roadways that serve the project area include:

- **Interstate 5** – I-5 is the primary interstate route in Washington State from Portland, Oregon to the Canadian border. This north-south freeway provides a minimum of four travel lanes (two in each direction). The freeway and adjacent BNSF Railway form the eastern boundary of the project site, with interchange access via West Kalama River Road at MP32. (The freeway has six travel lanes in the project area.)
- **West Kalama River Road** – West Kalama River Road is an east-west, two-lane county road that originates in the North Marine Industrial Park, intersects with I-5, and extends eastward into largely undeveloped rural areas east of the freeway. The posted speed limit in the project vicinity is 30 miles per hour.
- **Tradewinds Road** – Tradewinds Road is a two-lane private road that runs between the BNSF tracks and the vacant development site providing primary access to and from West Kalama River Road. The intersection with West Kalama River Road is approximately 1500 feet east of the I-5 interchange. Tradewinds Road extends north and west around the PMEC site (a distance of approximately 3,500 feet from West Kalama River Road to Eastwind Road).
- **Hendrickson Drive** – Hendrickson Drive is a two-lane county road that extends south from West Kalama River Road across the Kalama River, providing local north-south service for industrial areas between I-5 and the Columbia River in the vicinity.

Existing Traffic Volumes. Average annual daily traffic data for I-5 was obtained from the Washington State Department of Transportation (WSDOT) and is estimated at approximately

60,000 vehicles per day (vpd). Traffic data was not available for the I-5 ramps. Automatic traffic count data for West Kalama Road, west of the I-5 interchange (conducted in 2000 at the BNSF overpass) was obtained from Cowlitz County (2006). The results show relatively low traffic activity with an average annual daily traffic of approximately 700 vpd. Weekday daily volumes were slightly higher at approximately 800 vpd.

Utilizing the typical industrial use activity along West Kalama River Road, peak hour directional volumes were developed as shown on Exhibit 3-68. The traffic levels conservatively assume peak hour activity at 20% of daily volumes and directional flows at 80/20.

Exhibit 3-68
Existing Traffic Volumes, 2000

	Traffic Volumes	
Location	**AM Peak (7:00 – 9:00 am)**	**PM Peak (4:00 – 6:00 pm)**
W. Kalama River Rd – eastbound	35	125
W. Kalama River Rd – westbound	125	35
Tradewinds Rd. – northbound	Neg	Neg
Tradewinds Rd. – southbound	Neg	Neg

Existing Level of Service. Level of service (LOS) is an estimate of the performance efficiency and quality of a roadway as established by the *Highway Capacity Manual* methodology (TRB 2000). The Transportation Research Board (TRB) methodology measures the degree of delay at intersections using the letter rating "A" for the least amount of congestion and letter rating "F" for the most amount of congestion, as shown in Exhibit 3-69.

Input for the LOS analysis of the unsignalized intersection of West Kalama River Road and Tradewinds Road/Hendrickson Drive utilized geometric information such as number of lanes, width, configuration, and grade based on collected field data. This was combined with the existing traffic data to perform LOS analysis. The Highway Capacity Software 2000 Release

4.1a, which is used in conjunction with the TRB *Highway Capacity Manual*, was used to calculate LOS.

Exhibit 3-69
TRB Rating System: Level of Service and Delay for Unsignalized Intersections

Level of Service	Expected Traffic Delay
A	< 10 seconds
B	> 10 – 15 seconds
C	> 15 – 25 seconds
D	> 25 – 35 seconds
E	> 35 – 50 seconds
F	> 50 seconds

Source: TRB 2000

The results of the LOS analysis show LOS A under existing 2000 conditions for the unsignalized intersection, representing little or no delay for all travel directions. Analysis of critical turning movements (left turns) for stopped vehicles from Tradewinds Road show little or no delay (approximately 10 seconds), resulting in LOS A/B. An LOS of C or better is typically considered to be acceptable for a rural setting and is the LOS standard for Cowlitz County.

Estimated Future Traffic Volumes. The PMEC is expected to begin operation by 2012. Traffic volumes in 2012 without the PMEC were estimated for the site area, based on the assumption that background traffic volumes would increase 2.5 percent (linear) annually between 2000 and 2012 (Exhibit 3-70). The growth factor of 2.5 percent per year was based on historical traffic data obtained from WSDOT and anticipated general increases for this area of Cowlitz County. These traffic volumes and associated routes are illustrated on Exhibit 3-70.

Estimated Future Level of Service. The LOS analysis for future conditions was conducted using the same methodology that was used for existing LOS conditions. Results of the LOS analysis for 2012 conditions without the PMEC show that turning movements at the West Kalama River Road/Tradewinds Road/Hendrickson Drive intersection would continue to experience little delay, even with the assumed growth in background auto and truck traffic.

Exhibit 3-70
Estimated Future Traffic Volumes Without PMEC, 2012

Location	Traffic Volumes	
	AM Peak (7:00 – 9:00 am)	PM Peak (4:00 – 6:00 pm)
W. Kalama River Rd – eastbound	45	162
W. Kalama River Rd – westbound	163	46
Tradewinds Rd. – northbound	Neg	Neg
Tradewinds Rd. – southbound	Neg	Neg

The projected level of traffic along I-5 in the vicinity indicates an acceptable LOS C or better condition. WSDOT plans to pave and install guardrail improvements along this section of I-5 by 2008. No major capacity improvements are currently planned or programmed for the existing six-lane highway in the vicinity.

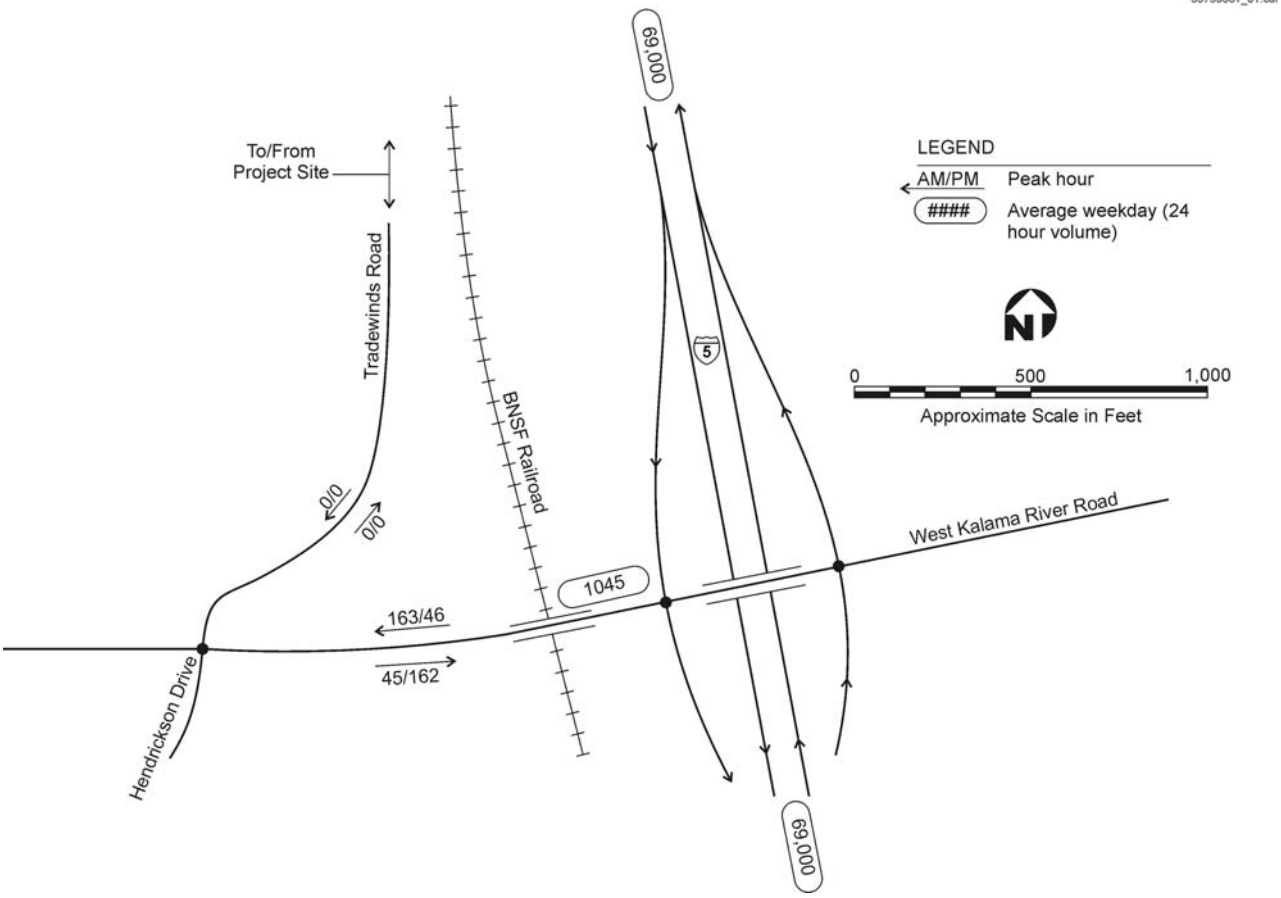
Rail Transportation

The BNSF Railway operates a rail line that extends along the eastern limit of the site area. This line along the I-5 corridor is a major link that ties the important industrial areas of Vancouver BC, Seattle-Tacoma to Portland, the North-Central states of the US, and eastern railroads via Chicago. The line is also used by Union Pacific Railroad to tie their network between Portland Oregon and Tacoma Washington, and by Amtrak.

Current traffic activity for the I-5 rail line in the Port of Kalama vicinity is an average of 49 trains per day, with a practical capacity of 96 trains per day. Overall, the I-5 rail line operates at between 40 and 60 percent of practical capacity in most sections, but is subject to frequent stoppages when trains tie up the mainline to enter and exit the many ports, terminals and industrial yards along the corridor (WSTC 2006).

Exhibit 3-71

Estimated Future Traffic Volumes and Associated Routes Without PMEC, 2012



The State of Washington has committed to improving overall rail capacity along the I-5 corridor and access to the Ports of Kalama and Longview with the proposed Kelso to Martins Bluff Third Mainline project. (WSTC 2006)

River Transportation

River transportation in the site area includes barge and boat/shipping transport on the Columbia River. The Portland Merchant Marine schedules an average of 160 escorted trips per month up the river.

The plant site is located on the east bank of the Columbia River, which runs from south to north (and towards the Pacific Ocean) in this part of the state. In 2004, there were 261 port calls for the Port of Kalama compared to 1,495 for Portland Oregon (Merchants Exchange 2004).

Air Transportation

Air transportation in the regional area includes the Portland International Airport, within a 40 minute drive south via I-5.

3.9.2 Environmental Impacts of the No Action Alternative

Under the No Action Alternative, the PMEC would not be constructed and therefore no additional auto or truck trips would be added due to the project. No impacts upon any type of transportation (road, rail, air, or river) would occur.

3.9.3 Environmental Impacts of the Proposed Action

Construction Impacts

PMEC Site. PMEC construction activities would last approximately four years and result in increased traffic activity in the site area and around the plant site due to workers and equipment delivery trucks arriving and departing. Traffic delays could occur due to the maneuvering of large vehicles carrying heavy loads and from additional vehicles on West Kalama River Road and Tradewinds Road. On average, approximately 400 workers over 14 quarters would work at the PMEC site during construction.

Access to the site during construction would be provided by Tradewinds Road, connecting to West Kalama River Road and the I-5 interchange as shown on Exhibit 2-2. The proposed site plan calls for Tradewinds Road to be a grade separated crossing over the future rail spurs as shown on Exhibit 2-4. Local port access would be maintained with a proposed unpaved service road running adjacent to Wetland A along the eastern boundary of the site.

It is anticipated that parking and laydown activity will use available area on the project site. As shown on Exhibit 2-4, the northeast corner of the site is available, providing convenient access via existing Tradewinds Road (during initial construction staging), and via the proposed new bridge overpass when completed during subsequent construction phasing. The entire southern portion of the site is available for construction staging areas and additional parking during peak construction periods.

In addition, large pieces of equipment may be delivered to the plant site by rail or river transport. The large equipment (i.e., turbines, HSRG parts, etc.) would be off-loaded onto trucks at an off-load platform for transport within the plant site. Timing of travel of the shipments would be coordinated with BNSF and the Port of Kalama. Anticipated impacts to rail or river transportation would be low. It is not expected that local or regional airports would be used for transporting construction equipment or material; therefore, no air transportation impacts would be anticipated.

Peak construction activity is estimated to last 12 months of the four-year construction period, and would require approximately 1,000 construction workers on a daily basis with a peak of 1,400 workers. (It is anticipated that additional work shifts during off-peak periods would be utilized to best accommodate the peak construction work force.) Typically, some carpooling would occur for these trips. Assuming average vehicle occupancy of 1.3 workers per vehicle, approximately 1,500 daily vehicle-trips are anticipated (ITE 1997). Daily truck activity is estimated to be up to 60 deliveries per day, which would result in approximately 120 daily truck trips during this peak construction period.

It is assumed that construction traffic trips would be distributed as follows: 60 percent traveling to and from south of the plant site on I-5 and 40 percent traveling to and from north of the plant site on I-5. Many of these trips could occur outside of the peak periods, depending on their origin location and start time. In addition, the majority of peak-hour trips from the south would be “reverse flow” to the Portland/Vancouver area commute. Resulting peak hour traffic operations would be affected at stop-controlled intersections where higher left turn demand is expected. Short-term delays are therefore expected during the am peak at the I-5 Northbound Ramp/West Kalama River Road intersection and during the pm peak at the West Kalama River Road and Tradewinds Road intersection (PM peak hour analyses for the Tradewinds Road intersection show LOS B for the average construction work force period and LOS

C for the peak). It is anticipated that short-term construction impacts would be moderate.

I-5 is a limited access highway, which is a classification that allows for efficient travel time and increases overall safety of the I-5 corridor. Short-term, potential moderate impacts to travel safety could occur due to the turning movements of trucks onto and off of West Kalama River Road during the peak construction period. No high (significant) construction impact is anticipated.

Natural Gas Pipeline. The proposed natural gas pipeline would be approximately five miles in length and would extend from the plant site south to the Deer Island Natural Gas Pressurization Station. The gas pipeline would be located within existing pipeline ROW on Port land and under or along Hendrickson Drive.

Temporary short-term impacts would be limited to the construction phase. Construction of the pipeline under or along side Hendrickson Drive and Tradewinds Road will require temporary traffic control for needed shoulder or lane closures. Traffic delays would be short term in nature and would not cause hazards to traffic beyond those associated with typical construction projects.

It is planned that required road crossings will be made by boring under the road, thereby minimizing any potential impact to vehicle circulation.

Railroad Spur. One or more rail sidings or spurs will be needed to connect the PMEC rail loop to the BNSF and Union Pacific joint rail line. These spurs would be constructed around the development site, resulting in a total of about 16,940 lineal feet of new railroad track. The proposed new spur connections will result in one or more new crossings of local roadways within the development site (See Exhibit 2-4).

Temporary short-term impacts are anticipated during the construction phase. Construction of the new rail spurs will require temporary traffic control along Tradewinds Road north

of West Kalama River Road. Potential impacts would be limited to construction traffic only, since the current site is vacant.

River Transportation. Depending on the amount of equipment that is transported to the site, low impacts to existing river transportation are anticipated during the construction phase.

Operation Impacts

PMEC Site. The PMEC is designed to operate continuously (24 hours a day, 7 days a week) with a work force of approximately 80 full-time employees. The work force allocation per 12-hour shift (over two shifts) would be approximately 40 people.

Primary access to the site will be via Tradewinds Road. The site will also have operating access to the BNSF rail and an expanded wharf on the Columbia River. The proposed site plan calls for Tradewinds Road to be a grade separated crossing over the future rail spurs (Exhibit 2-4).

The number of anticipated vehicle trips for the PMEC was calculated based on the *Trip Generation* manual (ITE 1997) under land use code 110 (General Light Industrial). The (worst-case) analysis assumed an on-site workforce slightly higher than would typically be on site at any one time (80 employees), and that each employee would drive to work alone and therefore account for 160 daily trips (80 entering and 80 exiting). In addition, it is estimated that 40 daily trips (20 entering and 20 exiting) would be associated with service vehicles (e.g., delivery trucks or site visitors). Therefore, it was assumed that a total of 200 daily vehicle trips (100 entering and 100 exiting) would be generated by the PMEC.

The estimated 2012 traffic volumes (Exhibit 3-71 and Exhibit 3-72) serve as the baseline condition for examination of the effects of the PMEC. The distribution of operational traffic trips is expected to be the same as for construction trips: 60 percent of the trips would be to and from the south on I-5, primarily originating from the Vancouver area, and 40 percent of the trips would be to and from the north on I-5.

Exhibit 3-72
Estimated Future Traffic Volumes With PMEC, 2012

Location	Traffic Volumes	
	AM Peak (7:00 – 9:00 am)	PM Peak (4:00 – 6:00 pm)
W. Kalama River Rd – eastbound	65	202
W. Kalama River Rd – westbound	203	66
Tradewinds Rd. – northbound	40	20
Tradewinds Rd. – southbound	20	40

The peak-hour trip generation would be 60 vehicle trips per hour. The am peak hour would result in approximately 40 vehicles entering and 20 vehicles exiting, while the pm peak hour would be the reverse, with 40 vehicles exiting and 20 vehicles entering.

It is anticipated that most of the employees, delivery trucks, and site visitors to the PMEC would come from nearby areas via I-5. The interchange at West Kalama River Road would likely be used for 100 percent of the vehicle trips from the surrounding areas. These trips would originate from employee homes or truck origination points.

To estimate future traffic volumes, the potential PMEC-generated traffic volumes were distributed onto the surrounding roadway network in accordance with the percentages noted above. Peak-hour traffic volumes include the 2.5 percent traffic growth per year and the proposed project traffic volumes (a total of 60 vehicle trips) that were calculated, and are presented in Exhibit 3-72.

A peak-hour LOS analysis was completed for the intersection of West Kalama River Road and Tradewinds Road. The results show that the continued small level of traffic traveling through the intersection would cause little or no perceptible change to operations. As shown in Exhibit 3-73, the maximum change in average stopped delay would amount to less than 1 second for any vehicle turning movement. A low impact to roadway traffic would be anticipated as a result of PMEC operation.

Exhibit 3-73
Level of Service Summary

Unsignalized Intersection	Weekday Peak Hour Period	Existing Conditions		Projected 2012 Traffic: Without Project		Projected 2012 Traffic: With Project	
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Tradewinds Road Southbound Left Turn	am	9.8	A	10.7	B	11.2	B
	pm	9.8	A	10.4	B	10.9	B
W. Kalama River Rd Eastbound Left Turn	am	7.6	A	7.6	A	7.7	A
	pm	7.4	A	7.4	A	7.4	A

Delay = Average delay per vehicle

Low impacts also are anticipated at the I-5 ramp intersections along West Kalama River Road, due to the low projected traffic volumes generated by the project.

The PMEC would provide for needed parking of employees, visitors and deliveries at the plant site. Peak employee use is anticipated during shift overlap at the beginning and end of the day shift. Two stalls would typically accommodate visitors and deliveries. Not all deliveries would require a parking stall because deliveries would occur in different areas of the plant site. It is anticipated that there would be no impacts from unmet parking needs.

No use of local or regional airports would be required for PMEC operation; therefore, air transportation impacts are not anticipated.

Natural Gas Pipeline. There would be no traffic or transportation related impacts as a result of pipeline operation.

Railroad Spur. PMEC operations may require up to 150 train arrivals per year for coal deliveries. Counting the empty return moves, the new facility would increase train traffic by approximately six trains per week between the Port of Kalama and Vancouver, Washington. From a site operation standpoint, this amounts to one train arrival every two to three days.

As noted above, the current train activity is an average of 49 trains per day, with a practical capacity of 96 trains per day. An increase of one train per day is expected to have a low impact.

Currently the Applicant has not yet decided from where coal will be imported. As a result, it is not possible to discuss impacts to rail operations throughout the region or the state. However, in consideration of the proposed site improvements and future I-5 corridor projects, this level of rail spur activity is not anticipated to change BNSF rail operations or local roadway traffic patterns in and around the site.

River Transportation. PMEC operations may require up to 34 ship arrivals per year for coal deliveries. This activity of approximately three ships per month (a 2% increase) is anticipated to have low impacts on existing river transportation in and around the site.

3.9.4 Mitigation Measures

No Action Alternative

Mitigation Measures would not be required for the No Action Alternative.

Proposed Action

Impacts to transportation as a result of the proposed project would be low to moderate, and therefore less than significant. Features included in the design of the proposed project that would reduce impacts include:

- Construction contractors will prepare a traffic control plan in conjunction with County staff to mitigate any disruptions to local traffic circulation caused by construction of the pipeline.
- Energy Northwest's construction contractor would provide WSDOT-approved safety signs during the construction period warning vehicles traveling along West Kalama River Road and the I-5 interchange approach ramps of upcoming truck access points.

To the extent feasible, daily construction activity would be scheduled to avoid typical peak traffic periods, particularly for

construction of the natural gas pipeline along Hendrickson Drive south of West Kalama River Road.

In addition, Energy Northwest would promote rideshare and vanpool programs for construction workers, particularly during the 12-month peak construction period, to reduce vehicle trips.

3.9.5 Significant Unavoidable Adverse Impacts

No Action Alternative

There would be no significant unavoidable adverse impacts as a result of the No Action Alternative.

Proposed Action

No significant and unavoidable impacts to traffic and transportation are expected to result from the construction or operation of the proposed project.

3.10 Public Services and Utilities

3.10.1 Affected Environment

Public Services

Law Enforcement. Law enforcement agencies with a presence near the proposed PMEC site and gas pipeline route include the Cowlitz County Sheriff's Department, the City of Kalama Police Department, the WDFW, and the Washington State Patrol. The Port of Kalama has a contract with Pacific Northwest Security to provide security on Port property. The Cowlitz County Sheriff's Department would have jurisdiction over the PMEC site as it is within unincorporated Cowlitz County, while the City of Kalama Police Department would have jurisdiction over the proposed pipeline route within the City of Kalama.

The Cowlitz County Sheriff's Department has a total of 45 deputies including 24 patrol officers and four patrol sergeants. Two to five officers are on duty 24 hours per day, seven days a week. The City of Kalama Police Department has one police consultant, one sergeant, three officers, and one clerk.

Fire Protection and Emergency Services. The Cowlitz County Department of Emergency Management provides emergency management activities for Kalama and all unincorporated areas of Cowlitz County. Fire and emergency services to the PMEC site and Port of Kalama are provided by the Cowlitz County Fire District No. 5. Services are provided from three stations located near Kalama to a service area of 36 square miles and over 5,000 residents.

The staff at Cowlitz County Fire District No. 5 include approximately 26 volunteers, seven part-time firefighters/paramedics, three staff firefighters/emergency medical technicians, three staff firefighters/paramedics, one administrative secretary, one part-time administrative assistant, and one staff Chief. Specific services provided include fire control and prevention, public education, advanced life support and emergency medical services, vehicular rescue, marine fire control and rescue, and technical rescue.

Utilities

Electricity. Electrical service in the project area is provided by Cowlitz County PUD.

Natural Gas. Natural gas in the project area is provided by Cascade Natural Gas Corporation.

Water. The City of Kalama Public Works department provides potable water service, while the Port of Kalama provides process water. The Port holds three permits for water withdrawals from two existing wells and from two planned wells. Total permitted withdrawals are 10, 450 gpm instantaneous withdrawal.

The City is currently permitted for water withdrawals totaling 2,225 gpm. As the City's Ranney well is a groundwater well under the influence of surface water, it undergoes treatment through the City of Kalama filtration plant, which includes chlorination, fluoridation, and pH adjustment.

Solid Waste. The Cowlitz County Department of Public Works Solid Waste Division operates the nearest municipal solid waste landfill located in Longview, Washington.

Sewer and Wastewater Treatment. The City of Kalama and the Port of Kalama provide sewer and wastewater treatment services to the project area. The Port of Kalma's treatment plant is a 20,000 gpd package plant designed to treat sanitary wastes for tenants occupying the North Port area. The plant discharges treated wastewater from an outfall at the North Port pier into the Columbia River as permitted by NPDES Permit No. WA0040843.

3.10.2 Environmental Impacts of the No Action Alternative

If the No Action Alternative is selected the proposed facility and associated components would not be built. No impacts to public services and utilities are expected.

3.10.3 Environmental Impacts of the Proposed Action

Construction Impacts

Public Services. Cowlitz County Sheriff's Department resources are generally adequate to serve the PMEC during construction and operation, given that Pacific Northwest Security provides on-site security at the Port of Kalama. The Cowlitz County Sheriff's Department has the resources to serve the PMEC at the peak of construction (1,400 workers), when additional calls for service are likely (Bill Mahoney, personal communication).

Emergency medical services are provided near the proposed PMEC site by primary response ambulance units, Cowlitz General Hospital in Kelso, and Saint John Medical Center in Longview. First response ambulance units are operated through Cowlitz County Fire District No. 5. The primary responsibility of the fire department is to provide basic life support and to prepare the victims for transport. Second responders to the PMEC site in response to a call for ambulance service would be Cowlitz 2 Fire and Rescue in Kelso and American Medical Response.

Transportation routes and adjacent roadways may experience temporary congestion, particularly during construction of the natural gas pipeline along Hendrickson Drive south of West Kalama River Road. Roadway delays could increase emergency response times in affected areas. To the extent feasible, daily construction activity would be scheduled to avoid typical peak traffic periods. See Section 3.9 for additional information on traffic.

Utilities. No impacts to existing utilities are expected to occur during construction of the PMEC. Cowlitz County PUD will provide temporary power hookups.

Operation Impacts

Public Services. Essential public services would be provided by on-site security personnel (Pacific Northwest Security), Cowlitz County Fire District No. 5, and County and City police departments. Emergency response plans would be

implemented during operations to protect plant employees and structures in emergency situations.

A Fire Protection System, including a fire water system, fixed suppression systems, detection systems, and portable fire extinguishers will provide the required fire protection for the complex and will consist of a number of extinguishers, sprinklers, standpipes and fire hoses, and on-site water storage tank and pumps.

Before they are allowed to operate the facility, employees will be presented with a facility plan, including a Health and Safety Plan, and will receive training regarding the operating procedures and other requirements of safe operation of the plant. In addition, employees will receive annual refresher training, which will include testing of their understanding of the procedures.

Utilities. Either the Cowlitz County PUD or the BPA would construct 230 kV transmission lines, utilizing an existing corridor of approximately 12 miles to add the proposed project's generated energy to the electrical grid. These lines are expected to replace up to three existing 115-kV lines. The proposed project would create an additional natural gas pipeline in the project area.

Water. The PMEC would have an estimated peak instantaneous water demand of 6,650 gpm, or an annual average demand of 10,726 acre-feet per year. As the Ranney collector well will have the ability to supply 15 million gpd, it is anticipated that the Port would have sufficient capacity to meet the project's process water demands. A water conveyance pipeline would be installed from the well location, under the rail loop track, to various PMEC facilities (e.g., storage tanks and water treatment plant). See Section 3.3 for additional details on water supply and water use.

Potable water would be supplied by the City of Kalama in distribution lines that have already been installed for the site. Energy Northwest has discussed its potable water needs with the

City of Kalama and has received verbal assurances that the City will be able to meet the PMEC's potable water supply needs.

Sewer and Wastewater Treatment. It is anticipated that the PMEC would generate an average wastewater discharge of 1,315 gpm, or 1.89 million gpd. Sanitary waste discharge is expected to be approximately 1,200 gpd. This wastewater would flow to the Port of Kalama's wastewater treatment plant before being discharged through the Port's outfall located on the North Port pier.

The Port's 20,000-gpd treatment plant would have more than enough capacity to treat the PMEC's sanitary waste discharges in addition to its current treatment flows. However, it may need to add a diffuser port to the outfall to accommodate the PMEC's discharge and may need to increase the pipe size to handle the increased flow.

In addition, process wastewater would be discharged first to an on-site treatment plant if one is needed to comply with Washington State water quality standards for discharge to the Columbia River. This discharge, with or without onsite treatment, would be subject to an NPDES permit issued by EFSEC.

No other impacts to utilities are expected as a result of the project.

3.10.4 Mitigation Measures

No Action Alternative

No mitigation measures would be required for the No Action Alternative.

Proposed Action

In order to manage construction traffic on roadways affected by the project, a construction traffic management plan would be prepared. Mitigation measures to be identified in the plan to ensure access by emergency service providers would include: (1) advance notice of construction activities to emergency services and law enforcement agencies, and (2) stipulating detour routes and parking locations.

Communication with utility providers would occur prior to construction to coordinate the relocation of utilities within an alternative right-of-way if necessary. Construction would be scheduled to minimize or avoid potential service interruptions. Precautions would be taken to ensure that excavations do not damage underground utilities, including communications cables.

3.10.5 Significant Unavoidable Adverse Impacts

No Action Alternative

There would be no significant and unavoidable adverse impacts as a result of the No Action Alternative.

Proposed Action

As discussed above, significant and unavoidable adverse impacts involving public services and utilities are not expected.