

Department of Environmental Quality
 Eastern Region
 Air Quality Program

**STANDARD
 AIR CONTAMINANT DISCHARGE PERMIT
 REVIEW REPORT**

Portland General Electric Company, Carty Plant
 Tower Road
 Boardman, OR
 (503) 464-8515

Unassigned emissions	
Emission credits	
Source test	X
COMS	
CEMS	X
Compliance schedule	
Special conditions	
Annual report	X
Semi-annual report	
Quarterly report	
Monthly report	
Excess emissions report	X

NSPS	Subparts, Dc, III, and KKKK
NESHAP	Subparts YYYY and ZZZZ
NSR	
PSD	X
RACT	
FCE	X
Public Notice	IV

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PERMIT ACTION

PERMITTING ACTION

1. Portland General Electric Company (PGE) owns and operates a 584 MW coal-fired electric generating facility (referred to as the Boardman Plant) located at Tower Road about 13 miles southwest of Boardman, Oregon. The permittee proposes to add a combined cycle natural gas-fired electric generating plant (referred to as the Carty Plant) to the source. This permit authorizes construction of the Carty Plant adjacent to the Boardman Plant in accordance with the Prevention of Significant Deterioration (PSD) regulations in OAR 340-224-0070.
2. The proposed permit is an Air Contaminant Discharge Permit (ACDP) for the new Carty Plant. The proposed permit allows for construction of a combined cycle natural gas-fired electric generating plant. As described later, the Carty Plant will emit several pollutants at levels greater than significant emissions rates and will be located at a source that is a federal major source in an area that meets all of the ambient air quality standards, so the modification is subject to the Prevention of Significant Deterioration (PSD) requirements in OAR 340-224-0070. This permit addresses the following requirements that the permittee must meet:
 - a. Best Available Control Technology (BACT): The owner or operator of the proposed major modification must apply BACT for each pollutant emitted at a Significant Emission Rate (SER) over the netting basis. For a major modification, the requirement for BACT applies only to:
 - i. each new emissions unit that emits the pollutant in question and was installed since the baseline period or the most recent New Source Review construction approval for that pollutant; and
 - ii. each modified emission unit that increases the actual emissions of the pollutant in question above the netting basis.
 - b. Air Quality Analysis: The owner or operator of a source subject to OAR 340-224-0070 must provide an analysis of the air quality impacts for the proposed source or modification in accordance with OAR 340-225-0050 through 340-225-0070 that include:
 - i. requirements for analysis of air quality impacts in PSD Class II and Class III Areas;
 - ii. requirements for demonstrating compliance with standards and increments in PSD Class I areas; and
 - iii. requirements for demonstrating compliance with air quality related values (AQRV) protection.
 - c. Air Quality Monitoring: The owner or operator of a source subject to this rule must conduct ambient air quality monitoring in accordance with the requirements in OAR 340-225-0050.

3. A Standard ACDP is required to establish the BACT limits for the proposed new emissions units and increase the PSEL because the Title V permit is an operating permit for assuring compliance with existing requirements and is not used to establish new requirements. Once the requirements are established in the ACDP, they will be applicable requirements that can be incorporated into the Title V permit.

OTHER PERMITS

4. The facility is currently operating under Oregon Title V Operating Permit 25-0016-TV-01 and must continue to comply with the provisions of the Title V permit. This permit is being issued to establish BACT limits for the new Carty Plant and increase the Plant Site Emission Limits, but the permittee cannot exceed the limits in the Title V permit until the requirements of this permit are incorporated into the Title V permit. Once this permit is issued, the permittee must submit an application to revise the Title V permit to incorporate the requirements of this permit. Modification of the Title V permit is required before the Carty Plant can be operated in accordance with OAR 340-218-0190(2)(d).

SOURCE DESCRIPTION

5. The existing Boardman Plant is a coal-fired electric generating unit. The new Carty Plant will consist of a 415 MW combined cycle natural gas-fired electric generating unit. Components of the electric generating unit include a combustion turbine, duct burners, heat recovery steam generator and steam turbine/generator. In addition to the electric generating unit, there will be a cooling tower, natural gas-fired auxiliary boiler used to produce steam during startup of the electric generating unit and fire water pump engine for emergency situations.
6. The Boardman Plant is located in Morrow County, which is currently designated in attainment for all criteria pollutants. Elevation of the site is approximately 700 feet above sea level. The source is located near the following PSD Class I areas in Oregon:

Class I Area	Distance from Plant (kilometers)
Mount Adams Wilderness Area	134
Mount Hood Wilderness Area	138
Goat Rocks Wilderness Area	141
Eagle Cap Wilderness Area	159
Strawberry Mountains Wilderness Area	159
Mount Ranier National Park	168
Mt. Jefferson Wilderness Area	181
Columbia River Gorge Scenic Area (technically not a Class I area)	81

EMISSIONS

7. Netting Basis and Plant Site Emission Limits (tons/yr):

Pollutant	Baseline Emission Rate	Netting Basis		Plant Site Emission Limit (PSEL)		
		Previous*	Proposed	Previous	Proposed**	Increase
PM/PM ₁₀	1,056	1,056	1,151	1,056	1,151	0
SO ₂	30,450	7,612	7,632	30,450	7,632	-22,815
NO _x	17,762	5,836	5,961	11,672	5,961	-5,711
CO	767	8,881	8,980	8,881	8,980	99
VOC	92	92	92	92	116	24
H ₂ SO ₄	d	d	17	d	17	17

*Effective June 19, 2009, except the CO netting basis is effective on the date that the Low NO_x Burner PSD permit is issued. (scheduled for mid-December 2010)

**Effective on the compliance date(s) of the regional haze rules

- a. The baseline emission rate equals the potential to emit during the baseline period (1978) because the Boardman Plant was permitted to construct and operate during the baseline period but had not begun operations. (see definition of Actual Emissions in OAR 340-200-0020)
- b. The netting basis, as defined in OAR 340-200-0020, equals the baseline emission rate minus any reductions required by rule plus any increases approved by a New Source Review permit action. On December 9, 2009, the Environmental Quality Commission adopted rules that reduced the netting basis for PM₁₀, SO₂, and NO_x. This permit action increases the netting basis for PM, PM₁₀, and NO_x based on satisfying the PSD requirements for the Carty Plant, as discussed later. The netting basis for SO₂, CO, and VOC are not affected by this permitting action because the increases are less than the significant emission rates. The netting basis for CO was increased in a previous PSD permit action for adding low NO_x burners to the Boardman Plant.
- c. As shown below, there will be a temporary increase in the Plant Site Emission Limits for all pollutants until the compliance date of the regional haze rules. The PSELs shown above are the PSELs after the compliance date of the regional haze rules. The PSELs for PM, PM₁₀, SO₂, and NO_x will ultimately decrease significantly. The PSELs for CO and VOC will increase, but the increases are less than the significant emission rates.
- d. A PSEL for H₂SO₄ has not been established for the Boardman Plant because the acid mist is included in the SO₂ PSEL. The PSEL included in this PSD permit is based on the Carty Plant emissions. Therefore, compliance with the PSEL for H₂SO₄ will be based on the Carty Plant emissions.

- e. The emission calculations supporting the baseline emission rate, netting basis and PSELs are provided in Appendix A.

Plant Site Emission Limits (tons/yr):

Pollutant	Current Title V Permit	Proposed PSD Permit	Regional Haze Rule Compliance Dates		
			7/1/12*	7/1/15*	7/1/19*
PM/PM ₁₀	1,056	1,151	1,151	1,151	1,151
PM _{2.5}	**	95**	95**	95**	95**
SO ₂	30,450	30,473	30,473	10,173	7,635
NO _x	11,672	11,789	5,961	5,961	5,961
CO	8,881***	8,980	8,980	8,980	8,980
VOC	92	116	116	116	116
H ₂ SO ₄	---	17	17	17	17

*These dates are one year after the compliance dates in the regional haze rules.

****PM_{2.5} PSEL:** The Environmental Quality Commission (EQC) recently adopted temporary rules for PM_{2.5}. The rules were adopted to provide DEQ the authority to issue PSD permits specifically for PM_{2.5} in the event that EPA repeals the 1997 PM₁₀ surrogate policy. DEQ has been relying on the surrogate policy for PM_{2.5} permits due to technical issues (e.g., source test methods and dispersion models) associated with PM_{2.5} that have not been fully resolved. The surrogate policy has not been repealed yet, so DEQ is relying on that policy for PM_{2.5} in this PSD permit action. However, with the adoption of the temporary rules, DEQ is now required to establish Plant Site Emission Limits for PM_{2.5}. The Oregon Title V permit does not include a specific PSEL for PM_{2.5} due to the temporary nature of the PM_{2.5} rules. The Title V permit requires PGE to submit an application for a permit modification to establish the PSEL for PM_{2.5}. Until the PM_{2.5} PSEL is established in the Title V permit, the PSEL in this permit only covers the Carty Plant.

***Established in the Low NO_x Burner PSD permit for the Boardman Plant.

SIGNIFICANT EMISSION RATE ANALYSIS

8. PGE is requesting increases in the PSELs for the entire source. The increases are all due to the new Carty Plant. PGE is not requesting an increase in emissions for the existing Boardman Plant. The increases for SO₂, CO, and VOC are less than the significant emission rate so the increases are not subject to the prevention of significant deterioration (PSD) requirements. The increases for PM, PM₁₀, PM_{2.5}, NO_x, and H₂SO₄ are more than the significant emission rates and the increases are due to a physical modification (e.g., addition of the Carty Plant) so the PSD requirements must be met to approve the increase. A discussion of those requirements is provided later in this review report.

Pollutant	SER	Requested Increase Over Previous Netting Basis	Increase Due to Utilizing Capacity that Existed in the Baseline Period	Increase Due to Physical Changes or Changes in the Method of Operation
PM	25	95	0	95
PM ₁₀	15	95	0	95
PM _{2.5}	10	95	0	95
SO ₂	40	23	0	23
NO _x	40	125	0	125
CO	100	99	0	99
VOC	40	24	0	24
H ₂ SO ₄	7	17	0	17

In addition to the PSELS, the permit includes annual limits specifically for the Boardman Plant to ensure that the emissions from the Boardman Plant will not exceed the baseline emission rate and circumvent the PSD requirements.

PM_{2.5} Emissions:

The temporary rules established a baseline period of 2006/2007 for PM_{2.5}. Therefore, under the temporary rules, the PM_{2.5} PSEL for the Boardman Plant would equal the actual emissions during the baseline period. As discussed above, this permit action does not involve any modifications to the Boardman Plant. Therefore, any increase in PM_{2.5} emissions would be evaluated under the Plant Site Emission Limit rules (OAR 340, Division 222) and not the PSD rules in OAR 340, Division 224.

DEQ is relying on EPA's 1997 surrogate policy for the PM_{2.5} emission increase as a result of the Carty Plant. DEQ has determined that the surrogate policy will provide adequate protection for the PM_{2.5} ambient air quality standards, as well as for determining Best Available Control Technology for PM_{2.5}. for the following reasons:

- EPA has limited the PM_{2.5} PSD analysis to the direct filterable portion of the total PM_{2.5} until January 1, 2011.
- PM_{2.5} from natural gas combustion is considered to be equal to or less than PM₁₀.
- The significant impact levels (SILs) for PM_{2.5} are equal to the PM₁₀ SILs in DEQ's rules.
- The SILs for PM₁₀ and PM_{2.5} in DEQ's rules are more stringent than the SILs EPA has established for PM_{2.5}.
- The effectiveness of emissions controls or operating practices for natural gas combustion devices should be the same for PM₁₀ and PM_{2.5}.

For these reasons, the following PSD analysis is limited to PM₁₀, which is also a surrogate for PM_{2.5}.

Greenhouse Gas Emissions:

Greenhouse gases (GHG) will become a regulated pollutant under the Clean Air Act beginning January 2, 2011. EPA promulgated a tailoring rule that establishes the major source threshold, significant emission rate for modifications, and a phased approach for implementing PSD program. A major source of GHG emissions will be any source that emits or has the potential to emit 100,000 or more tons of GHG per year. In addition, any modification at a major source that results in an increase in GHG emissions equal to or greater than a significant emission rate (75,000 tons per year) is considered a major modification. Until 7/1/11 major modifications are subject to PSD if PSD is applicable to some other regulated pollutant. GHG by itself cannot trigger PSD before 7/1/11. After 7/1/11, new major sources and major modifications at major sources will all be subject to PSD.

The existing Boardman Plant is a major source of GHG emissions. The proposed Carty Plant will increase GHG emissions by more than 75,000 tons per year. The proposed Carty Plant is subject to PSD for PM₁₀ and NO_x. Therefore, under EPA's tailoring rule, the Carty Plant would be subject to PSD for GHG after January 2, 2011.

DEQ has no authority to regulate GHG emissions before January 2, 2011. DEQ could wait to issue this permit until after January 2, 2011, but DEQ would still not have the authority to address GHG until DEQ's rules are revised to provide that authority (rules are expected to be adopted in February 2011). In the interim, it is possible that EPA could issue PSD permits for GHG under a federal implementation plan (FIP). Furthermore, DEQ understands that once a FIP is established, EPA may delegate the program to DEQ. However, implementation of the FIP and delegation will take time.

PSD for GHG emissions will be limited to the Best Available Control Technology (BACT) requirements. PSD for GHG will not require an air quality analysis because there is no ambient air quality standard for GHG. Since the PSD permit would be limited to BACT, the Department does not believe that waiting to issue the permit until after January 2, 2011 would result in additional requirements for the Carty Plant. Preliminary indications are that energy efficiency will be a significant criterion for determining BACT for fossil fuel fired combustion devices. In the event that energy efficiency cannot be applied to a unit, carbon dioxide sequestration may be considered. Combined cycle natural gas fired electric generating units such as the proposed Carty Plant are considered relatively efficient units because the heat produced from combustion is used directly to generate electricity and indirectly to produce steam to produce additional electricity. In addition, natural gas produces less GHG per million Btu heat input than other fossil fuels as show below. For these reasons, DEQ does not believe that an official BACT analysis would result in additional controls. DEQ requests comments on this presumption.

Although not required, PGE provided a BACT analysis that is available at <http://www.deq.state.or.us/er/PGE.htm>. The BACT analysis concluded that the "only feasible control technology for reducing greenhouse gas emissions from the CTG [combustion

turbine/duct burners] unit is good operation and maintenance to retain thermal efficiency of the equipment and using natural gas fuel.”

Carbon Dioxide emission factors for fossil fuels (AP-42):

Fossil Fuel	CO₂ Emission Factor
Natural gas	110 lb/MMBtu
Distillate oil	157 lb/MMBtu
Sub-bituminous coal	289 lb/MMBtu

PSD REQUIREMENTS

9. Best Available Control Technology:

Best Available Control Technology (BACT) means an emission limitation, including, but not limited to, a visible emission standard, based on the maximum degree of reduction of each air contaminant subject to regulation under the Clean Air Act which would be emitted from any proposed major source or major modification which, on a case-by-case basis, taking into account energy, environmental and economic impacts and other costs, is achievable for such source or modification through application of production processes or available methods, systems and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such air contaminant. In no event may the application of BACT result in emissions of any air contaminant that would exceed the emissions allowed by an applicable new source performance standard or any standard for hazardous air pollutant. If an emission limitation is not feasible, a design, equipment, work practice or operational standard, or combination thereof, may be required. Such standard must, to the degree possible, set forth the emission reduction achievable and provide for compliance by prescribing appropriate permit conditions.

The Environmental Protection Agency’s (EPA) “top-down” evaluation process specifies that all available control technologies be ranked in descending order of control effectiveness. The most stringent, or “top”, alternative is examined first. That alternative is established as BACT unless it is demonstrated that technical considerations, or energy, environmental or economic impacts justify a conclusion that the most stringent technology is not “achievable” in that case. If the most stringent technology is eliminated in this fashion, then the next most stringent alternative is considered, and so on. There are five key steps in performing the BACT analysis: 1) Identify all control technologies; 2) Eliminate technically infeasible options; 3) Rank the remaining control technologies by control effectiveness; 4) Evaluate most effective controls and document results; and 5) Select BACT. EPA maintains a clearinghouse of RACT/BACT/LAER Controls (RBLC) to assist permitting authorities in making determinations for a specific source.

BACT must be determined for each new or modified emissions device that contributes to an increase in the netting basis. The emission devices and pollutants that must be evaluated include the following:

Emission Devices and Pollutants subject to BACT:

Emission Device	PM/PM₁₀	NO_x	H₂SO₄ Mist
Combustion turbine/duct burners	Yes	Yes	Yes
Auxiliary boiler	Yes	Yes	No
Emergency fire-water pump	Yes	Yes	No
Cooling tower	Yes	No	No

The Department has reviewed the BACT analysis provided by PGE and agrees with the conclusions with a couple of exceptions, as discussed below. The analysis included a review of EPA's RACT/BACT/LAER clearing house, California's BACT clearing house, and the Bay Area Air Quality Management District's (BAAQMD) BACT Guidelines, and New Source Performance Standards (NSPS). BACT must be at least as stringent as any NSPS requirements. In addition, DEQ evaluated the conclusions in relation to other recent PSD actions in Oregon and determined that the proposed BACT limits are equal to or more stringent than those determinations. The most recent PSD permit was issued for PGE's Port Westward facility in Clatskanie (permit number 05-0008-ST-01).

A summary of potential control technologies, their feasibility for the emission devices, and the control effectiveness is provided in Appendix B. Based on this information, PGE's BACT selections are as follows:

Emission Device	Pollutant	BACT	Emission Limit/Operating Requirements
Combustion turbine/duct burners	NO _x	Selective catalytic reduction (SCR)	2.0 ppm*, 90 to 100% load; 3.5 ppm*, 75 to 90% load, and 4.5 ppm*, <75% load
	PM	Low sulfur fuel/good design/operation	Natural gas fuel only
	H ₂ SO ₄		
Auxiliary boiler	NO _x	Low NO _x burners	4.46 lb/hr
	PM	Low sulfur fuel/good design/operation	0.22 lb/hr
	H ₂ SO ₄		Natural gas fuel only
Fire water pump	NO _x	NSPS	3.0 g/hp-hr
	PM	NSPS	0.15 g/hp-hr
	SO ₂ /H ₂ SO ₄	NSPS	15 ppm sulfur content of fuel
Cooling tower	PM	Mist drift eliminators/good design/operation	Inherent design

*3-hour rolling average, corrected to 15% O₂

As shown above, PGE proposed three limits for the combustion turbine/duct burners based on various operating loads. At maximum load, the limit corresponds to 21 lbs/hr, which was used in the air quality analysis discussed below. PGE proposed multiple limits because uncontrolled

NO_x concentrations will increase while operating at lower loads and there is the potential for excess ammonia slip. DEQ is concerned that it will not be possible to monitor compliance with multiple limits considering a 3-hour rolling average and the fact that the operating load ranges will vary depending on ambient temperature. After discussing the issue with PGE, DEQ determined that a single concentration limit is appropriate when operating at or above 60% of the maximum load along with two lb/hr limits – one that applies at all times, excluding periods of startup/shutdown; and, one that applies at all times, including periods of startup/shutdown, as shown below. It is unlikely that the unit will be operated at less than 60% of the maximum load except during periods of startup and shutdown. These limits will ensure that BACT is met at all times and that the emissions will not exceed the levels used in the air quality analysis.

DEQ BACT Limits for NO_x:

Operating Condition	Limit	Averaging Time	Basis
≥60% of maximum load	2.0 ppm at 15% O ₂	3-hour rolling	SCR
All times, excluding periods of startup/shutdown	24 lb/hr	3-hour rolling	SCR
All times, including periods of startup/shutdown	150 lb/hr	3-hour rolling	Air Quality Analysis

10. Air Quality Impact Analysis:

An air quality analysis was conducted by the permittee in accordance with OAR 340-225-0050 through 0070 and a modeling protocol approved by DEQ. The analysis evaluated impacts in Class I and Class II areas within range of the proposed Carty Plant. Class I areas are national parks and wilderness areas designated by Congress. Class II areas are areas that are unclassified or in attainment with national ambient air quality standards. The analysis provides a conservative estimate of the ambient concentrations due to the Carty Plant's emissions using approved dispersion models. The results are compared to thresholds established to prevent significant deterioration of ambient air quality. The emissions from the proposed Carty Plant were first modeled to determine if the impacts are greater than significant impact levels (SILs) for each pollutant that will be emitted at levels equal to or greater than the significant emissions rates. If the impacts are greater than an SIL, two additional analyses would be required. The first analysis would evaluate the emissions from the proposed Carty Plant plus emissions from surrounding sources to determine if the impacts will exceed a PSD increment. PSD increments are established by EPA to prevent significant deterioration of air quality. The second analysis would evaluate whether the emissions from the proposed project plus background ambient concentrations could exceed a national ambient air quality standard. For Class I areas, there are additional requirements for determining if the emissions from the proposed project will have an adverse impact on visibility or contribute significantly to nitrogen or sulfur deposition.

PGE provided an initial analysis with the application that was submitted in September 2009. On October 14, 2010, PGE provided an independent third party analysis of the initial analysis. DEQ reviewed both the initial analysis and the subsequent analysis and agrees with the conclusions. DEQ's review is available at www.deq.state.or.us/er/PGE.htm. The analysis demonstrates that the emissions from the Carty Plant will not exceed the significant impact levels for PM₁₀, PM_{2.5}, and NO_x in both Class I and Class II areas as shown in the following tables. Thus, evaluation of the PSD increments and ambient air quality standards is not required. The analysis also demonstrates that the emissions from the Carty Plant will not have an adverse effect on visibility or contribute significantly to nitrogen and sulfur deposition in Class I areas. Sulfur dioxide emissions were included in the visibility and sulfur deposition analysis, but not included in the ambient concentration analysis because the sulfur dioxide emissions from the proposed Carty Plant will be less than the significant emission rate. Likewise, carbon monoxide emissions were not evaluated because the emissions will be less than the significant emission rate. In addition, an analysis of the impacts caused by the existing coal-fired power plant is not required for this permit action because the Boardman Plant is not being modified and the emissions from the proposed Carty Plant will not have impacts above the SILs.

Class II Analysis:

Pollutant	Averaging Time	Predicted Concentration (µg/m ³)	Significant Impact Level (µg/m ³)
PM ₁₀	Annual	0.196	0.2
PM ₁₀	24-hour	0.838	1
PM _{2.5}	Annual	0.196	0.2
PM _{2.5}	24-hour	0.838	1
NO ₂	Annual	0.253	1

Class I Analysis

Pollutant	Averaging Time	Predicted Concentration (µg/m ³)	Significant Impact Level (µg/m ³)
PM ₁₀	Annual	0.0285*	0.2
PM ₁₀	24-hour	0.0021**	0.3
PM _{2.5}	Annual	0.0285*	0.04
PM _{2.5}	24-hour	0.0021**	0.08
NO ₂	Annual	0.0008**	0.1

*Mt. Jefferson Wilderness Area

**Mt. Hood Wilderness Area

Class I Visibility and Deposition:

Parameter	Maximum Class I Area* Impacts	FLM** Significance Levels
Visibility (ΔdV ***)	0.132	0.5
Nitrogen deposition (kg/ha/yr)	0.00042	0.005
Sulfur deposition (kg/ha/yr)	0.00013	0.005

*Mt. Hood Wilderness Area

**Federal Land Manager

***delta deciview

Based on the air quality analysis, DEQ has determined that the proposed Carty Plant will not have an adverse impact on air quality in Class I and Class II areas. Impacts on the Columbia River Gorge National Scenic Area were also evaluated and determined to be slightly higher than the impacts in the Mt. Hood Wilderness Area, but still not significant. The analysis relied on a stack height of 70 meters, which is included as a requirement for construction of the Carty Plant.

11. Air Quality Monitoring:

Air Quality monitoring is not required because the modeled PM and NO_x impacts are less than significant monitoring concentrations. [OAR 340-224-0070(3) and 340-225-0050(4)]

TITLE V MAJOR SOURCE APPLICABILITY

CRITERIA POLLUTANTS

12. For purposes of the Title V permit program, a major source is a facility that has the potential to emit more than 100 tons per year of any criteria pollutant. The proposed Carty Plant is by itself a major source of criteria pollutant emissions without considering the adjacent Boardman Plant.

HAZARDOUS AIR POLLUTANTS

13. For purposes of the Title V permit program, a major source is a facility that has the potential to emit more than 10 tons/year of any single HAP or 25 tons/year of combined HAPs. The proposed Carty Plant by itself is not a major source of HAPs, but since it will be located adjacent to the existing Boardman Plant, the entire source (Carty Plant and Boardman Plant) is a major source.

Hazardous Air Pollutant	Potential to Emit (tons/year)
Carty Plant - 1,3, Butadiene	0.005
Carty Plant - Acetaldehyde	0.45
Carty Plant - Acrolein	0.072
Carty Plant – Benzene	0.135
Carty Plant – Ethylbenzene	0.36
Carty Plant – Formaldehyde	7.98
Carty Plant - Naphthalene	0.015
Carty Plant – PAH/POM	0.025
Carty Plant – Propylene oxide	0.326
Carty Plant - Toluene	1.46
Carty Plant - Xylenes	0.72
Carty Plant – total HAPs	11.5
Boardman Plant – total HAPs	108
Total	120

ADDITIONAL REQUIREMENTS

NSPS APPLICABILITY

14. The combustion turbine/duct burners are subject to 40 CFR, Part 60, subpart KKKK, which includes NO_x and SO₂ limits. The auxiliary boiler is subject to 40 CFR, Part 60, subpart Dc, but there are no emission limits for boilers that burn only natural gas. The fire water pump is subject to 40 CFR, Part 60, subpart IIII.

NESHAPS/MACT APPLICABILITY

15. The proposed Carty Plant will be co-located with a major source of hazardous air pollutants. Therefore, the combustion turbine/duct burners are subject to 40 CFR, Part 63, subpart YYYY. PGE must comply with the initial notification requirements set forth in 40 CFR 63.6145. However, pursuant to 40 CFR 63.6095(d), PGE need not comply with any other requirements of the subpart until the EPA takes final action to require compliance and publishes a document in the Federal Register. EPA has not, to date, taken such action so no further requirements apply at this time.

The fire water pump is subject to 40 CFR, Part 63, subpart ZZZZ, but 63.6590(c) specifies that engines of the type and size proposed for the Carty Plant are subject to 40 CFR, Part 60, subpart IIII and are not subject to any other requirements of subpart ZZZZ.

EPA is in the process of promulgating standards for boilers (40 CFR, Part 63, subpart DDDDD) that may apply to the auxiliary boiler. If standards are adopted that are applicable to the boiler, the permit will be re-opened to include the standards.

RACT APPLICABILITY

16. The RACT rules are not applicable to this source because it is not in the Portland AQMA, Medford AQMA, or Salem SKATS.

COMPLIANCE

17. The permit includes a requirement to install and operate a continuous emission monitoring systems for continuously measuring nitrogen oxides and carbon monoxide emissions. The emissions data is used to determine compliance with the BACT limit, as well as the Plant Site Emission Limit. An initial performance test is required to determine compliance with other emission limits and standards.

PUBLIC NOTICE

18. The public notice procedures for this permitting action are specified in OAR 340-209-0030(3)(d) for a Category IV public notice.
 - a. Notice of the application was provided to interested persons on December 29, 2009.
 - b. An information meeting was held in Boardman on January 21, 2010.
 - c. Notice of a public hearing was issued on November 9, 2010. The hearing was held on December 15, 2010.
 - d. Notice of the public comment period was issued on November 9, 2010 and the comment period ended on December 21, 2010.
19. Three people attended the hearing and one person testified in favor of the permit action. The Department received written comments from two individuals and PGE. One individual was in favor of the permit action and the other opposed the permit action, but neither provided specific comments related to the permit conditions. PGE provided specific comments on the draft permit. The Department's responses to the comments are provided below.
20. Response to PGE's comments: The complete text of PGE's comments is provided as an attachment to this review report. A summary of the comments and DEQ's responses are provided below.
 - a. PGE requested that the cooling tower be added to condition 1.1 of the permit as an emission unit approved by this permitting action. The Department agrees and has made the change in condition 1.1.a.

- b. PGE requested that the emissions associated with the existing coal-fired plant in condition 3.9 be adjusted to reflect the emission limits established by rule on December 9, 2010. The Department agrees and condition 3.9 has been revised in accordance with the revised rules.
- c. PGE requested that condition 4.1 be revised due to calculation errors and changes to the regional haze rules. The Department agrees and condition 4.1 has been revised.
- d. PGE requested the requirement to test for formaldehyde emissions be deleted from condition 5.1.d because there is no limit for formaldehyde and the estimated emissions are only 0.036 ton per year based on tests at other similar sources. The Department does not agree due to the uncertainty associated with formaldehyde emissions from combustion turbines. There have not been very many tests conducted for formaldehyde emissions and the emissions can vary from unit to unit, so the testing is required to verify the emission factor used to estimate the formaldehyde emissions to ensure that the source is not a major source of hazardous air pollutants.
- e. PGE requested that the reference to combustion turbine 2 be changed to combustion turbine (CTEU1). The Department agrees and has made the change.
- f. PGE requested the requirement to conduct meteorological monitoring be removed from the permit because off-site data is representative enough to adequately evaluate ambient air concentrations. The Department agrees that off-site data was sufficient for evaluating air quality impacts for this source, but the monitoring requirement is not being removed because the data will be necessary for future changes at the facility. The regional haze rules include provisions for conducting pilot studies for the dry sorbent injection system that will be added to the coal-fired power plant. The studies may require modeling of particulate matter emissions. In addition, PGE has indicated in the application for a site certificate from the Department of Energy that another gas-fired plant will be located at the site. On-site meteorology data will be necessary for permitting a second unit at the site.
- g. PGE requested a correction to condition 12 for the conversion of SO₂ to H₂SO₄. The conversion rate should be 31.7% instead of 50%. The Department agrees and has made the change to condition 12.

msf:

12/29/10

APPENDIX A: EMISSION DETAIL SHEET**Combustion Turbine/Duct Burners:****Combustion turbine/duct burners process data:**

Annual hours of operation	7840	920 outage hours
Hourly heat input	2868	million Btu/hr
Natural gas heating value	1020	Btu/cubic foot
Hourly natural gas usage	2.81	million cubic feet/hr
Cold startups (80)	273.60	hours/yr
Hot startups (80)	104.00	hours/yr
Shutdown (160)	80.00	hours/yr
SO2 to SO4 conversion	31.60	percent

Combustion turbine/duct burners normal operation emissions:

Pollutant	Emission Factor	Units	Emissions (tons/yr)
PM10	8.30E-03	lb/MMBtu	93.8
SO2	3	lb/MMcf	22.6
NOx	7.37E-03	lb/MMBtu	78.0
CO	7.40E-03	lb/MMBtu	78.3
VOC	2.10E-03	lb/MMBtu	23.6
H2SO4	1.50E+00	lb/MMcf	16.5

Combustion turbine/duct burners startup/shutdown emissions:

Pollutant	Emission Factor	Units	Emissions (tons/yr)
Nox cold startup	145.6	lb/hr	19.9
Nox hot startup	237.5	lb/hr	12.4
Nox shutdown	344	lb/hr	13.8
CO cold startup	75.5	lb/hr	10.3
CO hot startup	123	lb/hr	6.4
CO shutdown	75	lb/hr	3.0

Combustion turbine/duct burners total emissions:

Pollutant	Normal Operations (tons/yr)	Startup/Shutdown (tons/yr)	Total Emissions (tons/yr)
PM10	93.3	Included in normal	93.8
SO2	22.6	Included in normal	22.6
NOx	78.0	46.0	124.0
CO	78.3	19.8	93.2
VOC	23.6	Included in normal	23.6
H2SO4	16.5	Included in normal	16.5

Combustion turbine/duct burners hazardous air pollutants:

Pollutant	Emission Factor	Units	Emissions (tons/yr)
1,3 Butadiene	4.30E-07	lb/MMBtu	0.005
Acetaldehyde	4.00E-05	lb/MMBtu	0.450
Acrolein	6.40E-06	lb/MMBtu	0.072
Benzene	1.20E-05	lb/MMBtu	0.135
Ethylbenzene	3.20E-05	lb/MMBtu	0.360
Formaldehyde	7.10E-04	lb/MMBtu	7.982
Naphthalene	1.30E-06	lb/MMBtu	0.015
PAH/POM	2.20E-06	lb/MMBtu	0.025
Propylene Oxide	2.90E-05	lb/MMBtu	0.326
Toluene	1.30E-04	lb/MMBtu	1.462
Xylenes	6.40E-05	lb/MMBtu	0.720
Total HAPS			11.5
Maximum Single HAP (formaldehyde)			8.0

Auxiliary boiler process data:

Annual hours of operation	247	for startup of the combined cycle unit
Hourly heat input	91	million Btu/hr
Natural gas heating value	1020	Btu/cubic foot
Hourly natural gas usage	0.09	million cubic feet/hr

Auxiliary boiler normal operation emissions:

Pollutant	Emission Factor	Units	Emissions (tons/yr)
PM10	2.50E+00	lb/MMcf	0.028
SO2	3	lb/MMcf	0.033
NOx	5.00E+01	lb/MMcf	0.551
CO	8.40E+01	lb/MMcf	0.926
VOC	5.50E+00	lb/MMcf	0.061
Lead	5.00E-04	lb/MMcf	0.000

Auxiliary Boiler hazardous air pollutants:

Pollutant	Emission Factor	Units	Emissions (tons/yr)
Arsenic	2.00E-04	lb/MMcf	2.20E-06
Benzene	2.10E-03	lb/MMcf	2.31E-05
Beryllium	1.20E-05	lb/MMcf	1.32E-07
Cadmium	1.10E-03	lb/MMcf	1.21E-05
Chromium	1.40E-03	lb/MMcf	1.54E-05
Cobalt	8.40E-05	lb/MMcf	9.26E-07
Dichlorobenzene	1.20E-03	lb/MMcf	1.32E-05
Formaldehyde	7.50E-02	lb/MMcf	8.26E-04
Hexane	1.80E+00	lb/MMcf	1.98E-02
Lead	5.00E-04	lb/MMcf	5.51E-06
Manganese	3.80E-04	lb/MMcf	4.19E-06
Mercury	2.60E-04	lb/MMcf	2.86E-06
Naphthalene	6.10E-04	lb/MMcf	6.72E-06
Nickel	2.10E-03	lb/MMcf	2.31E-05
PAH/POM	1.30E-03	lb/MMcf	1.43E-05
Selenium	2.40E-05	lb/MMcf	2.64E-07
Toluene	3.40E-03	lb/MMcf	3.75E-05
Total HAPS			0.021
Maximum Single HAP (Hexane)			0.020

Fire water pump production data:

Annual hours of operation	50	for emergencies and routine testing
Horse power output	265	hp-hr
Average BSFC (Btu/hp-hr)	7000	Btu/hp-hr
Heat input (1.86	million Btu/hr

Fire water pump normal operation emissions:

Pollutant	Emission Factor	Units	Emissions (tons/yr)
PM10	3.31E-04	lb/hp-hr	0.002
SO2	2.05E-03	lb/hp-hr	0.014
NOx	3.10E-02	lb/hp-hr	0.205
CO	6.68E-03	lb/hp-hr	0.044
VOC	6.61E-03	lb/hp-hr	0.044

Fire water pump hazardous air pollutant emissions:

Pollutant	Emission Factor	Units	Emissions (tons/yr)
1,3-Butadiene	3.90E-05	lb/MMBtu	1.81E-06
Acetaldehyde	7.70E-04	lb/MMBtu	3.57E-05
Acrolein	9.30E-05	lb/MMBtu	4.31E-06
Benzene	9.30E-04	lb/MMBtu	4.31E-05
Formaldehyde	1.20E-03	lb/MMBtu	5.57E-05
Naphthalene	8.50E-05	lb/MMBtu	3.94E-06
Toluene	4.10E-04	lb/MMBtu	1.90E-05
Xylenes	2.90E-04	lb/MMBtu	1.34E-05
Total HAPS			0.00018
Maximum Single HAP (Formaldehyde)			0.00006

Cooling Tower PM/PM10 emissions:

Circulation Rate (gal/min)	85000
total dissolved solids (ppm)	1200
Density of water (lb/gal.)	8.34
Drift loss (%)	0.0005
Hourly emissions (lb/hr)	0.26
Annual emissions (tons/yr)	1.1

Total Source Emissions (tons/yr)

	PM10	SO2	Nox	CO	VOC	H2SO4	HAP	PM2.5
Carty Plant - combustion turbine	93.8	22.6	124.0	98.1	23.6	16.5	11.5	93.3
Carty Plant - auxiliary boiler	0.028	0.033	0.551	0.926	0.061		0.021	0.028
Carty Plant - fire water pump	0.002	0.014	0.205	0.044	0.044		0.000	0.002
Carty Plant - cooling tower	1.12							1.12
Carty Plant – total	94.9	22.7	124.8	99.1	23.7	16.5	11.6	94.5
Boardman Plant – current	1056	30450	11672	8881	92		108	
Boardman Plant - 7/1/12	1056	30450	7105	8881	92		108	
Boardman Plant - 7/1/15	346	3045	5836	8881	92		108	
Boardman Plant - 7/1/18	346	3045	1776	8881	92		108	
Totals – current	1151	30473	11797	8980	116	17	120	94
Totals - 7/1/12	1151	30473	7230	8980	116	17	120	94
Totals - 7/1/15	441	3068	5961	8980	116	17	120	94
totals - 7/1/18	441	3068	1901	8980	116	17	120	94

APPENDIX B: CONTROL TECHNOLOGY SUMMARY:

Emission Device	Pollutant	Potential Control Technologies	Feasible Control Technology?	Reason	Control Effectiveness
Combustion turbine/duct burners	NO _x	Catalytic combustion (XONON)	No	Does not have sufficient operating experience to ensure reliable performance on large gas turbines	NA
		Non-ammonia SCR (SONO _x)	No	Does not have sufficient operating experience to ensure reliable performance on large gas turbines	NA
		Selective Catalytic Reduction (SCR)	Yes	This is typically considered BACT	60 – 90% reduction (1.5 – 2.5 ppm @ 15% O _x)
		Selective non-catalytic reduction (SNCR)	No	Exhaust temperature is too low.	NA
		NSPS	Yes	40 CFR, Part 60, subpart KKKK	15 ppm @ 15% O ₂
		Good design/operation of low NO _x burners	Yes	Inherent design	25 – 40% reduction
		Water/steam injection	Yes	Typically used with fuel oil, not natural gas	<42 – 65 ppm
	PM	Fabric filters	No	Not effective for low level/very fine carbon particles	NA
		Dry ESP	No		NA
		Wet ESP	No		NA
		Venturi scrubber	No		NA
		NSPS	No	No standards for PM	NA
		Clean fuel/good design/operation	yes	Inherent design	Base case
	H ₂ SO ₄	Flue gas desulfurization	No	Not effective for low level emissions	NA
		NSPS	No	No standards for acid mist	NA
		Low sulfur fuel	Yes	Inherent design	Base case

Emission Device	Pollutant	Potential Control Technologies	Feasible Control Technology?	Reason	Control Effectiveness
Auxiliary boiler	All pollutants	NSPS	No	No standards for natural gas fired boilers	NA
	NO _x	Good combustion practices/low NO _x burners	Yes	Inherent design	Base case
	PM	Good combustion practices	Yes	Inherent design	Base case
	H ₂ SO ₄	Low sulfur fuel	Yes	Inherent design	Base case
Fire water pump	NO _x	NSPS	Yes	40 CFR, Part 60, subpart IIII	3.0 g/hp-hr
		Good combustion practices	Yes	Inherent design	Base case
	PM	NSPS	Yes	40 CFR, Part 60, subpart IIII	0.15 g/h-hr
		Good combustion practices	Yes	Inherent design	Base case
	SO ₂ /H ₂ SO ₄	NSPS	Yes	40 CFR, Part 60, subpart IIII	15 ppm (sulfur content of fuel)
		Low sulfur fuel	Yes	Inherent design	Base case
Cooling tower	PM	Mist eliminators/good design/operaton	Yes	Inherent design	75 -90% reduction