



**DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION**

**Permit Application Analysis
A0001323**

August 7, 2015

NAME OF FIRM: Cross H Ranch, Inc.

NAME OF PIT: Cross H Pit

LOCATION OF PIT: SE¹/₄SW¹/₄ of Section 18, T50N, R81W
Johnson County, Wyoming

TYPE OF OPERATION: Sand & Gravel Pit

RESPONSIBLE OFFICIAL: M. Wayne Nelson, President

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REVIEWING ENGINEER: Nick Meeker, Air Quality Engineer

1. PURPOSE OF APPLICATION

On July 17, 2015, the Division of Air Quality received an application from Cross H Ranch, Incorporated to modify the Cross H Pit by increasing the size of the pit from 57.42 acres to 78.33 acres and increasing the maximum annual production from 195,000 tons to 300,000 tons. The Cross H Pit will include sand and gravel crushing, screening, exposed acreage, stockpiling, haul activity, a hot mix asphalt plant and a concrete batch plant, located in the SE¹/₄SW¹/₄ of Section 18, T50N, R81W, approximately four (4) miles southeast of Buffalo, in Johnson County, Wyoming. The applicant estimates an annual production rate of 300,000 tons.

A facility location map is included in Appendix A.

2. REPORTED MINE INFORMATION

Annual Production Rate:	300,000 tons
Material Mined:	Sand & Gravel
Size of Pit:	78.33 acres
# of Blasts per Year:	0
Crushing and Screening Proposed:	Yes
Distance to Nearest Residence:	0.7 miles
Number of Residences within One (1) Mile Radius:	3
Distance Material Hauled Until Reaching Pavement:	2.25 miles
Proper Land Use Documentation Submitted:	Yes

3. PERMIT HISTORY

On March 20, 2014, Cross H Ranch Inc. was issued Air Quality Permit MD-12994 to modify the Cross H Pit by increasing the annual production of the pit and adding the authorization for a hot mix asphalt plant and concrete batch plant. The Cross H Pit included sand and gravel crushing, screening, exposed acreage, stockpiling, haul activity, a hot mix asphalt plant and a concrete batch plant. The applicant estimated an annual production rate of 195,000 tons.

On December 14, 2010, Cross H Ranch, Inc. was issued Air Quality Permit CT-11154 to establish the Cross H Pit, which included sand and gravel crushing, screening, wet screening, exposed acreage, stockpiling and haul activity. The applicant estimated an annual production rate of 50,000 tons. No hot mix asphalt plants or concrete batch plants were planned for this site.

4. ESTIMATED EMISSIONS

As stated previously in the analysis, Cross H Ranch, Inc. plans to locate and operate crushing/screening equipment, a hot mix asphalt plant and a concrete batch plant at the Cross H Pit. The Division issues separate valid air quality permits for any crushing/screening equipment, hot mix asphalt plants and concrete batch plants prior to locating/operating at the site. The estimated emissions of the following sources are listed below.

Pit Emissions - Cross H Pit

The pollutant of main concern at the Cross H Pit will be fugitive particulate matter (TSP and PM₁₀) emitted primarily from exposed acreage, stockpiling and haul truck activity. The Division estimated emissions based on EPA document, AP-42, Compilation of Emission Factors. Application of water during stockpiling operations is credited for fifty percent (50%) control efficiency. Table 1 lists the estimated emissions for exposed acreage and stockpiling based on a maximum production rate of 300,000 tpy of mined material, 300,000 tpy of stockpiled material and 14,850 tpy of topsoil. Exposed acreage is based on 27.75 acres. Table 2 lists emissions from haul road activities based on a haul road length of 4.5 miles (total miles to and from the pit). Emission calculations are detailed in Appendix B.

Table 1: Cross H Pit - Estimated Emissions, tpy ¹		
Source	TSP	PM ₁₀
Exposed Acreage	5.3	1.5
Truck Loading & Stockpiling	7.5	3.5
Total Emissions	12.8	5.0

¹ Emissions estimated to nearest 0.1.

Table 2: Haul Road Emissions, tpy ¹		
Source	TSP	PM ₁₀
Haul Road	117.1	28.2

¹ Emissions estimated to nearest 0.1.

Crushing/Screening Emissions

The pollutant of main concern during crushing/screening operations will be fugitive particulate matter. The Division estimated emissions based on EPA document, AP-42, Compilation of Emission Factors. Application of water during portable crushing/screening operations is credited for fifty percent (50%) control efficiency. Table 3 lists the estimated emissions for crushing/screening operations based on a maximum production rate of 300,000 tpy of mined material. Emission calculations are detailed in Appendix B.

Table 3: Crushing/Screening Emissions, tpy ¹		
Source	TSP	PM ₁₀
Crushing	0.4	0.2
Screening	1.9	0.7
Total Emissions	2.3	0.9

¹ Emissions estimated to nearest 0.1.

Hot Mix Asphalt Plant Emissions

The pollutants of main concern during hot mix asphalt plant operations will be fugitive particulate matter, nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC) and sulfur dioxide (SO₂). The Division averaged the emissions of hot mix asphalt plants from previous air quality permits issued from January 1, 2010 until July 1, 2011. Table 4 lists the average estimated emissions for a hot mix asphalt plant. Estimated emissions from a hot mix asphalt plant that may relocate to this site are listed in the associated air quality permit.

Table 4: Hot Mix Asphalt Plant Emissions, tpy ¹						
Source	TSP	PM ₁₀	NO _x	CO	VOC	SO ₂
Hot Mix Asphalt Plant	12.8	9.2	18.5	45.2	16.4	19.3

¹ Emissions estimated to nearest 0.1.

Concrete Batch Plant Emissions

The pollutants of main concern during concrete batch plant operations will be fugitive particulate matter. The Division averaged the emissions of concrete batch plants from previous air quality permits issued from January 1, 2010 until July 1, 2011. Table 5 lists the average estimated emissions for a concrete batch plant. Estimated emissions from a concrete batch plant that may relocate to this site are listed in the associated air quality permit.

Table 5: Concrete Batch Plant Emissions, tpy ¹		
Source	TSP	PM ₁₀
Concrete Batch Plant	5.9	1.7

¹ Emissions estimated to nearest 0.1.

Generator Emissions

The power source for the crushing/screening equipment, hot mix asphalt plant and concrete batch may include line power or generator power. Not all crushing/screening equipment, hot mix asphalt plants and concrete batch plants require the use of generator power. The major pollutants emitted from the generator include NO_x with some carbon CO from incomplete combustion. The Division averaged the emissions of generators used in conjunction with crushing/screening equipment, hot mix asphalt plants and concrete batch plants from previous air quality permits issued from January 1, 2010 until July 1, 2011. Many different generators were used in determining the average estimated emissions. Table 6 lists the average estimated emissions for generators used in conjunction with crushing/screening equipment, hot mix asphalt plants and concrete batch plants. Estimated emissions from generator(s) that may relocate to this site are listed in the associated air quality permit.

Table 6: Generator Emissions, tpy ¹					
Source	NO _x	CO	VOC	SO ₂	PM ₁₀
Generator(s)	17.5	5.5	0.8	0.6	0.8

¹Emissions estimated to nearest 0.1.

5. BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

The Division considers the use of two (2) applications of chemical dust suppressant to be applied annually in accordance with the manufacturer’s recommendations on the work areas, disturbed areas, stockpiles, access roads and haul roads to represent BACT for this type of operation.

The Division considers limiting the maximum production rate at the pit as BACT for this type of operation since it is the basis for the emission estimates in the Division’s analysis and it will limit the potential-to-emit (PTE) emissions at the pit. Therefore, any crushing/screening equipment operating at this pit will be limited to the maximum production rate. If multiple crushers/screens operate at this pit during a calendar year, the total amount of material crushed/screened shall not exceed this limit.

The Division considers areas within the pit boundary that are subject to wind erosion as disturbed areas and reclamation areas. BACT for the treatment and stabilization practices of the disturbed areas and reclamation areas may consist of ripping or chiseling to create a roughened surface, seeding with a temporary vegetative cover or other practices which effectively stabilize against wind erosion. Localized areas identified for equipment storage/staging, work areas and required buffers for haul roads and reclamation are not required to be stabilized. These practices are also required BACT for coal mines.

6. CHAPTER 6, SECTION 3 APPLICABILITY

The Cross H Pit is not a “major source” as defined by Chapter 6, Section 3 of the Wyoming Air Quality Standards and Regulations (WAQSR). Therefore, further analysis is not required under this section.

7. PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

The Cross H Pit is not a “major emitting facility” as defined by Chapter 6, Section 4 of the Wyoming Air Quality Standards and Regulations. Therefore, further analysis is not required under this section.

8. AMBIENT AIR QUALITY

The Division generally does not require modeling or monitoring for rock pits or multiple pits in an area. In previous permitting actions, the Division has modeled large surface coal mines with production rates in the millions of tons per year and the results have demonstrated compliance with particulate matter (PM₁₀ and PM_{2.5}) and nitrogen dioxide (NO₂) annual ambient standards, which are health based standards. Primary ambient air quality standards set limits to protect public health, including the health of “sensitive” populations such as asthmatics, children, and the elderly.

Emission estimates for pits range from 10 tpy to 200 tpy particulate matter depending on the operational activity at the pit. In comparison, a coal mine that produces 40 million tpy (MM tpy) of coal annually has estimated particulate emissions in the range of 1,500 tpy. The large surface coal mines in the Powder River Basin (PRB) are adjacent and the emissions from all mines in the modeling domain are considered in the modeling analysis, which can total 7,000 tpy particulate matter and 5,000 tpy NO_x. As discussed, large surface coal mines in the PRB have demonstrated compliance with Wyoming Air Quality Standards and Regulations health-based standards through modeling and/or monitoring.

Based on this experience, the Division concludes the cumulative impact from properly controlled pits, as required through the application of BACT, will not result in an exceedance of air quality standards.

9. GOVERNOR’S SAGE GROUSE EXECUTIVE ORDER 2011-5

Cross H Ranch, Inc. received a letter from the Wyoming Game and Fish Department dated March 18, 2015, stating that there are no terrestrial wildlife concerns with the expansion of the Cross H Pit.

10. COUNTY ZONING

Cross H Ranch, Inc. submitted a letter to the Division from Johnson County Commissioners dated September 17, 2002, stating that Johnson County has no zoning laws or building permit requirements. Since this application is a modification to the existing Cross H Pit, an updated letter from Johnson County Commissioners is not required.

11. PROPOSED PERMIT CONDITIONS

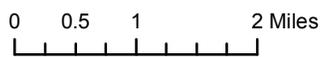
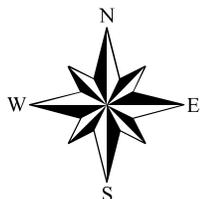
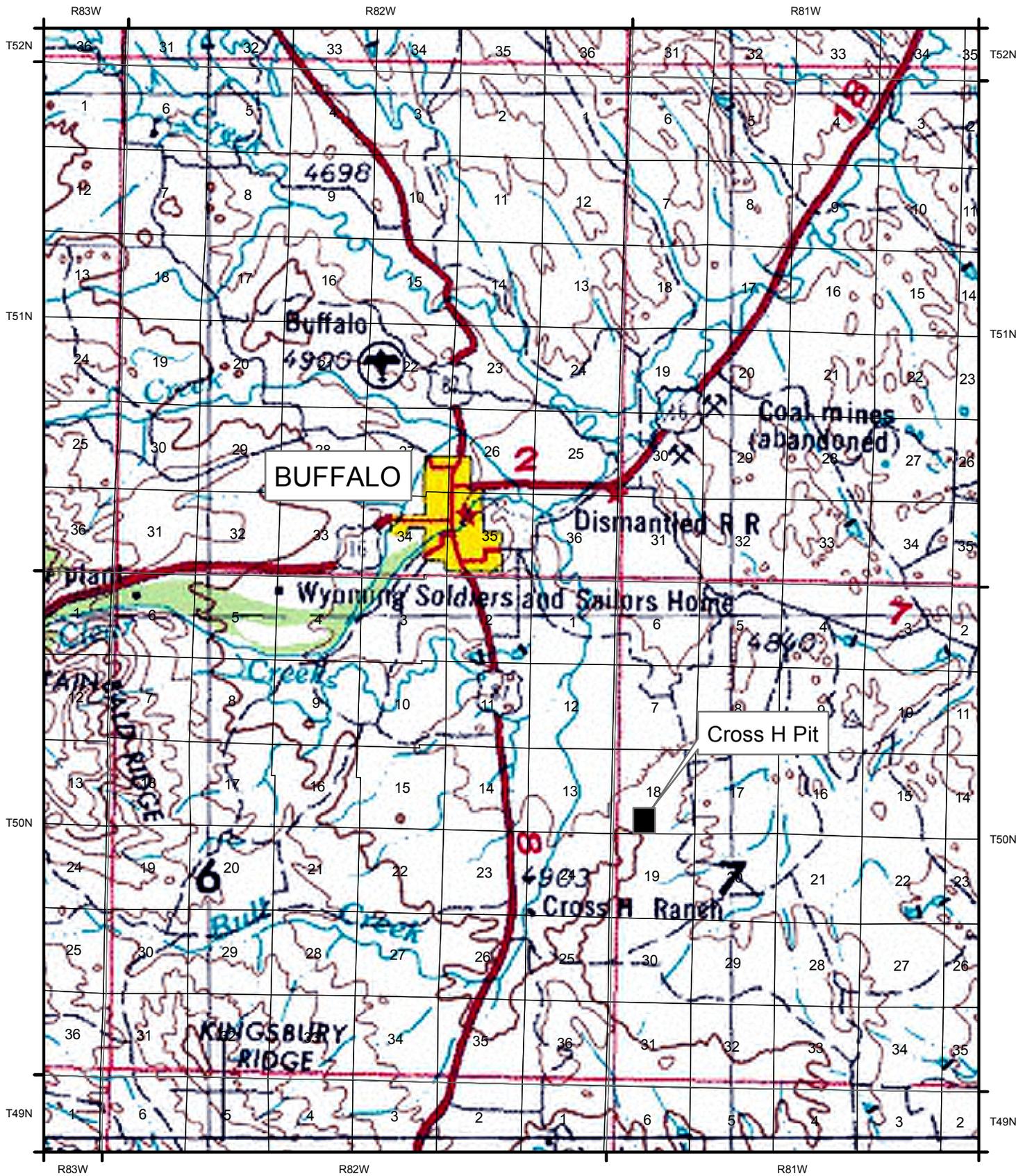
The Division is proposing to issue an Air Quality Permit to Cross H Ranch, Inc. to modify the Cross H Pit subject to the following conditions:

1. That authorized representatives of the Division of Air Quality be given permission to enter and inspect any property, premise or place on or at which an air pollution source is located or is being constructed or installed for the purpose of investigating actual or potential sources of air pollution and for determining compliance or non-compliance with any rules, standards, permits or orders.
2. That all substantive commitments and descriptions set forth in the application for this permit, unless superseded by a specific condition of this permit, are incorporated herein by this reference and are enforceable as conditions of this permit.

3. That all notifications, reports and correspondences associated with this permit shall be submitted to the Stationary Source Compliance Program Manager, Air Quality Division, 122 West 25th Street, Cheyenne, WY 82002 and a copy shall be submitted to the District Engineer, Air Quality Division, 2100 West 5th Street, Sheridan, WY 82801. Submissions may also be done electronically through <https://airimpact.wyo.gov> to satisfy requirements of this permit.
4. The owner or operator shall furnish the Administrator written notification of: (i) the anticipated date of initial startup not more than sixty (60) days or less than thirty (30) days prior to such date, and; (ii) the actual date of initial start-up within fifteen (15) days after such date in accordance with Chapter 6, Section 2(i) of the WAQSR.
5. That the date of commencement of construction shall be reported to the Administrator within thirty (30) days of commencement. In accordance with Chapter 6, Section 2(h) of the WAQSR, approval to construct or modify shall become invalid if construction is not commenced within twenty-four (24) months after receipt of such approval or if construction is discontinued for a period of twenty-four (24) months or more. The Administrator may extend the period based on satisfactory justification of the requested extension.
6. Any crushing/screening equipment, hot mix asphalt plants and concrete batch plants shall have separate valid air quality permit(s) prior to locating/operating at this site.
7. The amount of material crushed or hauled from the pit shall not exceed 300,000 tons per year. Records shall be kept for a period of five (5) years to demonstrate compliance with this condition and shall be made available to the Division upon request.
8. Cross H Ranch, Inc. shall stabilize the exposed areas against wind erosion at the mine. Newly disturbed areas shall be treated within sixty (60) days of completion of stripping unless otherwise approved by the Division. Reclamation areas shall be stabilized against wind erosion within sixty (60) days of reaching the approved post mining topography, unless otherwise approved by the Division. Stabilization practices may consist of ripping or chiseling to create a roughened surface, seeding with a temporary vegetative cover or other practices which effectively stabilize against wind erosion. Localized areas identified for equipment storage/staging, work areas and required buffers for haul roads and reclamation are not required to be stabilized.
9. That all work areas and stockpiles shall be treated with water and/or chemical dust suppressants on a schedule sufficient to control fugitive dust. At a minimum, two (2) applications of chemical dust suppressant shall be applied annually to all work areas in accordance with the manufacturer's recommendations. The chemical dust suppressant shall be maintained continuously to the extent that it remains a viable control measure, which may require additional applications. All work areas shall receive an initial treatment of chemical dust suppressant prior to any activities at the beginning of each construction season.
10. All unpaved haul roads shall be treated with water and/or chemical dust suppressants on a schedule sufficient to control fugitive dust from vehicular traffic and wind erosion. At a minimum, two (2) applications of chemical dust suppressant shall be applied annually in accordance with the manufacturer's recommendations. The chemical dust suppressant shall be maintained continuously to the extent that it remains a viable control measure, which may require additional applications. All unpaved portions of haul roads shall receive an initial treatment of chemical dust suppressant prior to any hauling activities at the beginning of each construction season.

11. Cross H Ranch, Inc. shall maintain a log book listing the dates, amount of dust suppressant applied, areas treated, water usage and operating hours of the water truck. The log shall be maintained on site for a period of at least five (5) years and shall be made available to the Division upon request.
12. Effective upon permit issuance, this permit shall supersede Air Quality Permit MD-12994 for the Cross H Pit.

APPENDIX A
Facility Location Map



Cross H Ranch, Inc.
Cross H Pit
SE¼SW¼ of Section 18, T50N, R81W
Johnson County, Wyoming



APPENDIX B

Emission Estimates

CRUSHING EMISSIONS:

Based on 300,000 tpy production rate, TSP and PM₁₀ emissions associated with crushing operations were estimated as follows:

Crushing: 0.0054 lb/ton TSP, 0.0024 lb/ton PM₁₀
AP-42 Table 11.19.2-2 8/04

$$\text{TSP Emissions} = \frac{300,000 \frac{\text{ton}}{\text{year}} \times 0.0054 \frac{\text{lb}}{\text{ton}} \times (1 - 0.50)}{2,000 \frac{\text{lb}}{\text{ton}}} = 0.41 \frac{\text{ton}}{\text{year}} \text{ (50\% control)}$$

$$\text{PM}_{10} \text{ Emissions} = \frac{300,000 \frac{\text{ton}}{\text{year}} \times 0.0024 \frac{\text{lb}}{\text{ton}} \times (1 - 0.50)}{2,000 \frac{\text{lb}}{\text{ton}}} = 0.18 \frac{\text{ton}}{\text{year}} \text{ (50\% control)}$$

SCREENING EMISSIONS:

Based on 300,000 tpy maximum production rate, TSP and PM₁₀ emissions associated with screening operations were estimated as follows:

Screening: 0.025 lb/ton TSP, 0.0087 lb/ton PM₁₀
AP-42 Table 11.19.2-2 8/04

$$\text{TSP Emissions} = \frac{300,000 \frac{\text{ton}}{\text{year}} \times 0.025 \frac{\text{lb}}{\text{ton}} \times (1 - 0.50)}{2,000 \frac{\text{lb}}{\text{ton}}} = 1.88 \frac{\text{ton}}{\text{year}} \text{ (50\% control)}$$

$$\text{PM}_{10} \text{ Emissions} = \frac{300,000 \frac{\text{ton}}{\text{year}} \times 0.0087 \frac{\text{lb}}{\text{ton}} \times (1 - 0.50)}{2,000 \frac{\text{lb}}{\text{ton}}} = 0.65 \frac{\text{ton}}{\text{year}} \text{ (50\% control)}$$

EXPOSED ACREAGE:

Based on 27.75 acres exposed to wind erosion annually, TSP and PM₁₀ emissions were estimated as follows:

Exposed Acreage: TSP: 0.38 tons/acre/year, PM₁₀: 0.11 tons/acre/year
AP-42 Table 11.9-4, PM₁₀ = TSP x 0.3

$$\text{TSP Emissions} = 27.75 \text{ acres} \times 0.38 \text{ tons/acre/year} \times (1 - 0.50) = 5.27 \text{ tpy (50\% control)}$$

$$\text{PM}_{10} \text{ Emissions} = 27.75 \text{ acres} \times 0.11 \text{ tons/acre/year} \times (1 - 0.50) = 8.83 \text{ tpy (50\% control)}$$

TRUCK LOADING AND STOCKPILING EMISSIONS:

Based on 300,000 tpy of mined material, 300,000 tpy of stockpiled material and 14,850 tpy of topsoil, TSP and PM₁₀ emissions associated with stockpiling operations were estimated as follows, using AP-42 13.2.4 Equation 1:

$$E = k(0.0032) \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

Where:

k=particle size multiplier

U=average wind speed, mph

M=material moisture content, %

TSP:

k=0.74

U= 9.7 mph (average wind speed for Buffalo, WY)

M=0.7%

$$E = 0.74(0.0032) \frac{\left(\frac{9.7}{5}\right)^{1.3}}{\left(\frac{0.7}{2}\right)^{1.4}} = 0.0244 \frac{lb}{ton}$$

$$\text{TSP Emissions} = \frac{614,850 \frac{ton}{yr} \times 0.0244 \frac{lb}{ton} \times (1 - 0.50)}{2,000 \frac{lb}{ton}} = 3.75 \frac{ton}{year} \times 2 \frac{drops}{trip} = 7.50 \frac{ton}{year} \text{ (50\% control)}$$

PM₁₀:

k=0.35

U= 9.7 mph (average wind speed for Buffalo, WY)

M=0.7%

$$E = 0.35(0.0032) \frac{\left(\frac{9.7}{5}\right)^{1.3}}{\left(\frac{0.7}{2}\right)^{1.4}} = 0.0115 \frac{lb}{ton}$$

$$\text{PM}_{10} \text{ Emissions} = \frac{614,850 \frac{ton}{year} \times 0.0115 \frac{lb}{ton} \times (1 - 0.50)}{2,000 \frac{lb}{ton}} = 1.77 \frac{ton}{year} \times 2 \frac{drops}{trip} = 3.54 \frac{ton}{year} \text{ (50\% control)}$$

HAUL ROAD ACTIVITY EMISSIONS:

Fugitive TSP and PM₁₀ emissions per Vehicle Mile Traveled (VMT) associated with haul roads are estimated using AP-42 Chapter 13.2.2, equation (1a) as follows:

$$E = k \left(\frac{s}{12} \right)^a \left(\frac{W}{3} \right)^b$$

Where:

k=empirical constant
s=surface material silt content, %
a=empirical constant
W=mean vehicular weight
b=empirical constant

TSP:

k=4.9
s=8.3
a=0.7
W=37.5 tons
b=0.45

$$E = 4.9 \left(\frac{8.3}{12} \right)^{0.7} \left(\frac{37.5}{3} \right)^{0.45} = 11.80 \frac{lb}{VMT}$$

$$\text{Amount of trips per year} = 300,000 \frac{ton}{year} \times \frac{1 \text{ trip}}{34 \text{ ton}} = 8,824 \frac{trip}{year}$$

$$\text{TSP Emissions} = 8,824 \frac{trip}{year} \times 4.5 \frac{mile}{trip} \times 11.80 \frac{lb}{VMT} \times \frac{ton}{2,000lb} \times (1 - 0.50) = 117.14 \frac{ton}{year} \text{ (50\% control)}$$

PM₁₀:

k=1.5
s=8.3
a=0.9
W=37.5 tons
b=0.45

$$E = 1.5 \left(\frac{8.3}{12} \right)^{0.9} \left(\frac{37.5}{3} \right)^{0.45} = 3.35 \frac{lb}{VMT}$$

$$\text{Amount of trips per year} = 300,000 \frac{ton}{year} \times \frac{1 \text{ trip}}{34 \text{ ton}} = 8,824 \frac{trip}{year}$$

$$\text{PM}_{10} \text{ Emissions} = 8,824 \frac{trip}{year} \times 4.5 \frac{mile}{trip} \times 3.35 \frac{lb}{VMT} \times \frac{ton}{2,000lb} \times (1 - 0.50) = 28.19 \frac{ton}{year} \text{ (50\% control)}$$