State of Idaho
Department of Environmental Quality
Air Quality Division

AIR QUALITY PERMIT
STATEMENT OF BASIS

Permit to Construct No. P-2008.0079

Final

University of Idaho

Moscow, Idaho

Facility ID No. 057-00025

September 4, 2008

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Permit Writer

The purpose of this Statement of Basis is to satisfy the requirements of IDAPA 58.01.01.200, Rules for the Control of Air Pollution in Idaho, for issuing air permits.

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Acronyms, Units, and Chemical Nomenclature

AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AQCR	Air Quality Control Region
Btu	British thermal unit
CAM	Compliance Assurance Monitoring
CFR	Code of Federal Regulations
CO	carbon monoxide
COMs	Continuous Opacity Monitor
DEQ	Department of Environmental Quality
gr	grain (1 lb = 7,000 grains)
dscf	dry standard cubic feet
EF	Emissions Factor
EPA	U.S. Environmental Protection Agency
HAPs	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
MACT	Maximum Achievable Control Technology
MMBtu	million British thermal units
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NSPS	New Source Performance Standards
PC	permit condition
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
SIP	State Implementation Plan
SM	Synthetic Minor
SO_2	sulfur dioxide
SO_x	sulfur oxides
T/yr	tons per year
TAPs	Toxic Air Pollutants
$\mu g/m^3$	micrograms per cubic meter
U of I	University of Idaho
UTM	Universal Transverse Mercator
VOC	volatile organic compound

1. FACILITY INFORMATION

1.1 Facility Description

University of Idaho's (U of I) primary campus is located in Moscow, Idaho. The facility covers approximately 1,200 acres. The facility is comprised of educational instruction buildings, research buildings, various student housing units, activity centers, and infrastructure to support day-to-day operations at U of I.

The facility contains numerous individual buildings that house the instructional and research functions. Some buildings are equipped with domestic hot water heaters, small boilers, and small furnaces, which are generally fired on natural gas.

The most significant emissions sources at the facility are located in the power building, where the four main boilers provide steam for space heating during cold weather and space cooling through an absorption chiller system during the summer. Three of these boilers are fired exclusively by natural gas and the fourth boiler is fired by wood waste and a small amount of paper waste. The other significant sources at the facility are three diesel-fired IC engines for emergency electrical backup generators located at different buildings on the campus.

1.2 Permitting History

This PTC is a revision of existing PTC 057-00025 at an existing Tier I facility.

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).

February 1, 2008	Tier I permit No. T1-2007.0082 was issued as a renewal to the current Tier I operating permit (A)
June 30, 2006	Tier I permit No. T1-060203 was issued as an administrative amendment to the Tier I operating permit to change the responsible official for the facility. (S)
May 20, 2005	Tier I permit No. T1-050205 was issued as an administrative amendment to the Tier I operating permit to change the responsible official for the facility. (S)
September 2, 2004	Tier I permit No. T1-040207 was issued as an administrative amendment to the Tier I operating permit to change the responsible official for the facility. (S)
July 28, 2003	Tier I permit No. T1-020208 was issued to correct a typographical error discovered by the U of I. (S)
November 18, 2002	Tier I permit No. 057-00025 was issued as the initial Tier I operating permit for the facility. (S, as a result of this project)

September 10, 2002	Tier II permit and PTC No. 057-00025 was issued as the initial Tier II operating permit for the facility. (S)
August 2, 2002	Tier II/PTC No. 057-00025 was issued for a wood waste-fired boiler, two natural gas-fired boilers, three diesel-fired emergency IC engine generators, other typically insignificant point sources including natural gas-fired domestic hot water heaters, small natural gas-fired space heating units, laboratory fume hoods, etc., and fugitive particulate matter emissions resulting from vehicle traffic on paved roads and parking lots, boiler ash handling, and wood-waste material transfer operations. (A)

2. APPLICATION SCOPE AND APPLICATION CHRONOLOGY

2.1 Application Scope

This permitting action modifies PTC No. T2-057-00025 by performing the following:

- Convert an existing combination Operating Permit and PTC for the wood waste-fired boiler (currently designated as S-B00, to be designated as S-BA) to a PTC only.
- Receive a PTC for an existing inactive natural gas-fired boiler (to be designated as S-BC) located at the facility.

In addition, the facility requests that the following minor administrative changes be made to the current permit:

- Permit paragraph 1.2 lists four consent orders that were to be terminated with the issuance of the Tier II PTC 057-00025. This permit paragraph is no longer valid and will be removed from the final permit.
- Change the current boiler identifications as follows:
    1. The wood waste-fired boiler designation from S-B00 to S-BA.
    2. The Clever-Brooks natural gas-fired boiler from S-B0 to S-BB.
    3. The Babcock & Wilcox natural gas-fired boiler, which is currently inactive and unpermitted, as S-BC.
    4. The Combustion Engineering natural gas-fired boiler from S-B4 to S-BD.
- Update the regulatory authorization citations in the current permit to the correct dates as listed in the current Tier I operating permit.
- Current permit paragraph 2.8 requires a monthly visible emissions check for significant sources at the facility. The only significant sources at the facility are the wood waste-fired boiler, the natural gas-fired boilers, and the diesel-fired emergency IC engine generators. The wood waste-fired boiler has a COMs installed in the exhaust stack which measures and records opacity. The natural gas-fired boilers have no opacity requirements. The diesel-fired emergency IC engine generators operate infrequently which makes a monthly visible emissions check impractical. Therefore, the facility proposes to remove the monthly opacity observation requirement from the permit. Note: It was determined that this request can not be granted because the visual emissions check is required for the emergency IC engine generators even though they are operated infrequently.

- Increase the hourly steam capacity of the wood waste-fired boiler as allowed by meeting the requirements of current permit paragraph 3.5.
- Remove the requirement that monitoring and maintaining of the pressure drop between specific ranges across the multiclone controlling the wood waste-fired boiler be performed. The current Tier I permit has a CAM requirement for monitoring and maintaining of the pressure drop across the multiclone. Note: It was determined that this request can not be granted because this PTC must remain consistent with the Tier I operating permit. Removing this requirement would give the appearance that there are different requirements for the PTC and the current Tier I operating permit.
- Change the EFs for PM_{10} and CO for the wood waste-fired boiler as listed in the current permit. The new proposed EFs are based upon source testing performed on the boiler as allowed by current permit paragraph 3.13.
- Remove the language in current permit paragraph 3.15 stating that "no further testing is required for the five-year term of this permit." This was based on the combination operating/construction permit. Instead, the facility is proposing a five-year testing frequency.
- Reduce the annual allowable hours of operation listed in permit paragraph 5.3 for all three of the diesel-fired emergency IC engine generators from 1,800 hrs/yr to 500 hrs/yr. This is based upon typical operation of these sources.
- Limit total annual fuel consumption for the three natural gas-fired boilers to 1,000,000,000 cubic feet of natural gas per year.
- Revise the facility's emissions inventory to reflect the changes made to the permit as part of this application.

2.2 Application Chronology

May 13, 2008	PTC application and $1,000 application fee were received for a revision to PTC No. 057-00025.
May 20 to June 5, 2008	Opportunity for a public comment period was held. No requests for a public comment period were received by DEQ.
June 10, 2008	DEQ determined the application complete.
July 22, 2008	DEQ sent the facility a draft permit for comment.
August 5, 2008	DEQ received comments from the facility on the draft permit.
August 18, 2008	DEQ received processing fee.
September 4, 2008	DEQ finalized the project and sent the final permit to the facility.

3. TECHNICAL ANALYSIS

3.1 Emissions Unit and Control Device

Table 3.1 EMISSION UNIT AND CONTROL DEVICE INFORMATION

Emission Unit/ID No.	Description	Control Device
S-BA	Hot water boiler Custom built, no model # No heat input rating Wood waste-fired	Multiclone
S-BB	Hot water boiler Clever-Brooks, model #DLD-76 Heat input rating of 82.5 MMBtu/hr Natural gas-fired	N/A
S-BC	Hot water boiler Babcock & Wilcox Heat input rating of 78.6 MMBtu/hr Natural gas-fired	N/A
S-BD	Hot water boiler Combustion Engineering, model #NB-242 Heat input rating of 42.9 MMBtu/hr Natural gas-fired	N/A
S-G01	Emergency IC engine genset Kohler, model #18 NA 3160 350 kW Diesel-fired	N/A
S-G02	Emergency IC engine genset Kohler, model #180ROZJ181 180 kW Diesel-fired	N/A
S-G03	Emergency IC engine genset Caterpillar, model #3412 500 kW Diesel-fired	N/A

3.2 Emissions Inventory

An emission inventory was developed and submitted by the facility for the three existing boilers, the new boiler, the three existing IC engines, insignificant sources at the facility, and fugitive sources at the facility (see Appendix B). Emissions estimates of criteria pollutant, TAP, and HAP PTE, as submitted by the facility (see Appendix C), were based on AP 42, Sections 1.6-2, 1.6-3, 1.4-1, 1.4-2, 3.3-1, 13.2.1.3, and 13.2.2.2, and emission factors and process information specific to the facility.

Table 3.2 PRE-PROJECT UNCONTROLLED EMISSIONS ESTIMATES OF CRITERIA POLLUTANTS

Emissions Unit	PM_{10}		SO_2		NO_x		CO		VOC		Lead	
	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
Point Sources Affected by the Permitting Action												
S-BA[1]	17.24	75.52	2.21	9.68	15.17	71.63	5.75	164.00	1.50	6.58	N/A	N/A
S-BB[2]	0.62	1.54	0.05	0.12	8.09	20.22	6.80	16.99	0.45	1.11	N/A	N/A
S-BD[2]	0.32	0.80	0.03	0.06	4.20	10.51	3.53	8.83	0.23	0.58	N/A	N/A
S-G01[3]	1.15	0.29	1.07	0.27	16.32	4.08	3.52	0.88	1.33	0.33	N/A	N/A
S-G02[3]	1.02	0.26	0.96	0.24	14.55	3.64	3.14	0.78	1.19	0.30	N/A	N/A
S-G03[3]	1.46	0.36	1.36	0.34	20.73	5.18	4.47	1.12	1.69	0.42	N/A	N/A
Insignificant sources	0.45	1.99	0.11	0.49	7.13	31.23	4.03	17.67	1.13	4.96	N/A	N/A
Pre-Project Totals	**22.26**	**80.76**	**5.79**	**11.20**	**86.19**	**146.49**	**31.24**	**210.27**	**7.52**	**14.28**	**0**	**0**

[1] – Based on AP-42 Tables 1.6-2 and 1.6-3 (9/03) for SO_2 and VOC combusting wood waste, Tier I operating permit for NO_x, and source testing performed on the boiler for PM_{10} (conservatively assuming PM is all PM_{10}).

[2] – Based on AP-42 Tables 1.4-1 and 1.4-2 (7/98) combusting 100% natural gas and an Applicant proposed annual limit of 1,000 MMscf of natural gas combusted by the three boilers combined.

[3] – Based on AP-42 Table 3.3-1 (10/96) for PM_{10}, SO_2, NO_x, CO and VOC combusting diesel fuel and an Applicant proposed annual limit of 500 hrs/yr of operation for each IC engine.

Table 3.3 POST PROJECT UNCONTROLLED EMISSIONS ESTIMATES OF CRITERIA POLLUTANTS

Emissions Unit	PM_{10}		SO_2		NO_x		CO		VOC		Lead	
	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
Point Sources Affected by the Permitting Action												
S-BA[1]	17.24	75.52	2.21	9.68	15.17	71.63	5.75	164.00	1.50	6.58	N/A	N/A
S-BB[2]	0.62	1.54	0.05	0.12	8.09	20.22	6.80	16.99	0.45	1.11	N/A	N/A
S-BC[2]	0.59	1.46	0.05	0.12	7.70	19.26	6.48	16.18	0.42	1.06	N/A	N/A
S-BD[2]	0.32	0.80	0.03	0.06	4.20	10.51	3.53	8.83	0.23	0.58	N/A	N/A
S-G01[3]	1.15	0.29	1.07	0.27	16.32	4.08	3.52	0.88	1.33	0.33	N/A	N/A
S-G02[3]	1.02	0.26	0.96	0.24	14.55	3.64	3.14	0.78	1.19	0.30	N/A	N/A
S-G03[3]	1.46	0.36	1.36	0.34	20.73	5.18	4.47	1.12	1.69	0.42	N/A	N/A
Insignificant sources	0.45	1.99	0.11	0.49	7.13	31.23	4.03	17.67	1.13	4.96	N/A	N/A
Post Project Totals	**22.85**	**82.22**	**5.84**	**11.32**	**93.89**	**165.75**	**37.72**	**226.45**	**7.94**	**15.34**	**0**	**0**

[1] – Based on AP-42 Tables 1.6-2 and 1.6-3 (9/03) for SO_2 and VOC combusting wood waste, Tier I operating permit for NO_x, and source testing performed on the boiler for PM_{10} (conservatively assuming PM is all PM_{10}).

[2] – Based on AP-42 Tables 1.4-1 and 1.4-2 (7/98) combusting 100% natural gas and an Applicant proposed annual limit of 1,000 MMscf of natural gas combusted by the three boilers combined.

[3] – Based on AP-42 Table 3.3-1 (10/96) for PM_{10}, SO_2, NO_x, CO and VOC combusting diesel fuel and an Applicant proposed annual limit of 500 hrs/yr of operation for each IC engine.

Table 3.4 CHANGES IN EMISSIONS ESTIMATES OF CRITERIA POLLUTANTS

Emissions Unit	PM_{10}		SO_2		NO_x		CO		VOC		Lead	
	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
Point Sources Affected by the Permitting Action												
Pre-Project Totals	22.26	80.76	5.79	11.20	86.19	146.49	31.24	210.27	7.52	14.28	0	0
Post Project Totals	22.85	82.22	5.84	11.32	93.89	165.75	37.72	226.45	7.94	15.34	0	0
Facility Total Change in Emissions	**0.59**	**1.46**	**0.05**	**0.12**	**7.70**	**19.26**	**6.48**	**16.18**	**0.42**	**1.06**	**0**	**0**

Table 3.5 TAP AND HAP EMISSIONS SUMMARY

Toxic Air Pollutants	Total PTE for Units at the Facility[1] ($\mu g/m^3$)	Non-Carcinogenic Screening Emission Level[2] (mg/m^3)	Carcinogenic Screening Emission Level[3] ($\mu g/m^3$)	Exceed Screening Level? (Y/N)
Acetaldehyde	3.16E-02	N/A	4.5E-01	N
Arsenic compounds	1.60E-04	N/A	2.3E-04	N
Benzene	8.94E-02	N/A	1.2E-01	N
1,3-Butadiene	1.61E-03	N/A	3.6E-03	N
Cadmium and compounds	5.00E-04	N/A	5.6E-04	N
Carbon-tetrachloride	9.40E-04	N/A	6.7E-02	N
Chloroform	5.90E-04	N/A	4.3E-02	N
Chromium 6	8.00E-05	N/A	8.3E-05	N
Formaldehyde	6.47E-02	N/A	7.7E-02	N
Hydrogen-chloride	4.0875	0.375	N/A	N
Manganese[4]	0.2259	0.25	N/A	N
Nickel	9.60E-04	N/A	4.2E-03	N
PAH	1.50E-04	N/A	1.4E-02	N
2,3,7,8-Tetrochlorodibenzo-p-dioxin	6.00E-011	N/A	2.2E-08	N

[1] – Based The facility modeled total emission for all units located at the facility.
[2] – IDAPA 58.01.01.585, Screening Emission Levels
[3] – IDAPA 58.01.01.586, Screening Emission Levels
[4] – Assumed to be dust and compounds.

3.3 Ambient Air Quality Impact Analysis

The facility has demonstrated 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 facility has also demonstrated compliance to DEQ's satisfaction that emissions increase due to this permitting action will not exceed any AAC or AACC for TAPs. A summary of the modeling analysis can be found in the modeling memo in Appendix D.

4. REGULATORY REVIEW

4.1 Attainment Designation (40 CFR 81.313)

University of Idaho's Moscow facility is located in Latah County (AQCR 62), which is designated as unclassifiable/attainment for SO_2, CO, PM_{10}, and NO_x, for federal and state criteria air pollutants. Reference 40 CFR 81.313.

4.2 Permit to Construct (IDAPA 58.01.01.201)

IDAPA 58.01.01.201 ..... Permit to Construct Required

The facility's proposed project does not meet the permit to construct exemption criteria contained in Sections 220 through 223 of the Rules. Therefore, a PTC is required.

4.3 Tier II Operating Permit (IDAPA 58.01.01.401)

IDAPA 58.01.01.312 ..... Duty To Apply

The facility is a Tier I source in accordance with IDAPA 58.01.01.006.113. Therefore, the requirements of IDAPA 58.01.01.312 do apply.

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

IDAPA 58.01.01.312 ..... Duty To Apply

The facility is a Tier I source in accordance with IDAPA 58.01.01.006.113. Therefore, the requirements of IDAPA 58.01.01.312 do apply.

4.5 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), the PSD requirements do not apply.

4.6 NSPS Applicability (40 CFR 60)

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

40 CFR 60.40c ..... Applicability and Delegation of Authority

In accordance with 40 CFR 60.40c(a), the four boilers at the facility are not affected facilities because they are steam generating units that commenced construction prior to June 9, 1989.

In addition, Section 60.14 defines a modification as: (a) Except as provided under paragraphs (e) and (f) of this section, any physical or operational change to an existing facility which results in an increase in the emission rate to the atmosphere of any pollutant to which a standard applies shall be considered a modification within the meaning of section 111 of the Act. Upon modification, an existing facility shall become an affected facility for each pollutant to which a standard applies and for which there is an increase in the emission rate to the atmosphere. Since the four boilers involved with this project have no proposed increases in emissions (the only proposed increase in emissions for the project is to correct the emissions from the wood waste-fired boiler and to permit an existing boiler at the facility). Therefore, the four boilers involved with this project are not being "modified". Therefore, 40 CFR 60.40c(b) does not apply to the boilers located at the facility.

40 CFR 60, Subpart IIII ..... National Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

40 CFR 60.4200a..... Applicability

In accordance with 40 CFR 60.4200(a), the three CI IC engines at the facility are not affected facilities because they each have a displacement of less than 30 liters per cylinder but all three CI IC engines commenced construction prior to July 11, 2005 and they are not fire pump engines.

4.7 NESHAP Applicability (40 CFR 61)

No NESHAP applies to this facility

4.8 MACT Applicability (40 CFR 63)

No MACT applies to this facility because it is a minor source of HAPs.

4.9 CAM Applicability (40 CFR 64)

40 CFR 64.1 ..... Definitions

This section generally applies to the facility.

40 CFR 64.2 ..... Applicability

In accordance with 40 CFR 64.2(a), this part applies to the facility because the wood waste-fired boiler is subject to part 40 CFR 70 and 71 permitting obligations and the facility is a major source. In accordance with 40 CFR 64.2(a)(1) and (2), the wood waste-fired boiler is subject to an emissions standard for PM_{10} and uses a multiclone as a control device to achieve compliance with the established emission standard. In accordance with 40 CFR 64.2(a)(3), without the multiclone, the wood waste-fired boiler has the potential to emit greater than 100% of the amount of PM_{10}, in tons per year, required for a source to be classified as a major source.

40 CFR 64.3 ..... Monitoring design criteria

In accordance with 40 CFR 64.3(a)(1), the facility has specified that the differential pressure will be used as an indicator of performance for the multiclone unit. In accordance with 40 CFR 64.3(a)(2), the facility has specified, in accordance with manufacturer recommendations, that an operating pressure of greater than or equal to 1 and less than or equal to 6 inches of water column shall provide reasonable assurance of ongoing compliance with emission limitations. In accordance with 40 CFR 64.3(a)(2), the O&M manual for the multiclone unit will contain the maintenance schedule necessary to assure that the performance of the unit will be maintained so that the unit stays within the indicator range.

In accordance with 40 CFR 64.3(b), the facility has designed the monitoring to meet the performance criteria by specifying that differential pressure data will be manually recorded once per hour and a consecutive 24-hour rolling average will be calculated.

40 CFR 64.4 ..... Submittal Requirements

In accordance with 40 CFR 64.4(a) the facility has satisfactorily identified the pressure differential as being the parameter to monitor for the above specified indicator range. The facility has justified the use of the differential pressure drop as an indicator for assurance of compliance based on 5-years of historical data and manufacturer recommendations in accordance with 40 CFR 64.4(b). In accordance with 40 CFR 64.4(c), the facility has specified that the operation pressure differential is consistently between 1 and 3 inches of water column, in their previous Tier I renewal application they have established that performance testing will be conducted to assure that the manufacturer recommended indicator range will assure compliance for their system pursuant to 40 CFR 64.4(d).

40 CFR 64.5 ..... Deadlines for Submittals

In accordance with this section, the facility has satisfied the deadline by submitting a CAM plan during the previous Tier I renewal application.

40 CFR 64.6 ..... Approval for Monitoring

Based on the CAM plan submitted by the facility and EPA guidance for CAM, permit conditions were written during the previous Tier I renewal application establishing the following:

- A Multiclone is required to be used to control PM emissions from the solid fuels wood-waste-fired boiler in accordance with 40 CFR 64.6(b).
- The definition of an exceedance and an excursion were provided, with the required action if an exceedance or excursion is detected.
- A requirement to submit reports in accordance with 40 CFR 64.9 was provided.

Table 7.1 Summary List of Tier I Permit Conditions Relative to CAM Requirement

Citation	CAM Requirements for Tier I Permit	Tier I Permit Requirement	Tier I Permit Condition(s)
40 CFR 64.6(c)(1)	Indicators to be monitored	Differential pressure through the multiclone tube	3.9, 3.10
	Method of measuring the indicator	1) Hourly meter readings with consecutive 24-hour averaging. 2) Inspections	3.10
	Performance criteria for assessing indicators	Manufacturer's recommendations and O&M manual	3.9
40 CFR 64.6(c)(20	Means of defining exceedances or excursions	Manufacturer's recommendations and O&M manual	3.10
	Level which constitutes an exceedance or excursion, or the means by which that level will be defined.	Any exceedance of manufacturer's recommendations and O&M manual	3.9
	Averaging period associated with exceedances or excursions	Consecutive 24-hour rolling average	3.9
	Procedures for notifying DEQ of the establishment or reestablishment of any exceedance or excursion level	1) Semi-annual and annual reporting requirements 2) Updated O&M manual requirement	3.23
40 CFR 64.6(c)(3)	The obligation to conduct monitoring and satisfy the requirements of 40 CFR 64.7 through 64.9	Contained in monitoring requirements of Tier I permit	3.23
40 CFR 64.6(c)(4)	If appropriate, the minimum data availability requirement for valid data collection for each averaging period.	Not necessary for this permit	N/A
	If appropriate, the minimum data availability requirement for the averaging periods in a reporting period.	Not necessary for this permit	N/A

40 CFR 64.7 ..... Operation of approved monitoring

In accordance with 40 CFR 64.7(a), the permittee shall conduct the continuous monitoring of the differential pressure drop through the multiclone unit as required under this part upon issuance of a part 70 or 71 permit that includes such monitoring.

- In accordance with 40 CFR 64.7(b), at all times, the permittee shall maintain the differential pressure drop monitoring equipment.

- In accordance with 40 CFR 64.7(c), except for monitoring malfunctions, associated repairs, and required quality assurance or control activities (including, calibration checks and required zero and span adjustments), the owner or operator shall conduct all monitoring data in accordance with Permit Condition 3.17. Data recorded during monitoring malfunctions, associated repairs, and required quality assurance or control activities shall not be used for purposes of this part, including data averages and calculations, or fulfilling a minimum data availability requirement, if applicable. The owner or operator shall use all the data collected during all other periods in assessing the operation of the control device and associated control system. A monitoring malfunction is any sudden, infrequent, not reasonably preventable failure of the monitoring to provide valid data. Monitoring failures that are caused in part by poor maintenance or careless operation are not malfunctions.
- In accordance with 40 CFR 64.7(d), upon detecting a pressure differential excursion (as defined in Permit Condition 3.9), the owner or operator shall restore operation of the solid fuels wood-waste-fired boiler and associated multiclone to its normal or usual manner of operation as expeditiously as practicable in accordance with good air pollution control practices for minimizing emissions. The response shall include taking any necessary corrective actions to restore normal operation as specified in Permit Condition 3.10 and prevent the likely recurrence of the cause of an excursion.
- In accordance with 40 CFR 6437(d), determination of whether the owner or operator has used acceptable procedures in response to an excursion will be based on the information available, which may include, but is not limited to, monitoring results, review of operations and maintenance procedures and records, and inspection of the control device, associated capture system and the process.
- In accordance with 40 CFR 64.7(e), after approval of monitoring under this part, if the owner or operator identifies a failure to achieve compliance with an emission limitation or standard for which the approved monitoring did not provide an indication of an excursion or exceedance while providing valid data, or the results of compliance or performance testing document a need to modify the existing indicator ranges or designated conditions, the owner or operator shall promptly notify the permitting authority and, if necessary, submit a proposed modification to the part 70 or 71 permit to address the necessary monitoring changes. Such a modification may include, but is not limited to, reestablishing indicator ranges or designated conditions, modifying the frequency of conducting monitoring and collecting data, or the monitoring of additional parameters.

40 CFR 64.8 ..... Quality improvement plan (QIP) requirements

At this time a QIP is not required for the facility. Implementation of a QIP may be required by the Administrator or permitting authority at a later date and may be required for instances such as (but not limited to) accumulation of exceedances or excursions exceeding 5 percent duration of a pollutant-specific emissions unit's operating time for a reporting period, for requiring the implementation of a QIP. If a QIP should be required by the department the facility shall refer to 40 CFR 64.8(b) for development of a QIP. In accordance with 40 CFR 64.8(c), if a QIP is required the owner or operator shall develop and implement a QIP as expeditiously as practicable and shall notify the permitting authority if the period for completing the improvements exceeds 180 days from the date on which the need to implement was determined.

40 CFR 64.9 ..... Reporting and recordkeeping requirements

The owner or operator shall submit monitoring reports in accordance with 40 CFR 70.6(a)(3)(iii).

4.10 Permit Conditions Review

This section describes only those permit conditions (PC) that have been added, revised, modified or deleted as a result of this permitting action. All other permit conditions remain unchanged.

The regulatory authorization citations throughout the permit will be updated to the most current rule dates.

Old Permit Condition 1.2 from PTC No. 057-00025 has been removed. This condition lists four consent orders, dated December 12, 1986 thru March 16, 2000, that are to be terminated upon issuance of Tier II permit 057-00025, which was issued September 10, 2002. Therefore, this permit condition is no longer valid and has been removed.

Old Table 1.1, LIST OF REGULATED SOURCES, from PTC No. 057-00025 has been revised to include the new boiler designations. Specifically, the wood waste-fired boiler designation has been changed from S-B00 to S-BA, the Clever-Brooks natural gas-fired boiler designation has been changed from S-B0 to S-BB, the Babcock & Wilcox natural gas-fired boiler, which is currently inactive and unpermitted, has been added and designated as S-BC, and the Combustion Engineering natural gas-fired boiler designation has been changed from S-B4 to S-BD.

The grain loading limit form old Permit Condition 3.3 from PTC No. 057-00025 has been renumbered to new Permit Condition 3.4.

Old Permit Condition 3.4 from PTC No. 057-00025 has been renumbered to new Permit Condition 3.5.

Old Permit Condition 3.5 from PTC No. 057-00025 has been revised as new Permit Condition 3.6 to reflect the wood waste-fired boiler's revised steam production rate based upon recent source testing done by the facility. Specifically, the steam production rate has been revised upward from 52,300 lb/hr to 66,800 lb/hr.

Old Permit Conditions 3.6 through 3.12 from PTC No. 057-00025 have been renumbered to new Permit Conditions 3.7 through 3.13.

Old Permit Condition 3.13 from PTC No. 057-00025 has been revised as new Permit Condition 3.14 to reflect the wood waste-fired boiler's emissions factors based upon recent source testing done by the facility. Specifically, the PM_{10} EF has been revised downward from 0.2395 lb/1,000 lb-steam to 0.1100 lb/1,000 lb-steam and the CO EF has been revised downward from 0.5200 lb/1,000 lb-steam to 0.0861 lb/1,000 lb-steam. In addition, the language specifying how annual emissions are calculated has been clarified.

Old Permit Condition 3.14 from PTC No. 057-00025 has been renumbered to new Permit Condition 3.15.

Old Permit Condition 3.15 from PTC No. 057-00025 has been revised as new Permit Condition 3.16 to reflect the change in the permit from a combination operating/construction permit to a PTC. Specifically, the one time source testing requirement has been changed to a frequency of once every five years. In addition, an additional source testing frequency of once every 36 months will be triggered if the results of the grain loading test is greater than 75% of the grain loading limit.

The grain loading limit form old Permit Condition 4.2 from PTC No. 057-00025 has been renumbered to new Permit Condition 4.4.

Old Permit Condition 4.3 from PTC No. 057-00025 has been renumbered to new Permit Condition 4.5.

New Permit Condition 4.6 has been added to limit natural gas input to the three boilers, designated as S-BB, S-BC, AND S-BD, to 1,000 MMscf in any consecutive 12-month period.

Old Permit Conditions 4.4 and 4.5 from PTC No. 057-00025 have been renumbered to new Permit Conditions 4.7 and 4.8.

New Permit Condition 4.9 has been added to keep records of the natural gas input to the three boilers, designated as S-BB, S-BC, AND S-BD.

Old Permit Condition 5.2 from PTC No. 057-00025 has been renumbered to new Permit Condition 5.4.

Old Permit Condition 5.3 from PTC No. 057-00025 has been revised as new Permit Condition 5.5 to reflect the reduction in operating hours for the diesel-fired emergency IC engines as proposed by the Applicant. Specifically, the annual operating hours limit has been lowered from 1,800 hrs/yr to 500 hrs/yr.

Old Permit Condition 5.4 from PTC No. 057-00025 has been renumbered to new Permit Condition 5.6.

Old Table 6.1, EMISSIONS RATE LIMITS, from PTC No. 057-00025 has been removed because the emissions rate limits are stated elsewhere in the Permit (specifically new Permit Condition 3.3).

Old Table 7.1, FACILITY EMISSIONS INVENTORY, from PTC No. 057-00025 has removed as Emissions Inventories are no loner placed within the Permit.

5. PERMIT FEES

Table 5.1 lists the processing fee associated with this permitting action. The facility is subject to a processing fee of $5,000.00 because its permitted annual change in emissions is 38.08 T/yr. Refer to the chronology for fee receipt dates.

Table 5.1 PTC PROCESSING FEE TABLE

Emissions Inventory			
Pollutant	**Annual Emissions Increase (T/yr)**	**Annual Emissions Reduction (T/yr)**	**Annual Emissions Change (T/yr)**
PM_{10}	1.46	0	1.46
SO_2	0.12	0	0.12
NO_x	19.26	0	19.26
CO	16.18	0	16.18
VOC	1.06	0	1.06
HAPS	0.0	0	0.0
Totals:	**38.08**	**0.00**	**38.08**
Fee Due	**$5,000.00** **Based upon an annual increase in emissions of 10 T/yr to < 100 T/yr**		

6. PUBLIC COMMENT

An opportunity for public comment period on the PTC application was provided from May 20 to June 5, 2008 in accordance with IDAPA 58.01.01.209.01.c. During this time, there were no comments on the application and no requests for a public comment period on DEQ's proposed action.

APPENDIX A – AIRS INFORMATION

AIRS/AFS[a] FACILITY-WIDE CLASSIFICATION[b] DATA ENTRY FORM

Permittee/Facility Name: University of Idaho
Facility Location: Moscow
AIRS Number: 057-00025

AIR PROGRAM POLLUTANT	SIP	PSD	NSPS (Part 60)	NESHAP (Part 61)	MACT (Part 63)	SM80	TITLE V	AREA CLASSIFICATION A-Attainment U-Unclassified N- Nonattainment
SO_2	B							U/A
NO_x	A							U/A
CO	A							U/A
PM_{10}	SM							U/A
PT (Particulate)	SM							
VOC	B							U
THAP (Total HAPs)	B							
			APPLICABLE SUBPART					
			Dc, IIII					

[a] Aerometric Information Retrieval System (AIRS) Facility Subsystem (AFS)

[b] AIRS/AFS Classification Codes:

A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For HAPs only, class "A" is applied to each pollutant which is at or above the 10 T/yr threshold, **or** each pollutant that is below the 10 T/yr threshold, but contributes to a plant total in excess of 25 T/yr of all HAPs.

SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.

B = Actual and potential emissions below all applicable major source thresholds.

C = Class is unknown.

ND = Major source thresholds are not defined (e.g., radionuclides).

APPENDIX B – EMISSIONS INVENTORY

Boiler PTE Emissions Calculations:

Table A.1 BOILER S-BA HOURLY AND ANNUAL PTE FOR CRITERIA POLLUTANTS

Emissions Unit	Rated Heat Input (MMBtu/hr)	Rated Steam Capacity (lb/hr)	Annual Hours of Operation (hrs/yr)	Criteria Pollutant	Emissions Factors (lb/1,000 lb-steam or lb/MMBtu)	Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)
S-BA[1,2,3]	88.4	66,800	8,760	PM_{10}	0.11	7.35	75.52
				SO_2	0.0250	2.21	9.68
				NO_x	0.2271	15.17	71.63
				CO	0.0861	5.75	164.00
				VOC	0.0170	1.50	6.58

[1] – Hourly PM_{10} and VOC emissions are based upon the boiler's rated steam capacity, hourly SO_2, CO, and NO_x emissions are based upon the boiler's rated heat input.

[2] – Annual PM_{10}, NO_x, and CO emissions are based upon the boiler's current permit limits, annual SO_2 and VOC emissions are based upon the boiler's rated heat input.

[3] – Based on AP-42 Tables 1.6-2 and 1.6-3 (9/03) for SO_2 and VOC combusting wood waste, Tier I operating permit for NO_x, and source testing performed on the boiler for PM_{10} (conservatively assuming PM is all PM_{10}).

For the natural gas-fired boilers the Applicant has proposed an annual fuel use limit for all three boilers combined of 1,000 MMscf/yr. All three boilers have the same emissions factors, therefore fuel use will be split proportionally between the three boilers based upon each boilers rated heat input as follows:

Fuel $Use_{S\text{-}BB}$ (MMscf/yr) = Annual fuel use (MMscf/yr) x {[Heat input of Boiler S-BB (MMBtu/hr)] ÷ [Heat input of Boiler S-BB (MMBtu/hr) + Heat input of Boiler S-BC (MMBtu/hr) + Heat input of Boiler S-BD (MMBtu/hr)]

Fuel $Use_{S\text{-}BB}$ MMscf/yr = 1,000 MMscf/yr x [82.5 MMBtu/hr] ÷ [82.5 MMBtu/hr + 78.6 MMBtu/hr + 42.9 MMBtu/hr]

Fuel $Use_{S\text{-}BB}$ MMscf/yr = 404.41 MMscf/yr

Fuel $Use_{S\text{-}BC}$ (MMscf/yr) = Annual fuel use (MMscf/yr) x {[Heat input of Boiler S-BC (MMBtu/hr)] ÷ [Heat input of Boiler S-BB (MMBtu/hr) + Heat input of Boiler S-BC (MMBtu/hr) + Heat input of Boiler S-BD (MMBtu/hr)]

Fuel $Use_{S\text{-}BC}$ MMscf/yr = 1,000 MMscf/yr x [78.6 MMBtu/hr] ÷ [82.5 MMBtu/hr + 78.6 MMBtu/hr + 42.9 MMBtu/hr]

Fuel $Use_{S\text{-}BC}$ MMscf/yr = 385.29 MMscf/yr

Fuel $Use_{S\text{-}BD}$ (MMscf/yr) = Annual fuel use (MMscf/yr) x {[Heat input of Boiler S-BD (MMBtu/hr)] ÷ [Heat input of Boiler S-BB (MMBtu/hr) + Heat input of Boiler S-BC (MMBtu/hr) + Heat input of Boiler S-BD (MMBtu/hr)]

Fuel $Use_{S\text{-}BD}$ MMscf/yr = 1,000 MMscf/yr x [42.9 MMBtu/hr] ÷ [82.5 MMBtu/hr + 78.6 MMBtu/hr + 42.9 MMBtu/hr]

Fuel $Use_{S\text{-}BD}$ MMscf/yr = 210.29 MMscf/yr

Table A.2 BOILER S-BB HOURLY AND ANNUAL PTE FOR CRITERIA POLLUTANTS

Emissions Unit	Rated Heat Input (MMBtu/hr)	Fuel Heat Content (Btu/scf)	Annual Heat Input (MMscf/yr)	Criteria Pollutant	Emissions Factors (lb/MMscf)	Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)
S-BB[1]	82.5	1,020	404.41	PM_{10}	7.6	0.61	1.54
				SO_2	0.6	0.05	0.12
				NO_x	100.0	8.09	20.22
				CO	84.0	6.79	16.99
				VOC	5.5	0.44	1.11

[1] – Based on AP-42 Tables 1.4-1 and 1.4-2 (7/98) combusting 100% natural gas and an Applicant proposed annual limit of 1,000 MMscf of natural gas combusted by the three boilers combined prorated based on heat input.

Table A.3 BOILER S-BC HOURLY AND ANNUAL PTE FOR CRITERIA POLLUTANTS

Emissions Unit	Rated Heat Input (MMBtu/hr)	Fuel Heat Content (Btu/scf)	Annual Heat Input (MMscf/yr)	Criteria Pollutant	Emissions Factors (lb/MMscf)	Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)
S-BC[1]	78.6	1,020	385.29	PM_{10}	7.6	0.59	1.46
				SO_2	0.6	0.05	0.12
				NO_x	100.0	7.71	19.26
				CO	84.0	6.47	16.18
				VOC	5.5	0.42	1.06

[1] – Based on AP-42 Tables 1.4-1 and 1.4-2 (7/98) combusting 100% natural gas and an Applicant proposed annual limit of 1,000 MMscf of natural gas combusted by the three boilers combined prorated based on heat input.

Table A.4 BOILER S-BD HOURLY AND ANNUAL PTE FOR CRITERIA POLLUTANTS

Emissions Unit	Rated Heat Input (MMBtu/hr)	Fuel Heat Content (Btu/scf)	Annual Heat Input (MMscf/yr)	Criteria Pollutant	Emissions Factors (lb/MMscf)	Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)
S-BD[1]	42.9	1,020	210.29	PM_{10}	7.6	0.32	0.80
				SO_2	0.6	0.03	0.06
				NO_x	100.0	4.21	10.51
				CO	84.0	3.53	8.83
				VOC	5.5	0.23	0.58

[1] – Based on AP-42 Tables 1.4-1 and 1.4-2 (7/98) combusting 100% natural gas and an Applicant proposed annual limit of 1,000 MMscf of natural gas combusted by the three boilers combined prorated based on heat input.

Table A.5 IC ENGINE S-G01 HOURLY AND ANNUAL PTE FOR CRITERIA POLLUTANTS

Emissions Unit	Rated Heat Input (MMBtu/hr)	Annual Hours of Operation (hrs/yr)	Criteria Pollutant	Emissions Factors (lb/MMscf)	Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)
S-G01[1]	3.7	500	PM_{10}	0.310	1.15	0.29
			SO_2	0.290	1.07	0.27
			NO_x	4.41	16.32	4.08
			CO	0.95	3.52	0.88
			VOC	0.36	1.33	0.33

[1] – Based on AP-42 Table 3.3-1 (10/96) for PM_{10}, SO_2, NO_x, CO and VOC combusting diesel fuel and an Applicant proposed annual limit of 500 hrs/yr for operation of the IC engine.

Table A.6 HOURLY AND IC ENGINE S-G02 ANNUAL PTE FOR CRITERIA POLLUTANTS

Emissions Unit	Rated Heat Input (MMBtu/hr)	Annual Hours of Operation (hrs/yr)	Criteria Pollutant	Emissions Factors (lb/MMscf)	Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)
S-G02[1]	3.3	500	PM_{10}	0.310	1.02	0.26
			SO_2	0.290	0.96	0.24
			NO_x	4.41	14.55	3.64
			CO	0.95	3.14	0.78
			VOC	0.36	1.19	0.30

[1] – Based on AP-42 Table 3.3-1 (10/96) for PM_{10}, SO_2, NO_x, CO and VOC combusting diesel fuel and an Applicant proposed annual limit of 500 hrs/y for operation of the IC engine.

Table A.7 IC ENGINE S-G03 HOURLY AND ANNUAL PTE FOR CRITERIA POLLUTANTS

Emissions Unit	Rated Heat Input (MMBtu/hr)	Annual Hours of Operation (hrs/yr)	Criteria Pollutant	Emissions Factors (lb/MMscf)	Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)
S-G03[1]	4.7	500	PM_{10}	0.310	1.46	0.36
			SO_2	0.290	1.36	0.34
			NO_x	4.41	20.73	5.18
			CO	0.95	4.47	1.12
			VOC	0.36	1.69	0.42

[1] – Based on AP-42 Table 3.3-1 (10/96) for PM_{10}, SO_2, NO_x, CO and VOC combusting diesel fuel and an Applicant proposed annual limit of 500 hrs/yr for operation of the IC engine.

APPENDIX C – APPLICANT SUBMITTED FORMS EI-CP1 THROUGH EI-CP4

DEQ AIR QUALITY PROGRAM
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PERMIT TO CONSTRUCT APPLICATION

Revision 3
4/5/2007

Please see instructions on page 2 before filling out the form.

Company Name:	**University of Idaho**
Facility Name:	**University of Idaho**
Facility ID No.:	057-00025
Brief Project Description:	Permit existing natural gas-fired boiler (S-BC)

SUMMARY OF FACILITY WIDE EMISSION RATES FOR CRITERIA POLLUTANTS - POINT SOURCES

1.	2.	3.											
		PM_{10}		SO_2		NO_X		CO		VOC		Lead	
Emissions units	**Stack ID**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**
Point Source(s)													
Solid Fuels Wood-waste fired boiler (S-BA)	S-BA/S-BC	17.24	75.52	2.21	9.68	15.17	71.63	5.75	164.00	1.50	6.58		
Cleaver-Brooks natural gas-fired boiler (S-BB)	S-BB	0.62	1.54	0.05	0.12	8.09	20.22	6.80	16.99	0.45	1.11		
Babcock & Wilcox natural gas-fired boiler (S-BC)	S-BA/S-BC	0.59	1.46	0.05	0.12	7.70	19.26	6.48	16.18	0.42	1.06		
Combustion Engineering natural gas-fired boiler (S-BD)	S-BD	0.32	0.80	0.03	0.06	4.20	10.51	3.53	8.83	0.23	0.58		
Diesel Fired Electrical generator engine (SG-01)	SG-01	1.15	0.29	1.07	0.27	16.32	4.08	3.52	0.88	1.33	0.33		
Diesel Fired Electrical generator engine (SG-02)	SG-02	1.02	0.26	0.96	0.24	14.55	3.64	3.14	0.78	1.19	0.30		
Diesel Fired Electrical generator engine (SG-03)	SG-03	1.46	0.36	1.36	0.34	20.73	5.18	4.47	1.12	1.69	0.42		
Insignificant Sources	N/A	0.45	1.99	0.11	0.49	7.13	31.23	4.03	17.67	1.13	4.96		
Total		22.85	82.22	5.84	11.32	93.89	165.75	37.72	226.45	7.94	15.34		

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Please see instructions on page 2 before filling out the form.

Company Name:	**University of Idaho**
Facility Name:	**University of Idaho**
Facility ID No.:	057-00025
Brief Project Description:	Permit existing natural gas-fired boiler (S-BC)

SUMMARY OF FACILITY WIDE EMISSION RATES FOR CRITERIA POLLUTANTS - POINT SOURCES

1.	2.	3.											
		PM_{10}		SO_2		NO_x		CO		VOC		Lead	
Emissions units	**Stack ID**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**
Point Source(s)													

Instructions for Form EI-CP1

This form is designed to provide the permit writer and air quality modeler with a summary of the criteria pollutant emissions of each emission unit/point located at the facility. This information may be used by the IDEQ to perform an air quality analysis or to review an air quality analysis submitted with the permit application or requested by the IDEQ.

Please fill in the same company name, facility name, facility ID number, and brief project description as on form CS in the boxes provided. This is useful in case any pages of the application get separated.

1. Provide the name of all emission units at the facility. This name must match names on other submittals to IDEQ and within this application.

2. Provide the identification number for the stack which the emission unit exits.

3. Provide the emission rate in pounds per hour and tons per year for all criteria pollutants emitted by this point source. In this form, emission rates for a point source are the maximum allowable emissions for both short term (pounds per hour) and long term (tons per year). These emission rates are its permitted limits (if any). Otherwise, potential to emit should be shown. Potential to emit is defined as uncontrolled emissions at maximum design or achievable capacity (whichever is higher) and year-round continuous operation (8760 hours per year) if there are no federally enforceable permit limits on the emission point. If the emission point has or will have control equipment or some other proposed permit limitation such as hours of operation or material usage, the control efficiency or proposed permit limit(s) may be used in calculating potential to emit.

NOTE: Attach a separate sheet of paper, or electronic file, to provide additional documentation on the development of the emission rates. Documentation can include emissions factors, throughput, and example calculations.

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
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PERMIT TO CONSTRUCT APPLICATION
Revision 2
4/5/2007

Please see instructions on page 2 before filling out the form.

Company Name:	University of Idaho
Facility Name:	University of Idaho
Facility ID No.:	057-00025
Brief Project Description:	Permit existing natural gas-fired boiler (S-BC)

SUMMARY OF FACILITY WIDE EMISSION RATES FOR CRITERIA POLLUTANTS - FUGITIVE SOURCES

1.	2.	3.											
		PM_{10}		SO_2		NO_x		CO		VOC		Lead	
Fugitive Source Name	**Fugitive ID**	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
Fugitive Source(s)													
Paved/Unpaved Road Fugitive Sources		10.58	46.34										
Paved/Unpaved Parking Lot Fugitive Sources		2.01	8.81										
Miscellaneous Fugitive Sources		0.88	3.84										
name of fugitive source4													
name of fugitive source5													
name of fugitive source6													
name of fugitive source7													
name of fugitive source8													
name of fugitive source9													
name of fugitive source10													
name of fugitive source11													
name of fugitive source12													
name of fugitive source13													
name of fugitive source14													
name of fugitive source15													
name of fugitive source16													
name of fugitive source17													
name of fugitive source18													
name of fugitive source19													
name of fugitive source20													
name of fugitive source21													
(insert more rows as needed)													
Total		13.47	58.99										

	DEQ AIR QUALITY PROGRAM 1410 N. Hilton, Boise, ID 83706 For assistance, call the **Air Permit Hotline - 1-877-5PERMIT**	**PERMIT TO CONSTRUCT APPLICATION** Revision 2 4/5/2007

Please see instructions on page 2 before filling out the form.

Company Name:	University of Idaho
Facility Name:	University of Idaho
Facility ID No.:	057-00025
Brief Project Description:	Permit existing natural gas-fired boiler (S-BC)

SUMMARY OF FACILITY WIDE EMISSION RATES FOR CRITERIA POLLUTANTS - FUGITIVE SOURCES

1.	2.	3.											
		PM_{10}		SO_2		NO_X		CO		VOC		Lead	
Fugitive Source Name	**Fugitive ID**	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
Fugitive Source(s)													

Instructions for Form EI-CP2

This form is designed to provide the permit writer and air quality modeler with a summary of the criteria pollutant emissions of each emission unit/point located at the facility. This information may be used by the IDEQ to perform an air quality analysis or to review an air quality analysis submitted with the permit application or requested by the IDEQ.

Please fill in the same company name, facility name, facility ID number, and brief project description as on form CS in the boxes provided. This is useful in case any pages of the application get separated.

Fugitive emissions are those emissions that cannot reasonably be made to pass through a stack or vent or equivalent opening. Examples include coal piles, unpaved roads, etc. Fugitive emission sources at your plant must be included in this form.

1. Provide the name of all fugitive sources at the facility. This name must match names on other submittals to IDEQ and within this application.

2. Provide the identification number for the fugitive source. This ID number should match ID numbers on other submittals to IDEQ and within this application.

3. Provide the emission rate in pounds per hour and tons per year for all criteria pollutants emitted by this fugitive source. In this form, emission rates for a fugitive source are the maximum allowable emissions for both short term (pounds per hour) and long term (tons per year). These emission rates are its permitted limits (if any). Otherwise, potential to emit should be shown. Potential to emit is defined as uncontrolled emissions at maximum design or achievable capacity (whichever is higher) and year-round continuous operation (8760 hours per year) if there are no federally enforceable permit limits on the emission point. If the emission point has or will have control equipment or some other proposed permit limitation such as hours of operation or material usage, then, the control efficiency or proposed permit limit(s) may be used in calculating potential to emit.

NOTE: Attach a separate sheet of paper, or electronic file, to provide additional documentation on the development of the emission rates. Documentation can include emissions factors, throughput, and example calculations.

DEQ AIR QUALITY PROGRAM
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PERMIT TO CONSTRUCT APPLICATION
Revision 3
4/5/2007

Please see instructions on page 2 before filling out the form.

Company Name:	University of Idaho
Facility Name:	University of Idaho
Facility ID No.:	057-00025
Brief Project Description:	Permit existing natural gas-fired boiler (S-BC)

SUMMARY OF EMISSIONS INCREASE (PROPOSED PTE - PREVIOUSLY MODELED PTE) - POINT SOURCES

1.	2.	3.											
		PM_{10}		SO_2		NO_X		CO		VOC		Lead	
Emissions units	**Stack ID**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**
Point Source(s)													
Babcock & Wilcox natural gas-fired boiler (S-BC)	S-BA/S-BC	0.59	1.46	0.047	0.12	7.7	19.26	6.48	16.18	0.42	1.06	N/A	N/A
name of the emissions unit2													
name of the emissions unit3													
name of the emissions unit4													
name of the emissions unit5													
name of the emissions unit6													
name of the emissions unit7													
name of the emissions unit8													
name of the emissions unit9													
name of the emissions unit10													
name of the emissions unit11													
name of the emissions unit12													
name of the emissions unit13													
name of the emissions unit14													
name of the emissions unit15													
name of the emissions unit16													
name of the emissions unit17													
name of the emissions unit18													
name of the emissions unit19													
name of the emissions unit20													
name of the emissions unit21													
(insert more rows as needed)													
Total		0.59	1.46	0.05	0.12	7.70	19.26	6.48	16.18	0.42	1.06		

	DEQ AIR QUALITY PROGRAM 1410 N. Hilton, Boise, ID 83706 For assistance, call the **Air Permit Hotline - 1-877-5PERMIT**	**PERMIT TO CONSTRUCT APPLICATION** Revision 3 4/5/2007

Please see instructions on page 2 before filling out the form.

Company Name:	University of Idaho
Facility Name:	University of Idaho
Facility ID No.:	057-00025
Brief Project Description:	Permit existing natural gas-fired boiler (S-BC)

SUMMARY OF EMISSIONS INCREASE (PROPOSED PTE - PREVIOUSLY MODELED PTE) - POINT SOURCES

1.	2.	3.											
		PM_{10}		SO_2		NO_x		CO		VOC		Lead	
Emissions units	Stack ID	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
Point Source(s)													

Instructions for Form EI-CP3

This form is designed to provide the permit writer and air quality modeler with a summary of the change in criteria pollutant emissions of each emission unit/point associated with this permit application. This information may be used by the IDEQ to perform an air quality analysis or to review an air quality analysis submitted with the permit application or requested by the IDEQ.

Please fill in the same company name, facility name, facility ID number, and brief project description as on form CS in the boxes provided. This is useful in case any pages of the application get separated.

1. Provide the name of the emission unit. This name should match names on other submittals to IDEQ and within this application.

2. Provide the identification number for the stack which the emission unit exits.

3. Provide the increase in emissions in pounds per hour and tons per year for all criteria pollutants emitted by this emission unit. In this form, increase in emissions for an emission unit are the proposed PTE - Previously modeled PTE. If the emission point has or will have control equipment or some other proposed permit limitation such as hours of operation or material usage, then, the control efficiency or proposed permit limit(s) may be used in calculating proposed potential to emit.

NOTE: Attach a separate sheet of paper, or electronic file, to provide additional documentation on the development of the emission rates. Documentation can include emissions factors, throughput, and example calculations.

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline - 1-877-5PERMIT

PERMIT TO CONSTRUCT APPLICATION

Revision 3
4/5/2007

Please see instructions on page 2 before filling out the form.

Company Name:	University of Idaho
Facility Name:	University of Idaho
Facility ID No.:	057-00025
Brief Project Description:	Permit existing natural gas-fired boiler (S-BC)

SUMMARY OF EMISSIONS INCREASE (PROPOSED PTE - PREVIOUSLY MODELED PTE) - FUGITIVE SOURCES

1.	2.	3. Air Pollutant Maximum Change in Emissions Rate (lbs/hr or t/yr)											
		PM_{10}		SO_2		NO_x		CO		VOC		Lead	
Fugitive Source Name	**Fugitive ID**	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
Fugitive Source(s)													
name of fugitive source1													
name of fugitive source2													
name of fugitive source3													
name of fugitive source4													
name of fugitive source5													
name of fugitive source6													
name of fugitive source7													
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name of fugitive source16													
name of fugitive source17													
name of fugitive source18													
name of fugitive source19													
name of fugitive source20													
name of fugitive source21													
(insert more rows as needed)													
Total													

	DEQ AIR QUALITY PROGRAM 1410 N. Hilton, Boise, ID 83706 For assistance, call the **Air Permit Hotline - 1-877-5PERMIT**	**PERMIT TO CONSTRUCT APPLICATION** Revision 3 4/5/2007

Please see instructions on page 2 before filling out the form.

Company Name:	University of Idaho
Facility Name:	University of Idaho
Facility ID No.:	057-00025
Brief Project Description:	Permit existing natural gas-fired boiler (S-BC)

SUMMARY OF EMISSIONS INCREASE (PROPOSED PTE - PREVIOUSLY MODELED PTE) - FUGITIVE SOURCES

1.	2.	3. Air Pollutant Maximum Change in Emissions Rate (lbs/hr or t/yr)											
		PM_{10}		SO_2		NO_X		CO		VOC		Lead	
Fugitive Source Name	**Fugitive ID**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**
Fugitive Source(s)													

Instructions for Form EI-CP4

This form is designed to provide the permit writer and air quality modeler with a summary of the change in criteria pollutant emissions of each emission unit/point associated with this permit application. This information may be used by the IDEQ to perform an air quality analysis or to review an air quality analysis submitted with the permit application or requested by the IDEQ.

Please fill in the same company name, facility name, facility ID Number, and brief project description as on Form CS in the boxes provided. This is useful in case any pages of the application get separated.

1. Provide the name of the emission unit. This name should match names on other submittals to IDEQ and within this application.

2. Provide the identification number for the fugitive source. This ID should match IDs on other submittals to IDEQ and within this application.

3. Provide the increase in emissions in pounds per hour and tons per year for all criteria pollutants emitted by this fugitive source. In this form, increase in emissions for an emission unit are the proposed PTE - Previously modeled PTE. If the fugitive source has or will have control equipment or some other proposed permit limitation such as hours of operation or material usage, the control efficiency or proposed permit limit(s) may be used in calculating proposed potential to emit.

NOTE: Attach a separate sheet of paper, or electronic file, to provide additional documentation on the development of the emission rates. Documentation can include emissions factors, throughput, and example calculations.

APPENDIX D – MODELING ANALYSIS

M E M O R A N D U M

DATE: June 26, 2008

TO: Darrin Pampaian, Air Quality Permitting Analyst, Air Program

FROM: Kevin Schilling, Stationary Source Modeling Coordinator, Air Program

PROJECT: University of Idaho Tier II PTC Modification

SUBJECT: Modeling results for the University of Idaho

DEQ performed stack height analyses for the University of Idaho (UI) in 2007 to assist in the design of a new emissions stack for their wood waste-fired boiler. The analyses included air pollutant dispersion modeling of facility-wide emissions of criteria pollutants. Results were used to generate a list of maximum air pollutant impacts for several potential stack heights varying from 80 feet to 200 feet. Attachment 1 provides the DEQ memorandum summarizing the stack height analyses.

DEQ's air pollutant dispersion modeling 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 the final recommended stack height resulted in either a) predicted pollutant concentrations from emissions associated with the proposed facility were below significant contribution levels (SCLs) or other applicable regulatory thresholds; or b) predicted pollutant concentrations from emissions associated with the facility, when appropriately combined with background concentrations, were below applicable air quality standards at all receptor locations.

New source review requirements for assuring compliance with $PM_{2.5}$ standards have not yet been promulgated. EPA has asserted through a policy memorandum that compliance with $PM_{2.5}$ standards can be demonstrated through an air quality analysis for the corresponding PM_{10} standard. Although the PM_{10} annual standard was revoked in 2006, compliance with the revoked PM_{10} annual standard must be demonstrated as a surrogate to the annual $PM_{2.5}$ standard for permitting purposes.

$PM_{2.5}$ concentrations were assessed in the 2007 stack height analyses for information purposes, to evaluate potential future compliance with the $PM_{2.5}$ standards. This was done, rather than rely on the results of the PM_{10} analyses, for the following reasons:

- Data on the $PM_{2.5}$ fraction of PM_{10} emissions are available for wood waste boilers using mechanical separators for control, and specific $PM_{2.5}$ emissions factors are available in EPA's AP42 emissions factor database.
- $PM_{2.5}$ is a substantial portion of PM_{10} emissions.
- Background $PM_{2.5}$ concentrations are much closer to the $PM_{2.5}$ standard than PM_{10} concentrations are to the PM_{10} standard.

DEQ's $PM_{2.5}$ analyses were performed under the assumption that implementation regulations will likely be very similar in approach as those for PM_{10}.

The UI, using results from DEQ's stack height analyses, decided to construct a 100-foot stack for the wood waste boiler. Modeling scenarios using the 100-foot stack easily demonstrated compliance with the PM_{10} standard at ground-level receptors. Because the adjacent Living and Learning Center (LLC) is multistoried and ventilation systems have air intakes at roof top, analyses were performed using elevated receptors. There is also the 196-foot Theophilus Tower dormitory located northwest of the stack. Impacts to elevated locations at the Theophilus Tower were evaluated by modeling receptors at elevations of 33 feet, 66 feet, 82 feet, 100 feet, 115 feet, 131 feet, 148 feet, 164 feet, 180 feet, and 197 feet. A maximum 24-hour averaged PM_{10} concentration of 44.9 $\mu g/m^3$ was modeled at the Theophilus Tower for a receptor located at 148 feet above ground-level. Compliance with the 24-hour 150 $\mu g/m^3$ PM_{10} NAAQS was easily demonstrated for the 100-foot stack scenario when model results were combined with a background concentration of 81 $\mu g/m^3$.

Compliance with the annual PM_{10} standard was also easily demonstrated for a 100-foot stack, with a maximum annual average impact of 5.5 $\mu g/m^3$. When combined with the annual PM_{10} background of 27 $\mu g/m^3$, the resulting concentration of 32.5 $\mu g/m^3$ is well below the 50 $\mu g/m^3$ PM_{10} annual NAAQS.

Modeling of $PM_{2.5}$ directly is currently not required by DEQ for permitting purposes. It is DEQ's policy to exclusively use PM_{10} analyses as a surrogate for demonstrating compliance with $PM_{2.5}$ for permitting purposes. Therefore, to maintain consistency in permitting analyses, the $PM_{2.5}$ modeling results from the stack height analyses were not used to evaluate compliance for permitting purposes. Compliance with $PM_{2.5}$ standards were satisfactorily demonstrated for a 100-foot wood waste boiler stack since modeled PM_{10} impacts were below the PM_{10} NAAQS.

NO_2 impacts are substantially driven by sources other than the wood waste boiler. Maximum NO_2 impacts from the wood waste boiler and other sources at the UI were 57.8 $\mu g/m^3$ for the 100-foot stack scenario, giving a design concentration of 97.8 $\mu g/m^3$ when combined with the background concentration value.

Emissions rates of SO_2 and CO are provided in the DEQ analyses, but DEQ did not perform modeling analyses for these pollutants. Considering the level of SO_2 and CO emissions, the applicable standards, and the model results for other pollutants, DEQ determined modeling analyses are not necessary to assure compliance with SO_2 and CO ambient air standards.

Considering results from DEQ's UI stack height analyses for the 100-foot wood waste boiler stack scenario, and considering permitting regulations and policies, compliance with applicable ambient air quality standards has been satisfactorily demonstrated.

ATTACHMENT 1

AIR POLLUTANT MODELING ANALYSES

TO SUPPORT DESIGN OF A NEW EMISSIONS STACK FOR THE WOODWASTE BOILER

AT THE UNIVERSITY OF IDAHO

M E M O R A N D U M

DATE: December 13, 2007

TO: Mike Lyngholm, University of Idaho
Jonathan Pettit, Air Quality Permitting Analyst, Air Program

FROM: Kevin Schilling, Stationary Source Modeling Coordinator, Air Program

PROJECT: University of Idaho Stack Height Analysis

SUBJECT: Modeling Results of Proposed New Stack for the University of Idaho Woodwaste Boiler

1.0 SUMMARY

The University of Idaho (UI) is designing a new emissions stack for their wood waste-fired boiler. DEQ agreed to perform air quality analyses to assure the new design would not cause or contribute to a violation of air quality standards. DEQ's analyses only assessed criteria pollutants. Impacts of toxic air pollutants (TAPs) were not evaluated because the boiler was in operation prior to the effective date of DEQ's permitting regulations for TAPs.

DEQ's air pollutant dispersion modeling 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 the final recommended stack height resulted in either a) predicted pollutant concentrations from emissions associated with the proposed facility were below significant contribution levels (SCLs) or other applicable regulatory thresholds; or b) predicted pollutant concentrations from emissions associated with the facility, when appropriately combined with background concentrations, were below applicable air quality standards at all receptor locations. Table 1 presents key assumptions and results that should be considered in the design of the new stack.

Table 1. KEY CONCLUSIONS OF THE MODELING ANALYSES

Criteria/Assumption/Result	Explanation/Consideration
DEQ recommends constructing a 130-foot stack for the woodwaste boiler and implementing more effective emissions controls for fine particulate.	Short-term PM_{10} and $PM_{2.5}$ modeled concentrations are well over the standards for an 80-foot stack. Annual NO_2 concentrations are also over the standard. Even a 200-foot stack only marginally demonstrated 24-hour $PM_{2.5}$ compliance for elevated locations at the Theophilus Tower.
A 130-foot stack will help assure the plume is not substantially affected by building wake effects.	A 110-foot stack is a good engineering practice (GEP) stack height, given the 44-foot height of the boiler building. Using a 130-foot stack will minimize downwash potentially caused by the Living and Learning Center (LLC) and any future buildings nearby.
A 130-foot stack assures the wood waste boiler will have a less than significant impact on ground-level annual NO_2 concentrations.	Ground-level NO_2 concentrations were largely driven by other sources, but reduced impacts from the boiler were necessary to achieve compliance.
DEQ did not perform an air impact assessment of toxic substances potentially emitted from the wood waste boiler because the boiler is not subject to toxic air pollutant (TAP) permitting requirements of Idaho Air Rules Section 210.	Since the boiler was in operation prior to the effective date of TAP permitting requirements (July 1995), Idaho Air Rules Section 210 are not applicable. This does not imply that potential emissions of toxic substances from the boiler are not a health concern for potentially exposed individuals.

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 UI facility is located in Moscow, Idaho. The area is designated as attainment or unclassifiable for all criteria pollutants.

2.1.2 Significant and Full NAAQS Impact Analyses

If estimated maximum pollutant impacts to ambient air from the emissions sources associated with the UI exceed the significant contribution levels (SCLs) of Idaho Air Rules Section 120, then a full impact analysis is necessary to demonstrate compliance with National Ambient Air Quality Standards (NAAQS) and Idaho Air Rules Section 203.02. A full NAAQS impact analysis for attainment area pollutants involves adding ambient impacts from facility-wide emissions, and emissions from any nearby 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 NAAQS listed in Table 2. Table 2 also lists SCLs and specifies the modeled value that must be used for comparison to the NAAQS.

New source review requirements for assuring compliance with $PM_{2.5}$ standards have not yet been developed. EPA has asserted through a policy memorandum that compliance with $PM_{2.5}$ standards will be demonstrated through an air quality analysis for the corresponding PM_{10} standard. Although the PM_{10} annual standard was revoked in 2006, compliance with the revoked PM_{10} annual standard must be demonstrated as a surrogate to the annual $PM_{2.5}$ standard for permitting purposes.

$PM_{2.5}$ concentrations were assessed in this study for information purposes, to evaluate potential future compliance with the $PM_{2.5}$ standards. This was done rather than rely on the results of the PM_{10} analyses for the following reasons:

- Data on the $PM_{2.5}$ fraction of PM_{10} emissions are available for wood waste boilers using mechanical separators for control, and specific $PM_{2.5}$ emissions factors are available in EPA's AP42 emissions factor database.
- $PM_{2.5}$ is a substantial portion of PM_{10} emissions.
- Background $PM_{2.5}$ concentrations are much closer to the $PM_{2.5}$ standard than PM_{10} concentrations are to the PM_{10} standard.

DEQ's $PM_{2.5}$ analyses were performed under the assumption that implementation regulations will likely be very similar in approach as those for PM_{10}.

Table 2. APPLICABLE REGULATORY LIMITS				
Pollutant	**Averaging Period**	**Significant Contribution Levels[a] ($\mu g/m^3$)[b]**	**Regulatory Limit[c] ($\mu g/m^3$)**	**Modeled Value Used[d]**
PM_{10}[e]	Annual[f]	1.0	50[g]	Maximum 1st highest
	24-hour	5.0	150[h]	Maximum 6th highest[i]
$PM_{2.5}$[j]	Annual	Not established	15	Maximum 1st highest[k]
	24-hour	Not established	35	Maximum 8th highest[l]
Carbon monoxide (CO)	8-hour	500	10,000[m]	Maximum 2nd highest
	1-hour	2,000	40,000[m]	Maximum 2nd highest
Sulfur Dioxide (SO_2)	Annual	1.0	80[g]	Maximum 1st highest
	24-hour	5	365[m]	Maximum 2nd highest
	3-hour	25	1,300[m]	Maximum 2nd highest
Nitrogen Dioxide (NO_2)	Annual	1.0	100[g]	Maximum 1st highest
Lead (Pb)	Quarterly	NA	1.5[h]	Maximum 1st highest

[a] Idaho Air Rules Section 006.120
[b] Micrograms per cubic meter
[c] Idaho Air Rules Section 577 for criteria pollutants
[d] The maximum 1st highest modeled value is always used for significant impact analysis – concentrations are from any modeled receptor
[e] Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
[f] The annual PM_{10} standard was revoked in 2006. The standard is still listed because compliance with the annual $PM_{2.5}$ standard (by EPA policy) is demonstrated by a PM_{10} analysis that demonstrates compliance with the revoked PM_{10} standard.
[g] Never expected to be exceeded in any calendar year
[h] Never expected to be exceeded more than once in any calendar year
[i] Concentration at any modeled receptor when using five years of representative meteorological data. If data are of questionable representativeness, a more conservative modeled design value may be required.
[j] Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers
[k] For monitoring compliance, the design value is the 3-year mean of the annual averages for each consecutive year. Note: current permitting policy is that an analysis demonstrating compliance with the PM_{10} annual standard will be used as a surrogate for compliance with the $PM_{2.5}$ standard.
[l] The maximum 8th highest modeled value corresponds to the 98th percentile. For monitoring compliance, the design value is the 3-year average of the 98th percentile for each consecutive year. If meteorological data are of questionable representativeness, a more conservative modeled design value may be required. Note: current permitting policy is that an analysis demonstrating compliance with the PM_{10} 24-hour standard will be used as a surrogate for compliance with the $PM_{2.5}$ standard.
[m] Not to be exceeded more than once per year

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.*

Permit requirements for toxic air pollutants 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 emissions increase associated with a new source or modification exceeds screening emission levels (ELs) 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 (AACs) for non-carcinogens of Idaho Air Rules Section 585 and Acceptable Ambient Concentrations for Carcinogens (AACCs) of Idaho Air Rules Section 586, then compliance with toxic air pollutant (TAP) requirements has been demonstrated.

The wood waste boiler was not subject to Idaho Air Rules Section 210 (TAPs preconstruction compliance demonstration) because the boiler was constructed prior to July 1995, the effective date of the TAP regulations for permitting purposes. Because of this and current workload of DEQ dispersion modeling staff, DEQ did not assess the impact of potential TAP emissions on ambient air. DEQ's decision to not perform an assessment of toxic substances should not be interpreted as an indication of acceptable impacts to potentially exposed individuals.

2.2 Background Concentrations

Background concentrations are used in the full NAAQS impact analyses to account for impacts from sources not explicitly modeled. Table 3 lists appropriate background concentrations for the UI location. Background concentrations were revised for all areas of Idaho by DEQ in March 2003[1]. Background concentrations in areas where no monitoring data are available were based on monitoring data from areas with similar population density, meteorology, and emissions sources. Default urban background concentrations were used for all criteria pollutants except $PM_{2.5}$. $PM_{2.5}$ concentrations were based on monitoring performed in Moscow. Only two years, 2002 and 2003, of monitoring data were available for Moscow. The 24-hour value associated with the upper 98th percentile was determined for each year, and the maximum value was selected as the background. The maximum annual average value was used for the annual $PM_{2.5}$ background.

Table 3. BACKGROUND CONCENTRATIONS

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)[a]
PM_{10}[b]	24-hour	81
	Annual	27
$PM_{2.5}$[c]	24-hour	18
	Annual	6.6
Carbon monoxide (CO)	1-hour	13,800
	8-hour	4,600
Sulfur dioxide (SO_2)	3-hour	120
	24-hour	40
	Annual	10
Nitrogen dioxide (NO_2)	Annual	40
Lead (Pb)	Quarterly	0.04

[a] Micrograms per cubic meter
[b] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
[c] Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers

3.0 MODELING IMPACT ASSESSMENT

3.1 Modeling Methodology

This section describes the modeling methods used by DEQ to demonstrate compliance with applicable air quality standards.

1 Hardy, Rick and Schilling, Kevin. *Background Concentrations for Use in New Source Review Dispersion Modeling*. Memorandum to Mary Anderson, March 14, 2003.

3.1.1 Overview of Analyses

Table 4 provides a brief description of parameters used in the submitted modeling analyses.

Table 4. MODELING PARAMETERS		
Parameter	**Description/Values**	**Documentation/Addition Description**
Model	AERMOD	AERMOD with the PRIME downwash algorithm, version 07026
Meteorological data	1987-1991	Spokane, Washington, surface and upper air data
Terrain	Considered	Receptor, building, and emissions source elevations were determined using Digital Elevation Model (DEM) files
Building downwash	Considered	The building profile input program (BPIP) was used
Receptor Grid	Grid 1	10-meter grid spacing from source to about 100 meters
	Grid 2	50-meter grid spacing to about 200 meters

3.1.2 Modeling Methodology

Modeling was generally conducted using methods and data described in the *State of Idaho Air Quality Modeling Guideline* and professional judgment of DEQ scientists.

3.1.3 Model Selection

Idaho Air Rules Section 202.02 require 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. EPA provided a 1-year transition period during which either ISCST3 or AERMOD could be used at the discretion of the permitting agency. AERMOD must be used for all air impact analyses, performed in support of air quality permitting, conducted after November 2006.

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 offers the following improvements over ISCST3:

- Improved dispersion in the convective boundary layer and the stable boundary layer
- Improved plume rise and buoyancy calculations
- Improved treatment of terrain affects on dispersion
- New vertical profiles of wind, turbulence, and temperature

AERMOD was used in the analyses conducted by DEQ.

3.1.4 Meteorological Data

Surface and upper air meteorological data for 1987 through 1991, collected from the National Weather Service site at the Spokane International Airport in Spokane, Washington, were processed through AERMET. AERMET is the meteorological data preprocessor for AERMOD. These data were processed by DEQ. Spokane meteorological data are of questionable representativeness to conditions in Moscow. A more conservative modeled design value was used to account for this uncertainty and/or additional modeling were performed with meteorological data obtained from Boise, Idaho.

3.1.5 Terrain Effects

Terrain effects on dispersion were considered in the analyses. Receptor elevations were obtained by using Digital Elevation Model (DEM) 7.5-minute files.

3.1.6 Facility Layout

The facility layout used in the modeling analyses, including the ambient air boundary, buildings, and emissions units, were checked against aerial photographs. The layout used in the model was sufficiently representative of the proposed site layout.

3.1.7 Building Downwash

Downwash effects potentially caused by structures at the facility were accounted for in the dispersion modeling analyses. The Building Profile Input Program (BPIP) was used to calculate direction-specific building dimensions and Good Engineering Practice (GEP) stack height information, from building dimensions/configurations and emissions release parameters, for AERMOD.

3.1.8 Ambient Air Boundary

Because the university is open to the public, ambient air was considered to be all areas outside of the power plant buildings.

3.1.9 Receptor Network

Table 4 describes the receptor grid used in DEQ's refined analyses. The receptor grid met the minimum recommendations specified in the *State of Idaho Air Quality Modeling Guideline*. DEQ used a grid with 10-meter receptor spacing in the area surrounding the power plant because of the close proximity of ambient air locations. DEQ is confident the receptor grid used was adequate to reasonably resolve maximum modeled concentrations

There are multistoried buildings near the emissions sources, including the Living and Learning Center (LLC) with air intakes at heights of 61 ft and 70 ft. To conservatively account for this, flagpole receptors (receptors at elevated heights) were used for the area over the LLC.

The 196-foot Theophilus Tower dormitory is located northwest of the boiler stack. Flagpole receptors were used to assess impacts at various heights because windows are openable and the clean air intakes for air conditioning are on the roof.

3.2 Emission Rates

Emissions rates used in the modeling analyses were obtained from previous modeling performed for the UI Tier II operating permit, except for $PM_{2.5}$ emissions. Recommendations and conclusions made in this study are not valid for emissions other than those used in this study, since pollutant impacts vary directly with emissions rates.

3.2.1 Criteria Pollutant Emissions Rates

Table 5 provides criteria pollutant emissions rates used in the modeling analyses for both long-term and short-term averaging periods. $PM_{2.5}$ emissions are not limited in the existing Tier II operating permit, except by the PM_{10} limit. $PM_{2.5}$ emissions estimated from the wood waste boiler were based on the calculated relationship between available PM_{10} emissions factors and $PM_{2.5}$ emissions factors. Data from EPA's AP42, Chapter 1.6 *Wood Residue Combustion in Boilers*, were used to estimate $PM_{2.5}/PM_{10}$ ratios. AP42 lists filterable PM_{10} and filterable $PM_{2.5}$ emissions factors for a variety of fuel types. AP42 also has a factor for condensable particulate, which was assumed to be entirely $PM_{2.5}$ and, consequently, entirely PM_{10} as well. A $PM_{2.5}/PM_{10}$ ratio was calculated for each fuel type, considering both filterable and condensable particulate. $PM_{2.5}/PM_{10}$ ratios ranged from 0.606 to 0.631, depending on fuel type. DEQ calculated $PM_{2.5}$ emissions from allowable PM_{10} emissions by using the most conservative $PM_{2.5}/PM_{10}$ ratio of 0.631.

$PM_{2.5}$ emissions were assumed to be equal to PM_{10} emissions for natural gas-fired boilers and generators. DEQ determined this is a reasonable assumption since particulate from combustion of liquid or gaseous fuels is primarily $PM_{2.5}$.

Because the generators will only be used for upset or emergency situations, the annualized emissions rate (allowable annual emissions based on 1800 hours per year divided by 8760 hour per year) was used for short-term modeling as well.

Emissions rates of SO_2 and CO are provided, but DEQ did not perform modeling analyses for these pollutants. Considering the level of SO_2 and CO emissions, the applicable standards, and the model results for other pollutants, DEQ determined modeling analyses are not necessary to assure compliance with SO_2 and CO ambient air standards.

Table 5. EMISSIONS RATES USED FOR FULL NAAQS IMPACT MODELING

Emissions Point	Description	Emissions Rates (lb/hr)				
		PM_{10}[a]	$PM_{2.5}$[b]	SO_2[c]	CO[d]	NOx[e]
NEW00	Wood waste Boiler 00	17.24	10.87	0.82	37.44	16.35
PP0	Boiler 0	0.61	0.61	0.049	6.79	8.09
PP1	Boiler 1	0.59	0.59	0.046	6.47	7.71
PP4	Boiler 4	0.32	0.32	0.025	3.53	4.21
SG01	Generator S-G01	0.236	0.236	0.22	3.52	3.36
SG02	Generator S-G02	0.21	0.21	0.197	3.14	2.99
SG03	Generator S-G03	0.306	0.306	0.279	4.47	4.25

[a] Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
[b] Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers
[c] Sulfur dioxide
[d] Carbon monoxide
[e] Oxides of nitrogen

3.2.2 TAP Emissions Rates

Impacts of TAP emissions on ambient air were not assessed in this study.

3.3 Emission Release Parameters

Table 6 provides emissions release parameters including stack height, stack diameter, exhaust temperature, and exhaust velocity. UI staff provided revised parameters for the woodwaste boiler stack, and stack parameters are within reasonably expected values for the type of source. Values of stack parameters for other sources were obtained from the previous modeling analyses, performed in support of issuing the previous Tier II operating permit.

Table 6. EMISSIONS RELEASE PARAMETERS

Release Point/Location	Source Type	Stack Height (ft)[a]	Modeled Diameter (ft)	Stack Gas Temp. (F)[b]	Stack Gas Flow Velocity (ft/sec)[c]
NEW00	Point	100	5.0	315	30.4
PP0	Point	69	5.0	300	15.7
PP1	Point	80	5.0	300	15.3
PP4	Point	69	4.0	300	19.9
SG01	Point	12	0.7	750	176
SG02	Point	50	0.7	750	95.4
SG03	Point	10	0.7	750	186

[a] Feet
[b] Fehrenheit
[c] Feet per second

3.4 Good Engineering Practice Stack Height

Idaho Air Rules Section 513 states, "The required degree of emission control of any regulated or toxic air pollutant shall not be affected by the amount of any stack height that exceeds good engineering practice (GEP) or by any other dispersion technique." GEP is defined by Idaho Air Rules Section 512.03 as the greater of either 65 meters or the GEP calculated height as per Idaho Air Rules Section 512.03.b. The GEP calculation is:

$$H = S + 1.5L$$

where:

H	=	GEP stack height
S	=	height of nearby structures
L	=	lesser dimension of height or projected width of nearby structures

The following are heights of nearby structures: LLC lower buildings = 18.6 meters; LLC higher buildings = 21.3 meters; boiler building = 13.4 meters. For both the boiler building and the LLC, the lesser dimension is the building height, so L was assigned a value of the building height.

GEP stack height based on the boiler building is 33.5 meters (110 feet), and GEP based on the higher LLC buildings is 53.3 meters (175 meters). The LLC building is within the area where downwash will affect dispersion (within five times "L" of the stack); however, the impact of the LLC building modeled concentrations is less than that of the boiler building.

3.5 Results for Full Impact Analyses

Results of the full NAAQS impact analyses are listed in Table 7.

Table 7. RESULTS FOR FULL IMPACT ANALYSES							
Pollutant	**Stack**	**Averaging Period**	**Maximum Modeled 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]	80 ft	24-hour	142 (127) ground-level	81	223	150	149
		Annual	29.4[d] (24.4) ground-level	27	56.4[d]	50	113
	100 ft	24-hour	40.9 (32.7) ground-level	81	121.9	150	81
			43.2[e] (33.5) LLC elevated	81	124.2[e]	150	83
			44.9[f] (41.4) Tower elevated	81	125.9[f]	150	84
		Annual	5.5[d] ground-level	27	32.5[d]	50	65
			5.4[d,e] LLC elevated	27	32.4[d,e]	50	65
			4.6[d,f] Tower elevated	27	31.6[d,f]	50	63
$PM_{2.5}$[g]	100 ft	24-hour	28.9 (20.6) ground-level	18	46.7	35	133
			30.8[e] (21.1) LLC elevated	18	48.6[e]	35	139
			29.6[f] 26.1) Tower elevated	18	47.4[f]	35	135
		Annual	5.3[d] (2.2) ground-level	6.6	11.9[d]	15	79
			5.0[d,e] (2.0) LLC elevated	6.6	11.6[d,e]	15	77
			3.0[d,f] (2.6) Tower elevated	6.6	9.6[d,f]	15	64
	130 ft	24-hour	15.2[d] (4.0) ground-level	18	33.2	35	95
			19.1[e] (2.0) LLC elevated	18	37.1[e]	35	106
			29.9[f] (27.6) Tower elevated	18	47.7[f]	35	136
	150 ft	24-hour	26.8[f] (25.6) Tower elevated	18	44.5[f]	35	127
	175 ft	24-hour	24.1[f] (23.3) Tower elevated	18	41.8[f]	35	119
	200 ft	24-hour	16.0[f] 15.2) Tower elevated	18	33.9[f]	35	99
NO_2[h]	80 ft	Annual	68.6[d] (17.3) ground-level	40	108.6[d]	100	109
	100 ft	Annual	51.5[d] (2.5) ground-level	40	91.5[d]	100	92
			44.5[d,e] (2.3) LLC elevated	40	84.5[d,e]	100	85
			8.2[d,e] (2.9) Tower elevated	40	47.0[d,f]	100	47
			36.3[d,i] (1.7) ground-level Boise Met	40	76.3[d,i]	100	76
			57.8[d,e,i] (6.2) LLC elevated Boise Met	40	97.8[d,e,i]	100	98
			48.5[d,f,i] (18.7) Tower elevated Boise Met	40	88.5[d,f,i]	100	89
	130 ft	Annual	51.2[d] (0.5) ground-level	40	91.2[d]	100	91
			35.5[d,i] (1.0) ground-level, Boise Met	40	75.5[d,i]	100	76
			43.7[d,e] (0.2) LLC elevated	40	83.7[d,e]	100	84
			56.8[d,e,i] (1.0) LLC elevated Boise Met	40	96.8[d,e,i]	100	97
			7.0[d,f] (2.7) Tower elevated	40	47.0[d,f]	100	47

[a]Micrograms per cubic meter – values in parentheses are the contribution from only the wood waste boiler
[b]National ambient air quality standards
[c]Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
[d]Maximum of 5 years of meteorological data modeled
[e]Using roof-top receptors at the LLC (61 ft and 70 ft)
[f]Using multiple elevated receptors to the 196 ft Theophilus Tower northwest of the stack
[g]Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers
[h]Nitrogen dioxide – assumes 75% of modeled NOx concentrations are NO_2
[i]Modeled using meteorological data from Boise, Idaho

Maximum of 1st highest modeled concentrations at each receptor were used to evaluate compliance with 24-hour average PM_{10} and $PM_{2.5}$ standards, rather than the typical design values of the maximum 6th highest concentration for PM_{10} and the maximum 8th highest concentration for $PM_{2.5}$. When highly-representative meteorological data are used in the modeling analyses, the typical design values are used to evaluate compliance. DEQ determined the maximum of 1st highest modeled concentrations would be a more appropriate value to evaluate compliance because Spokane meteorological data were used for the analyses rather than site-specific data.

Initial analyses with the wood waste-fired boiler stack at 80 feet did not demonstrate compliance with the 24-hour PM_{10}, annual PM_{10}, and annual NO_2 NAAQS. Compliance with $PM_{2.5}$ NAAQS was not evaluated for an 80-foot stack since a higher stack is already needed for compliance with PM_{10} and NO_2. Highest 24-hour concentrations were modeled immediately southwest of the boiler building while high annual values were located along the boiler building just northeast of the stack. The highest concentrations were caused by downwash from the boiler building and other surrounding structures, and were located within the recirculation cavity of the buildings.

The concentrations resulting from the 80-foot stack at the new proposed location are substantially higher than those predicted by the model for an 80-foot stack at the current location. Specific reasons for this were not investigated, although the plume from the stack at the original location was likely just outside of the zone that would draw it into the building recirculation cavity.

Modeling scenarios using the 100-foot stack easily demonstrated compliance with the PM_{10} standard at ground-level receptors. Because the adjacent Living and Learning Center (LLC) is multistoried and ventilation systems have air intakes at roof top, analyses were performed using elevated receptors. There is also the 196-foot Theophilus Tower dormitory located northwest of the stack. Impacts to elevated locations at the Theophilus Tower were evaluated by modeling receptors at elevations of 33 feet, 66 feet, 82 feet, 100 feet, 115 feet, 131 feet, 148 feet, 164 feet, 180 feet, and 197 feet. A maximum 24-hour averaged PM_{10} concentration of 44.9 $\mu g/m^3$ was modeled at the Theophilus Tower for a receptor located at 148 feet above groundlevel. Compliance with the 24-hour 150 $\mu g/m^3$ PM_{10} NAAQS was easily demonstrated for the 100-foot stack scenario when model results were combined with a background concentration of 81 $\mu g/m^3$.

Compliance with the annual PM_{10} standard was also easily demonstrated for a 100-foot stack, with a maximum annual average impact of 5.5 $\mu g/m^3$. When combined with the annual PM_{10} background of 27 $\mu g/m^3$, the resulting concentration of 32.5 $\mu g/m^3$ is well below the 50 $\mu g/m^3$ PM_{10} annual NAAQS.

Modeling of $PM_{2.5}$ directly is currently not required by DEQ for permitting purposes. However, it will likely be required in the near future as EPA promulgates $PM_{2.5}$ implementation regulations. Compliance with groundlevel and elevated receptors could not be demonstrated for 24-hour $PM_{2.5}$ when using the maximum of 1st highest modeled concentrations at each receptor for the 100-foot stack scenario. When the stack was raised to 130 feet, compliance with the $PM_{2.5}$ standard was narrowly demonstrated for ground-level receptors, concentrations were slightly over the standard for elevated receptors at the LLC, and concentrations exceeded the standard by a substantial margin at elevated receptors on the 196-foot Theophilus Tower northwest of the stack. A 200-foot stack was needed to achieve compliance with the 24-hour $PM_{2.5}$ standard at elevated receptors on the Theophilus Tower.

Compliance with the annual $PM_{2.5}$ standard was easily demonstrated for the 100-foot stack scenario at all receptors. Modeling annual $PM_{2.5}$ impacts for higher-stack scenarios was not performed since compliance was achieved for the shorter-stack scenario.

NO_2 impacts are substantially driven by sources other than the wood waste boiler. Maximum NO_2 impacts from only the wood waste boiler were 17 $\mu g/m^3$ (about 57 percent of the standard when combined with background) for the 80-foot stack scenario. This compares to an impact of 69 $\mu g/m^3$ for all sources at the UI (about 109 percent of the standard when combined with background). When the stack height is raised to 100 feet, the wood waste boiler contribution is reduced to 2.5 $\mu g/m^3$, and it is further reduced to 0.5 $\mu g/m^3$ for a 130-foot stack.

4.0 CONCLUSIONS

DEQ recommends constructing a stack for the wood waste boiler with a minimum height of 130 feet, provided more effective $PM_{2.5}$ emissions controls are used. This recommendation is based on the following:

1) Compliance with standards could not be demonstrated at groundlevel for an 80-foot stack.
2) Compliance with the $PM_{2.5}$ 24-hour standard was questionable at elevated receptor locations of the Theophilus Tower when a 200-foot stack was used in the modeling analyses. Given the uncertainty in results, DEQ recommends using more effective controls rather than increasing the stack height to 200 feet.
3) Based on the 44-foot boiler building, a good engineering practice (GEP) stack height, to prevent plume downwash effects, would be 110 feet. Using a 130-foot stack would help assure minimal downwash caused by the neighboring Living and Learning Center (LLC) or future buildings that may be constructed nearby.

APPENDIX E – FACILITY COMMENTS

Facility comment received 7/14/2008: The only change is a typo- the SO2 emission limit for the SG-02 generator should be 0.24 tpy, not 0.024 tpy. The draft looks good --clean and simple. Thanks.