



Air Quality Permitting
Technical Memorandum

Permit to Construct No. 001-00194

U.S. Department of Transportation,
Federal Aviation Administration
Boise Air Traffic Control Tower
Boise, Idaho

Prepared By:

Dustin Holloway
Permit Writer

Project No. P-020017

Date Prepared:

September 10, 2002

Permit Status:

FINAL

ACRONYMS, UNITS, AND CHEMICAL NOMENCLATURE

AAC	Acceptable Ambient Concentration
AACC	Acceptable Ambient Concentration for Carcinogens
AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AQCR	Air Quality Control Region
BACT	Best Available Control Technology
CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	carbon monoxide
DEQ	Idaho Department of Environmental Quality
ELs	Screening Emissions Limit
FAA	Federal Aviation Administration
HAPs	hazardous air pollutants
hp	horsepower
IDAPA	a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
lb/hr	pound per hour
MACT	Maximum Available Control Technology
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO _x	nitrogen oxides
NSPS	New Source Performance Standards
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
<i>Rules</i>	<i>Rules for the Control of Air Pollution in Idaho</i>
SIP	State Implementation Plan
SO ₂	sulfur dioxide
T/yr	tons per year
USDOT	U.S. Department of Transportation
UTM	Universal Transverse Mercator
VOC	volatile organic compound

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 (PTC).

PROJECT DESCRIPTION

The USDOT, FAA is proposing to install an emergency generator for the air traffic control tower located in the Boise Air Terminal complex.

SUMMARY OF EVENTS

- | | |
|----------------|---|
| May 21, 2002 | The Department of Environmental Quality (DEQ) received an application from the USDOT, FAA for the installation of an emergency generator for the air traffic control tower. |
| August 1, 2002 | The application was determined complete. |

DISCUSSION

1. Process Description

Emergency generators are used to supply electrical power during outages. Emergency generators are operated only for emergency use. This includes the maintenance and testing required to assure proper operation during emergencies. The equipment associated with this permit includes a 300-hp diesel generator.

2. Emissions Estimates

Emissions from the emergency generator were estimated using emissions factors from AP-42, Chapter 3 and from manufacturer emissions data. The estimated emissions rates are shown in Appendix A of this technical memorandum.

3. Modeling

The ambient concentrations of criteria pollutants and toxic air pollutants with emissions rates above their applicable ELs were estimated using the ISC Prime model. The modeling results are shown in Appendix B of this technical memorandum.

4. Facility Classification

This emergency generator is located at a facility that is classified as a natural minor facility ("B").

5. Area Classification

This facility is located in an area that is classified as nonattainment for CO. The area is classified as unclassifiable for all other criteria air pollutants.

6. Regulatory Review

IDAPA 58.01.01.201 Permit to Construct Required

The emissions from this generator do not meet the requirements of IDAPA 58.01.01.220. Therefore, this generator is not exempt from PTC requirements.

IDAPA 58.01.01.210 Demonstration of Preconstruction Compliance with Toxic Standards

The toxic pollutant emissions rates are shown in Appendix A. All of the toxic pollutants are either below their applicable ELs, AAC, or AACC levels. The modeled concentrations of toxic pollutants which had emissions rates above their applicable ELs are shown in Appendix B.

IDAPA 58.01.01.577 Ambient Air Quality Standards for Specific Air Pollutants

The hours of operation are limited to assure that this generator will not violate any ambient air quality standards.

40 CFR 60 New Source Performance Standards

This generator is not affected by any NSPS requirements.

7. Permit Requirements

The hours of operation are limited to two hours per day and 500 hours per year. Any time the generator operates for more than two hours in one 24-hour period the permittee must submit an excess emissions report to the Department in accordance with IDAPA 58.01.01.130-136.

8. Permit Coordination

This facility is not a Tier I source and does not need to apply for an operating permit.

9. AIRS Information

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

AIR PROGRAM	SIP ^c	PSD ^d	NSPS ^e (Part 60)	NESHAP ^f (Part 61)	MACT ^g (Part 63)	TITLE V	AREA CLASSIFICATION
POLLUTANT							A – Attainment U – Unclassifiable N – Nonattainment
SO ₂ ^h	B						U
NO _x ⁱ	B						U
CO ^j	B						N
PM ₁₀ ^k	B						U
PT (Particulate) ^l							
VOC ^m	B						U
THAP (Total HAPs) ⁿ							
			APPLICABLE SUBPART				

^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).

^c State Implementation Plan

^d Prevention of Significant Deterioration

^e New Source Performance Standards

^f National Emission Standards for Hazardous Air Pollutants

^g Maximum Achievable Control Technology

^h Sulfur Dioxide

ⁱ Nitrogen Oxides

^j Carbon Monoxide

^k Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers

^l Particulate Matter

^m Volatile Organic Compounds

ⁿ Hazardous Air Pollutants

FEES

The USDOT, FAA facility is not a major facility as defined in IDAPA 58.01.01.008.10. Therefore, Title V registration fees are not applicable in accordance with IDAPA 58.01.01.527. This permit application was received before July 1, 2002, when PTC fees became effective. Therefore, the permittee is not subject to PTC fees.

RECOMMENDATION

Based on review of application materials and all applicable state and federal rules and regulations, staff recommends the USDOT, FAA be issued PTC No. 001-00194 for the emergency generator. No public comment period is recommended, no entity has requested a comment period, and the project does not involve PSD requirements.

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cc: Michael McGown, Boise Regional Office
Joan Lechtenberg, Air Quality Division

APPENDIX A
EMISSIONS RATES

Table A.1

Criteria Pollutant Emissions	
	Modeled Emissions Rate (lb/hr)
NO _x	9.66
SO ₂	.64
CO	2.1
PM ₁₀	.68

Table A.2

Toxic Pollutant Emissions Factors for Diesel Engines					
	lb/MMBtu ^a	lb/hp-hr ^b	Emission Rate	EL	Greater than EL?
Benzene	9.33E-04	6.53E-06	1.96E-03	8.00E-04	yes
Toluene	4.09E-04	2.86E-06	8.59E-04	25	no
Xylene	2.85E-04	2.00E-06	5.99E-04	29	no
Formaldehyde	1.18E-03	8.26E-06	2.48E-03	5.10E-04	yes
acetaldehyde	7.67E-04	5.37E-06	1.61E-03	3.00E-03	no
acrolein	9.25E-05	6.48E-07	1.94E-04	0.017	no
Polycyclic Aromatic Hydrocarbons					
napthalene	8.48E-05	5.94E-07	1.78E-04	3.33	no
fluorene	2.92E-05	2.04E-07	6.13E-05	0.133	no
benzo(a)anthracene	1.68E-06	1.18E-08	3.53E-06		
chrysene	3.53E-07	2.47E-09	7.41E-07		
benzo(b)fluoranthene	9.91E-08	6.94E-10	2.08E-07		
benzo(k)fluoranthene	1.55E-07	1.09E-09	3.26E-07		
benzo(a)pyrene	1.88E-07	1.32E-09	3.95E-07	2.00E-06	no
Indeno(1,2,3-cd)pyrene	3.75E-07	2.63E-09	7.88E-07		
Dibenz(a,h)anthracene	5.83E-07	4.08E-09	1.22E-06		
Total PAH (as defined in IDA ² PA 58.01.01.586)			7.21E-06	2.00E-06	yes

^a lb/MMBtu = pounds per million British thermal units

^b lb/hp-hr = pound per horsepower per hour

APPENDIX B

MODELING RESULTS

MEMORANDUM

TO: Dustin Holloway, Air Quality Division
FROM: Mary Anderson, Modeling Coordinator, Air Quality Division
SUBJECT: Modeling Review for Permit to Construct for Emergency Generator at Located at the Boise Airport.
DATE: September 10, 2002

1. SUMMARY:

The Federal Aviation Administration (FAA), located at the Boise Airport, submitted an exemption request for installation of an emergency generator at the Boise Airport. After reviewing the modeling analysis, the Department determined that the hours of operation per day must be federally enforceable in order for the facility to demonstrate compliance with the National Ambient Air Quality Standards (NAAQS). Therefore, Department modelers performed a modeling analysis for the FAA.

The following criteria pollutants were included in the modeling analysis: Particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (PM_{10}), carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2). The following three toxic air pollutants (TAPs) have emissions rates that exceed the screening level emission rates listed in IDAPA 58.01.01.586: benzene, formaldehyde, and polyaromatic hydrocarbons (PAHs). The modeling analysis performed by the Department demonstrates compliance with all applicable regulatory limits.

2. DISCUSSION:

2.1 Applicable Air Quality Impact Limits

This facility is located in Ada County, which is designated as non-attainment for CO and unclassified for NO_2 and SO_2 . The area currently has no classification for PM_{10} . This facility is located at the Boise Airport. Therefore, total ambient impacts, including background and nearby sources, for the criteria pollutants must be below the National Ambient Air Quality Standards (NAAQS), listed in Table 1.

Table 1. Applicable regulatory limits.

Pollutant	Averaging Period	Significant Contribution Level^a ($\mu\text{g}/\text{m}^3$)^b	Regulatory Limit^c ($\mu\text{g}/\text{m}^3$)
Criteria Pollutants			
Nitrogen dioxide	Annual	1	100
Sulfur dioxide	Annual	1	80
	24-hour	5	365
	3-hour	25	1300
PM ₁₀ ^d	Annual	1	50
	24-hour	5	150
Carbon monoxide	8-hour	500	10,000
	1-hour	2000	40,000
Toxic Air Pollutants			
Benzene	Annual		1.2E-01
Formaldehyde	Annual		7.7E-02
Polyaromatic Hydrocarbons	Annual		3.0E-04

a. IDAPA 58.01.01.006.93

b. Micrograms per cubic meters

c. For the criteria pollutants IDAPA 58.01.01.577 and 58.01.01.586 for carcinogens.

d. Particulate matter with an aerodynamic diameter less than or equal to 10 micrometers.

2.2 Current Air Quality

The current air quality for each of the criteria pollutants of concern are presented in Table 2.

Table 2. Current air quality in the Boise area.

Pollutant	Averaging Period	Concentration ($\mu\text{g}/\text{m}^3$)^a
Nitrogen dioxide	Annual	40
Sulfur dioxide	3-hour	374
	24-hour	120
	Annual	18.3
PM ₁₀ ^b	24-hour	123
	Annual	31.6
Carbon monoxide	1-hour	11,450
	8-hour	5,130

a. Micrograms per cubic meters

b. Particulate matter with an aerodynamic diameter less than or equal to 10 micrometers.

2.3 Modeling Impact Assessment

DEQ modeled the emergency generator using the ISCPrime model. Five years of Boise meteorological data (1987 – 1991) were used. The facility will have a permit limit of 2 hours per day of operation of the emergency generator.

2.3.1 Emission and Source Data

Tables 3 and 4 present the actual source parameters and the modeled source parameters, respectively. The emissions rates are presented in Table 5.

Table 3. Actual source parameters						
Source	Identifier	Flow Rate (acfm) ^a	Diameter (feet)	Temperature (°F) ^b	Height (feet)	Stack Orientation
Generator	GEN	1735	0.667	920	9	raincap
a. Actual cubic feet per minute						
b. Degrees Fahrenheit						

The EPA recommended method for treating a buoyant source with a raincap present is to reduce the exit velocity to 0.001 meters per second and to adjust the exit diameter to conserve buoyancy. The adjusted exit diameter is calculated by the following equation:

$$d'_s = 31.6 * d_s * (v_s)^{0.5}$$

Where

d_s = diameter used in the model (meters)

and

d_s = actual diameter (meters)

v_s = actual exit velocity (meters per second)

31.6 = variable to account for conservation of buoyancy flux (seconds per meters)

Using this equation the new exit diameter used in the model is 105.9 feet.

Table 4. Modeled source parameters					
Source	Identifier	Exit Velocity (m/s) ^a	Diameter (feet)	Temperature (°F) ^b	Height (feet)
Generator	GEN	0.001	105.9	920	9
a. Actual cubic feet per minute					
b. Degrees Fahrenheit					

Table 5. Emission rates (pounds per hour)

Pollutant	Maximum Hourly	Adjusted Hourly^a
Criteria Pollutants		
Nitrogen dioxide	9.66	
Annual		0.55
Sulfur dioxide	0.64	
3-hour		0.43
24-hour		0.053
Annual		0.037
PM ₁₀ ^b	0.68	
24-hour		0.057
Annual		0.039
Carbon monoxide	2.1	
1-hour		2.1
8-hour		0.53
Toxic Air Pollutants (annual)		
Benzene	1.96E-03	1.12E-04
Formaldehyde	2.48E-03	1.42E-04
PAHs	7.21E-06	4.12E-07

a. Assumes a maximum operation of 2 hours per day and 500 hours per year.
b. Particulate matter with an aerodynamic diameter less than or equal to 10 micrometers.

2.3.2 Model Description and Justification

DEQ modelers chose ISCST3-Prime as the appropriate model for this application. This decision is based on the fact that downwash is an important factor and ambient air is in the cavity region of the building. Rural conditions were assumed. ISCPrime was run using regulatory defaults.

2.3.3 Receptor Network

MFG used a 275 meter by 275 meter, 25 meter resolution grid centered on the generator. A building was entered to estimate the effects of the main airport building. The building is 150 feet by 150 feet and 20 feet tall. Ambient air was determined to be any point external to the building because of the public access.

2.3.4 Elevation Data

Simple terrain was assumed because the maximum concentrations was right at the edge of the building.

2.3.5 Meteorological Data

Five years (1987 – 1991) of meteorological data from the Boise airport were used.

2.4 Modeling Results

The model was run with an emission rate of 1 pound per hour to obtain a unit concentration.

Table 5. Ambient impacts for the entire facility

Pollutant	Averaging Period	Unit Concentration ($\mu\text{g}/\text{m}^3$) ^a	Emission Rate (lb/hr)	Actual Ambient Concentration ($\mu\text{g}/\text{m}^3$) ^a	Regulatory Limit ^b	Exceeds the Standard (Y or N)
Criteria Pollutants						
Nitrogen dioxide	Annual	2.83	0.55	1.17 ^c	1	Y
	3-hour	18.28	0.43	7.86	25	N
Sulfur dioxide	24-hour	13.8	0.053	0.73	5	N
	Annual	2.83	0.037	0.10	1	N
PM ₁₀ ^d	24-hour	13.8	0.057	0.79	5	N
	Annual	2.83	0.039	0.11	1	N
Carbon monoxide	1-hour	22.35	2.1	46.9	2000	N
	8-hour	17	0.53	9.01	500	N
Toxic Air Pollutants						
Benzene	Annual	2.83	1.12E-04	3.17E-04	1.2E-01	N
Formaldehyde	Annual	2.83	1.42E-04	4.02E-04	7.7E-02	N
PAHs	Annual	2.83	4.12E-07	1.17E-06	3.0E-04	N

a. Micrograms per cubic meters
b. For the criteria pollutants, the significant contribution levels in IDAPA 58.01.01.006.93 and 58.01.01.586 for carcinogens.
c. Tier II screening method for NO₂. Multiply NO_x concentration by 0.75 (40 CFR 51, Appendix W, Section 6.2.3)
d. Particulate matter with an aerodynamic diameter less than or equal to 10 micrometers.

DEQ modelers have determined that, even though the estimated ambient impacts exceed the significant contribution level for NO₂, a facility-wide model would not be of benefit. The majority of the NO_x sources (i.e., airplanes and vehicles) would not be modeled in a facility-wide modeling analysis for a minor source. The current background concentration for NO₂ in Boise is 40 $\mu\text{g}/\text{m}^3$. Therefore, DEQ modelers have determined that this project has demonstrated compliance with all applicable regulations.

Electronic copies of the modeling analysis are saved on disk. Dustin Holloway reviewed this modeling memo to ensure consistency with the permit and Technical Memorandum.

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