



**Statement of Basis**

**Air Quality Construction Permit**

**The Department of Veterans Affairs**

**Hot Springs, South Dakota**

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## 1.0 Background

On January 25, 2010, the South Dakota Department of Environment and Natural Resources (DENR) issued a Title V air quality permit to the Department of Veterans Affairs for the operation of four boilers at the Hot Springs Medical Center in Hot Springs, South Dakota.

On March 4, 2013, DENR issued a modification to the Department of Veterans Affairs to incorporate an emergency generator operation into the current Title V permit.

On June 25, 2015, DENR received a construction application from the Department of Veterans Affairs to install an emergency generator. On August 18, 2015, the application was considered complete.

### 1.1 Existing Operations

Table 1.1 lists the equipment currently operated by the Department of Veterans Affairs listed in the existing Title V air quality permit issued March 4, 2013.

*Table 1.1 – Description of Permitted Units, Operations, and Processes*

Unit	Description	Maximum Operating Rate	Control Device
Unit #3	Boiler #3 - 1974 Nebraska boiler, water tube model, fired with distillate oil.	20.4 million Btus per hour heat input	Not Applicable
Unit #4	Boiler #4 - 2004 Hurst boiler fired with distillate oil.	7.5 million Btus per hour heat input	Not Applicable
Unit #5	Boiler #1 – 2008 Cleaver Brooks boiler, model CEW-101-500-150, fired on distillate oil	20.4 million Btus per hour heat input	Not Applicable
Unit #6	Boiler #2 -- 2011 Cleaver Brooks CEW-101-500-200ST 500 hp fired on distillate oil.	20.4 million Btus per hour heat input	Not Applicable
Unit #7	Emergency Generator #1, Gen-Dom- 1998 Generac 98A 032195 fired on distillate oil.	80 kilowatts 60 horsepower	Not Applicable
Unit #8	Emergency Generator #2, Gen-BP- 1997 Cummins Onan 230DFAB fired on distillate oil.	230 kilowatts 172 horsepower	Not Applicable
Unit #9	Emergency Generator #3, Gen-Hosp- 2001 Generac 1740510100 Type SD400 fired on distillate oil.	400 kilowatts 298 horsepower	Not Applicable

### 1.2 Proposed Revision

The Department of Veterans Affairs is proposing to construct and operate an emergency generator as part of the Police and Fire Department building. Table 1.2 summarizes the information for the emergency generator.

*Table 1.2 – Description of Proposed Units, Operations, and Processes*

Unit Description	Designed Maximum Operating Rate	Control Device
Emergency Generator #4, 2015 Cummins, Model # QSB7-G5NR3, fired on distillate oil, Tier III certified.	324 horsepower or 242 Kilowatts	Not Applicable

## 2.0 New Source Performance Standards

DENR reviewed the new source performance standards and determined the following may be applicable to the proposed boiler:

### 2.1 Standards for Compressions Ignition Internal Combustion Engines

The provisions under 40 CFR Part 60, Subpart IIII are applicable to owners and operators of stationary compression ignition internal combustion engines that meet one of the following:

1. Manufacturers of stationary compression ignition internal combustion engines with a displacement of less than 30 liters per cylinder where the model year is 2007 or later for engines that are not fire pump engines or model year 2008 or later for engines that are fire pump engines;
2. Owners or operators of stationary compression ignition internal combustion engines that commence construction after July 11, 2005 where the compression ignition internal combustion engines is manufactured after April 1, 2006 and is not a fire pump engine or manufactured as a certified National Fire Protection Association fire pump engine after July 1, 2006; or
3. Owners or operators of stationary compression ignition internal combustion engines that modified or reconstructed their stationary compression ignition internal combustion engines after July 11, 2005.

The emergency generator was constructed after April 1, 2006, is a compression ignition engine, and is not a fire pump engine. Therefore, the emergency generator is applicable to this subpart. The generator meets the following specifications:

1. Emergency generator;
2. Maximum rated capacity is less than 3,000 horsepower and 10 liters per cylinder
3. Fueled with diesel fuel (compression ignition);
4. Certified Tier III engine standards by the manufacturer.

The manufacturer's specification information submitted with the application state the diesel generator is EPA Tier III certified. The generator also has a displacement of 6.7 liters per cylinder and will be used for emergency use only and has no control device. The exhaust emission data from the generator is listed in Table 2.1, as well as a comparison of the emission limits required by Subpart IIII, which shows the generator is able to meet Subpart IIII emission requirements.

Table 2.1 – Generator Exhaust Emission Data Comparison (gram per kilowatt-hour)

Pollutant	Source Emission Data	NSPS Emission Limit	In Compliance
HC+NOx	4.0	4.0	Yes
CO	1.0	3.5	Yes
PM	0.11	0.2	Yes

### 2.2 Standards for Spark Ignition Internal Combustion Engines

The provisions under 40 CFR Part 60, Subpart JJJJ are applicable to owners and operators of stationary spark ignition internal combustion engines that commence construction after June 12,

2006, where the stationary spark ignition internal combustion engines are manufactured:

1. On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 horsepower (except lean burn engines with a maximum engine power greater than or equal to 500 horsepower and less than 1,350 horsepower);
2. On or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 horsepower and less than 1,350 horsepower;
3. On or after July 1, 2008, for engines with a maximum engine power less than 500 horsepower;
4. On or after January 1, 2009, for emergency engines with a maximum engine power greater than 19 kilowatts (25 horsepower); or
5. Owners and operators of stationary spark ignition internal combustion engines that commence modification or reconstruction after June 12, 2006.

The emergency generator is a compression ignition engine. Therefore, this subpart is not applicable to the emergency generator.

### **2.3 Other Applicable New Source Performance Standards**

DENR reviewed the other New Source Performance Standards and determined that there are no other standards applicable to the proposed construction.

### **3.0 New Source Review**

ARSD 74:36:10:01 notes that new source review regulations apply to areas of the state which are designated as nonattainment pursuant to the Clean Air Act for any pollutant regulated under the Clean Air Act. The Department of Veterans Affairs operates in Hot Springs, South Dakota, which is in attainment for all the pollutants regulated under the Clean Air Act. Therefore, the proposed construction is not subject to new source review.

### **4.0 Prevention of Significant Deterioration**

A Prevention of Significant Deterioration review applies to new major stationary sources and major modifications to existing major stationary sources in areas designated as attainment under Section 107 of the Clean Air Act for any regulated air pollutant. The following is a list of regulated air pollutants under the Prevention of Significant Deterioration program:

1. Total suspended particulate (PM);
2. Particulate with a diameter less than or equal to 10 microns (PM<sub>10</sub>);
3. Particulate with a diameter less than or equal to 2.5 microns (PM<sub>2.5</sub>);
4. Sulfur dioxide (SO<sub>2</sub>);
5. Nitrogen oxides (NO<sub>x</sub>);
6. Carbon monoxide (CO);
7. Ozone – measured as volatile organic compounds (VOC);
8. Lead;
9. Fluorides
10. Sulfuric acid mist;

11. Hydrogen sulfide;
12. Reduced sulfur compounds;
13. Total reduced sulfur; and
14. Greenhouse gases (carbon dioxide, methane, nitrous oxide, etc.).

If the source is considered one of the 28 named Prevention of Significant Deterioration program source categories listed in Section 169 of the federal Clean Air Act, the major source threshold is 100 tons per year of any regulated air pollutant, except for greenhouse gases. The major source threshold for all other sources is 250 tons per year of any regulated air pollutant, except for greenhouse gases.

On June 23, 2014, the Supreme Court of the United States issued a ruling that the EPA could not require facilities to obtain a Prevention of Significant Deterioration program permit based solely on greenhouse gas emissions. The Supreme Court of the United States ruling states that in order for a Prevention of Significant Deterioration program evaluation for greenhouse gas to occur, a facility must trigger one of the major source thresholds for another regulated pollutant before a greenhouse gas emission can be considered under the Prevention of Significant Deterioration permitting program. This ruling applies to both new Prevention of Significant Deterioration program sources as well as major source modifications.

#### 4.1 Potential Emissions

DENR uses stack test results to determine air emissions whenever stack test data is available from the source or a similar source. When stack test results are not available, DENR relies on manufacturing data, material balance, EPA’s Compilation of Air Pollutant Emission Factors (AP-42, Fifth Edition, Volume 1) document, the applicant’s application, or other methods to determine potential air emissions.

Potential emissions for each applicable pollutant are calculated from the maximum design capacity listed in the application and assuming the unit operates 500 hours per year since the operation is an emergency generator, while using the fuel that will emit the greatest emissions. Potential emissions are not realistic of the actual emissions and are used only to identify which air quality permit and the requirements the Department of Veteran Affairs is required to meet.

##### 4.1.1 Potential Emissions – Emergency Generator

The Department of Veteran Affairs is proposing to install one emergency generator. The emergency generator produces emissions from the burning of fuel. Table 4.1 displays the emission factors as derived from the Compilation of Air Pollutant Emission Factors (AP-42, Fifth Edition, Volume 1, Chapter 3, Section 3.3 (Engines < 600 horsepower).

**Table 4.1 Fuel Emissions Factor for Generators**

	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	CO	VOC
<b>Diesel Fuel – Engine &lt; 600 hp (lb/MMBtu)</b>	0.31 <sup>1</sup>	0.31 <sup>1</sup>	0.31 <sup>1</sup>	0.29	4.41	.95	0.35

<sup>1</sup>– All of the particulate emitted is assumed to be less than 0.1 microns in diameter. Therefore, the emission factor for PM10, PM2.5 is equivalent to TSP.

The application lists the emergency generator output in terms of horsepower (hp). DENR converted this unit’s output rating to an estimated heat input rating based on the following conversion factors of 3,413 Btus per hour per kilowatt, 0.746 kilowatts per horsepower,

1,000,000 Btus per MMBtus, and the generator efficiency from Table 4.2. The results are shown in Table 4.1.

**Equation 4-1 Generator Conversion**

$$\text{Input Capacity} \left[ \frac{\text{MMBtu}}{\text{hr}} \right] = \frac{\text{Output [Hp]} \times .746 \left[ \frac{\text{Kilowatts}}{\text{hp}} \right] \times 3,413 \left[ \frac{\text{Btus}}{\text{Kilowatt}} \right]}{\text{Efficiency} \times 1,000,000 \left[ \frac{\text{Btus}}{\text{MMBtus}} \right]}$$

**Table 4.2 Engine Specifications**

Unit	Output Capacity (horsepower)	Efficiency	Heat input Capacity (MMBtu/hr)
<b>Unit #10 – Generator #4, Police and Fire Station</b>	324	35%	2.36

The application states that the generator is used for emergency use only. Therefore, emergency electrical generators' potential emissions will be based on the unit operating 500 hours per year instead of operating 8,760 hours per year.

Equation 4-2 calculates the generators' potential emissions of each pollutant based on the capacities (heat input), the listed emission factor, and 500 operating hours per year.

**Equation 4-2 Generator Potential Emissions**

$$\text{Potential} \left[ \frac{\text{tons}}{\text{year}} \right] = \frac{\text{input capacity} \left[ \frac{\text{MMBtu}}{\text{hour}} \right] \times \text{emission factor} \left[ \frac{\text{lbs}}{\text{MMBtu}} \right] \times 500 \left[ \frac{\text{hours}}{\text{year}} \right]}{2,000 \left[ \frac{\text{lbs}}{\text{ton}} \right]}$$

Using Equation 4-2, DENR calculated the potential emissions for the generator. The emissions for the existing operations were provided in the statement of basis associated with the existing Title V air quality permit issued March 4, 2013. The results are shown in Table 4.3.

**Table 4.3 Potential Uncontrolled Emissions from Generators (tons/year)**

Unit	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	CO	VOC
<b>Existing Equipment</b>	6	6	6	17	52	13	1
<b>#10 – Generator #4</b>	0.2	0.2	0.2	0.2	2.6	0.59	0.2
<b>Total</b>	6	6	6	17	55	14	1

**4.2 Prevention of Significant Deterioration program Applicability**

The Department of Veteran Affairs is not one of the 28 named facilities; therefore its criteria pollutant threshold is 250 tons per year. Based on the emission estimates noted in Table 4.3, the Department of Veteran Affairs is considered a minor source for the criteria pollutants and not applicable to the Prevention of Significant Deterioration program. Therefore, the Department of Veteran Affairs is considered a minor source under the Prevention of Significant Deterioration program and is not subject to Prevention of Significant Deterioration program requirements. Since, the Department of Veteran Affairs does not require a Prevention of Significant Deterioration program permit; a review of the greenhouse gases will not be required.

## 5.0 National Emission Standards for Hazardous Air Pollutants

DENR reviewed the national emission standards for hazardous standards and determined that there were no applicable subparts.

## 6.0 Maximum Achievable Control Technology Standards

### 6.1 Potential HAP Emissions

The federal Maximum Achievable Control Technology Standards are applicable to both major and area sources of hazardous air pollutants. A major source of hazardous air pollutants is defined as having the potential to emit 10 tons or more per year of a single hazardous air pollutant or 25 tons per year or more of a combination of hazardous air pollutants. An area source is a source that is not a major source of hazardous air pollutants.

DENR uses stack test results to determine air emissions whenever stack test data is available from the source or a similar source. When stack test results are not available, DENR relies on manufacturing data, material balance, EPA's Compilation of Air Pollutant Emission Factors (AP-42, Fifth Edition, Volume 1) document, the applicant's application, or other methods to determine potential air emissions.

The potential for generators to emit hazardous air pollutants can be calculated using the same assumptions outlined in 4.1.1. The emission factor for diesel engines for hazardous air pollutants with maximum operating rates less than 600 horsepower is 0.0037 pounds per million Btus. The total potential emissions can be calculated using Equation 4-2. The emissions for the existing operations were provided in the statement of basis associated with the existing Title V air quality permit issued March 4, 2013. The result for the emergency generator is listed in Table 6.1.

*Table 6.1 – Potential HAPs Emissions for Generator (tons/year)*

Unit	HAPs
Existing Equipment	0.0
Unit #10 – Generator #4	0.0

Based on Table 6.1, the potential to emit is less than 10 tons of a single hazardous air pollutant, and has the potential to emit less than 25 tons of any combination of hazardous air pollutants. Therefore, the Department of Veteran Affairs' existing operations and addition of the emergency generator are considered an area source of hazardous air pollutants.

DENR reviewed the Maximum Achievable Control Technology standards under 40 CFR Part 63 and determined the following need to be reviewed further to determine if they are applicable.

### 6.2 Standards for Stationary Reciprocating Internal Combustion Engines

In accordance with 40 CFR Part 63 Subpart ZZZZ—National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines an affected source is any existing, new, or reconstructed stationary reciprocating internal combustion engines located at a major or area source of hazardous air pollutant emissions, excluding stationary reciprocating internal combustion engines being tested at a stationary reciprocating

internal combustion engines test cell/stand (40 CFR § 63.6585).

The generator was constructed after June 12, 2006, and is located at area source. Under section 40 CFR § 63.6585 (c) it states that a new or reconstructed stationary engine located at an area source must meet the requirements of this part by meeting the requirements of 40 CFR Part 60, Subpart IIII, for compression ignition engines or 40 CFR Part 60 Subpart JJJJ, for spark ignition engines. No further requirements apply for such engines under this part.

Therefore, the emergency generator is subject to Subpart ZZZZ, and must meet the requirements of this subpart by meeting the requirements of 40 CFR Part 60, subpart IIII, for compression ignition engines.

## **7.0 State Requirements**

Total suspended particulate and sulfur dioxide emission limits are applicable to fuel burning units. The Department of Veteran Affairs' operation involves fuel burning units. The total suspended particulate and sulfur dioxide emission limits for fuel burning units are derived from ARSD 74:36:06:02. In accordance with ARSD 74:36:06:01, a unit that is subject to a New Source Performance Standards that contains limits on particulate matter and/or sulfur dioxide is not applicable to the state's particulate matter and/or sulfur dioxide emission limits. The New Source Performance Standards the emergency generator is subject to does contain particulate matter and sulfur dioxide emission limits. Therefore, the state's particulate matter and sulfur dioxide emission limits are not applicable.

### **7.1 State Visible Emission Limit**

Visible emissions are applicable to any unit that discharges to the ambient air. In accordance with ARSD 74:36:12, a facility may not discharge into the ambient air more than 20 percent opacity for all units. The Department of Veteran Affairs must control the opacity at less than 20 percent for the emergency generator.

### **7.2 Title V Air Quality Operating Permit**

The Department of Veteran Affairs currently operates under a Title V air quality operating permit. The Department of Veteran Affairs is required to submit an application to modify its Title V air quality operating permit within 12 months of the initial startup of the emergency generator to incorporate the requirements in the air quality construction permit into the facility's existing Title V air quality operating permit.

## **8.0 Recommendation**

In accordance with ARSD 74:36:20:02, the owner or operator may not modify its existing source until a construction permit has been issued, unless it meets the requirements under ARSD 74:36:20:02.01. The Department of Veteran Affairs is required to obtain an air quality construction permit for the installation of the emergency generator. The Department of Veteran Affairs will be required to construct and operate within the requirements stipulated in the following regulations:

1. ARSD 74:36:07 – New Source Performance Standards;
2. ARSD 74:36:08 – National Emission Standards for Hazardous Air Pollutants;
3. ARSD 74:36:11 – Performance Testing;
4. ARSD 74:36:12 – Control of Visible Emissions; and
5. ARSD 74:36:20 – Construction Permits for New Sources or Modifications.

Based on the information in the air quality construction permit application, DENR recommends conditional approval of an air quality construction permit for the installation of an emergency generator at the Department of Veteran Affairs in Hot Springs, South Dakota. Questions regarding this permit review should be directed to Earl Berg, Engineer I.