



Statement of Basis

Air Quality Construction Permit

Polaris Industries Inc.

Spearfish, South Dakota

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1.0 Background

On September 22, 2015, the South Dakota Department of Environment and Natural Resources (DENR) received an air quality construction permit from Polaris Industries Inc. (Polaris) in Spearfish to utilize an acquired location. Polaris will paint motorcycle components auto bodies in spray booths. The primary standard industrial classification (SIC) code for the facility is 3751 – motorcycles, bicycles, and parts.

1.1 Equipment

Table 1.1 provides a list of the equipment at Polaris’ location that may require an air quality permit.

Table 1.1: Potential Permitted Units

Unit	Description	Maximum Operating Rate	Control Device
#1	2004 Tecor Incorporated spray booth; air-atomized prime booth. Natural Gas-fired heater.	1.0 Million Btus per hour	Panel Filters
#2	2007 Tecor Incorporated spray booth; air-atomized HD Large Booth. Natural Gas-fired heater.	1.84 Million Btus per hour	Panel Filters
#3	2007 Tecor Incorporated spray booth; air-atomized HD Small Booth. Natural Gas-fired heater.	1.30 Million Btus per hour	Panel Filters
#4	2004 Tecor Incorporated spray booth; air-atomized LTI booth. Natural Gas-fired heater.	1.30 Million Btus per hour	Panel Filters

1.2 Insignificant Activities

Polaris has the following additional equipment described in Table 1.2.

Table 1.2: Insignificant Activities

Unit	Description	Maximum Operating Rate	Control Device
#5	NorAm Booth Heater, Natural Gas-fired.	1.50 Million Btus per hour	Not Applicable
#6	Building Space Heater #1, Natural Gas-fired.	0.4 Million Btus per hour	Not Applicable
#7	Building Space Heater #2, Natural Gas-fired.	0.4 Million Btus per hour	Not Applicable
#8	Building Space Heater #3, Natural Gas-fired.	0.4 Million Btus per hour	Not Applicable
#9	Building Space Heater #4, Natural Gas-fired.	0.4 Million Btus per hour	Not Applicable
#10	Air Conditioning Unit #1	-	Not Applicable

#11	Air Conditioning Unit #2	-	Not Applicable
#12	Air Conditioning Unit #3	-	Not Applicable
#13	Parts Washer	-	Not Applicable

2.0 New Source Performance Standards

DENR reviewed the federal new source performance standards and determined there are currently no standards applicable.

3.0 New Source Review (NSR)

ARSD 74:36:10:01 states that New Source Review (NSR) 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. Polaris is located in Spearfish, South Dakota, which is in attainment or unclassifiable for all the pollutants regulated under the Clean Air Act. Therefore, Polaris is not subject to NSR review.

4.0 Prevention of Significant Deterioration

A prevention of significant deterioration (PSD) 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 pollutant. The following is a list of regulated air pollutants under the PSD program:

1. Total suspended particulate (PM);
2. Particulate with a diameter less than or equal to 10 microns (PM₁₀);
3. Particulate matter with a diameter less than or equal to 2.5 microns (PM_{2.5});
4. Sulfur dioxide (SO₂);
5. Nitrogen oxides (NO_x);
6. Carbon monoxide (CO);
7. Ozone – measured as volatile organic compounds (VOCs);
8. Lead;
9. Fluorides;
10. Sulfuric acid mist;
11. Hydrogen sulfide;
12. Reduced sulfur compounds; and
13. Total reduced sulfur

If the source is considered one of the 28 named PSD 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. The major source threshold for all other sources is 250 tons per year of any regulated air pollutant.

On June 24, 2014, the US Supreme Court ruled that greenhouse gases (carbon dioxide, methane, nitrous oxide, etc.) may not be regulated under the PSD program unless the facility requires a PSD permit for a regulated air pollutant.

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 assume the unit operates every hour of every day of the year, 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 type of air quality operating permit and potential regulations Polaris may be required to meet.

4.1.1 Potential Emissions from Paint Booths

The emission factors were derived from the material safety data sheets for the products used in the spray booth. The potential emission rate will be estimated from the amount of products listed in the application and the amount of time the spray booth is operated. Polaris stated in its application that the hours the spray booths would operate would be approximately 16 hours per day, 240 days per year (3,840 hours per year). Potential emissions are calculated assuming that the facility operates 24 hours per day, 365 days per year (8,760 hours per year). The potential emissions for the spray booth will be calculated by using the multiplying factor derived in Equation 4-1.

Equation 4-1: Multiplying Factors for Spray Booth Operation

$$\text{Operating Ratio} = \frac{8,760 \text{ potential operating hours per year}}{3,840 \text{ actual operating hours per year}} = 2.28$$

The ratio will be used to multiply the estimated product usage from Polaris’ application to adjust the estimated usage to represent 8,760 hours per year of operation.

Uncontrolled potential emissions are those that would occur with no air emission controls. There is no air pollution control equipment for volatile organic compounds associated with the spray booth operation. Therefore, the potential uncontrolled and controlled volatile organic compound emissions are equal. The potential volatile organic compound emissions from the spray booth will be based on the estimated amount of products submitted in the air quality construction permit application. Table 4.1 summarizes the product information that was in the application.

Table 4.1: Products Usage

Description	Estimated Usage (gallons per year)	Potential Usage ¹ (gallons per year)	VOC Content (pounds per gallon)
Black	8,145	18,570	4.54
Clearcoat	9,529	21,726	4.0
Ivory Cream	8,145	18,570	4.20
Activator	8,299	18,921	3.57
U-Primer	1,383	3,154	5.22
Vogue Silver	8,145	18,570	4.76
Willow Green	8,145	18,570	4.43

¹ Multiply the estimated usage by the multiplying ratio of 2.28.

Equation 4-2, the potential usage in Table 4.1, the products volatile organic compounds (VOC) content in Table 4.1, and a conversion factor of 2,000 pounds per ton were used to calculate the potential VOC emissions from the spray booth.

Equation 4-2 – Potential VOC Emissions

$$Potential\ VOC\ Emissions = \frac{Potential\ Usage\ \left(\frac{gallons}{year}\right) \times VOC\ Content\ \left(\frac{pounds}{gallon}\right)}{2,000\ \left(\frac{pounds}{ton}\right)}$$

Table 4.2 shows the potential volatile organic compounds emissions from the proposed paint booths.

Table 4.2 - Summary of Potential Uncontrolled Emissions (tons per year)

Description	VOC
Black	42.2
Clearcoat	43.5
Ivory Cream	39.0
Activator	33.8
U-Primer	8.2
Vogue Silver	44.2
Willow Green	41.1
Total	252

4.1.2 Potential Emissions from Heaters

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.

Table 4-2 contains emission factors for Natural Gas combustion from AP-42. This will be used to calculate potential emissions.

Table 4-2 Emission Factors for Natural Gas Combustion (Million Btus per hour)

Emission Factor	Pollutant						
	TSP	PM ₁₀	PM _{2.5}	SO ₂	NO _x	CO	VOC
	0.0075	0.0075	0.0075	0.0006	0.1	0.08	0.005

Potential emissions for each applicable pollutant are calculated from the maximum design capacity listed in the application and assuming the unit operates every hour of every day of the year, 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 requirements Polaris is required to meet.

Table 4-2 contains emission factors for Natural Gas combustion from AP-42. This will be used to calculate potential emissions.

Equation 4-3 Total potential emissions

$$\text{Potential Emissions} \left(\frac{\text{tons}}{\text{year}} \right) = \frac{\text{Heat Input} \left(\frac{\text{MMBtus}}{\text{hour}} \right) \times 8,760 \left(\frac{\text{hours}}{\text{year}} \right) \times \text{Emission Factor} \left(\frac{\text{pounds}}{\text{MMBtu}} \right)}{2,000 \left(\frac{\text{pounds}}{\text{year}} \right)}$$

The results of Equation 4-3 are summarized in Table 4-3. Additionally there is a comparison to the emission presently in order to ensure this addition does not require a change to the operational permit

Table 4-3 Potential Emissions (Tons per Year)

Units	TSP	PM ₁₀	PM _{2.5}	SO ₂	NO _x	CO	VOC
#1	0.01	0.01	0.01	0.001	0.2	0.2	0.01
#2	0.03	0.03	0.03	0.002	0.3	0.3	0.02
#3	0.02	0.02	0.02	0.001	0.2	0.2	0.01
#4	0.02	0.02	0.02	0.001	0.2	0.2	0.01
Total	0	0	0	0	1	1	0

4.2 Summary of Volatile Organic Carbon Emissions

Table 4.4 summarizes the potential VOC emissions for the facility.

Description	VOC
Paint Booths/Heaters	252
Total	252

4.3 PSD Summary

Polaris has the potential to emit greater than 250 tons per year of volatile organic compounds and may be considered a major source of under the Prevention of Significant Deterioration (PSD) program. However, Polaris has agreed to accept emission limits. The emission limits allow Polaris to emit less than 238 tons per year of volatile organic compounds. Therefore, considering the enforceable emission limit, Polaris is not applicable to PSD review. Since Polaris does not require a PSD permit for the criteria pollutants, greenhouse gases will not be reviewed.

5.0 National Emission Standards for Hazardous Air Pollutants

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

6.0 Maximum Achievable Control Technology Standards

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.

6.1 Potential HAP Emissions

The potential emissions are calculated assuming that the facility operates 24 hours a day, 365 days per year. Uncontrolled potential emissions are those that would occur with no emission controls. There is no pollution control equipment for hazardous air pollutants associated with the spray booth operations. Therefore, the potential uncontrolled and controlled hazardous air pollutants emissions are equal. The potential hazardous air pollutants emissions from the spray booth will be based on the estimated amount of products submitted in the air quality construction permit application.

6.1.1 HAP Emissions from Paint Booths

The emission factors were derived from the material safety data sheets for the products used in the spray booth. The potential emission rate will be estimated from the amount of products listed in the application and the amount of time the spray booth is operated. Polaris stated in its application that the hours the spray booth would operate would be approximately 16 hours per

day, 240 days per year (3,840 hours per year). Potential emissions are calculated assuming that the facility operates 24 hours per day, 365 days per year (8,760 hours per year). The potential emissions for the spray booth will be calculated by using the multiplying factor derived in Equation 4-1.

The ratio will be used to multiply the estimated product usage from Polaris' application to adjust the estimated usage to represent 8,760 hours per year of operation.

Uncontrolled potential emissions are those that would occur with no air emission controls. There is no air pollution control equipment for hazardous air pollutants associated with the spray booth operation. Therefore, the potential uncontrolled and controlled hazardous air pollutant emissions are equal. The hazardous air pollutant emissions from the spray booth will be based on the estimated amount of products submitted in the air quality construction permit application. Table 6.1 summarizes the product information that was in the application.

Table 6.1: Products Usage

Description	Estimated Usage (gallons per year)	Potential Usage¹ (gallons per year)	HAP Content (pounds per gallon)
Black	8,145	18,570	-
Clearcoat	9,529	21,726	-
Ivory Cream	8,145	18,570	-
Activator	8,299	18,921	0.0084
U-Primer	1,383	3,154	-
Vogue Silver	8,145	18,570	0.80
Willow Green	8,145	18,570	-

¹ Multiply the estimated usage by the multiplying ratio of 2.28

Equation 6-1, the potential usage in Table 6.1, the products hazardous air pollutant (HAP) content in Table 6.1, and a conversion factor of 2,000 pounds per ton were used to calculate the potential VOC emissions from the spray booth.

Equation 6-1 – Potential HAP Emissions

$$\text{Potential HAP Emissions} = \frac{\text{Potential Usage} \left(\frac{\text{gallons}}{\text{year}} \right) \times \text{HAP Content} \left(\frac{\text{pounds}}{\text{gallon}} \right)}{2,000 \left(\frac{\text{pounds}}{\text{ton}} \right)}$$

Table 6.2 summarizes the potential hazardous air pollutants emissions by the proposed construction.

Table 6.2 - Summary of Potential Uncontrolled Emissions from Paint Booths (tons per year)

Description	HAP
Black	-
Clearcoat	-

Ivory Cream	-
Activator	0.18
U-Primer	-
Vogue Silver	7.43
Willow Green	-
Total	8

6.1.2 HAP Emissions from Booth Heaters

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 emission factor, determined from EPA’s Compilation of Air Pollutant Emission Factors (AP-42, Fifth Edition, Volume 1) document is 0.0018 pounds per million Btus.

Equation 4-3, the heat rating, the products hazardous air pollutant (HAP) content, and a conversion factor of 2,000 pounds per ton were used to calculate the potential VOC emissions from the spray booth heaters. The results are shown below in Table 6.3.

Table 6.3 - Summary of Potential Uncontrolled Emissions from Booth Heaters (tons per year)

Unit	HAP
#1	0.0
#2	0.01
#3	0.01
#4	0.01
Total	0

6.1.3 Summary of HAPs Emissions

The summary of the HAPs emissions from the paint booths and the paint booth heaters are in Table 6.4.

Table 6.4 Summary of Total Uncontrolled Emissions (tons per year)

Description	HAP
Paint Booths/Heaters	8.0
Total	8

Based on Table 6.4, the potential emissions for hazardous air pollutants are less than 10 tons per year for any single HAP and less than 25 tons per year for a combination of HAPs. Therefore, Polaris is considered an area source of hazardous air pollutants.

6.2 MACT Standards

DENR reviewed the Maximum Achievable Control Technology (MACT) standards under 40 CFR Part 63 and determined the following may be applicable.

6.2.1 40 CFR Part 63 Subpart MMMM

The provisions of 40 CFR, Part 63, Subpart MMMM – National Emission Standards for Hazardous Air Pollutants, Surface Coating of Miscellaneous Metal Parts and Products are applicable to new, reconstructed, or existing affected sources that use 946 liters (250 gallons) per year or more, of coatings that contain hazardous air pollutants, that is a major source, is located at a major source, or is part of a major source of emissions of HAPs. A major source of HAP emissions is any stationary source that has the potential to emit any single HAP at a rate of 10 tons or more per year or any combination of HAP at a rate of 25 tons or more per year.

Polaris' potential hazardous air pollutant emissions make this facility an area source of hazardous air pollutants; therefore, Subpart MMMM is not applicable.

6.2.2 40 CFR Part 63 Subpart HHHHHH

DENR reviewed the national emission standards and determined that Polaris' spray booths may be applicable to 40 CFR Part 63, Subpart HHHHHH. This subpart is applicable to owners or operators of paint stripping operations, miscellaneous surface coating area sources and the spray application of coatings containing compounds of chromium (Cr) lead (Pb), manganese (Mn), nickel (Ni), or cadmium (Cd), to any part or product made of metal or plastic, or combinations of metal and plastic that are not motor vehicles or mobile equipment.

Polaris does not use spray coatings that contain compounds of chromium, lead, manganese, nickel, or cadmium. Therefore the proposed construction is not subject to this subpart.

6.3 Other MACT Standards

DENR reviewed the Maximum Achievable Control Technology (MACT) and determined there are no other applicable standards.

7.0 State Requirements

7.1 Permit Type

According to ARSD 74:36:05:03, a facility is required to obtain a Title V air quality operating permit if the source has the potential to emit more than 100 tons of a criteria pollutant (nitrogen oxide, volatile organic compounds, PM10, carbon monoxide, lead and ozone), has the potential to emit more than 10 tons of a single hazardous air pollutant, has the potential to emit more than 25 tons of any combination of a hazardous air pollutants, or is applicable to a New Source Performance Standard or a MACT standard. Based on the potential emissions for volatile

organic compounds, Polaris is considered a major source and meets the requirements for a Title V air quality permit.

South Dakota construction permit program uses the applicability thresholds for the Title V and Minor operating permit programs to determine if a construction permit is required and the timelines to submit an application for the operating permit. Polaris is required to obtain a construction permit and within 12 months of beginning operations submit an application for a Title V air quality operating permit.

The air quality construction permit will contain conditions that will limit actual emissions to less than or equal to 9.5 tons per 12-month rolling period of a single HAP and 23.8 tons per 12-month rolling period of any combination of HAPs. Polaris will be required to inventory the amount of sprayed material used on a monthly basis. The permit will contain conditions that require the actual HAP emissions be calculated on a monthly basis and submitted to the department on a quarterly basis to determine compliance with the HAP limits.

After compliance has been demonstrated for four consecutive quarters, the reporting requirement may be adjusted to an annual basis. The reporting frequency may revert back to quarterly reporting if there is sufficient data that indicates more frequent reporting is warranted.

7.2 Insignificant Activities

Polaris submitted a list of insignificant activities with the application to DENR. Polaris considers the following activities to be insignificant:

1. NorAm Booth Heater for Unit #1, Natural Gas-fired.
2. Building Space Heater for Unit #2, Natural Gas-fired.
3. Building Space Heater for Unit #3, Natural Gas-fired.
4. Building Space Heater for Unit #4, Natural Gas-fired.
5. Air Conditioning Unit #1
6. Air Conditioning Unit #2
7. Air Conditioning Unit #3
8. Parts Washer

A unit may not be considered an insignificant activity if a state or federal limit is applicable to the unit. If a unit is applicable to a federal standard such as a New Source Performance Standard, (Chapter 2.0) or a Maximum Achievable Technology Standard (Chapter 6.0), those units may not be considered insignificant activities. If a unit is applicable a state limit such as a limit to allow a facility to forgo a Title V permit or a Prevention of Significant Deterioration Permit which include the long term 12-month rolling facility limit, those units which contribute to the facility limit may not be considered insignificant activities.

However, a strict interpretation would require every system that emits very small amounts would need to be included in the permit. Since the limitation is based on tons per year, DENR includes those units that have the potential to emit 1 ton per year (0.5 tons will round to 1) or more in the permit.

The following units have the potential to emit 0 tons (emissions round to zero) per year and will not be included in the permit. Even though the units are not included in the permit, the emissions from the units still contribute to the facility 12-month rolling total limit:

1. NorAm Booth Heater for Unit #1, Natural Gas-fired.
2. Building Space Heater for Unit #2, Natural Gas-fired.
3. Building Space Heater for Unit #3, Natural Gas-fired.
4. Building Space Heater for Unit #4, Natural Gas-fired.
5. Air Conditioning Unit #1
6. Air Conditioning Unit #2
7. Air Conditioning Unit #3
8. Parts Washer

7.3 State Restrictions on Visible Emissions

Visible emissions are applicable to units that discharge into 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. Polaris must control the opacity at less than 20 percent for all units.

7.4 State Emission Limits

The state has total suspended particulate matter and sulfur dioxide limits for facilities required to obtain a Title V air quality permit. As part of the paint booths, the heaters are subject to the total suspended particulate matter and sulfur dioxide limits. The total suspended particulate matter and sulfur dioxide emission limits are derived from ARSD 74:36:06:02

According to ARSD 74:36:06:02, a fuel-burning unit with heat input values less than 10 million Btus per hour may not exceed 0.6 pounds of particulate matter per million Btus of heat input. The sulfur dioxide emission limit is 3.0 pounds per million Btus heat input.

Equation 7.1, the total suspended particulate (TSP) emissions from Table 4-3, and the heat rating for each heater were used to calculate the potential particulate matter and for the heaters.

Equation 7-1 –Emission Rate (pounds per million Btus)

$$Emission\ Rate_{TSP\ or\ SO_2} \left(\frac{pounds}{MMBtus} \right) = \frac{Emissions \left(\frac{tons}{year} \right) \times 2,000 \left(\frac{pounds}{ton} \right)}{8,760 \left(\frac{hours}{year} \right) \times Heat\ Input \left(\frac{MMBtus}{hour} \right)}$$

The comparison of the potential emission rate and state emission limit for particulate matter is listed in Table 7.1.

Table 7.1 – Total Suspended Particulate Limit Comparison (pounds per million Btus)

Unit	Potential Emission Rate	Emission Limit Rate
#1	0.002	0.6

#2	0.004	0.6
#3	0.004	0.6
#4	0.004	0.6

Equation 7.1, the sulfur dioxide (SO₂) emissions from Table 4.3, and the heat rating for each heater were used to calculate the potential sulfur dioxide emission rate for the heaters. The comparison of the potential emission rate and the state emission limit is listed in Table 7.2.

Table 7.2 – Sulfur Dioxide Limit Comparison (pounds per million Btus)

Unit	Potential Emission Rate	Emission Limit Rate
#1	0.0002	3.0
#2	0.0002	3.0
#3	0.0002	3.0
#4	0.0002	3.0

Based on the comparisons in Table 7.1 and 7.2, Polaris is capable of meeting the state’s particulate matter and sulfur dioxide allowable emission limits.

8.0 Recommendation

Based on the above findings, Polaris is required to obtain a construction permit for the increased utilization of the four paint booths. In addition, Polaris will be required to submit an application for a Title V air quality operating permit. Questions regarding this permit review should be directed to Samantha Elliott, Engineer I, Department of Environment and Natural Resources – Air Quality Program.