Air Quality Permitting
Statement of Basis

May 14, 2004

Permit to Construct No. P-000534

Idaho National Engineering and Environmental Laboratory, Test Reactor Area

Facility ID No. 023-00001

Prepared by:

Michael Stambulis, P.E.
TECHNICAL SERVICES DIVISION

FINAL PERMIT

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ACRONYMS, UNITS, AND CHEMICAL NOMENCLATURES

AACC	acceptable ambient concentrations of carcinogens
AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AP-42	Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: *Stationary Point and Area Sources*
AQCR	Air Quality Control Region
ASTM	American Society for Testing and Materials
ATR	Advanced Test Reactor
CO	carbon monoxide
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency
hp	horsepower
IDAPA	A numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
INEEL	Idaho National Engineering and Environmental Laboratory
lb	pounds
MACT	Maximum Achievable Control Technology
MMBtu	Million British thermal units
NAAQS	National Ambient Air Quality Standards
NESHAP	Nation Emission Standards for Hazardous Air Pollutants
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NSPS	New Source Performance Standards
O_3	ozone
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
Rules	*Rules for the Control of Air Pollution in Idaho*
SO_2	sulfur dioxide
TAP	toxic air pollutant
TRA	Test Reactor Area
T/yr	Tons per year
VOC	volatile organic compound

1. PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01.200, *Rules for the Control of Air Pollution in Idaho,* for issuing permits to construct (PTCs).

2. FACILITY DESCRIPTION

The TRA is located in the southern part of the INEEL facility. The TRA was originally established in the early 1950s and currently has approximately 80 buildings and 65 structures. The functions of the TRA are to provide work area to conduct experiments associated with the development, testing, and analysis of materials used in nuclear and reactor operations, and to support the production and processing of radioisotopes, nonnuclear research and development, and both radiological and nonradiological laboratory analyses.

The Advanced Test Reactor (ATR) is located at the TRA and is designed to study the effects of intense radiation on samples of reactor materials, especially fuels. In addition to the experimental irradiation, the ATR's secondary mission is to produce various isotopes, including about 50% of the iridium and 2% of the cobalt-60 used domestically. The ATR was constructed in 1965 and began operations in 1967.

3. FACILITY / AREA CLASSIFICATION

The TRA is considered a support facility to the INEEL. INEEL is an existing major facility as defined in IDAPA 58.01.01.006.55 and 58.01.01.008.10. The TRA is located within the boundaries of the INEEL which is located in Air Quality Control Region (AQCR) 61 and Zone 12. This area is located within Butte County which is designated as unclassifiable for all criteria air pollutants.

4. APPLICATION SCOPE

On December 15, 2000, DEQ received a PTC application from the INEEL to change the method of operation of three existing diesel-fired electrical generator sets located at the TRA on the INEEL. At the time of this application, two of the three generators (670-M-42 & 670-M-43) were constructed in 1967 and were considered "grandfathered" from the requirements to obtain a PTC. These two generators provide electrical power to the Advanced Test Reactor (ATR) both for normal and off normal conditions. The third generator (674 -M-6) was constructed in 1985 and has no PTC. This generator historically has been used only as a standby generator. The PTC application requests to change the method of operation of generator 674-M-6 to operate outside the standby generator mode. The application also requests to combine the operations of all three generators into one permit to establish federally enforceable emissions limits - specifically to limit the increase of NOx emissions to less than the major modification threshold.

4.1 Application Chronology

12/15/2000 DEQ received PTC application for the three TRA generators.

3/19/2001 DEQ determined the application incomplete.

5/31/2001 Permittee submitted additional information addressing incompleteness issues.

7/23/2002 DEQ determined the application incomplete.

8/27/2002 DEQ issued a letter to the permittee further clarifying the incompleteness letter issued on 7/23/2002.

2/27/2003 Permittee submitted additional information addressing incompleteness issues.

6/26/2003 DEQ declared the permit application complete.

5. PERMIT ANALYSIS

5.1 Equipment Listing

The following table describes the emission units that are being permitted in this action. Additional information regarding the exact location of the units, stack parameters, etc., are provided in Appendix B of this memorandum.

Table 5.1. EQUIPMENT LISTING

Unit	670-M-42	670-M-43	674-M-6
Manufacturer	Enterprise Engine and Machinery Company	Enterprise Engine and Machinery Company	Caterpillar
Manufacture Date	5/5/1963	5/5/1963	9/4/1984
Operation Date	1967	1967	April 1985
Maximum Fuel Throughput	106 gallons per hour	106 gallons per hour	108 gallons per hour

5.2 Emissions Inventory

DEQ staff reviewed the emissions inventory submitted by the applicant and documented in Appendix A of this memo. A summary of the emissions inventory is presented in Table 6.2 below.

Table 5.2. FACILITY WIDE EMISSIONS

Pollutant	Combined Emissions from 674-M-6, 670-M-42, and 670-M-43 Stacks (T/yr)		
	PTE[1]	Proposed Annual Emissions[2]	Proposed Emissions Increase[3]
PM	19.2	3.7	1.2
PM-10	11.0	2.1	0.7
NO_x	614.6	119.5	39.5
SO_2	97.0	18.8	6.2
CO	163.2	31.7	10.5
VOC	17.3	3.4	1.1

1. Potential to emit assuming no air pollution control equipment is used and no restrictions on operations.
2. Proposed emissions considering controls and/or restrictions on operations.
3. Proposed emissions increases are past actual to proposed.

Emissions estimates are calculated using the Environmental Protection Agency's (EPA's) AP-42 emission factors in Tables 3.4-1, 3.4-2, and 3.4-3 (*Section 3.4 - Large Stationary Diesel And All Stationary Dual-fuel Engines*). These emission factors are for diesel fuel (ASTM Grade 2) combustion. DEQ staff were unable to identify emission factors for combustion of ASTM Grade 1 fuel oil. Typically the concentrations of nitrogen and sulfur are lower in Grade 1 fuel oil in comparison to Grade 2 fuel oil. Concentrations of carbon and ash are similar in Grade 1 and Grade 2 fuel oils.[1] Therefore, the emissions of particulate matter (PM), nitrogen oxides (NO_x), sulfur dioxide (SO_2), and carbon monoxide (CO) from combustion of Grade 1 fuel oil are expected to be less than or equal to emissions from combustion of Grade 2 fuel oil.

5.3 Modeling

The permittee performed air dispersion modeling to determine the ambient impacts from the proposed increased diesel fuel throughput to the three generators. DEQ staff reviewed modeling results submitted by the permittee. A summary of DEQ's modeling review is presented in the memorandum attached in Appendix B.

[1] The John Zink Combustion Handbook, Charles E. Baukal, Jr., Ph. D., P.E., Editor, CRC Press, LLC, 2001.

5.4 Regulatory Review

IDAPA 58.01.01.201.............................. Permit to Construct Required

In accordance with IDAPA 58.01.01.201, no owner or operator may commence construction or modification of any stationary source without first obtaining a PTC. Of the three generators covered by this permit, two (670-M-42 and 670-M-43) were installed in 1967 and pre-date PTC rules. The third generator (674-M-6) was installed in 1985. The permittee submitted a PTC application for 674-M-6 on March 19, 2001. New and modified stationary sources are subject to the provisions of IDAPA 58.01.01.203.

IDAPA 58.01.01.210 Demonstration of Preconstruction Compliance with Toxic Standards

The proposed project results in increased emissions of numerous toxic air pollutants (TAPs), which are regulated in Idaho. A full list of TAPs emitted during the operation of the generators, including hourly and annual emission rates, is presented in Attachment A.

The maximum hourly emissions of benzene from the increased diesel fuel throughput exceed the screening emission levels in IDAPA 58.01.01.586. Emissions of other TAPs did not exceed the screening emission levels in IDAPA 58.01.01.585 or 586.

The uncontrolled ambient impact of benzene emissions are below the applicable acceptable ambient concentrations for carcinogens (AACC). The preconstruction compliance demonstration required by IDAPA 58.01.01.203.03 and 210.04-08 is satisfied.

IDAPA 58.01.01.577........................ Ambient Air Quality Standards for Specific Air Pollutants

The proposed project results in an increase of NO_x, SO_2, CO, and PM_{10} emissions (less than significant). This increase would not cause or significantly contribute to a NAAQS violation; therefore, the requirements of IDAPA 58.01.01.203.02 and .577 are satisfied. See the memorandum in Appendix B for further details.

IDAPA 58.01.01.625.............................. Visible Emissions Limitations

Emissions from the facility are subject to the requirements of IDAPA 58.01.01.625.

IDAPA 58.01.01.650.............................. Control of Fugitive Dust

Fugitive emissions from the facility are subject to the requirements of IDAPA 58.01.01.651.

40 CFR 52 .... Prevention of Significant Deterioration (PSD)

The INEEL is a major facility; therefore, it is necessary to determine if the permit application is for a major modification. The requested modification is to increase the combined fuel throughput to the 674-M-6, 670-M-42, and 670-M-43 generators by 180,161 gallons per year. This fuel increase would result in a NO_x emissions increase of 39.35 tons per year. To ensure that the emission increase does not exceed this amount, an annual NO_x emission limit is established in the permit (see Section 7.1 of this memorandum). Since the PTC limits the emissions increase of each criteria pollutant to less than the significant emissions levels of IDAPA 58.01.01.06.92 (e.g., the level for NO_x is 40 tons per year), the PTC is not a major modification and does not trigger prevention of significant deterioration requirements.

40 CFR 60 .... New Source Performance Standards (NSPS)

The emission units permitted in this PTC are not affected by any New Source Performance Standards.

40 CFR 61 and 63 .... National Emission Standards for Hazardous Air Pollutants (NESHAP) and Maximum Achievable Control Technology (MACT)

The emission units permitted in this PTC are not affected by any NESHAP or MACT standards.

5.5 Fee Review

The permit application was originally submitted in December 2000. Therefore, the application pre-dates the application fee rules of IDAPA 58.01.01.224, and the application fee was not required.

A permit to construct processing fee of $5,000 is required in accordance with IDAPA 58.01.01.225 because the increase in emissions from the modification is 57.4 T/yr as indicated in Table 5.3 below. The processing fee was ~~received~~ requested on November 18, 2003. + received on 12/3/03. (ms)

The INEEL facility is a major facility as defined in IDAPA 58.01.01.008.10 and is therefore subject to registration and registration fees in accordance with IDAPA 58.01.01.387. The facility is current with its registration fees.

Table 5.3 PTC PROCESSING FEE TABLE

Emissions Inventory			
Pollutant	**Annual Emissions Increase (T/yr)**	**Annual Emissions Reduction (T/yr)**	**Annual Emissions Change (T/yr)**
NO_X	39.5	0	39.5
SO_2	6.2	0	6.2
CO	10.5	0	10.5
PM_{10}	0.7	0	0.7
VOC	1.1	0	1.1
TAPS/HAPS	0.02	0	0.02
Total:	57.4	0	**57.4**
Fee Due	**$5,000.00**		

6. PERMIT CONDITIONS

This section summarizes the requirements established in the PTC.

Permit Condition 2.3

The PTC establishes an annual emission limit for combined NO_x emissions from the exhaust of all three generators. The permittee requested an increase to the combined throughput of diesel fuel to emissions units 674-M-6, 670-M-42, and 670-M-43 that would limit emissions of all criteria pollutants to below the significant emissions levels of IDAPA 58.01.01.06.92. The requested fuel throughput increase of 180,161 would limit annual NO_x emissions to 39.5 tons per year, which is less than the significant increase level of 40 tons per year.

To limit the NO_x emissions increase for this modification to less than 39.5 tons per year, the permit must establish an annual NO_x emissions limit and an associated fuel throughput limit for combined operation of the three generators. To establish an annual NO_x emission limit, the past actual emissions and the requested emissions increase of 39.5 tons per year were added together. The past actual NO_x emissions for the generators were determined based on the average fuel throughput for the years 1995, 1996, and 1997. These years represent normal operation of the generators. The average annual fuel throughput to the three generators during 1995, 1996, and 1997 was 364,361 gallons; the average actual annual emission rate during this period was 80.0 tons per year. Therefore, the permit emission limit was determined to be 119.5 tons per year (80 tons per year plus 39.5 tons per year).

At a fuel throughput increase of 180,161, emissions of other criteria pollutants are below 16% of respective significant emissions levels. Therefore, emissions limits for other criteria pollutants were deemed unnecessary.

Permit Condition 2.6 and 2.10

To demonstrate on-going compliance and to ensure the NO_x emission limit is federally enforceable, operating, monitoring, and recordkeeping requirements are established as follows. As requested by the permittee, an operating condition is established in the permit to limit the combined diesel fuel throughput to generators 674-M-6, 670-M-42 and 670-M-43 to 544,522 gallons per consecutive 12-month period. In addition, the permit establishes conditions to monitor and record diesel fuel usage on both a monthly and annual basis.

The fuel throughput limit is based on the maximum amount of fuel that may be burned such that the annual NO_x emission limit of 119.5 tons per year will not be exceeded. Note that the fuel throughput limit is based on EPA's AP-42 NO_x emission factor of 3.2 pounds per million British thermal units (lb/MMBtu), as used in the permit application analysis, and this factor should be used for purposes of demonstrating compliance with the permit emission limit.

Permit Condition 2.9

A performance test to determine NO_x emissions is required on 674-M-6 and either 670-M-42 or 670-M-43 to verify that actual NO_x emissions rates are equal to or less than the EPA emission factor of 3.2 lb/MMBtu.

7. PUBLIC COMMENT

An opportunity for public comment on the PTC application was provided, in accordance with IDAPA 58.01.01.209.01.c., from July 10, 2003 to August 11, 2003. During this time, there were no comments on the application and no requests for a public comment period on DEQ's proposed action.

The Idaho Falls Regional Office was provided a draft copy of the PTC on August 26, 2003. There were no comments from the regional office on the draft PTC.

DEQ issued a draft permit to INEEL on August 26, 2003. On December 4, 2003, DEQ received 14 comments from INEEL regarding the draft PTC. Seven comments were incorporated into the PTC as suggested by the permittee. The other seven comments were either partially incorporated or not incorporated into the PTC.

Changes to the PTC based on two comments warrant additional discussion. Comment 4 addresses a footnote to Table 2.1 of the draft permit, and Comment 9 addresses the performance test requirements of Permit Condition 2.9. DEQ has deleted the footnote to Table 2.1. DEQ has also modified the language of Permit Condition 2.9.

The permit application requests a limit to the increase of annual NO_x emissions from the generator stacks. The applicant calculated the annual emissions increase by assuming a NO_x emission factor and multiplying the emission factor by the fuel throughput. The method of compliance for the emissions limit proposed by the applicant was fuel throughput monitoring. The footnote was removed and the language in Permit Condition 2.9 was modified. The PTC is now in alignment with the permit application. The compliance method is to monitor the fuel throughput and verify the emission factor used in the permit application via performance testing.

8. RECOMMENDATION

Based on review of application materials and all applicable state and federal rules and regulations, staff recommend that the United States Department of Energy – Idaho Operations office be issued PTC No. P-000534 for the three generators located at the TRA facility. No public comment period is recommended, no entity has requested a comment period, and the project does not involve PSD requirements.

MJS/sd P-000534

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APPENDIX A

Emission Inventory Review Memo

Technical Analysis

July 3, 2003

Test Reactor Area, INEEL

P-000534

Prepared by:

Dan Pitman, Senior Engineer
Division of Technical Services

PURPOSE

The purpose for this memorandum is to verify the validity of the emissions estimates from three diesel fuel fired engines that power generators at the Test Reactor Area (TRA) at the Idaho National Environmental and Engineering Laboratory (INEEL).

PROJECT DESCRIPTION

INEEL is proposing to use three diesel fuel fired engines to generate power for operations at the TRA. For emission inventory purposes it is assumed that the three generator engines may operate at the same time. Annual emissions from the three generator engines are limited by the amount of fuel that may be combusted each year.

TECHNICAL ANALYSIS

Process Description

The three generator engines are used to generate power for the Advanced Test Reactor during normal operations, off-normal operations and emergency operation. INEEL has proposed increasing the total annual fuel consumption by the three generator engines from 364,361 gallons per year to 544,522 gallons per year.

Equipment Listing

M-42 diesel powered generator - 2,118 horsepower
M-43 diesel powered generator - 2,118 horsepower
M-6 diesel powered generator - 2,132 horsepower

Emission Estimates

Emission estimates for all pollutants were made using EPA AP-42[1], Section 3.4 emission factors for large stationary diesel fuel fired internal combustion engines. Short term, or pounds per hour, emissions from the M-42 and M-43 generators are identical. Emissions from the M-6 generator engine are slightly more due to a larger horsepower rating. All three engines may operate at the same time during any 24-hour period.

Annual emissions from the three generators are limited by an annual fuel consumption limit of 544,522 gallons per year. The hourly fuel consumption rate for each of the M-42 and M-43 generator engines is 106 gallons per hour. The hourly fuel consumption rate for the M-6 generator engine is 108 gallons per hour. For emission inventory purposes it does not matter which of the engines consumes the fuel because the emission factors for all pollutants is the same for each engine. Therefore, the estimated annual emissions are given for the three generator engines in aggregate.

Table 1 gives a summary of the emission estimates for the three generator engines. Emission calculations may be seen in Attachment A, as can the emission estimates for toxic air pollutants. Emissions from the generator engines are uncontrolled. The sulfur content of the diesel fuel is assumed to be 0.5% by weight.

[1] *Compilation of Air Pollutant Emission Factors* (AP-42), Fifth Edition, Volume I: *Stationary Point and Area Sources* Section 1.4, U. S. Environmental Protection Agency, Washington, DC, July 1988.

Table 1. Emission Estimates Generator Engines M-42, M-43, and M-6

Pollutant	M-42 Generator Emission Rate (lb/hr)(1)	M-43 Generator Emission Rate (lb/hr)(1)	M-6 Generator Emission Rate (lb/hr)(1)	Total Annual Emissions (ton/yr)(2)
PM	1.45	1.45	1.48	3.73
PM-10	0.832	0.832	0.848	2.14
SO_x	7.335	7.335	7.474	18.84
NO_x	46.48	46.48	47.36	119.39
CO	12.35	12.35	12.58	31.71
VOC	0.09	1.31	1.33	3.36

(1) pounds per hour
(2) tons per year

The applicant estimated actual emissions for regulatory purposes. Estimated actual emissions are given in Table 2. Estimated actual emissions are based on the average annual fuel consumption in the engines for the years 1995, 1996 and 1997. The actual annual average fuel consumption was 364,361 gallons per year. Actual emissions calculations may be seen in Attachment B.

Table 2. Actual Emissions from Generators

Pollutant	M-42, M-43 & M-6 Generator Emission Rate (T/yr)(1)
PM	2.496
PM-10	1.430
SO_x	12.61
NO_x	79.89
CO	21.22

(1) tons per year

The applicant also estimated the increase in emissions from actual emissions. The applicant proposed using an additional 180,161 gallons of fuel oil per year, relative to actual fuel usage. Table 3 gives the annual emissions increase from generator engines M-42, M-43, and M-6 that correlates to an annual fuel consumption rate of 180,161 gallons per year. Emission increase calculations may be seen in Attachment C.

Table 3. Emission Increase From Generators

Pollutant	M-42, M-43 & M-6 Generator Emission Rate (T/yr)(1)
PM	1.234
PM-10	0.707
SO_x	6.234
NO_x	39.50
CO	10.49
VOC	1.111

(1) tons per year

Stack Parameter Basis

The stack parameters submitted in the application are listed in Table 4. The applicant did not document the source of stack gas flowrate data or stack gas velocity data. Therefore DEQ performed a combustion evaluation to determine stack gas flowrate and stack gas velocity. Stack gas velocity and stack gas flowrate determined from the combustion evaluation are listed in Table 5. The combustion evaluation calculation spread sheet is included in Attachment D. It is recommended that the stack parameters given in Table 5 be used in air pollutant dispersion modeling. For modeling purposes stack gas velocity from the M-6 generator engine is assumed to be negligible because the stack exhausts horizontally.

Table 4. Stack Parameters Supplied by the applicant for M-42, M-43 & M-6 Generator Engines

Emission Unit	Stack Height (ft)(1)	Stack Diameter (ft)(1)	Gas Velocity (fps)(2)	Stack Flowrate (acfm)(3)	Stack Temp. (°K)(4)
M-42 Generator Engine Stack	30	1.34	179.7	15,197	647
M-43 Generator Engine Stack	30	1.34	179.7	15,197	647
M-6 Generator Engine Stack	10.5	1.0	----(5)	----(5)	763

(1) Feet
(2) Feet per second
(3) Actual cubic feet per minute
(4) Kelvin
(5) Stack exhausts horizontally, therefore no momentum induced buoyancy

Table 5. Stack Parameters Determined by DEQ for M-42, M-43 & M-6 Generator Engines

Emission Unit	Stack Height (ft)(1)	Stack Diameter (ft)(1)	Gas Velocity (fps)(2)	Stack Flowrate (acfm)(3)	Stack Temp. (°K)(4)
M-42 Generator Engine Stack	30	1.34	88.61	7,494	647
M-43 Generator Engine Stack	30	1.34	88.61	7,494	647
M-6 Generator Engine Stack	10.5	1.0	----(5)	----(5)	763

(1) Feet
(2) Feet per second
(3) Actual cubic feet per minute
(4) Kelvin
(5) Stack exhausts horizontally, therefore no momentum induced buoyancy

Operating Parameters

Annual emissions from the three generators are limited by a proposed annual fuel consumption limit of 544,522 gallons per year. Emission factors for all generator engines are the same. Therefore it does not matter which engine consumes the annual fuel usage limit of 544,522 gallons. Maximum hourly fuel consumption rates for M-42 and M-43 generator engines is 106 gallons per hour and is the basis for short term or pound per hour emission rate estimates. Maximum hourly fuel consumption rate for the M-6 generator engine is 108 gallons per hour and is the basis for the hourly emission rate estimates.

Sulfur content of the fuel oil used in the generator engines is assumed to be 0.5% by weight or less.

Attachment A

Source M-42, M-43 & M-6 generator engine emissions Dan Pitman, 7/21/03

M-42 &M-43 Fuel usage (gallons per hour) = 106
M-6 Engine Fuel usage (gallons per hour) = 108
Annual Fuel usage all eninges (gal./year) = 544,522

Fuel Density (lb/gal)[1] = 7.1
Heat Content (Btu/lb)[1] = 19300

Pollutant	Emission Factor (lb/MMBtu)[2]	M-42 Engine Emission Rate (lb/hr)	M-43 Engine Emission Rate (lb/hr)	M-6 Engine Emission Rate (lb/hr)	Total Annual Emission Rate (ton/yr)
PM	0.1	1.453	1.453	1.480	3.731
PM-10	0.0573	0.832	0.832	0.848	2.138
SOx	0.505	7.335	7.335	7.474	18.841
NOx	3.2	46.481	46.481	47.358	119.385
CO	0.85	12.346	12.346	12.579	31.712
VOC	0.09	1.307	1.307	1.332	3.358
Benzene	7.76E-04	1.127E-02	1.127E-02	1.148E-02	2.895E-02
Toluene	2.81E-04	4.082E-03	4.082E-03	4.159E-03	1.048E-02
Xylenes	1.93E-04	2.803E-03	2.803E-03	2.856E-03	7.200E-03
Propylene	2.79E-03	4.053E-02	4.053E-02	4.129E-02	1.041E-01
Formaldehyde	7.89E-05	1.146E-03	1.146E-03	1.168E-03	2.944E-03
Acetaldehyde	2.52E-05	3.660E-04	3.660E-04	3.729E-04	9.402E-04
Acrolein	7.88E-06	1.145E-04	1.145E-04	1.166E-04	2.940E-04
Napthalene	1.30E-04	1.888E-03	1.888E-03	1.924E-03	4.850E-03
Acenaphthylene	9.23E-06	1.341E-04	1.341E-04	1.366E-04	3.444E-04
Acenaphthene	4.68E-06	6.798E-05	6.798E-05	6.926E-05	1.746E-04
Fluorene	1.28E-05	1.859E-04	1.859E-04	1.894E-04	4.775E-04
Phenanthrene	4.08E-05	5.926E-04	5.926E-04	6.038E-04	1.522E-03
Anthracene	1.23E-06	1.787E-05	1.787E-05	1.820E-05	4.589E-05
Fluoranthene	4.03E-06	5.854E-05	5.854E-05	5.964E-05	1.504E-04
Pyrene	3.71E-06	5.389E-05	5.389E-05	5.491E-05	1.384E-04
Benz(a)anthracene	6.22E-07	9.035E-06	9.035E-06	9.205E-06	2.321E-05
Chrysene	1.53E-06	2.222E-05	2.222E-05	2.264E-05	5.708E-05
Benzo(b)fluoranthene	1.11E-06	1.612E-05	1.612E-05	1.643E-05	4.141E-05
Benzo(k)fluoranthene	2.18E-07	3.166E-06	3.166E-06	3.226E-06	8.133E-06
Benzo(a)pyrene	2.57E-07	3.733E-06	3.733E-06	3.803E-06	9.588E-06
Indeno(1,2,3cd)pyrene	4.14E-07	6.013E-06	6.013E-06	6.127E-06	1.545E-05
Dibenz(a,h)anthracene	3.46E-07	5.026E-06	5.026E-06	5.121E-06	1.291E-05
Benzo(g,h,l)perylene	5.56E-07	8.076E-06	8.076E-06	8.228E-06	2.074E-05

1) EPA AP-42 Section 3.4, Table 3.4-1, Foot note a.
2) EPA AP-42 Section 3.4

Attachment B

Source M-42, M-43 & M-6 generator engine emissions

Dan Pitman, 7/21/03

M-42 &M-43 Fuel usage (gallons per hour) = 106
M-6 Engine Fuel usage (gallons per hour) = 108
Annual Fuel usage all enlnges (gal./year) = 364,361

Fuel Density (lb/gal)(1) = 7.1
Heat Content (Btu/lb)(1) = 19300

Pollutant	Emission Factor (lb/MMBtu)(2)	M-42 Engine Emission Rate (lb/hr)	M-43 Engine Emission Rate (lb/hr)	M-6 Engine Emission Rate (lb/hr)	Total Annual Emission Rate (ton/yr)
PM	0.1	1.453	1.453	1.480	2.496
PM-10	0.0573	0.832	0.832	0.848	1.430
SOx	0.505	7.335	7.335	7.474	12.607
NOx	3.2	46.481	46.481	47.358	79.885
CO	0.85	12.346	12.346	12.579	21.220
VOC	0.09	1.307	1.307	1.332	2.247
Benzene	7.76E-04	1.127E-02	1.127E-02	1.148E-02	1.937E-02
Toluene	2.81E-04	4.082E-03	4.082E-03	4.159E-03	7.015E-03
Xylenes	1.93E-04	2.803E-03	2.803E-03	2.856E-03	4.818E-03
Propylene	2.79E-03	4.053E-02	4.053E-02	4.129E-02	6.965E-02
Formaldehyde	7.89E-05	1.146E-03	1.146E-03	1.168E-03	1.970E-03
Acetaldehyde	2.52E-05	3.660E-04	3.660E-04	3.729E-04	6.291E-04
Acrolein	7.88E-06	1.145E-04	1.145E-04	1.166E-04	1.967E-04
Napthalene	1.30E-04	1.888E-03	1.888E-03	1.924E-03	3.245E-03
Acenaphthylene	9.23E-06	1.341E-04	1.341E-04	1.366E-04	2.304E-04
Acenaphthene	4.68E-06	6.798E-05	6.798E-05	6.926E-05	1.168E-04
Fluorene	1.28E-05	1.859E-04	1.859E-04	1.894E-04	3.195E-04
Phenanthrene	4.08E-05	5.926E-04	5.926E-04	6.038E-04	1.019E-03
Anthracene	1.23E-06	1.787E-05	1.787E-05	1.820E-05	3.071E-05
Fluoranthene	4.03E-06	5.854E-05	5.854E-05	5.964E-05	1.006E-04
Pyrene	3.71E-06	5.389E-05	5.389E-05	5.491E-05	9.262E-05
Benz(a)anthracene	6.22E-07	9.035E-06	9.035E-06	9.205E-06	1.553E-05
Chrysene	1.53E-06	2.222E-05	2.222E-05	2.264E-05	3.820E-05
Benzo(b)fluoranthene	1.11E-06	1.612E-05	1.612E-05	1.643E-05	2.771E-05
Benzo(k)fluoranthene	2.18E-07	3.166E-06	3.166E-06	3.226E-06	5.442E-06
Benzo(a)pyrene	2.57E-07	3.733E-06	3.733E-06	3.803E-06	6.416E-06
Indeno(1,2,3cd)pyrene	4.14E-07	6.013E-06	6.013E-06	6.127E-06	1.034E-05
Dibenz(a,h)anthracene	3.46E-07	5.026E-06	5.026E-06	5.121E-06	8.638E-06
Benzo(g,h,l)perylene	5.56E-07	8.076E-06	8.076E-06	8.228E-06	1.388E-05

1) EPA AP-42 Section 3.4, Table 3.4-1, Foot note a.
2) EPA AP-42 Section 3.4

Attachment C

Source M-42, M-43 & M-6 generator engine emissions

Dan Pitman, 7/21/03

M-42 &M-43 Fuel usage (gallons per hour) = 106
M-6 Engine Fuel usage (gallons per hour) = 108
Annual Fuel usage all eninges (gal./year) = 180,161

Fuel Density (lb/gal)[(1)] = 7.1
Heat Content (Btu/lb)[(1)] = 19300

Pollutant	Emission Factor (lb/MMBtu)[(2)]	M-42 Engine Emission Rate (lb/hr)	M-43 Engine Emission Rate (lb/hr)	M-6 Engine Emission Rate (lb/hr)	Total Annual Emission Rate (ton/yr)
PM	0.1	1.453	1.453	1.480	1.234
PM-10	0.0573	0.832	0.832	0.848	0.707
SOx	0.505	7.335	7.335	7.474	6.234
NOx	3.2	46.481	46.481	47.358	39.500
CO	0.85	12.346	12.346	12.579	10.492
VOC	0.09	1.307	1.307	1.332	1.111
Benzene	7.76E-04	1.127E-02	1.127E-02	1.148E-02	9.579E-03
Toluene	2.81E-04	4.082E-03	4.082E-03	4.159E-03	3.469E-03
Xylenes	1.93E-04	2.803E-03	2.803E-03	2.856E-03	2.382E-03
Propylene	2.79E-03	4.053E-02	4.053E-02	4.129E-02	3.444E-02
Formaldehyde	7.89E-05	1.146E-03	1.146E-03	1.168E-03	9.739E-04
Acetaldehyde	2.52E-05	3.660E-04	3.660E-04	3.729E-04	3.111E-04
Acrolein	7.88E-06	1.145E-04	1.145E-04	1.166E-04	9.727E-05
Napthalene	1.30E-04	1.888E-03	1.888E-03	1.924E-03	1.605E-03
Acenaphthylene	9.23E-06	1.341E-04	1.341E-04	1.366E-04	1.139E-04
Acenaphthene	4.68E-06	6.798E-05	6.798E-05	6.926E-05	5.777E-05
Fluorene	1.28E-05	1.859E-04	1.859E-04	1.894E-04	1.580E-04
Phenanthrene	4.08E-05	5.926E-04	5.926E-04	6.038E-04	5.036E-04
Anthracene	1.23E-06	1.787E-05	1.787E-05	1.820E-05	1.518E-05
Fluoranthene	4.03E-06	5.854E-05	5.854E-05	5.964E-05	4.975E-05
Pyrene	3.71E-06	5.389E-05	5.389E-05	5.491E-05	4.580E-05
Benz(a)anthracene	6.22E-07	9.035E-06	9.035E-06	9.205E-06	7.678E-06
Chrysene	1.53E-06	2.222E-05	2.222E-05	2.264E-05	1.889E-05
Benzo(b)fluoranthene	1.11E-06	1.612E-05	1.612E-05	1.643E-05	1.370E-05
Benzo(k)fluoranthene	2.18E-07	3.166E-06	3.166E-06	3.226E-06	2.691E-06
Benzo(a)pyrene	2.57E-07	3.733E-06	3.733E-06	3.803E-06	3.172E-06
Indeno(1,2,3cd)pyrene	4.14E-07	6.013E-06	6.013E-06	6.127E-06	5.110E-06
Dibenz(a,h)anthracene	3.46E-07	5.026E-06	5.026E-06	5.121E-06	4.271E-06
Benzo(g,h,l)perylene	5.56E-07	8.076E-06	8.076E-06	8.228E-06	6.863E-06

1) EPA AP-42 Section 3.4, Table 3.4-1, Foot note a.
2) EPA AP-42 Section 3.4

Attachment D

Combustion Evaluation

INEEL M-42 and M-43 Generator Engines

Fuel Data (% by weight)

Fuel Oil #2

S	0.55
N2	0.2
C	86.4
H2	12.7
H20	0
O2	0.2

Fuel burned (lb/hr)	763.2
Excess air (%)	10
Stk temp (F)	705
Stk press (atm)	0.83

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.13	0.49
N2	0.00	0
C	54.90	206.53
H2	24.05	90.48
O2	-0.05	
	79.03	297.50

stioc. comb air = 401.04825 lb.mole/hr

stoic. dry comb air = 352.53054 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.13	8.38
N2	327.30	9164.51
CO2	54.90	2415.60
H2O(comb)	48.46	872.34
O2	7.90	252.91
H20(fuel)	0.00	0.00
dry	390.24	
wet	438.70	

Volume of flue gas (acfm)	7493.9
Volume of flue gas (sdcfm)	2469.6
Volume of flue gas (dscfm@7%O2)	3346.4
Volume of flue gas (dscfm@15%O2)	7808.3
Volume of flue gas (dscfm@8%02)	3603.8
Volume of flue gas (dscfm@3%02)	2602.8
Volume of flue gas (dscfm@10%02)	4259.1

APPENDIX B

Modeling Memo

M E M O R A N D U M

TO: Michael Stambulis, Air Permit Engineer, State Office of Technical Services
Mary Anderson, Air Modeling Coordinator, Air Program Division

FROM: Kevin Schilling, Air Quality Scientist, State Office of Technical Services

SUBJECT: Atmospheric Dispersion Modeling Review for the INEEL TRA Generator Permit to Construct

DATE: July 28, 2003

1.0 SUMMARY:

The U.S. Department of Energy (DOE) – Idaho Operations Office submitted a Permit to Construct (PTC) application for modifications associated with operations of generators located at the Test Reactor Area (TRA) of the Idaho National Environmental and Engineering Laboratory (INEEL), near Idaho Falls, Idaho. Air quality analyses involving atmospheric dispersion modeling of emissions increases resulting from the proposed modification were submitted in support of the PTC application to demonstrate that the modification would not cause or significantly contribute to a violation of any ambient air quality standard (IDAPA 58.01.01.203.02).

The Department of Environmental Quality (the Department) received a permit application from DOE on December 15, 2000, and received supplemental information to the application on June 10, 2002 and February 27, 2003. Bechtel BWXT Idaho LLC (Bechtel), under contract to DOE, conducted the ambient air quality analyses for the application. After receiving additional dispersion modeling information on February 27, 2003, the application was declared complete by the Department on June 26, 2003.

A technical review of the submitted air quality analyses was conduced by the Department's Technical Services Division. Emissions rates used in the modeling analyses were slightly modified by the Department to maintain consistency with the Department's emissions inventory review, allowable emissions rates specified in the proposed permit, and the Department's regulations/policies regarding the calculation of emissions increases. No other changes were made to modeling analyses submitted. The modeling analyses, with the stated modifications: 1) utilized appropriate methods and models; 2) was conducted using proper model parameters and accurate input data; 3) adhered to established Departmental guidelines for new source review dispersion modeling; 4) demonstrated that predicted pollutant concentrations from emissions associated with the proposed modification were below applicable air quality standards.

2.0 DISCUSSION:

2.1 Applicable Air Quality Impact Limits and Analyses

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

2.1.1 Area Classification

The TRA facility is located in Butte County, designated as an attainment or unclassifiable area for sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), lead (Pb), ozone (O_3), and particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}). There are no Class I areas within 10 kilometers of the INEEL facility.

2.2.2 *Significant Impact and Full Impact Analyses*

If estimated maximum impacts to ambient air from the emissions increase associated with the proposed modification exceed the "significant contribution" levels of IDAPA 58.01.01.006.93, then a full impact analysis may be necessary to demonstrate compliance with IDAPA 58.01.01.203.02. A full impact analysis for attainment area pollutants involves adding ambient impacts from facility-wide emissions to Department-approved background concentration values that are appropriate for the criteria pollutant/averaging-time at the facility location. The resulting maximum pollutant concentrations in ambient air are then compared to the NAAQS listed in Table 1. Table 1 also lists significant contribution levels and specifies the modeled design value that must be used for comparison to the NAAQS.

Table 1. Applicable regulatory limits

Pollutant	Averaging Period	Significant Contribution Levels[a] (μg/m³)[b]	Regulatory Limit[c] (μg/m³)	Modeled Value Used[d]
PM_{10}[e]	Annual	1.0	50[f]	Maximum 1st highest[g]
	24-hour	5.0	150[h]	Maximum 6th highest[i]
Carbon monoxide (CO)	8-hour	500	10,000[j]	Maximum 2nd highest[g]
	1-hour	2,000	40,000[j]	Maximum 2nd highest[g]
Sulfur Dioxide (SO_2)	Annual	1.0	80[f]	Maximum 1st highest[g]
	24-hour	5	365[j]	Maximum 2nd highest[g]
	3-hour	25	1,300[j]	Maximum 2nd highest[g]
Nitrogen Dioxide (NO_2)	Annual	1.0	100[f]	Maximum 1st highest[g]
Lead (Pb)	Quarterly	NA	1.5[h]	Maximum 1st highest[g]
Benzene	Annual	NA	0.12	Maximum 1st highest[g]

a. IDAPA 58.01.01.006.93
b. Micrograms per cubic meter
c. IDAPA 58.01.01.577 for criteria pollutants, IDAPA 58.01.01.585 for non-carcinogenic toxic air pollutants IDAPA 58.01.01.586 for carcinogenic toxic air pollutants.
d. The maximum 1st highest modeled value is always used for significant impact analysis and for all toxic air pollutants
e. Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
f. Never expected to be exceeded in any calendar year
g. Concentration at any modeled receptor
h. Never expected to be exceeded more than once in any calendar year
i. Concentration at any modeled receptor when using five years of meteorological data
j. Not to be exceeded more than once per year

2.2.3 *Toxic Air Pollutant Impact Analysis*

Toxic Air Pollutant (TAP) requirements for PTCs are specified in IDAPA 58.01.01.210. If the net emissions increase associated with a new source or modification exceeds screening emission levels (ELs) of IDAPA 58.01.01.585 and IDAPA 58.01.01.586, 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 IDAPA 58.01.01.585 and Acceptable Ambient Concentrations for Carcinogens (AACCs) of IDAPA 58.01.01.586, then compliance with TAP requirements has been demonstrated.

Maximum modeled ambient concentrations of carcinogenic TAPs, listed in IDAPA 58.01.01.586, of up to 10 times the AACC may be allowed if TAP Reasonably Available Control Technology (T-RACT) is utilized for the proposed new source, as per IDAPA 58.01.01.210.

2.2 Background Concentrations

Background concentrations were not used for these analyses since a full impact analysis was not conducted.

2.3 Modeling Impact Assessment

Table 2 provides a summary of the modeling parameters used for the DEQ analyses.

Table 2. Modeling Parameters

Parameter	Description/Values	Documentation/Additional Description
Model	ISCST3	Version 00101
Meteorological data	NOAA INEEL surface data	1997-2001 mixing heights all set to 100 meters for short term and 800 meters for annual
Model options	Regulatory Default	
Land use	Rural	Low population density in area and large fraction of unimproved land
Terrain	Considered	Receptor elevations specified
Building downwash	Used building profile input program for ISCST-3 (BPIP)	Building dimensions obtained from modeling files submitted
Receptor grid	Perimeter	500 meter spacing, 3 rows deep with 50 meters between rows
	Highway	Approximate 500 meter spacing along highway with 100 meter spacing in the maximum impact areas
Facility location (UTM)[a]	Easting	341 kilometers
	Northing	4,828 kilometers

a. Universal Transverse Mercator

b. National Oceanic and Atmospheric Administration

2.3.1 Modeling protocol

A modeling protocol was not submitted to the Department prior to the application.

2.3.2 Model Selection

Ambient air impact analyses were performed by Bechtel, DOE's contractor, using the model ISCST-3. The Department concurs with Bechtel's selection of ISCST-3 for these dispersion modeling analyses.

2.3.3 Land Use Classification

Well over 50 percent of the landuse of the surrounding area is rural. Therefore, rural dispersion coefficients were used in the modeling analyses.

2.3.4 Meteorological Data

Surface meteorological data were available from the National Oceanic and Atmospheric Administration (NOAA) for the INEEL site. Data for 1997 through 2001 were used in the modeling analyses. Upper air data were not available for the site at the time the application was submitted. Bechtel used a mixing level of 100 meters for short-term modeling (24-hour averaging periods and less) and 800 meters for annual averaging periods. The Department accepted this approach for the TRA site and determined these data are the most representative meteorological data available for the area.

2.3.5 Complex Terrain

The modeling analyses submitted by Bechtel considered elevated terrain. The Department reviewed elevations specified for receptors and concluded that the data appeared reasonable.

2.3.6 *Facility Layout*

The Department verified proper identification of the facility boundary and buildings on the site by comparing the modeling input to a facility plot plan submitted with the application.

2.3.7 *Building Downwash*

Plume downwash effects caused by structures present at the facility were accounted for in the modeling analyses. The Building Profile Input Program for ISCST-3 (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. Departmental verification modeling was conducted using regenerated parameters from BPIP.

2.3.8 *Ambient Air Boundary*

The applicant correctly identified ambient air as public roadways that bisect the INEEL site and that area external to the INEEL property boundary. Although public access to the property is not physically restricted by a fence, the area is constantly monitored and patrolled to prevent unauthorized entry.

2.3.9 *Receptor Network*

The atypical size of the INEEL site precludes standard generation and use of a receptor grid. Two types of receptors were generated for the TRA generator modeling analyses. Highway receptors were placed along US Highway 20/26, which extends from the eastern INEEL boundary to the western boundary, south of the TRA. Three rows of receptors were also placed along the property boundary of the INEEL, spaced at 500-meter intervals with 50 meters separating each row.

The highway receptors were not used for evaluating annual averaged impacts from carcinogenic TAP emissions. Both receptor types were used to evaluate concentrations of criteria pollutants.

2.3.10 *Emission Rates*

Emissions rates used in the dispersion modeling analyses submitted by the applicant were reviewed against those in the permit application, the Department's emission inventory review, and the proposed permit. The following approach was used for the Department's verification modeling:

- All modeled emissions rates were equal to or slightly greater than the facility's emissions calculated in the permit application or the permitted allowable rate.

- Modeling results were compared to "significant contribution" thresholds. More extensive review of modeling parameters selected was conducted when model results approached applicable thresholds.

Table 3 provides criteria pollutant and TAP emissions quantities for short-term averaging periods (1.0 hour through 24 hour) and annual averages. Lead emissions estimates were not provided; however, for the type of source it is expected that lead emissions would be well below modeling thresholds specified in the *State of Idaho Air Quality Modeling Guideline* and can be neglected from the analyses.

Bechtel estimated an increase in the maximum 1-hour fuel usage for each of the three generators, with the emissions increase from the M-6 engine equal to total emissions associated with operation at the maximum rated capacity (no accounting for any existing emissions). The M-42 and M-43 engines were in operation prior to promulgation of permitting rules and are considered grandfathered with regard to air permitting. Therefore, it was estimated by the Department that their potential emissions increase for short-term averaging periods is negligible. The M-6 engine is not considered grandfathered and its use prior to this permitting action was considered to be for emergency situations. The differences between the M-6 SO_2 short-term emissions rate used by Bechtel and that used by the Department results because of differences in the assumed maximum sulfur content of fuel (0.5% by weight used by the Department vs. 0.3% by weight used by Bechtel).

The applicant proposed limiting annual operations under a "bubble." The three units would have a combined allowable increase in fuel usage to be used by any operational combination of the units. The annual emissions increase must be limited to a quantity less than significant emissions increase levels identified in IDAPA 58.01.01.006.92; otherwise, the modification would be subject to requirements of the Prevention of Significant Deterioration (PSD) permitting program. Emissions estimates of oxides of nitrogen (NOx) are closest to significance levels, and a fuel usage increase limit of 180,161 gallons per year will ensure NOx emissions resulting from the proposed modification remain below the significance level of 40 tons per year. Because all three engines essentially have the same emissions rate as a function of fuel use, and the emissions stack parameters for M-6 engine have comparatively worse dispersion characteristics (shorter stack and lower stack gas flow velocity), annual averaged impacts were modeled assuming that all emissions occur from the M-6 stack.

Table 3. Criteria Pollutant and TAP Emissions Rates for the M-6 Engine Used for Modeling (Short-Term and Annual)

Pollutant	Emissions Rate Used for Modeling (lb/hr)[a]	
	Short-Term[c]	Annual Averaged[c]
PM_{10}[b]	0.85	0.16
Carbon monoxide (CO)	12.6	NA
Sulfur Dioxide (SO_2)	7.47 (4.5)	1.42 (0.9)
Nitrogen Dioxide (NO_2)	NA	9.02 (9)
Benzene	NA	2.19E-3

a. Pound per hour
b. Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
c. Value in parentheses are those used by Bechtel for M-6 engine

TAP emissions increases only exceeded screening emissions levels (ELs) for benzene, thereby requiring dispersion modeling to demonstrate compliance with TAP requirements of IDAPA 58.01.01.210.

2.3.11 Emission Release Parameters

Table 4 provides emissions release parameters, including stack location, stack height, stack diameter, exhaust temperature, and exhaust velocity. The stack of the M-6 vents in the horizontal direction. This stack was modeled with an exit velocity of 0.001 meters per second (m/sec) to appropriately remove effects of momentum-induced plume rise. Thermal plume rise should still be considered in the analyses since the stack exhaust temperature is significantly higher than ambient air temperatures. Thermal plume rise is dependent upon the heat content of the emitted plume, which is a function of the stack gas volumetric flow and temperature. To properly account for this with a 0.001 m/sec stack gas velocity, the stack diameter used in the model was increased by the Department to the point where the volumetric flow obtained from the 0.001 m/sec velocity and the modeled stack diameter is equal to the actual volumetric flow.

Table 4. Emissions and Stack Parameters for M-6 Engine Stack

Release Point / Location	Source Type	Stack Height (m)[a]	Modeled Diameter (m)	Stack Gas Temp. (K)[b]	Stack Gas Flow Velocity (m/sec)[c]
M-6 Generator Engine (M6)	Point	3.2	70[d] (0.41)[e]	692	0.001

a. Meters
b. Kelvin
c. Meters per second
d. Set at a value to properly account for thermal plume rise when combined with a 0.001 m/sec stack velocity
e. The value submitted with the application is indicated in parenthesis. Verification modeling was conducted using the flow parameter values generated by the Department as described above.

3.0 MODELING RESULTS:

This Section describes dispersion modeling results from the significant impact analysis and TAP analysis.

3.1 Significant Impact Analysis Results

The applicant conducted a Significant Impact Analysis, considering impacts from the proposed modification. Results of the Significant Impact Analysis are presented in Table 5. Values in the tables are those obtained from the Department's verification analyses, unless indicated otherwise.

Table 5. Criteria Pollutant Design concentrations for significant impact analysis

Pollutant	Averaging Period	Year	Design Concentration[a] ($\mu g/m^3$)[b]	Receptor Location UTM[c]	
				Easting (m)	Northing (m)
PM_{10}[d]	24-hour	1999	0.59 (3.9)	339750	4821821
	Annual	1998	0.0068 (0.07)	338009	4823462
Carbon Monoxide (CO)	1-hour	1997	64.8 (144)	338009	4823462
	8-hour	1998	17.5 (101)	341313	4820272
Sulfur Dioxide (SO_2)	3-hour	1997	22.6 (20.3)	339396	4822173
	24-hour	1999	5.2 (5.2)	339750	4821821
	Annual	1998	0.060 (0.4)	338009	4823462
Nitrogen Dioxide (NO_2)	Annual	1998	0.38[e] (0.34)	338009	4823462

a. Maximum 1st highest modeled concentration. The value obtained by Bechtel, as submitted with the application, is indicated in parentheses.
b. Micrograms per cubic meter
c. Universal Transverse Mercator
d. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
e. Assumes all NOx is emitted as NO_2

Maximum modeled impacts were below significant contribution levels for all criteria pollutants other than 24-hour averaged SO_2. A full impact analysis for SO_2 was not conducted for this sources because of the following:

- Modeled 24-hour averaged SO_2 concentrations only exceeded significant contribution levels at three receptors along the highway bisection the INEEL.
- There are no sensitive receptors (schools, hospitals, homes, etc.) in the area where the generators may have a maximum impact to ambient air.
- There are no other substantial sources of SO_2 at the TRA; therefore, it is fairly certain that results from modeling TRA-wide SO_2 emissions would be well below NAAQS.

3.2 Toxic Air Pollutants Results

Table 6 provides modeling results for TAPs. Maximum modeled annual averages of all TAPs were below AACCs.

Table 6. Toxic air pollutants analysis results (Carcinogens)

Pollutant	Year	Highest Annual Impact (μg/m³)	AACC (μg/m³)	Percent of AACC	Receptor Location	
					Easting (m)	Northing (m)
benzene	1998	0.00002	0.12	0.02	333799	4812548

4.0 FILES

Electronic copies of the modeling analysis are saved on disk. Table 7 provides a summary of the files used in the modeling analysis. The Permit Writer has reviewed this modeling memo to ensure consistency with the PTC and technical memorandum.

Table 7. Dispersion Modeling Files

Type of File	Description	File Name
Met data	Surface data from INEEL site	GRI9701H.ASC (short term) GRI9701A.ASC (long term)
BEEST input files	24-hour	TRADEQ24HR.BST
	Annual criteria pollutant and TAPs	TRADEQXXANN.BST; XX = year of met data
Each BST file has the following type of files associated with it:		
	Input file for BPIP program	.PIP
	BPIP output file	.TAB
	Concise BPIP output file	.SUM
	BEE-Line file containing direction specific building dimensions	.SO
	ISCST3 input file for each pollutant	.DTA
	ISCST3 output list file for each pollutant	.LST
	User summary output file for each pollutant	.USF
	Master graphics output file for each pollutant	.GRF
Some modeling files have the following type of graphics files associated with them:		
	Surfer data file	.DAT
	Surfer boundary file	.BLN
	Surfer post file containing source locations	.TXT
	Surfer plot file	.SRF

KS: D:\CURRENT PROJECTS\INEEL GENERATOR BUBBLE\INEEL GENERATOR MODELING MEMO.DOC

APPENDIX C

AIRS INFORMATION

Table 9.1 AIRS/AFS[a] FACILITY-WIDE CLASSIFICATION[b] DATA ENTRY FORM

AIR PROGRAM / POLLUTANT	SIP	PSD	NSPS (Part 60)	NESHAP (Part 61)	MACT (Part 63)	TITLE V	AREA CLASSIFICATION A – Attainment U – Unclassifiable 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			–	–
VOC	B	–	B			–	U
THAP (Total HAPs)	B	–		X	–	–	–
			APPLICABLE SUBPART				
			Dc & Kb	H & 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 NESHAP only, class "A" is applied to each pollutant which is below the 10 T/yr threshold, but which contributes to a plant total in excess of 25 T/yr of all NESHAP pollutants.

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).