# Statement of Basis

**Permit to Construct No. P-2014.0014**
**Project ID 61351**

**Rathdrum Power LLC**
**Rathdrum, Idaho**

**Facility ID 055-00045**

**Final**

**October 22, 2014**
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The purpose of this Statement of Basis is to satisfy the requirements of IDAPA 58.01.01.et seq, Rules for the Control of Air Pollution in Idaho, for issuing air permits.

## ACRONYMS, UNITS, AND CHEMICAL NOMENCLATURE

| | |
|---|---|
| AAC | acceptable ambient concentrations |
| AACC | acceptable ambient concentrations for carcinogens |
| acfm | actual cubic feet per minute |
| ASTM | American Society for Testing and Materials |
| BACT | Best Available Control Technology |
| BMP | best management practices |
| Btu | British thermal units |
| CAA | Clean Air Act |
| CAM | Compliance Assurance Monitoring |
| CAS No. | Chemical Abstracts Service registry number |
| CBP | concrete batch plant |
| CEMS | continuous emission monitoring systems |
| cfm | cubic feet per minute |
| CFR | Code of Federal Regulations |
| CI | compression ignition |
| CMS | continuous monitoring systems |
| CO | carbon monoxide |
| $CO_2$ | carbon dioxide |
| $CO_2e$ | $CO_2$ equivalent emissions |
| COMS | continuous opacity monitoring systems |
| DEQ | Department of Environmental Quality |
| dscf | dry standard cubic feet |
| EL | screening emission levels |
| EPA | U.S. Environmental Protection Agency |
| FEC | Facility Emissions Cap |
| GHG | greenhouse gases |
| gph | gallons per hour |
| gpm | gallons per minute |
| gr | grains (1 lb = 7,000 grains) |
| HAP | hazardous air pollutants |
| HHV | higher heating value |
| HMA | hot mix asphalt |
| hp | horsepower |
| HRSG | heat recovery steam generator |
| hr/yr | hours per consecutive 12 calendar month period |
| ICE | internal combustion engines |
| IDAPA | a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act |
| iwg | inches of water gauge |
| km | kilometers |
| lb/hr | pounds per hour |
| lb/qtr | pound per quarter |
| m | meters |
| MACT | Maximum Achievable Control Technology |
| mg/dscm | milligrams per dry standard cubic meter |
| MMBtu | million British thermal units |
| MMscf | million standard cubic feet |
| NAAQS | National Ambient Air Quality Standard |
| NESHAP | National Emission Standards for Hazardous Air Pollutants |
| $NO_2$ | nitrogen dioxide |
| NOx | nitrogen oxides |

| | |
|---|---|
| NSPS | New Source Performance Standards |
| O&M | operation and maintenance |
| $O_2$ | oxygen |
| PAH | polyaromatic hydrocarbons |
| PC | permit condition |
| PCB | polychlorinated biphenyl |
| PERF | Portable Equipment Relocation Form |
| PM | particulate matter |
| $PM_{2.5}$ | particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers |
| $PM_{10}$ | particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers |
| POM | polycyclic organic matter |
| ppm | parts per million |
| ppmw | parts per million by weight |
| PSD | Prevention of Significant Deterioration |
| psig | pounds per square inch gauge |
| PTC | permit to construct |
| PTC/T2 | permit to construct and Tier II operating permit |
| PTE | potential to emit |
| PW | process weight rate |
| RAP | recycled asphalt pavement |
| RFO | reprocessed fuel oil |
| RICE | reciprocating internal combustion engines |
| Rules | Rules for the Control of Air Pollution in Idaho |
| scf | standard cubic feet |
| SCL | significant contribution limits |
| SCR | selective catalytic reduction |
| SIP | State Implementation Plan |
| SM | synthetic minor |
| SM80 | synthetic minor facility with emissions greater than or equal to 80% of a major source threshold |
| $SO_2$ | sulfur dioxide |
| SOx | sulfur oxides |
| T/day | tons per calendar day |
| T/hr | tons per hour |
| T/yr | tons per consecutive 12 calendar month period |
| T2 | Tier II operating permit |
| TAP | toxic air pollutants |
| TEQ | toxicity equivalent |
| T-RACT | Toxic Air Pollutant Reasonably Available Control Technology |
| ULSD | ultra-low sulfur diesel |
| U.S.C. | United States Code |
| VOC | volatile organic compounds |
| $yd^3$ | cubic yards |
| $\mu g/m^3$ | micrograms per cubic meter |

## FACILITY INFORMATION

### *Description*

Rathdrum Power, LLC operates a combined cycle gas turbine electrical power generation facility located near Rathdrum, Idaho. The facility is operated in combined-cycle mode such that the hot exhaust gases from the General Electric Frame 7F turbine are discharged to the heat recovery steam generator (HRSG) to create steam which drives the steam turbine. The turbine and duct burners are fired with natural gas only and the facility can generate up to approximately 278 MW of electricity. The facility is equipped with supplemental firing capability in the form of "duct burner" which may add up to 230 MMBtu/hr of additional heat into the HRSG for power generation. Other equipment at the facility includes a mechanical draft cooling tower, auxiliary boiler, fuel pre-heater, emergency generator, and an emergency fire water pump. Emissions from the gas turbine and duct firing are controlled with selective catalytic reduction (SCR) and oxidation catalyst which are located within the HRSG, and NOx emissions are monitored by a continuous emissions monitoring system.

### *Permitting History*

The following information was derived from a review of the permit files available to DEQ. Permit status is noted as active and in effect (A) or superseded (S).

| Permit Type | Permit Number | Issued date | Expired date | Explanation | Status | Note |
|---|---|---|---|---|---|---|
| PTC | P-940134 | 01/31/95 | NA | PTC for a new combined cycle natural gas-fired turbine power generation facility | S | |
| PTC | P-950175 | 09/29/95 | NA | Name change for the facility | S | |
| PTC | 055-00045 | 10/10/97 | NA | Reissuance of PTC No. 055-00045 | S | |
| PTC | P-990042 | 10/29/99 | NA | Modification to PTC No. 055-00045 | S | |
| PTC | P-020116 | 10/12/04 | NA | Revision of PTC No. 055-00045 | Will become S after issuance of this PTC | |
| T1 | T1-020108 | 03/25/05 | 03/23/10 | Initial Tier I operating permit | S | |
| T1 | T1-2008.0166 | 11/26/08 | 03/25/10 | Tier I operating permit administrative amendment to change the responsible official | S | This permit replaced T1-020108, issued on 3/25/2005 |
| T1 | T1-2009.0111 | 02/12/10 | 02/12/15 | Tier I operating permit renewal | S | This permit replaced T1-2008.0166, issued on 11/26/2008 |
| T1 | T1-2009.0111 Project 60965 | 12/14/11 | 02/12/15 | Tier I operating permit administrative amendment to change responsible official | A | This permit replaced T1-2009.0111, issued on 02/12/10 |

### *Application Scope*

This PTC is for a minor modification at an existing minor facility. This minor modification results in emissions increases as shown in Tables 5 and 6 of the statement of basis.

The applicant has proposed to:

- Increase duct burner operation hours from 2,000 to 2,927 hours per year,
- Decrease auxiliary boiler operation hours from 5,000 to 1,000 hours per year, and

- Reduce CO emissions rate from 34.6 to 32.6 lb/hr during normal operation of the turbine with duct firing.

### *Application Chronology*

| | |
|---|---|
| April 7, 2014 | DEQ received an application and an application fee. |
| May 1, 2014 | DEQ determined that the application was incomplete. |
| May 30, 2014 | DEQ received supplemental information from the applicant. |
| June 19, 2014 | DEQ determined that the application was complete. |
| July 22, 2014 | DEQ received the modeling report. |
| July 30, 2014 | DEQ made available the draft permit and statement of basis for peer and regional office review. |
| August 7, 2014 | DEQ made available the draft permit and statement of basis for applicant review. |
| September 2 – October 2, 2014 | DEQ provided a public comment period on the proposed action. |
| September 10, 2014 | DEQ received the permit processing fee. |
| October 22, 2014 | DEQ issued the final permit and statement of basis. |

## TECHNICAL ANALYSIS

### *Emissions Units and Control Equipment*

**Table 1 EMISSIONS UNIT AND CONTROL EQUIPMENT INFORMATION**

| Permit Section | Source Description | Emissions Control |
|---|---|---|
| 1 - 3 | Gas turbine with duct burners<br><br>Manufacturer: General Electric, Model PG7241FA, with advanced dry low-$NO_x$ combustors (DLN III)<br>Typical operation: base load (70-100% load range)<br>Normal Output from the turbine alone: 168 MW<br>Nominal Output from turbine with duct burner: 278 MW<br>Turbine rated heat input: 1,682 MMBtu/hr<br>Duct burner rated heat input: 230 MMBtu/hr<br>Fuels: natural gas exclusively | Selective catalytic reduction (SCR) with aqueous ammonia injection<br><br>Manufacturer: Hitachi<br><br>Catalytic oxidation<br><br>Manufacturer: Engelhard |
| | Auxiliary boiler (startup boiler)<br><br>Manufacturer: Vapor Power<br>Model: TG5905AHK500LN with low-$NO_x$ burners<br>Rated output: 17,200 lb/hr of steam, 500 horsepower<br>Rated heat input: 16.7 MMBtu/hr<br>Fuel: natural gas | Flue gas recirculation<br><br>Manufacturer: Vapor Power |
| | Fuel pre-heater<br><br>Manufacturer: ATCO<br>Model: 2E789 with low-$NO_x$ burners<br>Rated heat input: 4.0 MMBtu/hr<br>Fuel: natural gas | None |
| | Diesel-fired emergency generator<br><br>Manufacturer: Detroit Diesel<br>Model: 6063-TK35<br>Rated capacity: 550 horsepower | None |

| Permit Section | Source Description | Emissions Control |
|---|---|---|
| | Diesel-fired emergency fire pump<br><br>Manufacturer: Clark-Detroit Diesel<br>Model: PDFP06YR<br>Rated capacity: 185 horsepower | None |

## *Emissions Inventories*

### Potential to Emit

IDAPA 58.01.01 defines Potential to Emit as the maximum capacity of a facility or stationary source to emit an air pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the facility or source to emit an air pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is state or federally enforceable. Secondary emissions do not count in determining the potential to emit of a facility or stationary source.

Using this definition of Potential to Emit an emission inventory was developed by Rathdrum Power LLC and reviewed by DEQ. Detailed calculations can be found in Appendix A of this statement of basis.

### Pre-Project Potential to Emit

Pre-project Potential to Emit is used to establish the change in emissions at the facility as a result of this project.

The following table presents the pre-project potential to emit for all criteria and greenhouse gases (GHG) pollutants from turbine with duct burner, auxiliary boiler, and fuel pre-heater at the facility as submitted by the Applicant and reviewed by DEQ staff. See Appendix A for a detailed presentation of the calculations of these emissions for each emissions unit.

**Table 2 PRE-PROJECT POTENTIAL TO EMIT FOR REGULATED AIR POLLUTANTS**

| | $PM_{10}/PM_{2.5}$ | $SO_2$ | NOx | CO | VOC | Greenhouse Gas ($CO_2e$) |
|---|---|---|---|---|---|---|
| Source | T/yr | T/yr | T/yr | T/yr | T/yr | T/yr |
| Turbine/Duct Burner [1] | 39.3 | 10.60 | 92.2 | 92.3 | 5.1 | 917,234 |
| Auxiliary Boiler | 0.4 | 0.03 | 4.0 | 4.0 | 0.10 | 5,850 |
| Fuel Pre-Heater | 0.2 | 0.01 | 1.6 | 1.6 | 0.04 | 2,340 |
| Total, Point Sources | **39.90** | **10.64** | **97.8** | **97.9** | **5.24** | **925,424** |

[1] After the implementation of Cold Day Software - a separate project

### Post Project Potential to Emit

Post project Potential to Emit is used to establish the change in emissions at a facility and to determine the facility's classification as a result of this project. Post project Potential to Emit includes all permit limits resulting from this project.

The following table presents the post project Potential to Emit for criteria and GHG pollutants from turbine with duct burner, auxiliary boiler, and fuel pre-heater at the facility as submitted by the Applicant and reviewed by DEQ staff. See Appendix A for a detailed presentation of the calculations of these emissions for each emissions unit.

**Table 3 POST PROJECT POTENTIAL TO EMIT FOR REGULATED AIR POLLUTANTS**

| | $PM_{10}/PM_{2.5}$ | $SO_2$ | NOx | CO | VOC | $CO_2e$ |
|---|---|---|---|---|---|---|
| Source | T/yr | T/yr | T/yr | T/yr | T/yr | T/yr |
| Turbine/Duct Burner | 40.1 | 10.66 | 95.4 | 95.5 | 5.3 | 929,706 |
| Auxiliary Boiler | 0.08 | 0.006 | 0.8 | 0.8 | 0.02 | 1,170 |
| Fuel Pre-Heater | 0.2 | 0.01 | 1.6 | 1.6 | 0.04 | 2,340 |
| **Total, Point Sources** | **40.38** | **10.68** | **97.8** | **97.9** | **5.36** | **933,216** |

The following table presents the post project Potential to Emit for criteria and GHG pollutants from all emissions units at the facility.

**Table 4 POST PROJECT FACILITY-WIDE POTENTIAL TO EMIT FOR REGULATED AIR POLLUTANTS**

| | $PM_{10}/PM_{2.5}$ | $SO_2$ | NOx | CO | VOC | $CO_2e$ |
|---|---|---|---|---|---|---|
| Source | T/yr | T/yr | T/yr | T/yr | T/yr | T/yr |
| Turbine/Duct Burner | 40.1 | 10.66 | 95.4 | 95.5 | 5.3 | 929,706 |
| Auxiliary Boiler | 0.08 | 0.006 | 0.8 | 0.8 | 0.02 | 1,170 |
| Fuel Pre-Heater | 0.2 | 0.01 | 1.6 | 1.6 | 0.04 | 2,340 |
| Diesel-fired emergency generator, 550 hp[1,2] | 0.07 | 0.06 | 0.9 | 0.2 | 0.08 | 56.9 |
| Diesel-fired emergency fire pump, 550 hp [1,2] | 0.02 | 0.02 | 0.3 | 0.2 | 0.03 | 19.1 |
| **Total, Point Sources** | **40.47** | **10.76** | **99** | **98.3** | **5.47** | 933,291 |

[1] Taken from Table 3-3 of 1999 PTC application.
[2] GHG emissions rates are provided in the 8/21/2014 submittal.

## Change in Potential to Emit

The change in facility-wide potential to emit is used to determine the processing fee per IDAPA 58.01.01.225. The following table presents the facility-wide change in the potential to emit for criteria pollutants.

**Table 5 CHANGES IN POTENTIAL TO EMIT FOR REGULATED AIR POLLUTANTS**

| | $PM_{10}/PM_{2.5}$ | $SO_2$ | NOx | CO | VOC |
|---|---|---|---|---|---|
| | T/yr | T/yr | T/yr | T/yr | T/yr |
| Pre-project potential without emergency engines [1] | 39.90 (38.3) | 10.64 (10.44) | 97.8 (97.6) | 97.9 (97.9) | 5.24 (4.84) |
| Post project potential to Emit without emergency engines | 40.38 | 10.68 | 97.8 | 97.9 | 5.36 |
| **Total, Point Sources [2]** | **0.48 (2.08)** | **0.04 (0.24)** | **0 (0.2)** | **0 (0)** | **0.12 (0.88)** |

[1] The values are after the implementation of Cold Day Software - a separate project. The values in parentheses are permit limits from the PTC issued on October 12, 2004.
[2] Values in parentheses are the total increase from the Cold Day Software project and this project.

## Non-Carcinogenic TAP Emissions

This project does not change the rated capacity of the duct burner and the auxiliary boiler. Hourly emissions rates are unchanged. Therefore, there is no emissions increment for any non-carcinogenic toxic air pollutants (TAP) emissions that are based on 24-hour average.

## Carcinogenic TAP Emissions

A summary of the estimated PTE for emissions increase of carcinogenic TAP is provided in the following table.

**Table 6 PRE- AND POST PROJECT POTENTIAL TO EMIT FOR CARCINOGENIC TOXIC AIR POLLUTANTS**

| Pollutant | Pre-project Duck Burner and Auxiliary Boiler (lb/hr, annual average) | Post-project Duck Burner and Auxiliary Boiler (lb/hr, annual average) | Total Net TAP Emissions Increment (lb/hr) | Screening Level (lb/hr) | Modeling? (Y/N) |
|---|---|---|---|---|---|
| Arsenic | 1.22E-05 | 1.54E-05 | 3.28E-06 | 1.5E-06 | Yes |
| Benzene | 1.28E-04 | 1.62E-04 | 3.44E-05 | 8.0E-04 | No |
| Beryllium | 7.30E-07 | 9.27E-07 | 1.97E-07 | 2.8E-05 | No |
| Cadmium | 6.69E-05 | 8.49E-05 | 1.80E-05 | 3.7E-06 | Yes |
| Formaldehyde | 4.56E-03 | 5.79E-03 | 1.23E-03 | 5.1E-04 | Yes |
| Nickel | 1.28E-04 | 1.62E-04 | 3.44E-05 | 2.7E-05 | Yes |
| Benzo(a)pyrene | 7.30E-08 | 9.27E-08 | 1.97E-08 | 2.0E-06 | No |
| Benz(a)anthracene | 1.09E-07 | 1.39E-07 | 2.95E-08 | NA | No |
| Benzo(b)fluoranthene | 1.09E-07 | 1.39E-07 | 2.95E-08 | NA | No |
| Benzo(k)fluoranthene | 1.09E-07 | 1.39E-07 | 2.95E-08 | NA | No |
| Chrysene | 1.09E-07 | 1.39E-07 | 2.95E-08 | NA | No |
| Dibenzo(a,h)anthracene | 7.30E-08 | 9.27E-08 | 1.97E-08 | NA | No |

| Pollutant | Pre-project Duck Burner and Auxiliary Boiler (lb/hr, annual average) | Post-project Duck Burner and Auxiliary Boiler (lb/hr, annual average) | Total Net TAP Emissions Increment (lb/hr) | Screening Level (lb/hr) | Modeling? (Y/N) |
|---|---|---|---|---|---|
| Indeno(1,2,3-cd)pyrene | 1.09E-07 | 1.39E-07 | 2.95E-08 | NA | No |
| Total POM [1] | 6.9E-07 | 8.8E-07 | 1.87E-07 | 2.00E-06 | No |

[1] Polycyclic Organic Matter (POM) is considered as one TAP comprised of: benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, chrysene, indeno(1,2,3-cd)pyrene, benzo(a)pyrene. The total is compared to benzo(a)pyrene.

Some of the increments for carcinogenic TAP exceeded the annual average carcinogenic screening ELs identified in IDAPA 58.01.01.586 as a result of this project. Therefore, modeling is required for these TAP.

**Post Project HAP Emissions**

According to the 5/30/2014 submittal and confirmed by DEQ, the uncontrolled HAP combined is less than 25 T/yr, and the maximum single HAP is less than 10 T/yr.

### *Ambient Air Quality Impact Analyses*

The applicant has demonstrated pre-construction compliance to DEQ's satisfaction that emissions from this facility will not cause or significantly contribute to a violation of any ambient air quality standard. The applicant has also demonstrated pre-construction compliance to DEQ's satisfaction that the emissions increase due to this permitting action will not exceed any acceptable ambient concentration (AACC) for carcinogenic TAP.

An ambient air quality impact analyses document has been crafted by DEQ based on a review of the modeling analysis submitted in the application. That document is part of the final permit package for this permitting action (see Appendix B).

## REGULATORY ANALYSIS

### *Attainment Designation (40 CFR 81.313)*

The facility is located in Kootenai County, which is designated as attainment or unclassifiable for $PM_{2.5}$, $PM_{10}$, $SO_2$, $NO_2$, CO, and Ozone. Refer to 40 CFR 81.313 for additional information.

### *Facility Classification*

"Synthetic Minor" classification for criteria pollutants is defined as the uncontrolled Potential to Emit for criteria pollutants are above the applicable major source thresholds and the Potential to Emit for criteria pollutants fall below the applicable major source thresholds. The facility is "SM" because the allowable emissions specified in the facility's permit are less than 100 T/yr and the uncontrolled potential to emit is greater than 100 T/yr for NOx and CO.

"Synthetic Minor" classification for HAP pollutants is defined as the uncontrolled Potential to Emit for HAP pollutants are above the applicable major source thresholds and the Potential to Emit for HAP pollutants fall below the applicable major source thresholds. The facility's the uncontrolled HAP combined is less than 25 T/yr and the maximum single HAP is less than 10 T/yr. Therefore, the facility is minor source for HAP emissions.

### *Permit to Construct Required (IDAPA 58.01.01.201)*

This project results in emissions increases as shown in Tables 5 and 6 of the statement of basis and is a "modification" as defined in IDAPA 58.01.01.007. The permittee has requested that a PTC be issued to the facility for the modified emissions sources. Therefore, a permit to construct is required to be issued in accordance with IDAPA 58.01.01.220. This permitting action was processed in accordance with the procedures of IDAPA 58.01.01.200-228.

### Standards for New Sources (IDAPA 58.01.01.676)

The fuel burning equipment located at this facility, with a maximum rated input of ten (10) million BTU per hour or more, are subject to a particulate matter limitation of 0.015 gr/dscf of effluent gas corrected to 3% oxygen by volume when combusting gaseous fuels. Fuel-Burning Equipment is defined as any furnace, boiler, apparatus, stack and all appurtenances thereto, used in the process of burning fuel for the primary purpose of producing heat or power by indirect heat transfer. This requirement is assured by Permit Condition 2.10.

### Rule for Control of Odors (IDAPA 58.01.01.775)

Odorous gases shall not be emitted to the atmosphere in such quantities as to cause air pollution in accordance with IDAPA 58.01.01.775. This requirement is assured by Permit Condition 2.8.

### Title V Classification (IDAPA 58.01.01.300, 40 CFR Part 70)

IDAPA 58.01.01.301 ..... Requirement to Obtain Tier I Operating Permit

The facility is a Tier I source and has an existing Tier I operating permit because the facility is a phase II source of the acid rain program. This permit will be incorporated into Tier I operating permit in accordance with IDAPA 58.01.01.209.05.c.

No post project facility-wide emissions from this facility have a potential to emit greater than 100 tons per year for regulated air pollutants or 10 tons per year for any one HAP or 25 tons per year for all HAP combined.

### PSD Classification (40 CFR 52.21)

40 CFR 52.21 ..... Prevention of Significant Deterioration of Air Quality

The facility is not a major stationary source as defined in 40 CFR 52.21(b)(1), nor is it undergoing any physical change at a stationary source not otherwise qualifying under paragraph 40 CFR 52.21(b)(1) as a major stationary source, that would constitute a major stationary source by itself as defined in 40 CFR 52. Therefore in accordance with 40 CFR 52.21(a)(2), PSD requirements are not applicable to this permitting action. The facility is/is not a designated facility as defined in 40 CFR 52.21(b)(1)(i)(a), and does not have facility-wide emissions of any criteria pollutant that exceed 250 T/yr.

### NSPS Applicability (40 CFR 60)

This project does not change facility's applicability and requirements of 40 CFR 60. Refer to the statement of basis of the facility's initial Tier I operating permit for federal regulation analysis of these requirements. The facility has submitted Tier I operating permit renewal application in August 2014, and an analysis on NSPS requirements will be required in the Tier I operating permit renewal application.

### NESHAP Applicability (40 CFR 61)

This facility is not subject to any requirements in 40 CFR 61.

### MACT Applicability (40 CFR 63)

This project does not change facility's applicability and requirements of 40 CFR 63. The facility has submitted Tier I operating permit renewal application in August 2014, and an analysis on 40 CFR 63 requirements will be required in the Tier I operating permit renewal application.

### Permit Conditions Review

This section describes those permit conditions that have been added, revised, modified or deleted as a result of this permitting action. The most current PTC template is used, which has changed the numbering system of the permit. The following table shows how the new permit condition numbers correspond to the old permit condition numbers.

| Old Permit Condition Number | New Permit Condition Number | Old Permit Condition Number | New Permit Condition Number | Old Permit Condition Number | New Permit Condition Number | Old Permit Condition Number | New Permit Condition Number |
|---|---|---|---|---|---|---|---|
| 1.1 | 2.3 | 2.1 | 2.9 | 3.1 | 2.13 | 4.1 | 2.25 |
| 1.2 | 2.4 | 2.2 | 2.10 | 3.2 | 2.14 | 4.2 | 2.26 |
| 1.3 | 2.5 | 2.3 | 2.11 | 3.3 | 2.15 | 4.3 | 2.27 |
| 1.4 | 2.6 | 2.4 | 2.12 | 3.4 | 2.16 | 4.4 | 2.28 |
| 1.5 | 2.7 | Table 2 | Table 2.2 | 3.5 | 2.17 | 4.5 | 2.29 |
| 1.6 | 2.8 | | | 3.6 | 2.18 | 4.6 | 2.30 |
| Table 1 | Table 2.1 | | | 3.7 | 2.19 | 4.7 | 2.31 |
| | | | | 3.8 | 2.20 | | |
| | | | | 3.9 | 2.21 | | |
| | | | | 3.10 | 2.22 | | |
| | | | | 3.11 | 2.23 | | |
| | | | | 3.12 | 2.24 | | |

SECTION 1 - PERMIT SCOPE

Permit Conditions 1.1 to 1.3

This section states the purposes of this permitting action and states that this PTC will replace the PTC No. P-020116, issued on October 12, 2004.

Table 1.1

Table 1.1 lists all sources of regulated emissions in this permit. The information in Table 1.1 is taken from the current effective Tier I operating permit issued on December 14, 2011 except for the turbine rating. Refer to Cold Day Performance software installation project and the facility's 8/21/2014 submittal for the new turbine rating details.

SECTION 2 - GAS TURBINE WITH DUCT BURNERS, AUXILIARY BOILER, FUEL PRE-HEATER, DIESEL-FIRED EMERGENCY GENERATOR, DIESEL-FIRED EMERGENCY FIRE PUMP

Permit Condition 2.1

The content in Permit Condition 2.1 is taken from the current effective Tier I operating permit issued on December 14, 2011 except for the turbine rating. Refer to Cold Day Performance software installation project and the facility's 8/21/2014 submittal for the new turbine rating details.

Permit Condition 2.3

Rathdrum Power LLC has requested to reduce CO emissions limit from 34.6 lb/hr to 32.6 lb/hr to keep the facility-wide CO below major source threshold of 100 T/yr in facility's 5/30/2014 submittal. This change is made to the existing permit condition.

Table 2.1

The emissions increases, as a result of duct burner operation hour increase, are $7.83 \times 10^{-3}$ T/yr for formaldehyde and $2.19 \times 10^{-4}$ T/yr for benzene. They are insignificant comparing to their respective limits in Table 2.1 of the permit. Therefore, no changes are made to the limits in Table 2.1 of the permit.

The following are taken from the internal guidance on permit conditions and are added to Table 2.1 as footnotes.

a In absence of any other credible evidence, compliance is ensured by complying with permit operating, monitoring, and record keeping requirements.
b Pounds per hour, as determined by a test method prescribed by IDAPA 58.01.01.157, EPA reference test method, continuous emission monitoring system (CEMS) data, or DEQ-approved alternative.
c Tons per any consecutive 12-calendar month period.

Table 2.2

Duct burner operation hours are changed from 2,000 hr/yr to 2,927 hr/yr as a result of this project, and auxiliary boiler operation hours are reduced from 5,000 hr/yr to 1,000 hr/yr.

Permit Conditions 2.13, 2.14, 2.15, and 2.20

"All such records shall be maintained onsite for the most recent two-year period and shall be made available to DEQ representatives upon request." has been changed to "All such records shall be maintained onsite for the most recent five-year period and shall be made available to DEQ representatives upon request." to be consistent with the current General Provision 10 for keeping records for five years.

Permit Condition 2.15.1

"All CEMS data, calibration reports, and maintenance logs shall be maintained onsite in accordance with Section 2 of this permit and shall be made available to DEQ representatives upon request." is changed to "All CEMS data, calibration reports, and maintenance logs shall be maintained onsite in accordance with General Provision 10."

Appendix

T/yr limits in Appendix are revised as a result of this permitting action. New T/yr limits for gas turbine with duct firing are calculated by adding T/yr emissions increases of the duct firing to the existing T/yr limits. New T/yr limits for combined emissions from auxiliary boiler and fuel pre-heater are calculated by subtracting T/yr emissions changes of the auxiliary boiler from the existing T/yr limits.

SECTION 3 GENERAL PROVISIONS

The general provisions are replaced with the ones taken from the current PTC template.

## PUBLIC REVIEW

### *Public Comment Period*

A public comment period was made available to the public in accordance with IDAPA 58.01.01.209.05.c. EPA's 45-day review was provided concurrently with the public comment period in accordance with IDAPA 58.01.01.209.05.c from September 2 to October 17, 2014. During this time, comments were not submitted in response to DEQ's proposed action. Refer to the chronology for public comment period dates.

# APPENDIX A – EMISSIONS INVENTORIES

## B. RESPONSES TO IDEQ LETTER DATED MAY 1, 2014

The responses to questions in the letter are provided in the order of the questions in the letter.

**Emissions Inventory**

*1. Provide EI using DEQ's Form EI, available at DEQ's website. Specifically, the EI needs to include pre-project potential to emit (PTE) and post project PTE, including $PM_{2.5}$ and Greenhouse Gas ($CO_2e$), post project hazardous air pollutants (HAP) PTE, and emissions increments of carcinogenic toxic air pollutants (TAP) regulated under IDAPA 58.01.01.586 due to this project.*

Response:

The following tables, which were reproduced from your e-mail dated May 1, 2014, have been completed and are provided below;

**Table 1. PRE-PROJECT FACILITY-WIDE PTE FOR REGULATED AIR POLLUTANTS[1,2]**

| | $PM_{10}/PM_{2.5}$ | $SO_2$ | NOx | CO | VOC | Greenhouse Gas ($CO_2e$)[3] |
|---|---|---|---|---|---|---|
| Source | T/yr | T/yr | T/yr | T/yr | T/yr | T/yr |
| Point Sources | | | | | | |
| Turbine/Duct Burner | 39.3 | 10.60 | 92.2 | 92.3 | 5.1 | 917,234 |
| Auxiliary Boiler | 0.4 | 0.03 | 4.0 | 4.0 | 0.10 | 5,850 |
| Fuel Pre-Heater | 0.2 | 0.01 | 1.6 | 1.6 | 0.04 | 2,340 |
| **Total, Point Sources** | **39.90** | **10.64** | **97.8** | **97.9** | **5.24** | **925,424** |

[1] Based on permitted levels and increases associated with implementation of Cold Day Software.
[2] Based on hours of operation for turbine, duct burner, and auxiliary boiler of 8,000 hours, 2,000 hours, and 5,000 hours respectively.
[3] Based on The Climate Registry's 2013 Default Emission Factors, Table 12.1 (117 lb/MMBtu).

**Table 2. POST-PROJECT FACILITY-WIDE PTE FOR REGULATED AIR POLLUTANTS[1]**

| | $PM_{10}/PM_{2.5}$ | $SO_2$ | NOx | CO | VOC | Greenhouse Gas ($CO_2e$)[2] |
|---|---|---|---|---|---|---|
| Source | T/yr | T/yr | T/yr | T/yr | T/yr | T/yr |
| Point Sources | | | | | | |
| Turbine/Duct Burner | 40.1 | 10.66 | 95.4 | 95.5 | 5.3 | 929,706 |
| Auxiliary Boiler | 0.08 | 0.006 | 0.8 | 0.8 | 0.02 | 1,170 |
| Fuel Pre-Heater | 0.2 | 0.01 | 1.6 | 1.6 | 0.04 | 2,340 |
| **Total, Point Sources** | **40.38** | **10.68** | **97.8** | **97.9** | **5.36** | **933,216** |

[1] Based on permitted levels and hours of operation for turbine, duct burner, and auxiliary boiler of 8,000 hours, 2,927 hours, and 1,000 hours respectively.
[2] Based on The Climate Registry's 2013 Default Emission Factors, Table 12.1 (117 lb/MMBtu).

# SUMMARY OF EMISSIONS

| | Hours of Operation | $NO_x$ (tons/yr) | CO (tons/yr) | PM (tons/yr) | VOC (tons/yr) | $SO_2$ (tons/yr) |
|---|---|---|---|---|---|---|
| **Original PTC/ October 2004** | | | | | | |
| Turbine, | | | | | | |
| Base Load 49 deg F | 8000 | 85.2 | 78.8 | 36 | 3.8 | 9.6 |
| | | | | | | |
| Duct Burner | 2000 | 7.0 | 13.4 | 1.7 | 0.5 | 0.14 |
| Aux Boiler | 5000 | 4.0 | 4.0 | 0.4 | 0.1 | 0.03 |
| Fuel Pre-Heater | 8000 | 1.6 | 1.6 | 0.2 | 0.04 | 0.01 |
| **TOTAL (tons/yr)** | | **97.8** | **97.8**[1] | **38.3** | **4.44** | **9.78** |
| | | | | | | |
| **Exempt Cold Day Modification/February 2014** | | | | | | |
| | | | | | | |
| Turbine, Cold Day | 8000 | 85.2 | 78.8 | 37.6 | 4.6 | 10.46 |
| Duct Burner | 2000 | 7.0 | 13.4 | 1.7 | 0.5 | 0.14 |
| Aux Boiler | 5000 | 4.0 | 4.0 | 0.4 | 0.1 | 0.03 |
| Fuel Pre-Heater | 8000 | 1.6 | 1.6 | 0.2 | 0.04 | 0.01 |
| **TOTAL (tons/yr)** | | **97.8** | **97.8** | **39.9** | **5.24** | **10.64** |
| | | | | | | |
| **Proposed PTC Modification/May 2014** | | | | | | |
| | | | | | | |
| Turbine | 8000 | 85.2 | 78.8 | 37.6 | 4.6 | 10.46 |
| Duct Burner | 2927 | 10.2 | 16.7 | 2.5 | 0.7 | 0.20 |
| Aux Boiler | 1000 | 0.8 | 0.8 | 0.08 | 0.02 | 0.006 |
| Fuel Pre-Heater | 8000 | 1.6 | 1.6 | 0.2 | 0.04 | 0.01 |
| **TOTAL (tons/yr)** | | **97.8** | **97.9** | **40.38** | **5.36** | **10.68** |

[1] The PTC lists total annual CO emissions of 97.9 tons/yr.

## Table 1

The pre-project PTE for the turbine/duct burner is the sum of the permitted emission levels and the increase, if any, based on the implementation of the Cold Day Software (Table 1 of memorandum dated February 26, 2014).

Turbine/Duct Burner

$NO_x$ = 92.2 tons/yr + 0 = 92.2 tons/yr
CO = 92.3 tons/yr + 0 = 92.3 tons/yr
PM = 37.7 tons/yr + (0.41 lbs/hr x 8000 hrs/yr)/2000 lbs/ton = 39.3 tons/yr
VOC = 4.7 tons/yr + (0.1 lbs/hr x 8000 hrs/yr)/2000 lbs/ton = 5.1 tons/yr
$SO_2$ = 10.4 tons/yr + (0.05 lbs/hr x 8000 hrs/yr)/2000 lbs/ton = 10.6 tons/yr
$CO_{2e}$ = 890, 324 tons/yr + (117 lbs/MMBtu x 230 MMBtu/hr x 2000 hrs/yr)/2000 lbs/ton = 917,234 tons/yr

Auxiliary Boiler

The pre-project PTE for the auxiliary boiler are the permitted emission levels and the calculated $CO_{2e}$.
$CO_{2e}$ = (117 lbs/MMBtu x 20 MMBtu/hr)/2000 lbs/ton = 5,850 tons/yr

## Table 2

The post-project PTE for the turbine/duct burner is the sum of the pre-project PTE based on implementation of the Cold Day Software and the calculated emissions from the duct burner based on the hourly emission rates from Table 3-2 of the PTC application and the 2,927 hours/yr operation for the duct burner. (Note that the emissions calculations for PM and VOC are based on the increase in hours of operation for the duct burner because the pre-project PTE includes 2,000 hours of operation. The post-project PTE for the turbine/duct burner also reflects the proposed decrease in permitted CO emissions from 34.6 lbs/hr to 32.6 lbs/hr (decrease in CO emissions from the duct burner from 13.4 lbs/hr to 11.4 lbs/hr to offset the increased hours of operation).

Turbine/Duct Burner (turbine/8000 hours and duct burner/2927 hours)

$NO_x$ = 85.2 tons/yr + (7 lbs/hr x 2927 hrs/yr)/2000 lbs/ton = 95.4 tons/yr
CO = 78.8 tons/yr + (11.4 lbs/hr x 2927 hrs/yr)/2000 lbs/ton = 95.5 tons/yr
PM = 39.3 tons/yr + (1.7 lbs/hr x 927 hrs/yr)/2000 lbs/ton = 40.1 tons/yr
VOC = 5.1 tons/yr + (0.46lbs/hr x 927 hrs/yr)/2000 lbs/ton = 5.3 tons/yr
$SO_2$ = 10.6 tons/yr + (0.05 lbs/hr x 927 hrs/yr)/2000 lbs/ton = 10.62 tons/yr
$CO_{2e}$ = 890,324 + (117 lbs/MMBtu x 230 MMBtu/hr x 2927 hrs/yr)/2000 lbs/ton = 929,706 tons/yr

Auxiliary Boiler (1000 hours)

The post-project PTE for the auxiliary boiler is based on the hourly emission rate from Table 3-2 of the PTC application and 1,000 hours/yr operation.
$NO_x$ = (1.6 lbs/hr x 1000 hrs/yr)/2000 lbs/ton = 0.80 tons/yr
CO = (1.6 lbs/hr x 1000 hrs/yr)/2000 lbs/ton = 0.80 tons/yr
PM = (0.15 lbs/hr x 1000 hrs/yr)/2000 lbs/ton = 0.075 tons/yr
VOC = (0.04 lbs/hr x 1000 hrs/yr)/2000 lbs/ton = 0.02 tons/yr

$SO_2$ = (0.012 lbs/hr x 1000 hrs/yr)/2000 lbs/ton = 0.006 tons/yr
$CO_{2e}$ = (117 lbs/MMBtu x 20 MMBtu/hr)/2000 lbs/ton = 1,170 tons/yr

## Table 3

a) The single HAP with the highest annual emission rate is formaldehyde. The turbine emissions are based on the HAP emission rates contained in the Cold Day memorandum dated February 26, 2014. The duct burner and auxiliary boiler emissions are based on the emission rates contained in the PTC application. The hours of operation for the turbine, duct burner, and auxiliary boiler are 8,000 hours/yr, 2,927 hours/yr, and 1,000 hours/yr respectively. Note that the potential control efficiency of the oxidation catalyst is not included.

Turbine = (0.384284 lbs/hr x 8000 hrs/yr)/2000 lbs/ton = 1.53 tons/yr
Duct Burner = (0.089100 lbs/hr x 2927 hrs/yr)/2000 lbs/ton = 0.13 tons/yr
Auxiliary Boiler = (0.0077 lbs x 1000 hrs/yr)/2000 lbs/ton = 0.004 tons/yr
**Total** = 1.66 tons/yr

b) The total combined emissions of all HAPs from the turbine are based on the HAP emission rates contained in the Cold Day memorandum dated February 26, 2014. The duct burner and auxiliary boiler emissions are based on the emission rates contained in the PTC application. The hours of operation for the turbine, duct burner, and auxiliary boiler of 8,000 hours/yr, 2,927 hours/yr, and 1,000 hours/yr respectively. Note that the potential control efficiency of the oxidation catalyst is not included.

Turbine = (0.987969 lbs/hr x 8000 hrs/yr)/2000 lbs/ton = 3.95 tons/yr
Duct Burner = (0.322985 lbs/hr x 2927 hrs/yr)/2000 lbs/ton = 0.47 tons/yr
Auxiliary Boiler = (0.028490 lbs/hr x 1000 hrs/yr)/2000 lbs/ton = 0.01 tons/yr
**Total** = 4.43 tons/yr

61351 Rathdrum

| | | Pre-project | Post project |
|---|---|---|---|
| | Capacity (MMBtu/hr) | Operating hours | |
| Duck burner | 230 | 2000 | 2927 |
| Auxiliary boiler | 16.7 | 5000 | 1000 |
| Natural gas heating value | 1020 | mmbtu/10^6 scf | |

**CARCINOGENS (POUNDS PER HOUR)**

| Pollutant | CAS # | EF for NG Combustion (lb/$10^6$ scf)[a] | EF for NG Combustion (lb/MMBtu) | Duck Burner (lb/hr, max) | Auxiliary Boiler (lb/hr, max) | Pre-project Duck Burner and Auxiliary Boiler (lb/hr, annual average) | Post-project Duck Burner and Auxiliary Boiler (lb/hr, annual average) | Total, duct burner and the boiler, Net Change TAP Emissions (lb/hr) | Screening Level (lb/hr) | Modeling? (Y/N) |
|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 7440-38-2 | 2.0E-04 | 2.0E-07 | 4.5E-05 | 3.3E-06 | 1.22E-05 | 1.54E-05 | 3.28E-06 | 1.5E-06 | Yes |
| Benzene | 71-43-2 | 2.1E-03 | 2.1E-06 | 4.7E-04 | 3.4E-05 | 1.28E-04 | 1.62E-04 | 3.44E-05 | 8.0E-04 | No |
| Beryllium | 7440-41-7 | 1.2E-05 | 1.2E-08 | 2.7E-06 | 2.0E-07 | 7.30E-07 | 9.27E-07 | 1.97E-07 | 2.8E-05 | No |
| Cadmium | 7440-43-9 | 1.1E-03 | 1.1E-06 | 2.5E-04 | 1.8E-05 | 6.69E-05 | 8.49E-05 | 1.80E-05 | 3.7E-06 | Yes |
| Formaldehyde | 50-00-0 | 7.5E-02 | 7.4E-05 | 1.7E-02 | 1.2E-03 | 4.56E-03 | 5.79E-03 | 1.23E-03 | 5.1E-04 | Yes |
| Nickel | 7440-02-0 | 2.1E-03 | 2.1E-06 | 4.7E-04 | 3.4E-05 | 1.28E-04 | 1.62E-04 | 3.44E-05 | 2.7E-05 | Yes |
| Benzo(a)pyrene | 50-32-8 | 1.2E-06 | 1.2E-09 | 2.7E-07 | 2.0E-08 | 7.30E-08 | 9.27E-08 | 1.97E-08 | 2.0E-06 | No |
| Benz(a)anthracene | 56-55-3 | 1.8E-06 | 1.8E-09 | 4.1E-07 | 2.9E-08 | 1.09E-07 | 1.39E-07 | 2.95E-08 | NA | No |
| Benzo(b)fluoranthene | 205-82-3 | 1.8E-06 | 1.8E-09 | 4.1E-07 | 2.9E-08 | 1.09E-07 | 1.39E-07 | 2.95E-08 | NA | No |
| Benzo(k)fluoranthene | 205-99-2 | 1.8E-06 | 1.8E-09 | 4.1E-07 | 2.9E-08 | 1.09E-07 | 1.39E-07 | 2.95E-08 | NA | No |
| Chrysene | 218-01-9 | 1.8E-06 | 1.8E-09 | 4.1E-07 | 2.9E-08 | 1.09E-07 | 1.39E-07 | 2.95E-08 | NA | No |
| Dibenzo(a,h)anthracene | 53-70-3 | 1.2E-06 | 1.2E-09 | 2.7E-07 | 2.0E-08 | 7.30E-08 | 9.27E-08 | 1.97E-08 | NA | No |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 1.8E-06 | 1.8E-09 | 4.1E-07 | 2.9E-08 | 1.09E-07 | 1.39E-07 | 2.95E-08 | NA | No |
| Total PAHs | | 1.1E-05 | 1.1E-08 | 2.6E-06 | 1.9E-07 | 6.9E-07 | 8.8E-07 | 1.87E-07 | 2.00E-06 | No |
| Total | | | | | | | | | | |

[a]EFs from AP-42, Tables 1.4-3 and 1.4-4, 7/98

Polycyclic Organic Matter (POM) is considered as one TAP comprised of: benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, chrysene, indeno(1,2,3-cd)pyrene, benzo(a)pyrene. The total is compared to benzo(a)pyrene.

**NON-CARCINOGENS (POUNDS PER HOUR)**

| Pollutant | CAS # | EF for NG Combustion (lb/$10^6$ scf)[a] | EF for NG Combustion (lb/MMBtu) | Duct Burner (lb/hr, max) | Auxiliary Boiler (lb/hr, max) |
|---|---|---|---|---|---|
| Barium | 7440-39-3 | 4.4E-03 | 4.3E-06 | 9.9E-04 | 7.2E-05 |
| Chromium | 7440-47-3 | 1.4E-03 | 1.4E-06 | 3.2E-04 | 2.3E-05 |
| Cobalt | 7440-48-4 | 8.4E-05 | 8.2E-08 | 1.9E-05 | 1.4E-06 |
| Copper | 7440-50-8 | 8.5E-04 | 8.3E-07 | 1.9E-04 | 1.4E-05 |
| Hexane | 110-54-3 | 1.8E+00 | 1.8E-03 | 4.1E-01 | 2.9E-02 |
| Manganese | 7439-96-5 | 3.8E-04 | 3.7E-07 | 8.6E-05 | 6.2E-06 |
| Mercury | 7439-97-6 | 2.6E-04 | 2.5E-07 | 5.9E-05 | 4.3E-06 |
| Molybdenum | 7439-98-7 | 1.1E-03 | 1.1E-06 | 2.5E-04 | 1.8E-05 |
| Naphthalene | 91-20-3 | 6.1E-04 | 6.0E-07 | 1.4E-04 | 1.0E-05 |
| Pentane | 109-66-0 | 2.6E+00 | 2.5E-03 | 5.9E-01 | 4.3E-02 |
| Selenium | 7782-49-2 | 2.4E-05 | 2.4E-08 | 5.4E-06 | 3.9E-07 |
| Toluene | 108-88-3 | 3.4E-03 | 3.3E-06 | 7.7E-04 | 5.6E-05 |
| Vanadium | 1314-62-1 | 2.3E-03 | 2.3E-06 | 5.2E-04 | 3.8E-05 |
| Zinc | 7440-66-6 | 2.9E-02 | 2.8E-05 | 6.5E-03 | 4.7E-04 |

# PERMIT TO CONSTRUCT APPLICATION
# FOR THE
# RATHDRUM GENERATING PROJECT
# RATHDRUM, IDAHO

2.1.3

Prepared for

Rathdrum Power, LLC

March 31, 1999

Prepared by

AirPermits.com
18115 N.E. 197th Place
Woodinville, Washington 98072

Project 99109.01

## Table 3-2

## Hourly Emission Rates - Controlled

| Load Condition | Uncontrolled Pollutant Emission Rate (lbs/hr) | | | | |
|---|---|---|---|---|---|
| | $NO_X$ | CO | PM | VOC | $SO_2$ [a] |
| Base Load | | | | | |
| 0°F | 22.8 | 21.2 | 9.0 | 1.04 | 2.57 |
| 30°F | 22.0 | 20.4 | 9.0 | 1.04 | 2.47 |
| 49°F | 21.3 | 19.7 | 9.0 | 0.96 | 2.40 |
| 95°F | 18.6 | 17.5 | 9.0 | 0.89 | 2.12 |
| 85% Load | | | | | |
| 0°F | 19.8 | 18.3 | 9.0 | 0.89 | 2.23 |
| 30°F | 19.0 | 18.3 | 9.0 | 0.89 | 2.17 |
| 49°F | 18.6 | 17.5 | 9.0 | 0.89 | 2.12 |
| 95°F | 16.7 | 16.1 | 9.0 | 0.81 | 1.89 |
| 70% Load | | | | | |
| 0°F | 17.1 | 16.1 | 9.0 | 0.81 | 1.97 |
| 30°F | 16.7 | 16.1 | 9.0 | 0.74 | 1.91 |
| 49°F | 16.3 | 15.3 | 9.0 | 0.74 | 1.86 |
| 95°F | 14.8 | 14.6 | 9.0 | 0.74 | 1.68 |
| Duct Burner [b,c] | 7.0 | 13.4 | 1.7 | 0.46 | 0.14 |
| Auxiliary Boiler [b] | 1.6 | 1.6 | 0.15 | 0.04 | 0.012 |
| Fuel Pre-Heater [b] | 0.4 | 0.4 | 0.04 | 0.01 | 0.003 |
| Emergency Generator [b] | 3.7 | 0.81 | 0.26 | 0.31 | 0.25 |
| Diesel Fire Pump [b] | 1.2 | 0.73 | 0.087 | 0.10 | 0.081 |

NOTE:

[a] The highest $SO_2$ emission rate will occur at base load operation, since this is when the maximum fuel input is needed and the amount of $SO_2$ formed is directly related to fuel flow because the sulfur content of the fuel is constant.

[b] Not affected by turbine load or ambient temperature.

[c] Operated only with turbine at base load.

# Toxic Emissions for Gas Turbine with Duct Firing at Full Load and 0 Deg. F

| Toxic Compound | Weight Fraction for Gas Turbine | Emission Rate for Gas Turbine (lb/hr) | Weight Fraction for Duct Burners | Emission Rate for Duct Burners (lb/hr) | Total Emissions (lb/hr) |
|---|---|---|---|---|---|
| Ammonia | NA | NA | NA | NA | 20.6 |
| Sulfuric Acid | NA | NA | NA | NA | 0.01 |
| VOC | | 1.04 | | 0.5 | |
| Acetaldehyde | 0.003222 | 0.003338 | NA | NA | 0.0033 |
| Benzene | 0.011815 | 0.012241 | 0.081967 | 0.037705 | 0.050 |
| Cyclohexane | 0.001074 | 0.001113 | 0.021942 | 0.010093 | 0.0112 |
| Cyclopentane | 0.002148 | 0.002226 | NA | NA | 0.0022 |
| Ethylbenzene | 0.001074 | 0.001113 | NA | NA | 0.0011 |
| Formaldehyde | 0.087003 | 0.090135 | 0.193695 | 0.089100 | 0.18 |
| Hexane (isomers) | 0.002148 | 0.002226 | 0.022699 | 0.010441 | 0.013 |
| Heptane | 0.004296 | 0.004451 | NA | NA | 0.0045 |
| Nonane | 0.001074 | 0.001113 | NA | NA | 0.0011 |
| Octane | 0.002148 | 0.002226 | NA | NA | 0.0022 |
| Pentane (isomers) | 0.013963 | 0.014466 | 0.340479 | 0.156620 | 0.17 |
| Toluene | 0.004296 | 0.004451 | 0.041362 | 0.019026 | 0.023 |
| Trimethylbenzene (isomers) | 0.004296 | 0.004451 | NA | NA | 0.0045 |
| Xylene (isomers) | 0.002148 | 0.002226 | NA | NA | 0.0022 |
| PM | | 9.0 | | | |
| Chromium | 0.00050 | 0.0045 | NA | NA | 0.0045 |
| Cobalt | 0.00050 | 0.0045 | NA | NA | 0.0045 |
| Copper | 0.00050 | 0.0045 | NA | NA | 0.0045 |
| Manganese | 0.00050 | 0.0045 | NA | NA | 0.0045 |
| Mercury | NA | NA | NA | NA | 3.65E-06 |
| Nickel | 0.00050 | 0.0045 | NA | NA | 0.0045 |
| Zinc | 0.00050 | 0.0045 | NA | NA | 0.0045 |

NA = Not Applicable

# Toxic Emissions for the Auxiliary Boiler

| Toxic Compound | Weight Fraction for Auxiliary Boiler | Emission Rate for Auxiliary Boiler (lb/hr) |
|---|---|---|
| **VOC** | | **0.040** |
| Acetaldehyde | NA | NA |
| Benzene | 0.081967 | 0.0033 |
| Cyclohexane | 0.021942 | 0.00088 |
| Cyclopentane | NA | NA |
| Ethylbenzene | NA | NA |
| Formaldehyde | 0.193695 | 0.0077 |
| Hexane (isomers) | 0.022699 | 0.00091 |
| Heptane | NA | NA |
| Nonane | NA | NA |
| Octane | NA | NA |
| Pentane (isomers) | 0.340479 | 0.014 |
| Toluene | 0.041362 | 0.0017 |
| Trimethylbenzene (isomers) | NA | NA |
| Xylene (isomers) | NA | NA |
| **PM** | | |
| Chromium | NA | NA |
| Cobalt | NA | NA |
| Copper | NA | NA |
| Manganese | NA | NA |
| Mercury | NA | 4.00E-08 |
| Nickel | NA | NA |
| Zinc | NA | NA |

NA = Not Applicable

# Toxic Emissions for Gas Turbine with Duct Firing at Full Load and 0 Deg. F

| Toxic Compound | Weight Fraction for Gas Turbine | Emission Rate for Gas Turbine (lb/hr) | Weight Fraction for Duct Burners | Emission Rate for Duct Burners (lb/hr) | Total Emissions (lb/hr) |
|---|---|---|---|---|---|
| Ammonia | NA | NA | NA | NA | 20.6 |
| Sulfuric Acid | NA | NA | NA | NA | 0.01 |
| VOC | | 1.04 | | 0.5 | |
| Acetaldehyde | 0.003222 | 0.003338 | NA | NA | 0.0033 |
| Benzene | 0.011815 | 0.012241 | 0.081967 | 0.037705 | 0.050 |
| Cyclohexane | 0.001074 | 0.001113 | 0.021942 | 0.010093 | 0.0112 |
| Cyclopentane | 0.002148 | 0.002226 | NA | NA | 0.0022 |
| Ethylbenzene | 0.001074 | 0.001113 | NA | NA | 0.0011 |
| Formaldehyde | 0.087003 | 0.090135 | 0.193695 | 0.089100 | 0.18 |
| Hexane (isomers) | 0.002148 | 0.002226 | 0.022699 | 0.010441 | 0.013 |
| Heptane | 0.004296 | 0.004451 | NA | NA | 0.0045 |
| Nonane | 0.001074 | 0.001113 | NA | NA | 0.0011 |
| Octane | 0.002148 | 0.002226 | NA | NA | 0.0022 |
| Pentane (isomers) | 0.013963 | 0.014466 | 0.340479 | 0.156620 | 0.17 |
| Toluene | 0.004296 | 0.004451 | 0.041362 | 0.019026 | 0.023 |
| Trimethylbenzene (isomers) | 0.004296 | 0.004451 | NA | NA | 0.0045 |
| Xylene (isomers) | 0.002148 | 0.002226 | NA | NA | 0.0022 |
| PM | | 9.0 | | | |
| Chromium | 0.00050 | 0.0045 | NA | NA | 0.0045 |
| Cobalt | 0.00050 | 0.0045 | NA | NA | 0.0045 |
| Copper | 0.00050 | 0.0045 | NA | NA | 0.0045 |
| Manganese | 0.00050 | 0.0045 | NA | NA | 0.0045 |
| Mercury | NA | NA | NA | NA | 3.65E-06 |
| Nickel | 0.00050 | 0.0045 | NA | NA | 0.0045 |
| Zinc | 0.00050 | 0.0045 | NA | NA | 0.0045 |

NA = Not Applicable

# Toxic Emissions for the Auxiliary Boiler

| Toxic Compound | Weight Fraction for Auxiliary Boiler | Emission Rate for Auxiliary Boiler (lb/hr) |
|---|---|---|
| **VOC** | | 0.040 |
| Acetaldehyde | NA | NA |
| Benzene | 0.081967 | 0.0033 |
| Cyclohexane | 0.021942 | 0.00088 |
| Cyclopentane | NA | NA |
| Ethylbenzene | NA | NA |
| Formaldehyde | 0.193695 | 0.0077 |
| Hexane (isomers) | 0.022699 | 0.00091 |
| Heptane | NA | NA |
| Nonane | NA | NA |
| Octane | NA | NA |
| Pentane (isomers) | 0.340479 | 0.014 |
| Toluene | 0.041362 | 0.0017 |
| Trimethylbenzene (isomers) | NA | NA |
| Xylene (isomers) | NA | NA |
| **PM** | | |
| Chromium | NA | NA |
| Cobalt | NA | NA |
| Copper | NA | NA |
| Manganese | NA | NA |
| Mercury | NA | 4.00E-08 |
| Nickel | NA | NA |
| Zinc | NA | NA |

NA = Not Applicable

# Toxic Emissions for the Natural Gas Preheater

| Toxic Compound | Weight Fraction for Natural Gas Preheater | Emission Rate for Natural Gas Preheater (lb/hr) |
|---|---|---|
| **VOC** | | 0.010 |
| Acetaldehyde | NA | NA |
| Benzene | 0.081967 | 0.0008 |
| Cyclohexane | 0.021942 | 0.00022 |
| Cyclopentane | NA | NA |
| Ethylbenzene | NA | NA |
| Formaldehyde | 0.193695 | 0.0019 |
| Hexane (isomers) | 0.022699 | 0.00023 |
| Heptane | NA | NA |
| Nonane | NA | NA |
| Octane | NA | NA |
| Pentane (isomers) | 0.340479 | 0.003 |
| Toluene | 0.041362 | 0.0004 |
| Trimethylbenzene (isomers) | NA | NA |
| Xylene (isomers) | NA | NA |
| **PM** | | |
| Chromium | NA | NA |
| Cobalt | NA | NA |
| Copper | NA | NA |
| Manganese | NA | NA |
| Mercury | NA | 4.00E-08 |
| Nickel | NA | NA |
| Zinc | NA | NA |

NA = Not Applicable

# Toxic Emissions for the Emergency Generator

| Toxic Compound | Weight Fraction for Emergency Generator | Emission Rate for Emergency Generator (lb/hr) |
|---|---|---|
| **VOC** | | **0.31** |
| Acetaldehyde | 0.003222 | 0.00099 |
| Benzene | 0.011815 | 0.0036 |
| Cyclohexane | 0.001074 | 0.00033 |
| Cyclopentane | 0.002148 | 0.00066 |
| Ethylbenzene | 0.001074 | 0.00033 |
| Formaldehyde | 0.087003 | 0.027 |
| Hexane (isomers) | 0.002148 | 0.00066 |
| Heptane | 0.002148 | 0.00066 |
| Nonane | 0.001074 | 0.00033 |
| Octane | 0.002148 | 0.00066 |
| Pentane (isomers) | 0.019334 | 0.0059 |
| Toluene | 0.004296 | 0.00132 |
| Trimethylbenzene (isomers) | 0.004296 | 0.00132 |
| Xylene (isomers) | 0.002148 | 0.00066 |
| **PM** | | **0.26** |
| Chromium | 0.00050 | 0.00013 |
| Cobalt | 0.00050 | 0.00013 |
| Copper | 0.00050 | 0.00013 |
| Manganese | 0.00050 | 0.00013 |
| Mercury | NA | 1.70E-09 |
| Nickel | 0.00050 | 0.00013 |
| Zinc | 0.00050 | 0.00013 |

NA = Not Applicable

# Toxic Emissions for the Fire Pump

| Toxic Compound | Weight Fraction for Fire Pump | Emission Rate for Fire Pump (lb/hr) |
|---|---|---|
| **VOC** | | **0.10** |
| Acetaldehyde | 0.003222 | 0.00033 |
| Benzene | 0.011815 | 0.0012 |
| Cyclohexane | 0.001074 | 0.00011 |
| Cyclopentane | 0.002148 | 0.00022 |
| Ethylbenzene | 0.001074 | 0.00011 |
| Formaldehyde | 0.087003 | 0.0088 |
| Hexane (isomers) | 0.002148 | 0.00022 |
| Heptane | 0.002148 | 0.00022 |
| Nonane | 0.001074 | 0.00011 |
| Octane | 0.002148 | 0.00022 |
| Pentane (isomers) | 0.019334 | 0.0019 |
| Toluene | 0.004296 | 0.00043 |
| Trimethylbenzene (isomers) | 0.004296 | 0.00043 |
| Xylene (isomers) | 0.002148 | 0.00022 |
| **PM** | | **0.087** |
| Chromium | 0.00050 | 0.000043 |
| Cobalt | 0.00050 | 0.000043 |
| Copper | 0.00050 | 0.000043 |
| Manganese | 0.00050 | 0.000043 |
| Mercury | NA | 5.60E-10 |
| Nickel | 0.00050 | 0.000043 |
| Zinc | 0.00050 | 0.000043 |

NA = Not Applicable

## Annual Emissions Summary (tons/yr)

| Equipment | $NO_X$ | CO | VOC | PM | $SO_2$ |
|---|---|---|---|---|---|
| Gas Turbine Set w/ Duct Firing | 92.1 | 92.3 | 4.3 | 37.7 | 9.7 |
| Auxiliary Boiler | 4.0 | 4.0 | 0.10 | 0.37 | 0.030 |
| Natural Gas Preheater | 1.6 | 1.6 | 0.04 | 0.15 | 0.012 |
| Emergency Generator | 0.94 | 0.20 | 0.077 | 0.066 | 0.062 |
| Fire Pump | 0.31 | 0.18 | 0.025 | 0.022 | 0.020 |
| Total | 99.0 | 98.3 | 4.5 | 38.3 | 9.9 |

Note: The gas turbine emissions are for base load with duct firing at the annual average temperature of 49 F since total emissions are higher with duct firing than without duct firing.

# APPENDIX B – AMBIENT AIR QUALITY IMPACT ANALYSES

***MEMORANDUM***

**DATE:** August 7, 2014

**TO:** Shawnee Chen, P.E., Permit Writer, Air Program
Darrin Pampaian, P.E., Permit Writer, Air Program

**FROM:** Darrin Mehr, Stationary Source Modeler, Air Program

**PROJECT:** P-2014.0014 PROJ 61351 PTC Application for the Rathdrum Power LLC Facility Near Rathdrum, Idaho – Annual Operating Hours Swap from Auxiliary Boiler to Duct Burner

PROJ 61405 PTC Application for the Rathdrum Power LLC Facility Near Rathdrum, Idaho – Cold Day Operations and OpFlex Advantage Autotune Software Packages and Hardware Project

**SUBJECT:** Demonstration of Compliance with IDAPA 58.01.01.203.02 (NAAQS) and 203.03 (TAP)

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## 1.0 Summary

Rathdrum Power LLC submitted a PTC application for a modification to an existing permitted facility. The facility generates electricity for the grid using a natural gas-fired combustion turbine and duct burner system. The modeling analyses address a second independent project. The other project consists of the installation of two software package and associated monitoring hardware that will improve performance of the combustion turbine during periods where the ambient temperature is below 50 degrees Fahrenheit. Increased natural throughput is expected and potential emissions increases for short and long term averaging periods were evaluated. The facility is located near Rathdrum, Idaho in Kootenai County. Site-specific air quality impact analyses involving atmospheric dispersion modeling of estimated emissions associated with the facility were submitted to DEQ to demonstrate that the proposed modification to the facility's PTC would not exceed allowable carcinogenic increments.

DEQ did not require Rathdrum Power to demonstrate that emissions increases of criteria air pollutants attributed to the project would not cause or significantly contribute to a violation of any ambient air quality standard (IDAPA 58.01.01.203.02 and 203.03 [Idaho Air Rules Section 203.02 and 203.03]). The potential criteria pollutant emission increases presented to DEQ did not exceed the Level II modeling thresholds listed in Idaho DEQ's *Air Quality Modeling Guideline*. Thus, modeling was not submitted to demonstrate compliance with any criteria air pollutant significant impact levels or National Ambient Air Quality Standards.

RTP Environmental (RTP), Rathdrum Power's permitting consultant, performed the air impact analyses. Rathdrum Power submitted the analyses and applicable information and data enabling DEQ to evaluate potential impacts to ambient air.

RTP performed site-specific air quality impact analyses to demonstrate compliance with air quality standards for the operations at the facility. The DEQ review summarized by this memorandum addressed the rules, policies, methods, and data pertaining to the pollutant dispersion modeling analyses used to demonstrate that the estimated emissions associated with operation of the proposed facility or modification will not cause or significantly contribute to a violation of any applicable air quality standard. This review

did not evaluate compliance with any other rules or analyses that do not pertain to the air impact analyses. This review did not evaluate the accuracy of the emissions estimates. Evaluation of the emissions estimates is the responsibility of the permit writer.

The submitted modeling information and air quality impact analyses: 1) utilized appropriate methods and models; 2) was conducted using reasonably accurate or conservative model parameters and input data; 3) adhered to established DEQ guidelines for new source review dispersion modeling; 4) showed that Toxic Air Pollutant (TAP) emissions increases associated with the facility do not result in increased ambient air impacts exceeding allowable TAP increments. Table 1 presents key assumptions and results to be considered in the development of the permit.

Air impact analyses are required by Idaho Air Rules to be conducted according to methods outlined in 40 CFR 51, Appendix W (Guideline on Air Quality Models). Appendix W requires that facilities be modeled using emissions and operations representative of design capacity or as limited by a federally enforceable permit condition. The submitted information and analyses demonstrated to the satisfaction of the Department that operation of the proposed facility or modification will not cause or significantly contribute to a violation of any ambient air quality standard, provided the key conditions in Table 1 are representative of facility design capacity or operations as limited by a federally enforceable permit condition.

| Table 1. KEY CONDITIONS USED IN MODELING ANALYSES | |
|---|---|
| **Criteria/Assumption/Result** | **Explanation/Consideration** |
| This memorandum accounts for two projects. Permitting staff have determined that the requested changes to the facility are two independent projects.<br><br>TAPs regulations allow separate projects an allowable ambient impact up to the increment for each project. Therefore this memo presents a modeling staff concurrence that compliance with the allowable increment has been established by Rathdrum Power. | Both projects will cause an increase in TAPs emissions but the increase for each project will be emitted through the shared combustion turbine/duct burner stack.<br><br>The modeling demonstration combined emissions of any common TAPs for the two projects. The modeling demonstration showed that both projects were only a small fraction of any allowable TAP increment. |
| There are no specific items to note concerning the Cold Day Operations/Optimization Software project in this modeling report. | Short term and annual emission increases demonstrated compliance with BRC and Level II modeling exemption thresholds for criteria pollutants and allowable carcinogenic TAPs increments where potential emissions exceeded the screening emission rate limit. Modeled TAPs impacts were extremely low in comparison to the increments. |
| Hours of operation were increased to reflect the following changes:<br><br><u>Duct Burner</u><br>• 927 hours per year (hr/yr) increase to 2,927 hr/yr, and<br><u>Auxiliary Boiler</u><br>• A reduction from 5,000 hr/yr to 1,000 hr/yr. | Annual operating hours were changed.<br><br>Allowable short-term operating hours remain 24 hr/day for the duct burner and auxiliary boiler. |
| This modeling demonstration was submitted as a single demonstration to address requirements for two individual projects. At the time this memorandum was drafted, the Cold Day Operations Software PTC application had not been received. Modeling exemption evaluation addresses the Duct Burner/Auxiliary Boiler Operating Hours Switch only.<br><br>This project does not alter the short term capacity of either the duct burner or the and thus the short term emission rates will not increase as a result of this project.<br><br>**DEQ Modeling Guideline Level II Modeling Thresholds:**<br>NOx: 14 tons per year (T/yr),<br>$PM_{2.5}$: 4.1 T/yr, and,<br>$SO_2$: 14 T/yr.<br><br>**Duct Burner/Auxiliary Boiler Annual Emission Increases (reflecting only the duct burner increases):**<br>NOx: 3.2 tons per year (T/yr),<br>$PM_{2.5}$: 0.8 T/yr, and<br>$SO_2$: 0.06 T/yr. | For the Duct Burner/Auxiliary Boiler Operating Hours Switch the potential criteria air pollutant emission increases were well below Level II modeling thresholds which are applied by DEQ on discretionary basis.<br><br>The duct burner emission unit will experience emissions increases and the duct burner exhausts to the same stack as the facility's combustion turbine.<br><br>The auxiliary boiler will experience emission decreases.<br><br>The combustion turbine/duct burner stack has the following release parameters:<br>• Stack height of 150 feet above grade,<br>• Stack diameter of 18 feet,<br>• Exit temperature of 198 degrees Fahrenheit, and<br>• Exit velocity of 53.2 feet per second (or 16.2 meters per second)<br><br>Although the combustion turbine/duct burner stack is only 20 feet tall than the adjacent heat recovery steam generators structure and is only 34 meters (112 feet) from the ambient air boundary, DEQ modeling staff are confident that the stack's 812,500 actual cubic feet per minute flow rate outweighs these considerations, and concluded that modeling should not be required for the project's criteria air pollutant emissions. |

## 2.0 Background Information

### 2.1 Applicable Air Quality Impact Limits and Modeling Requirements

This section identifies applicable ambient air quality standards and analyses used to demonstrate compliance with air quality standards.

#### 2.1.1 Area Classification

The Rathdrum Power facility is an existing stationary source. The facility is located near the town of Rathdrum, in Kootenai County. The area is designated as attainment or unclassifiable for all criteria air pollutants.

#### 2.1.2 Preliminary SIL and Cumulative NAAQS Impact Analyses

If estimated maximum pollutant impacts to ambient air from the emissions sources associated with the facility exceed the significant impact levels (SIL) of Idaho Air Rules Section 006 (referred to as a significant contribution in Idaho Air Rules) or as incorporated by reference as per Idaho Air Rules Section 107.03.b in a preliminary analysis, then a cumulative NAAQS impact analysis is necessary to demonstrate compliance with NAAQS and Idaho Air Rules Section 203.02. A cumulative NAAQS impact analysis for attainment area pollutants involves assessing ambient impacts from facility-wide emissions, and emissions from any nearby co-contributing sources, and then adding a DEQ-approved background concentration value to the modeled result that is appropriate for the criteria pollutant/averaging-time at the facility location and the area of significant impact. The resulting pollutant concentrations in ambient air are then compared to the NAAQS listed in Table 2. Table 2 also lists SIL and specifies the modeled design value that must be used for comparison to the NAAQS. NAAQS compliance is evaluated on receptor-by-receptor basis.

A revised $PM_{2.5}$ annual average NAAQS standard has recently been promulgated by EPA. The revised standard of 12 $\mu g/m^3$, annual average, became applicable for permitting purposes in Idaho when incorporated by reference *sine die* into Idaho Air Rules in Spring of 2014. DEQ required any modeling demonstration received after January 1, 2014 to reflect the new standard.

Rathdrum Power was not required to perform any preliminary or cumulative NAAQS analyses for this project. The project's potential emissions increases were below Level II modeling thresholds[1]. DEQ modeling staff approved of the use of the discretionary Level II thresholds based on the exhaust parameters for the only stack that had an increase in potential criteria air pollutant emissions—the shared stack for the combustion turbine and the duct burner.

[1] *Idaho Air Quality Modeling Guideline* (State of Idaho Guideline for Performing Air Quality Impact Analyses. Doc. ID AQ-011 {September 2013}).

| Table 2. APPLICABLE REGULATORY LIMITS | | | | |
|---|---|---|---|---|
| **Pollutant** | **Averaging Period** | **Significant Impact Levels[a] ($\mu g/m^3$)[b]** | **Regulatory Limit[c] ($\mu g/m^3$)** | **Modeled Design Value Used[d]** |
| $PM_{10}$[e] | 24-hour | 5.0 | 150[f] | Maximum 6th highest[g] |
| $PM_{2.5}$[h] | 24-hour | 1.2 | 35[i] | Mean of maximum 8th highest[j] |
| | Annual | 0.3 | 12[k] | Mean of maximum 1st highest[l] |
| Carbon monoxide (CO) | 1-hour | 2,000 | 40,000[m] | Maximum 2nd highest[n] |
| | 8-hour | 500 | 10,000[m] | Maximum 2nd highest[n] |
| Sulfur Dioxide ($SO_2$) | 1-hour | 3 ppb[o] (7.8 $\mu g/m^3$) | 75 ppb[p] (196 $\mu g/m^3$) | Mean of maximum 4th highest[q] |
| | 3-hour | 25 | 1,300[m] | Maximum 2nd highest[n] |
| | 24-hour | 5 | 365[m] | Maximum 2nd highest[n] |
| | Annual | 1.0 | 80[r] | Maximum 1st highest[n] |
| Nitrogen Dioxide ($NO_2$) | 1-hour | 4 ppb (7.5 $\mu g/m^3$) | 100 ppb[s] (188 $\mu g/m^3$) | Mean of maximum 8th highest[t] |
| | Annual | 1.0 | 100[r] | Maximum 1st highest[n] |
| Lead (Pb) | 3-month[u] | NA | 0.15[r] | Maximum 1st highest[n] |
| | Quarterly | NA | 1.5[r] | Maximum 1st highest[n] |
| Ozone ($O_3$) | 8-hour | 40 TPY VOC[v] | 75 ppb[w] | Not typically modeled |

a. Idaho Air Rules Section 006 (definition for significant contribution) or as incorporated by reference as per Idaho Air Rules Section 107.03.b.
b. Micrograms per cubic meter.
c. Incorporated into Idaho Air Rules by reference, as per Idaho Air Rules Section 107.
d. The maximum 1st highest modeled value is always used for the significant impact analysis unless indicated otherwise. Modeled design values are calculated for each ambient air receptor.
e. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.
f. Not to be exceeded more than once per year on average over 3 years.
g. Concentration at any modeled receptor when using five years of meteorological data.
h. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.
i. 3-year mean of the upper 98th percentile of the annual distribution of 24-hour concentrations.
j. 5-year mean of the 8th highest modeled 24-hour concentrations at the modeled receptor for each year of meteorological data modeled. For the SIL analysis, the 5-year mean of the 1st highest modeled 24-hour impacts at the modeled receptor for each year.
k. 3-year mean of annual concentration. The NAAQS was revised from 15 $\mu g/m^3$ to12 $\mu g/m^3$ on December 14, 2012. However, this standard will not be applicable for permitting purposes in Idaho until it is incorporated by reference *sine die* into Idaho Air Rules (Spring 2014).
l. 5-year mean of annual averages at the modeled receptor.
m. Not to be exceeded more than once per year.
n. Concentration at any modeled receptor.
o. Interim SIL established by EPA policy memorandum.
p. 3-year mean of the upper 99th percentile of the annual distribution of maximum daily 1-hour concentrations.
q. 5-year mean of the 4th highest daily 1-hour maximum modeled concentrations for each year of meteorological data modeled. For the significant impact analysis, the 5-year mean of 1st highest modeled 1-hour impacts for each year is used.
r. Not to be exceeded in any calendar year.
s. 3-year mean of the upper 98th percentile of the annual distribution of maximum daily 1-hour concentrations.
t. 5-year mean of the 8th highest daily 1-hour maximum modeled concentrations for each year of meteorological data modeled. For the significant impact analysis, the 5-year mean of maximum modeled 1-hour impacts for each year is used.
u. 3-month rolling average.
v. An annual emissions rate of 40 ton/year of VOCs is considered significant for $O_3$.
w. Annual 4th highest daily maximum 8-hour concentration averaged over three years.

### *2.1.3 Toxic Air Pollutant Analyses*

Emissions of toxic substances are generally addressed by Idaho Air Rules Section 161:

> *Any contaminant which is by its nature toxic to human or animal life or vegetation shall not be emitted in such quantities or concentrations as to alone, or in combination with other*

*contaminants, injure or unreasonably affect human or animal life or vegetation.*

Permitting requirements for toxic air pollutants (TAP) from new or modified sources are specifically addressed by Idaho Air Rules Section 203.03 and require the applicant to demonstrate to the satisfaction of DEQ the following:

> *Using the methods provided in Section 210, the emissions of toxic air pollutants from the stationary source or modification would not injure or unreasonably affect human or animal life or vegetation as required by Section 161. Compliance with all applicable toxic air pollutant carcinogenic increments and toxic air pollutant non-carcinogenic increments will also demonstrate preconstruction compliance with Section 161 with regards to the pollutants listed in Sections 585 and 586.*

Per Section 210, if the total project-wide emissions increase of any TAP associated with a new source or modification exceeds screening emission levels (EL) of Idaho Air Rules Section 585 or 586, then the ambient impact of the emissions increase must be estimated. If ambient impacts are less than applicable Acceptable Ambient Concentrations (AAC) for non-carcinogens of Idaho Air Rules Section 585 and Acceptable Ambient Concentrations for Carcinogens (AACC) of Idaho Air Rules Section 586, then compliance with TAP requirements has been demonstrated.

### 2.2 Background Concentrations

Background concentrations are used in the cumulative NAAQS impact analyses to account for impacts from sources not explicitly modeled. Criteria pollutants were not modeled for this project and no ambient background concentrations were needed for this modeling demonstration.

Potential emissions of lead, $SO_2$, NOx, and CO were below the Below Regulatory Concern (BRC) thresholds for the Cold Day Operations/Optimization Software project. $PM_{10}$ and $PM_{2.5}$ emissions were below the Level II modeling thresholds for 24-hour and annual averaging periods.

The BRC exemption thresholds could not be applied to the Duct Burner/Auxiliary Boiler Operating Hours Project. The requested potential emissions increases of $PM_{2.5}$, NOx, and $SO_2$ were below the DEQ Modeling Guideline Level II annual average modeling thresholds. DEQ approved the use of those thresholds for this project. Emissions for this project were not expected to increase short term averaging period emission rates.

## 3.0 Modeling Impact Assessment

### 3.1 Modeling Methodology

This section describes the modeling methods used by RTP, the applicant's consultant, to demonstrate preconstruction compliance with applicable air quality standards.

#### 3.1.1 Overview of Analyses

RTP performed site-specific air impact analyses that were determined by DEQ to be reasonably representative of the Rathdrum Power facility. Results of the submitted analyses demonstrated compliance with applicable air quality standards to DEQ's satisfaction, provided the facility is operated as described in the submitted application and in this memorandum.

Table 3 provides a brief description of parameters used in the modeling analyses.

| Table 3. MODELING PARAMETERS | | |
|---|---|---|
| **Parameter** | **Description/Values** | **Documentation/Addition Description** |
| General Facility Location | Rathdrum | The area is an attainment or unclassified area for all criteria pollutants. |
| Model | AERMOD | AERMOD with the PRIME downwash algorithm, version 14134. Regulatory default settings were used with an ambient concentration output specified. |
| Meteorological Data | Spokane, Washington | 2008-2012 dataset generated by DEQ. Spokane airport NWS primary surface data with Spokane ASOS data for data fill and Spokane upper air data for the same time period.<br>A 0.5 meter per second threshold wind speed was used for the ASOS data.<br>AERMET Version 12345 was used to process the data |
| Projection | UTM/NAD83 | Universal Transverse Mercator, Zone 11. Datum specified in model setup as the North American Datum (NAD) for 1983. |
| Terrain | Considered | Receptor, building, and emissions source elevations were determined using a USGS 1 arc second National Elevation Dataset (NED) file.ite grading plans. AERMAP Version 11103 was used to generate receptor elevations and hill height scales. |
| Building Downwash | Considered | Plume downwash was considered for the structures associated with the facility. |
| Receptor Grid | Grid 1 | 25-meter or less spacing along the ambient air boundary. |
| | Grid 2 | 25-meter spacing within a 2,425-meter by 2,325-meter grid set on the facility. |
| | Grid 3 | 100-meter spacing within a 10,400-meter by 10,500-meter grid set on Grid 2. |
| | Grid 4 | 250-meter spacing within a 20,750-meter by 20,500-meter grid set on Grid 3. |

### *3.1.2 Modeling protocol and Methodology*

A modeling protocol was submitted to DEQ prior to receipt of the application for the Cold Day/Optimization Software project. The DEQ State Office received the protocol on February 4, 2014 from the DEQ Coeur d'Alene Regional Office. DEQ issued a modeling protocol approval letter on March 7, 2014.

No modeling protocol was submitted for the Duct Burner/Auxiliary Boiler Operating Hours project.

Site-specific modeling was generally conducted using data and methods described in the *Idaho Air Quality Modeling Guideline* (State of Idaho Guideline for Performing Air Quality Impact Analyses. Doc. ID AQ-011 {September 2013}. See the document listed at http://www.deq.idaho.gov/media/1029/modeling-guideline.pdf.

### *3.1.3 Model Selection*

Idaho Air Rules Section 202.02 requires that estimates of ambient concentrations be based on air quality models specified in 40 CFR 51, Appendix W (Guideline on Air Quality Models). The refined, steady state, multiple-source, Gaussian dispersion model AERMOD was promulgated as the replacement model for ISCST3 in December 2005. AERMOD retains the single straight line trajectory of ISCST3, but includes more advanced algorithms to assess turbulent mixing processes in the planetary boundary layer for both convective and stable stratified layers. AERMOD was used for the modeling analyses to evaluate

impacts for the projects. Regulatory default settings were used for this modeling demonstration.

### *3.1.4 Meteorological Data*

DEQ provided Rathdrum/RTP with AERMOD-ready meteorological data processed from Spokane, Washington airport surface and Spokane, Washington upper air meteorological data for calendar years 2008 through 2012. Surface data was collected by the Automated Surface Observing System (ASOS) at the Spokane Airport, located west of Spokane, Washington. Upper air data was collected at the Spokane airport. AERMET Version 12345 was used by DEQ to process the met data and a threshold wind speed of 0.5 meters per second was set. These met data were determined by DEQ to be reasonably representative for the facility's location just outside of Rathdrum, Idaho.

### *3.1.5 Terrain Effects*

RTP used a National Elevation Dataset (NED) file as input data to AERMAP Version 11103 to determine receptor elevations, hill height scale values,

The methods used to determine the base elevations of buildings and emission sources were not discussed. The area is quite flat and the minor differences in base elevations of the structures and point source modeled in this project cannot produce any appreciable effect on the modeling results and the base elevations appeared reasonable. DEQ did not perform an extensive review of the AERMAP runs and data. A 1 arc second NED file has a 30-meter data resolution.

### *3.1.6 Building Downwash*

Potential downwash effects on the emissions plume were accounted for in the model by using building parameters developed by RTP. The Building Profile Input Program (BPIP) with the PRIME downwash algorithm (BPIP-PRIME) was used to calculate direction-specific dimensions and Good Engineering Practice (GEP) stack height information from building dimensions/configurations and release parameters for input to AERMOD. The facility is composed of multiple buildings and tanks. Each building and tank was represented using a single tier height.

DEQ did not perform an in-depth review of the BPIP inputs and UTM coordinates of the structures. Given the flat terrain surrounding the facility, the location of the design concentration at the ambient air boundary, and the maximum single TAP consumption of 1.4% of the allowable carcinogenic TAP increment, and other TAPs were well below TAPs increments, no effect on the compliance status of the of proposed projects could be affected by altering building location. The distance from the structures to the ambient air boundary is the key consideration for the modeling demonstration and the building and ambient air boundary distances appeared to be appropriately represented.

### *3.1.7 Ambient Air Boundary*

The ambient air boundary was established using the perimeter of the fencing and gates that preclude public access to the interior property of the facility. The methods proposed to prevent public access within the ambient air boundary satisfy the requirements specified in the *Idaho Air Quality Modeling Guideline.*

### *3.1.8 Receptor Network*

The TAPs modeling demonstration was performed using a receptor grid centered on the facility. A receptor

spacing of 25 meters on the ambient air boundary and out a distance of 1 kilometer in all directions provided a dense grid sufficient to capture the maximum ambient impacts. A receptor spacing of 100 meters was used between 1 kilometer and 5 kilometers from the facility. The coarsely-spaced receptors were set at a distance of 250 meters from each other in a grid extending from approximately 5 kilometers to 10 kilometers in each direction from the facility. These grids are composed of over 25,000 discrete receptors.

DEQ agrees that the receptor network was adequate for resolving the maximum ambient impacts for the project's TAP emissions

## 3.2 Emission Rates

Emissions rates of criteria pollutants and TAP for the "Cold Day/Optimization Software Project (Cold Day) and the Duct Burner/Auxiliary Boiler Annual Operating Hours Switch project (Duct Burner) were provided by the RTP and Rathdrum Power. The Duct Burner project's final submittal was received by DEQ on July 22, 2014. The Cold Day Software project final submittal was received by DEQ on August 1, 2014.

### *3.2.1 Criteria Pollutant Emissions Rate*

Tables 4, 5, and 6 list criteria pollutant emissions rates used to evaluate the need for site-specific modeling analyses for the facility's two projects. The rates listed represent the emission rate increases presented by applicant to the permit writer in the permit application for the project. The review of the acceptability of the methods used to calculate the emission increases is the permit writer's responsibility. Based on the emissions rates presented by Rathdrum Power and RTP Environmental DEQ did not require criteria pollutant modeling for either the Cold Day Operations/Optimization Software Project or the Duct Burner and Auxiliary Boiler Annual Operating Hours Switch Project. Level II modeling thresholds were selected by modeling staff as appropriate thresholds in consideration of the release parameters for the primary stack for the project. This is the only point of emissions that was presented as being affected by the two proposed projects.

Modeling applicability is based on future requested potential to emit and the current existing potential to emit, in annual emission rates. DEQ modeling staff evaluated each of the projects with regard to the Below Regulatory Concern exemption for modeling. This exemption is based strictly on annual emissions. Hourly emissions are not included in the evaluation. See Section 3.1 of the September 2013 *State of Idaho Air Quality Modeling Guideline* to review the guidance provided by the Department on this subject.

The term "Below Regulatory Concern" is established by IDAPA 58.01.01.221.01 for Category I PTC exemptions, and reads:

> ***Below Regulatory Concern.*** *The maximum capacity of a source to emit an air pollutant under its physical and operational design considering limitations on emissions such as air pollution control equipment, restrictions on hours of operation and restrictions on the type and amount of material combusted, stored or processed shall be less than ten percent (10%) of the significant emissions rates set out in the definition of significant at Section 006.*

Each project was evaluated separately for the need to conduct modeling for any criteria air pollutants. Lead was not expected to be emitted in any substantial quantity for either project.

The annual emissions increases for the Cold Day Operations project were compared against the Below Regulatory Concern thresholds, as listed below in Table 4. Those increases that remained below the thresholds were exempted from the modeling demonstration. The BRC exemption applies to ambient standards with short term averaging periods as well as annual averaging periods.

**Table 4. COLD DAY OP SOFTWARE PROJECT ANNUAL CRITERIA POLLUTANT EMISSIONS RATES**

| Pollutant | Pre-Project Annual Potential to Emit (T/yr)[g] | Post-Project Annual Potential to Emit (T/yr) | Change Between Future Allowable and Current Allowable Emissions (T/yr) | BRC[h] Level (T/yr) | Project Qualifies For BRC Modeling Exemption? |
|---|---|---|---|---|---|
| $PM_{10}$[a] | 38.3 | 39.9 | 1.6 | 1.5 | No |
| $PM_{2.5}$[b] | 27.2[i] | 28.5[i] | 1.3 | 1.0 | No |
| NOx[c] | 97.8 | 97.8 | 0.0 | 4.0 | Yes |
| CO[d] | 97.8 | 97.8 | 0.0 | 10.0 | Yes |
| $SO_2$[e] | 9.8 | 10.6 | 0.8 | 4.0 | Yes |
| VOCs[f] (as a precursor) | 4.4 | 5.2 | 0.8 | 4.0 | Yes |

a. Particulate matter with a mean aerodynamic diameter of 10 microns or less, including condensables.
b. Particulate matter with a mean aerodynamic diameter of 2.5 microns or less, including condensables.
c. Nitrogen oxides.
d. Carbon monoxide.
e. Sulfur dioxide.
f. Volatile organic compounds.
g. Tons per year.
h. Below Regulatory Concern (Less than 10% of the significant emission rates listed in IDAPA 58.01.01.006
i. The August 1, 2014 Cold Day Operations/Optimization Software project submittal presented a 0.71 lb $PM_{2.5}$ per lb $PM_{10}$ fraction. This was applied by DEQ modeling staff to pre-project and post project PTE.

The annual emission increase for $PM_{10}$ and $PM_{2.5}$ slightly exceeded the below regulatory concern modeling thresholds. Further analysis was required to evaluate modeling requirements for these pollutants. Short term and annual emissions increases were compared against the Level II modeling thresholds contained in the Idaho DEQ *Air Quality Modeling Guideline*.

Because the $PM_{10}$ and $PM_{2.5}$ emissions increases slightly exceeded the BRC thresholds for modeling exemptions, the short term and the annual emission increases DEQ compared the short term emission rate increases against the Level II modeling thresholds. Only the shared combustion turbine/duct burner stack was described as experiencing any emission increase for the project. The short-term Level II threshold comparison is listed in Table 5.

The annual emission rates for the Cold Day Operations Software project complied with the Level II modeling threshold. Following revocation of the annual $PM_{10}$ NAAQS, the annual Level I and II modeling thresholds were dropped. Only the annual $PM_{2.5}$ Level I and II thresholds remain in effect. The annual $PM_{2.5}$ increase for this project was estimated to be 1.1 T/yr, which is well below the 4.1 T/yr Level II modeling threshold. Modeling was not required for annual average $PM_{2.5}$ emissions.

| Table 5. COLD DAY OPS PROJECT SHORT-TERM CRITERIA POLLUTANT EMISSIONS RATES | | | |
|---|---|---|---|
| **Pollutant** | **Application's Emission Rate (lb/hr)** | **Level II Modeling Threshold (lb/hr)[a]** | **Modeling Required For Project? (Yes/No)** |
| **Cold Day Operations/Optimization Software Project** | | | |
| $PM_{10}$[b] | 0.41 | 2.6 | No |
| $PM_{2.5}$[c] | 0.29 | 0.63 | No |

a. Pounds per hour.
b. Particulate matter with a mean aerodynamic diameter of 10 microns or less, including condensables.
c. Particulate matter with a mean aerodynamic diameter of 2.5 microns or less, including condensables.

Short term emission rates will not be affected by the Duct Burner project. The switch in annual operating hours between the duct burner and auxiliary boiler would generally require modeling because the auxiliary boiler exhaust stack and the duct burner/combustion turbine common exhaust stack have quite different release parameters. However, only the duct burner/combustion turbine stack will experience an emissions increase, whereas the auxiliary boiler will reduce annual emissions with this modification. Attachment A contains a DEQ email that used a worst-case approach at the exemption evaluation where only the duct burner/combustion turbine stack emissions increases were evaluated for the modeling exemption. See the permit writer's Statement of Basis section on Emissions Inventories to review the source of the bulk of the information listed in Tables 4, 5, and 6.

| Table 6. DUCT BURNER/AUXILIARY BOILER PROJECT ANNUAL CRITERIA POLLUTANT EMISSIONS RATES | | | | | |
|---|---|---|---|---|---|
| **Pollutant** | **Pre-Project Annual Potential to Emit (T/yr)[a]** | **Post-Project Annual Potential to Emit (T/yr)** | **Change Between Future Allowable and Current Allowable Emissions (T/yr)** | **Level II Modeling Threshold (T/yr)** | **Project Qualifies For Modeling Exemption?** |
| $PM_{2.5}$[b] | 28.5[f] | 28.7[e,f] | 0.2 | 14 | Yes |
| NOx[c] | 97.8 | 97.8 | 0.0 | 4.1 | Yes |
| $SO_2$[d] | 10.7 | 10.6 | 0.1 | 14 | Yes |

a. Tons per year.
b. Particulate matter with a mean aerodynamic diameter of 2.5 microns or less, including condensables.
c. Nitrogen oxides.
d. Sulfur dioxide.
e. This value reflects the reduction in PM2.5 emissions that will occur for the Auxiliary boiler due to a 4,000 hr/yr reduction in operating hours.
f. The August 1, 2014 Cold Day Operations/Optimization Software project submittal presented a 0.71 lb $PM_{2.5}$ per lb $PM_{10}$ fraction. This was applied by DEQ modeling staff to pre-project and post project PTE.

### *3.2.2 TAP Emission Rates*

RTP and Rathdrum Power modeled those TAPs where facility-wide TAP emissions from applicable sources exceeded the emissions screening levels (EL) of Idaho Air Rules Section 585 and 586. Only carcinogenic TAP regulated under Section 586 of the Rules exceeded the applicable EL. Table 7 provides modeled emissions rates for TAPs. These emission rates are the combined emission rates for the two separate projects. Because they are combined for both distinctly separate projects this approach for modeling the TAPs emissions increases is conservative. See Tables 1 and 2 in Appendix B of the July 22, 2014 final modeling demonstration report. The hourly emission rates were modeled for 8,760 hours per year.

| Table 7. CARCINOGENIC TOXIC AIR POLLUTANT EMISSIONS RATES | | | | |
|---|---|---|---|---|
| **Pollutant** | **Chemical Abstract Service Number** | **Cold Day Software Project Emissions (lb/hr)[a]** | **Duct Burner & Auxiliary Boiler Annual Operating Hours Project (lb/hr)** | **Total Modeled Emissions Increase (lb/hr)** |
| 1,3-Butadiene | 106-99-0 | 3.7E-05 | 0[b] | 3.70E-05 |
| Acetaldehyde | 75-07-0 | 3.39E-03 | 0 | 3.39E-03 |
| Benzene | 71-43-2 | 1.01E-03 | 2.86E-07 | 1.06E-03 |
| Formaldehyde | 50-00-0 | 1.39E-02 | 1.79E-03 | 1.56E-02 |
| Polyaromatic Hydrocarbons | NA | 1.8E-04 | 0 | 1.80E-04 |
| Arsenic | 7440-38-2 | 0[b] | 4.8E-06 | 4.80E-06 |
| Cadmium | 7440-43-9 | 0 | 2.86E-07 | 2.63E-05 |
| Nickel | 7440-02-0 | 0 | 5E-05 | 5.00E-05 |

a. Pounds per hour emissions rate used in modeling analyses for the annual averaging period.
b. No emissions of this pollutant were attributed to this project where a value of "0" is shown in the table.

## 3.3 Emission Release Parameters

Table 8 lists emission release parameters for sources modeled.

| Table 8. EMISSIONS RELEASE PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| **Model ID** | **Description** | **Source Type / Release Orientation** | **Stack Height (m)[a]** | **Modeled Diameter (m)** | **Stack Gas Temperature (K)[b]** | **Stack Gas Flow Velocity (m/sec)[c]** |
| RATHTURB | Shared stack for combustion turbine and duct burner | Point source / vertical and uninterrupted | 45.72 | 5.49 | 365.4 | 16.22 |

a. Meters.
b. Kelvin.
c. Meters per second.

DEQ accepted the modeled release parameters as submitted. The parameters used in the modeling demonstration appeared to be supported by data in the facility's August 20, 2013 RATA and performance test report and the facility's initial PSD PTC application, dated March 31, 1999.

## 3.4 Results for Significant Impact Level Analyses

Significant Impact Level analyses were not required..

## 3.5 Results for Cumulative Impact Analyses

Cumulative impact analyses were not required for either project.

## 3.6 Results for Toxic Air Pollutant Analysis

Table 9 presents results for TAP modeling. The impacts listed below are attributed to facility-wide emissions. TAP impacts were well below the applicable increments. The maximum ambient impact occurred using the 2012 year of meteorological data and was predicted to occur on the facility's northeastern ambient air boundary.

| Table 9. RESULTS FOR TOXIC AIR POLLUTANT ANALYSES | | | | | |
|---|---|---|---|---|---|
| **Pollutant** | **Chemical Abstract Service Number** | **Averaging Period** | **Maximum Modeled Concentration ($\mu g/m^3$)[a]** | **AACC[b] ($\mu g/m^3$)** | **Percent of Increment** |
| 1,3-Butadiene | 106-99-0 | Annual | 8.7E-07 | 3.6E-03 | 0.02% |
| Acetaldehyde | 75-07-0 | Annual | 8.0E-05 | 4.5E-01 | 0.02% |
| Benzene | 71-43-2 | Annual | 2.5E-05 | 1.2E-01 | 0.02% |
| Formaldehyde | 50-00-0 | Annual | 3.7E-04 | 7.7E-02 | 0.48% |
| Polyaromatic Hydrocarbons | NA | Annual | 4.2E-06 | 3.0E-04 | 1.4% |
| Arsenic | 7440-38-2 | Annual | 1.1E-07 | 2.3E-04 | 0.05% |
| Cadmium | 7440-43-9 | Annual | 6.2E-07 | 5.6E-04 | 0.11% |
| Nickel | 7440-02-0 | Annual | 1.2E-06 | 4.2E-03 | 0.03% |

a. Micrograms per cubic meter.
b. Acceptable Ambient Concentration for Carcinogens (Toxic Air Pollutant allowable increment listed in Idaho Air Rules Section 586).

## 4.0 Conclusions

The ambient air impact analyses demonstrated to DEQ's satisfaction that emissions from the facility will not cause or significantly contribute to a violation of any ambient air quality standard.

# Attachment A

## Initial Modeling Applicability Determination

## For the May 30, 2014 Submittal

## Project:
## Duct Burner/Auxiliary Boiler Annual Operating Hours Switch

You replied to this message on 6/17/2014 9:05 AM.

From: Darrin Mehr
Sent: Mon 6/16/2014 3:50
To: Shawnee Chen
Cc: Darrin Mehr; Kevin Schilling
Subject: P-2014.0014 Proj 61351 - Rathdrum Power LLC - Duct Burner/Aux Boiler Operating Hour PTC Modification - Modeling Applicability

Shawnee,

I finished a review of the incompleteness response from Rathdrum Power, LLC, dated May 30, 2014.

- Affected emissions units for this project:
  - One 1.7 billion Btu/hr natural gas-fired turbine,
  - One 150 million Btu/hr natural gas-fired duct burner, and
  - One 20 million Btu/hr natural gas-fired auxiliary boiler.
- Duct firing occurs during base load operations of the natural gas-fired turbine per the March 1999 initial facility-wide PTC application. "Base load" represents 100% capacity for the turbine.
- The stack release parameters are:
  Release height of 150 feet above grade,
  Stack diameter of 18 feet,
  Exit temperature of 178 °F,
  Stack exhaust flow rate ranging from a low of 859,535 actual cubic feet per minute (ACFM) at 95 degree Fahrenheit (°F ) ambient temperature to a high of 1,014,292 at 0 °F Table 5-2, March 1999 PTC application – Base Load With Duct Firing entry. The documentation is not clear whether this includes the duct burner's contribution to the shared stack's flow rate. Flow velocity ranges from 17.2 meters per second to 20.2 m/s based on these parameters.
- An overhead view from Google earth shows that the center of the stack shared by the turbine and duct burner is approximately 35 meters from the nearest fence line for the facility.
- Requested allowable short term emission rates will not increase with this project.
- Any annual emissions increase for the duct burner will be emitted from the shared duct burner/turbine stack.
- The project requests a change in permit-allowable operating hours and requires a modification to the current PTC-enforceable operating limitations; therefore, this project cannot apply the latest Idaho DEQ Modeling Guideline modeling exemption for the entire project based on the requested emissions increases remaining less than the Below Regulatory Concern (BRC) thresholds of each pollutant.
- For this reason the project warrants a modeling exemption evaluation using the case-by-case Level II modeling thresholds.

| Modeling Applicability - Annual Emission Increases for Duct Burner Alone Compared to DEQ Level II Modeling Thresholds | | | |
|---|---|---|---|
| Pollutant | Emission Increase (tons per year) | Level II Threshold (tons per year) | Proposed Increase is Below Threshold? |
| $NO_x$[1] | 3.3 | 10 | Yes |
| $PM_{2.5}$[2] | 0.8 | 4.1 | Yes |
| $SO_2$[3] | 0.06 | 14 | Yes |

[1]Nitrogen oxides.
[2]Particulate matter with aerodynamic diameter of 2.5 microns or less.
[3]Sulfur dioxide.

- The Level II modeling exemption used a 150 meter distance from the source to the ambient air boundary. The closest distance to ambient air for this project appears to be roughly 35 meters if the fence line is used as the ambient air boundary. All other parameters compare favorably with the assumptions used to establish the Level II modeling exemptions (see footnote "c" of Table 2 in the State of Idaho Guideline for Performing Air Quality Impact Analyses, Doc. ID AQ-011, September 2003).
- Annual emissions for the Auxiliary Boiler will decrease while the annual emissions of the duct burner increase. NOx and $SO_2$ emissions will be offset by identical emissions rates. This modeling exemption is further supported by the concept that some level of ambient impact reduction would occur as a result of the reduced annual operating hours for auxiliary boiler. $PM_{2.5}$ and $PM_{10}$ emissions will not be entirely offset and the net "project" increase will be approximately 0.5 tons per year overall and will be attributed to the duct burner.

Conclusion:
DEQ modeling staff recommends that no modeling demonstration be required for Rathdrum Power LLC's Duct Burner/Auxiliary Boiler Operating Hours switch project.

## APPENDIX C – FACILITY DRAFT COMMENTS

The comments were received from the facility on August 21, 2014 and were incorporated into the permit.

Rathdrum Power, LLC
"Powering Idaho's Future"

**RATHDRUM POWER, LLC**
P.O. BOX 995
9924 W LANCASTER ROAD
RATHDRUM, IDAHO 83858
(208) 687-5570

August 21, 2014

Shawnee Chen, P.E.
Senior Air Quality Engineer
Idaho Department of Environmental Quality
1410 North Hilton
Boise, Idaho 83706

Subject: Rathdrum Power, LLC
Facility ID No. 055-00045
Comments on Draft Permit to Construct No. P-2014.0014

Dear Ms. Chen:

Rathdrum Power, LLC has reviewed the referenced Draft Permit to Construct (PTC) and Statement of Basis (SOB) and offers the following comments;

**A. Responses to IDEQ Questions and Comments on Draft Permit to Construct**

1.) Table 1.1 Regulated Sources - The table contains descriptions of the regulated sources and IDEQ requested that Rathdrum Power provide an updated Turbine Rated Heat Input and an updated Nominal Output after implementation of the Cold Day Software.

Response - Based on information provided by General Electric who is the vendor for the Cold Day Software, the Turbine Rated Heat Input, after implementation of the Cold Day Software, will be approximately 1,682 MMBtu/hr (HHV) at baseload and 50 degrees F. The Nominal Output from the turbine alone, after implementation of the Cold Day Software, will be approximately 168 MW at baseload and 50 degrees F. The Nominal Output from the turbine with duct burner, after implementation of the Cold Day Software, will be approximately 278 MW at baseload and 50 degrees F. These values are intended to be general descriptions of the equipment and are not considered permit limits.

2.) Section 2.1 Process Description - IDEQ requested the new nominal out for the turbine with duct burner.

Response - The Nominal Output from the turbine with duct burner, after implementation of the Cold Day Software, will be approximately 278 MW at baseload and 50 degrees F. This value is intended to be a general description of the equipment and is not considered a permit limit.

3.) Section 2.3 $NO_x$ and CO Emissions and Section 2.4 Duct Burner $NO_x$ Emissions – IDEQ asked whether the performance test had been completed and, if so, the date of the performance test.

Response - The performance test was completed on December 6, 2001.

4.) Appendix/ Emission Limits - Hourly (lb/hr) and Annual (T/yr) – The table contains the criteria pollutant emission limits.

Rathdrum Power Comment - The hourly and annual $SO_2$ emission limits contain two digits to the right of the decimal however, the hourly and annual emission limits for $NO_x$, CO, VOC, and $PM_{10}$ only contain one digit to the right of the decimal. Thus it is requested that the hourly and annual $SO_2$ emission limits be revised to 2.7 lb/hr and 10.7 T/yr respectively for consistency. In addition, it is our understanding based on the conference call with Bill Rogers/IDEQ on August 18, 2014 and the e-mail from Bill Rogers/IDEQ on August 18, 2014, that compliance with the permit limits will be in accordance with the "rounding" procedure described in the e-mail.

**B. Comments on Statement of Basis**

1.) Table 4 Post Project Facility-Wide Potential to Emit for Regulated Air Pollutants – The IDEQ requested that Rathdrum Power provide the Greenhouse Gas emissions for the diesel-fired emergency generator and diesel-fired emergency fire pump.

Response - Table 4 has been revised to include the Greenhouse Gas emissions for the two emission sources and is provided below;

**Table 4. POST-PROJECT FACILITY-WIDE PTE FOR REGULATED AIR POLLUTANTS[1]**

| | $PM_{10}/PM_{2.5}$ | $SO_2$ | NOx | CO | VOC | Greenhouse Gas ($CO_2e$) |
|---|---|---|---|---|---|---|
| **Source** | **T/yr** | **T/yr** | **T/yr** | **T/yr** | **T/yr** | **T/yr** |
| **Point Sources** | | | | | | |
| Turbine/Duct Burner | 40.1 | 10.66 | 95.4 | 95.5 | 5.3 | 929,706[2] |
| Auxiliary Boiler | 0.08 | 0.006 | 0.8 | 0.8 | 0.02 | 1,170[2] |
| Fuel Pre-Heater | 0.2 | 0.01 | 1.6 | 1.6 | 0.04 | 2,340[2] |
| Diesel-fired emergency generator, 550 hp | 0.07 | 0.06 | 0.9 | 0.2 | 0.08 | 56.9[3] |
| Diesel-fired emergency fire pump, 185 hp | 0.02 | 0.02 | 0.3 | 0.2 | 0.03 | 19.1[3] |
| **Total, Point Sources** | **40.47** | **10.76** | **99.0** | **98.3** | **5.47** | **933,292** |

[1]Based on permitted levels and hours of operation for turbine, duct burner, and auxiliary boiler of 8,000 hours, 2,927 hours, and 1,000 hours respectively.
[2] Based on The Climate Registry's 2013 Default Emission Factors, Table 12.1 (117 lb/MMBtu).
[3] Based on The Climate Registry's 2013 Default Emission Factors, Table 12.1 (163 lb/MMBtu).

Example Calculation
$CO_{2e}$ = (163 lb/MMBtu x 550 hp x 2544 Btu/hp x 500 hrs/yr)/1MMBtu x 2000 lbs/ton = 56.9 tons/yr

2.) Facility Information/Description - IDEQ requested the new nominal out for the turbine with duct burner based on implementation of the Cold Day Software.

Response - The Nominal Output from the turbine with duct burner, after implementation of the Cold Day Software, will be approximately 278 MW at baseload and 50 degrees F. This value is intended to be a general description of the equipment and is not considered a permit limit.

3.) Permitting History – IDEQ requested that the applicant provide a copy of the tech memo (Statement of Basis) for the 1999 PTC if available.

Response – Rathdrum Power does not have a copy of the Statement of Basis for the 1999 PTC.

4.) Application Scope – IDEQ requested that Rathdrum Power explain why installing the Cold day Performance Software was not part of this project.

Response – As discussed in the conference call with IDEQ on May 7, 2014, it was agreed that because the Cold Day Performance Software exemption determination was submitted previously, the emissions changes would be used as the baseline for the PTC modification application. Thus, the PTC modification application reflects the exemption determination.

If you have any questions or require additional information, please give me a call at (913) 754-5709, ext 223 or Jim Laughlin of RTP Environmental Associates, Inc. at (704) 996-1510.

Sincerely,
Rathdrum Power, LLC

Jesse Song
Asset Manager

cc: Bill Rogers/IDEQ Stationary Source Permit Coordinator
Gary Allard/Rathdrum Power LLC
Jim Laughlin/RTP Environmental Associates, Inc

# APPENDIX D – PROCESSING FEE

| Emissions Inventory | | | |
|---|---|---|---|
| Pollutant | Annual Emissions Increase (T/yr) | Annual Emissions Reduction (T/yr) | Annual Emissions Change (T/yr) |
| $NO_X$ | 0 | 0 | 0.0 |
| $SO_2$ | 0.04 | 0 | 0.0 |
| CO | 0 | 0 | 0.0 |
| $PM_{10}$ | 0.48 | 0 | 0.5 |
| VOC | 0.12 | 0 | 0.1 |
| TAPS/HAPS | 0.32 | 0 | 0.3 |
| Total: | 0.96 | 0 | **0.96** |
| | | | |
| Fee Due | **$ 1,000.00** | | |