# Statement of Basis

**Final**

**Garden Valley School District**
**Garden Valley, Idaho**
**Facility ID No. 015-00002**
**Permit to Construct P-2010.0070**

**July 23, 2010**
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**Permit Writer**

**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.**

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## ACRONYMS, UNITS, AND CHEMICAL NOMENCLATURE

| | |
|---|---|
| AAC | acceptable ambient concentrations |
| AACC | acceptable ambient concentrations for carcinogens |
| AQCR | Air Quality Control Region |
| CFR | Code of Federal Regulations |
| CO | carbon monoxide |
| DEQ | Department of Environmental Quality |
| dscf | dry standard cubic feet |
| EL | screening emission levels |
| EPA | U.S. Environmental Protection Agency |
| HAP | hazardous air pollutants |
| IDAPA | a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act |
| lb/hr | pounds per hour |
| MMBtu | million British thermal units |
| NAAQS | National Ambient Air Quality Standard |
| NAICS | North American Industry Classification System |
| NESHAP | National Emission Standards for Hazardous Air Pollutants |
| $NO_X$ | nitrogen oxides |
| NSPS | New Source Performance Standards |
| PM | particulate matter |
| $PM_{10}$ | particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers |
| PSD | Prevention of Significant Deterioration |
| PTC | permit to construct |
| PTE | potential to emit |
| Rules | Rules for the Control of Air Pollution in Idaho |
| scf | standard cubic feet |
| SIC | Standard Industrial Classification |
| SM | synthetic minor |
| $SO_2$ | sulfur dioxide |
| T/yr | tons per consecutive 12-calendar month period |
| TAP | toxic air pollutants |
| VOC | volatile organic compounds |
| $\mu g/m^3$ | micrograms per cubic meter |

## FACILITY INFORMATION

### *Description*

Garden Valley School District is proposing to install an Alternative Energy Solutions International, Inc. dual combustion chamber wood fired boiler. The exhaust from the boiler is treated by a multiclone. Untreated wood will be the only fuel combusted; the unit has maximum rated input capacity of 2.74 MMBtu/hr.

### *Permitting History*

There has not been any air quality permits issued to Garden Valley School District.

### *Application Scope*

This permit is the initial PTC for this facility.

The applicant has proposed to install and operate a 2.74 MMBtu/hr wood fired boiler.

### *Application Chronology*

| | |
|---|---|
| May 14, 2010 | DEQ received an application and an application fee. |
| May 26 – June 10, 2010 | DEQ provided an opportunity to request a public comment period on the application and proposed permitting action. |
| May 20, 2010 | DEQ approved pre-permit construction. |
| June 14, 2010 | DEQ determined that the application was complete. |
| July 2, 2010 | DEQ made available the draft permit and statement of basis for peer and regional office review. |
| July 6, 2010 | DEQ made available the draft permit and statement of basis for applicant review. |
| July 21, 2010 | DEQ received the permit processing fee. |

## TECHNICAL ANALYSIS

### *Emissions Units and Control Devices*

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

| ID No. | Source Description | Control Equipment Description | Emissions Point ID No. and Description |
|---|---|---|---|
| NA | Emissions Unit Name:<br>Manufacturer: Alternative Energy Solutions, Inc.<br>Heat input rating: 2.74 MMBtu/hr<br>Fuel: Wood<br>Fuel consumption: 521 T/yr | Multiclone | Exit height: 50 ft<br>Exit diameter: 1.135 ft<br>Exit flow rate: 1,307 acfm<br>Exit temperature: 350 °F |

### *Emissions Inventories*

Garden Valley School District provided an emission inventory for the dual combustion chamber 2.74 MMBtu/hr wood fired boiler. The emission inventory may be seen in Appendix A. Emission estimates were calculated using emission factors developed from testing a dual chamber Messersmith 2.2 MMBtu per hour wood fired boiler in Vermont for the Coalition of Northeastern Governors Policy Research Center. The proposed combustor and the one tested in Vermont are similar in design and rated input capacity and emissions are expected to be similar. Where AP-42 provided toxic air pollutant emission factors that were not available from the Vermont study those AP-42 emission factors were used to estimate emissions. Summaries of the permitted emissions of criteria pollutants, and TAPs from the facility are provided in the following tables.

**Uncontrolled Emissions:**

The following table presents the uncontrolled emissions for criteria pollutants. These annual uncontrolled emission rates were calculated by DEQ using the pound per hour emission rate estimates provided by Garden Valley School District. See Appendix A for a detailed presentation of the calculations which were provided by Garden Valley School District.

**Table 2 PROJECT UNCONTROLLED EMISSIONS FOR CRITERIA POLLUTANTS**

| Emissions Unit | $PM^1$ | $PM_{10}{}^2$ | $SO_2$ | $NO_X$ | CO | VOC | Lead |
|---|---|---|---|---|---|---|---|
| | T/yr | T/yr | T/yr | T/yr | T/yr | T/yr | T/yr |
| Wood fired boiler | 10.25 | 8.6 | 0.3 | 1.75 | 25.5 | 0.2 | 6.19E-4 |

1) Garden Valley Estimated PM emissions using the particulate matter grain loading standard of 0.200 grains per dry standard cubic foot at 8% oxygen, this standard is typically achieved when a control device has a 50% removal efficiency; therefore uncontrolled emissions were back calculated using this control efficiency. Though these are gross assumptions, they are valid enough to determine the facilities classification as a minor facility.
2) $PM_{10}$ emissions

As demonstrated in Table 2, this facility has uncontrolled potential to emit less than the Major Source threshold of 100 T/yr. Therefore, this facility is designated as a Synthetic Minor facility.

**Permitted Potential to Emit**

The following table presents the permitted potential to emit for criteria pollutants from the new wood fired boiler as submitted by the Applicant and verified by DEQ staff. The pounds per hour values are at the combustors maximum rated capacity, the annual values are from combusting 521 tons of wood per year. 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 CRITERIA POLLUTANTS[a]**

| Emissions Unit | PM | $PM_{10}$ | $SO_2$ | $NO_X$ | CO | VOC | Lead |
|---|---|---|---|---|---|---|---|
| | T/yr | T/yr | T/yr | T/yr | T/yr | T/yr | T/yr |
| Wood fired boiler | 1.6 | 1.1 | 0.09 | 0.55 | 7.96 | 0.064 | 1.94E-4 |

a) Controlled average emission rate in tons per year is an annual average, based on the proposed annual operating schedule and annual limits.

## TAP Emissions

A summary of the toxic air pollutants (TAP) which exceed screening modeling emission rate thresholds is provided in the following table. The permitted emissions of all other TAP are below screening emission levels (EL) as shown in Appendix A.

**Table 4 TAP EMISSIONS SUMMARY**
**POTENTIAL TO EMIT**

| Non-Carcinogenic Toxic Air Pollutants | Average Permitted Emissions Rates (lb/hr) | Averaging period | TAP Screening Emission Level (lb/hr) | Exceeds Screening Level? (Y/N) |
|---|---|---|---|---|
| **Formaldehyde** | 8.96E-3 | Annual | 5.1E-4 | Yes |
| **Hydrogen Chloride** | 5.20E-2 | Daily | 5.0E-2 | Yes |
| **Benzo(a)pyrene** | 8.55E-7 | Annual | 2.0E-6 | Yes |
| **POM**[a] | 9.87E-6 | Annual | 2.0E-6 | Yes |
| **Arsenic** | 2.28E-6 | Annual | 1.56E-6 | Yes |
| **Cadmium** | 1.52E-5 | Annual | 3.7E-6 | Yes |
| **Hexavalent Chromium** | 1.12E-6 | Annual | 5.6E-7 | Yes |
| **Nickel** | 1.81E-5 | Annual | 2.7E-5 | No[b] |

a) 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.

b) The applicant calculated, as shown in Appendix A, nickel emissions to exceed the screening emission level. However, when nickel emissions are averaged over a 12-month period the emissions are actually below the screening emission level as shown in this table.

Modeling was conducted for all TAPs that exceed screening emission levels. All ambient impacts were determined to be below acceptable ambient concentrations.

## HAP Emissions

The majority of HAP emissions from the wood fired boiler exist as either a VOC or as particulate matter. VOC and particulate matter emissions combined are less than 2 tons per year. It can reasonably assumed that HAP emissions will not exceed major source thresholds (10 T/yr for any one HAP or 25 T/yr for all HAPs in aggregate) without a need to determine the exact emissions rates for each HAP.

## *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 (AAC) or acceptable ambient concentration for carcinogens (AACC) for toxic air pollutants (TAP). A summary of the Ambient Air Impact Analysis for TAPs is provided in Appendix B.

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 Boise 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.

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

IDAPA 58.01.01.201 Permit to Construct Required

The permittee has requested that a PTC be issued to the facility for the wood fired boiler. 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.

### *Tier II Operating Permit (IDAPA 58.01.01.401)*

IDAPA 58.01.01.401 Tier II Operating Permit

The facility is not subject to IDAPA 58.01.01.300-399, and the applicant did not apply for a Tier II operating permit in accordance with IDAPA 58.01.01.401. This permitting action was processed in accordance with the procedures of IDAPA 58.01.01.400-410.

### *Fuel Burning Equipment – Particulate Matter (IDAPA 58.01.01.677)*

IDAPA 58.01.01.677 Rule Title

The rated input capacity of the wood fired boiler is less than 10 MMBtu/hr, therefore in accordance with section 677 the particulate matter standard is 0.200 grains per dry standard cubic foot at 8% oxygen.

Particulate matter grain loading emission estimates were calculated using emission factors developed from testing a dual chamber Messersmith 2.2 MMBtu per hour wood fired boiler in Vermont[1]. This unit is similar to the proposed Garden Valley Alternative Energy Solutions, Inc. combustor. Both units have dual combustion chambers and similar Btu rating. Particulate matter grain loading from the uncontrolled Messersmith unit was measured at 0.095 gr/dscf @ 8.3 oxygen which is approximately half the grain loading emission standard. The combustor proposed to be installed at Garden Valley will be equipped with multiclone and emissions are expected to be less than those measured from the similar unit that was tested in Vermont which shows compliance without controls. The permit requires that a multiclone be used to control emissions, this is consistent with application materials. With the use of a multiclone particulate matter emissions will remain in compliance should combustion conditions be poor.

1 Wood-chip Fired Furnaces Testing Project for the Coalition of Northeastern Governors, April 1996

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

IDAPA 58.01.01.301 Requirement to Obtain Tier I Operating Permit

Post project facility-wide emissions from this facility do not have a potential to emit greater than 100 tons per year for $PM_{10}$, $SO_2$, $NO_X$, CO, and VOC or 10 tons per year for any one HAP or 25 tons per year for all HAPs combined. Therefore, the facility is not a Tier I source in accordance with IDAPA 58.01.01.006.113 and the requirements of IDAPA 58.01.01.301 do not apply.

## *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 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)*

The facility is not subject to any NSPS requirements.

40 CFR 60, Subpart Dc Standards of Performance for Small Industrial–Commercial–Institutional Steam Generating Units

*The affected facility to which this subpart applies is each steam generating unit for which construction, modification, or reconstruction is commenced after June 9, 1989 and that has a maximum design heat input capacity of 29 megawatts (MW) (100 million British thermal units per hour (MMBtu/hr)) or less, but greater than or equal to 2.9 MW (10 MMBtu/hr).*

The wood fired boiler has a heat input capacity of 2.74 MMBtu/hr which is less than the Subpart Dc applicability threshold.

40 CFR 60, Subpart CCCC Commercial and Industrial Solid Waste Incineration Units (CISWI)

In accordance with 40 CFR 60.210 this subpart applies if the incineration unit meets all the requirements specified in paragraphs (a) through (c).

*(a) Your incineration unit is a new incineration unit as defined in §60.2015.*

*(b) Your incineration unit is a CISWI unit as defined in §60.2265.*

*(c) Your incineration unit is not exempt under §60.2020.*

In accordance with the definition of CISWI (40 CFR 60.2265) the proposed wood fired boiler is not an affected emission unit. In order to be an affected unit the source must combust commercial or industrial waste. "*Commercial or industrial waste* means solid waste that is combusted at any commercial or industrial facility using controlled flame combustion in an enclosed, distinct operating unit: Whose design does not provide for energy recovery ..." The purpose of the proposed wood fired boiler is to recover energy; therefore the emission unit is not an affected emission unit.

It should be noted that at the time of permit issuance there are proposed amendments to the CISWI regulation which if promulgated may change the applicability determination. The proposed changes are to the definition of commercial or industrial waste, including the definition of solid waste. Under the

proposed regulations, if the wood combusted at the facility is secondary material from a commercial or industrial process then the regulation becomes applicable. The proposed changes to the CISWI rule were published in the Federal Register on June 4, 2004. It is unknown when, or if, the proposed rule will be finalized.

### *NESHAP Applicability (40 CFR 61)*

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

### *MACT Applicability (40 CFR 63)*

The facility is not subject to any MACT standards in 40 CFR Part 63.

40 CFR 63 Subpart DDDDD - Industrial, Commercial, and Institutional Boilers and Process Heaters

On June 19, 2007 Subpart DDDDD was vacated by the United States Court of Appeals. Proposed updates to Subpart DDDDD were published in the Federal Register on June 4, 2010. As proposed, Subpart DDDDD will only apply to sources which are major emitters of HAPs. The Garden Valley School District is not a major source of HAP emissions and Subpart DDDDD will not apply.

### *Permit Conditions Review*

This section describes the permit conditions for this initial permit.

Permit Conditions 1 & 2

Permit Condition 1 is the process description and Permit Condition 2 is the emission control description. Both are directly from the application materials.

Permit Condition 3

Formaldehyde emissions are limited to 78.5 pounds per any consecutive 12-month period consistent with the analysis that demonstrates compliance with toxic air pollutant acceptable ambient concentrations. All other toxic air pollutants (see Appendix A) are inherently limited by the amount of wood that may be combusted without a need for specific emission rate limits.

Permit Condition 4

Permit Condition 4 is the 20% opacity limit (IDAPA 58.01.01.625).

Permit Condition 5

This condition is the 0.200 grains per dry standard cubic foot particulate matter standard of IDAPA 58.01.01.677. As stated on page 7 of this statement of basis uncontrolled emissions from the dual combustion chamber burner are in compliance. The facility has proposed to operate a multiclone to further control particulate emissions.

Permit Condition 6

The amount of wood combusted is limited to 521 tons per any consecutive 12-month period. This combustion rate is consistent with the analysis that shows compliance with all applicable standards. A short term combustion rate limit is not necessary because short term emission rates used to demonstrate compliance are determined based on the maximum rated design capacity of the combustor.

Permit Condition 7

Wood combusted in the boiler is limited to untreated wood. Treated wood will have different emissions than wood that is not treated, the analysis that demonstrates compliance with all applicable requirements is for untreated wood only.

Permit Condition 8

Consistent with the application the permit requires that a multiclone be used to control emissions. Though, as detailed in the Fuel Burning Equipment Standard regulatory analysis covered on page of this statement of basis, uncontrolled emissions from the combustor are expected to be in compliance. The applicant proposed to install a multiclone, which will provide a buffer for compliance should combustion conditions deteriorate to such an extent that uncontrolled particulate matter emissions increase. There are no operating or monitoring requirements for the multiclone because uncontrolled particulate matter emissions are expected to be in compliance.

Initial Permit Condition 9 & 10

Permit Conditions 9 and 10 requiring monitoring of the amount of fuel combusted so that compliance may be determined with the combustion rate limits on a monthly basis.

## PUBLIC REVIEW

### *Public Comment Opportunity*

An opportunity for public comment period on the application was provided in accordance with IDAPA 58.01.01.209.01.c or IDAPA 58.01.01.404.01.c. During this time, there were no comments on the application and there was not a request for a public comment period on DEQ's proposed action. Refer to the chronology for public comment opportunity dates.

# APPENDIX A – EMISSIONS INVENTORIES

**Emission Inventory**
**Garden Valley K-12 School**
**Garden Valley, Idaho**

| Wood Fired Boiler Operating Parameters | |
|---|---|
| Heat Input (MM Btu/hr) = | 2.7389 |
| Limited Annual Heat Input (MM Btu/yr) = | 7,499.78 |
| Fuel Moisture (%) = | 20 |
| Fuel Heat Value (Btu/bone dry lb) = | 9,000 |
| Fuel Heat Value (Btu/wet lb) = | 7,200 |
| Fuel Burned (wet tons/hr) = | 0.1902 |
| Potential Fuel Use (wet tons/yr) = | 520.82 |

| Criteria Air Pollutant | Emission Factor (lb/MMBtu) | Note | Potential Emissions (lb/hr) | Potential Emissions (tons/yr) |
|---|---|---|---|---|
| PM (0.2 grains/dscf) | 0.4277 | 3 | 1.171 | 1.604 |
| PM-10 (Dry wood, Mech Collector) | 0.2870 | 1 | 0.786 | 1.076 |
| PM-2.5 | 0.2280 | 1 | 0.624 | 0.855 |
| SO2 | 0.025 | 1 | 6.847E-02 | 0.094 |
| NOx | 0.146 | 2 | 0.400 | 0.547 |
| CO | 2.123 | 2 | 5.815E+00 | 7.961 |
| VOC | 0.017 | 1 | 4.656E-02 | 0.064 |
| Lead | 5.160E-05 | 2 | 1.413E-04 | 1.935E-04 |

| Toxic Air Pollutant | Emission Factor (lb/MMBtu) | Note | Potential Emissions (lb/hr) | Potential Emissions (tons/yr) | Emission Screening Level (lb/hr) | Modeling Required? (yes/no) |
|---|---|---|---|---|---|---|
| Acetaldehyde | 8.30E-04 | 1 | 2.27E-03 | 3.112E-03 | 3.00E-03 | no |
| Acetone | 1.90E-04 | 1 | 5.20E-04 | 7.125E-04 | 119 | no |
| Acetophenone | 3.20E-09 | 1 | 8.76E-09 | 1.200E-08 | | |
| Acrolein | 4.00E-03 | 1 | 1.10E-02 | 1.500E-02 | 0.017 | no |
| Benzaldehyde | 8.50E-07 | 1 | 2.33E-06 | 3.187E-06 | | |
| Benzene | 4.494E-05 | 2 | 1.23E-04 | 1.685E-04 | 8.00E-04 | no |
| Benzo(j,k)fluoranthene | 1.60E-07 | 1 | 4.38E-07 | 6.000E-07 | | |
| Benzoic acid | 4.70E-08 | 1 | 1.29E-07 | 1.762E-07 | | |
| Bis(2-ethylhexyl)phthalate | 4.70E-08 | 1 | 1.29E-07 | 1.762E-07 | 2.80E-02 | no |
| Bromomethane | 1.50E-05 | 1 | 4.11E-05 | 5.625E-05 | | |
| 2-Butanone (MEK) | 5.40E-06 | 1 | 1.48E-05 | 2.025E-05 | 39.3 | no |
| Carbazole | 1.80E-06 | 1 | 4.93E-06 | 6.750E-06 | | |
| Carbon tetrachloride | 4.50E-05 | 1 | 1.23E-04 | 1.687E-04 | 4.40E-04 | no |
| Chlorine | 7.90E-04 | 1 | 2.16E-03 | 2.962E-03 | 0.2 | no |
| Chlorobenzene | 3.30E-05 | 1 | 9.04E-05 | 1.237E-04 | 23.3 | no |
| Chloroform | 2.80E-05 | 1 | 7.67E-05 | 1.050E-04 | 2.80E-04 | no |
| Chloromethane | 2.30E-05 | 1 | 6.30E-05 | 8.625E-05 | | |
| 2-Chlorophenol | 2.40E-08 | 1 | 6.57E-08 | 9.000E-08 | 0.033 | no |
| Crotonaldehyde | 9.90E-06 | 1 | 2.71E-05 | 3.712E-05 | 0.38 | no |
| Decachlorobiphenyl | 2.70E-10 | 1 | 7.40E-10 | 1.012E-09 | | |
| 1,2-Dibromoethene | 5.50E-05 | 1 | 1.51E-04 | 2.062E-04 | | |
| Dichlorobiphenyl | 7.40E-10 | 1 | 2.03E-09 | 2.775E-09 | | |
| 1,2-Dichloroethane | 2.90E-05 | 1 | 7.94E-05 | 1.087E-04 | 2.50E-04 | no |
| Dichloromethane | 2.90E-04 | 1 | 7.94E-04 | 1.087E-03 | 1.60E-03 | no |
| 1,2-Dichloropropane (Propylene dichloride) | 3.30E-05 | 1 | 9.04E-05 | 1.237E-04 | 23.133 | no |
| 2,4-Dinitrophenol | 1.80E-07 | 1 | 4.93E-07 | 6.750E-07 | | |
| Ethylbenzene | 3.10E-05 | 1 | 8.49E-05 | 1.162E-04 | 29 | no |
| Formaldehyde | 1.047E-02 | 2 | 2.87E-02 | 3.926E-02 | 5.10E-04 | yes |
| Heptachlorobiphenyl | 6.60E-11 | 1 | 1.81E-10 | 2.475E-10 | | |

**Emission Inventory**
**Garden Valley K-12 School**
**Garden Valley, Idaho**

| Toxic Air Pollutant | Emission Factor (lb/MMBtu) | Note | Potential Emissions (lb/hr) | Potential Emissions (tons/yr) | Emission Screening Level (lb/hr) | Modeling Required? (yes/no) |
|---|---|---|---|---|---|---|
| Hexachlorobiphenyl | 5.50E-10 | 1 | 1.51E-09 | 2.062E-09 | | |
| Hexanal | 7.00E-06 | 1 | 1.92E-05 | 2.625E-05 | | |
| Heptachlorodibenzo-p-dioxins | 2.00E-09 | 1 | 5.48E-09 | 7.500E-09 | | |
| Heptachlorodibenzo-p-furans | 2.40E-10 | 1 | 6.57E-10 | 9.000E-10 | | |
| Hexachlorodibenzo-p-dioxins | 1.60E-06 | 1 | 4.38E-06 | 6.000E-06 | | |
| Hexachlorodibenzo-p-furans | 2.80E-10 | 1 | 7.67E-10 | 1.050E-09 | | |
| Hydrogen Chloride | 1.90E-02 | 1 | 5.20E-02 | 7.125E-02 | 0.05 | yes |
| Isobutyraldhyde | 1.20E-05 | 1 | 3.29E-05 | 4.500E-05 | | |
| Methane | 2.10E-02 | 1 | 5.75E-02 | 7.875E-02 | | |
| Monochlorobiphenyl | 2.20E-10 | 1 | 6.03E-10 | 8.250E-10 | | |
| 2-Nitrophenol | 2.40E-07 | 1 | 6.57E-07 | 9.000E-07 | | |
| 4-Nitrophenol | 1.10E-07 | 1 | 3.01E-07 | 4.125E-07 | | |
| Octachlorodibenzo-p-dioxins | 6.60E-08 | 1 | 1.81E-07 | 2.475E-07 | | |
| Octachlorodibenzo-p-furans | 8.80E-11 | 1 | 2.41E-10 | 3.300E-10 | | |
| Pentachlorodibenzo-p-dioxins | 1.50E-09 | 1 | 4.11E-09 | 5.625E-09 | | |
| Pentachlorodibenzo-p-furans | 4.20E-10 | 1 | 1.15E-09 | 1.575E-09 | | |
| Pentachlorobiphenyl | 1.20E-09 | 1 | 3.29E-09 | 4.500E-09 | | |
| Pentachlorophenol | 5.10E-08 | 1 | 1.40E-07 | 1.912E-07 | 0.033 | no |
| Phenol | 5.10E-05 | 1 | 1.40E-04 | 1.912E-04 | 1.27 | no |
| Polyaromatic Hydrocarbons (PAH) | | | | | | |
| Acenaphthene | 7.530E-07 | 2 | 1.339E-06 | 2.824E-06 | | |
| Acenaphthylene | 3.330E-05 | 2 | 8.37E-05 | 1.249E-04 | | |
| Anthracene | 2.440E-06 | 2 | 6.87E-06 | 9.150E-06 | | |
| Benzo(a)anthracene | 1.540E-06 | 2 | 6.36E-06 | 5.775E-06 | | |
| Benzo(a)pyrene | 9.910E-07 | 2 | 4.50E-06 | 3.716E-06 | 2.00E-06 | yes |
| Benzo(b)fluoranthene | 3.660E-06 | 2 | 1.74E-05 | 1.372E-05 | | |
| Benzo(e)pyrene | 2.380E-06 | 2 | 1.17E-05 | 8.925E-06 | | |
| Benzo(g,h,I)perylene | 1.930E-06 | 2 | 5.90E-06 | 7.237E-06 | | |
| Benzo(k)fluoranthene | 7.790E-07 | 2 | 3.54E-06 | 2.921E-06 | | |
| 2-Chloronaphthalene | 5.180E-09 | 2 | 3.17E-08 | 1.942E-08 | | |
| Chrysene | 3.150E-06 | 2 | 2.04E-05 | 1.181E-05 | | |
| Dibenzo(a,h)anthracene | 1.330E-07 | 2 | 4.06E-07 | 4.987E-07 | | |
| Fluoranthene | 1.080E-05 | 2 | 9.22E-05 | 4.050E-05 | | |
| Fluorene | 6.220E-07 | 2 | 2.46E-06 | 2.332E-06 | | |
| Indeno(1,2,3-cd)pyrene | 1.280E-06 | 2 | 4.31E-06 | 4.800E-06 | | |
| 2-Methylnaphthalene | 1.320E-05 | 2 | 2.66E-05 | 4.950E-05 | | |
| Naphthalene | 1.260E-04 | 2 | 2.65E-04 | 4.725E-04 | 3.33 | no |
| Perylene | 2.080E-07 | 2 | 7.07E-07 | 7.800E-07 | | |
| Phenanthrene | 2.670E-05 | 2 | 2.05E-04 | 1.001E-04 | | |
| Pyrene | 9.380E-06 | 2 | 7.86E-05 | 3.517E-05 | | |
| PAH Total | 2.393E-04 | | 8.375E-04 | 8.972E-04 | | |
| Polycyclic Organic Matter (POM) | | | | | | |
| Benzo(a)anthracene | 1.540E-06 | 2 | 4.22E-06 | 5.775E-06 | | |
| Benzo(a)pyrene | 9.910E-07 | 2 | 2.71E-06 | 3.716E-06 | 2.00E-06 | yes |
| Benzo(b)fluoranthene | 3.660E-06 | 2 | 1.00E-05 | 1.372E-05 | | |
| Benzo(k)fluoranthene | 7.790E-07 | 2 | 2.13E-06 | 2.921E-06 | | |
| Chrysene | 3.150E-06 | 2 | 8.63E-06 | 1.181E-05 | | |
| Dibenzo(a,h)anthracene | 1.330E-07 | 2 | 3.64E-07 | 4.987E-07 | | |
| Indeno(1,2,3-cd)pyrene | 1.280E-06 | 2 | 3.51E-06 | 4.800E-06 | | |
| POM Total | 1.153E-05 | | 3.159E-05 | 4.325E-05 | 2.00E-06 | yes |
| Propanal | 3.20E-06 | 1 | 8.76E-06 | 1.200E-05 | | |
| Propionaldehyde | 6.10E-05 | 1 | 1.67E-04 | 2.287E-04 | 0.0287 | no |
| Styrene | 1.90E-03 | 1 | 5.20E-03 | 7.125E-03 | 6.67 | no |

**Emission Inventory**
**Garden Valley K-12 School**
**Garden Valley, Idaho**

| Toxic Air Pollutant | Emission Factor (lb/MMBtu) | Note | Potential Emissions (lb/hr) | Potential Emissions (tons/yr) | Emission Screening Level (lb/hr) | Modeling Required? (yes/no) |
|---|---|---|---|---|---|---|
| 2,3,7,8-Tetrachlorodibenzo-p-dioxins | 8.60E-12 | 1 | 2.36E-11 | 3.225E-11 | 1.50E-10 | no |
| Tetrachlorodibenzo-p-dioxins | 4.70E-10 | 1 | 1.29E-09 | 1.762E-09 | | |
| 2,3,7,8-Tetrachlorodibenzo-p-furans | 9.00E-11 | 1 | 2.47E-10 | 3.375E-10 | | |
| Tetrachlorodibenzo-p-furans | 7.50E-10 | 1 | 2.05E-09 | 2.812E-09 | | |
| Total Dioxin/Furan | 1.130E-11 | 2 | 3.09E-11 | 4.237E-11 | | |
| Tetrachlorobiphenyl | 2.50E-09 | 1 | 6.85E-09 | 9.375E-09 | | |
| Tetrachloroethene | 3.80E-05 | 1 | 1.04E-04 | 1.425E-04 | | |
| o-Tolualdehyde | 7.20E-06 | 1 | 1.97E-05 | 2.700E-05 | | |
| p-Tolualdehyde | 1.10E-05 | 1 | 3.01E-05 | 4.125E-05 | | |
| Toluene | 9.20E-04 | 1 | 2.52E-03 | 3.450E-03 | 25 | no |
| Trichlorobiphenyl | 2.60E-09 | 1 | 7.12E-09 | 9.750E-09 | | |
| 1,1,1 Trichloroethane (Methyl Chloroform) | 3.10E-05 | 1 | 8.49E-05 | 1.162E-04 | 127 | no |
| Trichloroethene | 3.00E-05 | 1 | 8.22E-05 | 1.125E-04 | | |
| Trichlorofluoromethane | 4.10E-05 | 1 | 1.12E-04 | 1.537E-04 | | |
| 2,4,6-Trichlorophenol | 2.20E-08 | 1 | 6.03E-08 | 8.250E-08 | 1.20E-03 | no |
| Vinyl Chloride | 1.80E-05 | 1 | 4.93E-05 | 6.750E-05 | 9.40E-04 | no |
| o-Xylene | 2.50E-05 | 1 | 6.85E-05 | 9.375E-05 | 29 | no |
| Metals | | | | | | |
| Antimony | 7.90E-06 | 1 | 2.16E-05 | 2.962E-05 | 0.033 | no |
| Arsenic | 2.660E-06 | 2 | 7.29E-06 | 9.975E-06 | 1.56E-06 | yes |
| Barium | 1.070E-04 | 2 | 2.93E-04 | 4.012E-04 | 0.033 | no |
| Beryllium | 2.510E-07 | 2 | 6.87E-07 | 9.412E-07 | 2.80E-05 | no |
| Cadmium | 1.780E-05 | 2 | 4.88E-05 | 6.675E-05 | 3.70E-06 | yes |
| Chromium, total | 2.640E-05 | 2 | 7.23E-05 | 9.900E-05 | 0.033 | no |
| Chromium, hexavalent | 1.311E-06 | 2 | 3.59E-06 | 4.916E-06 | 5.60E-07 | yes |
| Cobalt | 6.50E-06 | 1 | 1.78E-05 | 2.437E-05 | 0.0033 | no |
| Copper | 6.390E-05 | 2 | 1.75E-04 | 2.396E-04 | 0.013 | no |
| Iron | 9.90E-04 | 1 | 2.71E-03 | 3.712E-03 | 0.333 | no |
| lead | 4.80E-05 | 1 | 1.31E-04 | 1.800E-04 | | |
| Manganese | 5.570E-04 | 2 | 1.53E-03 | 2.089E-03 | 0.333 | no |
| Mercury | 3.50E-06 | 1 | 9.59E-06 | 1.312E-05 | 0.001 | no |
| Molybdenum | 2.10E-06 | 1 | 5.75E-06 | 7.875E-06 | 0.333 | no |
| Nickel | 2.110E-05 | 2 | 5.78E-05 | 7.912E-05 | 2.70E-05 | yes |
| Phosphorous | 2.70E-05 | 1 | 7.40E-05 | 1.012E-04 | 0.007 | no |
| Potassium | 3.90E-02 | 1 | 1.07E-01 | 1.462E-01 | | |
| Selenium | 3.120E-06 | 2 | 8.55E-06 | 1.170E-05 | 0.013 | no |
| Silver | 2.680E-06 | 2 | 7.34E-06 | 1.005E-05 | 0.001 | no |
| Sodium | 3.60E-04 | 1 | 9.86E-04 | 1.350E-03 | | |
| Strontium | 1.00E-05 | 1 | 2.74E-05 | 3.750E-05 | | |
| Tin | 2.30E-05 | 1 | 6.30E-05 | 8.625E-05 | 0.007 | no |
| Titanium | 2.00E-05 | 1 | 5.48E-05 | 7.500E-05 | | |
| Vanadium | 9.80E-07 | 1 | 2.68E-06 | 3.675E-06 | 0.003 | no |
| Yttrium | 3.00E-07 | 1 | 8.22E-07 | 1.125E-06 | 0.067 | no |
| Zinc | 6.130E-04 | 2 | 1.68E-03 | 2.299E-03 | 0.667 | no |

Notes:

1 Emission Factors From AP-42 Section 1.6 (9/03)

2 Emission Factors From "Wood Chip Fired Furnaces Testing Project Air Emissions Testing and Public Health Impacts Analysis", Coalition of Northwestern Govenors Policy Research Center, Inc., April 1996 Table 3-2.

3 PM Emissions Limited to 0.2 grains/dscf at 8% Oxygen (IDAPA 58.01.01.677). Fd Factor for Wood, 9,240 dscf/MMBtu.

# APPENDIX B – AMBIENT AIR QUALITY IMPACT ANALYSES

***MEMORANDUM***

**DATE:** July 22, 2010

**TO:** Dan Pitman, P.E., Senior Air Quality Engineer, Air Program

**FROM:** Darrin Mehr, Air Quality Analyst, Air Program

**PROJECT NUMBER:** P-2010.0070

**SUBJECT:** Modeling Demonstration for the 15-Day Pre-Permit PTC Application for the Proposed Installation of a Woodwaste-fired Boiler Garden Valley School District's Facility Located in Garden Valley, Idaho

## 1.0 Summary

The Garden Valley School District (Garden Valley) submitted an application for 15-Day Pre-Construction Approval for a Permit to Construct (PTC) to install a woodwaste boiler with the rated heat input capacity of 2.7 million British Thermal Units per hour (MMBtu/hr) at the existing school located in Garden Valley.

This modeling analysis was based on the permit application and modeling files received on April 9, 2010. The April 9, 2010 submittal is regarded as a new project due to the withdrawal of the permit application under the project number P-2010.0054. The modeling protocol for Project P-2010.0054 is the approved protocol for this project, and additional issues affecting the modeling protocol were addressed in email correspondence and are considered to be part of the current project's modeling protocol. Please refer to the permit statement of basis to review a complete history for this project.

The facility is not a *designated facility*, as defined in IDAPA 58.01.01.006, Rules for the Control of Air Pollution in Idaho (Rules). The facility's potential to emit (PTE) of particulate matter with an aerodynamic diameter of ten microns or less ($PM_{10}$), sulfur dioxide ($SO_2$), carbon monoxide (CO), and nitrogen oxides ($NO_x$) each is less than 100 tons per year (T/yr). The facility is not a major facility under the New Source Review (NSR) PSD program.

The proposed project is subject to review under Section 200 of the Rules. Section 203.02 of the Rules requires the facility to demonstrate compliance with the National Ambient Air Quality Standards (NAAQS). Section 210 of the Rules requires the facility to demonstrate compliance with the toxic air pollutants (TAPs) increments, which are listed in Sections 585 and 586 of the Rules.

The modeling analyses: 1) utilized appropriate methods and models; 2) were 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 predicted pollutant concentrations from emissions associated with the facility were below national ambient air quality standards and other applicable increments at all ambient air locations.

This modeling analysis was conducted by Spidell and Associates, on behalf of the applicant, Garden Valley School District (GVSD).

Key assumptions and results that should be considered in the development of the permit are shown in Table 1.

| Table 1. KEY ASSUMPTIONS USED IN MODELING ANALYSES | |
|---|---|
| **Criteria/Assumption/Result** | **Explanation/Consideration** |
| Modeling for a single point source representing the proposed boiler was conducted by modeling a unit emission rate (1 pound per hour) of a generic pollutant. The significant contribution analysis was performed by multiplying the requested potential emissions rates by the maximum (highest first high) ambient impacts for each averaging period.<br><br>TAPs compliance followed the same methodology as for the significant contribution analysis.<br><br>For the pollutants that exceeded the significant contribution levels ($NO_2$ and $PM_{10}$) the boiler's potential emission rates were multiplied by the appropriate unit emission rate design concentration impact | The proposed boiler's ambient impacts were either below significant contribution levels (SCLs), and where impacts were above the SCLs, the predicted impacts, combined with the DEQ-supplied ambient background concentrations were below the National Ambient Air Quality Standards (NAAQS). No total ambient impact was close to a NAAQS.<br><br>Compliance was easily demonstrated for all non-carcinogenic TAPs.<br><br>Compliance with the carcinogenic TAPs was achieved using average hourly emission rates that reflected a reduction of the maximum potential emission rate. Average hourly emission rates were based on requested annual level of operation of approximately 31% of the unrestricted level of operation of the boiler. The design concentration for formaldehyde was at 90% of the allowable increment using this reduced hourly emission rate. All other carcinogenic TAP impacts were well below the allowable increments. |
| **Fire Water Pump Engine**<br>The diesel-fired engine for the fire water pump engine is technically required to be included in a full facility-wide ambient impact analysis for $NO_2$ and $PM_{10}$ NAAQS.<br><br>DEQ staff evaluated the engine at the following parameters<br><br>• Operate up to 2 hr/day and 20 hr/yr for testing and maintenance purposes<br>• Engine rated at 111 horsepower (increased to 149 horsepower in the application materials for project P-2010.0066)<br>• Distance between the proposed boiler's stack and the fire water pump engine stack is approximately 850 feet.<br>• Stack height of 8 feet above grade with a 6.5 inch diameter<br>• Structure housing the fire water pump system had assumed dimensions of 20 ft D x 20 ft W x 7 ft H (P-2010.0066 application documentation listed the structure with a height of 12') | DEQ performed SCREEN3 modeling to estimate if the overlapping impacts of the fire water pump engine and the boiler would approach or exceed the $NO_2$ or $PM_{10}$ NAAQS. Low exhaust flow rate and temperature for the engine were assumed to obtain a conservative prediction. EPA AP-42 emission factors were used to estimate the emission rates at 111 horsepower.<br><br>The permit application contained a specification sheet on the engine including pollutant emissions factors. DEQ reran SCREEN3 using revised emission estimates and the increased height of the enclosing structure. Exhaust parameters were not changed and a conservative impact was obtained.<br><br>The results showed that at the discrete receptors for the design concentrations for $PM_{10}$, 24-hour average, and the $PM_{10}$ and $NO_2$ annual average, the engine's SCREEN3 impacts combined with the boiler's predicted impact and ambient background concentrations did not exceed NAAQS.<br><br>Thus, DEQ modeling staff believes including the firewater pump engine under the testing and maintenance operation scenario is not necessary to evaluate the boiler project's NAAQS compliance status. |

# 2.0 Background Information

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

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

### *2.1.1 Area Classification*

The Garden Valley facility is located in Boise County, which is designated as an attainment or unclassifiable area for sulfur dioxide ($SO_2$), nitrogen dioxide ($NO_2$), carbon monoxide (CO), lead (Pb), ozone ($O_3$), and particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers ($PM_{10}$).

There are no Class I areas within 10 kilometers of the facility.

### *2.1.2 Significant and Full Impact Analyses*

If estimated maximum pollutant impacts to ambient air from the emissions sources at the facility exceed the significant contribution levels (SCLs) of Section 006.105 of the Rules, then a full impact analysis is necessary to demonstrate compliance with Section 203.02. A full impact analysis for attainment area pollutants involves adding ambient impacts from facility-wide emissions, and emissions from any identified co-contributing sources, to DEQ-approved background concentration values that are appropriate for the criteria pollutant/averaging-time at the facility location and the area of significant impact. The resulting maximum pollutant concentrations in ambient air are then compared to the National Ambient Air Quality Standards (NAAQS) listed in Table 2. Table 2 also lists SCLs and specifies the modeled value that must be used for comparison to the NAAQS.

**Table 2. CRITERIA AIR POLLUTANTS APPLICABLE REGULATORY LIMITS**

| Pollutant | Averaging Period | Significant Contribution Levels[a] ($\mu g/m^3$)[b] | Class II NAAQS Regulatory Limit[c] ($\mu g/m^3$) | Modeled Value Used[d] |
|---|---|---|---|---|
| $PM_{10}$[e] | Annual | 1.0 | 50[f] | Maximum 1st highest[g] |
| | 24-hour | 5.0 | 150[h] | Maximum 6th highest[i] |
| Carbon monoxide (CO) | 8-hour | 500 | 10,000[j] | Maximum 2nd highest[g] |
| | 1-hour | 2,000 | 40,000[j] | Maximum 2nd highest[g] |
| Sulfur Dioxide ($SO_2$) | Annual | 1.0 | 80[f] | Maximum 1st highest[g] |
| | 24-hour | 5 | 365[j] | Maximum 2nd highest[g] |
| | 3-hour | 25 | 1,300[j] | Maximum 2nd highest[g] |
| Nitrogen Dioxide ($NO_2$) | Annual | 1.0 | 100[f] | Maximum 1st highest[g] |
| Lead (Pb) | Quarterly | NA | 1.5[k,l] | Maximum 1st highest[g] |
| | Rolling 3-month | NA | 0.15[l] | Maximum 1st highest[g] |

[a] Idaho Air Rules Section 006.105
[b] Micrograms per cubic meter
[c] National Ambient Air Quality Standards specified by Idaho Air Rules Section 577 for criteria pollutants
[d] The maximum 1st highest modeled value is always used for significant impact analysis
[e] Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
[f] Never expected to be exceeded in any calendar year
[g] Concentration at any modeled receptor
[h] Never expected to be exceeded more than once in any calendar year.
[i] Concentration at any modeled receptor when using five years of meteorological data
[j] Not to be exceeded more than once per year
[k] Measured as total suspended particulates
[l] Not to be exceeded in any year

### *2.1.3 TAPs Analyses*

The increase in emissions from the proposed project are required to demonstrate compliance with the toxic air pollutant (TAP) increments, with an ambient impact dispersion analysis required for any TAP having a requested potential emission rate that exceeds the screening emission rate limit (EL) specified by Idaho Air Rules (Rules) Section 585 or 586.

This project is for an existing facility which proposes to install a single 2.74 MMBtu/hr woodwaste-fired boiler equipped with a multiclone. Any TAP emissions increases associated with this project are subject to the requirements of the TAPs regulations. The analyses submitted in the application included a TAPs compliance demonstration per the requirements of Section 210 of the Rules. A compliance demonstration was included for emission increases requested with this permitting action. Non-carcinogenic TAPs regulated by Section 585 of the Rules and carcinogenic TAPs regulated by Section 586 of the Rules were expected to increase.

## 2.2 Background Concentrations

Background concentration values were provided by DEQ for this project. Default rural agricultural background values were provided in the modeling protocol approval letter. Only $PM_{10}$ and $NO_2$ emissions were expected to exceed modeling thresholds and the following background concentrations were provided by DEQ for this project:

- $PM_{10}$, 24-hour average: 73 $\mu g/m^3$,
  $PM_{10}$, annual average: 26 $\mu g/m^3$,
- $NO_2$, annual average: 17 $\mu g/m^3$.

# 3.0 Modeling Impact Assessment

## 3.1 Modeling Methodology

Table 3 provides a summary of the modeling parameters used in the submitted modeling analyses.

**Table 3. MODELING PARAMETERS**

| Parameter | Description/ Values | Documentation/Additional Description |
|---|---|---|
| Model | AERMOD | AERMOD, Version 09292 |
| Meteorological data | 2001-2005 | DEQ provided a pre-processed data set of Boise airport surface and upper air data covering the years 2001-2005 of concatenated and individual year files |
| Land Use (urban or rural) | Rural | Urban heat rise coefficients were not used. DEQ agrees with the applicant's assessment that a rural land use designation is appropriate. |
| Terrain | Considered | 3-dimensional receptor coordinates were obtained from Digital Elevation Model (DEM) files for the surrounding area. |
| Building downwash | Downwash algorithm | AERMOD, Version 09292 uses BPIP-Prime and the PRIME algorithms to evaluate structure-induced downwash effects. |
| Receptor grid | Grid 1 | 10-meter spacing immediately exterior to the school building out to a distance of 100 meters |
| | Grid 2 | 25-meter spacing in a grid placed external to Grid 1 and extending out to 300 meters surrounding the school building |
| | Grid 3 | 50-meter spacing in a grid placed external to Grid 2 and extending out to 600 meters surrounding the school building |
| | Grid 4 | 100-meter spacing in a grid placed external to Grid 3 and extending out to 1,100 meters surrounding the school building |

### 3.1.1 Modeling protocol

A modeling protocol was submitted to DEQ by Spidell and Associates, on behalf of the Garden Valley School District, on February 18, 2010. This modeling protocol was approved, with comments, by DEQ, on October 24, 2010. This protocol was used for Project P-2010.0054 and was used for Project P-2010.0066 with the additional email exchange concerning DEQ's authorization to exclude the fire water pump engine from the full impact analysis for $NO_2$ and $PM_{10}$ for this project.

Modeling was conducted using methods documented in the modeling protocol and the *State of Idaho Air Quality Modeling Guideline.*

### *3.1.2 Model Selection*

AERMOD, Version 09292, was used by Spidell and Associates, on behalf of the Garden Valley School District, to conduct the ambient air analyses for NAAQS and TAPs compliance demonstrations.

### *3.1.3 Meteorological Data*

DEQ supplied a dataset that was processed using AERMET and 2001 through 2005 Boise airport surface and upper air data files.

### *3.1.4 Terrain Effects*

The modeling analyses conducted by Spidell and Associates, on behalf of Garden Valley, considered elevated terrain. The elevation of each receptor was obtained from United States Geological Survey (USGS) digital elevation map (DEM) files for the area surrounding the facility. The DEM files used the NAD27 coordinate system. Elevations for the emission source and building were accepted as submitted and matched the elevation in Google Earth.

### *3.1.5 Facility Layout*

DEQ checked Google Earth to verify the facility's layout. The structure layout was accepted as submitted.

### *3.1.6 Building Downwash*

Plume downwash effects caused by structures at the facility were accounted for in the modeling analyses. The Building Profile Input Program-Plume Rise and Building Downwash Model (BPIP-PRIME) was used by the applicant to calculate direction-specific building dimensions and Good Engineering Practice (GEP) stack height information from building dimensions/configurations and emissions release parameters. The output from BPIP-PRIME was used as input to AERMOD, Version 09292, to account for building-induced downwash effects.

### *3.1.7 Ambient Air Boundary*

Ambient air was determined to exist for all areas immediately exterior to the facility's building. This is a public school building and members of the public are allowed and expected to access the school grounds at any location. This approach follows the methods of determining the ambient air boundary as specified in the *State of Idaho Air Quality Modeling Guideline.*

### *3.1.8 Receptor Network*

The receptor grids used by Garden Valley met the minimum recommendations specified in the *State of Idaho Air Quality Modeling Guideline*. DEQ determined the receptor grid was adequate to reasonably resolve the maximum modeled ambient impacts.

## 3.2 Emission Rates

### *3.2.1 Modeled Emission Rates*

Emissions rates used in the dispersion modeling analyses submitted by the applicant were reviewed against those in the permit application. The following approach was used for Garden Valley's modeling demonstration:

- All modeled criteria air pollutant and TAP emissions rates were equal to or greater than the facility's emissions calculated in the PTC application and the requested permit allowable emission rates listed in the air quality permit.

Table 4 lists the hourly emission rates that were modeled to demonstrate compliance with the significant contribution levels (SCLs), and, where applicable, to demonstrate compliance with NAAQS, for pollutants with short term averaging periods of 24 hours or less. The emission rate listed in Table 4 was modeled continuously for 24 hours per day.

**Table 4. MODELED SHORT-TERM AVERAGE EMISSIONS RATES**

| Source ID | Description | $PM_{10}$[b], 24-hour avg (lb/hr)[a] | CO[c], 1-hour and 8-hour (lb/hr) | $SO_2$[d], 3-hour and 24-hour (lb/hr) |
|---|---|---|---|---|
| BLR | Woodwaste-fired Boiler | 0.79 | 5.82 | 0.068 |

[a] Pounds per hour
[b] Particulate matter with a mean aerodynamic diameter of ten microns or less
[c] Carbon monoxide
[d] Sulfur dioxide

Table 5 lists the hourly emission rates that were modeled to demonstrate compliance with the significant contribution levels (SCLs), and, where applicable, to demonstrate compliance with NAAQS, for pollutants with annual averaging periods. The emission rates listed in Table 5 were modeled continuously for 8,760 hours per year.

**Table 5. MODELED ANNUAL AVERAGE EMISSIONS RATES**

| Source ID | Description | Emission Rates (lb/hr)[a] | | |
|---|---|---|---|---|
| | | $NO_2$[b] | $PM_{10}$[c] | $SO_2$[d] |
| BLR | Woodwaste-fired Boiler | 0.40 | 0.79 | 0.068 |

[a] Pounds per hour
[b] Nitrogen dioxide
[c] Particulate matter with a mean aerodynamic diameter of ten microns or less
[d] Sulfur dioxide

The carcinogenic toxic air pollutant (TAP) annual average emission rates listed below in Table 6 were modeled to demonstrate compliance with the applicable acceptable ambient concentration (AACC) increments. Non-carcinogenic TAP 24-hour average emission rate listed below in Table 6 was modeled to demonstrate compliance with the acceptable ambient concentration for non-carcinogens (AAC). The emission rates were modeled continuously for 8,760 hours per year without any additional restrictions on the emission rates or hours of operation. Multiply the carcinogenic TAP hourly emission rates listed in Table 6 by 8,760 hours per year to obtain the annual emissions represented in the modeling demonstration, and multiply the non-carcinogenic TAP emission rate by 24 hours per day to obtain the daily amount of emissions represented in the modeling.

Emissions of all other TAPs were estimated to be below emissions screening levels (ELs) listed in Sections 585 and 586 of the Rules, and air impact analyses were not required.

| Table 6. MODELED TOXIC AIR POLLUTANT EMISSIONS RATES | | |
|---|---|---|
| **TAP** | **CAS #** | **(lb/hr)[a]** |
| **Non-carcinogenic TAPs** | | |
| Hydrogen Chloride | 7647-01-0 | 5.20E-04 |
| **Carcinogenic TAPs** | | |
| Arsenic | 7440-38-2 | 2.28E-06 |
| Cadmium | 7440-43-9 | 1.52E-05 |
| Chromium VI | 7440-47-3 | 1.12E-06 |
| Formaldehyde | 50-00-0 | 8.96E-03 |
| Polycyclic Organic Matter | NA | 9.87E-06 |
| Nickel | 7440-02-0 | 1.81E-05 |

[a] Pounds per hour

## 3. 3 Emission Release Parameters

### 3.3.1 Point Sources

Table 7 provides emissions release parameters, including stack height, stack diameter, exhaust temperature, and exhaust velocity for point sources.

The exhaust flow rate was determined using the EPA Method 19 $F_d$ calculation method. All other exhaust parameters were accepted as representing the stack and emissions unit as-proposed. Values used in the analyses appeared reasonable and within expected ranges for the assumptions used in the submitted analyses.

| Table 7. POINT SOURCE STACK PARAMETERS | | | | | |
|---|---|---|---|---|---|
| **Release Point** | **Description** | **Stack Height (m)[a]** | **Stack Gas Flow Temperature (K)[b]** | **Stack Gas Flow Velocity (m/sec)[c]** | **Stack Diameter (m)** |
| BLR | Woodwaste-fired Boiler | 15.24 | 449.8 | 6.57 | 1.14 |

[a] Meters
[b] Kelvin
[c] Meters per second

## 3.4 Results for Ambient Impact Analyses

### 3.4.1 Significant Impact Analyses

A significant impact analysis was performed for this project. Emissions of $PM_{10}$, $SO_2$, CO, and $NO_x$ from the proposed boiler were modeled and the impacts were compared to the significant contribution concentrations listed in Section 006.105 of the Idaho Air Rules. The results are listed in Table 8. Lead emissions were not modeled and were expected to be below modeling thresholds.

Modeled impacts were above the SCLs for $PM_{10}$ 24-hour and annual averaging periods and for $NO_2$, annual averaging period. A full impact analysis was required for these pollutants and averaging periods.

| Table 8. RESULTS OF SIGNIFICANT IMPACT ANALYSES | | | | | |
|---|---|---|---|---|---|
| **Pollutant** | **Averaging Period** | **Maximum Modeled Concentration ($\mu g/m^3$)[b]** | **Significant Contribution Level ($\mu g/m^3$)** | **Facility-Wide Modeling Required** | **Percentage of Significant Contribution Level Of Impact** |
| $PM_{10}$[c] | 24-hour | 30.1 | 5.0 | Yes | 602% |
| | Annual | 6.1 | 1.0 | Yes | 610% |
| $SO_2$[d] | Annual | 0.5 | 1.0 | No | 50% |
| | 24-hour | 2.6 | 5.0 | No | 52% |
| | 3-hour | 4.4 | 25.0 | No | 18% |
| $NO_2$[e] | Annual | 3.1 | 1.0 | Yes | 310% |
| CO[f] | 1-hour | 495 | 2,000.0 | No | 25% |
| | 8-hour | 265 | 500.0 | No | 53% |

[b] Micrograms per cubic meter
[c] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
[d] Sulfur dioxide
[e] Nitrogen dioxide
[f] Carbon monoxide

### *3.4.2 Full Impact Analyses*

A full impact analysis was performed by the Garden Valley School District for this project by adding the proposed boiler's ambient impacts to the ambient background concentrations provided by DEQ for $NO_2$ and $PM_{10}$. The Garden Valley school is equipped with a fire water pump engine, which is located on the southeastern corner of the middle water retention basin on the facility's property. This engine is fired on diesel fuel and the application lists the horsepower rating at 149 horsepower. DEQ advised Spidell and Associates that inclusion of the fire water pump engine in the full impact analysis would not be required if the Garden Valley School District agreed to operate this engine for no more than 2 hours during any day and 20 hours per year, which were greater than the actual operating hours for testing and maintenance per discussions with Spidell and Associates. These operating hours only address operating the engine for testing and maintenance activities. Emergency operation of the fire water pump engine is not restricted by any limitation for testing and maintenance purposes. The permit writer for this project is advised of these conditions and will determine what, if any, permit conditions for the fire water pump engine will be needed. The highlights of this issue are listed above in Table 1. The results of the full impact analysis are listed in Table 9.

| Table 9. RESULTS OF FULL IMPACT ANALYSES | | | | | | |
|---|---|---|---|---|---|---|
| **Pollutant** | **Averaging Period** | **Modeled Design Concentration ($\mu g/m^3$)[a]** | **Background Concentration ($\mu g/m^3$)** | **Total Ambient Impact ($\mu g/m^3$)** | **NAAQS[b] ($\mu g/m^3$)** | **Percent of NAAQS** |
| $PM_{10}$[c] | 24-hour | 19.0 | 73 | 92.0 | 150 | 61% |
| | Annual | 6.1 | 26 | 32.1 | 50 | 64% |
| $NO_2$[d] | Annual | 3.1 | 17 | 20.1 | 100 | 20% |

[a] Micrograms per cubic meter
[b] National ambient air quality standards
[c] Particulate matter with a mean aerodynamic diameter of ten microns or less
[d] Nitrogen dioxide

### *3.4.3 Toxic Air Pollutant Impact Analyses*

Dispersion modeling for TAPs was required to demonstrate compliance with TAP increments specified by Idaho Air Rules Sections 585 and 586. This project's caused emission increases that exceeded the screening emission rate limits. The requested emission increases were modeled to demonstrate compliance with the

allowable TAP increments. The results of the TAPs analyses are listed in Table 11. The predicted ambient TAPs impacts were below allowable increments.

| Table 11. RESULTS OF TAPs ANALYSES | | | | |
|---|---|---|---|---|
| **Toxic Air Pollutant** | **CAS No.[a]** | **Maximum Modeled Concentration ($\mu g/m^3$)[b]** | **AAC/AACC[c] ($\mu g/m^3$)** | **Percent of AAC/AACC** |
| **Non-carcinogenic TAPs** | | | | |
| Hydrogen Chloride | 7647-01-0 | 1.99 | 375 | 0.5% |
| **Carcinogenic TAPs** | | | | |
| Arsenic | 7440-38-2 | 1.76E-05 | 2.3E-04 | 8% |
| Cadmium | 7440-43-9 | 1.18E-04 | 5.6E-04 | 21% |
| Chromium VI | 7440-47-3 | 8.67E-06 | 8.3E-05 | 10% |
| Formaldehyde | 50-00-0 | 6.93E-02 | 7.7E-02 | 90% |
| Nickel | 7440-02-0 | 1.40E-04 | 4.2E-03 | 3% |
| Polycyclic Organic Matter | NA | 7.63E-05 | 3.0E-04[d] | 25% |

[a] Chemical Abstract Service Number
[b] Micrograms per cubic meter
[b] Acceptable ambient concentration for non-carcinogens (Section 585)/acceptable ambient concentration for carcinogens (Section 586)
[d] Mixtures of polyaromatic hydrocarbons (PAHs) consisting of the combination of 7 listed PAHs are considered a single TAP and are limited by the benzo(a)pyrene AACC.

## 4.0 Conclusions

The ambient air impact analysis submitted demonstrated to DEQ's satisfaction that emissions from the facility, as represented by the applicant in the permit application, will not cause or significantly contribute to a violation of any air quality standard.

# APPENDIX C – PROCESSING FEE

# PTC Fee Calculation

**Instructions:**
**Fill in the following information and answer the following questions with a Y or N. Enter the emissions increases and decreases for each pollutant in the table.**

**Company:** **Garden Valley School**
**Address:**
**City:** **Garden Valley**
**State:** **Idaho**
**Zip Code:**
**Facility Contact:** **Dr. Tomlin**
**Title:** **Superintendant**
**AIRS No.:** **015-00002**

**N** Does this facility qualify for a general permit (i.e. concrete batch plant, hot-mix asphalt plant)? Y/N

**Y** Did this permit require engineering analysis? Y/N

**N** Is this a PSD permit Y/N (IDAPA 58.01.01.205.04)

| Emissions Inventory | | | |
|---|---|---|---|
| Pollutant | Annual Emissions Increase (T/yr) | Annual Emissions Reduction (T/yr) | Annual Emissions Change (T/yr) |
| $NO_X$ | 0.5 | 0 | 0.5 |
| $SO_2$ | 0.0 | 0 | 0.0 |
| CO | 5.8 | 0 | 5.8 |
| PM10 | 0.8 | 0 | 0.8 |
| VOC | 0.0 | 0 | 0.0 |
| TAPS/HAPS | 1.0 | 0 | 1.0 |
| Total: | 0.0 | 0 | **8.2** |
| | | | |
| Fee Due | **$ 2,500.00** | | |

Comments: Total TAPs and HAPs are expected to be less than 1 tons per year, though they were not calculated exactly. TAP/HAP emissions would have to be 2.8 tons per year to affect the amount of fees due; determining the exact emission rate is not necessary for purposes of determining the PTC processing fee.