3.2 AIR QUALITY

This section describes the analysis conducted to evaluate the potential air quality impacts of the proposed Plymouth Generating Facility (PGF). The section discusses existing air quality, applicable air quality regulations, anticipated air pollutant emissions, the method of analysis, and results of the air quality assessment. An evaluation of the air quality implications of the PGF is also included in the project's Notice of Construction (NOC) air permit application that was submitted to the Benton Clean Air Authority (BCAA) in April 2002. On May 25, the BCAA deemed the air permit application complete and is expected to issue a draft air permit in 60 days, subject to completion of the State Environmental Policy Act (SEPA) environmental review process.

3.2.1 AFFECTED ENVIRONMENT

3.2.1.1 Regulatory Overview

New industrial sources of air pollution must receive an air quality permit prior to operation. Power plants that emit more than 100 tons per year of any regulated air pollutant are deemed a "major source" and must obtain a Prevention of Significant Deterioration (PSD) permit. Because the PGF would emit less than 100 tons per year of each regulated pollutant, it would be deemed a minor source.

Washington state law requires minor sources to obtain an NOC air quality permit. The NOC application must provide a description of the facility and an inventory of pollutant emissions and controls. The reviewing agency considers whether Best Available Control Technology (BACT) has been employed and evaluates ambient concentrations resulting from these emissions to ensure compliance with ambient air quality standards. A permit cannot be granted unless the agency determines the project (1) would meet applicable state and federal emission limits; (2) would employ BACT; and (3) would not cause or contribute to violations of ambient air quality standards or toxic air pollutant increments.

A key component of the state NOC permit process is the identification of emission control technologies through the BACT analysis. This analysis identifies pollutant-specific alternatives for emission control, and evaluates the advantages and disadvantages of each alternative. The determination of which control scenario best protects ambient air quality is made on a case-by-case basis and considers the economic, energy, and environmental costs.

A review of permits in Washington and nationwide indicates BACT for projects similar to the PGF is the use of selective catalytic reduction (SCR) to control oxides of nitrogen (NO_x), catalytic oxidation to control carbon monoxide (CO) and volatile organic compounds (VOCs), and the use of natural gas and proper combustion to minimize emissions of sulfur dioxide (SO_2), particulate matter (PM_{10}), and toxic air pollutants. The catalytic oxidation unit Plymouth Energy proposes to employ to reduce CO emissions would also reduce emissions of some toxic air pollutants.

General standards for maximum emissions from air pollution sources in Washington are outlined in the Washington Administrative Code (WAC) Chapter 173 (400-040). This section limits visible emissions to 20 percent opacity except for 3 minutes per hour; controls nuisance particulate fallout, fugitive dust, and odors; and limits SO_2 emissions to no more than 1,000 ppm (hourly average, 7 percent oxygen [O_2], dry basis). WAC 173-400-050 identifies emission standards for combustion and incinerator units, and limits particulate matter emissions to 0.1 grains per dry standard cubic foot at 7 percent O_2. In practice, however, the requirement to employ BACT would result in emission rates well below these general requirements.

In addition to the NOC, Plymouth Energy will be required to obtain an Acid Rain Permit (as required under the Acid Rain Program [40 CFR 72] and a Title V air operating permit (as required under WAC 173-401-300). Neither the Acid Rain Permit nor the Title V permit are required for the PGF to commence construction. An application under the Acid Rain Program must be filed 24 months prior to the initial operation of the facility. Plymouth Energy filed its acid rain permit application with the BCAA in June 2002. The Title V permit application must be filed within 12 months after the project begins operation.

3.2.1.2 Background Air Quality

Air quality is typically characterized by comparing measured concentrations of certain compounds with the state or national ambient (outdoor) air quality standards (WAAQS or NAAQS). The key pollutants are known as "criteria" pollutants, and include nitrogen dioxide (NO_2), CO, SO_2, PM_{10}, lead, and ozone (see Table 3.2-1). Some of the criteria pollutants are subject to both "primary" and "secondary" federal standards. 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.

Air quality regulatory agencies such as the Washington State Department of Ecology (Ecology), Oregon Department of Environmental Quality, and BCAA maintain air quality monitoring stations in locations where there may be air quality problems. Often, such stations are located in or near urban areas or close to specific large air pollution sources. There are no air quality monitoring stations in the immediate vicinity of the PGF site. The nearest monitoring stations are in Pendleton, Oregon and Kennewick, Washington but these are located too far away to be representative of conditions in Plymouth.

Ecology and the U.S. Environmental Protection Agency (U.S. EPA) designate regions as being "attainment" or "nonattainment" areas for particular criteria air pollutants based on monitoring information collected over a period of years. Attainment status is therefore a measure of whether air quality in an area complies with the health-based ambient air quality standards. Benton County, including the PGF site area, is in attainment for all air pollutants except for a very small area near Wallula.

BCAA staff indicate that PM_{10} measurements from regional monitoring stations occasionally indicate violations of the 24-hour PM_{10} standard. These violations are attributed to windblown dust. Except for these periodic dust events, existing air quality in the Plymouth area is believed to be good (BCAA 2002).

Table 3.2-1
Ambient Air Quality Standards

Pollutant	National Primary	National Secondary	State of Wash.
Total Suspended Particulate			
Annual Geo. Mean	N.A.	N.A.	60
24-hour Average			150
Inhalable Particulate (PM_{10})			
Annual Arith. Mean	50	50	50
24-hour Average	150	150	150
Sulfur Dioxide (SO_2)			
Annual Average	80		50
24-hour Average	365		260
3-hour Average [a]		300	
1-hour Average			1,050[b]
Carbon Monoxide (CO)			
8-hour Average [a]	10,000	N.A.	10,000
1-hour Average [a]	40,000		40,000
Ozone (O_3)			
1-hour Average	235	235	235
Nitrogen Dioxide (NO_2)			
Annual Average	100	100	100
Lead (Pb)			
Quarterly Average	1.5	1.5	1.5

Notes:

N.A. = standard not established
All concentrations in micrograms per cubic meter
[a] Not to be exceeded on more than 1 day per calendar year as determined under the conditions of WAC 173-475
[b] 655 micrograms per cubic meter not to be exceeded more than twice in 7 days

In addition to criteria pollutants, Washington also regulates more than 500 additional air pollutants under its toxic air pollutant rules. This program addresses only the contribution from industrial sources such as PGF, and is discussed in greater detail later in this section. There is relatively little monitoring of ambient concentrations of toxic air pollutants.

Local meteorology plays a significant role in air quality because winds tend to disperse air pollutants. Figure 3.2-1 displays a wind rose that summarizes 5 years of wind data from the Pendleton Airport. The wind rose identifies how frequently winds blow from a certain direction, and the average wind speed associated with each wind direction. Figure 3.2-1 indicates that the predominant winds are from the west. Winds from the south-southeast and southeast are also common but much lower in speed.

3.2.2 ENVIRONMENTAL CONSEQUENCES

3.2.2.1 Methodology

3.2.2.1.1 Calculation of Air Quality Impacts

As noted above, wind disperses emissions from industrial facilities. To quantify how much dispersion occurs (and thus the residual concentration of air pollutants), U.S. EPA has developed a series of computer models tailored to various types of emission sources and topographic settings. The dispersion modeling techniques employed in the analysis of PGF followed a basic set of U.S. EPA regulatory guidelines (40 CFR Part 51, Appendix W). The guidelines include recommendations for model selection, data preparation, and model application, but allow flexibility on a case-by-case basis.

A U.S. EPA-approved dispersion model was used to calculate ambient pollutant concentrations attributable to emissions from PGF at specific locations referred to as "receptors." Receptor grids of varying spacing were used (Figure 3.2-2). In a coarse grid, receptors were spaced 1,000 meters (3,280 feet) apart throughout the 19 mile by 26 mile modeling region. Closer to the site, a grid of receptors spaced 500 meters (1,640 feet) apart was established in a smaller 12 mile by 12 mile area. Still closer to the site, a close grid of receptors with a spacing of 250 meters (820 feet) was used to cover an area 6 miles by 6 miles, centered on the PGF. Finally, a center array of receptors spaced 100 meters (328 feet) apart was used to cover a 1.2 square mile area centered on the facility.

Concentrations predicted by the model were then characterized by comparing them with Significant Impact Levels (SILs), ambient air quality standards, and Ecology's Acceptable Source Impact Levels (ASILs) for toxic pollutants to evaluate potential air quality impacts.

3.2.2.1.2 Impact Evaluation Criteria

Ambient air quality standards have been established by both the federal government (U.S. EPA) and the State of Washington. These standards are designed to be protective of human health and, at a minimum, a proposed new source such as the PGF must demonstrate compliance with the ambient air quality standards. In areas where representative air quality monitoring data are readily available, compliance with the standards is determined by adding computer model-predicted pollutant concentrations to measured existing pollutant concentrations. The total concentrations (project plus existing) must be less than the ambient air quality standards. If predicted total concentrations exceed the ambient air quality standards, a significant adverse environmental impact would likely result.

In areas that are known to generally be in attainment of the national air quality standards, such as Benton County, but for which local ambient air quality data are unavailable, a screening approach for assessing air quality impacts is used. This screening approach, which is conservative (i.e., over predictive of potential impacts), evaluates the air quality impacts of the project by itself. If the impacts are found to be at a very low level, the project could not reasonably cause an impact to air quality independent of what the existing air quality may be. As noted in Section 3.2.1.2, no ambient air quality data are available for the local area, so the screening method was used to determine air quality impacts from the PGF.

To employ the screening method, a criterion was established for the level of project air quality impact below which the project would have no reasonable contribution to degradation of local or regional air quality. The criterion used was the Significant Impact Level (SIL), which is a significance criterion established in the U.S. EPA PSD permitting process. New sources

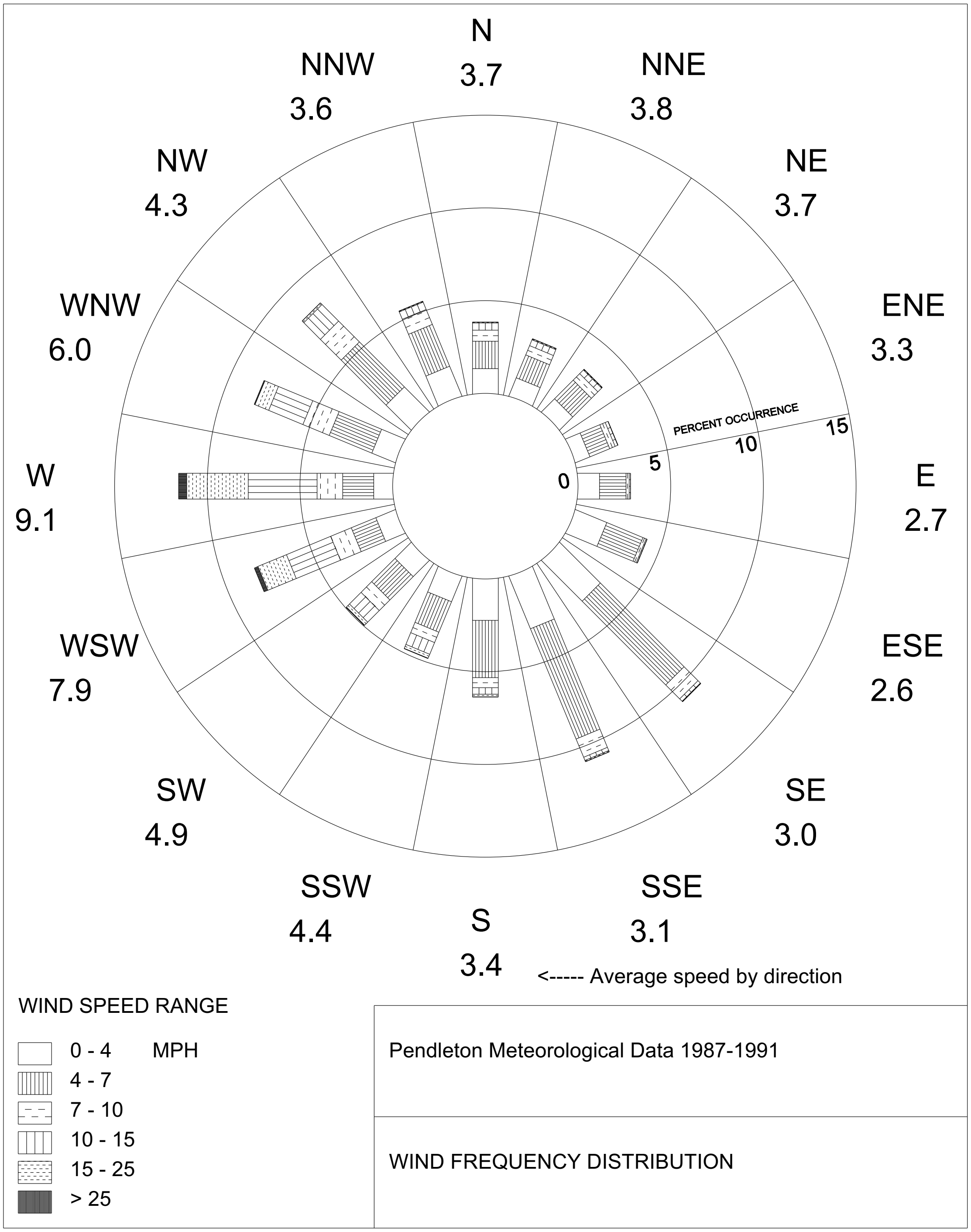
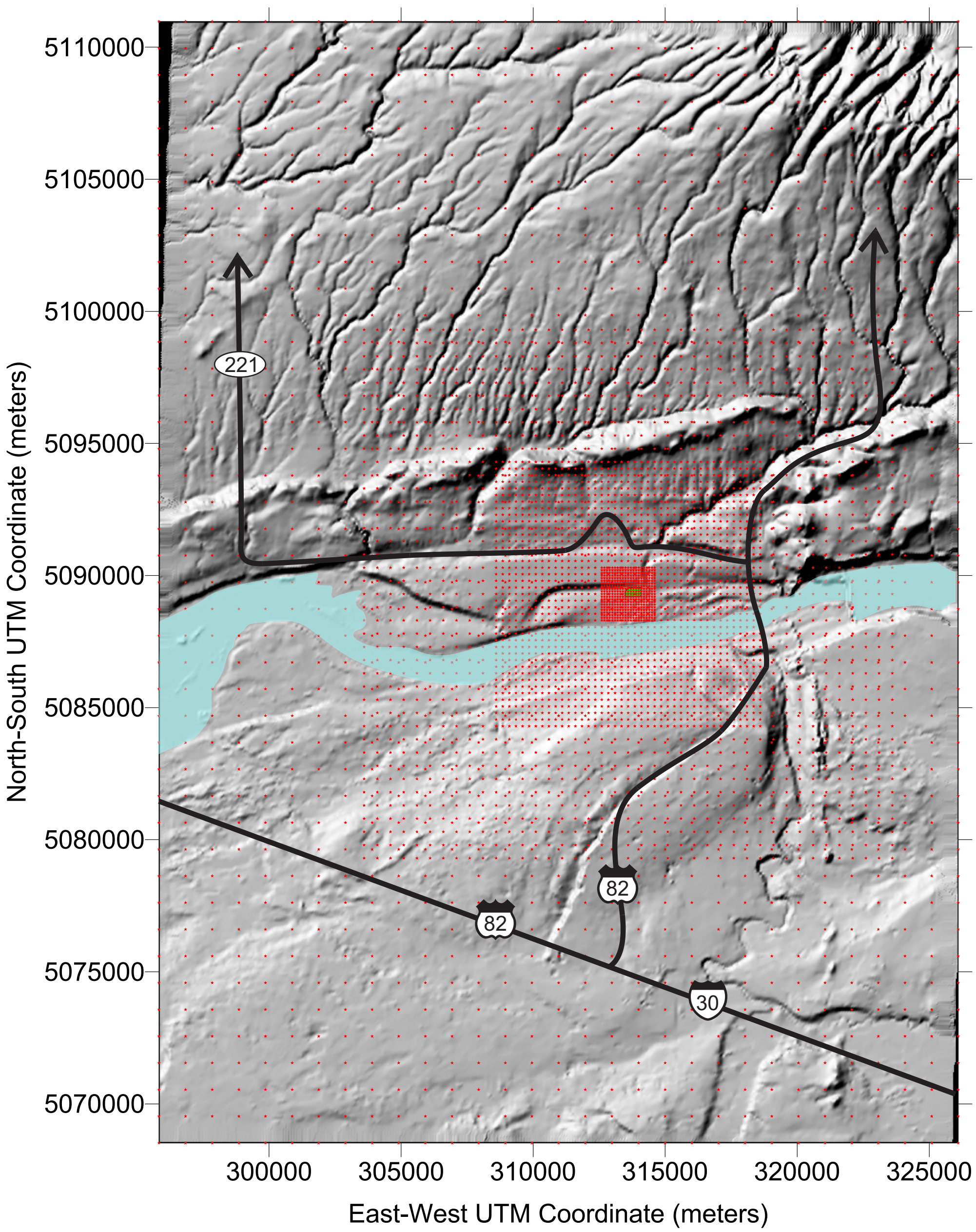


Figure 3.2-1

Wind Direction and Speed for 1987-1991 at Pendleton Airport

Figure 3.2-1 (Continued)



Source: MFG

Figure 3.2-2
Receptor Locations

URS

Plymouth Generating Facility
Plymouth, Washington

Figure 3.2-2 (Continued)

(typically sources larger than the PGF) do not need to consider background air quality or other increment-consuming air pollution sources if calculated concentrations from the project are found to be less than the SILs. Thus, the SILs for each criteria pollutant were used as a threshold criteria for determining if the PGF would cause any significant air quality impacts[1].

In addition to criteria pollutants, Washington regulates emissions of toxic and known carcinogenic air pollutants from new and modified air pollution sources. This regulation establishes acceptable outdoor exposure levels (ASILs) for each of more than 500 substances. Ecology conservatively set the ASILs to protect human health. For each "known, probable, and potential" human carcinogenic pollutant (i.e., the Class A toxic air pollutants), the ASIL limits the risk of an additional cancer case to one in a million. For others (i.e., Class B toxic air pollutants), the ASILs 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 toxic air pollutant. Most Class A toxic air pollutant ASILs are based on annual average concentrations. ASIL compliance for Class B pollutants is based on 24-hour average concentrations.

Washington requires permit applications to include dispersion modeling of toxic air pollutant emissions and include a comparison of calculated concentrations with the ASILs if anticipated emissions exceed certain Small Quantity Emission Rates. If calculated concentrations 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 toxic emissions from the source are sufficiently low to protect human health. Similar to the SILs, concentrations below the ASILs indicate that emissions from the source do not have a significant potential for adverse health effects from these chemicals.

Although the highest pollutant concentrations would occur relatively near the PGF plant site, winds carry pollutants at increasingly dilute concentrations for considerable distances. Over the last decade or two, there has been growing interest in visibility in national parks and wilderness areas. Several of the pollutants emitted by industrial facilities such as power plants (including PGF) contribute to visibility degradation. The potential for visibility degradation by the PGF was considered by using dispersion models to evaluate emissions of NO_x, SO_2, PM_{10}, and ammonia. This evaluation is briefly mentioned in the air quality impacts subsection, and described in detail in Appendix B.

As discussed below, emissions from the plant exhaust stack would vary with temperature and operating load. In order to provide a worst-case assessment, the maximum emission rates were evaluated using the stack exhaust conditions representative of the poorest dispersion conditions. In addition to considering the worst-case PGF conditions, only the maximum predicted concentrations from 5 years of hourly wind conditions are presented for comparison with SILs,

[1] The U.S. EPA does not consider concentrations (air quality impacts) below the SILs to be significant, and consideration of background air quality is not required when assessing compliance with ambient air quality standards; Ecology concurs with this approach. While the PSD regulation does not apply to the PGF, the SILs can be applied to place the significance of predicted concentrations in context. Consistent with U.S. EPA and Ecology permitting policy, predicted criteria pollutant concentrations that are less than the SILs would be assumed to have no significant adverse air quality impact.

ambient air quality standards, and ASILs. Because typical emissions are lower than those modeled, stack exhaust characteristics are typically much better than those modeled, and the meteorological conditions leading to the maximum values are infrequent, ambient air quality impacts would virtually always be lower than those identified in the ambient air quality analysis.

3.2.2.2 No Action Alternative

Under the No Action Alternative, the PGF would not be constructed. Existing air quality would remain good.

3.2.2.3 Proposed Action

3.2.2.3.1 Plant Site

Construction

Construction of the facility would span approximately 24 months. An average of 130 workers is expected during the construction phase. During the peak period, as many as 222 workers may be needed. Construction would include grading; excavation and earthmoving; operation of vehicles, cranes, and other engine equipment; and application of paints and other materials. Air emissions resulting from these operations would include engine exhaust and VOCs from paint.

Dust would be generated during the initial excavation and grading phase but would be controlled by watering as necessary to reduce impacts to neighboring properties. As part of the construction program, Plymouth Energy would prepare and submit a dust control plan to the BCAA. This plan would be implemented during construction to minimize formation of fugitive dust.

There would also be emissions from engine-powered construction equipment. However, there would be relatively few such engines involved, and the significant distances to offsite sensitive receptors would preclude the potential for significant offsite air quality impacts related to engine emissions.

Operation

Pollutant Emissions

The use of a combustion turbine with a heat recovery steam generator (HRSG) to generate electricity has evolved into an efficient means of generating electricity. With more electricity being generated with less fuel than with older technologies, less air pollution is generated per megawatt hour. Natural gas has been selected as the sole operating fuel for the PGF combustion turbine (CT) in part to minimize air pollution emissions. Natural gas combustion results in lower emissions of NO_x, SO_2, CO, PM_{10}, and VOCs than combustion of other fossil fuels.

The determination of what constitutes BACT at the time of the final NOC permit review would limit PGF emissions. The proposed level of emission control for the PGF is consistent with the lowest emission rates assigned in other air permits approved elsewhere in the U.S.

At present, SCR installed in the HRSG is the most commonly used and effective means of controlling NO_x for combined cycle combustion turbine projects. In Washington, all combined cycle combustion turbine projects permitted in the last 5 years have also been required to install oxidation catalysts to control CO. Oxidation catalysts also control VOCs and reduce emissions of formaldehyde by as much as 90 percent.

There are no controls available to control emissions of PM_{10} or SO_2 from combustion-turbine power plants. Emissions of PM_{10}, toxic air pollutants, and sulfur dioxide would be minimized by the exclusive use of natural gas fuel for the combustion turbine and optimizing combustion. Table 3.2-2 summarizes the proposed BACT for PGF.

Table 3.2-2
Summary of Emission Controls Performance

Pollutant	Best Available Control	Emission Rate
Nitrogen Dioxide (NO_2)	Dry low NO_x combustor with SCR	2 ppmvd @ 15% O_2, 3-hour average
Sulfur Dioxide (SO_2)	Natural gas	Fuel dependent
Carbon Monoxide (CO)	Turbine design, proper combustion, catalytic oxidation	2 ppmvd @15% O_2, 1-hour average 10 ppmvd @15% O_2 at partial load
Particulate Matter (PM_{10})	Natural gas fuel, proper combustion	0.01 gr/dscf
Volatile Organic Compounds	Turbine Design, combustion control, catalytic oxidation	10 ppmvd @15% O_2
Toxic Air Pollutants	Natural gas fuel, proper combustion, catalytic oxidation	

Notes:
ppmvd = parts per million by volume on a dry basis
gr/dscf = grams per dry standard cubic foot

Table 3.2-3 summarizes pollutant emission rates for the following three plant operating scenarios based on vendor information and proposed BACT limits.

- **Partial load –** A 60 percent load is considered to be the minimum efficient operating rate. Except for CO and VOC, emissions are lower at partial load because the fuel rate and combustion temperatures are lower. Although most emissions from the partially loaded turbines are lower than base load emissions, this scenario was considered in the modeling analysis because there is less plume rise, and therefore, less dispersion of emissions from the stack. There is no duct firing at partial load. Plymouth Energy does not expect to operate PGF at partial load often because it is not as economical as base load operation.

- **Base load –** The base load case represents normal operating conditions without supplemental duct firing.

- **Base load with duct firing –** This case provides for maximum power production. The gas turbine is assumed to operate at base load when the duct burners are employed.

Actual emission rates vary with time and averaging period because of variations in turbine firing rate, ambient temperature, and relative humidity. The short-term pound per hour (lb/hr) emission rates presented in Table 3.2-3 represent maximum anticipated emissions, considering calculations based on ambient temperatures ranging from 20º to 90º Fahrenheit (F), and significantly overstate typical emissions. While actual ambient temperatures may exceed this range, they would do so only for a few hours of the year and would not increase either the actual short-term or annual emission.

Table 3.2-3
Power Plant Emissions

	Maximum Short-Term Emissions (lb/hr)				Annual Emissions (Tons Per Year)
Criteria Pollutant	Partial Load	Base Load	Peak Load	Maximum (Proposed Permit Limits)	(Proposed Permit Limits)
NO_2	10.0	14.9	18.4	18.4	81
CO	30.4	9.1	11.2	30.4	99
SO_2	15.0	22.4	26.6	26.6	38
PM_{10}	10	15	20	20	88
VOC(as CH4)	5.1	3.5	17.5	17.5	77

CO emissions from a combustion turbine are much higher at partial load than at base load. The partial load CO emission rate in Table 3.2-3 is based on the assumption that the oxidation catalyst would provide the same level of control (80 percent) at partial load as at base load.

Total annual NO_2, PM_{10}, and VOC emissions were calculated by assuming the worst-case short-term emission rates (considering operating load and ambient temperature) occur every hour of the year. This is a very conservative assumption because all plants must shut down for occasional maintenance, plants tend to emit pollutants at levels below the emission limits, and the worst-case short-term NO_2 and VOC emissions occur only during low temperatures and maximum operating load.

Although startup conditions last only a couple hours, CO emissions are much higher during startup than during typical operation. Annual emissions from constant base load operation would total about 44 tons per year, but Plymouth Energy is requesting a permit condition allowing up to 99 tons per year of CO emissions to allow for the higher emissions that occur during startup. Plymouth Energy would install a continuous emission monitoring system (CEMS) to ensure that the rolling 12-month total CO emissions do not exceed 99 tons per year (tpy). Note, however, that the impact assessment that addresses 1-hour and 8-hour ambient air quality standards is still based on the higher short-term CO/hr emission rate of 30.4 lb associated with partial load operation. There would be no adverse impact resulting from the proposed CO emission rate, as discussed further in this section under Dispersion Modeling Results.

In addition to the combustion turbine and duct burners, the project would include a diesel-fueled 900-kilowatt (kW) emergency generator and a 110-horsepower (hp) diesel-fueled emergency firewater pump. With the exception of a few hours of testing each month, neither would operate unless there were an emergency. Two mechanical draft cooling towers would also be utilized.

Because of naturally occurring dissolved solids in the water supply, the cooling tower mist would include small amounts of particulate matter (approximately 0.9 lb PM_{10}/hr).

Most of the toxic air pollutant emissions for the turbine were based on AP-42 Section 3.1 Stationary Gas Turbines (U.S. EPA 2000). Emissions were calculated for those pollutants that were both listed in the AP-42 database and had test results above the detection limits of the stack test methods employed.

Nitric oxide from the combustion sources and ammonia "slip" from the SCR would account for most of the toxic air pollutant emissions. To estimate potential nitric oxide (NO) concentrations, it was assumed that 100 percent of the NO_x emitted by PGF would be NO. To minimize ammonia emissions, Plymouth Energy has committed to an ammonia slip of 5 ppm, which is a significant improvement over the 10-ppm industry norm.

Toxic air pollutant emissions were also calculated for the standby diesel generator and diesel fire water pump, based on anticipated power ratings and AP-42 emission factors. Although actual testing requirements are much less stringent, the emission calculations and modeling analysis were based on the assumption that each engine would operate 3 hours per week.

Toxic air pollutant emission factors and emission rates are summarized in Table 3.2-4. The emission rates in Table 3.2-4 represent the combined emissions of the combustion turbine, duct burners, standby diesel generator, and diesel fire water pump. Table 3.2-4 also identifies Small Quantity Emission Rates prescribed by WAC 173-460. If a source emits a toxic air pollutant at a rate exceeding the Small Quantity Emission Rate, that pollutant emission rate must be assessed in a dispersion modeling analysis. The predicted ambient concentration of that pollutant is then compared with an ASIL. Table 3.2-4 indicates that 15 of the 39 air pollutants emitted by the HRSG or diesel engines would exceed the Small Quantity Emission Rate. Consequently, these 15 toxic air pollutants were evaluated with dispersion models.

Dispersion Modeling

To evaluate the potential ambient air pollutant concentrations (i.e., impacts on air quality) attributable to the PGF, the worst-case short-term pollutant emission rates were selected and input to the dispersion modeling analysis (see Table 3.2-3). These are the emission rates that Plymouth Energy has proposed for its air permit as short-term emission limits, and these rates apply to averaging periods up to 24 hours.

In addition to the combustion turbine and duct burners, PGF would maintain a 900-kW emergency generator that would provide onsite power in the event that the PGF was not operating and the local public power distribution system was unavailable. This is expected to be an infrequent and short-term occurrence. However, the diesel engine that powers the generator would be tested for at least 30 minutes per month. In the modeling, it was conservatively assumed that the engine would operate 3 hours per week.

Table 3.2-4
Toxic Air Pollutant Emission Factors and Rates

Compound	Averaging Period	Facility-Wide Emission Rate		SQ Emission Rate		Model?
		lb/yr [a]	lb/hr	lb/yr	lb/hr	
1,3-Butadiene	Annual	7.8	8.9E-04	0.5	N/A	Yes
Acetaldehyde	Annual	723.7	0.08	50	N/A	Yes
Acrolein	24-hour	115.8	1.3E-02	175	0.0	
Ammonia	24-hour	148,975	17	17,500	2	Yes
Arsenic	Annual	0.6	7.0E-05	0.0	N/A	Yes
Barium	24-hour	13.6	1.5E-03	175	0.0	
Benz(a)anthracene[b]	Annual	5.5E-03	6.3E-07	TBD	TBD	
Benzene	Annual	226.3	3.3E-02	20	N/A	Yes
Benzo(a)pyrene [b]	Annual	3.7E-03	4.2E-07	0.0	N/A	Yes
Benzo[b]fluoranthene [b]	Annual	5.5E-03	6.3E-07	TBD	TBD	
Benzo(k)fluoranthene [b]	Annual	5.5E-03	6.3E-07	TBD	TBD	
Beryllium	Annual	3.7E-02	4.2E-06	0.0	N/A	Yes
Butane	24-hour	6,467.5	0.74	43,748	5	
Cadmium	Annual	3.4	3.9E-04	0.0	N/A	Yes
Chromium III[c]	24-hour	2.2	2.5E-04	175	0.0	
Chromium VI[c]	Annual	2.2	2.5E-04	0.0	N/A	Yes
Chrysene [b]	N/A	5.5E-03	6.3E-07	N/A	N/A	
Cobalt	24-hour	0.3	3.0E-05	175	0.0	
Copper	24-hour	2.6	3.0E-04	175	0.0	
Dibenzo(a,h)anthracene [b]	Annual	3.7E-03	4.2E-07	TBD	TBD	
Dichlorobenzene	24-hour	3.7	4.2E-04	43,748	5	
Ethylbenzene	24-hour	578.9	0.07	43,748	5	
Formaldehyde	Annual	1,3074.7	1.49	20	N/A	Yes
Hexane	24-hour	5,543.5	0.63	22,750	3	
Indeno(1,2,3-cd)pyrene [b]	Annual	5.5E-03	6.3E-07	TBD	TBD	
Lead	24-hour	1.5	1.8E-04	0.0	0.0	Yes
Manganese	24-hour	1.2	1.3E-04	175	0.0	
Mercury	24-hour	0.8	9.1E-05	175	0.0	
Molybdenum	24-hour	3.4	3.9E-04	1,750	0.2	
Naphthalene	24-hour	25.9	4.2E-03	22,750	3	
Nickel	N/A	6.5	7.4E-04	N/A	N/A	
Nitric Oxide	24-hour	168,724.1	38.90	17,500	2	Yes
PAH [d]	Annual	39.9	4.6E-03	0.0	N/A	Yes
Pentane	24-hour	8,007.3	0.91	43,748	5	
Propylene Oxide	Annual	524.6	0.06	50	N/A	Yes
Selenium	24-hour	0.1	8.4E-06	175	0.0	
Sulfuric Acid	24-hour	15,399	1.76	175	0.0	Yes
Toluene	24-hour	2,363.1	0.27	43,748	5	
Xylenes	24-hour	1,158.4	0.13	43,748	5	

[a] Based on 8,760 hours of operation per year for the combustion turbine and duct burner and 156 hours of operation per year for the diesel generators.
[b] Included in polyaromatic hydrocarbon (PAH) emission factor, does not need to be modeled individually per WAC 173-460-050(c).
[c] AP-42 provides a chromium emission factor for natural gas-fired external combustion, but does not include guidance for partitioning emissions between the carcinogenic chromium VI (hexavalent chromium) and the chromium III (trivalent chromium). In the EPA's Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units – Final Report to Congress (EPA-453/R-98-004a), chromium emissions from natural gas-fired units are not included. However, data on speciation of chromium were available from 11 coal- and oil-fired test sites. From these limited data, EPA estimated that the average chromium VI from the coal-fired utilities was 11 percent, and the average from oil-fired utilities was 18 percent. It is conservatively assumed 50 percent of the chromium emissions are chromium VI.
[d] Emission factor calculated per WAC 173-460-050(c).

An emergency firewater pump would also be maintained in the event of a fire occurring at the facility. The firewater pump would be powered by a 110-hp diesel engine, which would be tested for at least 30 minutes per week. In the modeling, it was conservatively assumed the engine would operate 3 hours per week.

Annual average pollutant concentrations attributable to the PGF were determined by analyzing the proposed annual emission limits (see Table 3.2-3). The analysis also assumed that the combustion turbine would operate every hour of the year (8,760 hours).

To ensure that the worst-case impacts were identified, stack temperature and exit velocity conditions representative of partial load conditions combined with maximum emission rates were used. These assumptions maximize potential impacts by minimizing the anticipated dispersion, thereby overestimating the facility's impacts.

Based on the recommendation of the BCAA (BCAA 2002), meteorological data for the dispersion modeling were taken from Pendleton Airport, located approximately 25 miles to the east-southeast of the plant site. A full 5-year data set from Pendleton, for the years 1987 through 1991, was used in the analysis.

Dispersion Modeling Results

Predicted criteria pollutant concentrations are compared to ambient air quality standards and SILs in Table 3.2-5. Table 3.2-5 indicates that concentrations for all pollutants and averaging periods were lower than the SILs, even with the compounding conservative assumptions used in the analysis. Consequently, concentrations attributable to the PGF would be insignificant with respect to ambient air quality standards; therefore, no significant adverse air quality impact would be expected.

Table 3.2-5
Maximum Criteria Pollutant Predictions

Pollutant	Averaging Time	Maximum PGF Concentration	Ambient Air Quality Standard	Significant Impact Level (SIL)
NO_2	Annual	0.88	100	1
SO_2	1-hour	28.26	1,050	NA
	3 hour	17.14	1,300	25
	24 hour	3.46	262	5
	Annual	0.17	52	1
CO	1 hour	116.53	40,000	2,000
	8 hour	13.67	10,000	500
PM_{10}	24 hour	2.63	150	5
	Annual	0.39	50	1

Notes:
All concentrations in micrograms per cubic meter (µg/m^3).
NA = not applicable

Maximum 24-hour and annual toxic air pollutant concentrations attributable to the PGF are compared to Ecology ASILs in Table 3.2-6. The maximum predicted concentration of each pollutant is less than the applicable Ecology ASILs, implying that toxic air pollutant emissions from PGF would have an insignificant potential for adverse health effects. Consequently, no significant adverse impact from toxic air pollutant emissions is anticipated.

Table 3.2-6
Maximum 24-hour and Annual Toxic Air Pollutant Concentrations

Compound	Concentrations Attributable to Each Source (ug/m3)			Combined Concentration (µg/m3)	ASIL (µg/m3)	Over ASIL?
	HRSG Stack	Standby Generator	Fire Pump Generator			
1,3-Butadiene	1.7E-05	0	0	0.00002	0.0036	No
Acetaldehyde	1.6E-03	5.7E-06	4.6E-06	0.002	0.45	No
Ammonia	2.2	0	0	2.2	100	No
Arsenic	1.4E-06	0	0	0.000001	0.00023	No
Benzene	4.9E-04	1.8E-04	1.4E-04	0.0008	0.12	No
Benzo(a)pyrene	8.2E-09	0	0	0.00000001	0.00048	No
Beryllium	8.2E-08	0	0	0.0000001	0.00042	No
Cadmium	7.5E-06	0	0	0.000007	0.00056	No
Chromium VI	4.8E-06	0	0	0.000005	0.000083	No
Formaldehyde	2.9E-02	1.8E-05	1.4E-05	0.03	0.077	No
Lead	3.4E-06	0	0	0.000003	0.5	No
Nickle	1.4E-05	0	0	.0000014	0.0021	No
Nitric Oxide	2.4	6.7	5.1	14	100	No
PAH	8.8E-05	1.0E-06	8.1E-07	0.00009	0.00048	No
Propylene Oxide	1.2E-03	0	0	0.001	.27	No
Sulfuric Acid	2.25E-01	0	0	0.2	3.3	No

3.2.2.3.2 Transmission Interconnection

Construction

Construction of the proposed transmission interconnection would occur in a corridor extending north of the plant site over uninhabited property to the Bonneville Power Administration (BPA) transmission line corridor. The corridor is more than 0.36 mile from the nearest offsite residence. Because of the limited duration and limited intensity of activity associated with transmission interconnection construction and the significant distance to the nearest offsite residential receivers, no significant air quality impact related to transmission line construction is anticipated.

Operation

There would be no air quality impacts associated with the operation of the transmission interconnection because transmission lines have no measurable air emissions.

3.2.2.3.3 Access Road

Construction

The proposed access road would extend from Plymouth Industrial Road, which currently accesses the AgriNorthwest grain facility. From the AgriNorthwest grain facility to the plant site, the new access road would traverse agricultural and undeveloped properties to the northeast corner of the plant site. Grading of the road extension would require heavy-duty mobile equipment (such as a bulldozer, a scraper, and dump trucks). In addition to engine emissions, construction of the access road would generate dust during the grading phase. Paving the road with asphaltic concrete would also require heavy-duty mobile equipment, and would result in odorous hydrocarbon emissions during the paving operation.

The offsite residence nearest to the access road corridor is more than 0.36 mile away. The short-term nature of construction and the large distances between the access road corridor and the nearest offsite residential receivers would serve to minimize potential dust and odor impacts from the access road construction. Therefore, no significant air quality impact is anticipated.

Operation

The proposed access road would also be used during PGF operation. Small volumes of passenger vehicles and occasional trucks would use this road. The 0.36-mile distance to the nearest offsite residential property, coupled with the light traffic volumes, would result in negligible vehicle exhaust concentrations at neighboring properties. No significant air quality impact from vehicles traveling the access road is anticipated.

3.2.2.4 Alternate 230-kV Transmission Interconnection

Impacts attributable to the alternate 230-kV transmission interconnection would be the same as the proposed transmission interconnection because the proposed 500-kV and the 230-kV lines are located in the same physical location.

3.2.2.5 Alternate Benton PUD/BPA Transmission Interconnection

3.2.2.5.1 Construction

Construction of the alternate Benton PUD/BPA transmission interconnection would occur near the existing Benton Public Utility District (PUD) transmission line adjacent to Christy Road. Construction of the interconnection would involve improving the existing line by installing new towers and restringing the line. This would involve minimal construction activities over a limited amount of time. Because of the limited duration and limited intensity of activity associated with the alternate Benton PUD/BPA transmission interconnection construction and the significant distance to the nearest offsite residential receivers, no significant air quality impacts are anticipated.

3.2.2.5.2 Operation

There would be no air quality impacts associated with the operation of the alternate Benton PUD/BPA transmission interconnection.

3.2.2.6 Access Alternative

3.2.2.6.1 Alternate Construction Access Road

The alternate construction access road would follow Christy Road from SR 14 and veer from Christy Road onto private agricultural property prior to Christy Road's intersection with the Burlington Northern Santa Fe (BNSF) railroad tracks. The access road would then follow the perimeter of the Plymouth Farm property, adjacent to the Emmanuel Orchards property. The alternate construction access road would most affect persons living on or working nearest the western perimeter of the Emmanuel Orchards property. Depending on wind direction, dust generated from road grading may blow toward the orchard. However, the grading phase would be limited in duration and water would be applied as needed to minimize dust impacts.

3.2.2.6.2 Alternate Operation Access Road

The alternate operation access road would be Christy Road to the access road currently used by employees of the Williams Northwest Gas Pipeline Company (Williams Co.) compressor station. Only small volumes of passenger vehicles and occasional trucks would use this operation access road. Because of the very low traffic volumes and significant distances to offsite receivers, no significant air quality impact is anticipated.

If the alternate operation access road is paved, there would be odors generated as asphaltic concrete material is applied. These odors would be noticeable on neighboring properties downwind of the road. However, because the event would be of short duration, the paving odors would not constitute a significant air quality impact.

3.2.3 CUMULATIVE IMPACTS

Although the dispersion modeling analysis indicated that the emissions from the PGF would not result in significant increases in ambient pollutant concentrations, two cumulative air quality analyses that considered emissions from other existing and proposed fossil fuel-fired power plants in the area were also conducted.

To address local cumulative air quality impacts, emissions from nine existing or proposed power plants in the Plymouth-Umatilla-Hermiston-Boardman area were assessed. The study evaluated permitted emission rates for existing power plants (such as the Boardman coal-fired plant and the Hermiston Generating Facility) and anticipated emission rates for proposed power plants (such as Coyote Springs II, Plymouth, and the Wanapa projects). Although the cumulative pollutant concentrations exceeded the SILs, all concentrations were well below ambient air quality standards. For additional detail on the cumulative air quality analysis, please refer to Appendix B.

In addition, cumulative air quality impacts were evaluated on a regional scale. The cumulative air quality impacts from 45 proposed power plants on national parks and wilderness areas were examined for BPA (BPA 2001). That study determined there could be significant visibility impacts in national parks and wilderness areas if all the plants evaluated (totaling 24,000 MW) were constructed. The study noted that only 6,000 to 8,000 MW were needed to meet forecasted regional energy requirements, thus, the predicted impacts were likely to significantly overstate potential impacts from power generation.

Since the air quality assessment was completed in August 2001, the energy market has changed considerably and a number of proposed plants were canceled or postponed indefinitely. In April 2002, a revised subset of power plants that BPA considered to be most likely to be constructed were evaluated. Projects in the mid-Columbia River region that were included in the regional study included PGF, Coyote Springs II, the Hermiston Power Project, the Wanapa Energy Center, and the Wallula Power Project.

Because the August 2001 study concluded that visibility was the primary issue of concern on a regional scale, the April 2002 cumulative air quality study focused solely on visibility impacts. The visibility assessment was based on procedures and criteria established by Federal Land Managers (FLMs) from the National Park Service and the U.S. Forest Service. The FLMs suggest the predicted change to the 24-hour average extinction coefficient (the degree to which gases and airborne particles reduce visibility) as the best means of assessing visibility degradation. According to the FLMs, a five percent change in extinction can be used to indicate a “just perceptible” change to a landscape and a ten percent change in extinction coefficient from the “natural” background is considered a significant incremental impact.

In this context, background visibility is based on the particulate matter concentrations on the days with the best visibility. In the visibility assessment, excellent background visual conditions are conservatively assumed to occur every day of the year. As a result, the analysis may significantly overestimate visibility impacts because of the low probability that the meteorology that causes maximum impacts from the power plants will coincide with the few days per year with the best visibility. In addition, the study does not take into account the possibility that the high relative humidity conditions that cause the worst visibility impacts may also result in fog, rain, or snow, which also reduce visual range.

The April 2002 study indicated that emissions from the PGF would never cause changes in the extinction coefficient that exceed five percent in any of the nearby national parks and wilderness areas or the Columbia River Gorge National Scenic Area, indicating that the facility alone would not perceptibly affect visibility in any of the areas evaluated. However, the study determined that if all 15 power projects were built and operated at maximum capacity 365 days per year, they would have the potential to perceptibly affect visibility at Mount Hood 6 days per year and in the Columbia River Gorge National Scenic Area 7 days per year. Changes in extinction greater than 10 percent (implying a significant incremental impact) would occur 1 day per year at Mount Hood and in the Columbia River Gorge National Scenic Area. For additional detail on the cumulative air quality analysis, please refer to Appendix B.

3.2.4 SUMMARY OF IMPACTS

The PGF would be constructed and operated in compliance with an NOC air quality permit issued by the BCAA. This permit will require that BACT be employed to minimize air pollutant emissions. As a result of this requirement, air quality impacts associated with operation of the PGF would not be significant.

3.2.5 MITIGATION

Since air quality impacts would not be significant, no mitigation would be required.

3.2.6 REFERENCES

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