



Air Quality Permitting Statement of Basis

January 3, 2007

Permit to Construct No. P-060518

**Idaho National Laboratory, Central Facilities Area
Boiler CFA-609-005 (Cleaver Brooks Boiler)
Scoville, Idaho**

Facility ID No. 023-00001

Prepared by:

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AIR QUALITY DIVISION

A handwritten signature in black ink, appearing to read "CAR", is written over the printed name of Cheryl A. Robinson.

FINAL

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Acronyms, Units, and Chemical Nomenclatures

AIRS	Aerometric Information Retrieval System
AQCR	Air Quality Control Region
CFA	Central Facilities Area
CFR	Code of Federal Regulations
CO	carbon monoxide
DEQ	Department of Environmental Quality
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
IFRO	Idaho Falls Regional Office
INL	Idaho National Laboratory
lb/hr	pound per hour
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
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
SIC	Standard Industrial Classification
SO ₂	sulfur dioxide
TAPs	toxic air pollutants
T/yr	tons per year
UTM	Universal Transverse Mercator
VOC	volatile organic compound

Tier I Public Comment / Affected States / EPA Review Summary

A 30-day public comment period for the Idaho National Laboratory draft Tier I operating permit was held in accordance with IDAPA 58.01.01.364, Rules for the Control of Air Pollution in Idaho.

IDAPA 58.01.01.008.01 defines *affected states* as: “*All states: whose air quality may be affected by the emissions of the Tier I source and that are contiguous to Idaho; or that are within fifty (50) miles of the Tier I source.*”

A review of the site location information included in the permit application indicates that the facility is located within 50 miles of the Montana state border and the Shoshone-Bannock Tribes Fort Hall Indian Reservation, which meets the definition of an affected state per 40 CFR 71.2. Therefore, the state of Montana and the Shoshone-Bannock Tribes were provided an opportunity to comment on the draft modifications to the Tier I operating permit, which were included in the permit package issued to affected states and tribal governments on November 24, 2006. As a courtesy, DEQ also provided an opportunity to comment to the state of Wyoming.

Summary of Comments

No comments were received from the Shoshone-Bannock Tribes, or from Montana or Wyoming.

No comments were received from the public.

The proposed permit was also provided to the EPA. On December 4, 2006, DEQ received an e-mail from EPA Region X's Laurie Kral stating that EPA had elected not to review this draft permit action.

1. PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01.200 and 300, Rules for the Control of Air Pollution in Idaho, for issuing permits to construct (PTC) and Tier I operating permits.

2. FACILITY DESCRIPTION

The Central Facilities Area (CFA) at the Idaho National Laboratory (INL) serves as the main service and support center for the rest of the INL facilities. CFA is located approximately 50 miles west of Idaho Falls, about one mile north of Highway 20/26. Activities at CFA support transportation, maintenance, construction, environmental and radiological monitoring, security, fire protection, warehouses, calibration activities, and a cafeteria. Building 609 houses the safeguards and security headquarters for the INL.

3. FACILITY / AREA CLASSIFICATION

The INL is classified as a major facility, in accordance with IDAPA 58.01.01.008.10, for Tier I permitting purposes, because the facility has the potential to emit (PTE) more than 100 tons per year each of regulated air pollutants, specifically NO_x, SO₂, and PM, and may emit more than 10 tons per year of a single hazardous air pollutant (HAP). The facility is a multipurpose national laboratory with SIC codes of 9511 and 8733. The AIRS classification is therefore "A."

The CFA facility is located within AQCR 61 and UTM Zone 12, and is located in Butte county, which is designated as attainment or unclassifiable for all regulated criteria pollutants (PM₁₀, CO, NO_x, SO₂, lead, and ozone).

Information provided in Appendix A defines the classification for each regulated air pollutant at the INL. This required information is entered into the EPA AIRS database. No changes to the AIRS facility classification were needed as a result of these PTC and Tier I permit modifications.

4. APPLICATION SCOPE

On behalf of the INL, Battelle Energy Alliance, LLC, submitted an application to concurrently modify PTC No. 023-00001, issued December 5, 1995, and modified on February 14, 1996, and Tier I operating permit issued June 28, 2005, and modified/amended on June 6, 2006 (T1-060508). The scope of this project is to increase the allowable fuel throughput for the CFA-609-005 (Clever Brooks) boiler at the CFA-609 HQ/SRT Building from 25,000 gallons per year to 35,000 gallons per year, and to increase the allowable emissions of particulate matter (PM) from this boiler from 0.025 tons per year to 0.035 tons per year. This will allow greater operational flexibility, particularly during periods of cold weather. The facility contact and responsible official information is also being updated for the PTC.

4.1 Application Chronology

August 24, 2006	DEQ received a permit modification request, \$1,000 PTC application fee and \$1,000 PTC processing fee.
September 12, 2006	DEQ requested additional information to make the application complete.
September 19, 2006	DEQ received additional information.
September 21, 2006	DEQ declared the application to be complete.

October 10, 2006 DEQ provided a draft PTC and statement of basis to the Idaho Falls Regional Office for review.

October 13, 2006 DEQ provided the draft PTC and statement of basis to the INL/Battelle Energy Alliance, LLC for review. Received e-mail from IFRO stating they had no comments.

October 25, 2006 Receipt of minor comments from the facility.

October 27, 2006 Proposed PTC issued for public comment and affected states' review (Montana, Shoshone-Bannock Tribes, and a courtesy copy to Wyoming).

November 24 through December 26, 2006 Public comment period was held. No comments were received.

5. PERMIT ANALYSIS

This section of the Statement of Basis describes the regulatory requirements for this PTC action.

5.1 Equipment Listing

Table 5.1 lists all sources affected by this project.

Table 5.1 SUMMARY OF REGULATED SOURCES

Emissions Unit(s)/Process(es)	Emissions Control Device	Emissions Point
<u>CFA-609-005 Space-Heating Boiler</u> Manufacturer: Cleaver Brooks Model: CB-101-50 Serial No.: L-83922 Rated capacity: 2.092 MMBtu/hr Fuels: ASTM No. 1 fuel oil, ASTM No. 2 fuel oil, JP-4 jet fuel, JP-8 jet fuel Date Installed or Modified: 1987 ^a	None	<u>Boiler stack:</u> ^a Height: 27 feet Exit diameter: 10 inches Exhaust flow: 830 acfm Exhaust temp: 400°F

^a Source: INEEL/EXT-2000-01610, Application for a Title V Operating Permit for the Idaho National Engineering and Environmental Laboratory, Volume III Central Facilities Area, March 2001

5.2 Emissions Inventory

Emissions increases of criteria pollutants associated with this project were estimated by INL in the permit application based on AP-42 Section 1.3 (09/98) emissions factors. This information was reviewed and found to be consistent with DEQ methods. For the purposes of evaluating the increase in the annual emissions of toxic air pollutants (TAPs) associated with this PTC, the INL identified more current emission factors for polycyclic organic matter (POM) than the 09/98 AP-42 factors. DEQ concurred that the proposed factors were more appropriate for estimating the 7-PAH and 16-PAH group POM emissions. DEQ's detailed verification calculations for the emission inventory are included in Appendix B.

5.3 Modeling

The estimated increase in criteria pollutant emissions associated with this PTC does not exceed current DEQ thresholds¹ that would require modeling, as shown in Table 5.2. None of the increases in TAPs emissions exceeded the applicable screening emission level, so modeling of the TAPs emission increase was also not required (see the detailed emission inventory in Appendix B).

¹ State of Idaho Air Quality Modeling Guidance, Document ID AQ-011, Rev. 1, 12/31/2002.

Table 5.2 INCREASE IN EMISSIONS COMPARED TO MODELING THRESHOLDS

Criteria Pollutant	Emission Increase (T/yr)	Modeling Threshold (T/yr)
NO _x	0.10	1.0
SO ₂	0.36	1.0
PM ₁₀	5.4E-03	1.0

5.4 Regulatory Review

This section describes the regulatory analysis of the applicable air quality rules with respect to the PTC and Tier I operating permit.

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. The INL has requested that the existing PTC and Tier I permit conditions limiting annual fuel usage and PM emissions from the CFA-609-005 boiler be increased. Therefore, a PTC is required.

IDAPA 58.01.01.203.....Permit Requirements for New and Modified Stationary Sources

The applicant has shown to the satisfaction of DEQ that the facility will comply with all applicable emissions standards, ambient air quality standards, and toxic increments.

IDAPA 58.01.01.210.....Demonstration of Preconstruction Compliance with Toxic Standards

DEQ’s analysis has demonstrated preconstruction compliance for the increased emissions for all TAPs associated with this project.

IDAPA 58.01.01.224.....Permit to Construct Application Fee

The applicant satisfied the PTC application fee requirement by submitting a fee of \$1,000 with the application received on August 24, 2006.

IDAPA 58.01.01.225.....Permit to Construct Processing Fee

The total emissions from the proposed project are less than one T/yr; therefore, the associated processing fee is \$1,000. No permit to construct can be issued without first paying the required processing fee. The processing fee was received with the application on August 24, 2006.

IDAPA 58.01.01.205.....PTC Requirements for Major Facilities or Major Modifications

The proposed project is not a major modification for this existing major facility.

IDAPA 58.01.01.209.05.c..... PTC Procedures for Tier I Sources

This PTC modification is for a Tier I source, therefore, the PTC is processed according to the procedures for a Tier I source. A draft PTC will be provided for public comment and affected state review per Sections 209, 364, and 365. A proposed PTC will be prepared and sent to EPA for review per Section 366. EPA review can occur concurrently with public comment and affected state review of the draft permit, per Subsection 209.05.c.iii, except that if the draft permit is revised in response to public comment or affected state review, DEQ must send the revised proposed PTC to EPA for review in accordance with Section 366.

Except as otherwise provided by these rules, DEQ shall prepare and issue to the owner or operator a final permit to construct or denial per Section 367. The permittee may at any time after issuance, request that the PTC requirements be incorporated into the Tier I operating Permit through an administrative amendment in accordance with Section 381. The INL's August 24, 2006, PTC application included this request.

IDAPA 58.01.01.381, 382.....Tier I Administrative Amendment upon PTC Issuance

The requested changes are a significant modification to the Tier I permit under IDAPA 58.01.01.382.01.a, since implementation of the changes would “violate an existing Tier I permit condition derived from an applicable requirement.” The changes will be implemented as a Tier I Administrative Amendment upon completion of the requirements specified in IDAPA 58.01.001.209.05.c and 381. Refer to the information provided above under IDAPA 58.01.01.209.05.c for details.

5.5 Permit Conditions Review

This section describes only those permit conditions in the PTC issued on December 5, 1995, and modified on February 14, 1996, and the Tier I operating permit issued June 6, 2006, that have been revised, modified or deleted as a result of this permit action. All other permit conditions remain unchanged. The permit condition numbers listed below refer to the revised/new PTC and Tier I permits unless otherwise noted.

PTC Condition 2.3, Table 2.1 and Tier I Table 4.1 and Condition 4.1.1

The annual PM emissions limit was increased from 0.025 tons per year to 0.035 tons per year.

PTC Condition 2.5 and Tier I Table 4.1 and Condition 4.1.2

The list of allowable fuel types was expanded to include ASTM Grade 1 fuel oil. EPA AP-42 emission factors used to estimate emissions are applicable to both Grade 1 and Grade 2 fuel oils, so this change does not result in any increase in the estimated emissions. The addition of this lighter weight fuel oil increases the flexibility for the facility to burn fuels that are appropriate for very cold weather conditions.

PTC Condition 2.6 and Tier I Table 4.1 and Condition 4.1.3

The allowable sulfur content for fuels was expanded to include the 0.3 weight percent limit on sulfur in ASTM Grade 1 fuel oil.

PTC Condition 2.7 and Tier I Table 4.1 and Condition 4.1.4

The maximum annual fuel consumption was increased from 25,000 gallons to 35,000 gallons per any consecutive 12-month period.

PTC Condition 2.8 and Tier I Condition 4.1.5

PTC Condition 2.8 was added to clarify that maintaining documentation for the as-received fuel sulfur content is required, in accordance with IDAPA 58.01.01.322.07. The associated Tier I condition will be revised to delete the specific fuel types and to refer to the sulfur content limits contained in Permit Condition 4.1.3.

PTC Condition 2.9.1

PTC Condition 2.9 was expanded to require annual recordkeeping in addition to monthly recordkeeping of the type and amount of fuel combusted in the boiler.

PTC Condition 2.9.2

PTC Condition 2.9.2 was added to clarify that maintaining documentation for the monthly and annual estimates of PM emissions is required, in accordance with IDAPA 58.01.01.322.07.

PTC and Tier I General Provisions

The most recent version of the PTC and Tier I General Provisions was used in the modified PTC and will be incorporated in the amended Tier I.

6. PERMIT FEES

DEQ received a \$1,000 PTC application fee (IDAPA 58.01.01.224) and a \$1,000 PTC processing fee (IDAPA 58.01.01.225) from INL on August 24, 2006. A PTC processing fee of \$1,000 is required, because the modification will allow an annual increase of emissions less than one ton.

The INL is a major facility as defined in IDAPA 58.01.01.008.10. Therefore, Tier I registration fees are applicable in accordance with IDAPA 58.01.01.387. As of October 10, 2006, the INL is in compliance with their Tier I fee lump sum payment, in accordance with IDAPA 58.01.01.397.

Table 6.1 PTC PROCESSING FEE TABLE

Emissions Inventory			
Pollutant	Annual Emissions Increase (T/yr)	Annual Emissions Reduction (T/yr)	Annual Emissions Change (T/yr)
NO _x	0.10	0	0.10
SO ₂	0.36	0	0.36
CO	0.03	0	0.03
PM ₁₀	5.4E-03	0	5.4E-03
VOC	2.78E-03	0	2.78E-03
Lead	6.17E-06	0	6.17E-06
HAPS	9.04E-04	0	9.04E-04
Total:	0.49	0	0.49
Fee Due	\$ 1,000		

7. PERMIT REVIEW

7.1 Regional Review of Draft Permit

Copies of the draft PTC and Statement of Basis were provided to the Idaho Falls Regional Office (IFRO) for review on October 10, 2006. On October 13, 2006, IFRO air quality staff sent an e-mail stating that they had no comments.

7.2 Facility Review of Draft Permit

Copies of the draft PTC and Statement of Basis were issued to the INL/Battelle Energy Alliance, LLC on October 13, 2006, for review. On October 25, DEQ received minor comments from the INL, which were incorporated into the proposed permit. In particular, the PM₁₀ emission factor was changed to reflect the factor for a commercial boiler burning distillate oil, as shown in AP-42 Table 1.3-7. This resulted in a small increase in the PM₁₀ estimated emissions, with a resultant increase in the total annual emissions from 0.484 tons per year to 0.489 tons per year.

7.3 Public Comment

A 30-day public comment period on the modified draft PTC was held from November 24, 2006, through December 26, 2006, in accordance with IDAPA 58.01.01.209.05.c and 58.01.01.364. A notice was published in the local newspaper of record, and copies of the proposed action were made available to the Shoshone-Bannock Tribes, State of Montana, State of Wyoming, and in the local area in accordance with these rules. No comments were received.

8. RECOMMENDATION

Based on review of application materials, and all applicable state and federal rules and regulations, staff recommend that the INL be issued proposed PTC No. P-060518 for the CFA-609-005 Cleaver-Brooks boiler. The project does not involve PSD requirements.

CR/bf Permit No. P-060518

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APPENDIX A

AIRS Information

P-060518

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

Facility Name: Idaho National Laboratory
Facility Location: Scoville, Idaho
AIRS Number: 023-00001

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		B					U
NO _x	A	A	A				A	U
CO	A	A					A	U
PM ₁₀	B							U
PT (Particulate)	B		B					U
VOC	B		B					U
THAP (Total HAPs)	A			X				
			APPLICABLE SUBPART					
			Db and Dc	H and M				

^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

P-060518

Facility:
 Facility ID/Permit:
 Location:

INL CFA-609 HQ/SRT Bldg
 023-00001 P-060518 & T1-060519
 INL Central Facilities Area, Scoville, Idaho
 Cleaver-Brooks Space Heating Boiler CFA-609-005

10/27/2006

Boiler Emissions

Fuel Oil Combustion, AP-42 Section 1.3			
Generator Make/Model	Cleaver-Brooks		
Rated Capacity	2,092 MMBtu/hr		
FUEL OPTIONS: #2 Fuel Oil (Diesel)	This PTC		
Max Sulfur weight percent (w/o)	0.5		
Max Fuel Use Rate, gal/hr	15.27	= (2,092 MMBtu/hr x 1E+6 Btu/MMBtu)/(137,030 Btu/gal)	
Fuel Heating Value, Btu/gal	137,030		
MMBtu/hr	2,092		
Annual Fuel Usage, gal	10,000		
Max Operational Hours per Day	24		
Max Hours per Year at Rated Capacity	655	= (10,000 gal/yr)/(137,030 Btu/gal)	
Max Hrs (facility classification)	8,760		

Annual average = lb/hr x 655/8760

Pollutant	Uncontrolled Emission Factor (lb/10 ³ gal)	Emissions (lb/hr)				Emissions from PTC Fuel Usage Increase (T/yr)	
PM (filterable)	2	0.031				0.01	Table 1.3-1
PM-10 (total)	1.08	0.016				5.40E-03	Table 1.3-7
P.M.-2.5							
CO	5	0.076				0.03	Table 1.3-1
NOx	20	0.305				0.10	Table 1.3-1
SO ₂ (total SOx presumed SO ₂ = 142S)	71	1.084				0.36	Table 1.3-1
VOC (total TOC--> VOCs)	0.556	0.008				2.78E-03	Table 1.3-3, Commercial / Institutional Boilers
HAPs/TAPs - Organics	Uncontrolled Emission Factor (lb/10³ gal)	Emissions (lb/hr)	Emissions (lb/hr, 24-hr or annual avg)	TAPs Screening EL (lb/hr)	Exceed TAPs EL increment?	Emissions from PTC Fuel Usage Increase (T/yr)	
<i>Idaho TAPs, 585 - Noncarcinogenic</i>							
N ₂ O - Nitrous Oxide	0.11	0.002	0.002	6	No	5.50E-04	Table 1.3-8
<i>Idaho TAPs, 586 - Carcinogenic</i>							
Formaldehyde* (EF range 0.035 - 0.061)	0.061	9.31E-04	6.96E-05	5.10E-04	No	3.05E-04	Table 1.3-8
Polycyclic Organic Matter (POM)	0.0033	5.04E-05	3.77E-06	9.10E-05	No	1.65E-05	Table 1.3-8. EF based on 1993 EMF Documentation, which in turn was based on EPA-450/4-84-007p, the 1988 L&E POM Emissions Report. "POM" EF = 22 lb/10 ³ Btu *137030 Btu/gal *1000gal/kgal = 0.0030 lb/1,000 gal
POM (16-PAH)	0.0069	1.05E-04	7.88E-06	9.10E-05	No	3.45E-05	EPA 454/R-98-014, L&E POM Emissions, July 1998, Table A-1 16-PAH EF = 5.00E-5 lb/MMBtu *137030 Btu/gal *1000gal/kgal* MMBtu/1E+06 Btu = 0.0069 lb/1,000 gal
POM (7-PAH)	7.80E-07	1.19E-08	8.90E-10	2.00E-06	No	3.90E-09	EPA 454/R-98-014, L&E POM Emissions, July 1998, Table A-1 7-PAH EF = 5.96E-09 lb/MMBtu *137030 Btu/gal *1000gal/kgal* MMBtu/1E+06 Btu = 7.80E-07 lb/1,000 gal
HAPs/TAPs Trace Elements/ Metals	Uncontrolled Emission Factor (lb/10¹² Btu)	Emissions (lb/hr)	Emissions (lb/hr, 24-hr or annual avg)	TAPs Screening EL (lb/hr)	Exceed TAPs EL increment?	Emissions from PTC Fuel Usage Increase (T/yr)	
<i>Criteria Pollutants</i>							
Pb - Lead	9	1.88E-05	1.88E-05	n/a	n/a	6.17E-06	Table 1.3-10
<i>Idaho TAPs, 585 - Noncarcinogenic</i>							
Cu - Copper	6	1.26E-05	1.26E-05	0.067	No	4.11E-06	Table 1.3-10
Cr - Chromium	3	6.28E-06	6.28E-06	0.033	No	2.06E-06	Table 1.3-10
Hg - Mercury	3	6.28E-06	6.28E-06	0.007	No	2.06E-06	Table 1.3-10
Mn - Manganese	3	6.28E-06	6.28E-06	0.333	No	2.06E-06	Table 1.3-10
Se - Selenium	15	3.14E-05	3.14E-05	0.013	No	1.03E-05	Table 1.3-10
Zn - Zinc	4	8.37E-06	8.37E-06	0.667	No	2.74E-06	Table 1.3-10
<i>Idaho TAPs, 586 - Carcinogenic</i>							
As - Arsenic	4	8.37E-06	6.26E-07	1.5E-06	No	2.74E-06	Table 1.3-10
Be - Beryllium	3	6.28E-06	4.69E-07	2.8E-05	No	2.06E-06	Table 1.3-10
Cd - Cadmium	3	6.28E-06	4.69E-07	3.7E-06	No	2.06E-06	Table 1.3-10
Cr VI - Hexavalent Chromium	0.88	1.84E-06	1.38E-07	5.6E-07	No	6.03E-07	Table 1.3-10 Cr EF * Table 1.3-11 ratio of Cr6+ to Chromium (2.48/8.45)
Ni - Nickel	3	6.28E-06	4.69E-07	2.7E-05	No	2.06E-06	Table 1.3-10
						9.04E-04 Tons TOTAL HAPs	
						4.89E-01 Tons TOTAL CRITERIA + HAPs	

**TABLE A-1. SUMMARY OF EMISSION FACTORS FOR 7-PAH^a AND
16-PAH^b SUBSETS BY SOURCE CATEGORY**

Source Category	7-PAH Emission Factor ^c	16-PAH Emission Factor ^d
STATIONARY EXTERNAL COMBUSTION		
Residential Heating		
Residential Wood Combustion		
Conventional Woodstoves	0.044 lb/ton wood burned	0.718 lb/ton wood burned
Catalytic/Noncatalytic Stoves	0.048 lb/ton wood burned	0.627 lb/ton wood burned
Fireplaces	0.007 lb/ton wood burned	0.037 lb/ton wood burned
Residential Natural Gas Combustion	0.0373 lb/1E+12 Btu of heat input	2.37 lb/1E+12 Btu of heat input
Residential Distillate Oil Combustion	5.63E-04 lb/1,000 gal of fuel consumed	6.97E-03 lb/1,000 gal of fuel consumed
Residential Coal Combustion (bituminous and lignite)	0.0335 lb/ton of coal consumed	0.108 lb/ton of coal consumed
Residential Coal Combustion (anthracite)	1.41E-04 lb/ton of coal consumed	6.18E-04 lb/ton of coal consumed
Utility, Industrial, and Commercial Boilers		
Industrial Wood/Wood Residue Combustion	5.90E-05 lb/ton of wood burned	3.36E-03 lb/ton of wood burned
Industrial Natural Gas Combustion	ND	5.56E-06 lb/MMCF of natural gas consumed
Industrial Coal Consumption	5.36E-05 lb/ton of coal consumed	2.72E-03 lb/ton of coal consumed
Industrial Residual Oil Combustion	1.60E-07 lb/MMBtu of heat input	2.15E-04 lb/MMBtu of heat input
Industrial Distillate Oil Combustion	5.96E-09 lb/MMBtu of heat input	5.00E-05 lb/MMBtu of heat input
Industrial Waste Oil Combustion	4.53E-03 lb/1,000 gallons of waste oil consumed	0.0265 lb/1,000 gallons of waste oil consumed
Commercial Wood/Wood Residue Combustion	7.43E-05 lb/MMBtu of heat input	2.63E-03 lb/MMBtu of heat input
Commercial Natural Gas Combustion	ND	2.54E-05 lb/MMCF of natural gas consumed
Commercial Coal Combustion (bituminous and lignite)	0.0200 lb/ton of coal consumed	0.0771 lb/ton of coal consumed
Commercial Coal Combustion (anthracite)	ND	0.137 lb/ton of coal consumed
Commercial Residual Oil Combustion	1.60E-07 lb/MMBtu of heat input	2.14E-04 lb/MMBtu of heat input
Commercial Distillate Oil Combustion	5.96E-09 lb/MMBtu of heat input	5.00E-05 lb/MMBtu of heat input
STATIONARY INTERNAL COMBUSTION		
Industrial IC Engines		
Industrial IC Engines - Diesel	3.36E-06 lb/MMBtu of heat input	1.89E-04 lb/MMBtu of heat input
Industrial IC Engines - Natural Gas	2.75E-03 lb/MMCF of natural gas consumed	0.127 lb/MMCF of natural gas consumed

A-3

(continued)

Source: EPA-454/R-98-014, July 1998, Locating and Estimating Air Emissions from Sources of Polycyclic Organic Matter, accessed 9/19/2006 at <http://www.epa.gov/ttn/chief/le/pomptb.pdf>