ArchCoal

David Kline
Environmental Engineer
307-464-2383
dkline@archcoal.com

August 13, 2015

Administrator, Division of Air Quality
Department of Environmental Quality
Herschler Building
122 W 25th Street
Cheyenne, WY 82002

RECEIVED
AUG 13 2015
AIR QUALITY DIVISION

**RE: Notice of Publication – Permit Application A0000611**

Dear Steven A. Dietrich

Black Thunder Mine would like to address changes needed within the Permit Application A0000611. Listed below please find our proposed changes to the Permit Application A0000611:

1. **Section 3.4 Disturbed Acreage (page 8)**

Section 3 of Black Thunder's Air Quality Permit Application, includes an in-depth discussion of the constituents making up Table 3-2 of the proposed permit. The table provides an estimate of the potential open acres that could be prone to wind erosion. This table also provides an estimate of the number of acres that were stabilized in each category based on actual data. It is important to understand that under normal circumstances not all the potential open acres are prone to wind erosion as represented by the acres shown as "actual open acres". The first sentence of the last paragraph in section 3.4 should state that the amount of open acreage utilized for the modeling was the Total Actual Open Acres from the current year quantity.

2. **Section 5.0 Table 5-1 (page 10)**

Section 5 Table 5-1 of the Black Thunder Mine's Air Quality Permit Application states that the four Top-Off System Dust Collectors produce zero emissions. This system is not a baghouse but an enclosed dust collector that controls displacement air from the silos as they are filled and the dust is returned to the silo or onto the conveyor. The systems are completely enclosed with no exhaust to the atmosphere.

Thunder Basin Coal Co., LLC.
Black Thunder Mine
P.O. Box 406
Wright, WY 82732
Office: 307-464-2300

ArchCoal

David Kline
Environmental Engineer
307-464-2383
dkline@archcoal.com

Please replace the following pages in the submitted permit applications with the enclosed pages for the additional model runs without the control efficiencies for the open acres, justifying the removal of condition 24. **The following 3 sets of information, was sent out via FedEx on 13August2015.**

1. Page 6 – Table 3-1 (Life-of-Mine Parameters), replace Page 6
2. Page 31 – Table 5-2 (Annual $PM_{10}$ Emission Summary (tpy)), replaces Page 31
3. Page 37 – Last Paragraph of text and Table 7-1 (Annual $PM_{10}$ Modeling Results), replaces Page 37
4. Map 10 – 2018 Area Source Locations and $PM_{10}$ Modeling Results, replaces Map 10
5. Map 11 – 2023 Area Source Locations and $PM_{10}$ Modeling Results, replaces Map 11
6. Appendix 2 – Black Thunder $PM_{10}$ and $PM_{2.5}$ Emission Inventory, replace the first 4 spreadsheet pages. The remaining 2 spreadsheet pages in original Appendix 2 (entitled Black Thunder PM10 Model Source Emission Calculations) are unchanged.
7. Appendix 8 – pm10 Emission Apportioning, replace the first four spreadsheet pages in Appendix 8. The remaining 8 spreadsheets pages in original Appendix 8 are unchanged.
8. Also enclosed is a new CD containing the revised modeling files, apportioning tables, maps and modeling results.

8. **Section 11.0 (page 47) Permit Condition 27**

Black Thunder Mine is currently submitting data generated by the $NO_2$ monitoring network on a voluntary basis. We will continue to submit this data on a quarterly basis. Please remove mention of $NO_2$ monitoring as a requirement in permit condition 27.

If you have any questions in regards to the proposed changes to the Permit Application A0000611, please contacted me at your earliest convenience at (307) 464-2383 or e-mail me at dkline@archcoal.com.

Sincerely,

David Kline
Environmental Engineer
cc : Air Quality Permit Application to Modify the Black Thunder Mine – February 2015 (3 Ring Binder)

Thunder Basin Coal Co., LLC.
Black Thunder Mine
P.O. Box 406
Wright, WY 82732
Office: 307-464-2300

3. **Section 5.0 Table 5-2 (page 11)**

Boiler #1 Baghouse has been listed twice with varying rates. Could you please adjust the second "Boiler #1 Baghouse" to read "Boiler #2 Baghouse".

Coal Top-off Baghouse listings also have numeric duplications. Please label as "Coal Top-off Baghouse" 1 through 4.

4. **Section 8.1.1 (page 12)**

In the second paragraph down there is what appears to be a small typographical error. The last sentence of the paragraph reads "If a compliance demonstration is greater than ten percent (10%) opacity or greater then Thunder Basin...". Please remove the second ***or greater than*** in this sentence.

5. **Section 10.4.5 (page 37)**

In accordance with Black Thunder Mine's Air Quality Permit Application, the background $NO_2$ concentration used in the permit modeling was 14 μg/m$^3$. Please change the background $NO_2$ in this section to 14 μg/m$^3$.

6. **Section 11.0 (page 44) Permit Condition 13,14,15,16,17, and 18**

Several of the proposed permits conditions, mention Black Thunder Mine conducting control effectiveness demonstrations on each truck dump. It would be more accurate to describe the control equipment as the "truck dump stilling shed." Please revise this description in all of the permit conditions shown above.

7. **Section 11.0 (page 47) Permit Condition 24**

We would like to request that condition 24 be removed from the draft permit. Additional model runs were completed to show that the receptors around the LNCM still show compliance utilizing no controls for open acres. The results of these model runs are shown below. The receptors with the highest concentrations remain the same as in the original model runs and the concentration at the receptors increase only slightly:

Year 2018 high concentration (at receptor 19):

43.3 ug/m3 in the application

43.6 ug/m3 now, with no ripped acres

Year 2023 high concentration (at receptor 271):

45.6 ug/m3 in the application

45.8 ug/m3 now, with no ripped acres

ArchCoal

RECEIVED
AUG 17 2015
AIR QUALITY DIVISION

David Kline
Environmental Engineer
307-464-2383
dkline@archcoal.com

August 13, 2015

Administrator, Division of Air Quality
Department of Environmental Quality
Herschler Building
122 W 25th Street
Cheyenne, WY 82002

**RE: Notice of Publication – Permit Application A0000611**

Dear Steven A. Dietrich

Black Thunder Mine would like to address changes needed within the Permit Application A0000611. Listed below please find our proposed changes to the Permit Application A0000611:

1. **Section 3.4 Disturbed Acreage (page 8)**

Section 3 of Black Thunder's Air Quality Permit Application, includes an in-depth discussion of the constituents making up Table 3-2 of the proposed permit. The table provides an estimate of the potential open acres that could be prone to wind erosion. This table also provides an estimate of the number of acres that were stabilized in each category based on actual data. It is important to understand that under normal circumstances not all the potential open acres are prone to wind erosion as represented by the acres shown as "actual open acres". The first sentence of the last paragraph in section 3.4 should state that the amount of open acreage utilized for the modeling was the Total Actual Open Acres from the current year quantity.

2. **Section 5.0 Table 5-1 (page 10)**

Section 5 Table 5-1 of the Black Thunder Mine's Air Quality Permit Application states that the four Top-Off System Dust Collectors produce zero emissions. This system is not a baghouse but an enclosed dust collector that controls displacement air from the silos as they are filled and the dust is returned to the silo or onto the conveyor. The systems are completely enclosed with no exhaust to the atmosphere.

Thunder Basin Coal Co., LLC.
Black Thunder Mine
P.O. Box 406
Wright, WY 82732
Office: 307-464-2300

3. **Section 5.0 Table 5-2 (page 11)**

Boiler #1 Baghouse has been listed twice with varying rates. Could you please adjust the second "Boiler #1 Baghouse" to read "Boiler #2 Baghouse".

Coal Top-off Baghouse listings also have numeric duplications. Please label as "Coal Top-off Baghouse" 1 through 4.

4. **Section 8.1.1 (page 12)**

In the second paragraph down there is what appears to be a small typographical error. The last sentence of the paragraph reads "If a compliance demonstration is greater than ten percent (10%) opacity or greater then Thunder Basin…". Please remove the second ***or greater than*** in this sentence.

5. **Section 10.4.5 (page 37)**

In accordance with Black Thunder Mine's Air Quality Permit Application, the background $NO_2$ concentration used in the permit modeling was 14 $\mu g/m^3$. Please change the background $NO_2$ in this section to 14 $\mu g/m^3$.

6. **Section 11.0 (page 44) Permit Condition 13,14,15,16,17, and 18**

Several of the proposed permits conditions, mention Black Thunder Mine conducting control effectiveness demonstrations on each truck dump. It would be more accurate to describe the control equipment as the "truck dump stilling shed." Please revise this description in all of the permit conditions shown above.

7. **Section 11.0 (page 47) Permit Condition 24**

We would like to request that condition 24 be removed from the draft permit. Additional model runs were completed to show that the receptors around the LNCM still show compliance utilizing no controls for open acres. The results of these model runs are shown below. The receptors with the highest concentrations remain the same as in the original model runs and the concentration at the receptors increase only slightly:

Year 2018 high concentration (at receptor 19):

43.3 ug/m3 in the application

43.6 ug/m3 now, with no ripped acres

Year 2023 high concentration (at receptor 271):

45.6 ug/m3 in the application

45.8 ug/m3 now, with no ripped acres

ArchCoal

David Kline
Environmental Engineer
307-464-2383
dkline@archcoal.com

Please replace the following pages in the submitted permit applications with the enclosed pages for the additional model runs without the control efficiencies for the open acres, justifying the removal of condition 24.

1. Page 6 – Table 3-1 (Life-of-Mine Parameters), replace Page 6
2. Page 31 – Table 5-2 (Annual $PM_{10}$ Emission Summary (tpy)), replaces Page 31
3. Page 37 – Last Paragraph of text and Table 7-1 (Annual $PM_{10}$ Modeling Results), replaces Page 37
4. Map 10 – 2018 Area Source Locations and $PM_{10}$ Modeling Results, replaces Map 10
5. Map 11 – 2023 Area Source Locations and $PM_{10}$ Modeling Results, replaces Map 11
6. Appendix 2 – Black Thunder $PM_{10}$ and $PM_{2.5}$ Emission Inventory, replace the first 4 spreadsheet pages. The remaining 2 spreadsheet pages in original Appendix 2 (entitled Black Thunder PM10 Model Source Emission Calculations) are unchanged.
7. Appendix 8 – pm10 Emission Apportioning, replace the first four spreadsheet pages in Appendix 8. The remaining 8 spreadsheets pages in original Appendix 8 are unchanged.
8. Also enclosed is a new CD containing the revised modeling files, apportioning tables, maps and modeling results.

**8. <u>Section 11.0 (page 47) Permit Condition 27</u>**

Black Thunder Mine is currently submitting data generated by the $NO_2$ monitoring network on a voluntary basis. We will continue to submit this data on a quarterly basis. Please remove mention of $NO_2$ monitoring as a requirement in permit condition 27.

If you have any questions in regards to the proposed changes to the Permit Application A0000611, please contacted me at your earliest convenience at (307) 464-2383 or e-mail me at dkline@archcoal.com.

Sincerely,

David Kline
Environmental Engineer
cc : Air Quality Permit Application to Modify the Black Thunder Mine – February 2015 (3 Ring Binder)

Thunder Basin Coal Co., LLC.
Black Thunder Mine
P.O. Box 406
Wright, WY 82732
Office: 307-464-2300

Page Replacement Key for Revised Open Acre Calculations and Modeling for the
Air Quality Permit Application to Modify the Black Thunder Mine (originally submitted February 2015)
-Revisions Dated 8/11/15-

The 13 pages following this cover sheet are direct replacements to existing pages in the original (February 2015) application, as described below. The enclosed CD also replaces the disk contained with the February application.

- Page 6 Revised 8/11/15 replaces the original Page 6.

- Page 31 Revised 8/11/15 replaces the original Page 31.

- Page 37 Revised 8/11/15 replaces the original Page 37.

- Maps 10 and 11 Revised 8/11/15 replace the original Maps 10 and 11.

- Four spreadsheet pages with the footer "Appendix 2 Revised 8/11/15" replace the first four spreadsheet pages in Appendix 2. The remaining two spreadsheet pages in original Appendix 2 (entitled Black Thunder $PM_{10}$ Mobile Source Emission Calculations) are unchanged.

- Four spreadsheet pages with the footer "Appendix 8 Revised 8/11/15" replace the first four spreadsheet pages in Appendix 8. The remaining eight spreadsheet pages in original Appendix 8 are unchanged.

## Table 3-1
## Black Thunder Mine
## Life-of-Mine Parameters

| Year | Coal Tons | Coal Haul Truck | | Dragline OB | Shovel OB | OB Haul Truck | | Water Truck | | Drill Hrs | | Scraper Hrs | Grader Hrs | Tracked Dozer Hrs | Rubber Tire Dozer Hrs | | Wheeled Loader Hrs | | Number of Blasts | | Tons of ANFO Used | | Train Hrs | Open Acres |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | VMT | Hrs | $Yd^3$ | $Yd^3$ | VMT | Hrs | VMT | Hrs | Coal | OB | | | on OB | Coal | OB | Coal | OB | Coal | OB | Coal | OB | | |
| 2015 | 190,000,000 | 3,939,654 | 372,811 | 295,158,158 | 438,932,656 | 7,553,755 | 868,248 | 620,529 | 62,053 | 12,561 | 56,845 | 27,768 | 161,338 | 310,017 | 12,000 | 70,162 | 47,500 | 42,709 | 1,357 | 1,472 | 47,500 | 257,590 | 224,040 | 9,554 |
| 2016 | 190,000,000 | 4,299,812 | 414,209 | 283,783,554 | 447,699,776 | 7,707,339 | 885,901 | 650,055 | 65,005 | 12,888 | 56,007 | 27,768 | 169,014 | 314,631 | 12,000 | 69,324 | 47,500 | 41,631 | 1,357 | 1,447 | 47,500 | 253,163 | 225,285 | 10,146 |
| 2017 | 190,000,000 | 4,443,613 | 430,737 | 291,842,005 | 476,016,709 | 8,203,402 | 942,920 | 686,829 | 68,683 | 12,459 | 58,865 | 27,768 | 178,575 | 329,535 | 12,000 | 72,183 | 47,500 | 45,307 | 1,357 | 1,523 | 47,500 | 266,529 | 225,328 | 10,738 |
| 2018 | 190,000,000 | 4,715,616 | 462,002 | 270,501,112 | 476,273,216 | 8,207,896 | 943,436 | 702,719 | 70,272 | 13,570 | 57,720 | 27,768 | 182,707 | 329,670 | 12,000 | 71,037 | 47,500 | 43,834 | 1,357 | 1,488 | 47,500 | 260,362 | 227,027 | 11,125 |
| 2019 | 190,000,000 | 5,060,510 | 501,645 | 252,305,995 | 421,006,177 | 7,239,714 | 832,151 | 666,898 | 66,690 | 9,721 | 53,056 | 27,768 | 173,394 | 288,182 | 12,000 | 66,372 | 47,500 | 37,836 | 1,357 | 1,356 | 47,500 | 237,237 | 221,242 | 11,562 |
| 2020 | 190,000,000 | 5,246,270 | 522,997 | 252,944,464 | 456,125,004 | 7,854,935 | 902,866 | 712,932 | 71,293 | 8,192 | 55,460 | 27,768 | 185,362 | 294,266 | 12,000 | 68,777 | 47,500 | 40,928 | 1,357 | 1,406 | 47,500 | 246,125 | 214,465 | 11,999 |
| 2021 | 190,000,000 | 5,538,604 | 556,599 | 262,693,326 | 408,410,007 | 7,019,051 | 806,788 | 681,693 | 68,169 | 7,864 | 52,876 | 27,768 | 177,240 | 269,153 | 12,000 | 66,192 | 47,500 | 37,603 | 1,357 | 1,345 | 47,500 | 235,379 | 214,293 | 13,003 |
| 2022 | 190,000,000 | 5,656,720 | 570,175 | 270,430,112 | 430,694,865 | 7,409,443 | 851,660 | 710,918 | 71,092 | 7,646 | 55,014 | 27,768 | 184,839 | 280,882 | 12,000 | 68,330 | 47,500 | 40,353 | 1,357 | 1,393 | 47,500 | 243,836 | 214,393 | 13,428 |
| 2023 | 190,000,000 | 5,730,401 | 578,644 | 269,071,012 | 560,494,500 | 9,683,305 | 1,113,024 | 845,834 | 84,583 | 7,646 | 63,560 | 27,768 | 219,917 | 349,197 | 12,000 | 76,879 | 47,500 | 51,345 | 1,357 | 1,580 | 47,500 | 276,556 | 214,541 | 12,642 |
| 2024 | 190,000,000 | 4,567,616 | 444,991 | 202,890,957 | 515,252,181 | 8,890,739 | 1,021,924 | 733,457 | 73,346 | 7,427 | 54,043 | 27,768 | 190,699 | 325,385 | 12,000 | 67,360 | 47,500 | 40,008 | 1,357 | 1,337 | 47,500 | 233,964 | 216,782 | 11,710 |
| 2025 | 190,000,000 | 3,459,737 | 317,648 | 185,070,840 | 593,473,808 | 10,261,045 | 1,179,430 | 748,539 | 74,854 | 7,427 | 57,110 | 27,768 | 194,620 | 354,155 | 12,000 | 70,427 | 47,500 | 43,049 | 1,357 | 1,380 | 47,500 | 241,529 | 217,648 | 10,896 |
| 2026 | 190,000,000 | 1,497,672 | 114,764 | 293,599,851 | 336,862,994 | 5,765,673 | 662,721 | 388,743 | 38,874 | 6,335 | 48,108 | 27,768 | 101,073 | 219,096 | 12,000 | 61,422 | 47,500 | 31,676 | 1,357 | 1,165 | 47,500 | 203,820 | 224,112 | 11,115 |
| 2027 | 183,448,841 | 1,243,660 | 95,300 | 356,086,801 | 48,537,567 | 748,670 | 86,054 | 90,677 | 9,068 | 6,117 | 49,878 | 27,121 | 23,576 | 67,174 | 12,000 | 62,735 | 45,862 | 34,797 | 1,310 | 1,142 | 45,862 | 199,780 | 225,000 | 10,104 |
| 2028 | 148,091,317 | 1,076,428 | 82,485 | 303,852,210 | 217,286,524 | 3,634,194 | 417,724 | 250,104 | 25,010 | 5,789 | 39,558 | 23,629 | 65,027 | 155,058 | 12,000 | 49,936 | 37,023 | 27,181 | 1,058 | 581 | 37,023 | 101,745 | 225,000 | 8,982 |
| 2029 | 173,622,102 | 1,326,300 | 101,632 | 355,171,525 | 297,329,158 | 5,058,764 | 581,467 | 341,550 | 34,155 | 5,789 | 49,249 | 26,150 | 88,803 | 197,858 | 12,000 | 61,418 | 43,406 | 35,560 | 1,240 | 1,178 | 43,406 | 206,224 | 225,000 | 7,313 |
| 2030 | 190,000,000 | 1,324,468 | 101,492 | 326,108,231 | 356,320,800 | 6,106,540 | 701,901 | 401,696 | 40,170 | 3,932 | 51,855 | 27,768 | 104,441 | 229,337 | 12,000 | 65,171 | 47,500 | 36,291 | 1,357 | 1,247 | 47,500 | 218,260 | 225,000 | 5,678 |
| 2031 | 190,000,000 | 888,515 | 68,085 | 0 | 739,423,554 | 12,817,829 | 1,473,314 | 770,700 | 77,070 | 646 | 52,107 | 27,768 | 200,382 | 406,170 | 12,000 | 65,422 | 47,500 | 36,614 | 1,357 | 1,246 | 47,500 | 218,130 | 225,000 | 3,685 |

**Table 5-2**
**Black Thunder and Regional Mines**
**Annual $PM_{10}$ Emission Summary (tpy)**

| Year | Black Thunder | School Creek | NARM | Antelope | Total |
|---|---|---|---|---|---|
| 2015 | 6,375 | 1,051 | 3,645 | 2,153 | 13,224 |
| 2016 | 6,512 | 916 | 3,676 | 2,367 | 13,470 |
| 2017 | 6,817 | 992 | 3,674 | 2,519 | 14,002 |
| 2018 | 6,816 | 1,035 | 3,501 | 2,792 | 14,144 |
| 2019 | 6,475 | 1,081 | 3,703 | 2,716 | 13,976 |
| 2020 | 6,787 | 1,109 | 3,793 | 2,712 | 14,399 |
| 2021 | 6,657 | 1,252 | 3,858 | 2,757 | 14,525 |
| 2022 | 6,901 | 1,158 | 3,975 | 2,809 | 14,844 |
| 2023 | 7,722 | 1,134 | 3,471 | 2,802 | 15,129 |
| 2024 | 6,769 | 1,150 | 3,383 | 2,821 | 14,123 |
| 2025 | 6,881 | 1,123 | 3,314 | 2,781 | 14,100 |
| 2026 | 5,212 | 1,126 | 3,320 | 2,781 | 12,439 |
| 2027 | 3,438 | 1,096 | 3,366 | 2,780 | 10,679 |
| 2028 | 4,111 | 1,138 | 3,274 | 2,801 | 11,324 |
| 2029 | 4,869 | 833 | 3,632 | 2,827 | 12,161 |
| 2030 | 5,043 | | | 2,858 | 7,901 |
| 2031 | 5,864 | | | 1,656 | 7,520 |
| 2032 | | | | 760 | 760 |
| 2033 | | | | 341 | 341 |
| 2034 | | | | 347 | 347 |
| 2035 | | | | 226 | 226 |

## 7.0 $PM_{10}$ Modeling Analysis and Results

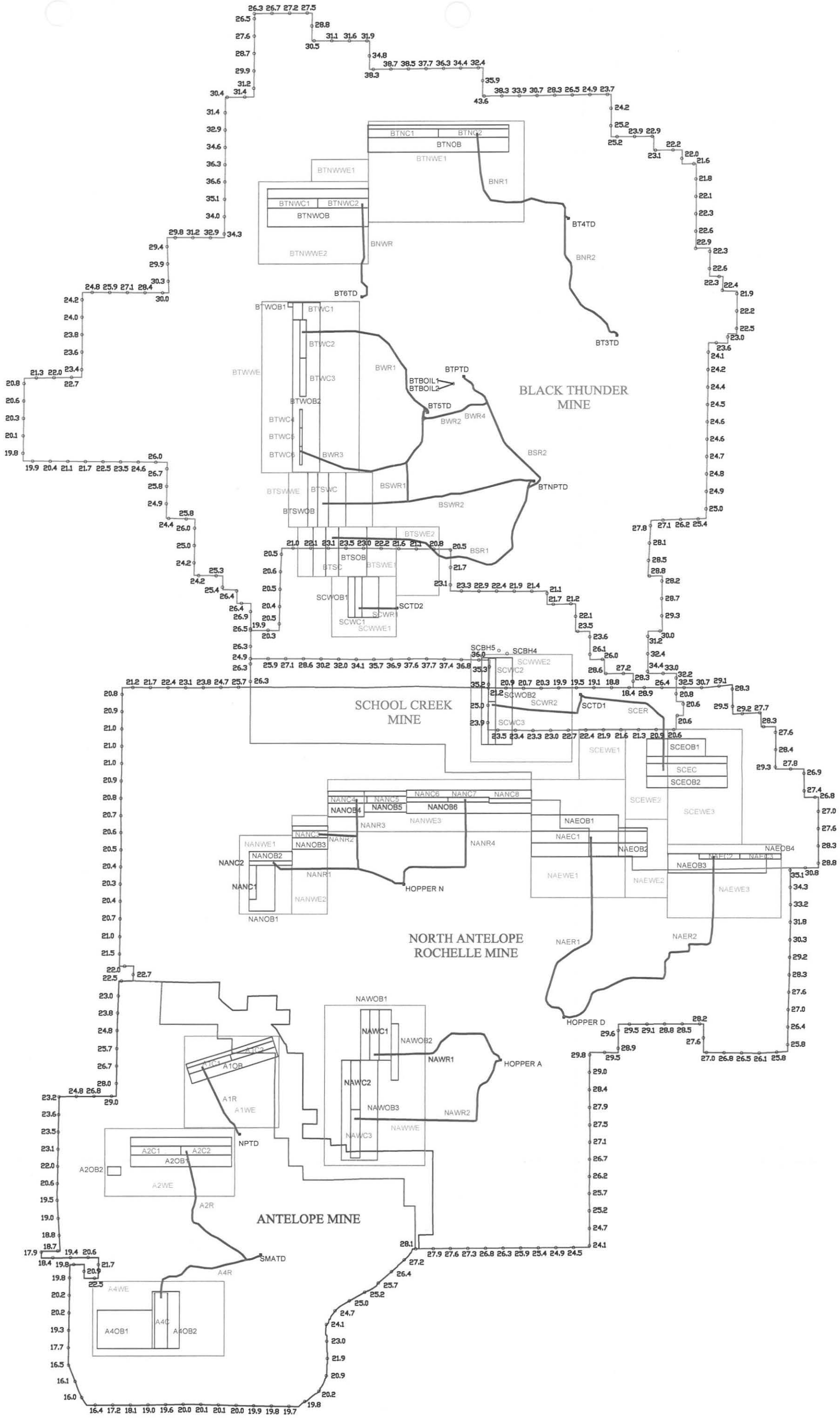
The area source, haul road, and point source $PM_{10}$ information for Black Thunder and other sources in the area were input into ISCLT3. The LNCM receptors and JFDs identified in Section 6.0 were also input to the model. The site-specific background concentration (see Section 6.7.1) of 11.2 $\mu g/m^3$ was added to the results from the model to obtain the total impact from the fugitive and point sources.

The maximum annual $PM_{10}$ modeling results for the worst-case years are summarized in Table 7-1. The receptor-specific $PM_{10}$ concentrations predicted by the model are included on the CD attached to this document. These concentrations are also displayed on Maps 10 and 11 for the two years.

From Table 7-1, the maximum cumulative concentration predicted in 2018 was 43.57 $\mu g/m^3$ (including 11.2 $\mu g/m^3$ background) and occurred at receptor 19 on the Black Thunder LNCM. The maximum concentration predicted in 2023 was 45.82 $\mu g/m^3$ and occurred at receptor 271 on the Black Thunder LNCM. A secondary high concentration predicted in 2023 of 45.75 $\mu g/m^3$ occurred at receptor 337 on Black Thunder's LNCM within School Creek.

**Table 7-1**
**Annual $PM_{10}$ Modeling Results**

| Year | Receptor | UTM Location X(m) | UTM Location Y(m) | Maximum Annual $PM_{10}$ Concentration, with Background | Black Thunder Contribution | Mine LNCM | Wyoming Standard ($\mu g/m^3$) |
|---|---|---|---|---|---|---|---|
| 2018 | 19 | 477398.49 | 4846662.99 | 43.57 $\mu g/m^3$ | 30.24 $\mu g/m^3$ | Black Thunder | 50 |
| 2023 | 271 | 468261.10 | 4841010.91 | 45.82 $\mu g/m^3$ | 30.70 $\mu g/m^3$ | Black Thunder | 50 |



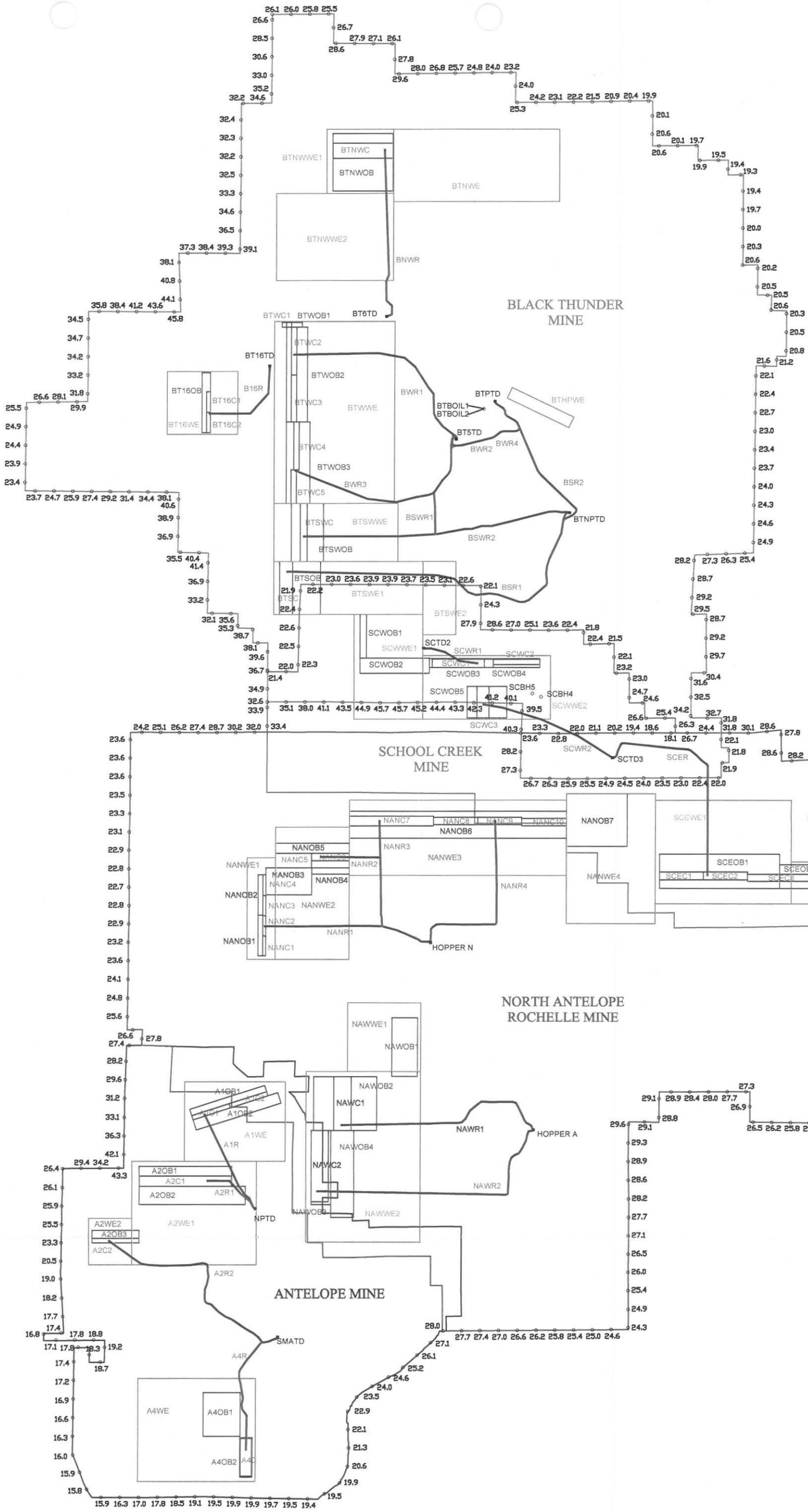

**McVEHIL-MONNETT ASSOCIATES, INC.**
*Air Quality ▪ Environmental Management*
44 Inverness Drive East, Building C
Englewood, CO 80112

# MAP 10
# 2018 AREA SOURCE LOCATIONS AND $PM_{10}$ MODELING RESULTS ($\mu g/m^3$)

PROJECT: 2622-13

DATE: Revised 8/11/15

- BLACK THUNDER MINE LNCM
- SCHOOL CREEK MINE LNCM
- NARM LNCM
- ANTELOPE MINE LNCM




**McVEHIL-MONNETT ASSOCIATES, INC.**
*Air Quality ▪ Environmental Management*
44 Inverness Drive East, Building C
Englewood, CO 80112

# MAP 11
# 2023 AREA SOURCE LOCATIONS AND $PM_{10}$ MODELING RESULTS (μg/m³)

PROJECT: 2622-13

DATE: Revised 8/11/15

- BLACK THUNDER MINE LNCM
- SCHOOL CREEK MINE LNCM
- NARM LNCM
- ANTELOPE MINE LNCM

**Black Thunder $PM_{10}$ Emission Calculations**

**North Pit**

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 38,352,223 | 44,076,597 | 43,036,317 | 50,551,300 | 27,399,678 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | $yd^3$/yr | 64,073,144 | 72,581,587 | 74,652,419 | 116,510,680 | 64,632,500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3$/yr | 68,828,929 | 67,280,639 | 69,391,173 | 63,899,223 | 39,787,169 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 5,605 | 6,442 | 6,290 | 7,388 | 4,004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 303 | 314 | 322 | 378 | 225 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 274 | 315 | 307 | 361 | 196 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 1,111,601 | 1,260,711 | 1,297,702 | 2,011,337 | 1,109,947 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 863,374 | 1,044,067 | 1,065,071 | 1,302,777 | 735,318 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 38,352,223 | 44,076,597 | 43,036,317 | 50,551,300 | 27,399,678 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 72,044 | 77,632 | 79,450 | 107,039 | 66,054 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | 18.6 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 9.626 lb/hr | hr/yr | 12,010 | 13,803 | 13,477 | 15,831 | 8,580 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 27,231 | 31,913 | 32,812 | 46,647 | 26,061 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 104,736 | 122,743 | 126,201 | 179,412 | 100,236 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 2,937 | 3,092 | 3,247 | 3,197 | 3,197 | 3,197 | 3,197 | 3,197 | 2,155 | 1,032 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Coal Removal[1] | 12.08 | 13.88 | 13.56 | 15.92 | 8.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 250.85 | 284.16 | 292.26 | 456.14 | 253.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 309.73 | 302.76 | 312.26 | 287.55 | 179.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 9.77 | 11.22 | 10.96 | 12.87 | 6.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 1.70 | 1.77 | 1.81 | 2.13 | 1.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 1.08 | 1.24 | 1.21 | 1.42 | 0.77 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 130.71 | 148.24 | 152.59 | 236.51 | 130.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 180.48 | 218.26 | 222.65 | 272.34 | 153.71 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 11.00 | 12.64 | 12.35 | 14.50 | 7.86 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 19.69 | 21.21 | 21.71 | 29.25 | 18.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 57.80 | 66.43 | 64.86 | 76.19 | 41.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 47.45 | 55.61 | 57.17 | 81.28 | 45.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 6.84 | 8.02 | 8.24 | 11.72 | 6.55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 220.30 | 231.92 | 243.55 | 239.80 | 239.80 | 239.80 | 239.80 | 239.80 | 161.61 | 77.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | **1259.48** | **1377.37** | **1415.19** | **1737.62** | **1092.92** | **239.80** | **239.80** | **239.80** | **161.61** | **77.41** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

**Northwest Pit**

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 43,604,929 | 39,348,198 | 43,533,736 | 38,744,823 | 46,493,528 | 56,557,923 | 54,373,213 | 55,642,602 | 46,212,509 | 36,314,508 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | $yd^3$/yr | 73,786,199 | 71,649,374 | 82,864,102 | 72,827,346 | 98,544,488 | 119,515,756 | 70,294,067 | 78,266,839 | 64,186,469 | 57,018,586 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3$/yr | 57,382,142 | 55,420,310 | 53,475,125 | 49,193,304 | 69,853,808 | 83,139,756 | 86,345,750 | 89,044,394 | 88,812,685 | 54,949,175 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 6,373 | 5,751 | 6,362 | 5,663 | 6,795 | 8,266 | 7,947 | 8,132 | 6,754 | 5,307 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 280 | 270 | 301 | 273 | 356 | 427 | 353 | 373 | 319 | 246 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 311 | 281 | 311 | 277 | 332 | 404 | 388 | 397 | 330 | 259 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 1,279,639 | 1,241,010 | 1,436,869 | 1,263,264 | 1,696,291 | 2,063,896 | 1,226,293 | 1,364,232 | 1,129,680 | 996,814 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 551,472 | 550,426 | 664,365 | 640,612 | 859,180 | 1,112,536 | 1,144,739 | 1,244,316 | 1,086,705 | 1,067,199 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 43,604,929 | 39,348,198 | 43,533,736 | 38,744,823 | 46,493,528 | 56,557,923 | 54,373,213 | 55,642,602 | 46,212,509 | 36,314,508 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 75,653 | 73,654 | 81,798 | 74,014 | 95,303 | 112,605 | 79,508 | 85,535 | 74,722 | 63,722 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | 18.6 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 9.626 lb/hr | hr/yr | 13,655 | 12,322 | 13,633 | 12,133 | 14,560 | 17,712 | 17,027 | 17,425 | 14,472 | 11,372 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 25,905 | 25,437 | 29,842 | 27,035 | 36,419 | 45,258 | 33,279 | 36,690 | 31,146 | 28,411 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 99,636 | 97,834 | 114,778 | 103,983 | 140,073 | 174,069 | 127,997 | 141,115 | 119,791 | 109,273 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 1,680 | 1,813 | 1,947 | 2,080 | 2,213 | 2,346 | 2,480 | 2,613 | 2,570 | 2,570 | 2,570 | 2,570 | 1,754 | 937 | 121 | 0 | 0 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Coal Removal[1] | 13.74 | 12.39 | 13.71 | 12.20 | 14.65 | 17.82 | 17.13 | 17.53 | 14.56 | 11.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 288.87 | 280.51 | 324.41 | 285.12 | 385.80 | 467.90 | 275.20 | 306.41 | 251.29 | 223.23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 258.22 | 249.39 | 240.64 | 221.37 | 314.34 | 374.13 | 388.56 | 400.70 | 399.66 | 247.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 11.10 | 10.02 | 11.09 | 9.87 | 11.84 | 14.40 | 13.85 | 14.17 | 11.77 | 9.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 1.58 | 1.52 | 1.70 | 1.54 | 2.00 | 2.40 | 1.99 | 2.10 | 1.79 | 1.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 1.23 | 1.11 | 1.22 | 1.09 | 1.31 | 1.59 | 1.53 | 1.56 | 1.30 | 1.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 150.47 | 145.93 | 168.96 | 148.54 | 199.46 | 242.69 | 144.20 | 160.42 | 132.84 | 117.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 115.28 | 115.06 | 138.88 | 133.92 | 179.61 | 232.57 | 239.30 | 260.12 | 227.17 | 223.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 12.51 | 11.29 | 12.49 | 11.11 | 13.34 | 16.23 | 15.60 | 15.96 | 13.26 | 10.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 20.67 | 20.13 | 22.35 | 20.23 | 26.04 | 30.77 | 21.73 | 23.37 | 20.42 | 17.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 65.72 | 59.30 | 65.61 | 58.39 | 70.07 | 85.24 | 81.95 | 83.86 | 69.65 | 54.73 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 45.14 | 44.32 | 52.00 | 47.11 | 63.46 | 78.86 | 57.99 | 63.93 | 54.27 | 49.51 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 6.51 | 6.39 | 7.50 | 6.79 | 9.15 | 11.37 | 8.36 | 9.22 | 7.83 | 7.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 126.00 | 136.00 | 145.99 | 155.99 | 165.99 | 175.99 | 185.98 | 195.98 | 192.76 | 192.76 | 192.76 | 192.76 | 131.53 | 70.31 | 9.08 | 0.00 | 0.00 |
| | **1117.03** | **1093.36** | **1206.55** | **1113.27** | **1457.06** | **1751.96** | **1453.35** | **1555.34** | **1398.55** | **1165.86** | **192.76** | **192.76** | **131.53** | **70.31** | **9.08** | **0.00** | **0.00** |

**West Pit**

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 57,785,815 | 50,800,795 | 54,051,842 | 51,397,668 | 60,785,745 | 71,323,818 | 67,244,730 | 68,974,926 | 66,604,309 | 69,746,350 | 62,017,866 | 1,118,889 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | $yd^3$/yr | 134,562,214 | 157,372,161 | 174,596,180 | 165,165,329 | 135,502,401 | 183,573,119 | 170,367,191 | 183,687,149 | 189,453,268 | 188,871,859 | 165,390,650 | 33,567 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3$/yr | 63,842,448 | 63,947,395 | 65,917,687 | 62,679,040 | 82,554,418 | 98,256,075 | 102,045,182 | 104,960,550 | 104,960,434 | 108,369,927 | 93,646,210 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 8,445 | 7,424 | 7,900 | 7,512 | 8,884 | 10,424 | 9,828 | 10,081 | 9,734 | 10,193 | 9,064 | 164 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 368 | 406 | 441 | 425 | 423 | 537 | 519 | 546 | 556 | 559 | 493 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 413 | 363 | 386 | 367 | 434 | 509 | 480 | 493 | 476 | 498 | 443 | 8 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 2,315,342 | 2,695,753 | 2,995,681 | 2,834,148 | 2,329,821 | 3,156,976 | 2,917,891 | 3,149,907 | 3,275,087 | 3,259,091 | 2,867,288 | 1,490 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 1,148,154 | 1,074,172 | 1,195,932 | 1,188,689 | 1,460,701 | 1,771,030 | 1,727,469 | 1,824,443 | 1,810,948 | 1,890,738 | 1,650,501 | 27,372 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 57,785,815 | 50,800,795 | 54,051,842 | 51,397,668 | 60,785,745 | 71,323,818 | 67,244,730 | 68,974,926 | 66,604,309 | 69,746,350 | 62,017,866 | 1,118,889 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 115,477 | 131,062 | 143,435 | 137,270 | 122,055 | 157,932 | 149,294 | 158,882 | 162,830 | 162,893 | 144,320 | 27 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | 18.6 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 9.626 lb/hr | hr/yr | 18,096 | 15,909 | 16,927 | 16,096 | 19,036 | 22,336 | 21,058 | 21,600 | 20,858 | 21,842 | 19,421 | 350 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 48,722 | 53,733 | 59,833 | 57,489 | 53,637 | 70,125 | 66,169 | 70,974 | 72,711 | 72,645 | 62,544 | 295 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 187,391 | 206,667 | 230,129 | 221,112 | 206,297 | 269,712 | 254,495 | 272,977 | 279,656 | 279,405 | 240,555 | 1,134 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 2,932 | 3,071 | 3,211 | 3,350 | 3,490 | 3,629 | 3,769 | 3,908 | 3,884 | 3,879 | 3,879 | 3,879 | 3,879 | 3,879 | 3,474 | 2,664 | 1,854 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Coal Removal[1] | 18.20 | 16.00 | 17.03 | 16.19 | 19.15 | 22.47 | 21.18 | 21.73 | 20.98 | 21.97 | 19.54 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 526.81 | 616.11 | 683.54 | 646.62 | 530.49 | 718.69 | 666.99 | 719.14 | 741.71 | 739.43 | 647.50 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 287.29 | 287.76 | 296.63 | 282.06 | 371.49 | 442.15 | 459.20 | 472.32 | 472.32 | 487.66 | 421.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 14.72 | 12.94 | 13.76 | 13.09 | 15.48 | 18.16 | 17.12 | 17.57 | 16.96 | 17.76 | 15.79 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 2.07 | 2.28 | 2.48 | 2.39 | 2.38 | 3.02 | 2.92 | 3.07 | 3.12 | 3.14 | 2.77 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 1.63 | 1.43 | 1.52 | 1.45 | 1.71 | 2.01 | 1.89 | 1.94 | 1.87 | 1.96 | 1.74 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 272.25 | 316.99 | 352.25 | 333.26 | 273.96 | 371.22 | 343.11 | 370.39 | 385.11 | 383.23 | 337.16 | 0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 240.01 | 224.55 | 250.00 | 248.49 | 305.35 | 370.22 | 361.12 | 381.39 | 378.57 | 395.25 | 345.03 | 5.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 16.58 | 14.57 | 15.51 | 14.74 | 17.44 | 20.46 | 19.29 | 19.79 | 19.11 | 20.01 | 17.79 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 31.56 | 35.81 | 39.20 | 37.51 | 33.35 | 43.16 | 40.80 | 43.42 | 44.50 | 44.51 | 39.44 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 87.09 | 76.57 | 81.47 | 77.46 | 91.61 | 107.50 | 101.35 | 103.96 | 100.38 | 105.12 | 93.47 | 1.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 84.90 | 93.63 | 104.26 | 100.17 | 93.46 | 122.19 | 115.30 | 123.67 | 126.70 | 126.58 | 108.98 | 0.51 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 12.24 | 13.50 | 15.03 | 14.44 | 13.48 | 17.62 | 16.63 | 17.83 | 18.27 | 18.25 | 15.71 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 219.89 | 230.35 | 240.81 | 251.28 | 261.74 | 272.20 | 282.66 | 293.13 | 291.29 | 290.91 | 290.91 | 290.91 | 290.91 | 290.91 | 260.54 | 199.81 | 139.07 |
| | **1815.23** | **1942.50** | **2113.49** | **2039.15** | **2031.09** | **2531.07** | **2449.55** | **2589.33** | **2620.89** | **2655.80** | **2357.25** | **300.21** | **290.91** | **290.91** | **260.54** | **199.81** | **139.07** |

**Southwest Pit**

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 18,090,549 | 23,451,572 | 20,381,880 | 23,191,152 | 23,375,091 | 21,324,178 | 24,078,189 | 25,756,732 | 25,261,410 | 31,699,728 | 31,103,228 | 10,130,526 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | $yd^3$/yr | 100,047,346 | 78,642,694 | 76,887,520 | 70,322,438 | 44,989,450 | 55,417,700 | 59,096,787 | 61,458,326 | 69,086,594 | 107,829,250 | 85,440,282 | 16,323,976 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3$/yr | 49,690,891 | 46,384,729 | 49,246,080 | 44,845,450 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 2,644 | 3,427 | 2,979 | 3,389 | 3,416 | 3,117 | 3,519 | 3,764 | 3,692 | 4,633 | 4,546 | 1,481 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 272 | 211 | 213 | 194 | 76 | 96 | 102 | 106 | 121 | 186 | 148 | 30 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 129 | 168 | 146 | 166 | 167 | 152 | 172 | 184 | 180 | 226 | 222 | 72 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 1,700,513 | 1,345,502 | 1,316,328 | 1,207,800 | 776,231 | 952,864 | 1,012,787 | 1,056,155 | 1,195,130 | 1,853,777 | 1,480,436 | 280,166 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 450,840 | 614,351 | 558,558 | 669,287 | 735,624 | 688,863 | 799,669 | 875,503 | 877,611 | 1,100,646 | 1,054,507 | 312,907 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 18,090,549 | 23,451,572 | 20,381,880 | 23,191,152 | 23,375,091 | 21,324,178 | 24,078,189 | 25,756,732 | 25,261,410 | 31,699,728 | 31,103,228 | 10,130,526 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 90,509 | 73,885 | 73,127 | 67,928 | 31,010 | 38,278 | 40,820 | 42,452 | 47,831 | 74,458 | 59,082 | 11,412 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | 18.6 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 9.626 lb/hr | hr/yr | 5,665 | 7,344 | 6,383 | 7,262 | 7,320 | 6,678 | 7,540 | 8,066 | 7,911 | 9,927 | 9,740 | 3,172 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 30,956 | 27,799 | 26,708 | 26,572 | 21,079 | 23,166 | 25,581 | 27,254 | 29,379 | 41,640 | 34,708 | 7,303 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 119,062 | 106,919 | 102,723 | 102,200 | 81,072 | 89,098 | 98,387 | 104,822 | 112,995 | 160,153 | 133,491 | 28,090 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 704 | 775 | 847 | 918 | 989 | 1,061 | 1,132 | 1,203 | 1,274 | 1,251 | 1,251 | 1,251 | 1,251 | 1,251 | 1,251 | 961 | 548 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Coal Removal[1] | 5.70 | 7.39 | 6.42 | 7.31 | 7.36 | 6.72 | 7.58 | 8.11 | 7.96 | 9.99 | 9.80 | 3.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 391.69 | 307.89 | 301.01 | 275.31 | 176.13 | 216.96 | 231.36 | 240.61 | 270.47 | 422.15 | 334.50 | 63.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 223.61 | 208.73 | 221.61 | 201.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 4.61 | 5.97 | 5.19 | 5.91 | 5.95 | 5.43 | 6.13 | 6.56 | 6.43 | 8.07 | 7.92 | 2.58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 1.53 | 1.19 | 1.20 | 1.09 | 0.43 | 0.54 | 0.57 | 0.60 | 0.68 | 1.05 | 0.83 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 0.51 | 0.66 | 0.57 | 0.65 | 0.66 | 0.60 | 0.68 | 0.72 | 0.71 | 0.89 | 0.87 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 199.96 | 158.21 | 154.78 | 142.02 | 91.27 | 112.04 | 119.09 | 124.19 | 140.53 | 217.98 | 174.08 | 32.94 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 94.25 | 128.43 | 116.76 | 139.91 | 153.78 | 144.00 | 167.17 | 183.02 | 183.46 | 230.08 | 220.44 | 65.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 5.19 | 6.73 | 5.85 | 6.65 | 6.71 | 6.12 | 6.91 | 7.39 | 7.25 | 9.09 | 8.92 | 2.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 24.73 | 20.19 | 19.98 | 18.56 | 8.47 | 10.46 | 11.15 | 11.60 | 13.07 | 20.35 | 16.14 | 3.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 27.27 | 35.35 | 30.72 | 34.95 | 35.23 | 32.14 | 36.29 | 38.82 | 38.07 | 47.78 | 46.88 | 15.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 53.94 | 48.44 | 46.54 | 46.30 | 36.73 | 40.37 | 44.57 | 47.49 | 51.19 | 72.56 | 60.48 | 12.73 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 7.78 | 6.98 | 6.71 | 6.68 | 5.30 | 5.82 | 6.43 | 6.85 | 7.38 | 10.46 | 8.72 | 1.84 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 52.80 | 58.15 | 63.50 | 68.85 | 74.19 | 79.54 | 84.89 | 90.24 | 95.58 | 93.86 | 93.86 | 93.86 | 93.86 | 93.86 | 93.86 | 72.09 | 41.07 |
| | **1093.55** | **994.30** | **980.85** | **956.00** | **602.22** | **660.74** | **722.83** | **766.19** | **822.79** | **1144.31** | **983.45** | **298.20** | **93.86** | **93.86** | **93.86** | **72.09** | **41.07** |

**Black Thunder $PM_{10}$ Emission Calculations (continued)**

**South Pit**

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | $0.003 * 0.70 * 0.3$ lb/ton | | 0.001 lb/ton | ton/yr | 32,166,483 | 32,322,838 | 28,996,224 | 26,115,057 | 31,945,958 | 40,794,080 | 44,303,868 | 39,625,741 | 40,616,385 | 2,644,678 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | $0.02 * 0.75 * 0.3$ lb/ton | | 0.0045 lb/ton | $yd^3/yr$ | 66,463,754 | 67,453,961 | 67,016,490 | 51,447,423 | 77,337,339 | 97,618,429 | 108,651,962 | 107,282,552 | 120,372,888 | 79,340 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | $0.04 * 0.75 * 0.3$ lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3/yr$ | 55,413,748 | 50,750,481 | 53,811,940 | 49,884,095 | 60,110,599 | 71,548,633 | 74,302,394 | 76,425,168 | 75,297,893 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | $32 * C * 0.3$ lb/hr | 50 | 6.970 lb/hr | hr/yr | 4,701 | 4,724 | 4,238 | 3,817 | 4,669 | 5,962 | 6,475 | 5,791 | 5,936 | 387 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | $50 * 0.75 * 0.3$ lb/blast | | 11.250 lb/blast | blasts/yr | 249 | 246 | 245 | 217 | 275 | 346 | 371 | 368 | 387 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | $35 * 0.75 * 0.3$ lb/blast | | 7.875 lb/blast | blasts/yr | 230 | 231 | 207 | 187 | 228 | 291 | 316 | 283 | 290 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 1,146,660 | 1,164,363 | 1,156,822 | 891,347 | 1,327,424 | 1,681,199 | 1,862,081 | 1,839,150 | 2,079,445 | 3,585 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 925,814 | 1,016,796 | 959,687 | 914,252 | 1,269,687 | 1,673,841 | 1,866,726 | 1,712,459 | 1,860,190 | 118,093 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | $0.017 * 0.75 * 0.3$ lb/ton | 85 | 0.004 lb/ton | ton/yr | 32,166,483 | 32,322,838 | 28,996,224 | 26,115,057 | 31,945,958 | 40,794,080 | 44,303,868 | 39,625,741 | 40,616,385 | 2,644,678 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | $1.0 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 0.547 lb/hr | hr/yr | 69,204 | 69,353 | 69,216 | 58,290 | 77,967 | 95,155 | 103,325 | 102,696 | 111,426 | 65 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | $18.6 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 9.626 lb/hr | hr/yr | 10,073 | 10,122 | 9,080 | 8,178 | 10,004 | 12,775 | 13,874 | 12,409 | 12,719 | 828 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | $32 * C * 0.3$ lb/hr | 50 | 6.970 lb/hr | hr/yr | 28,523 | 30,132 | 29,379 | 24,963 | 36,197 | 46,814 | 52,212 | 49,921 | 55,491 | 1,549 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 109,705 | 115,892 | 112,997 | 96,013 | 139,220 | 180,053 | 200,814 | 192,003 | 213,427 | 5,958 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | $0.25 * 0.3$ ton/acre/year | | 0.075 ton/acre/year | acres | 1,300 | 1,393 | 1,486 | 1,579 | 1,672 | 1,765 | 1,858 | 1,828 | 1,828 | 1,828 | 1,828 | 1,828 | 1,415 | 1,001 | 588 | 174 | 0 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 10.13 | 10.18 | 9.13 | 8.23 | 10.06 | 12.85 | 13.96 | 12.48 | 12.79 | 0.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 260.21 | 264.08 | 262.37 | 201.42 | 302.78 | 382.18 | 425.37 | 420.01 | 471.26 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 249.36 | 228.38 | 242.15 | 224.48 | 270.50 | 321.97 | 334.36 | 343.91 | 338.84 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 8.19 | 8.23 | 7.38 | 6.65 | 8.14 | 10.39 | 11.28 | 10.09 | 10.34 | 0.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 1.40 | 1.38 | 1.38 | 1.22 | 1.55 | 1.95 | 2.09 | 2.07 | 2.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 0.90 | 0.91 | 0.82 | 0.73 | 0.90 | 1.15 | 1.25 | 1.11 | 1.14 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 134.83 | 136.91 | 136.03 | 104.81 | 156.09 | 197.69 | 218.96 | 216.26 | 244.52 | 0.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 193.54 | 212.55 | 200.62 | 191.12 | 265.42 | 349.91 | 390.23 | 357.98 | 388.86 | 24.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 9.23 | 9.27 | 8.32 | 7.49 | 9.16 | 11.70 | 12.71 | 11.37 | 11.65 | 0.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 18.91 | 18.95 | 18.91 | 15.93 | 21.31 | 26.00 | 28.23 | 28.06 | 30.45 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 48.48 | 48.72 | 43.70 | 39.36 | 48.15 | 61.48 | 66.77 | 59.72 | 61.22 | 3.99 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 49.70 | 52.50 | 51.19 | 43.50 | 63.07 | 81.57 | 90.98 | 86.99 | 96.69 | 2.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 7.17 | 7.57 | 7.38 | 6.27 | 9.09 | 11.76 | 13.12 | 12.54 | 13.94 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 97.54 | 104.51 | 111.49 | 118.46 | 125.44 | 132.41 | 139.39 | 137.14 | 137.14 | 137.14 | 137.14 | 137.14 | 106.11 | 75.09 | 44.07 | 13.04 | 0.00 |
| | **1089.59** | **1104.16** | **1100.87** | **969.67** | **1291.64** | **1603.01** | **1748.69** | **1699.74** | **1821.02** | **171.99** | **137.14** | **137.14** | **106.11** | **75.09** | **44.07** | **13.04** | **0.00** |

**Highway/Plant Pit**

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | $0.003 * 0.70 * 0.3$ lb/ton | | 0.001 lb/ton | ton/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19,940,151 | 48,949,342 | 123,753,602 | 128,451,858 | 101,181,531 | 118,625,119 | 148,567,029 | 190,000,000 |
| OB Removal (T/S)[1] | $0.02 * 0.75 * 0.3$ lb/ton | | 0.0045 lb/ton | $yd^3/yr$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29,419,032 | 198,545,439 | 151,578,368 | 18,320,881 | 65,616,149 | 116,241,607 | 233,621,179 | 739,423,554 |
| OB Removal (dragline)[1] | $0.04 * 0.75 * 0.3$ lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3/yr$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 186,413,712 | 248,900,662 | 212,154,763 | 247,985,386 | 253,956,044 | 0 |
| Scrapers[1] | $32 * C * 0.3$ lb/hr | 50 | 6.970 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,914 | 7,154 | 18,086 | 18,990 | 16,144 | 17,867 | 21,713 | 27,768 |
| OB Blasting[1] | $50 * 0.75 * 0.3$ lb/blast | | 11.250 lb/blast | blasts/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 335 | 663 | 668 | 424 | 690 | 912 | 1,246 |
| Coal Blasting[1] | $35 * 0.75 * 0.3$ lb/blast | | 7.875 lb/blast | blasts/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 142 | 350 | 884 | 918 | 723 | 847 | 1,061 | 1,357 |
| OB Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 515,331 | 3,420,376 | 2,626,226 | 320,996 | 1,143,114 | 2,019,683 | 4,023,769 | 12,817,829 |
| Coal Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 108,518 | 255,120 | 578,721 | 600,691 | 473,165 | 554,738 | 694,758 | 888,515 |
| Coal Dumping[1] | $0.017 * 0.75 * 0.3$ lb/ton | 85 | 0.004 lb/ton | ton/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19,940,151 | 48,949,342 | 123,753,602 | 128,451,858 | 101,181,531 | 118,625,119 | 148,567,029 | 190,000,000 |
| Dozers & Loaders on OB[2] | $1.0 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 0.547 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20,267 | 136,453 | 153,120 | 72,980 | 98,631 | 138,942 | 221,154 | 508,207 |
| Dozers & Loaders on Coal[2] | $18.6 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 9.626 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6,244 | 15,329 | 38,754 | 40,515 | 33,494 | 37,855 | 46,525 | 59,500 |
| Graders[1] | $32 * C * 0.3$ lb/hr | 50 | 6.970 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,075 | 54,154 | 45,007 | 10,780 | 21,795 | 35,705 | 67,046 | 200,382 |
| Water Trucks[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34,903 | 208,285 | 173,106 | 41,463 | 83,825 | 137,328 | 257,870 | 770,700 |
| Wind Erosion, untreated acres[1] | $0.25 * 0.3$ ton/acre/year | | 0.075 ton/acre/year | acres | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 142 | 250 | 357 | 465 | 573 | 681 | 647 | 647 | 647 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.28 | 15.42 | 38.98 | 40.46 | 31.87 | 37.37 | 46.80 | 59.85 |
| OB Removal (T/S)[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 115.18 | 777.31 | 593.43 | 71.73 | 256.89 | 455.09 | 914.63 | 2894.84 |
| OB Removal (dragline)[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 838.86 | 1120.05 | 954.70 | 1115.93 | 1142.80 | 0.00 |
| Scrapers[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.08 | 12.47 | 31.52 | 33.09 | 28.13 | 31.13 | 37.83 | 48.39 |
| OB Blasting[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 1.88 | 3.73 | 3.76 | 2.39 | 3.88 | 5.13 | 7.01 |
| Coal Blasting[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.56 | 1.38 | 3.48 | 3.61 | 2.85 | 3.34 | 4.18 | 5.34 |
| OB Haul Roads[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 60.60 | 402.19 | 308.81 | 37.75 | 134.42 | 237.49 | 473.14 | 1507.21 |
| Coal Haul Roads[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 22.68 | 53.33 | 120.98 | 125.57 | 98.91 | 115.96 | 145.23 | 185.74 |
| Coal Dumping[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.72 | 14.04 | 35.50 | 36.85 | 29.03 | 34.03 | 42.62 | 54.51 |
| Dozers & Loaders on OB[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.54 | 37.29 | 41.84 | 19.94 | 26.95 | 37.97 | 60.43 | 138.87 |
| Dozers & Loaders on Coal[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 30.05 | 73.77 | 186.52 | 194.99 | 161.20 | 182.19 | 223.92 | 286.36 |
| Graders[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 15.81 | 94.36 | 78.42 | 18.78 | 37.98 | 62.22 | 116.83 | 349.16 |
| Water Trucks[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.28 | 13.61 | 11.31 | 2.71 | 5.48 | 8.97 | 16.85 | 50.35 |
| Wind Erosion, untreated acres[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 10.63 | 18.72 | 26.80 | 34.88 | 42.97 | 51.05 | 48.50 | 48.50 | 48.50 |
| | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **10.63** | **288.78** | **1523.85** | **2328.26** | **1752.26** | **1821.83** | **2374.07** | **3278.89** | **5636.13** |

**Section 16 Pit**

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | $0.003 * 0.70 * 0.3$ lb/ton | | 0.001 lb/ton | ton/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11,305,388 | 29,654,584 | 47,929,564 | 54,996,983 | 54,996,983 | 46,909,786 | 54,996,983 | 41,432,971 | 0 |
| OB Removal (T/S)[1] | $0.02 * 0.75 * 0.3$ lb/ton | | 0.0045 lb/ton | $yd^3/yr$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 117,395,283 | 132,034,113 | 144,097,437 | 168,927,083 | 30,216,686 | 151,670,375 | 181,087,551 | 122,699,621 | 0 |
| OB Removal (dragline)[1] | $0.04 * 0.75 * 0.3$ lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3/yr$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39,571,855 | 91,424,631 | 107,186,139 | 107,186,139 | 91,697,447 | 107,186,139 | 72,152,187 | 0 |
| Scrapers[1] | $32 * C * 0.3$ lb/hr | 50 | 6.970 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,652 | 4,334 | 7,005 | 8,038 | 8,131 | 7,485 | 8,283 | 6,055 | 0 |
| OB Blasting[1] | $50 * 0.75 * 0.3$ lb/blast | | 11.250 lb/blast | blasts/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 198 | 296 | 404 | 472 | 473 | 157 | 488 | 335 | 0 |
| Coal Blasting[1] | $35 * 0.75 * 0.3$ lb/blast | | 7.875 lb/blast | blasts/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 81 | 212 | 342 | 393 | 393 | 335 | 393 | 296 | 0 |
| OB Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,003,963 | 2,262,141 | 2,492,945 | 2,857,791 | 427,674 | 2,491,081 | 3,039,081 | 2,082,770 | 0 |
| Coal Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 94,947 | 282,424 | 499,609 | 578,672 | 642,969 | 603,264 | 771,563 | 629,710 | 0 |
| Coal Dumping[1] | $0.017 * 0.75 * 0.3$ lb/ton | 85 | 0.004 lb/ton | ton/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11,305,388 | 29,654,584 | 47,929,564 | 54,996,983 | 54,996,983 | 46,909,786 | 54,996,983 | 41,432,971 | 0 |
| Dozers & Loaders on OB[2] | $1.0 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 0.547 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 80,614 | 110,445 | 127,776 | 147,430 | 91,726 | 133,545 | 155,894 | 109,645 | 0 |
| Dozers & Loaders on Coal[2] | $18.6 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 9.626 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,540 | 9,287 | 15,010 | 17,223 | 17,347 | 15,529 | 17,550 | 12,975 | 0 |
| Graders[1] | $32 * C * 0.3$ lb/hr | 50 | 6.970 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31,191 | 37,379 | 43,214 | 48,467 | 12,796 | 43,233 | 53,098 | 37,395 | 0 |
| Water Trucks[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 119,964 | 143,765 | 166,208 | 186,412 | 49,214 | 166,279 | 204,222 | 143,826 | 0 |
| Wind Erosion, untreated acres[1] | $0.25 * 0.3$ ton/acre/year | | 0.075 ton/acre/year | acres | 0 | 0 | 0 | 0 | 0 | 0 | 567 | 677 | 788 | 899 | 1,010 | 1,121 | 1,232 | 1,232 | 1,232 | 1,232 | 636 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.56 | 9.34 | 15.10 | 17.32 | 17.32 | 14.78 | 17.32 | 13.05 | 0.00 |
| OB Removal (T/S)[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 459.60 | 516.91 | 564.14 | 661.35 | 118.30 | 593.79 | 708.96 | 480.37 | 0.00 |
| OB Removal (dragline)[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 178.07 | 411.41 | 482.34 | 482.34 | 412.64 | 482.34 | 324.68 | 0.00 |
| Scrapers[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.88 | 7.55 | 12.21 | 14.01 | 14.17 | 13.04 | 14.43 | 10.55 | 0.00 |
| OB Blasting[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.11 | 1.66 | 2.27 | 2.65 | 2.66 | 0.88 | 2.74 | 1.89 | 0.00 |
| Coal Blasting[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.83 | 1.35 | 1.55 | 1.55 | 1.32 | 1.55 | 1.17 | 0.00 |
| OB Haul Roads[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 235.64 | 266.00 | 293.14 | 336.04 | 50.29 | 292.92 | 357.36 | 244.91 | 0.00 |
| Coal Haul Roads[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 19.85 | 59.04 | 104.44 | 120.97 | 134.41 | 126.11 | 161.29 | 131.64 | 0.00 |
| Coal Dumping[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.24 | 8.51 | 13.75 | 15.78 | 15.78 | 13.46 | 15.78 | 11.89 | 0.00 |
| Dozers & Loaders on OB[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 22.03 | 30.18 | 34.92 | 40.29 | 25.07 | 36.49 | 42.60 | 29.96 | 0.00 |
| Dozers & Loaders on Coal[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 17.04 | 44.69 | 72.24 | 82.89 | 83.49 | 74.74 | 84.47 | 62.45 | 0.00 |
| Graders[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 54.35 | 65.13 | 75.30 | 84.45 | 22.30 | 75.33 | 92.52 | 65.16 | 0.00 |
| Water Trucks[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.84 | 9.39 | 10.86 | 12.18 | 3.21 | 10.86 | 13.34 | 9.40 | 0.00 |
| Wind Erosion, untreated acres[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 42.49 | 50.81 | 59.13 | 67.45 | 75.77 | 84.09 | 92.40 | 92.40 | 92.40 | 92.40 | 47.73 |
| | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **42.49** | **50.81** | **886.59** | **1264.77** | **1686.88** | **1955.89** | **1063.28** | **1758.76** | **2087.10** | **1479.51** | **47.73** |

**Total**

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | $0.003 * 0.70 * 0.3$ lb/ton | | 0.001 lb/ton | ton/yr | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 183,448,841 | 148,091,317 | 173,622,102 | 190,000,000 | 190,000,000 |
| OB Removal (T/S)[1] | $0.02 * 0.75 * 0.3$ lb/ton | | 0.0045 lb/ton | $yd^3/yr$ | 438,932,656 | 447,699,776 | 476,016,709 | 476,273,216 | 421,006,177 | 456,125,004 | 408,410,007 | 430,694,865 | 560,494,500 | 515,252,181 | 593,473,808 | 336,862,994 | 48,537,567 | 217,286,524 | 297,329,158 | 356,320,800 | 739,423,554 |
| OB Removal (dragline)[1] | $0.04 * 0.75 * 0.3$ lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3/yr$ | 295,158,158 | 283,783,554 | 291,842,005 | 270,501,112 | 252,305,995 | 252,944,464 | 262,693,326 | 270,430,112 | 269,071,012 | 202,890,957 | 185,070,840 | 293,599,851 | 356,086,801 | 303,852,210 | 355,171,525 | 326,108,231 | 0 |
| Scrapers[1] | $32 * C * 0.3$ lb/hr | 50 | 6.970 lb/hr | hr/yr | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,121 | 23,629 | 26,150 | 27,768 | 27,768 |
| OB Blasting[1] | $50 * 0.75 * 0.3$ lb/blast | | 11.250 lb/blast | blasts/yr | 1,472 | 1,447 | 1,523 | 1,488 | 1,356 | 1,406 | 1,345 | 1,393 | 1,580 | 1,337 | 1,380 | 1,165 | 1,142 | 581 | 1,178 | 1,247 | 1,246 |
| Coal Blasting[1] | $35 * 0.75 * 0.3$ lb/blast | | 7.875 lb/blast | blasts/yr | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,310 | 1,058 | 1,240 | 1,357 | 1,357 |
| OB Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 7,553,755 | 7,707,339 | 8,203,402 | 8,207,896 | 7,239,714 | 7,854,935 | 7,019,051 | 7,409,443 | 9,683,305 | 8,890,739 | 10,261,045 | 5,765,673 | 748,670 | 3,634,194 | 5,058,764 | 6,106,540 | 12,817,829 |
| Coal Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 3,939,654 | 4,299,812 | 4,443,613 | 4,715,616 | 5,060,510 | 5,246,270 | 5,538,604 | 5,656,720 | 5,730,401 | 4,567,616 | 3,459,737 | 1,497,672 | 1,243,660 | 1,076,428 | 1,326,300 | 1,324,468 | 888,515 |
| Coal Dumping[1] | $0.017 * 0.75 * 0.3$ lb/ton | 85 | 0.004 lb/ton | ton/yr | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 183,448,841 | 148,091,317 | 173,622,102 | 190,000,000 | 190,000,000 |
| Dozers & Loaders on OB[2] | $1.0 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 0.547 lb/hr | hr/yr | 422,888 | 425,586 | 447,025 | 444,541 | 392,390 | 403,970 | 372,948 | 389,565 | 477,422 | 431,850 | 467,631 | 311,990 | 164,705 | 232,176 | 294,836 | 330,799 | 508,207 |
| Dozers & Loaders on Coal[2] | $18.6 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 9.626 lb/hr | hr/yr | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 57,862 | 49,023 | 55,406 | 59,500 | 59,500 |
| Graders[1] | $32 * C * 0.3$ lb/hr | 50 | 6.970 lb/hr | hr/yr | 161,338 | 169,014 | 178,575 | 182,707 | 173,394 | 185,362 | 177,240 | 184,839 | 219,917 | 190,699 | 194,620 | 101,073 | 23,576 | 65,027 | 88,803 | 104,441 | 200,382 |
| Water Trucks[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 620,529 | 650,055 | 686,829 | 702,719 | 666,898 | 712,932 | 681,693 | 710,918 | 845,834 | 733,457 | 748,539 | 388,743 | 90,677 | 250,104 | 341,550 | 401,696 | 770,700 |
| Wind Erosion, untreated acres[1] | $0.25 * 0.3$ ton/acre/year | | 0.075 ton/acre/year | acres | 9,554 | 10,146 | 10,738 | 11,125 | 11,562 | 11,999 | 13,003 | 13,428 | 12,642 | 11,710 | 10,896 | 11,115 | 10,104 | 8,982 | 7,313 | 5,678 | 3,685 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 59.85 | 59.85 | 59.85 | 59.85 | 59.85 | 59.85 | 59.85 | 59.85 | 59.85 | 59.85 | 59.85 | 59.85 | 57.79 | 46.65 | 54.69 | 59.85 | 59.85 |
| OB Removal (T/S)[1] | 1718.42 | 1752.74 | 1863.61 | 1864.61 | 1648.24 | 1785.73 | 1598.93 | 1686.17 | 2194.34 | 2017.21 | 2323.45 | 1318.82 | 190.02 | 850.68 | 1164.04 | 1395.00 | 2894.84 |
| OB Removal (dragline)[1] | 1328.21 | 1277.03 | 1313.29 | 1217.26 | 1135.38 | 1138.25 | 1182.12 | 1216.94 | 1210.82 | 913.01 | 832.82 | 1321.20 | 1602.39 | 1367.33 | 1598.27 | 1467.49 | 0.00 |
| Scrapers[1] | 48.39 | 48.39 | 48.39 | 48.39 | 48.39 | 48.39 | 48.39 | 48.39 | 48.39 | 48.39 | 48.39 | 48.39 | 47.26 | 41.17 | 45.57 | 48.39 | 48.39 |
| OB Blasting[1] | 8.28 | 8.14 | 8.57 | 8.37 | 7.63 | 7.91 | 7.57 | 7.84 | 8.89 | 7.52 | 7.76 | 6.55 | 6.42 | 3.27 | 6.63 | 7.02 | 7.01 |
| Coal Blasting[1] | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.16 | 4.17 | 4.88 | 5.34 | 5.34 |
| OB Haul Roads[1] | 888.22 | 906.28 | 964.61 | 965.14 | 851.30 | 923.64 | 825.35 | 871.25 | 1138.63 | 1045.44 | 1206.57 | 677.97 | 88.03 | 427.33 | 594.85 | 718.05 | 1507.21 |
| Coal Haul Roads[1] | 823.56 | 898.85 | 928.91 | 985.77 | 1057.87 | 1096.70 | 1157.81 | 1182.50 | 1197.90 | 954.83 | 723.24 | 313.08 | 259.98 | 225.02 | 277.25 | 276.87 | 185.74 |
| Coal Dumping[1] | 54.51 | 54.51 | 54.51 | 54.51 | 54.51 | 54.51 | 54.51 | 54.51 | 54.51 | 54.51 | 54.51 | 54.51 | 52.63 | 42.48 | 49.81 | 54.51 | 54.51 |
| Dozers & Loaders on OB[2] | 115.56 | 116.30 | 122.16 | 121.48 | 107.23 | 110.39 | 101.91 | 106.45 | 130.46 | 118.01 | 127.79 | 85.26 | 45.01 | 63.45 | 80.57 | 90.39 | 138.87 |
| Dozers & Loaders on Coal[2] | 286.36 | 286.36 | 286.36 | 286.36 | 286.36 | 286.36 | 286.36 | 286.36 | 286.36 | 286.36 | 286.36 | 286.36 | 278.48 | 235.94 | 266.66 | 286.36 | 286.36 |
| Graders[1] | 281.13 | 294.50 | 311.16 | 318.36 | 302.13 | 322.99 | 308.83 | 322.07 | 383.20 | 332.29 | 339.12 | 176.12 | 41.08 | 113.31 | 154.74 | 181.99 | 349.16 |
| Water Trucks[1] | 40.54 | 42.47 | 44.87 | 45.91 | 43.57 | 46.57 | 44.53 | 46.44 | 55.26 | 47.91 | 48.90 | 25.40 | 5.92 | 16.34 | 22.31 | 26.24 | 50.35 |
| Wind Erosion, untreated acres[1] | 716.53 | 760.93 | 805.34 | 834.37 | 867.16 | 899.94 | 975.21 | 1007.09 | 948.14 | 878.24 | 817.23 | 833.63 | 757.79 | 673.63 | 548.46 | 425.85 | 276.37 |
| | **6374.89** | **6511.68** | **6816.96** | **6815.71** | **6474.93** | **6786.57** | **6656.71** | **6901.20** | **7722.08** | **6768.90** | **6881.32** | **5212.46** | **3437.96** | **4110.76** | **4868.73** | **5043.33** | **5864.00** |

Constants:

| | | | |
|---|---|---|---|
| Number of wet days, W, (> 0.01")= | 100 | Tire correction factor, T = | 2.5 |
| C = ((365-W)/365) = | 0.726 | Overburden density (ton/$yd^3$) = | 1.74 |
| Silt content of road bed, s, (%) = | 8.6 | Dozed overburden silt content, s, (%) = | 6.9 |
| Speed of OB haul trucks, S, (mph)= | 15 | Dozed overburden moisture content, M, (%) = | 7.9 |
| Speed of coal haul trucks (mph)= | 20 | Dozed coal silt content, s, (%) = | 8.6 |
| Speed of water trucks (mph)= | 10 | Dozed coal moisture content, M, (%) = | 10.4 |

[1] Emission Factor Equation from Wyoming Memorandum Dated January 24, 1979, Subject: Fugitive Dust Emission Factors.
[2] Emission Factor Equations from AP-42 Table 11.9-1, July 1998.

# Black Thunder $PM_{2.5}$ Emission Calculations

## North Pit

| Mining Operation | $PM_{2.5}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{2.5}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.03 lb/ton | | 0.0001 lb/ton | ton/yr | 38,352,223 | 44,076,597 | 43,036,317 | 50,551,300 | 27,399,678 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.03 lb/ton | | 0.00045 lb/ton | $yd^3/yr$ | 64,073,144 | 72,581,587 | 74,652,419 | 116,510,680 | 64,632,500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.03 $lb/yd^3$ | | 0.0009 $lb/yd^3$ | $yd^3/yr$ | 68,828,929 | 67,280,639 | 69,391,173 | 63,899,223 | 39,787,169 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr | 5,605 | 6,442 | 6,290 | 7,388 | 4,004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.03 lb/blast | | 1.125 lb/blast | blasts/yr | 303 | 314 | 322 | 378 | 225 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.03 lb/blast | | 0.788 lb/blast | blasts/yr | 274 | 315 | 307 | 361 | 196 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.059 lb/VMT | VMT/yr | 1,111,601 | 1,260,711 | 1,297,702 | 2,011,337 | 1,109,947 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.105 lb/VMT | VMT/yr | 863,374 | 1,044,067 | 1,065,071 | 1,302,777 | 735,318 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.03 lb/ton | 85 | 0.0004 lb/ton | ton/yr | 38,352,223 | 44,076,597 | 43,036,317 | 50,551,300 | 27,399,678 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | 5.7 * $s^{1.2}/M^{1.3}$ * 0.105 * C lb/hr | | 0.300 lb/hr | hr/yr | 72,044 | 77,632 | 79,450 | 107,039 | 66,054 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | 78.4 * $s^{1.2}/M^{1.3}$ * 0.022 * C lb/hr | | 0.789 lb/hr | hr/yr | 12,010 | 13,803 | 13,477 | 15,831 | 8,580 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 32 * C *0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr | 27,231 | 31,913 | 32,812 | 46,647 | 26,061 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 50 | 0.026 lb/VMT | VMT/yr | 104,736 | 122,743 | 126,201 | 179,412 | 100,236 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.045 ton/acre/year | | 0.01125 ton/acre/year | acres | 2,937 | 3,092 | 3,247 | 3,197 | 3,197 | 3,197 | 3,197 | 3,197 | 2,155 | 1,032 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Mining Operation | Controlled $PM_{2.5}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 1.21 | 1.39 | 1.36 | 1.59 | 0.86 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 25.08 | 28.42 | 29.23 | 45.61 | 25.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 30.97 | 30.28 | 31.23 | 28.75 | 17.90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 0.98 | 1.12 | 1.10 | 1.29 | 0.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 0.17 | 0.18 | 0.18 | 0.21 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 0.11 | 0.12 | 0.12 | 0.14 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 13.07 | 14.82 | 15.26 | 23.65 | 13.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 18.05 | 21.83 | 22.26 | 27.23 | 15.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 1.10 | 1.26 | 1.23 | 1.45 | 0.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 10.82 | 11.66 | 11.93 | 16.08 | 9.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 4.74 | 5.44 | 5.32 | 6.24 | 3.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 4.74 | 5.56 | 5.72 | 8.13 | 4.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 0.68 | 0.80 | 0.82 | 1.17 | 0.65 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 33.04 | 34.79 | 36.53 | 35.97 | 35.97 | 35.97 | 35.97 | 35.97 | 24.24 | 11.61 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | **144.77** | **157.67** | **162.29** | **197.53** | **128.65** | **35.97** | **35.97** | **35.97** | **24.24** | **11.61** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

## Northwest Pit

| Mining Operation | $PM_{2.5}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{2.5}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.03 lb/ton | | 0.0001 lb/ton | ton/yr | 43,604,929 | 39,348,198 | 43,533,736 | 38,744,823 | 46,493,528 | 56,557,923 | 54,373,213 | 55,642,602 | 46,212,509 | 36,314,508 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.03 lb/ton | | 0.00045 lb/ton | $yd^3/yr$ | 73,786,199 | 71,649,374 | 82,864,102 | 72,827,346 | 98,544,488 | 119,515,756 | 70,294,067 | 78,266,839 | 64,186,469 | 57,018,586 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.03 $lb/yd^3$ | | 0.0009 $lb/yd^3$ | $yd^3/yr$ | 57,382,142 | 55,420,310 | 53,475,125 | 49,193,304 | 69,853,808 | 83,139,756 | 86,345,750 | 89,044,394 | 88,812,685 | 54,949,175 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr | 6,373 | 5,751 | 6,362 | 5,663 | 6,795 | 8,266 | 7,947 | 8,132 | 6,754 | 5,307 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.03 lb/blast | | 1.125 lb/blast | blasts/yr | 280 | 270 | 301 | 273 | 356 | 427 | 353 | 373 | 319 | 246 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.03 lb/blast | | 0.788 lb/blast | blasts/yr | 311 | 281 | 311 | 277 | 332 | 404 | 388 | 397 | 330 | 259 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.059 lb/VMT | VMT/yr | 1,279,639 | 1,241,010 | 1,436,869 | 1,263,264 | 1,696,291 | 2,063,896 | 1,226,293 | 1,364,232 | 1,129,680 | 996,814 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.105 lb/VMT | VMT/yr | 551,472 | 550,426 | 664,365 | 640,612 | 859,180 | 1,112,536 | 1,144,739 | 1,244,316 | 1,086,705 | 1,067,199 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.03 lb/ton | 85 | 0.0004 lb/ton | ton/yr | 43,604,929 | 39,348,198 | 43,533,736 | 38,744,823 | 46,493,528 | 56,557,923 | 54,373,213 | 55,642,602 | 46,212,509 | 36,314,508 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | 5.7 * $s^{1.2}/M^{1.3}$ * 0.105 * C lb/hr | | 0.300 lb/hr | hr/yr | 75,653 | 73,654 | 81,798 | 74,014 | 95,303 | 112,605 | 79,508 | 85,535 | 74,722 | 63,722 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | 78.4 * $s^{1.2}/M^{1.3}$ * 0.022 * C lb/hr | | 0.789 lb/hr | hr/yr | 13,655 | 12,322 | 13,633 | 12,133 | 14,560 | 17,712 | 17,027 | 17,425 | 14,472 | 11,372 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 32 * C *0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr | 25,905 | 25,437 | 29,842 | 27,035 | 36,419 | 45,258 | 33,279 | 36,690 | 31,146 | 28,411 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 50 | 0.026 lb/VMT | VMT/yr | 99,636 | 97,834 | 114,778 | 103,983 | 140,073 | 174,069 | 127,997 | 141,115 | 119,791 | 109,273 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.045 ton/acre/year | | 0.01125 ton/acre/year | acres | 1,680 | 1,813 | 1,947 | 2,080 | 2,213 | 2,346 | 2,480 | 2,613 | 2,570 | 2,570 | 2,570 | 2,570 | 1,754 | 937 | 121 | 0 | 0 |

| Mining Operation | Controlled $PM_{2.5}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 1.37 | 1.24 | 1.37 | 1.22 | 1.46 | 1.78 | 1.71 | 1.75 | 1.46 | 1.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 28.89 | 28.05 | 32.44 | 28.51 | 38.58 | 46.79 | 27.52 | 30.64 | 25.13 | 22.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 25.82 | 24.94 | 24.06 | 22.14 | 31.43 | 37.41 | 38.86 | 40.07 | 39.97 | 24.73 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 1.11 | 1.00 | 1.11 | 0.99 | 1.18 | 1.44 | 1.38 | 1.42 | 1.18 | 0.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 0.16 | 0.15 | 0.17 | 0.15 | 0.20 | 0.24 | 0.20 | 0.21 | 0.18 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 0.12 | 0.11 | 0.12 | 0.11 | 0.13 | 0.16 | 0.15 | 0.16 | 0.13 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 15.05 | 14.59 | 16.90 | 14.85 | 19.95 | 24.27 | 14.42 | 16.04 | 13.28 | 11.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 11.53 | 11.51 | 13.89 | 13.39 | 17.96 | 23.26 | 23.93 | 26.01 | 22.72 | 22.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 1.25 | 1.13 | 1.25 | 1.11 | 1.33 | 1.62 | 1.56 | 1.60 | 1.33 | 1.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 11.36 | 11.06 | 12.29 | 11.12 | 14.32 | 16.91 | 11.94 | 12.85 | 11.22 | 9.57 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 5.39 | 4.86 | 5.38 | 4.79 | 5.74 | 6.99 | 6.72 | 6.87 | 5.71 | 4.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 4.51 | 4.43 | 5.20 | 4.71 | 6.35 | 7.89 | 5.80 | 6.39 | 5.43 | 4.95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 0.65 | 0.64 | 0.75 | 0.68 | 0.92 | 1.14 | 0.84 | 0.92 | 0.78 | 0.71 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 18.90 | 20.40 | 21.90 | 23.40 | 24.90 | 26.40 | 27.90 | 29.40 | 28.91 | 28.91 | 28.91 | 28.91 | 19.73 | 10.55 | 1.36 | 0.00 | 0.00 |
| | **126.11** | **124.12** | **136.82** | **127.17** | **164.45** | **196.29** | **162.92** | **174.33** | **157.42** | **133.07** | **28.91** | **28.91** | **19.73** | **10.55** | **1.36** | **0.00** | **0.00** |

## West Pit

| Mining Operation | $PM_{2.5}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{2.5}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.03 lb/ton | | 0.0001 lb/ton | ton/yr | 57,785,815 | 50,800,795 | 54,051,842 | 51,397,668 | 60,785,745 | 71,323,818 | 67,244,730 | 68,974,926 | 66,604,309 | 69,746,350 | 62,017,866 | 1,118,889 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.03 lb/ton | | 0.00045 lb/ton | $yd^3/yr$ | 134,562,214 | 157,372,161 | 174,596,180 | 165,165,329 | 135,502,401 | 183,573,119 | 170,367,191 | 183,687,149 | 189,453,268 | 188,871,859 | 165,390,650 | 33,567 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.03 $lb/yd^3$ | | 0.0009 $lb/yd^3$ | $yd^3/yr$ | 63,842,448 | 63,947,395 | 65,917,687 | 62,679,040 | 82,554,418 | 98,256,075 | 102,045,182 | 104,960,550 | 104,960,434 | 108,369,927 | 93,646,210 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr | 8,445 | 7,424 | 7,900 | 7,512 | 8,884 | 10,424 | 9,828 | 10,081 | 9,734 | 10,193 | 9,064 | 164 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.03 lb/blast | | 1.125 lb/blast | blasts/yr | 368 | 406 | 441 | 425 | 423 | 537 | 519 | 546 | 556 | 559 | 493 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.03 lb/blast | | 0.788 lb/blast | blasts/yr | 413 | 363 | 386 | 367 | 434 | 509 | 480 | 493 | 476 | 498 | 443 | 8 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.059 lb/VMT | VMT/yr | 2,315,342 | 2,695,753 | 2,995,681 | 2,834,148 | 2,329,821 | 3,156,976 | 2,917,891 | 3,149,907 | 3,275,087 | 3,259,091 | 2,867,288 | 1,490 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.105 lb/VMT | VMT/yr | 1,148,154 | 1,074,172 | 1,195,932 | 1,188,689 | 1,460,701 | 1,771,030 | 1,727,469 | 1,824,443 | 1,810,948 | 1,890,738 | 1,650,501 | 27,372 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.03 lb/ton | 85 | 0.0004 lb/ton | ton/yr | 57,785,815 | 50,800,795 | 54,051,842 | 51,397,668 | 60,785,745 | 71,323,818 | 67,244,730 | 68,974,926 | 66,604,309 | 69,746,350 | 62,017,866 | 1,118,889 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | 5.7 * $s^{1.2}/M^{1.3}$ * 0.105 * C lb/hr | | 0.300 lb/hr | hr/yr | 115,477 | 131,062 | 143,435 | 137,270 | 122,055 | 157,932 | 149,294 | 158,882 | 162,830 | 162,893 | 144,320 | 27 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | 78.4 * $s^{1.2}/M^{1.3}$ * 0.022 * C lb/hr | | 0.789 lb/hr | hr/yr | 18,096 | 15,909 | 16,927 | 16,096 | 19,036 | 22,336 | 21,058 | 21,600 | 20,858 | 21,842 | 19,421 | 350 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 32 * C *0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr | 48,722 | 53,733 | 59,833 | 57,489 | 53,637 | 70,125 | 66,169 | 70,974 | 72,711 | 72,645 | 62,544 | 295 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 50 | 0.026 lb/VMT | VMT/yr | 187,391 | 206,667 | 230,129 | 221,112 | 206,297 | 269,712 | 254,495 | 272,977 | 279,656 | 279,405 | 240,555 | 1,134 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.045 ton/acre/year | | 0.01125 ton/acre/year | acres | 2,932 | 3,071 | 3,211 | 3,350 | 3,490 | 3,629 | 3,769 | 3,908 | 3,884 | 3,879 | 3,879 | 3,879 | 3,879 | 3,879 | 3,474 | 2,664 | 1,854 |

| Mining Operation | Controlled $PM_{2.5}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 1.82 | 1.60 | 1.70 | 1.62 | 1.91 | 2.25 | 2.12 | 2.17 | 2.10 | 2.20 | 1.95 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 52.68 | 61.61 | 68.35 | 64.66 | 53.05 | 71.87 | 66.70 | 71.91 | 74.17 | 73.94 | 64.75 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 28.73 | 28.78 | 29.66 | 28.21 | 37.15 | 44.22 | 45.92 | 47.23 | 47.23 | 48.77 | 42.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 1.47 | 1.29 | 1.38 | 1.31 | 1.55 | 1.82 | 1.71 | 1.76 | 1.70 | 1.78 | 1.58 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 0.21 | 0.23 | 0.25 | 0.24 | 0.24 | 0.30 | 0.29 | 0.31 | 0.31 | 0.31 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 0.16 | 0.14 | 0.15 | 0.14 | 0.17 | 0.20 | 0.19 | 0.19 | 0.19 | 0.20 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 27.23 | 31.70 | 35.23 | 33.33 | 27.40 | 37.12 | 34.31 | 37.04 | 38.51 | 38.32 | 33.72 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 24.00 | 22.45 | 25.00 | 24.85 | 30.54 | 37.02 | 36.11 | 38.14 | 37.86 | 39.52 | 34.50 | 0.57 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 1.66 | 1.46 | 1.55 | 1.47 | 1.74 | 2.05 | 1.93 | 1.98 | 1.91 | 2.00 | 1.78 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 17.35 | 19.69 | 21.55 | 20.62 | 18.33 | 23.72 | 22.43 | 23.87 | 24.46 | 24.47 | 21.68 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 7.14 | 6.27 | 6.68 | 6.35 | 7.51 | 8.81 | 8.30 | 8.52 | 8.23 | 8.61 | 7.66 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 8.49 | 9.36 | 10.43 | 10.02 | 9.35 | 12.22 | 11.53 | 12.37 | 12.67 | 12.66 | 10.90 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 1.22 | 1.35 | 1.50 | 1.44 | 1.35 | 1.76 | 1.66 | 1.78 | 1.83 | 1.83 | 1.57 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 32.98 | 34.55 | 36.12 | 37.69 | 39.26 | 40.83 | 42.40 | 43.97 | 43.69 | 43.64 | 43.64 | 43.64 | 43.64 | 43.64 | 39.08 | 29.97 | 20.86 |
| | **205.14** | **220.49** | **239.54** | **231.95** | **229.54** | **284.18** | **275.60** | **291.24** | **294.85** | **298.24** | **266.32** | **44.54** | **43.64** | **43.64** | **39.08** | **29.97** | **20.86** |

## Southwest Pit

| Mining Operation | $PM_{2.5}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{2.5}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.03 lb/ton | | 0.0001 lb/ton | ton/yr | 18,090,549 | 23,451,572 | 20,381,880 | 23,191,152 | 23,375,091 | 21,324,178 | 24,078,189 | 25,756,732 | 25,261,410 | 31,699,728 | 31,103,228 | 10,130,526 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.03 lb/ton | | 0.00045 lb/ton | $yd^3/yr$ | 100,047,346 | 78,642,694 | 76,887,520 | 70,322,438 | 44,989,450 | 55,417,700 | 59,096,787 | 61,458,326 | 69,086,594 | 107,829,250 | 85,440,282 | 16,323,976 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.03 $lb/yd^3$ | | 0.0009 $lb/yd^3$ | $yd^3/yr$ | 49,690,891 | 46,384,729 | 49,246,080 | 44,845,450 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr | 2,644 | 3,427 | 2,979 | 3,389 | 3,416 | 3,117 | 3,519 | 3,764 | 3,692 | 4,633 | 4,546 | 1,481 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.03 lb/blast | | 1.125 lb/blast | blasts/yr | 272 | 211 | 213 | 194 | 76 | 96 | 102 | 106 | 121 | 186 | 148 | 30 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.03 lb/blast | | 0.788 lb/blast | blasts/yr | 129 | 168 | 146 | 166 | 167 | 152 | 172 | 184 | 180 | 226 | 222 | 72 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.059 lb/VMT | VMT/yr | 1,700,513 | 1,345,502 | 1,316,328 | 1,207,800 | 776,231 | 952,864 | 1,012,787 | 1,056,155 | 1,195,130 | 1,853,777 | 1,480,436 | 280,166 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.105 lb/VMT | VMT/yr | 450,840 | 614,351 | 558,558 | 669,287 | 735,624 | 688,863 | 799,669 | 875,503 | 877,611 | 1,100,646 | 1,054,507 | 312,907 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.03 lb/ton | 85 | 0.0004 lb/ton | ton/yr | 18,090,549 | 23,451,572 | 20,381,880 | 23,191,152 | 23,375,091 | 21,324,178 | 24,078,189 | 25,756,732 | 25,261,410 | 31,699,728 | 31,103,228 | 10,130,526 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | 5.7 * $s^{1.2}/M^{1.3}$ * 0.105 * C lb/hr | | 0.300 lb/hr | hr/yr | 90,509 | 73,885 | 73,127 | 67,928 | 31,010 | 38,278 | 40,820 | 42,452 | 47,831 | 74,458 | 59,082 | 11,412 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | 78.4 * $s^{1.2}/M^{1.3}$ * 0.022 * C lb/hr | | 0.789 lb/hr | hr/yr | 5,665 | 7,344 | 6,383 | 7,262 | 7,320 | 6,678 | 7,540 | 8,066 | 7,911 | 9,927 | 9,740 | 3,172 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 32 * C *0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr | 30,956 | 27,799 | 26,708 | 26,572 | 21,079 | 23,166 | 25,581 | 27,254 | 29,379 | 41,640 | 34,708 | 7,303 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 50 | 0.026 lb/VMT | VMT/yr | 119,062 | 106,919 | 102,723 | 102,200 | 81,072 | 89,098 | 98,387 | 104,822 | 112,995 | 160,153 | 133,491 | 28,090 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.045 ton/acre/year | | 0.01125 ton/acre/year | acres | 704 | 775 | 847 | 918 | 989 | 1,061 | 1,132 | 1,203 | 1,274 | 1,251 | 1,251 | 1,251 | 1,251 | 1,251 | 1,251 | 961 | 548 |

| Mining Operation | Controlled $PM_{2.5}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.57 | 0.74 | 0.64 | 0.73 | 0.74 | 0.67 | 0.76 | 0.81 | 0.80 | 1.00 | 0.98 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 39.17 | 30.79 | 30.10 | 27.53 | 17.61 | 21.70 | 23.14 | 24.06 | 27.05 | 42.22 | 33.45 | 6.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 22.36 | 20.87 | 22.16 | 20.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 0.46 | 0.60 | 0.52 | 0.59 | 0.60 | 0.54 | 0.61 | 0.66 | 0.64 | 0.81 | 0.79 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 0.15 | 0.12 | 0.12 | 0.11 | 0.04 | 0.05 | 0.06 | 0.06 | 0.07 | 0.10 | 0.08 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 0.05 | 0.07 | 0.06 | 0.07 | 0.07 | 0.06 | 0.07 | 0.07 | 0.07 | 0.09 | 0.09 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 20.00 | 15.82 | 15.48 | 14.20 | 9.13 | 11.20 | 11.91 | 12.42 | 14.05 | 21.80 | 17.41 | 3.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 9.42 | 12.84 | 11.68 | 13.99 | 15.38 | 14.40 | 16.72 | 18.30 | 18.35 | 23.01 | 22.04 | 6.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 0.52 | 0.67 | 0.58 | 0.67 | 0.67 | 0.61 | 0.69 | 0.74 | 0.72 | 0.91 | 0.89 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 13.60 | 11.10 | 10.98 | 10.20 | 4.66 | 5.75 | 6.13 | 6.38 | 7.18 | 11.18 | 8.87 | 1.71 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 2.23 | 2.90 | 2.52 | 2.86 | 2.89 | 2.63 | 2.97 | 3.18 | 3.12 | 3.92 | 3.84 | 1.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 5.39 | 4.84 | 4.65 | 4.63 | 3.67 | 4.04 | 4.46 | 4.75 | 5.12 | 7.26 | 6.05 | 1.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 0.78 | 0.70 | 0.67 | 0.67 | 0.53 | 0.58 | 0.64 | 0.68 | 0.74 | 1.05 | 0.87 | 0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 7.92 | 8.72 | 9.52 | 10.33 | 11.13 | 11.93 | 12.73 | 13.54 | 14.34 | 14.08 | 14.08 | 14.08 | 14.08 | 14.08 | 14.08 | 10.81 | 6.16 |
| | **122.62** | **110.78** | **109.69** | **106.76** | **67.11** | **74.17** | **80.89** | **85.65** | **92.25** | **127.41** | **109.45** | **35.64** | **14.08** | **14.08** | **14.08** | **10.81** | **6.16** |

**Black Thunder $PM_{2.5}$ Emission Calculations (continued)**

**South Pit**

| Mining Operation | $PM_{2.5}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{2.5}$ Emission Factor | Operations Parameter Units |
|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.03 lb/ton | | 0.0001 lb/ton | ton/yr |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.03 lb/ton | | 0.00045 lb/ton | yd$^3$/yr |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.03 lb/yd$^3$ | | 0.0009 lb/yd$^3$ | yd$^3$/yr |
| Scrapers[1] | 32 * C * 0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr |
| OB Blasting[1] | 50 * 0.75 * 0.03 lb/blast | | 1.125 lb/blast | blasts/yr |
| Coal Blasting[1] | 35 * 0.75 * 0.03 lb/blast | | 0.788 lb/blast | blasts/yr |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.059 lb/VMT | VMT/yr |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.105 lb/VMT | VMT/yr |
| Coal Dumping[1] | 0.017 * 0.75 * 0.03 lb/ton | 85 | 0.0004 lb/ton | ton/yr |
| Dozers & Loaders on OB[2] | 5.7 * $s^{1.2}/M^{1.3}$ * 0.105 * C lb/hr | | 0.300 lb/hr | hr/yr |
| Dozers & Loaders on Coal[2] | 78.4 * $s^{1.2}/M^{1.3}$ * 0.022 * C lb/hr | | 0.789 lb/hr | hr/yr |
| Graders[1] | 32 * C *0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 50 | 0.026 lb/VMT | VMT/yr |
| Wind Erosion, untreated acres[1] | 0.25 * 0.045 ton/acre/year | | 0.01125 ton/acre/year | acres |

| Operations Parameters by Year | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 32,166,483 | 32,322,838 | 28,996,224 | 26,115,057 | 31,945,958 | 40,794,080 | 44,303,868 | 39,625,741 | 40,616,385 | 2,644,678 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 66,463,754 | 67,453,961 | 67,016,490 | 51,447,423 | 77,337,339 | 97,618,429 | 108,651,962 | 107,282,552 | 120,372,888 | 79,340 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 55,413,748 | 50,750,481 | 53,811,940 | 49,884,095 | 60,110,599 | 71,548,633 | 74,302,394 | 76,425,168 | 75,297,893 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 4,701 | 4,724 | 4,238 | 3,817 | 4,669 | 5,962 | 6,475 | 5,791 | 5,936 | 387 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 249 | 246 | 245 | 217 | 275 | 346 | 371 | 368 | 387 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 230 | 231 | 207 | 187 | 228 | 291 | 316 | 283 | 290 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | 1,146,660 | 1,164,363 | 1,156,822 | 891,347 | 1,327,424 | 1,681,199 | 1,862,081 | 1,839,150 | 2,079,445 | 3,585 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | 925,814 | 1,016,796 | 959,687 | 914,252 | 1,269,687 | 1,673,841 | 1,866,726 | 1,712,459 | 1,860,190 | 118,093 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 32,166,483 | 32,322,838 | 28,996,224 | 26,115,057 | 31,945,958 | 40,794,080 | 44,303,868 | 39,625,741 | 40,616,385 | 2,644,678 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | 69,204 | 69,353 | 69,216 | 58,290 | 77,967 | 95,155 | 103,325 | 102,696 | 111,426 | 65 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | 10,073 | 10,122 | 9,080 | 8,178 | 10,004 | 12,775 | 13,874 | 12,409 | 12,719 | 828 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 28,523 | 30,132 | 29,379 | 24,963 | 36,197 | 46,814 | 52,212 | 49,921 | 55,491 | 1,549 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | 109,705 | 115,892 | 112,997 | 96,013 | 139,220 | 180,053 | 200,814 | 192,003 | 213,427 | 5,958 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 1,300 | 1,393 | 1,486 | 1,579 | 1,672 | 1,765 | 1,858 | 1,828 | 1,828 | 1,828 | 1,828 | 1,828 | 1,415 | 1,001 | 588 | 174 | 0 |

| Controlled $PM_{2.5}$ Emissions (tons/yr) | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 1.01 | 1.02 | 0.91 | 0.82 | 1.01 | 1.29 | 1.40 | 1.25 | 1.28 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 26.02 | 26.41 | 26.24 | 20.14 | 30.28 | 38.22 | 42.54 | 42.00 | 47.13 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 24.94 | 22.84 | 24.22 | 22.45 | 27.05 | 32.20 | 33.44 | 34.39 | 33.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 0.82 | 0.82 | 0.74 | 0.67 | 0.81 | 1.04 | 1.13 | 1.01 | 1.03 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 0.14 | 0.14 | 0.14 | 0.12 | 0.15 | 0.19 | 0.21 | 0.21 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 0.09 | 0.09 | 0.08 | 0.07 | 0.09 | 0.11 | 0.12 | 0.11 | 0.11 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 13.48 | 13.69 | 13.60 | 10.48 | 15.61 | 19.77 | 21.90 | 21.63 | 24.45 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 19.35 | 21.26 | 20.06 | 19.11 | 26.54 | 34.99 | 39.02 | 35.80 | 38.89 | 2.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 0.92 | 0.93 | 0.83 | 0.75 | 0.92 | 1.17 | 1.27 | 1.14 | 1.17 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 10.39 | 10.42 | 10.40 | 8.76 | 11.71 | 14.29 | 15.52 | 15.43 | 16.74 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 3.97 | 3.99 | 3.58 | 3.23 | 3.95 | 5.04 | 5.47 | 4.89 | 5.02 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 4.97 | 5.25 | 5.12 | 4.35 | 6.31 | 8.16 | 9.10 | 8.70 | 9.67 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 0.72 | 0.76 | 0.74 | 0.63 | 0.91 | 1.18 | 1.31 | 1.25 | 1.39 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 14.63 | 15.68 | 16.72 | 17.77 | 18.82 | 19.86 | 20.91 | 20.57 | 20.57 | 20.57 | 20.57 | 20.57 | 15.92 | 11.26 | 6.61 | 1.96 | 0.00 |
| | **121.46** | **123.28** | **123.38** | **109.34** | **144.15** | **177.50** | **193.33** | **188.37** | **201.55** | **23.99** | **20.57** | **20.57** | **15.92** | **11.26** | **6.61** | **1.96** | **0.00** |

**Highway/Plant Pit**

| Mining Operation | $PM_{2.5}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{2.5}$ Emission Factor | Operations Parameter Units |
|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.03 lb/ton | | 0.0001 lb/ton | ton/yr |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.03 lb/ton | | 0.00045 lb/ton | yd$^3$/yr |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.03 lb/yd$^3$ | | 0.0009 lb/yd$^3$ | yd$^3$/yr |
| Scrapers[1] | 32 * C * 0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr |
| OB Blasting[1] | 50 * 0.75 * 0.03 lb/blast | | 1.125 lb/blast | blasts/yr |
| Coal Blasting[1] | 35 * 0.75 * 0.03 lb/blast | | 0.788 lb/blast | blasts/yr |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.059 lb/VMT | VMT/yr |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.105 lb/VMT | VMT/yr |
| Coal Dumping[1] | 0.017 * 0.75 * 0.03 lb/ton | 85 | 0.0004 lb/ton | ton/yr |
| Dozers & Loaders on OB[2] | 5.7 * $s^{1.2}/M^{1.3}$ * 0.105 * C lb/hr | | 0.300 lb/hr | hr/yr |
| Dozers & Loaders on Coal[2] | 78.4 * $s^{1.2}/M^{1.3}$ * 0.022 * C lb/hr | | 0.789 lb/hr | hr/yr |
| Graders[1] | 32 * C *0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 50 | 0.026 lb/VMT | VMT/yr |
| Wind Erosion, untreated acres[1] | 0.25 * 0.045 ton/acre/year | | 0.01125 ton/acre/year | acres |

| Operations Parameters by Year | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19,940,151 | 48,949,342 | 123,753,602 | 128,451,858 | 101,181,531 | 118,625,119 | 148,567,029 | 190,000,000 |
| OB Removal (T/S)[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29,419,032 | 198,545,439 | 151,578,368 | 18,320,881 | 65,616,149 | 116,241,607 | 233,621,179 | 739,423,554 |
| OB Removal (dragline)[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 186,413,712 | 248,900,662 | 212,154,763 | 247,985,386 | 253,956,044 | 0 |
| Scrapers[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,914 | 7,154 | 18,086 | 18,990 | 16,144 | 17,867 | 21,713 | 27,768 |
| OB Blasting[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 335 | 663 | 668 | 424 | 690 | 912 | 1,246 |
| Coal Blasting[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 142 | 350 | 884 | 918 | 723 | 847 | 1,061 | 1,357 |
| OB Haul Roads[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 515,331 | 3,420,376 | 2,626,226 | 320,996 | 1,143,114 | 2,019,683 | 4,023,769 | 12,817,829 |
| Coal Haul Roads[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 108,518 | 255,120 | 578,721 | 600,691 | 473,165 | 554,738 | 694,758 | 888,515 |
| Coal Dumping[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19,940,151 | 48,949,342 | 123,753,602 | 128,451,858 | 101,181,531 | 118,625,119 | 148,567,029 | 190,000,000 |
| Dozers & Loaders on OB[2] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20,267 | 136,453 | 153,120 | 72,980 | 98,631 | 138,942 | 221,154 | 508,207 |
| Dozers & Loaders on Coal[2] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6,244 | 15,329 | 38,754 | 40,515 | 33,494 | 37,855 | 46,525 | 59,500 |
| Graders[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,075 | 54,154 | 45,007 | 10,780 | 21,795 | 35,705 | 67,046 | 200,382 |
| Water Trucks[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34,903 | 208,285 | 173,106 | 41,463 | 83,825 | 137,328 | 257,870 | 770,700 |
| Wind Erosion, untreated acres[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 142 | 250 | 357 | 465 | 573 | 681 | 647 | 647 | 647 |

| Controlled $PM_{2.5}$ Emissions (tons/yr) | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.63 | 1.54 | 3.90 | 4.05 | 3.19 | 3.74 | 4.68 | 5.99 |
| OB Removal (T/S)[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.52 | 77.73 | 59.34 | 7.17 | 25.69 | 45.51 | 91.46 | 289.48 |
| OB Removal (dragline)[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 83.89 | 112.01 | 95.47 | 111.59 | 114.28 | 0.00 |
| Scrapers[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.51 | 1.25 | 3.15 | 3.31 | 2.81 | 3.11 | 3.78 | 4.84 |
| OB Blasting[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.19 | 0.37 | 0.38 | 0.24 | 0.39 | 0.51 | 0.70 |
| Coal Blasting[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.14 | 0.35 | 0.36 | 0.28 | 0.33 | 0.42 | 0.53 |
| OB Haul Roads[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.06 | 40.22 | 30.88 | 3.77 | 13.44 | 23.75 | 47.31 | 150.72 |
| Coal Haul Roads[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.27 | 5.33 | 12.10 | 12.56 | 9.89 | 11.60 | 14.52 | 18.57 |
| Coal Dumping[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.57 | 1.40 | 3.55 | 3.68 | 2.90 | 3.40 | 4.26 | 5.45 |
| Dozers & Loaders on OB[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.04 | 20.50 | 23.00 | 10.96 | 14.82 | 20.87 | 33.22 | 76.34 |
| Dozers & Loaders on Coal[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.46 | 6.05 | 15.28 | 15.98 | 13.21 | 14.93 | 18.35 | 23.47 |
| Graders[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.58 | 9.44 | 7.84 | 1.88 | 3.80 | 6.22 | 11.68 | 34.92 |
| Water Trucks[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.23 | 1.36 | 1.13 | 0.27 | 0.55 | 0.90 | 1.68 | 5.03 |
| Wind Erosion, untreated acres[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.60 | 2.81 | 4.02 | 5.23 | 6.45 | 7.66 | 7.28 | 7.28 | 7.28 |
| | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **1.60** | **31.76** | **169.16** | **250.02** | **182.82** | **193.94** | **253.62** | **353.45** | **623.32** |

**Section 16 Pit**

| Mining Operation | $PM_{2.5}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{2.5}$ Emission Factor | Operations Parameter Units |
|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.03 lb/ton | | 0.0001 lb/ton | ton/yr |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.03 lb/ton | | 0.00045 lb/ton | yd$^3$/yr |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.03 lb/yd$^3$ | | 0.0009 lb/yd$^3$ | yd$^3$/yr |
| Scrapers[1] | 32 * C * 0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr |
| OB Blasting[1] | 50 * 0.75 * 0.03 lb/blast | | 1.125 lb/blast | blasts/yr |
| Coal Blasting[1] | 35 * 0.75 * 0.03 lb/blast | | 0.788 lb/blast | blasts/yr |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.059 lb/VMT | VMT/yr |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.105 lb/VMT | VMT/yr |
| Coal Dumping[1] | 0.017 * 0.75 * 0.03 lb/ton | 85 | 0.0004 lb/ton | ton/yr |
| Dozers & Loaders on OB[2] | 5.7 * $s^{1.2}/M^{1.3}$ * 0.105 * C lb/hr | | 0.300 lb/hr | hr/yr |
| Dozers & Loaders on Coal[2] | 78.4 * $s^{1.2}/M^{1.3}$ * 0.022 * C lb/hr | | 0.789 lb/hr | hr/yr |
| Graders[1] | 32 * C *0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 50 | 0.026 lb/VMT | VMT/yr |
| Wind Erosion, untreated acres[1] | 0.25 * 0.045 ton/acre/year | | 0.01125 ton/acre/year | acres |

| Operations Parameters by Year | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11,305,388 | 29,654,584 | 47,929,564 | 54,996,983 | 54,996,983 | 46,909,786 | 54,996,983 | 41,432,971 | 0 |
| OB Removal (T/S)[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 117,395,283 | 132,034,113 | 144,097,437 | 168,927,083 | 30,216,686 | 151,670,375 | 181,087,551 | 122,699,621 | 0 |
| OB Removal (dragline)[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39,571,855 | 91,424,631 | 107,186,139 | 107,186,139 | 91,697,447 | 107,186,139 | 72,152,187 | 0 |
| Scrapers[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,652 | 4,334 | 7,005 | 8,038 | 8,131 | 7,485 | 8,283 | 6,055 | 0 |
| OB Blasting[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 198 | 296 | 404 | 472 | 473 | 157 | 488 | 335 | 0 |
| Coal Blasting[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 81 | 212 | 342 | 393 | 393 | 335 | 393 | 296 | 0 |
| OB Haul Roads[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,003,963 | 2,262,141 | 2,492,945 | 2,857,791 | 427,674 | 2,491,081 | 3,039,081 | 2,082,770 | 0 |
| Coal Haul Roads[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 94,947 | 282,424 | 499,609 | 578,672 | 642,969 | 603,264 | 771,563 | 629,710 | 0 |
| Coal Dumping[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11,305,388 | 29,654,584 | 47,929,564 | 54,996,983 | 54,996,983 | 46,909,786 | 54,996,983 | 41,432,971 | 0 |
| Dozers & Loaders on OB[2] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 80,614 | 110,445 | 127,776 | 147,430 | 91,726 | 133,545 | 155,894 | 109,645 | 0 |
| Dozers & Loaders on Coal[2] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,540 | 9,287 | 15,010 | 17,223 | 17,347 | 15,529 | 17,550 | 12,975 | 0 |
| Graders[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31,191 | 37,379 | 43,214 | 48,467 | 12,796 | 43,233 | 53,098 | 37,395 | 0 |
| Water Trucks[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 119,964 | 143,765 | 166,208 | 186,412 | 49,214 | 166,279 | 204,222 | 143,826 | 0 |
| Wind Erosion, untreated acres[1] | 0 | 0 | 0 | 0 | 0 | 0 | 567 | 677 | 788 | 899 | 1,010 | 1,121 | 1,232 | 1,232 | 1,232 | 1,232 | 636 |

| Controlled $PM_{2.5}$ Emissions (tons/yr) | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.36 | 0.93 | 1.51 | 1.73 | 1.73 | 1.48 | 1.73 | 1.31 | 0.00 |
| OB Removal (T/S)[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 45.96 | 51.69 | 56.41 | 66.13 | 11.83 | 59.38 | 70.90 | 48.04 | 0.00 |
| OB Removal (dragline)[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 17.81 | 41.14 | 48.23 | 48.23 | 41.26 | 48.23 | 32.47 | 0.00 |
| Scrapers[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.29 | 0.76 | 1.22 | 1.40 | 1.42 | 1.30 | 1.44 | 1.06 | 0.00 |
| OB Blasting[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.17 | 0.23 | 0.27 | 0.27 | 0.09 | 0.27 | 0.19 | 0.00 |
| Coal Blasting[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.08 | 0.13 | 0.15 | 0.15 | 0.13 | 0.15 | 0.12 | 0.00 |
| OB Haul Roads[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 23.56 | 26.60 | 29.31 | 33.60 | 5.03 | 29.29 | 35.74 | 24.49 | 0.00 |
| Coal Haul Roads[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.98 | 5.90 | 10.44 | 12.10 | 13.44 | 12.61 | 16.13 | 13.16 | 0.00 |
| Coal Dumping[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.85 | 1.37 | 1.58 | 1.58 | 1.35 | 1.58 | 1.19 | 0.00 |
| Dozers & Loaders on OB[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 12.11 | 16.59 | 19.19 | 22.15 | 13.78 | 20.06 | 23.42 | 16.47 | 0.00 |
| Dozers & Loaders on Coal[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.40 | 3.66 | 5.92 | 6.79 | 6.84 | 6.12 | 6.92 | 5.12 | 0.00 |
| Graders[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.43 | 6.51 | 7.53 | 8.45 | 2.23 | 7.53 | 9.25 | 6.52 | 0.00 |
| Water Trucks[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.78 | 0.94 | 1.09 | 1.22 | 0.32 | 1.09 | 1.33 | 0.94 | 0.00 |
| Wind Erosion, untreated acres[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.37 | 7.62 | 8.87 | 10.12 | 11.36 | 12.61 | 13.86 | 13.86 | 13.86 | 13.86 | 7.16 |
| | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **6.37** | **7.62** | **101.21** | **142.61** | **186.87** | **216.41** | **120.71** | **195.56** | **230.96** | **164.92** | **7.16** |

**Total**

| Mining Operation | $PM_{2.5}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{2.5}$ Emission Factor | Operations Parameter Units |
|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.03 lb/ton | | 0.0001 lb/ton | ton/yr |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.03 lb/ton | | 0.00045 lb/ton | yd$^3$/yr |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.03 lb/yd$^3$ | | 0.0009 lb/yd$^3$ | yd$^3$/yr |
| Scrapers[1] | 32 * C * 0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr |
| OB Blasting[1] | 50 * 0.75 * 0.03 lb/blast | | 1.125 lb/blast | blasts/yr |
| Coal Blasting[1] | 35 * 0.75 * 0.03 lb/blast | | 0.788 lb/blast | blasts/yr |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.059 lb/VMT | VMT/yr |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.105 lb/VMT | VMT/yr |
| Coal Dumping[1] | 0.017 * 0.75 * 0.03 lb/ton | 85 | 0.0004 lb/ton | ton/yr |
| Dozers & Loaders on OB[2] | 5.7 * $s^{1.2}/M^{1.3}$ * 0.105 * C lb/hr | | 0.300 lb/hr | hr/yr |
| Dozers & Loaders on Coal[2] | 78.4 * $s^{1.2}/M^{1.3}$ * 0.022 * C lb/hr | | 0.789 lb/hr | hr/yr |
| Graders[1] | 32 * C *0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 50 | 0.026 lb/VMT | VMT/yr |
| Wind Erosion, untreated acres[1] | 0.25 * 0.045 ton/acre/year | | 0.01125 ton/acre/year | acres |

| Operations Parameters by Year | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 183,448,841 | 148,091,317 | 173,622,102 | 190,000,000 | 190,000,000 |
| OB Removal (T/S)[1] | 438,932,656 | 447,699,776 | 476,016,709 | 476,273,216 | 421,006,177 | 456,125,004 | 408,410,007 | 430,694,865 | 560,494,500 | 515,252,181 | 593,473,808 | 336,862,994 | 48,537,567 | 217,286,524 | 297,329,158 | 356,320,800 | 739,423,554 |
| OB Removal (dragline)[1] | 295,158,158 | 283,783,554 | 291,842,005 | 270,501,112 | 252,305,995 | 252,944,464 | 262,693,326 | 270,430,112 | 269,071,012 | 202,890,957 | 185,070,840 | 293,599,851 | 356,086,801 | 303,852,210 | 355,171,525 | 326,108,231 | 0 |
| Scrapers[1] | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,121 | 23,629 | 26,150 | 27,768 | 27,768 |
| OB Blasting[1] | 1,472 | 1,447 | 1,523 | 1,488 | 1,356 | 1,406 | 1,345 | 1,393 | 1,580 | 1,337 | 1,380 | 1,165 | 1,142 | 581 | 1,178 | 1,247 | 1,246 |
| Coal Blasting[1] | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,310 | 1,058 | 1,240 | 1,357 | 1,357 |
| OB Haul Roads[1] | 7,553,755 | 7,707,339 | 8,203,402 | 8,207,896 | 7,239,714 | 7,854,935 | 7,019,051 | 7,409,443 | 9,683,305 | 8,890,739 | 10,261,045 | 5,765,673 | 748,670 | 3,634,194 | 5,058,764 | 6,106,540 | 12,817,829 |
| Coal Haul Roads[1] | 3,939,654 | 4,299,812 | 4,443,613 | 4,715,616 | 5,060,510 | 5,246,270 | 5,538,604 | 5,656,720 | 5,730,401 | 4,567,616 | 3,459,737 | 1,497,672 | 1,243,660 | 1,076,428 | 1,326,300 | 1,324,468 | 888,515 |
| Coal Dumping[1] | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 183,448,841 | 148,091,317 | 173,622,102 | 190,000,000 | 190,000,000 |
| Dozers & Loaders on OB[2] | 422,888 | 425,586 | 447,025 | 444,541 | 392,390 | 403,970 | 372,948 | 389,565 | 477,422 | 431,850 | 467,631 | 311,990 | 164,705 | 232,176 | 294,836 | 330,799 | 508,207 |
| Dozers & Loaders on Coal[2] | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 57,862 | 49,023 | 55,406 | 59,500 | 59,500 |
| Graders[1] | 161,338 | 169,014 | 178,575 | 182,707 | 173,394 | 185,362 | 177,240 | 184,839 | 219,917 | 190,699 | 194,620 | 101,073 | 23,576 | 65,027 | 88,803 | 104,441 | 200,382 |
| Water Trucks[1] | 620,529 | 650,055 | 686,829 | 702,719 | 666,898 | 712,932 | 681,693 | 710,918 | 845,834 | 733,457 | 748,539 | 388,743 | 90,677 | 250,104 | 341,550 | 401,696 | 770,700 |
| Wind Erosion, untreated acres[1] | 9,554 | 10,146 | 10,738 | 11,125 | 11,562 | 11,999 | 13,003 | 13,428 | 12,642 | 11,710 | 10,896 | 11,115 | 10,104 | 8,982 | 7,313 | 5,678 | 3,685 |

| Controlled $PM_{2.5}$ Emissions (tons/yr) | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 5.99 | 5.99 | 5.99 | 5.99 | 5.99 | 5.99 | 5.99 | 5.99 | 5.99 | 5.99 | 5.99 | 5.99 | 5.78 | 4.66 | 5.47 | 5.99 | 5.99 |
| OB Removal (T/S)[1] | 171.84 | 175.27 | 186.36 | 186.46 | 164.82 | 178.57 | 159.89 | 168.62 | 219.43 | 201.72 | 232.34 | 131.88 | 19.00 | 85.07 | 116.40 | 139.50 | 289.48 |
| OB Removal (dragline)[1] | 132.82 | 127.70 | 131.33 | 121.73 | 113.54 | 113.83 | 118.21 | 121.69 | 121.08 | 91.30 | 83.28 | 132.12 | 160.24 | 136.73 | 159.83 | 146.75 | 0.00 |
| Scrapers[1] | 4.84 | 4.84 | 4.84 | 4.84 | 4.84 | 4.84 | 4.84 | 4.84 | 4.84 | 4.84 | 4.84 | 4.84 | 4.73 | 4.12 | 4.56 | 4.84 | 4.84 |
| OB Blasting[1] | 0.83 | 0.81 | 0.86 | 0.84 | 0.76 | 0.79 | 0.76 | 0.78 | 0.89 | 0.75 | 0.78 | 0.66 | 0.64 | 0.33 | 0.66 | 0.70 | 0.70 |
| Coal Blasting[1] | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.52 | 0.42 | 0.49 | 0.53 | 0.53 |
| OB Haul Roads[1] | 88.82 | 90.63 | 96.46 | 96.51 | 85.13 | 92.36 | 82.53 | 87.13 | 113.86 | 104.54 | 120.66 | 67.80 | 8.80 | 42.73 | 59.48 | 71.80 | 150.72 |
| Coal Haul Roads[1] | 82.36 | 89.88 | 92.89 | 98.58 | 105.79 | 109.67 | 115.78 | 118.25 | 119.79 | 95.48 | 72.32 | 31.31 | 26.00 | 22.50 | 27.73 | 27.69 | 18.57 |
| Coal Dumping[1] | 5.45 | 5.45 | 5.45 | 5.45 | 5.45 | 5.45 | 5.45 | 5.45 | 5.45 | 5.45 | 5.45 | 5.45 | 5.26 | 4.25 | 4.98 | 5.45 | 5.45 |
| Dozers & Loaders on OB[2] | 63.52 | 63.93 | 67.15 | 66.77 | 58.94 | 60.68 | 56.02 | 58.52 | 71.71 | 64.87 | 70.24 | 46.86 | 24.74 | 34.87 | 44.29 | 49.69 | 76.34 |
| Dozers & Loaders on Coal[2] | 23.47 | 23.47 | 23.47 | 23.47 | 23.47 | 23.47 | 23.47 | 23.47 | 23.47 | 23.47 | 23.47 | 23.47 | 22.82 | 19.33 | 21.85 | 23.47 | 23.47 |
| Graders[1] | 28.11 | 29.45 | 31.12 | 31.84 | 30.21 | 32.30 | 30.88 | 32.21 | 38.32 | 33.23 | 33.91 | 17.61 | 4.11 | 11.33 | 15.47 | 18.20 | 34.92 |
| Water Trucks[1] | 4.05 | 4.25 | 4.49 | 4.59 | 4.36 | 4.66 | 4.45 | 4.64 | 5.53 | 4.79 | 4.89 | 2.54 | 0.59 | 1.63 | 2.23 | 2.62 | 5.03 |
| Wind Erosion, untreated acres[1] | 107.48 | 114.14 | 120.80 | 125.16 | 130.07 | 134.99 | 146.28 | 151.06 | 142.22 | 131.74 | 122.58 | 125.05 | 113.67 | 101.04 | 82.27 | 63.88 | 41.45 |
| | **720.11** | **736.34** | **771.72** | **772.74** | **733.90** | **768.12** | **755.09** | **783.17** | **873.11** | **768.70** | **781.29** | **596.10** | **396.90** | **469.03** | **545.71** | **561.10** | **657.50** |

Constants:

| | | | |
|---|---|---|---|
| Number of wet days, W, (> 0.01")= | 100 | Tire correction factor, T = | 2.5 |
| C = ((365-W)/365) = | 0.726 | Overburden density (ton/yd$^3$) = | 1.74 |
| Silt content of road bed, s, (%) = | 8.6 | Dozed overburden silt content, s, (%) = | 6.9 |
| Speed of OB haul trucks, S, (mph)= | 15 | Dozed overburden moisture content, M, (%) = | 7.9 |
| Speed of coal haul trucks (mph)= | 20 | Dozed coal silt content, s, (%) = | 8.6 |
| Speed of water trucks (mph)= | 10 | Dozed coal moisture content, M, (%) = | 10.4 |

[1] Emission Factor Equation from Wyoming Memorandum Dated January 24, 1979, Subject: Fugitive Dust Emission Factors.
[2] Emission Factor Equations from AP-42 Table 11.9-1, July 1998.

**$PM_{10}$ Emission Apportioning**
**Year 2018**
**Black Thunder Mine**

| Emission Activities | Total Annual $PM_{10}$ Emissions (g/s) | North Annual $PM_{10}$ Emissions (g/s) | Northwest Annual $PM_{10}$ Emissions (g/s) | West Annual $PM_{10}$ Emissions (g/s) | Southwest Annual $PM_{10}$ Emissions (g/s) | South Annual $PM_{10}$ Emissions (g/s) | North Coal Area 1 $PM_{10}$ Emissions (g/s) | North Coal Area 2 $PM_{10}$ Emissions (g/s) | North OB Area $PM_{10}$ Emissions (g/s) | North Wind Erosion Area $PM_{10}$ Emissions (g/s) | Northwest Coal Area 1 $PM_{10}$ Emissions (g/s) | Northwest Coal Area 2 $PM_{10}$ Emissions (g/s) | Northwest OB Area $PM_{10}$ Emissions (g/s) | Northwest Wind Erosion Area 1 $PM_{10}$ Emissions (g/s) | Northwest Wind Erosion Area 2 $PM_{10}$ Emissions (g/s) | West Coal Area 1 $PM_{10}$ Emissions (g/s) | West Coal Area 2 $PM_{10}$ Emissions (g/s) | West Coal Area 3 $PM_{10}$ Emissions (g/s) | West Coal Area 4 $PM_{10}$ Emissions (g/s) | West Coal Area 5 $PM_{10}$ Emissions (g/s) | West Coal Area 6 $PM_{10}$ Emissions (g/s) | West OB Area 1 $PM_{10}$ Emissions (g/s) | West OB Area 2 $PM_{10}$ Emissions (g/s) | West Wind Erosion Area $PM_{10}$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal | 1.722 | 0.458 | 0.351 | 0.466 | 0.210 | 0.237 | 0.229 | 0.229 | | | 0.176 | 0.176 | | | | 0.102 | 0.141 | 0.141 | 0.027 | 0.027 | 0.027 | | | |
| OB Removal (T/S) | 53.639 | 13.122 | 8.202 | 18.601 | 7.920 | 5.794 | | | 13.122 | | | | 8.202 | | | | | | | | | 0.089 | 18.513 | |
| OB Removal (dragline) | 35.017 | 8.272 | 6.368 | 8.114 | 5.805 | 6.458 | | | 8.272 | | | | 6.368 | | | | | | | | | 0.039 | 8.075 | |
| Scrapers | 1.392 | 0.370 | 0.284 | 0.377 | 0.170 | 0.191 | | | 0.370 | | | | 0.284 | | | | | | | | | 0.002 | 0.375 | |
| OB Blasting | 0.241 | 0.061 | 0.044 | 0.069 | 0.031 | 0.035 | | | 0.061 | | | | 0.044 | | | | | | | | | 0.000 | 0.068 | |
| Coal Blasting | 0.154 | 0.041 | 0.031 | 0.042 | 0.019 | 0.021 | 0.020 | 0.020 | | | 0.016 | 0.016 | | | | 0.009 | 0.013 | 0.013 | 0.002 | 0.002 | 0.002 | | | |
| OB Haul Roads | 27.764 | 6.804 | 4.273 | 9.587 | 4.086 | 3.015 | | | 6.804 | | | | 4.273 | | | | | | | | | 0.046 | 9.541 | |
| Coal Haul Roads | 28.358 | 7.834 | 3.852 | 7.148 | 4.025 | 5.498 | | | | | | | | | | | | | | | | | | |
| Coal Dumping | 1.568 | 0.417 | 0.320 | 0.424 | 0.191 | 0.216 | | | | | | | | | | | | | | | | | | |
| Dozers & Loaders on OB | 3.495 | 0.841 | 0.582 | 1.079 | 0.534 | 0.458 | | | 0.841 | | | | 0.582 | | | | | | | | | 0.005 | 1.074 | |
| Dozers & Loaders on Coal | 8.238 | 2.192 | 1.680 | 2.228 | 1.005 | 1.132 | 1.096 | 1.096 | | | 0.840 | 0.840 | | | | 0.486 | 0.675 | 0.675 | 0.131 | 0.131 | 0.131 | | | |
| Graders | 9.158 | 2.338 | 1.355 | 2.882 | 1.332 | 1.251 | | | | | | | | | | | | | | | | | | |
| Water Trucks | 1.321 | 0.337 | 0.195 | 0.416 | 0.192 | 0.180 | | | | | | | | | | | | | | | | | | |
| Wind Erosion | 24.003 | 6.898 | 4.487 | 7.228 | 1.981 | 3.408 | | | | 6.898 | | | | 0.547 | 3.941 | | | | | | | | | 7.228 |
| **Total** | **196.0684** | **49.9863** | **32.0257** | **58.6606** | **27.5013** | **27.8945** | **1.3454** | **1.3454** | **29.4703** | **6.8983** | **1.0311** | **1.0311** | **19.7533** | **0.5468** | **3.9406** | **0.5970** | **0.8290** | **0.8290** | **0.1603** | **0.1603** | **0.1603** | **0.1808** | **37.6459** | **7.2285** |

Modeling Summary:

| Source Description | North Coal Area 1 | North Coal Area 2 | North OB Area | North Wind Erosion Area | Northwest Coal Area 1 | Northwest Coal Area 2 | Northwest OB Area | Northwest Wind Erosion Area 1 | Northwest Wind Erosion Area 2 | West Coal Area 1 | West Coal Area 2 | West Coal Area 3 | West Coal Area 4 | West Coal Area 5 | West Coal Area 6 | West OB Area 1 | West OB Area 2 | West Wind Erosion Area |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | BTNC1 | BTNC2 | BTNOB | BTNWE1 | BTNWC1 | BTNWC2 | BTNWOB | BTNWWE1 | BTNWWE2 | BTWC1 | BTWC2 | BTWC3 | BTWC4 | BTWC5 | BTWC6 | BTWOB1 | BTWOB2 | BTWWE |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area |
| SW X-Coordinate | 474066.1654 | 476077.8454 | 474066.1654 | 474092.4963 | 471222.3814 | 472654.5941 | 471222.3814 | 472482.2452 | 470984.3417 | 471946.2814 | 472156.5934 | 472156.5934 | 472156.5934 | 472156.5934 | 472156.5934 | 471806.0734 | 471946.2814 | 471081.7014 |
| SW Y-Coordinate | 4845476.2155 | 4845476.2155 | 4845049.4955 | 4843033.8686 | 4843450.8195 | 4843450.8195 | 4842902.1795 | 4844208.7214 | 4841830.5817 | 4840232.1315 | 4839134.8515 | 4838037.5715 | 4837129.8366 | 4836598.7124 | 4836067.5882 | 4840597.8915 | 4835846.0595 | 4835844.8170 |
| Angle | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Area X-Dimension (m) | 2011.6800 | 2011.6800 | 4023.3600 | 4444.0443 | 1432.2127 | 1432.2127 | 2864.4254 | 1610.2511 | 3108.1546 | 280.4160 | 175.5435 | 175.5435 | 70.1040 | 70.1040 | 70.1040 | 140.2080 | 771.1440 | 2763.7604 |
| Area Y-Dimension (m) | 247.5726 | 247.5726 | 784.4633 | 2911.6436 | 274.3200 | 274.3200 | 1097.2800 | 636.9998 | 2378.1396 | 494.6523 | 1097.2800 | 1097.2800 | 531.1241 | 531.1242 | 531.1242 | 128.8923 | 4880.7243 | 4906.0219 |
| Area ($m^2$) | 498,037 | 498,037 | 3,156,178 | 12,939,473 | 392,885 | 392,885 | 3,143,077 | 1,025,730 | 7,391,626 | 138,708 | 192,620 | 192,620 | 37,234 | 37,234 | 37,234 | 18,072 | 3,763,741 | 13,559,069 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Road Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Model Emission Rate[1] | 2.701331E-06 | 2.701331E-06 | 9.337339E-06 | 5.331244E-07 | 2.624554E-06 | 2.624554E-06 | 6.284697E-06 | 5.331117E-07 | 5.331117E-07 | 4.303894E-06 | 4.303894E-06 | 4.303894E-06 | 4.303894E-06 | 4.303894E-06 | 4.303894E-06 | 1.000226E-05 | 1.000226E-05 | 5.331114E-07 |

1. Units are g/s-$m^2$ for area sources.

**$PM_{10}$ Emission Apportioning**
**Year 2018**
**Black Thunder Mine**

| Southwest Coal Area | Southwest OB Area | Southwest Wind Erosion Area | South Coal Area | South OB Area | South Wind Erosion Area 1 | South Wind Erosion Area 2 | North Haul Road 1 to Circuit 4 Dump | North Haul Road 2 to Circuit 3 Dump | Northwest Haul Road to 6-North Dump | West Haul Road 1 to 5-West Dump | West Haul Road 2 to Primary Dump | West Haul Road 3 to 5-West Dump | West Haul Road 4 to Primary Dump | Southwest Haul Road 1 to Primary Dump | Southwest Haul Road 2 to Near Pit Dump | South Haul Road 1 to Near Pit Dump | South Haul Road 2 to Primary Dump | Circuit 4 Truck Dump | Circuit 3 Truck Dump | 6-North Truck Dump | 5-West Truck Dump | Primary Truck Dump | Near Pit Truck Dump |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) |
| 0.210 | | | 0.237 | | | | | | | | | | | | | | | | | | | | |
| | 7.920 | | | 5.794 | | | | | | | | | | | | | | | | | | | |
| | 5.805 | | | 6.458 | | | | | | | | | | | | | | | | | | | |
| | 0.170 | | | 0.191 | | | | | | | | | | | | | | | | | | | |
| | 0.031 | | | 0.035 | | | | | | | | | | | | | | | | | | | |
| 0.019 | | | 0.021 | | | | | | | | | | | | | | | | | | | | |
| | 4.086 | | | 3.015 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 5.883 | 1.952 | 3.852 | 3.828 | 2.064 | 0.831 | 0.425 | 0.505 | 3.520 | 4.707 | 0.791 | | | | | | |
| | | | | | | | | | | | | | | | | | | 0.355 | 0.063 | 0.320 | 0.318 | 0.147 | 0.366 |
| | 0.534 | | | 0.458 | | | | | | | | | | | | | | | | | | | |
| 1.005 | | | 1.132 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 1.756 | 0.583 | 1.355 | 1.543 | 0.832 | 0.335 | 0.171 | 0.167 | 1.165 | 1.071 | 0.180 | | | | | | |
| | | | | | | | 0.253 | 0.084 | 0.195 | 0.223 | 0.120 | 0.048 | 0.025 | 0.024 | 0.168 | 0.154 | 0.026 | | | | | | |
| | | 1.981 | | | 2.127 | 1.281 | | | | | | | | | | | | | | | | | |
| **1.2344** | **18.5462** | **1.9805** | **1.3900** | **15.9515** | **2.1268** | **1.2810** | **7.8915** | **2.6182** | **5.4030** | **5.5940** | **3.0159** | **1.2144** | **0.6211** | **0.6965** | **4.8523** | **5.9330** | **0.9967** | **0.3546** | **0.0626** | **0.3197** | **0.3181** | **0.1467** | **0.3662** |

| Southwest Coal Area | Southwest OB Area | Southwest Wind Erosion Area | South Coal Area | South OB Area | South Wind Erosion Area 1 | South Wind Erosion Area 2 | North Haul Road 1 to Circuit 4 Dump | North Haul Road 2 to Circuit 3 Dump | Northwest Haul Road to 6-North Dump | West Haul Road 1 to 5-West Dump | West Haul Road 2 to Primary Dump | West Haul Road 3 to 5-West Dump | West Haul Road 4 to Primary Dump | Southwest Haul Road 1 to Primary Dump | Southwest Haul Road 2 to Near Pit Dump | South Haul Road 1 to Near Pit Dump | South Haul Road 2 to Primary Dump | Circuit 4 Truck Dump | Circuit 3 Truck Dump | 6-North Truck Dump | 5-West Truck Dump | Primary Truck Dump | Near Pit Truck Dump |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BTSWC Area | BTSWOB Area | BTSWWE Area | BTSC Area | BTSOB Area | BTSWE1 Area | BTSWE2 Area | BNR1_1-20 Areas | BNR2_1-40 Areas | BNWR_1-12 Areas | BWR1_1-23 Areas | BWR2_1-44 Areas | BWR3_1-25 Areas | BWR4_1-43 Areas | BSWR1_1-44 Areas | BSWR2_1-25 Areas | BSR1_1-37 Areas | BSR2_1-59 Areas | BT4TD Area | BT3TD Area | BT6TD Area | BT5TD Area | BTPTD Area | BTNPTD Area |
| 472668.6574 | 472380.6229 | 471848.9894 | 472899.8482 | 472534.0882 | 472111.1638 | 474904.8014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 479767.5031 | 481152.9307 | 473886.8930 | 475758.6691 | 476805.4664 | 478800.6291 |
| 4834282.4355 | 4834282.4355 | 4834282.4355 | 4832854.4303 | 4832854.4303 | 4832854.4303 | 4832312.7556 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4843113.2555 | 4839749.3099 | 4840858.8153 | 4837546.3517 | 4838572.6800 | 4835563.7317 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 304.7999 | 1080.5145 | 2377.8739 | 365.7600 | 1524.4827 | 2793.6376 | 1219.9481 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 50.0000 | 50.0000 | 50.0000 | 50.0000 | 50.0000 | 50.0000 |
| 1562.3814 | 1562.3814 | 1562.3814 | 1428.0053 | 1428.0053 | 1428.0053 | 1969.6799 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 50.0000 | 50.0000 | 50.0000 | 50.0000 | 50.0000 | 50.0000 |
| 476,214 | 1,688,176 | 3,715,146 | 522,307 | 2,176,969 | 3,989,329 | 2,402,907 | 137,267 | 258,068 | 85,812 | 147,895 | 239,206 | 146,380 | 224,605 | 236,231 | 182,852 | 228,850 | 346,007 | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 |
| -- | -- | -- | -- | -- | -- | -- | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | -- | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- | -- | 4,576 | 8,602 | 2,860 | 4,930 | 7,974 | 4,879 | 7,487 | 7,874 | 6,095 | 7,628 | 11,534 | -- | -- | -- | -- | -- | -- |
| 2.592133E-06 | 1.098592E-05 | 5.330962E-07 | 2.661349E-06 | 7.327377E-06 | 5.331127E-07 | 5.331127E-07 | 5.749033E-05 | 1.014535E-05 | 6.296249E-05 | 3.782417E-05 | 1.260806E-05 | 8.296415E-06 | 2.765472E-06 | 2.948518E-06 | 2.653666E-05 | 2.592520E-05 | 2.880577E-06 | 1.418405E-04 | 2.503068E-05 | 1.278977E-04 | 1.272488E-04 | 5.869239E-05 | 1.464850E-04 |

**$PM_{10}$ Emission Apportioning**
**Year 2023**
**Black Thunder Mine**

| Emission Activities | Total Annual $PM_{10}$ Emissions (g/s) | North Annual $PM_{10}$ Emissions (g/s) | Northwest Annual $PM_{10}$ Emissions (g/s) | West Annual $PM_{10}$ Emissions (g/s) | Southwest Annual $PM_{10}$ Emissions (g/s) | South Annual $PM_{10}$ Emissions (g/s) | H-way/Plant Annual $PM_{10}$ Emissions (g/s) | Section 16 Annual $PM_{10}$ Emissions (g/s) | North Wind Erosion Area $PM_{10}$ Emissions (g/s) | Northwest Coal Area $PM_{10}$ Emissions (g/s) | Northwest OB Area $PM_{10}$ Emissions (g/s) | Northwest Wind Erosion Area 1 $PM_{10}$ Emissions (g/s) | Northwest Wind Erosion Area 2 $PM_{10}$ Emissions (g/s) | West Coal Area 1 $PM_{10}$ Emissions (g/s) | West Coal Area 2 $PM_{10}$ Emissions (g/s) | West Coal Area 3 $PM_{10}$ Emissions (g/s) | West Coal Area 4 $PM_{10}$ Emissions (g/s) | West Coal Area 5 $PM_{10}$ Emissions (g/s) | West OB Area 1 $PM_{10}$ Emissions (g/s) | West OB Area 2 $PM_{10}$ Emissions (g/s) | West OB Area 3 $PM_{10}$ Emissions (g/s) | West Wind Erosion Area $PM_{10}$ Emissions (g/s) | Southwest Coal Area $PM_{10}$ Emissions (g/s) | Southwest OB Area $PM_{10}$ Emissions (g/s) | Southwest Wind Erosion Area $PM_{10}$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal | 1.722 | 0.000 | 0.419 | 0.604 | 0.229 | 0.368 | 0.000 | 0.102 | | 0.419 | | | | 0.015 | 0.158 | 0.158 | 0.159 | 0.113 | | | | | 0.229 | | |
| OB Removal (T/S) | 63.125 | 0.000 | 7.229 | 21.337 | 7.781 | 13.557 | 0.000 | 13.221 | | | 7.229 | | | | | | | | 0.513 | 10.565 | 10.259 | | | 7.781 | |
| OB Removal (dragline) | 34.832 | 0.000 | 11.497 | 13.587 | 0.000 | 9.747 | 0.000 | 0.000 | | | 11.497 | | | | | | | | 0.327 | 6.728 | 6.533 | | | 0.000 | |
| Scrapers | 1.392 | 0.000 | 0.339 | 0.488 | 0.185 | 0.298 | 0.000 | 0.083 | | | 0.339 | | | | | | | | 0.012 | 0.242 | 0.235 | | | 0.185 | |
| OB Blasting | 0.256 | 0.000 | 0.052 | 0.090 | 0.020 | 0.063 | 0.000 | 0.032 | | | 0.052 | | | | | | | | 0.002 | 0.045 | 0.043 | | | 0.020 | |
| Coal Blasting | 0.154 | 0.000 | 0.037 | 0.054 | 0.020 | 0.033 | 0.000 | 0.009 | | 0.037 | | | | 0.001 | 0.014 | 0.014 | 0.014 | 0.010 | | | | | 0.020 | | |
| OB Haul Roads | 32.755 | 0.000 | 3.821 | 11.078 | 4.043 | 7.034 | 0.000 | 6.779 | | | 3.821 | | | | | | | | 0.266 | 5.485 | 5.327 | | | 4.043 | |
| Coal Haul Roads | 34.460 | 0.000 | 6.535 | 10.890 | 5.278 | 11.186 | 0.000 | 0.571 | | | | | | | | | | | | | | | | | |
| Coal Dumping | 1.568 | 0.000 | 0.381 | 0.550 | 0.208 | 0.335 | 0.000 | 0.093 | | | | | | | | | | | | | | | | | |
| Dozers & Loaders on OB | 3.753 | 0.000 | 0.587 | 1.280 | 0.376 | 0.876 | 0.000 | 0.634 | | | 0.587 | | | | | | | | 0.031 | 0.634 | 0.615 | | | 0.376 | |
| Dozers & Loaders on Coal | 8.238 | 0.000 | 2.004 | 2.888 | 1.095 | 1.761 | 0.000 | 0.490 | | 2.004 | | | | 0.073 | 0.758 | 0.758 | 0.759 | 0.540 | | | | | 1.095 | | |
| Graders | 11.023 | 0.000 | 1.561 | 3.645 | 1.473 | 2.782 | 0.000 | 1.563 | | | | | | | | | | | | | | | | | |
| Water Trucks | 1.590 | 0.000 | 0.225 | 0.526 | 0.212 | 0.401 | 0.000 | 0.225 | | | | | | | | | | | | | | | | | |
| Wind Erosion | 27.275 | 4.649 | 5.545 | 8.380 | 2.750 | 3.945 | 0.306 | 1.701 | 4.649 | | | 1.641 | 3.904 | | | | | | | | | 8.380 | | | 2.750 |
| **Total** | **222.1420** | **4.6491** | **40.2322** | **75.3953** | **23.6694** | **52.3855** | **0.3059** | **25.5045** | **4.6491** | **2.4598** | **23.5247** | **1.6410** | **3.9040** | **0.0893** | **0.9304** | **0.9304** | **0.9323** | **0.6627** | **1.1505** | **23.6980** | **23.0119** | **8.3795** | **1.3446** | **12.4041** | **2.7497** |

Modeling Summary:

| Source Description | North Wind Erosion Area | Northwest Coal Area | Northwest OB Area | Northwest Wind Erosion Area 1 | Northwest Wind Erosion Area 2 | West Coal Area 1 | West Coal Area 2 | West Coal Area 3 | West Coal Area 4 | West Coal Area 5 | West OB Area 1 | West OB Area 2 | West OB Area 3 | West Wind Erosion Area | Southwest Coal Area | Southwest OB Area | Southwest Wind Erosion Area |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | BTNWE1 | BTNWC | BTNWOB | BTNWWE1 | BTNWWE2 | BTWC1 | BTWC2 | BTWC3 | BTWC4 | BTWC5 | BTWOB1 | BTWOB2 | BTWOB3 | BTWWE | BTSWC | BTSWOB | BTSWWE |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area |
| SW X-Coordinate | 474092.4963 | 472470.2420 | 472468.7580 | 472320.1286 | 470984.3417 | 471251.8272 | 471385.4494 | 471385.4494 | 471455.5534 | 471385.4494 | 471131.3700 | 471251.8272 | 471248.2777 | 470937.0160 | 471632.3374 | 471388.1926 | 470937.0160 |
| SW Y-Coordinate | 4843983.2285 | 4845165.3195 | 4844273.7795 | 4844208.7214 | 4841852.6729 | 4840597.8915 | 4839317.7315 | 4838037.5715 | 4836754.8512 | 4835843.0115 | 4840597.8915 | 4838037.5715 | 4835843.0115 | 4835844.8170 | 4834282.4355 | 4834282.4355 | 4834282.4355 |
| Angle | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Area X-Dimension (m) | 4444.0443 | 1595.9233 | 1597.4073 | 1772.3677 | 3108.1546 | 133.6222 | 140.2080 | 140.2080 | 140.2080 | 140.2080 | 534.4954 | 554.2462 | 627.8996 | 3203.8469 | 182.8800 | 853.7448 | 3301.3075 |
| Area Y-Dimension (m) | 1962.2837 | 411.4800 | 1550.3141 | 1736.7908 | 2356.0484 | 128.8923 | 1280.1600 | 1280.1600 | 1282.7203 | 911.8397 | 128.8923 | 2560.3200 | 2194.5600 | 4906.0219 | 1560.5760 | 1560.5760 | 1562.3814 |
| Area ($m^2$) | 8,720,476 | 656,691 | 2,476,483 | 3,078,232 | 7,322,963 | 17,223 | 179,489 | 179,489 | 179,848 | 127,847 | 68,892 | 1,419,048 | 1,377,963 | 15,718,143 | 285,398 | 1,332,334 | 5,157,901 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Road Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Model Emission Rate[1] | 5.331282E-07 | 3.745723E-06 | 9.499247E-06 | 5.331132E-07 | 5.331132E-07 | 5.183818E-06 | 5.183818E-06 | 5.183818E-06 | 5.183818E-06 | 5.183818E-06 | 1.669996E-05 | 1.669996E-05 | 1.669996E-05 | 5.331126E-07 | 4.711328E-06 | 9.310020E-06 | 5.331027E-07 |

1. Units are g/s-$m^2$ for area sources.

**$PM_{10}$ Emission Apportioning**
**Year 2023**
**Black Thunder Mine**

| South Coal Area | South OB Area | South Wind Erosion Area 1 | South Wind Erosion Area 2 | H-way/Plant Wind Erosion Area | Section 16 Coal Area 1 | Section 16 Coal Area 2 | Section 16 OB Area | Section 16 Wind Erosion Area | Northwest Haul Road to 6-North Dump | West Haul Road 1 to 5-West Dump | West Haul Road 2 to Primary Dump | West Haul Road 3 to 5-West Dump | West Haul Road 4 to Primary Dump | Southwest Haul Road 1 to Primary Dump | Southwest Haul Road 2 to Near Pit Dump | South Haul Road 1 to Near Pit Dump | South Haul Road 2 to Primary Dump | Section 16 Haul Road to West Hilight Dump | 6-North Truck Dump | 5-West Truck Dump | Primary Truck Dump | Near Pit Truck Dump | West Hilight Truck Dump |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) |
| 0.368 | | | | | 0.051 | 0.051 | | | | | | | | | | | | | | | | | |
| | 13.557 | | | | | | 13.221 | | | | | | | | | | | | | | | | |
| | 9.747 | | | | | | 0.000 | | | | | | | | | | | | | | | | |
| | 0.298 | | | | | | 0.083 | | | | | | | | | | | | | | | | |
| | 0.063 | | | | | | 0.032 | | | | | | | | | | | | | | | | |
| 0.033 | | | | | 0.005 | 0.005 | | | | | | | | | | | | | | | | | |
| | 7.034 | | | | | | 6.779 | | | | | | | | | | | | | | | | |
| | | | | | | | | | 6.535 | 3.965 | 2.026 | 3.293 | 1.607 | 0.642 | 4.635 | 9.668 | 1.519 | 0.571 | | | | | |
| | | | | | | | | | | | | | | | | | | | 0.381 | 0.412 | 0.192 | 0.489 | 0.093 |
| | 0.876 | | | | | | 0.634 | | | | | | | | | | | | | | | | |
| 1.761 | | | | | 0.245 | 0.245 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | 1.561 | 1.327 | 0.678 | 1.102 | 0.538 | 0.179 | 1.293 | 2.404 | 0.378 | 1.563 | | | | | |
| | | | | | | | | | 0.225 | 0.191 | 0.098 | 0.159 | 0.078 | 0.026 | 0.186 | 0.347 | 0.054 | 0.225 | | | | | |
| | | 3.021 | 0.924 | 0.306 | | | | 1.701 | | | | | | | | | | | | | | | |
| **2.1619** | **31.5744** | **3.0206** | **0.9244** | **0.3059** | **0.3009** | **0.3009** | **20.7487** | **1.7009** | **8.3213** | **5.4826** | **2.8019** | **4.5536** | **2.2223** | **0.8475** | **6.1150** | **12.4183** | **1.9507** | **2.3599** | **0.3814** | **0.4122** | **0.1918** | **0.4893** | **0.0933** |

| South Coal Area | South OB Area | South Wind Erosion Area 1 | South Wind Erosion Area 2 | H-way/Plant Wind Erosion Area | Section 16 Coal Area 1 | Section 16 Coal Area 2 | Section 16 OB Area | Section 16 Wind Erosion Area | Northwest Haul Road to 6-North Dump | West Haul Road 1 to 5-West Dump | West Haul Road 2 to Primary Dump | West Haul Road 3 to 5-West Dump | West Haul Road 4 to Primary Dump | Southwest Haul Road 1 to Primary Dump | Southwest Haul Road 2 to Near Pit Dump | South Haul Road 1 to Near Pit Dump | South Haul Road 2 to Primary Dump | Section 16 Haul Road to West Hilight Dump | 6-North Truck Dump | 5-West Truck Dump | Primary Truck Dump | Near Pit Truck Dump | West Hilight Truck Dump |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BTSC | BTSOB | BTSWE1 | BTSWE2 | BTHPWE | BT16C1 | BT16C2 | BT16OB | BT16WE | BNWR_1-18 | BWR1_1-26 | BWR2_1-47 | BWR3_1-27 | BWR4_1-45 | BSWR1_1-48 | BSWR2_1-29 | BSR1_1-43 | BSR2_1-65 | B16R_1-10 | BT6TD | BT5TD | BTPTD | BTNPTD | BT16TD |
| Area | Area | Area | Area | Area | Area | Area | Area | Area | Areas | Areas | Areas | Areas | Areas | Areas | Areas | Areas | Areas | Areas | Area | Area | Area | Area | Area |
| 471082.0978 | 471082.0978 | 470937.0160 | 474904.8014 | 477155.0138 | 469133.5104 | 469133.5104 | 469004.8247 | 468087.5108 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 473886.8930 | 475758.6691 | 476805.4664 | 478800.6291 | 470784.3774 |
| 4832856.7922 | 4832856.7922 | 4832854.4303 | 4832312.7556 | 4838685.1296 | 4838307.0047 | 4837750.0529 | 4837750.0529 | 4837711.1436 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4840858.8153 | 4837546.3517 | 4838572.6800 | 4835563.7317 | 4839527.4275 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 25.9513 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 352.0196 | 1086.2304 | 3967.7853 | 880.3060 | 1828.6965 | 95.5951 | 95.5951 | 224.2808 | 1879.6145 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 50.0000 | 50.0000 | 50.0000 | 50.0000 | 50.0000 |
| 1425.6434 | 1425.6434 | 1428.0053 | 1969.6799 | 313.8107 | 556.9518 | 556.9518 | 1624.0140 | 1697.5049 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 50.0000 | 50.0000 | 50.0000 | 50.0000 | 50.0000 |
| 501,854 | 1,548,577 | 5,666,018 | 1,733,921 | 573,865 | 53,242 | 53,242 | 364,235 | 3,190,655 | 141,179 | 171,264 | 262,576 | 168,561 | 246,786 | 269,148 | 215,769 | 283,136 | 400,293 | 76,887 | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | 4,706 | 5,709 | 8,753 | 5,619 | 8,226 | 8,972 | 7,192 | 9,438 | 13,343 | 2,563 | -- | -- | -- | -- | -- |
| 4.307848E-06 | 2.038928E-05 | 5.331136E-07 | 5.331136E-07 | 5.330443E-07 | 5.651179E-06 | 5.651179E-06 | 5.696505E-05 | 5.330945E-07 | 5.894145E-05 | 3.201270E-05 | 1.067090E-05 | 2.701490E-05 | 9.004965E-06 | 3.148959E-06 | 2.834063E-05 | 4.385978E-05 | 4.873309E-06 | 3.069277E-05 | 1.525488E-04 | 1.648970E-04 | 7.671210E-05 | 1.957180E-04 | 3.731939E-05 |

RECEIVED
FEB 24 2015
AIR QUALITY DIVISION

# AIR QUALITY PERMIT APPLICATION TO MODIFY THE BLACK THUNDER MINE

Prepared for:
Thunder Basin Coal Co., LLC.
P. O. Box 406
Wright, WY 82732

Prepared by:

McVehil-Monnett Associates, Inc.
44 Inverness Drive East
Building C
Englewood, CO 80112

February 2015

MMA Project Number 2622-13

Reviewer ADK
cc:
Modeler NTH
D.E.
File A0000611
IMP FID F000805

# TABLE OF CONTENTS


| Section | Title | Page |
|---|---|---|
| **1.0** | **Introduction** | 1 |
| **2.0** | **New Source Review Application Form** | 2 |
| **3.0** | **Black Thunder Mine Operation** | 5 |
| 3.1 | Mine Plan | 5 |
| 3.2 | Equipment | 5 |
| 3.3 | Open Acreage | 8 |
| **4.0** | **Emission Control Practices** | 12 |
| 4.1 | Point Sources | 12 |
| 4.2 | Best Available Control Technology/Best Available Control Measures | 12 |
| 4.3 | Miscellaneous Emission Control Practices | 16 |
| 4.3.1 | Dust Control Program | 16 |
| 4.3.2 | Real-Time Emission Monitoring Program | 18 |
| 4.3.3 | Coal Fires | 21 |
| **5.0** | **Emission Inventory Development & Worst-Case Years Selection** | 22 |
| 5.1 | Black Thunder Mine Emission Inventory | 22 |
| 5.1.1 | Fugitive $PM_{10}$ Emission Inventory | 22 |
| 5.1.2 | Fugitive $PM_{2.5}$ Emission Inventory | 23 |
| 5.1.3 | Point Source $PM_{10}$ Emission Inventory | 24 |
| 5.1.4 | Mobile Source Tailpipe $PM_{10}$ Emission Inventory | 24 |
| 5.1.5 | Non-Road Engine $PM_{10}$, $NO_X$ and $SO_2$ Emission Inventory | 25 |
| 5.1.6 | Mobile and Fugitive Source $NO_X$ Emission Inventory | 25 |
| 5.1.7 | Potential-to-Emit | 25 |
| 5.2 | Regional Source Emission Inventories for the South Group of Mines | 27 |
| 5.2.1 | School Creek Mine | 28 |
| 5.2.2 | North Antelope/Rochelle Mine | 28 |
| 5.2.3 | Antelope Mine | 28 |
| 5.2.4 | Railroad, Highway, Power Plant, Urban and Regional Point Sources | 28 |
| 5.3 | Selection of Worst-Case Years | 29 |

# TABLE OF CONTENTS


| Section | Title | Page |
|---|---|---|
| **6.0** | **Dispersion Modeling Methodology** | 33 |
| 6.1 | Dispersion Model | 33 |
| 6.2 | Terrain Data | 34 |
| 6.3 | Meteorological Data | 34 |
| 6.4 | Receptors | 34 |
| 6.5 | Emission Apportioning | 35 |
| 6.6 | $PM_{10}$ Point Source Modeling Parameters | 36 |
| 6.7 | Background Concentration | 36 |
| 6.7.1 | $PM_{10}$ Background Concentration | 36 |
| 6.7.2 | $NO_2$ Background Concentration | 36 |
| **7.0** | **$PM_{10}$ Modeling Analysis and Results** | 37 |
| **8.0** | **$NO_2$ Modeling Analysis and Results** | 38 |
| **9.0** | **Other Compliance Discussions and Monitor Siting** | 40 |
| 9.1 | Short-Term $PM_{10}$ Standards | 40 |
| 9.2 | Historical Ambient Air Quality - $PM_{10}$ | 40 |
| 9.2.1 | Black Thunder Mine | 40 |
| 9.2.2 | South Group Mines | 41 |
| 9.3 | $PM_{10}$ Compliance | 42 |
| 9.4 | $PM_{2.5}$ Compliance | 43 |
| 9.5 | Ozone Compliance | 44 |
| 9.6 | 1-Hour $NO_2$ Compliance | 46 |
| 9.7 | Monitoring Network | 47 |
| **10.0** | **Summary and Conclusions** | 48 |
| **11.0** | **Reference List** | 49 |

# LIST OF TABLES


| Number | Title | Page |
|---|---|---|
| 3-1 | Black Thunder Mine Life-of-Mine Parameters | 6 |
| 3-2 | Black Thunder Mine Mining Equipment | 7 |
| 3-3 | Black Thunder Mine 2013 Open Acreage | 10 |
| 4-1 | Black Thunder Water and Chemical Use for Dust Control | 17 |
| 5-1 | PTE Summary | 27 |
| 5-2 | Black Thunder and Regional Mines Annual $PM_{10}$ Emission Summary | 31 |
| 5-3 | Black Thunder and Regional Source Annual $NO_X$ Emission Summary | 32 |
| 6-1 | Black Thunder and Regional Mine $PM_{10}$ Point Source Parameters | 36 |
| 7-1 | Annual $PM_{10}$ Modeling Results | 37 |
| 8-1 | Annual $NO_2$ Modeling Results | 39 |
| 9-1 | Summary of $PM_{10}$ Monitoring and Coal Production Data for Black Thunder | 41 |
| 9-2 | Summary of $PM_{10}$ Monitoring Data for the South Group | 42 |
| 9-3 | Powder River Basin Monitored $PM_{2.5}$ Concentrations | 43 |
| 9-4 | Summary of Regional $NO_X$ and VOC Emissions for 2011 | 44 |
| 9-5 | Fourth-Highest 8-Hour Average Ozone Concentrations at TBNG | 45 |
| 9-6 | 1-Hour $NO_2$ Concentrations at the Belle Ayr Mine | 46 |


# LIST OF MAPS


| Number | Title |
|---|---|
| 1 | Black Thunder Mine Location |
| 2 | Black Thunder Mine LNCM, Coal Progression and Monitoring Station Locations |
| 3A | Black Thunder East Coal Processing and Conveying Equipment |
| 3B | Black Thunder and Black Thunder West Coal Processing and Conveying Equipment |
| 4 | Black Thunder Mine Disturbed Acres and Haul Road Treatment Areas for 2013 |
| 5 | Black Thunder Mine Modeling Area Overview |
| 6 | Receptor Locations for $PM_{10}$ Modeling |
| 7 | Receptor Locations for $NO_2$ Significant Impact Area Modeling |
| 8 | Receptor Locations for 2018 $NO_2$ Cumulative Modeling |
| 9 | Receptor Locations for 2023 $NO_2$ Cumulative Modeling |
| 10 | 2018 Area Source Locations and $PM_{10}$ Modeling Results |
| 11 | 2023 Area Source Locations and $PM_{10}$ Modeling Results |
| 12 | 2018 $NO_2$ Significant Impact Area Results |
| 13 | 2023 $NO_2$ Significant Impact Area Results |
| 14 | 2018 $NO_2$ Cumulative Impact Results |
| 15 | 2023 $NO_2$ Cumulative Impact Results |
| 16 | Regional $PM_{10}$ Monitoring Station Locations |

# LIST OF APPENDICES


| Number | Title |
|---|---|
| 1 | PRB Coal Mine Permitting Guidance |
| 2 | Black Thunder $PM_{10}$ and $PM_{2.5}$ Emission Inventory |
| 3 | Black Thunder Non-Road Engine Emission Inventory |
| 4 | Black Thunder $NO_X$ Emission Inventory |
| 5 | Neighboring Mine $PM_{10}$ Emission Inventory |
| 6 | Neighboring Mine $NO_X$ Emission Inventory |
| 7 | Regional $NO_X$ Emission Inventory |
| 8 | $PM_{10}$ Emission Apportioning |
| 9 | $NO_X$ Emission Apportioning |
| 10 | Background $PM_{10}$ Determination |
| 11 | Ambient Air Monitoring Network Justification |

# 1.0 Introduction

The Black Thunder Mine is an existing surface coal mine located approximately 12 miles southeast of Wright, Wyoming in Campbell County (see Map 1). It is currently operated under Air Permit MD-10986 which allows a maximum of 190 million tons of production annually. McVehil-Monnett Associates, Inc. (MMA) prepared this application in support of Thunder Basin Coal Company, LLC's (TBCC) request to modify this air permit for Black Thunder. In this application, TBCC proposes to modify the coal removal progression and Lands Necessary to Conduct Mining (LNCM) boundary. The revised LNCM is needed to incorporate additional mining lease areas to the north and west of the property, scoria operations in the east, and future hydrologic control structures. A new truck dump and crusher (identified as the West Hilight truck dump and crusher) will be constructed by 2023 to accept coal from the State Section 16 lease on the west side of the mine, and an overland conveyor will transport coal from the West Hilight crusher to the existing west loadout facility. The West Hilight truck dump will be equipped with a stilling shed for dust control, and dust from the crusher and associated conveyor transfer points will be controlled with atomizer/fogger systems. The West Hilight truck dump will comply with the 10% opacity limit specified in Subpart Y. Permit MD-14786 also exists for Black Thunder and is not being modified with this application.

Chapter 6, Section 2 of the Wyoming Air Quality Standards and Regulations (WAQSR) requires a demonstration that the proposed changes will not prevent the attainment or maintenance of any applicable air quality standards. This document contains air quality modeling analyses and other supporting information showing that Chapter 6, Section 2 requirements are satisfied at the Black Thunder Mine.

## 2.0 New Source Review Application Form

Following this page is the cover sheet to the New Source Review Application form. Additional forms containing emission unit, emission control, and release point information for the sources considered in this application are provided on the attached CD. Emission information for sources included in MD-14786 may be found in that permit. Supporting documentation for this application is presented in subsequent sections of this report.

WYOMING

# Department of Environmental Quality Air Quality Division

## Permit Application Form

Is this a revision to an existing application?

Yes _____ No x

Previous Application #:

Date of Application: 2/5/2015

## COMPANY INFORMATION:

Company Name: Thunder Basin Coal Company, LLC
Address: P.O. Box 406
City: Wright State: WY Zip Code: 82732
Country: USA Phone Number: 307-464-2300

## FACILITY INFORMATION:

Facility Name: Black Thunder Mine
New Facility or Existing Facility: existing
Facility Description: surface coal mine
Facility Class: Operating Status: operating
Facility Type: Coal mine

***For Oil & Gas Production Sites ONLY:***
**First Date of Production (FDOP)/Date of Modification:**
**Does production at this facility contain H2S?***
***If yes, contact the Division.***
**API Number(s):**

NAICS Code: 212111

## FACILITY LOCATION:

***Enter the facility location in either the latitude/longitude area or section/township/range area. Both are not required.**

Physical Address: 12 miles south of Wright on Highway 450
City: Wright Zip Code: 82732
State: WY County: Campbell

## OR

Latitude: Longitude: County:
Quarter Quarter: Quarter:
Section: Township: Range:

***For longitude and latitude, use NAD 83/WGS84 datum and 5 digits after the decimal (i.e. 41.12345, -107.56789)***

## CONTACT INFORMATION:

***Note that an Environmental AND NSR Permitting Contact is required for your application to be deemed complete by the agency.**

Title: Ms. First Name: Lecia
Last Name: Craft
Company Name: Thunder Basin Coal Company, LLC
Job Title: Environmental Supervisor
Address: P.O. Box 406
City: Wright State: WY
Zip Code: 82737
Primary Phone No.: 307-464-2300 E-mail: LCraft@archcoal.com
Mobile Phone No.: Fax No.: 307-464-2313
Contact Type: Environmental and NSR Start Date:

Additional Contact Type (if needed): NA

Title: First Name:

Last Name:

Company Name:

Job Title:

Address:

City: State:

Zip Code:

Primary Phone No.: E-mail:

Mobile Phone No.: Fax No.:

Contact Type: Start Date:

## FACILITY APPLICATION INFORMATION:

### General Info:

| | |
|---|---|
| Has the facility changed location or is it a new/ greenfield facility? | no |
| Has a Land Use Planning document been included in this application? | no |
| Is the facility located in a sage grouse core area?* | no |
| If the facility is in a sage grouse core area, what is the WER number? | |

** For questions about sage grouse core area, contact WY Game & Fish Department.*

### Federal Rules Applicability - Facility Level:

| | |
|---|---|
| Prevention of Significant Deterioration (PSD): | no |
| Non-Attainment New Source Review: | no |

### Modeling Section:

| | |
|---|---|
| Has the Air Quality Division been contacted to determine if modeling is required? | yes |
| Is a modeling analysis part of this application? | yes |
| Is the proposed project subject to Prevention of Significant Deterioration (PSD) requirements? | no |
| Has the Air Quality Division been notified to schedule a pre-application meeting? | yes |
| Has a modeling protocol been submitted to and approved by the Air Quality Division? | no |
| Has the Air Quality Division received a Q/D analysis to submit to the respective FLMs to determine the need for an AQRV analysis? | no |

### Required Attachments:

| | |
|---|---|
| Facility Map | ☑ |
| Process Flow Diagram | ☑ |
| Modeling Analysis (if applicable) | ☑ |
| Land Use Planning Document | ☐ |
| Detailed Project Description | ☑ |
| Emissions Calculations | ☑ |

I, Keith Williams President and General Manager

Responsible Official (Printed Name) Title

an Official Representative of the Company, state that I have knowledge of the facts herein set forth and that the same are true and correct to the best of my knowledge and belief. I further certify that the operational information provided and emission rates listed on this application reflect the anticipated emissions due to the operation of this facility. The facility will operate in compliance with all applicable Wyoming Air Quality Standards and Regulations.

Signature: Keith Williams (ink) Date: 2/5/2015

# 3.0 Black Thunder Mine Operation

## 3.1 Mine Plan

The Black Thunder Mine is an existing surface coal mine that utilizes draglines and truck/shovel techniques to mine coal. This modification to the Black Thunder air permit makes revisions to the coal pit progression and LNCM boundary, and adds a new truck dump, crusher, and overland conveyor system by year 2023. Map 2 presents the revised coal progression and proposed LNCM boundary. Table 3-1 contains the production parameters (tons, yards, vehicle miles traveled, hours, etc.) that form the basis for emission computations.

## 3.2 Equipment

Mining equipment that will be utilized changes from year-to-year depending on haul distance, overburden thickness and other factors. The percentage of larger equipment generally increases through time as older, smaller equipment is retired. Table 3-2 lists the current mining equipment and the equipment needed to operate with this mine plan.

The existing coal preparation facilities consist of six truck dumps with primary crushers (Primary, Near-Pit, Circuit 3, Circuit 4, 5-West, 6-North), four overland conveyors, storage silos, and three rail loadouts. Dust in the preparation, storage, and loadout facilities is controlled with atomizer/fogger units. Stilling sheds are used to control emissions from the truck dump hoppers. Map 3A is a flow diagram of the existing Black Thunder East (Circuits 3 and 4) preparation, conveying, storage and loadout facilities. Map 3B shows the Black Thunder and Black Thunder West facilities. Also shown on these diagrams are the locations of all emission control units, which are described in Section 4.0.

**Table 3-2**
**Black Thunder Mine**
**Mining Equipment**

| Equipment | Type/Size | Operating in 2014 | Operating at 190 MM TPY |
|---|---|---|---|
| Draglines | 44 - 164 cubic yard | 6 | 7 |
| Shovels | 36 - 85 cubic yard | 22 | 28 |
| Haul Trucks | 240 - 400 ton | 146 | 202 |
| Front End Loaders | 4 - 54 cubic yard | 12 | 13 |
| Rubber Tire Dozers | Cat 854 or equivalent | 8 | 10 |
| Track Dozers | Cat D10 | 4 | 9 |
| | Cat D11 | 36 | 41 |
| Scrapers | Cat 637E | 2 | 2 |
| | Cat 657E | 5 | 7 |
| Graders | Cat 16H | 3 | 8 |
| | Cat 24H | 17 | 20 |
| Water Trucks | 12,000 gal | 1 | 1 |
| | 18,000 gal | 1 | 1 |
| | 20,000 gal | 1 | 1 |
| | 36,000 gal | 2 | 2 |
| | 42,000 gal | 6 | 6 |
| | 42,500 gal | 2 | 2 |
| | 48,500 gal | 3 | 8 |
| Drills | 10 - 12¼ inch diameter | 14 | 16 |

## 3.3 Open Acreage

Permitting requirements established by the Wyoming Department of Environmental Quality, Air Quality Division (AQD) in 2002 include a discussion of open acreage potentially subject to wind erosion. More specifically, the requirement is to discuss, summarize, and map the land status for the current year and for the years modeled. This is similar to a Wyoming Department of Environmental Quality, Land Quality Division (LQD) annual report requirement. Much of the information provided herein has been obtained from the annual report to LQD for the 2013 reporting year, which represents the "current year" for this application.

Detailed plan information is not available for the modeled years of 2018 and 2023. Current conditions or information are assumed to represent a reasonable estimate for those years. Because of this assumption, the information has not been mapped, but may be assumed to generally resemble the configuration of the operation in 2013.

**Most Recent Year – 2013**

At the end of the 2013 annual reporting period, Black Thunder had disturbed a total of 29,561 acres since mining commenced. *(A disturbed acre is one that has been disturbed for any mining or mining-related activity. This definition does not address the current status of a disturbed acre – it may be part of the active pit or completely reclaimed.)* The status of these lands is shown on Table 3-3. Forty-four percent (12,870 acres) of the total disturbed acres have been permanently reclaimed and are considered stable. The remaining acres are considered to be **Potential Open Acres**.

**Potential Open Acres** have been divided into two categories. **Potential Open Acres: Pit** represents the active coal pits, including areas of topsoil stripping and stockpiling, overburden removal and backfilling or stockpiling, coal removal, and in-pit haul roads. Also included are areas

mined but unreclaimed. These areas are defined in the annual report to LQD. **Potential Open Acres: Pit** accounts for 6,095 acres, or about 21% of the total disturbed acreage.

**Potential Open Acres: Other** includes all other disturbance areas at the mine outside of the pit area. Included are areas of the preparation plants, railroad loops and associated facilities, maintenance shops, warehouses, storage areas, administrative offices, spoil and topsoil stockpiles, out-of-pit coal haul roads, mine access roads, monitoring sites, utility and conveyor corridors, and so forth. At Black Thunder, this category covers 10,596 acres, or 36% of the total disturbed area.

Within each of these categories, some lands have been stabilized. For example, within the **Pit** area, roads are treated with chemical agents or watered, and impoundments have been revegetated for stabilization. Some areas of backfill that are or will remain inactive for long periods of time have also been seeded, ripped, rough and/or plug dumped. Black Thunder utilizes scarification and other methods such as rough and/or plug dumping to control dust on larger temporarily inactive disturbed acres. Within the **Other** category, stable areas include paved roads and parking areas, buildings, roads treated with chemical agents or water, and revegetated road slopes, stockpiles, impoundments and diversions.

For both categories, the stabilized acres were subtracted from the respective **Potential Open Acre** figures. This resulted in the **Actual Open Acre** figures shown in Table 3-3. **Actual Open Acres: Pit** covers 3,995 acres and **Actual Open Acres: Other** covers 3,096 acres. When summed, these figures give the **Total Actual Open Acres** of 7,091 that existed at the end of 2013. These are considered the acres subject to wind erosion. Map 4 shows the disturbed acre status as of 2013.

**Table 3-3**
**Black Thunder Mine**
**2013 Open Acreage**

| Category | 2013 Acres |
|---|---|
| Total Disturbed Acres | 29,561 |
| Total Permanently Reclaimed Acres | 12,870 |
| **Potential Open Acres** | **16,691** |
| Potential Open Acres: Pit | 6,095 |
| Stabilized Acres: Pit | 2,100 |
| **Actual Open Acres: Pit** | **3,995** |
| Potential Open Acres: Other | 10,596 |
| Stabilized Acres: Other | 7,500 |
| **Actual Open Acres: Other** | **3,096** |
| | |
| **Total Actual Open Acres** | **7,091** |

**Model Years – 2018, 2023**

Detailed plans for these model years have not been created. Therefore, the open acre figures for 2013 have been adjusted based on mining and reclamation assumptions for the life of the mine, to determine conditions for the model years. Considerations for adjustment of the current open acre figure to future years include:

- Open acres will increase slightly with the additional mining area in State Section 16 beginning in year 2021. The other pit configurations will remain the same, but greater acreage due to increasing pit depths will increase potential open acres in the pits.
- Reclamation and stabilization efforts generally keep pace with mining; therefore, the use of 2013 as a model for future years is reasonable. Additional facilities will be added for the West Hilight circuit, but other facilities are not expected to change significantly over the life of the mine.
- Black Thunder maintains a program of contemporaneous reclamation that stresses permanent reclamation at the earliest possible date. This has and will continue to keep

## Table 3-1
## Black Thunder Mine
## Life-of-Mine Parameters

| Year | Coal Tons | Coal Haul Truck | | Dragline OB | Shovel OB | OB Haul Truck | | Water Truck | | Drill Hrs | | Scraper Hrs | Grader Hrs | Tracked Dozer Hrs | Rubber Tire Dozer Hrs | | Wheeled Loader Hrs | | Number of Blasts | | Tons of ANFO Used | | Train Hrs | Untreated Open | Treated Open |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | VMT | Hrs | $Yd^3$ | $Yd^3$ | VMT | Hrs | VMT | Hrs | Coal | OB | | | on OB | Coal | OB | Coal | OB | Coal | OB | Coal | OB | | Acres | Acres |
| 2015 | 190,000,000 | 3,939,654 | 372,811 | 295,158,158 | 438,932,656 | 7,553,755 | 868,248 | 620,529 | 62,053 | 12,561 | 56,845 | 27,768 | 161,338 | 310,017 | 12,000 | 70,162 | 47,500 | 42,709 | 1,357 | 1,472 | 47,500 | 257,590 | 224,040 | 8,598 | 955 |
| 2016 | 190,000,000 | 4,299,812 | 414,209 | 283,783,554 | 447,699,776 | 7,707,339 | 885,901 | 650,055 | 65,005 | 12,888 | 56,007 | 27,768 | 169,014 | 314,631 | 12,000 | 69,324 | 47,500 | 41,631 | 1,357 | 1,447 | 47,500 | 253,163 | 225,285 | 9,131 | 1,015 |
| 2017 | 190,000,000 | 4,443,613 | 430,737 | 291,842,005 | 476,016,709 | 8,203,402 | 942,920 | 686,829 | 68,683 | 12,459 | 58,865 | 27,768 | 178,575 | 329,535 | 12,000 | 72,183 | 47,500 | 45,307 | 1,357 | 1,523 | 47,500 | 266,529 | 225,328 | 9,664 | 1,074 |
| 2018 | 190,000,000 | 4,715,616 | 462,002 | 270,501,112 | 476,273,216 | 8,207,896 | 943,436 | 702,719 | 70,272 | 13,570 | 57,720 | 27,768 | 182,707 | 329,670 | 12,000 | 71,037 | 47,500 | 43,834 | 1,357 | 1,488 | 47,500 | 260,362 | 227,027 | 10,012 | 1,112 |
| 2019 | 190,000,000 | 5,060,510 | 501,645 | 252,305,995 | 421,006,177 | 7,239,714 | 832,151 | 666,898 | 66,690 | 9,721 | 53,056 | 27,768 | 173,394 | 288,182 | 12,000 | 66,372 | 47,500 | 37,836 | 1,357 | 1,356 | 47,500 | 237,237 | 221,242 | 10,406 | 1,156 |
| 2020 | 190,000,000 | 5,246,270 | 522,997 | 252,944,464 | 456,125,004 | 7,854,935 | 902,866 | 712,932 | 71,293 | 8,192 | 55,460 | 27,768 | 185,362 | 294,266 | 12,000 | 68,777 | 47,500 | 40,928 | 1,357 | 1,406 | 47,500 | 246,125 | 214,465 | 10,799 | 1,200 |
| 2021 | 190,000,000 | 5,538,604 | 556,599 | 262,693,326 | 408,410,007 | 7,019,051 | 806,788 | 681,693 | 68,169 | 7,864 | 52,876 | 27,768 | 177,240 | 269,153 | 12,000 | 66,192 | 47,500 | 37,603 | 1,357 | 1,345 | 47,500 | 235,379 | 214,293 | 11,703 | 1,300 |
| 2022 | 190,000,000 | 5,656,720 | 570,175 | 270,430,112 | 430,694,865 | 7,409,443 | 851,660 | 710,918 | 71,092 | 7,646 | 55,014 | 27,768 | 184,839 | 280,882 | 12,000 | 68,330 | 47,500 | 40,353 | 1,357 | 1,393 | 47,500 | 243,836 | 214,393 | 12,085 | 1,343 |
| 2023 | 190,000,000 | 5,730,401 | 578,644 | 269,071,012 | 560,494,500 | 9,683,305 | 1,113,024 | 845,834 | 84,583 | 7,646 | 63,560 | 27,768 | 219,917 | 349,197 | 12,000 | 76,879 | 47,500 | 51,345 | 1,357 | 1,580 | 47,500 | 276,556 | 214,541 | 11,378 | 1,264 |
| 2024 | 190,000,000 | 4,567,616 | 444,991 | 202,890,957 | 515,252,181 | 8,890,739 | 1,021,924 | 733,457 | 73,346 | 7,427 | 54,043 | 27,768 | 190,699 | 325,385 | 12,000 | 67,360 | 47,500 | 40,008 | 1,357 | 1,337 | 47,500 | 233,964 | 216,782 | 10,539 | 1,171 |
| 2025 | 190,000,000 | 3,459,737 | 317,648 | 185,070,840 | 593,473,808 | 10,261,045 | 1,179,430 | 748,539 | 74,854 | 7,427 | 57,110 | 27,768 | 194,620 | 354,155 | 12,000 | 70,427 | 47,500 | 43,049 | 1,357 | 1,380 | 47,500 | 241,529 | 217,648 | 9,807 | 1,090 |
| 2026 | 190,000,000 | 1,497,672 | 114,764 | 293,599,851 | 336,862,994 | 5,765,673 | 662,721 | 388,743 | 38,874 | 6,335 | 48,108 | 27,768 | 101,073 | 219,096 | 12,000 | 61,422 | 47,500 | 31,676 | 1,357 | 1,165 | 47,500 | 203,820 | 224,112 | 10,004 | 1,112 |
| 2027 | 183,448,841 | 1,243,660 | 95,300 | 356,086,801 | 48,537,567 | 748,670 | 86,054 | 90,677 | 9,068 | 6,117 | 49,878 | 27,121 | 23,576 | 67,174 | 12,000 | 62,735 | 45,862 | 34,797 | 1,310 | 1,142 | 45,862 | 199,780 | 225,000 | 9,094 | 1,010 |
| 2028 | 148,091,317 | 1,076,428 | 82,485 | 303,852,210 | 217,286,524 | 3,634,194 | 417,724 | 250,104 | 25,010 | 5,789 | 39,558 | 23,629 | 65,027 | 155,058 | 12,000 | 49,936 | 37,023 | 27,181 | 1,058 | 581 | 37,023 | 101,745 | 225,000 | 8,084 | 898 |
| 2029 | 173,622,102 | 1,326,300 | 101,632 | 355,171,525 | 297,329,158 | 5,058,764 | 581,467 | 341,550 | 34,155 | 5,789 | 49,249 | 26,150 | 88,803 | 197,858 | 12,000 | 61,418 | 43,406 | 35,560 | 1,240 | 1,178 | 43,406 | 206,224 | 225,000 | 6,582 | 731 |
| 2030 | 190,000,000 | 1,324,468 | 101,492 | 326,108,231 | 356,320,800 | 6,106,540 | 701,901 | 401,696 | 40,170 | 3,932 | 51,855 | 27,768 | 104,441 | 229,337 | 12,000 | 65,171 | 47,500 | 36,291 | 1,357 | 1,247 | 47,500 | 218,260 | 225,000 | 5,110 | 568 |
| 2031 | 190,000,000 | 888,515 | 68,085 | 0 | 739,423,554 | 12,817,829 | 1,473,314 | 770,700 | 77,070 | 646 | 52,107 | 27,768 | 200,382 | 406,170 | 12,000 | 65,422 | 47,500 | 36,614 | 1,357 | 1,246 | 47,500 | 218,130 | 225,000 | 3,316 | 368 |

the acres mined and unreclaimed to a minimum. Scarification of disturbed acres and continued treatment of roads and other long-term facility areas is expected to control the number of acres subject to wind erosion.

- Temporary reclamation, as discussed in Section 4.2 of this application, will result in stabilization of topsoil stockpiles, impoundments, diversions and other inactive disturbance areas within an average of two months after seeding. This program has helped Black Thunder to minimize erosion from disturbed acres that could not be permanently reclaimed immediately.

# 4.0 Emission Control Practices

This section contains descriptions of the programs, practices and technologies in place for controlling particulate emissions at Black Thunder. Many of the activities qualify as Best Available Control Technology (BACT) for controlling particulate emissions at certain fugitive and point sources. Other activities qualify as Best Practices for the purpose of managing the operations to control or mitigate particulate emissions.

## 4.1 Point Sources

Most of the point sources at Black Thunder are controlled with atomizer/fogger units. The two exceptions are the coal-fired hot water generators which are controlled with baghouses. Maps 3A and 3B show locations of foggers and baghouses in the preparation and processing facilities.

The atomizer/foggers are zero-visible emission systems designed to control dust in an enclosed environment. The atomizer/fogger systems have been found to reliably control dust in the enclosed environment without visible emissions to the atmosphere. This technology has been identified by AQD as meeting the requirements of BACT for several coal mines in the Powder River Basin.

## 4.2 Best Available Control Technology/Best Available Control Measures

WAQSR Chapter 6, Section 2 requires all sources for which a Permit to Construct is necessary to use BACT to reduce or eliminate particulate emissions. Minimum BACT standards are established by regulation for large surface mines. Black Thunder employs BACT to control fugitive and point source emissions as described below.

- *The paving of access roads (Chapter 6 Section 2(c)(v)(A)):* The main access roads to the mine have been paved. Paving is also utilized in parking areas wherever practicable.

- *The treating of major haul roads with a suitable dust suppressant (Chapter 6 Section 2(c)(v)(B)):* BACT is effected on major haul roads, facility roads, rail access roads and parking areas through the use of water and surfactants, and the application of chemicals such as magnesium chloride. The haul road watering and treatment program is discussed in further detail below. A control efficiency of 60% has been assumed for water and chemical treatment on roads.
- *The treatment of temporary haul roads (Chapter 6 Section 2(c)(v)(C)):* The program for control of fugitive dust on temporary haul roads is similar to that for major haul roads. Water is applied whenever the roads are in use and when wind erosion from the roadway becomes a concern. Watering efficiency is improved under certain conditions by the addition of surfactants. This treatment is used on all roads that are watered. Temporary haul roads are generally not treated with magnesium chloride because the effective life of such treatments far exceeds the short duration of these roads. It therefore becomes uneconomical as a treatment for temporary roads. Other than use of water, there are no other economical methods for treating temporary roads.
- *The use of silos, trough barns, or similar enclosed containers for the storage of large volumes of material awaiting loadout and shipment (Chapter 6 Section (c)(v)(D)):* Black Thunder Mine has multiple silos/barns for the storage of coal awaiting loadout.
- *The treatment of active work areas (Chapter 6 Section 2(c)(v)(E)):* There are numerous practices Black Thunder Mine employs to mitigate fugitive emissions in active work areas or from active operations. Included are practices for controlling emissions from scraper operations, overburden and coal blasting, overburden and coal loading, coal dumping, repair of haul roads, and areas subject to wind erosion, as described below.

- *Scrapers:* Emissions are controlled through the application of water to the surfaces on which scraper operations occur. This is considered BACT for these active work areas because there is no other known method of control. In the calculation of emissions estimates, a control efficiency of 50% is associated with this control approach.
- *Overburden and Coal Blasting:* Best mining practices are used to limit the number and/or surface area extent of overburden and coal blasts. No control efficiencies are assumed for these work practices.
- *Overburden and Coal Loading:* Limiting the drop height between the shovel bucket and truck bed, or dragline and spoil pile, minimizes emissions from overburden and coal loading operations. This is considered a best practice and BACT because of its effectiveness in reducing emissions. No control efficiency is assumed.
- *Coal Dumping:* Stilling sheds are used to control fugitive emissions from coal truck dumping operations. Properly designed stilling sheds are consistent with the AQD's definition of BACT. A control efficiency of 85% is assumed for stilling sheds per AQD policy.
- *Haul Road Repair:* The application of water and chemicals to roads on which graders operate and perform maintenance is considered BACT. This practice is further described in the dust control plan later in this section. A control efficiency of 50% is assumed for this practice.
- *Areas Susceptible to Wind Erosion:* At Black Thunder, several practices are employed to stabilize areas subject to wind erosion.

- *Permanent reclamation:* When an area has been backfilled and topsoiled, it is revegetated with a permanent seed mixture. Permanent reclamation is performed as soon as possible after mining is completed. A control efficiency of 100% is assumed. Actual planting typically occurs in early spring or late fall when precipitation is most likely. A stubble crop may also be used to stabilize the soil and retain moisture for germination. It usually takes 1-2 months from the time of spring seeding to establish a vegetative cover capable of mitigating the effects of wind erosion (six months for the occasional fall seeding). Annual weeds such as kochia and Russian thistle generally dominate the reclaimed areas in the first year or two after seeding. These weeds provide a very effective and dense ground cover.
- *Temporary reclamation:* When an area becomes inactive and may remain so for several months to several years, temporary revegetation may be used as a method for minimizing emissions from wind erosion. Temporary revegetation will utilize plant species selected for rapid establishment. Temporary revegetation may also be used to help prepare an area for permanent revegetation. A control efficiency of 100% is assumed.
- *Scarification or other surface manipulation:* Inactive areas as described above may also be scarified, furrowed or otherwise roughened to minimize emissions due to wind erosion. The advantage to this activity is that it can be performed at any time during the year and results are immediate. Surface treatments are typically performed using heavy duty farm implements such as

large discs and chisel plows, or mining machinery with ripper shanks. A control efficiency of 80% is associated with this best management practice.

- *Coal loadout:* The coal loadout facilities are located in a protected area underneath the silos or beneath the loadout bins. Emissions are controlled through the use of telescoping chutes which effectively limit the drop height of coal into the train cars. For some customers, additional dust emission reduction is provided by water/chemical spray systems. In combination, the chute/spray system is believed to represent BACT because of its effectiveness and the absence of feasible alternative technologies.

## 4.3 Miscellaneous Emission Control Practices

### 4.3.1 Dust Control Program

Black Thunder operates a dust control program involving the use of large volumes of water and chemical dust suppressants on roads, disturbed ground, and in the preparation plant dust control systems. Water and chemical use rates can vary widely depending on the specific circumstances, including the location and duration of mining activities and the amount of precipitation received. Considerations for chemical use involve the offsetting effect of different chemicals and effectiveness of residual chemicals from prior treatments. The overall effectiveness of the dust control program relies on an assessment of current circumstances and the flexibility to react to changing conditions. Historical use of water and chemicals is summarized in Table 4-1.

**Table 4-1**
**Black Thunder Water and Chemical Use for Dust Control**

| Year | Number of Water Trucks by Capacity | Water (gallons) | Magnesium Chloride Solution (gallons) |
|---|---|---|---|
| 2011 | 2 – 12,000 gallon<br>1 – 18,000 gallon<br>1 – 20,000 gallon<br>3 – 36,000 gallon<br>6 – 42,000 gallon<br>2 – 42,500 gallon<br>3 – 48,500 gallon | 838,775,644 | 447,407 |
| 2012 | 2 – 12,000 gallon<br>1 – 18,000 gallon<br>1 – 20,000 gallon<br>3 – 36,000 gallon<br>6 – 42,000 gallon<br>2 – 42,500 gallon<br>3 – 48,500 gallon | 1,203,940,174 | 314,814<br>(plus 5,336 gallons of Pennzsuppress) |
| 2013 | 1 – 12,000 gallon<br>1 – 18,000 gallon<br>1 – 20,000 gallon<br>2 – 36,000 gallon<br>6 – 42,000 gallon<br>2 – 42,500 gallon<br>3 – 48,500 gallon | 1,050,940,174 | 188,888 |

In 2013 there were sixteen water trucks used on the mine site. Occasionally, the mine will use rental water trucks to supplement the existing fleet or for coverage when a mine water truck will be down for a significant period of time. Topsoil and reclamation contractors also water their areas. In the future, water trucks may be added as equipment availability and haul road lengths warrant.

The roads treated in calendar year 2013 are shown on Map 4. Non-road areas that have received water applications for dust control include the areas of active topsoil stripping and the facilities areas.

Over the past three years, magnesium chloride has been applied to portions of the coal haul roads, portions of the overburden haul roads, various portions of other haul and access roads, and around the facilities and the rail loops. The areas selected for these treatments see the most sustained

and long-term traffic of all areas at the mine. As a result, they had been afforded a disproportionately high percentage of the watering and chemical attention.

Magnesium chloride or other similar dust suppressant chemicals are selectively applied at approximately the manufacturer's recommended rate. Applications have been made up to two times each year. In multiple applications over time, the application rate may be less due to residual effects, but varies depending upon the road conditions. Magnesium chloride acts as a road stabilizer and is therefore effective where road use occurs over extended timeframes.

There are no fundamental changes proposed for this dust control program for the future. Water and chemical use in the long term is tied to several factors but could be expected to increase. Road lengths subject to watering will increase as coal haul distances become greater. Coal production is expected to rise, further increasing vehicle miles. However, potential truck fleet changes and conveyor extensions would decrease the number of vehicle miles traveled.

### 4.3.2 Real-Time Emission Monitoring Program

Black Thunder employs two continuous tapered element oscillating microbalance (TEOM) samplers. These samplers enhance the mine's ability to determine the immediate sources of emissions and respond to high levels of fugitive particulate emissions based on real time data. The mine has installed an automated system that is monitored by the mine dispatcher. The system triggers an alert when monitored emissions elevate to a level of concern. These threshold levels have been set low enough that emission sources can be proactively determined and appropriate measures can be implemented in a timely fashion. Threshold levels above these values will not be implemented without approval from AQD.

When hourly values are above 300 $\mu g/m^3$, the production supervisor will be notified and will:

- Supervisor Actions:

- Notify Production Superintendent
- Ensure adequate water trucks operating
- Ensure problem areas are addressed
- Record water usage and activities for the shift

When the 24-hour average (for hours since the previous midnight) exceeds 150 $\mu g/m^3$, the production supervisor is notified and will:

- Supervisor Actions:
  - Upon notification, the operations supervisor will consider relevant information, which can include time of day, wind speed, wind direction, and/or the near-term forecast for precipitation and wind activity
  - Notify Production Superintendent, who will notify the Mine Manager if it appears an excursion of the full-day 24-hour average of 150 $\mu g/m^3$ may occur
  - Determine areas of mining activity that are generating visible dust
  - Direct water trucks to those areas where access is feasible
  - Prioritize efforts at locations nearest to the mine boundary
  - Ensure adequate water trucks are operating
  - Ensure problem areas are addressed
  - Note any offsite or non-mine activities that may be contributing
  - Inspect topsoil removal and reclamation contractors to ensure proper dust control
  - If it is precipitating in the field, notify dispatch of conditions and continue to monitor levels and field conditions. (The monitor may read false highs until precipitation conditions change.)
  - In areas where water truck access is not feasible, relocate, modify or shut down

mining activities contributing dust in the area nearest the triggered monitor, if necessary, to stabilize dust conditions. The immediate focus should be on those activities that generate fine soil particles. These activities include:

- Spoil Ripping
- Topsoil chiseling
- Topsoil laydown
- Road maintenance/grading
- Haul truck traffic
- Truck dumping of waste coal
- Truck dumping of product coal
- Truck dumps of overburden and/or topsoil

- The secondary focus should be on those activities that generate large soil particles. These activities include:
  - Spoil dozing
  - Dragline operations in the south pit if the spoil peaks are insufficient to contain the dust
  - Other dragline operations
  - If feasible, modify dragline operations to dump the spoils as low as possible in high wind conditions

Because of the automated data collection and alarm system coupled with immediate notification and involvement of operations personnel, this plan has been shown to be workable and effective 24 hours per day.

### 4.3.3 Coal Fires

Black Thunder operates a program to mitigate coal fires originating from spontaneous combustion as rapidly as possible. All employees are responsible for reporting coal fires to a production supervisor. The production supervisor, in communication with other mine management, will determine the best way to handle any particular fire to mitigate impacts to safety and air quality. Common methods include digging out the fire and burying it low in the backfill, or dumping overburden on the fire. Reported fires are extinguished within 24 hours unless operational safety issues prevent entering the area. For significant fires, operation personnel will document the measures used to extinguish the fire.

# 5.0 Emission Inventory Development & Worst-Case Years Selection

Fugitive and point source emission inventories for $PM_{2.5}$, $PM_{10}$ and $NO_X$ were developed for Black Thunder based on site-specific information provided by the mine (see Section 5.1). Fugitive and point source emissions for $PM_{10}$ and $NO_X$ from nearby mines (School Creek, North Antelope/Rochelle, and Antelope Mines) were also developed (see Section 5.2). The resultant particulate emission inventories were used to determine the years that would be modeled.

It is important to note that calculations of future mine-wide emissions from Black Thunder and other regional sources are based on methodology prescribed by the AQD. A memorandum, *PRB Coal Mine Permitting Guidance*, issued by WDEQ-AQD on February 27, 2006 (WDEQ-AQD[(A)], 2006) provides the basis for how this permitting analysis was performed (see Appendix 1).

## 5.1 Black Thunder Mine Emission Inventory

### 5.1.1 Fugitive $PM_{10}$ Emission Inventory

Black Thunder Mine provided life-of-mine (LOM) coal production, overburden handling and related operational parameters needed for emissions inventory development for the 190 MMTPY mine plan evaluated in this application. The LOM production parameters are presented in Table 3-1. The parameters were used in conjunction with a set of emission factors endorsed by the AQD (WDEQ-AQD[(B)], 1979) and EPA's AP-42 to calculate annual emissions of $PM_{10}$ from each emission-producing activity. Note that the AQD emission factors calculate TSP emissions, which are then multiplied by AQD's factor of 0.30 to arrive at the $PM_{10}$ emissions. Fugitive $PM_{10}$ emissions at Black Thunder are presented in Appendix 2 for each year of the LOM.

### 5.1.2 Fugitive $PM_{2.5}$ Emission Inventory

A fugitive $PM_{2.5}$ emission inventory was also developed for Black Thunder, based on the $PM_{10}$ inventory previously created. Most of the emission factors used to calculate the $PM_{10}$ emission inventory were obtained from the AQD, with the exception of the bulldozing emission factor which is listed in AP-42. The AQD emission factors calculate TSP emissions, which are then multiplied by AQD's $PM_{10}$/TSP ratio of 0.30 to arrive at the $PM_{10}$ emissions. However, there are no AQD ratios provided to determine $PM_{2.5}$ emissions from these equations. Therefore, the ratios were derived from EPA's AP-42. Specific documentation for these ratios are provided in the AP-42 sections for unpaved roads (Section 13.2.2), western surface coal mining (Section 11.9), and industrial wind erosion (Section 13.2.5), and in the *Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors* (MRI, 2006). Most sources have a $PM_{2.5}/PM_{10}$ ratio of 0.10 ($PM_{2.5}$/TSP ratio of 0.03), except wind erosion which has a $PM_{2.5}/PM_{10}$ ratio of 0.15 ($PM_{2.5}$/TSP ratio of 0.045).

AP-42 Section 13.2.2, Table 13.2.2-2 lists the particle size multipliers (k) used in the industrial unpaved road emission factor equation. This constant is 0.15 for $PM_{2.5}$ and 1.5 for $PM_{10}$, a ratio of 0.10. Therefore, $PM_{2.5}$ emissions from unpaved roads were calculated by multiplying the TSP emissions generated from the AQD emission factor equation by 0.03 [(0.10 $PM_{2.5}/PM_{10}$) x (0.30 $PM_{10}$/TSP) = 0.03 $PM_{2.5}$/TSP].

Section 11.9, Table 11.9-1 contains emission factor equations and $PM_{2.5}$/TSP scaling factors for several western surface mining operations. All $PM_{2.5}$/TSP ratios for the operations listed in Table 11.9-1 are 0.03 or less (with the exception of bulldozing). Therefore, it was determined that a $PM_{2.5}$/TSP ratio of 0.03 applied to the results of AQD's TSP emission factor equations was appropriate in most cases. Coal and overburden bulldozing (and loader activity not related to product

removal) emission factor equations are not provided in AQD's emission factor guideline, so these equations have historically been used as shown for "Bulldozing" in Table 11.9-1 of AP-42. $PM_{2.5}$ emissions are calculated directly from the equations in this table.

AP-42 Section 13.2.5 lists the particle size multipliers (k) used in the industrial wind erosion emission factor equation. This constant is 0.075 for $PM_{2.5}$ and 0.5 for $PM_{10}$, a ratio of 0.15. Therefore, $PM_{2.5}$ emissions from wind erosion were calculated by multiplying the TSP emissions generated from the AQD emission factor equation by 0.045 [(0.15 $PM_{2.5}/PM_{10}$) x (0.30 $PM_{10}$/TSP) = 0.045 $PM_{2.5}$/TSP].

A $PM_{2.5}$ emission inventory for Black Thunder is presented in Appendix 2.

### 5.1.3 Point Source $PM_{10}$ Emission Inventory

The Black Thunder coal preparation and processing facilities include crushers, material transfer points, silos and loadouts. Most point sources are controlled for particulate emissions with atomizer/foggers, except the two coal-fired hot water generators which use baghouses for dust control. The atomizers/foggers are located within enclosed structures and are deemed by AQD to be a zero visible emission technology.

### 5.1.4 Mobile Source Tailpipe $PM_{10}$ Emission Inventory

Per AQD requirements, tailpipe $PM_{10}$ emissions from mobile sources have been calculated in this application. Emission sources include scrapers, haul trucks, graders, dozers, water trucks, drills, and loaders. Locomotives, although not owned by TBCC, are also included. Emissions were calculated using AP-42 emission factors for all sources except locomotives, where the emission factor was taken from the AQD 2000 database. Please refer to Appendix 2 for additional calculation details.

### 5.1.5 Non-Road Engine $PM_{10}$, $NO_X$ and $SO_2$ Emission Inventory

$PM_{10}$, $NO_X$ and $SO_2$ emissions from non-road engines were calculated using equipment information provided by Black Thunder. This equipment includes light plants, pumps, welders, and generators. $PM_{10}$ emissions for each engine were calculated using the engine tier standards and totaled 11.1 tons per year. $NO_X$ emissions are estimated to be 160.6 tons per year and $SO_2$ emissions are estimated to be 14.2 tons per year. See Appendix 3 for details.

### 5.1.6 Mobile and Fugitive Source $NO_X$ Emission Inventory

Emission sources included in this inventory are mobile source mining equipment such as scrapers, haul trucks, graders, dozers, water trucks and locomotives, and fugitive sources such as overburden and coal blasting events. Mobile source (tailpipe) $NO_X$ emissions were calculated using estimated operating hours necessary to mine coal at the projected production rate and EPA-approved mobile source emission factors. $NO_X$ emissions from blasting were calculated using estimated explosive usage necessary to mine coal at the projected rate and an EPA-approved emission factor. The annual $NO_X$ emissions at Black Thunder are presented in Appendix 4.

### 5.1.7 Potential-to-Emit

Emissions from stationary point sources and certain fugitive sources (truck dumps) at the preparation plant count toward the potential-to-emit (PTE) of the mine for WAQSR Chapter 6, Section 3 and Section 4 applicability purposes. At the proposed maximum coal mining rate of 190 MMTPY, $PM_{10}$ emissions from the coal truck dumps are estimated to be 54.5 tons per year. This estimate is based on an AQD-approved emission factor and a control efficiency of 85% for stilling shed control. See Appendix 2 for details. In addition to the truck dumps, the two coal-fired hot water generators emit a combined 5.7 tons of $PM_{10}$, 40.0 tons of $NO_X$, 88.1 tons of CO, and 37.8 tons of $SO_2$ per year. Emission calculations for the hot water generators are provided below:

---

Combined fuel usage (per Permit MD-14786) = 6,530 tons coal/year
Hot water generator #1 (18.65 MMBtu/hr) = 2,233 tons coal/year
Hot water generator #2 (35.824 MMBtu/hr) = 4,297 tons coal/year

Heat content of coal = 17.52 MMBtu/ton (from application in support of Permit MD-10986)

Emission factors (from application in support of Permit MD-10986):

| $PM_{10}$ | $NO_X$ | CO | $SO_2$ |
|---|---|---|---|
| 0.1 lb/MMBtu | 0.7 lb/MMBtu | 1.54 lb/MMBtu | 0.66 lb/MMBtu |

Annual emissions:

| | MMBtu/year | $PM_{10}$ tons/year | $NO_X$ tons/year | CO tons/year | $SO_2$ tons/year |
|---|---|---|---|---|---|
| Hot water generator #1 | 39,122 | 1.96 | 13.69 | 30.12 | 12.91 |
| Hot water generator #2 | 75,283 | 3.76 | 26.35 | 57.97 | 24.84 |
| Totals: | | 5.72 | 40.04 | 88.09 | 37.75 |

---

Table 5-1 presents the PTE summary for Black Thunder. Emissions from the stationary sources not described above were obtained from Black Thunder's Permit MD-14786. Because the PTE values are below the 100 ton per year major source threshold limit specified in Chapter 6, Section 3 of the Wyoming Air Quality Standards and Regulations, Black Thunder is not subject to the Title V operating permit program, and is a minor source for purposes of Chapter 6, Section 4 applicability.

**Table 5-1**
**PTE Summary (tpy)**

| Source | $PM_{10}$ | $NO_X$ | CO | $SO_2$ |
|---|---|---|---|---|
| Truck Dumps | 54.5 | - | - | - |
| Hot Water Generators[A] | 5.7 | 40.0 | 88.1 | 37.8 |
| Four Top-Off System Dust Collectors[B] | - | - | - | - |
| Propane Heaters | - | 16.3 | 9.4 | 0.1 |
| Used Oil Heater #1 | - | 0.1 | <0.1 | <0.1 |
| Used Oil Heater #2 | - | 0.4 | 0.1 | 0.1 |
| Detroit Emergency Generator #1 (Primary) | - | 0.4 | 0.1 | <0.1 |
| Detroit Emergency Generator #2 (Slot) | - | 0.4 | 0.1 | <0.1 |
| John Deere Emergency Generator #3 (Silo) | - | 0.4 | 0.1 | <0.1 |
| Cummins Emergency Generator #4 (Utility Building - BT West) | - | 0.4 | 0.1 | <0.1 |
| Detroit Emergency Generator #5 (Plant Control - BT East) | - | 0.4 | 0.1 | <0.1 |
| Cummins Fire Pump (Utility Building) | - | 0.2 | <0.1 | <0.1 |
| Cummins Fire Pump (East) | - | 0.2 | <0.1 | <0.1 |
| Detroit Fire Pump (Silo) | - | 0.2 | <0.1 | <0.1 |
| **Totals** | **60.2** | **59.4** | **98.1** | **38.0** |

[A] $PM_{10}$ emissions from the hot water generators are further controlled with baghouses.
[B] The top-off system dust collectors control displaced air from the silos as they are filled. The dust is returned to the silo or onto the conveyor. The systems are completely enclosed with no exhaust to the atmosphere.

## 5.2 Regional Source Emission Inventories for the South Group of Mines

The following regional mines in the South Group of mines were included in the $PM_{10}$ modeling analysis: Black Thunder, School Creek, North Antelope/Rochelle (NARM), and Antelope. These mines, plus regional sources provided by AQD (regional power plants and point sources, CBM sources, mainline trains, urban areas, and road emissions), were considered in the $NO_X$ analysis. These emission sources are shown on Map 5. The South Group search area was defined by AQD in a memorandum dated May 28, 2002 as:

| | UTM Easting | UTM Northing |
|---|---|---|
| South Group SW corner | 450000 | 4806400 |
| South Group NW corner | 450000 | 4852000 |
| South Group NE corner | 490000 | 4852000 |
| South Group SE corner | 490000 | 4806400 |

### 5.2.1 School Creek Mine

Fugitive and point source $PM_{10}$ emissions and $NO_X$ emissions at the School Creek Mine were taken from the most recent permit application obtained from AQD files, dated August 2008 (MMA, 2008). $PM_{10}$ emission inventories are shown in Appendix 5, and $NO_X$ emissions for the modeled years (see Section 5.3) are shown in Appendix 6.

### 5.2.2 North Antelope/Rochelle Mine

Fugitive $PM_{10}$ and $NO_X$ emissions at NARM were taken from the most recent permit application obtained from AQD files, dated April 2014 (MMA, 2014). $PM_{10}$ emission inventories are shown in Appendix 5, and $NO_X$ emissions are shown in Appendix 6.

### 5.2.3 Antelope Mine

Fugitive $PM_{10}$ and $NO_X$ emissions at the Antelope Mine were taken from the most recent permit application dated April 2012 (MMA, 2012). Again, $PM_{10}$ emission inventories are shown in Appendix 5, and $NO_X$ emissions are shown in Appendix 6.

### 5.2.4 Railroad, Highway, Power Plant, Urban and Regional Point Sources

The information for railroads, highways, power plants, urban areas, and regional point sources were taken from the previously completed permit application for NARM (MMA, 2014) and from miscellaneous point source information provided by the state (WDEQ-AQD[(C)]). Specifically, the north/south main line railroad, Highway 59 and other small road segments, Two Elk Power Plant, Neil Simpson I and II Power Plants, Wyodak Power Plant, WYGEN Units I, II and III Power Plants, Dry Fork Station, the town of Wright and numerous compressor stations supporting oil/gas and coal bed methane production are included in this category. Only $NO_X$ emissions were considered from these sources, and emission rates were used as provided by the AQD. Available emission information for these sources is contained in Appendix 7.

## 5.3 Selection of Worst-Case Years

AQD policy requires that the maximum $PM_{10}$ and $NO_X$ impacts (during the life-of-mine) from all mine sources be identified and compared to the applicable air quality standards. Because it is not practical to model all of the years in the life-of-mine, years with maximum annual emissions from mining operations are determined and then modeled. Model results for these "worst-case" emission years are then compared to the applicable ambient air quality standards. If the maximum impact is below the air quality standard, it can be assumed that the standard will be achieved throughout the LOM.

Impacts on ambient air from Black Thunder (and other mines) are not solely dependent on emission rate. Yearly variations in mining activities, emission density, and pit proximity to defined LNCM boundaries also influence ambient air impacts. As such, it was necessary to apply a set of semi-objective criteria to select as many "worst-case" years as practical for detailed modeling. The process involves a year-to-year comparison of fugitive $PM_{10}$ emissions from the applicant mine. Annual fugitive emissions for each year are ranked and candidate worst-case years are further evaluated regarding their proximity to the LNCM boundary, as the LNCM defines the location of ambient air and therefore the placement of model receptors. If the distance between mining and the LNCM boundary is small, air quality impacts at the LNCM boundary can be more significant than impacts in years with higher emission rates that are further from the LNCM boundary. Therefore, special attention was given to those years when mining will be conducted in close proximity to LNCM boundaries.

The annual $PM_{10}$ emissions from Black Thunder and the other South Group mines are summarized in Table 5-2. Based on mine plan parameters, emission inventories, and discussions with AQD personnel, Years 2018 and 2023 were chosen as worst-cases to be modeled. Year 2018

was selected as the highest regional $PM_{10}$ emission year within the next 5 years. Black Thunder's north pit approaches its north LNCM, and School Creek and NARM's east pits are close to their LNCMs. Year 2023 was selected as Black Thunder's highest emission year and the highest emission year for all the regional mines combined. Also, Black Thunder's pit is close to its southwest LNCM, Antelope's pits are close to its west boundary, and NARM has pit areas near the southwest LNCM. The selection of these years should ensure that the maximum potential $PM_{10}$ impacts on ambient air quality are addressed.

Table 5-3 summarizes life-of-mine $NO_X$ emissions from Black Thunder. $NO_X$ modeling was performed for Years 2018 and 2023; the years were selected as described above.

**Table 5-2**
**Black Thunder and Regional Mines**
**Annual $PM_{10}$ Emission Summary (tpy)**

| Year | Black Thunder | School Creek | NARM | Antelope | Total |
|---|---|---|---|---|---|
| 2015 | 6,318 | 1,051 | 3,645 | 2,153 | 13,166 |
| 2016 | 6,451 | 916 | 3,676 | 2,367 | 13,409 |
| 2017 | 6,753 | 992 | 3,674 | 2,519 | 13,937 |
| 2018 | 6,749 | 1,035 | 3,501 | 2,792 | 14,077 |
| 2019 | 6,406 | 1,081 | 3,703 | 2,716 | 13,906 |
| 2020 | 6,715 | 1,109 | 3,793 | 2,712 | 14,327 |
| 2021 | 6,579 | 1,252 | 3,858 | 2,757 | 14,447 |
| 2022 | 6,821 | 1,158 | 3,975 | 2,809 | 14,763 |
| 2023 | 7,646 | 1,134 | 3,471 | 2,802 | 15,053 |
| 2024 | 6,699 | 1,150 | 3,383 | 2,821 | 14,053 |
| 2025 | 6,816 | 1,123 | 3,314 | 2,781 | 14,035 |
| 2026 | 5,146 | 1,126 | 3,320 | 2,781 | 12,373 |
| 2027 | 3,377 | 1,096 | 3,366 | 2,780 | 10,618 |
| 2028 | 4,057 | 1,138 | 3,274 | 2,801 | 11,270 |
| 2029 | 4,825 | 833 | 3,632 | 2,827 | 12,118 |
| 2030 | 5,009 | | | 2,858 | 7,867 |
| 2031 | 5,842 | | | 1,656 | 7,498 |
| 2032 | | | | 760 | 760 |
| 2033 | | | | 341 | 341 |
| 2034 | | | | 347 | 347 |
| 2035 | | | | 226 | 226 |

**Table 5-3**
**Black Thunder and Regional Source**
**Annual $NO_X$ Emission Summary (tpy)**

| Year | Black Thunder | School Creek | NARM | Antelope | Mainline Railroad | Power Plants | Roads | Town of Wright | Miscellaneous Point Sources | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 2015 | 6,847 | | | | | | | | | |
| 2016 | 6,945 | | | | | | | | | |
| 2017 | 7,244 | | | | | | | | | |
| 2018 | 7,264 | 1,111 | 3,965 | 2,012 | 1,946 | 11,961 | 108 | 21 | 1,437 | 29,825 |
| 2019 | 6,839 | | | | | | | | | |
| 2020 | 7,110 | | | | | | | | | |
| 2021 | 6,852 | | | | | | | | | |
| 2022 | 7,071 | | | | | | | | | |
| 2023 | 8,031 | 1,198 | 3,975 | 1,848 | 1,946 | 11,961 | 108 | 21 | 1,437 | 30,525 |
| 2024 | 7,120 | | | | | | | | | |
| 2025 | 7,285 | | | | | | | | | |
| 2026 | 5,256 | | | | | | | | | |
| 2027 | 3,788 | | | | | | | | | |
| 2028 | 3,589 | | | | | | | | | |
| 2029 | 5,017 | | | | | | | | | |
| 2030 | 5,459 | | | | | | | | | |
| 2031 | 7,216 | | | | | | | | | |

# 6.0 Dispersion Modeling Methodology

Cumulative $PM_{10}$ impacts from Black Thunder and neighboring sources were modeled using the Industrial Source Complex Long-Term (ISCLT3) Model. $PM_{10}$ impacts were modeled for all facilities for the worst-case years, and concentrations were calculated at receptors located along the LNCMs for the South Group mines. The cumulative $PM_{10}$ concentrations at each receptor location were compared to the Wyoming annual ambient air quality standard of 50 $\mu g/m^3$ to determine compliance with that standard.

$NO_2$ impacts from Black Thunder and neighboring sources were also modeled for the worst-case years. However, initial model runs were first performed to determine the significant impact area (SIA, $\geq 1$ $\mu g/m^3$ annual $NO_2$ impact) produced on a regional receptor grid from sources within Black Thunder only. Then, additional model runs considered all sources from the area mines as well as the regional sources to determine cumulative $NO_2$ impacts at receptors within the SIA. The cumulative $NO_2$ concentrations were compared to the Wyoming ambient air quality standard of 100 $\mu g/m^3$ to determine compliance. Emissions were modeled as $NO_X$, and the final concentrations were multiplied by 0.75 to account for chemical conversion to $NO_2$.

## 6.1 Dispersion Model

The Industrial Source Complex Long-Term (ISCLT3) Model dated 96113 (i.e., the year [96] and Julian day [113] that the model was released for public use) was used to model annual average $PM_{10}$ and $NO_2$ concentrations from both fugitive emission sources and point sources per AQD directive (WDEQ-AQD[(A)], 2006). Specific model options and switch settings can be found in the model output located on the CD at the end of this document. ISCLT3 was run in regulatory default mode with rural dispersion parameters. In addition, the model was run using elevations for all

sources and receptors. Elevations were determined from the USGS 10-meter National Elevation Dataset (NED).

### 6.2 Terrain Data

NED files for the area encompassing the South Group were downloaded from http://www.mrlc.gov/viewerjs/. The NED files and all source and receptor locations were used as inputs into EPA's terrain processor, AERMAP. AERMAP uses the input data to extract elevations in meters for all sources and receptors. These elevations were then used in each respective ISCLT3 input file. All source and receptor locations are presented in UTM coordinates using the 1927 North American Datum.

### 6.3 Meteorological Data

A Joint Frequency Distribution (JFD) of wind speed, wind direction, and atmospheric stability class produced from hourly meteorological data collected at NARM (2000-2004) was used in this modeling analysis for all sources except those at the Antelope Mine. Per AQD directive, the Antelope Mine sources were modeled separately using meteorological data collected at Antelope Mine (1995-2000). The modeling results were then added together to determine the final receptor concentrations. A copy of each meteorological data file is contained on the CD enclosed with this document.

### 6.4 Receptors

For $PM_{10}$ modeling, receptors were placed at approximate 500-meter intervals along mine LNCM boundaries. Receptors were located in accordance with the AQD "Mine A/Mine B" policy for cumulative impacts wherever the LNCMs of these mines overlap. See Map 6 for $PM_{10}$ receptor locations.

According to the "Mine A/Mine B" policy, Black Thunder is the mine of concern (Mine A). The LNCM of Black Thunder overlaps School Creek and NARM, so these mines are referred to as Mine B. Where these overlaps occur, the contribution of the mine within whose LNCM a receptor is located is not added to the cumulative total (i.e., for a Black Thunder receptor within School Creek's LNCM, the School Creek contribution is not added to the cumulative total). Note that in some cases there are two Mine B's (i.e., Black Thunder receptors within both School Creek's and NARM's LNCM). For these receptors, School Creek and NARM contributions are not included in the total concentration. At receptors not located within the boundary of any LNCM, the concentrations from all mines and sources were summed to arrive at a total impact.

For $NO_2$ significant impact area modeling, additional receptors were placed outside Black Thunder's LNCM boundary. The SIA modeling utilized a regional receptor grid extending up to 70 km from the center of Black Thunder's LNCM. The cumulative modeling analysis utilized a subset of the regional grid contained within the SIA. All $NO_2$ modeling receptors were spaced at 500-meter intervals. Map 7 shows the regional receptor grid used for significant impact area modeling while Maps 8 and 9 show the cumulative modeling grids for Years 2018 and 2023, respectively.

## 6.5 Emission Apportioning

Fugitive $PM_{10}$ and $NO_X$ emissions were apportioned into area sources based on the activity type. The number and location of the area sources, as well as their dimensions and orientation, were based on the pit configuration and road orientation provided in the coal progression maps. Emissions were divided by the area of each area source in which they occurred to arrive at an emission rate in grams/second/square meter. $NO_X$ emissions for the regional roads and mainline trains were also apportioned into area sources. Specific apportioning information is presented in Appendix 8 for $PM_{10}$ and Appendix 9 for $NO_X$.

## 6.6 $PM_{10}$ Point Source Modeling Parameters

The $PM_{10}$ point source modeling parameters used in this analysis are presented in Table 6-1.

**Table 6-1**
**Black Thunder and Regional Mine $PM_{10}$ Point Source Parameters**

| Mine | Source ID | UTM Easting (m) | UTM Northing (m) | Elevation (m) | Emission Rate (g/s) | Stack Height (m) | Stack Temp (K) | Stack Velocity (m/s) | Stack Diameter (m) |
|---|---|---|---|---|---|---|---|---|---|
| Black Thunder | BTBOIL1 | 476530 | 4838392 | 1431 | 0.0564 | 15.10 | 567 | 3.50 | 1.07 |
| Black Thunder | BTBOIL2 | 476530 | 4838392 | 1431 | 0.1082 | 15.10 | 536 | 13.50 | 0.76 |
| School Creek | BH4 | 478075 | 4830631 | 1475 | 0.1512 | 21.56 | 281 | 19.60 | 0.73 |
| School Creek | BH5 | 477842 | 4830720 | 1473 | 0.0756 | 37.20 | 281 | 16.56 | 0.49 |

## 6.7 Background Concentration

### 6.7.1 $PM_{10}$ Background Concentration

The AQD has required all mines in the PRB to "submit and justify a background $PM_{10}$ concentration with each permit application" (WDEQ-AQD[(A)], 2006). A background $PM_{10}$ analysis was prepared for Black Thunder in May 2014. This analysis recommended a background $PM_{10}$ concentration of 11.2 $\mu g/m^3$, which was approved by the AQD on June 3, 2014. Please see Appendix 10 for a copy of the background analysis.

### 6.7.2 $NO_2$ Background Concentration

A background value of 14 $\mu g/m^3$ $NO_2$ was added to the modeled $NO_2$ concentrations. The $NO_2$ background value was determined from $NO_2$ monitoring conducted in 2001 and 2002 at the Eagle Butte Mine, and is the best estimate of background $NO_2$ available.

## 7.0 $PM_{10}$ Modeling Analysis and Results

The area source, haul road, and point source $PM_{10}$ information for Black Thunder and other sources in the area were input into ISCLT3. The LNCM receptors and JFDs identified in Section 6.0 were also input to the model. The site-specific background concentration (see Section 6.7.1) of 11.2 $\mu g/m^3$ was added to the results from the model to obtain the total impact from the fugitive and point sources.

The maximum annual $PM_{10}$ modeling results for the worst-case years are summarized in Table 7-1. The receptor-specific $PM_{10}$ concentrations predicted by the model are included on the CD attached to this document. These concentrations are also displayed on Maps 10 and 11 for the two years.

From Table 7-1, the maximum cumulative concentration predicted in 2018 was 43.31 $\mu g/m^3$ (including 11.2 $\mu g/m^3$ background) and occurred at receptor 19 on the Black Thunder LNCM. The maximum concentration predicted in 2023 was 45.59 $\mu g/m^3$ and occurred at receptor 271 on the Black Thunder LNCM. A secondary high concentration predicted in 2023 of 45.56 $\mu g/m^3$ occurred at receptor 337 on Black Thunder's LNCM within School Creek.

**Table 7-1**
**Annual $PM_{10}$ Modeling Results**

| Year | Receptor | UTM Location X(m) | UTM Location Y(m) | Maximum Annual $PM_{10}$ Concentration, with Background | Black Thunder Contribution | Mine LNCM | Wyoming Standard ($\mu g/m^3$) |
|---|---|---|---|---|---|---|---|
| 2018 | 19 | 477398.49 | 4846662.99 | 43.31 $\mu g/m^3$ | 29.98 $\mu g/m^3$ | Black Thunder | 50 |
| 2023 | 271 | 468261.10 | 4841010.91 | 45.59 $\mu g/m^3$ | 30.48 $\mu g/m^3$ | Black Thunder | 50 |

## 8.0 $NO_2$ Modeling Analysis and Results

Black Thunder emission sources were modeled to determine the extent of the annual average 1 $\mu g/m^3$ $NO_2$ contour defining the significant impact area. The SIA receptor concentrations near the Black Thunder LNCM for each modeled year are depicted in Maps 12 and 13. Receptors within the SIA were then modeled to determine compliance with the ambient air quality standard in the cumulative impact modeling assessment, as discussed below.

The area source, haul road, and point source $NO_X$ information for Black Thunder and other South Group mines were input into ISCLT3 along with the SIA receptor grid and JFDs identified in Section 6.0. Annual $NO_X$ emissions from other regional sources were also input into the model. Emissions were modeled as $NO_X$, and the resulting concentrations were multiplied by 0.75 to account for chemical conversion to $NO_2$. The background concentration of 14 $\mu g/m^3$ $NO_2$ was then added to the model results to obtain the total impact.

The Wyoming and Federal annual $NO_2$ air quality standard is 100 $\mu g/m^3$. All results for the Black Thunder impact analysis show concentration predictions below this value. Maximum annual $NO_2$ concentrations for the two modeled years are summarized in Table 8-1 along with the highest modeled concentration predicted on Black Thunder's LNCM. The receptor-specific $NO_2$ concentrations predicted by the model are included on the CD. The concentrations near the mine LNCMs are displayed on Map 14 for Year 2018 and Map 15 for Year 2023.

From Table 8-1, the maximum cumulative concentration predicted in 2018 was 41.68 $\mu g/m^3$ (including background) and occurred at receptor number 278 on Black Thunder's LNCM. In 2023, the maximum predicted concentration was 50.27 $\mu g/m^3$, occurring at receptor 228 on School Creek's LNCM. The maximum concentration along Black Thunder's LNCM in 2023 was 49.02 $\mu g/m^3$.

**Table 8-1**
**Annual $NO_2$ Modeling Results**

| Year | Receptor | UTM Location X(m) | UTM Location Y(m) | Maximum Annual $NO_2$ Concentration, with Background | Black Thunder Contribution | Mine LNCM | Wyoming Standard ($\mu g/m^3$) |
|---|---|---|---|---|---|---|---|
| 2018 | 278 | 470008.93 | 4842700.54 | 41.68 $\mu g/m^3$ | 20.01 $\mu g/m^3$ | Black Thunder | 100 |
| 2023 | 228 | 470771.82 | 4829849.22 | 50.27 $\mu g/m^3$ | 8.10 $\mu g/m^3$ | School Creek | 100 |
| 2023 | 230 | 470771.55 | 4830849.22 | 49.02 $\mu g/m^3$ | 10.46 $\mu g/m^3$ | Black Thunder | 100 |

# 9.0 Other Compliance Discussions and Monitor Siting

## 9.1 Short-Term $PM_{10}$ Standards

AQD does not require modeling of fugitive dust emissions to predict compliance with the 24-hour $PM_{10}$ standard of 150 $\mu g/m^3$. Neither EPA nor the AQD have been able to demonstrate that available modeling tools and emission factors are adequate for this task. Section 234 of the 1990 Clean Air Act Amendments required EPA to demonstrate that it had adequate modeling tools before the agency could require states to employ 24-hour modeling at surface coal mines. To date, that demonstration has not been made.

Instead, it has been AQD's position that ambient air monitoring data collected by the mines provides a real-world demonstration that compliance with short-term ambient standards can be achieved when a mine uses operating practices based on BACT. In 2002 the agency also began requiring a demonstration that "...mining operations will not cause or contribute to ambient violations..." (WDEQ-AQD[(A)], 2006). The following discussion is a demonstration that Black Thunder will not cause or contribute to a 24-hour $PM_{10}$ ambient air violation in the area of the South Group of mines.

## 9.2 Historical Ambient Air Quality - $PM_{10}$

### 9.2.1 Black Thunder Mine

Ambient $PM_{10}$ concentrations are monitored at five locations at Black Thunder. Two other sampling sites (Section 12 and JRM-4) have been retired in the past three years. $PM_{10}$ concentrations are currently monitored using high volume samplers at the Section 25 site, low volume samplers at the Section 9 and JRM-3 sites, and TEOM monitors at the Section 36 and JRM-5 sites. An automated system collects data from the TEOM monitoring sites and sounds an alert when

high short-term (1-hour) concentrations are measured so that appropriate response actions can be taken. (Please see Section 4.3.2 for additional detail.)

Table 9-1 provides a listing of the highest second-high 24-hour $PM_{10}$ concentrations measured at the monitoring sites over the past three calendar years along with actual coal production. All concentrations were below the 24-hour $PM_{10}$ standard of 150 $\mu g/m^3$. The concentration data for all three years were obtained from EPA's AirData website. Black Thunder's monitoring sites are shown on Map 2.

**Table 9-1**
**Summary of $PM_{10}$ Monitoring and Coal Production Data for Black Thunder**
**(Highest Second-High 24-Hour Concentrations in std. $\mu g/m^3$)**

| Sampler ID | Latitude (degrees N) | Longitude (degrees W) | 2011 ($\mu g/m^3$) | 2012 ($\mu g/m^3$) | 2013 ($\mu g/m^3$) |
|---|---|---|---|---|---|
| Section 9 | 43.714010 | 105.391270 | 59 | 63 | 66 |
| Section 12[A] | 43.623300 | 105.213300 | 75 | 120 | 62 |
| Section 25A | 43.669640 | 105.216710 | 26 | 39 | 34 |
| Section 25B | 43.669640 | 105.216710 | 32 | 39 | 33 |
| Section 36 | 43.648300 | 105.213300 | 82 | 83 | 64[C] |
| JRM-3A | 43.702176 | 105.199227 | 60 | 85 | 58 |
| JRM-3B | 43.702176 | 105.199227 | 51 | 82 | 49 |
| JRM-4[B] | 43.696390 | 105.226940 | 35 | 20 | NA |
| JRM-5 | 43.770917 | 105.318882 | 80 | 121 | 79 |
| Coal Production (million tons) | | | 104.9 | 92.9 | 100.7 |

[A] Monitoring at Section 12 ended June 2013.
[B] Monitoring at JRM-4 ended June 2012.
[C] One monitor value in 2013 was deemed a high wind event by AQD, however it is not yet reflected on the EPA AirData website. The value shown in the table accounts for the high wind event designation.
All data from EPA web page http://www.epa.gov/airdata/ad_rep_mon.html

### 9.2.2 South Group Mines (School Creek, NARM and Antelope)

The other mines in the South Group currently operate a total of 10 $PM_{10}$ samplers at nine sites as shown in Map 16. Monitoring data for these mines are presented in Table 9-2.

**Table 9-2**
**Summary of $PM_{10}$ Monitoring Data for the South Group**
**(Highest Second-High 24-Hour Concentrations, std. $\mu g/m^3$)**

| Mine | $PM_{10}$ Sampler ID | 2011 ($\mu g/m^3$) | 2012 ($\mu g/m^3$) | 2013 ($\mu g/m^3$) |
|---|---|---|---|---|
| School Creek | SC-1 | 69 | 99 | 60 |
| | SC-2 | 121 | 140 | 118 |
| | SC-3 | 94 | 122 | 108 |
| NARM | RO-1 | 154 | 150 | 128 |
| | NA-7 | 74 | 82 | 57 |
| | NA-8 | 124 | 101 | 74 |
| Antelope | 3[A] | 39 | 65 | 38 |
| | 4 | 53 | 82 | 75 |
| | 5 | 103 | 115 | 66 |
| | 6A | 102 | 100 | 75 |
| | 6B | 100 | 88 | 69 |

[A] Monitoring at Antelope 3 ended June 2013.
All data from EPA web page http://www.epa.gov/airdata/ad_rep_mon.html

During this three-year period, a number of high values were recorded at NARM's RO-1 sampler. Some of these have been flagged by AQD as high wind events during which all reasonable precautions were taken by the mine to control or reduce emissions from mining activities. Details of these cases can be found in the application in support of NARM's Permit MD-16282 (MMA, 2014).

## 9.3 $PM_{10}$ Compliance

Under the revised mining operation proposed in this application, Black Thunder will not cause or contribute to a violation of the 24-hour ambient air quality standards. The revised LNCM proposed in this application is needed to encompass additional mining lease areas to the north and west of the property, scoria operations in the east, and future hydrologic control structures, and will provide a buffer between active operations and downwind ambient air boundaries. Additional water trucks (48,500 gallon) will be added for dust control in the future (see Table 3-2). Continued surface manipulation (scarification) and temporary revegetation of open areas subject to wind erosion, as well as diligent application of BACT as described in Section 4.0, will maintain dust emissions from

Black Thunder near current levels. Finally, the real-time monitoring program discussed in Section 4.3.2 has been effective in the past and will continue to allow the mine to respond immediately to high particulate concentrations.

## 9.4 $PM_{2.5}$ Compliance

$PM_{2.5}$ monitoring has been conducted at four mine locations in the Powder River Basin. Annual summary data for the past three years was obtained from EPA's AirData website http://www.epa.gov/airdata/ad_rep_mon.html and are presented in Table 9-3. The highest concentrations recorded by monitors at Black Thunder and Antelope Mines (the only South Group monitoring sites) are below the $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS), which are 35 $\mu g/m^3$ for the 24-hour period and 12 $\mu g/m^3$ for the annual average. As discussed above in Section 9.3, the modifications to Black Thunder as proposed in this application will not significantly increase monitored values, nor will they cause the monitored values to approach the $PM_{2.5}$ NAAQS.

**Table 9-3**
**Powder River Basin Monitored $PM_{2.5}$ Concentrations**

| Monitoring Site | Year | Number of Valid Samples | 98th Percentile of 24-Hour Concentrations (actual $\mu g/m^3$) | Annual Mean Concentration (actual $\mu g/m^3$) |
|---|---|---|---|---|
| Black Thunder Site 0891 | 2011 | 179 | 14 | 3.1 |
| | 2012 | 168 | 16 | 4.9 |
| | 2013 | 194 | 14 | 4.2 |
| Belle Ayr Site 0892 | 2011 | 192 | 20 | 5.5 |
| | 2012 | 40 | 24 | 7.3 |
| | 2013 | 201 | 14 | 6.4 |
| Buckskin Site 1899 | 2011 | 123 | 16 | 4.8 |
| | 2012 | 163 | 18 | 5.9 |
| | 2013 | 343 | 14 | 4.8 |
| Antelope Site 0819 | 2011 | 139 | 11 | 3.6 |
| | 2012 | 86 | 27 | 8.0 |
| | 2013 | 168 | 8 | 2.8 |

## 9.5 Ozone Compliance

A qualitative analysis of potential ozone impacts from the revised mine plan at Black Thunder was conducted based on estimated increases in facility $NO_X$ and VOC emissions. These emission increases are compared to regional $NO_X$ and VOC emissions in the context of monitored regional ozone concentrations.

Table 9-4 presents $NO_X$ and VOC emissions from sources obtained from AQD's 2011 emission inventory for Title V and minor sources (WDEQ-AQD[(D)]). The 2011 inventory represents the most current information available for the five counties in northeast Wyoming. Total $NO_X$ and VOC emissions are reported as 40,936 and 4,615 tons per year, respectively. The combined $NO_X$ and VOC emissions equal 45,551 tons per year. It is important to note that variability exists in these inventories with respect to which emission sources were reported to AQD and the methods used to calculate emissions. Some facilities did not report non-road mobile source or locomotive emissions. Therefore, the regional emissions are likely higher than reported in 2011, and the following demonstrations of future compliance for ozone and $NO_2$ should be considered conservative.

**Table 9-4**
**Summary of Regional $NO_X$ and VOC Emissions for 2011**

| | Point Sources (tons) | | On-Road Mobile Sources (tons) | |
|---|---|---|---|---|
| **County** | **$NO_X$** | **VOC** | **$NO_X$** | **VOC** |
| Campbell | 35,729.4 | 1,605.3 | 485.1 | 368.3 |
| Crook | 1,032.4 | 17.1 | 234.0 | 169.3 |
| Johnson | 2,127.3 | 1,450.4 | 293.6 | 218.1 |
| Sheridan | 517.2 | 312.3 | 319.7 | 250.8 |
| Weston | 112.1 | 168.7 | 84.8 | 54.5 |

Black Thunder's $NO_X$ emissions as reported to the 2011 inventory were calculated using different methods than typically used for air permit applications. Also, no VOC emissions were reported in the 2011 inventory. Therefore, $NO_X$ and VOC emissions from 2011 were recalculated to

provide an equivalent basis for the following analysis.

The recalculated 2011 $NO_X$ and VOC emissions from Black Thunder are 3,851 and 141 tons per year, respectively. The highest annual $NO_X$ emissions calculated in this application equal 8,077 tons in year 2023. VOC emissions in year 2023 are estimated at 272 tons. Black Thunder's annual $NO_X$ emissions increase by 4,226 tons and annual VOC emissions increase by 131 tons from year 2011 to year 2023. The combined $NO_X$ and VOC emissions increase would be 4,357 tons per year.

With $NO_X$ and VOC as precursors for ozone formation, the additional emissions from Black Thunder's operations as detailed in this application represent a 9.6% increase in combined $NO_X$ and VOC emissions in northeast Wyoming. To evaluate whether this increase would significantly impact maximum monitored ozone concentrations in the region, a summary of monitored ozone data from the Thunder Basin National Grassland was obtained from EPA's AirData website for the period of 2011 - 2013. This summary is presented in Table 9-5.

**Table 9-5**
**Fourth-Highest 8-Hour Average Ozone Concentrations at TBNG**

| | 2011 (ppm) | 2012 (ppm) | 2013 (ppm) | Average (ppm) |
|---|---|---|---|---|
| Ozone Concentration | 0.061 | 0.071 | 0.061 | 0.064 |

The form of the ozone NAAQS is the 3-year average of the fourth-highest daily maximum 8-hour average concentrations. The most recent 3-year average of these concentrations is 0.064 ppm. Multiplying this average concentration by 1.096 (to reflect the regional increase due to Black Thunder's projected $NO_X$ and VOC emissions) results in an estimated ozone concentration of 0.070 ppm, below the 8-hour NAAQS of 0.075 ppm. Because of the variability in emission sources reported to AQD for the 2011 inventory (as described above), this estimated ozone concentration is conservatively high.

## 9.6 1-Hour $NO_2$ Compliance

Similar to the ozone demonstration above, a qualitative analysis of maximum 1-hour $NO_2$ impacts from the revised mine plan at Black Thunder was conducted based on estimated increases in facility $NO_X$ emissions. As detailed in Section 9.5, the regional $NO_X$ emissions reported in AQD's 2011 inventory were 40,936 tons. Black Thunder's emissions in 2011 are calculated as 3,851 tons. Black Thunder's annual $NO_X$ emissions would be expected to increase by 4,226 tons with this application, or a regional increase of 10.3%.

The $NO_2$ monitor located near the Belle Ayr Mine was selected to represent maximum regional $NO_2$ concentrations for this compliance demonstration. Data collected at the Tracy Ranch monitor was not used in this analysis because recovery in 2013 was below 70%. A summary of monitored $NO_2$ data at Belle Ayr during 2011 - 2013 are shown in Table 9-6, again obtained from EPA's AirData website.

**Table 9-6**
**1-Hour $NO_2$ Concentrations at the Belle Ayr Mine**

| | 2011 (ppb) | 2012 (ppb) | 2013 (ppb) | Average (ppb) |
|---|---|---|---|---|
| Maximum Concentration | 44 | 61 | 52 | 52 |
| 98$^{th}$ Percentile Concentration | 36 | 34 | 35 | 35 |

The form of the 1-hour $NO_2$ NAAQS is the 98$^{th}$ percentile concentration averaged over three years. This value is 35 ppb for the 2011 - 2013 period at Belle Ayr. Multiplying this value by 1.103 (to reflect the regional increase due to Black Thunder's projected $NO_X$ emissions) results in an estimated $NO_2$ concentration of 39 ppb, well below the ambient air quality standard of 100 ppb.

## 9.7 Monitoring Network

Monitoring networks typically measure ambient concentrations of pollutants for comparison to the NAAQS. NAAQS only apply in ambient air, which starts at the LNCM for a Powder River Basin mine. Inside the LNCM, NAAQS do not apply. Placement of monitoring stations around or in close proximity to the LNCM requires consideration of several factors including location of future pit activities, overall meteorological wind flow regime, as well as practical matters such as availability of power to operate the monitors, physical access to the monitoring site for general servicing and maintenance, and ownership/access rights.

Black Thunder has conducted an evaluation of the current locations of the $PM_{10}$ samplers with respect to their suitability for measuring future, worst-case impacts. The network currently consists of five stations. With the changes proposed in this application, three of the stations (Section 9, JRM-5, and Section 25) will be inside the LNCM and no longer be located in ambient air. TBCC proposes to relocate the Section 9 site approximately 2 miles to the east-northeast (and rename it Section 6 site), relocate JRM-5 approximately 1.5 miles north-northeast (and rename it Section 12N site), and decommission the Section 25 station and relocate its three high-volume samplers to the current JRM-3 site (replacing the low volume sampler at JRM-3). Please see Appendix 11 for a detailed discussion and justification for the current and proposed monitoring network. TBCC will coordinate with ADQ to relocate these stations in the near future.

## 10.0 Summary and Conclusions

A detailed and comprehensive air quality modeling study was undertaken to determine the annual air quality impacts of the proposed Black Thunder Mine modifications. Conservative modeling of two worst-case years demonstrated that annual $PM_{10}$ and $NO_2$ standards will be maintained.

Short-term modeling was not performed for $PM_{10}$ 24-hour standards because accurately estimating maximum daily emissions from mining operations that produce fugitive dust is technically infeasible. However, as discussed in Section 9.0, Black Thunder operations are not expected to cause or contribute to violations of the 24-hour $PM_{10}$ standard. Also, based on monitoring data in the Powder River Basin, annual and 24-hour $PM_{2.5}$, 8-hour ozone, and 1-hour $NO_2$ NAAQS will likewise be met.

This report demonstrates that the Black Thunder operations will not cause or contribute to violations of any Wyoming or Federal particulate or $NO_2$ annual air quality standards and that all sources will be operated in compliance with applicable Wyoming air quality regulations and permit conditions.

## 11.0 Reference List


MMA, 2008

*Air Quality Permit Application for the School Creek Mine.* McVehil-Monnett Associates, Inc., Englewood, CO. August 2008.

MMA, 2012

*Air Quality Permit Application to Modify the Antelope Mine.* McVehil-Monnett Associates, Inc., Englewood, CO. April 2012.

MMA, 2014

*Air Quality Permit Application to Modify the North Antelope Rochelle Mine.* McVehil-Monnett Associates, Inc., Englewood, CO. April 2014.

MRI, 2006. *Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors.* Midwest Research Institute, February 2006.

WDEQ-AQD

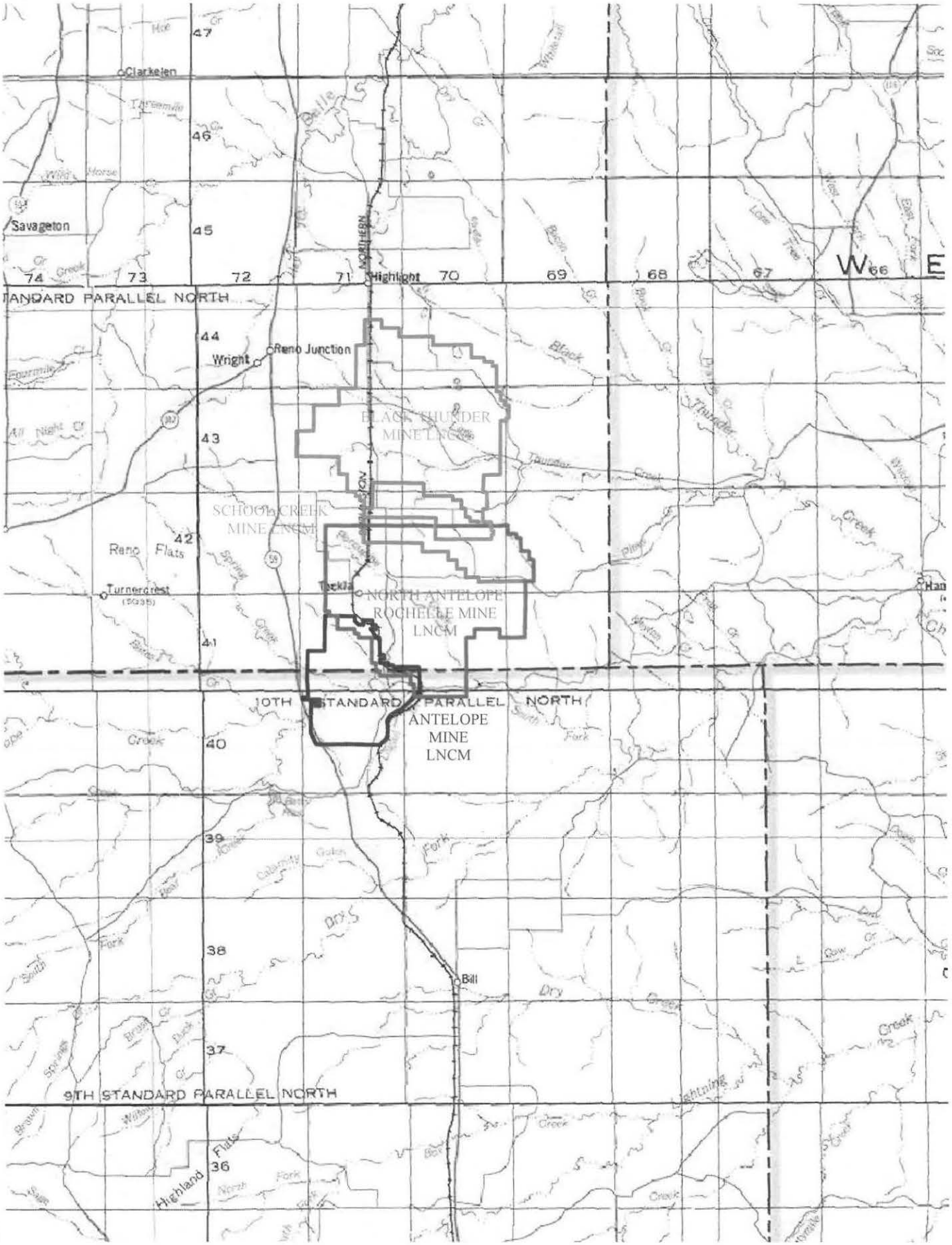
(A) 2/27/06. Memorandum from Bernie Dailey to Powder River Basin Coal Mine Operators. *PRB Coal Mine Permitting Guidance.*

(B) 1979. Memorandum from Charles Collins. (Wyoming) *Fugitive Dust Emission Factors.*

(C) 4/16/14. Email from Don Watzel transmitting additional $NO_x$ sources for South Group modeling.

(D) 7/29/13. Email from Brian Bohlmann containing 2011 inventory data for $NO_x$ and VOC sources in northeastern Wyoming.

MAPS




**McVEHIL-MONNETT ASSOCIATES, INC.**
*Air Quality ▪ Environmental Management*
44 Inverness Drive East, Building C
Englewood, CO 80112

MAP 1
BLACK THUNDER MINE
LOCATION

PROJECT: 2622-13
DATE: 10/10/14

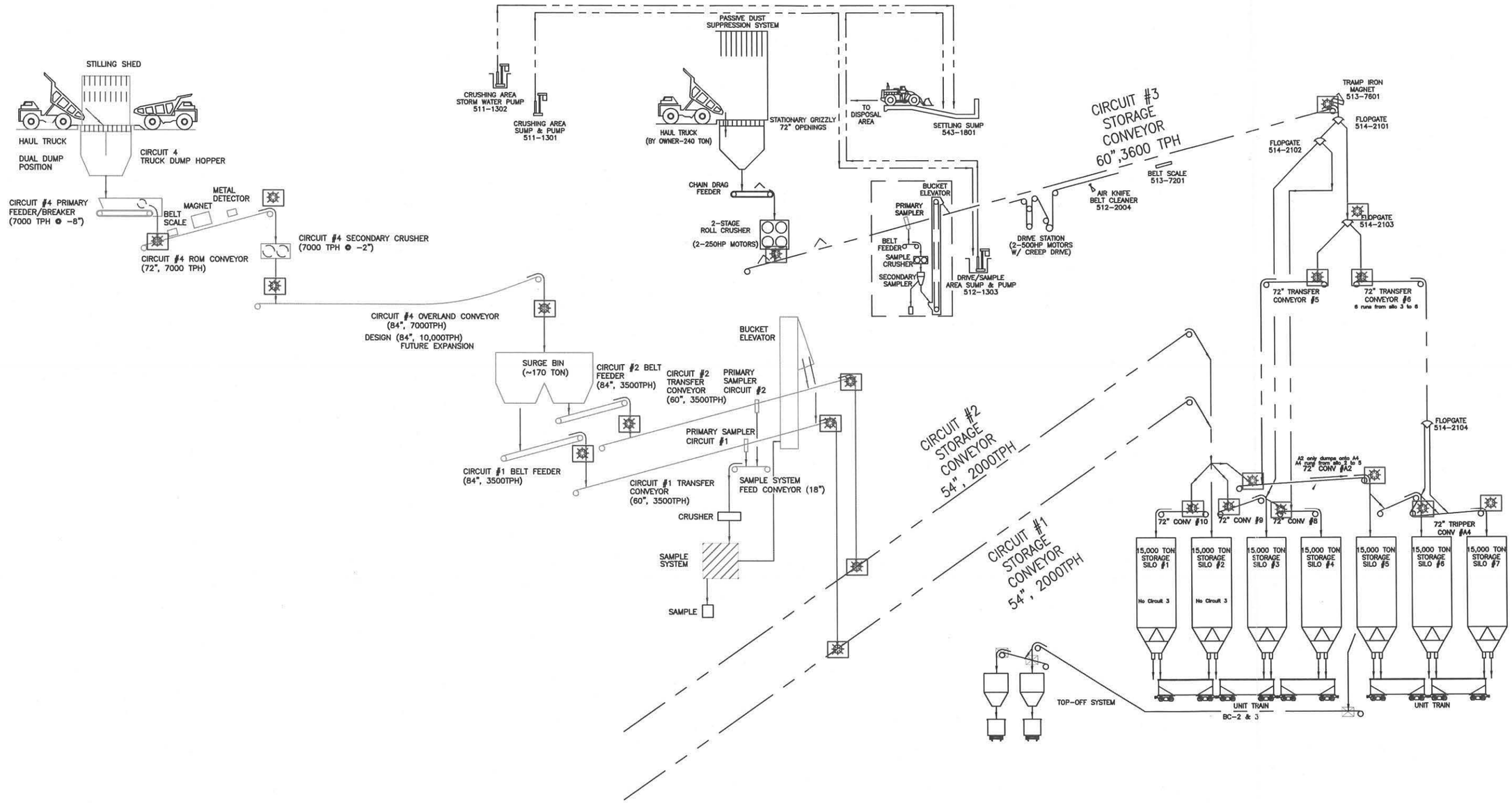
1 MILE 8 MILES 16 MILES

**McVEHIL-MONNETT ASSOCIATES, INC.**
*Air Quality ▪ Environmental Management*
44 Inverness Drive East, Building C
Englewood, CO 80112

MAP 2
BLACK THUNDER MINE LNCM,
COAL PROGRESSION AND
MONITORING STATION LOCATIONS

PROJECT: 2622-13
DATE: 10/10/14

CURRENTLY PERMITTED BLACK THUNDER MINE LNCM
PROPOSED LNCM EXPANSION
SECTION LINES




LEGEND:

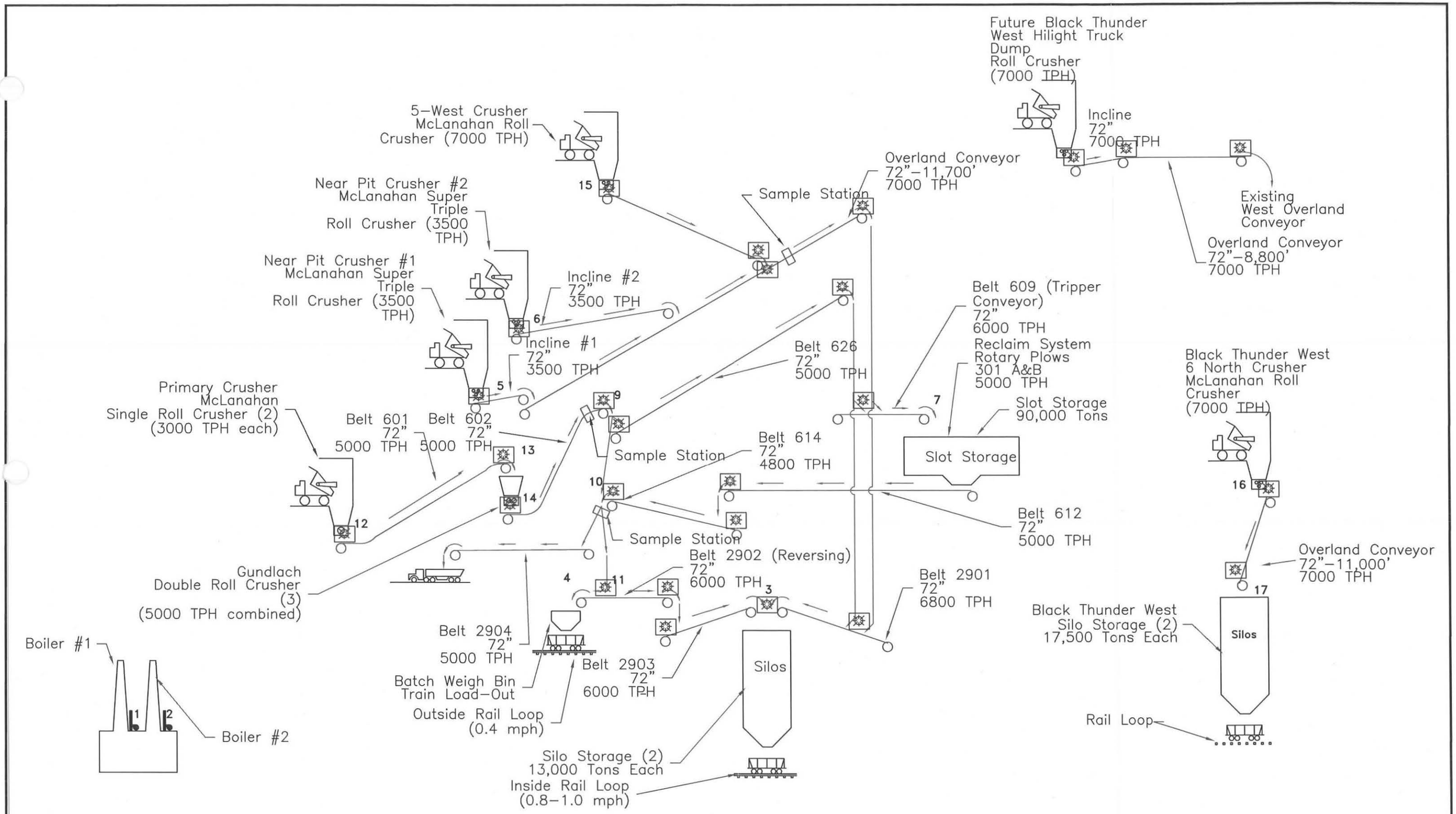
- FOGGER LOCATION
- DUST COLLECTION
- EXISTING EQUIPMENT

**Thunder Basin Coal Company**

Black Thunder Mine Wright, Wyoming 82732

***Map 3A***
***Black Thunder East***
***Coal Processing and***
***Conveying Equipment***

| | | |
|---|---|---|
| Designed/Engineered by: | Date: Hol. To Make | FILE |
| Drawn by: | Date: 12-12-2014 | |
| Approved/Checked by: | Sheet No. 1 of 1 | |




## Legend

| | | | |
|---|---|---|---|
| 1 Boiler #1 | 10 Train Loadout #2 | Baghouse | |
| 2 Boiler #2 | 11 Train Loadout #3 | Fogger Locations | |
| 3 Silo Storage | 12 Primary Crusher | Conveyor | |
| 4 Batch Loadout | 13 Secondary Crusher #1 | Flow Direction | |
| 5 Near Pit Crusher #1 | 14 Secondary Crusher #2 | Crusher | |
| 6 Near Pit Crusher #2 | 15 5–West Crusher | Stilling Shed | |
| 7 Slot Storage #1 New Transfer | 16 Thundercloud Crusher | | |
| 8 Slot Storage #2 | 17 BT West Silo Storage | | |
| 9 Train Loadout #1 | | | |

**Thunder Basin Coal Company**

Black Thunder Mine Wright, Wyoming 82732

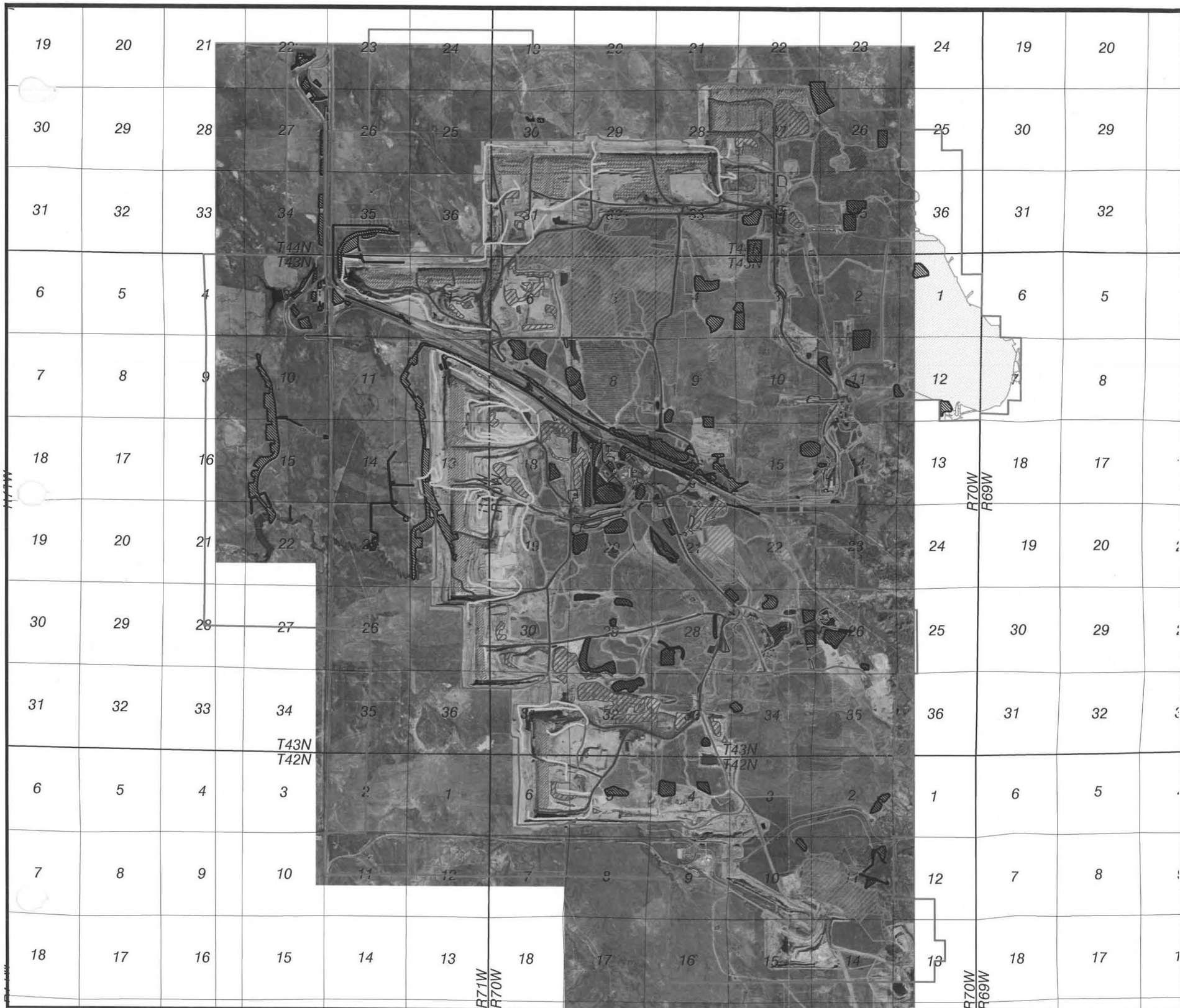
***Map 3B***

***Black Thunder & Black Thunder West Coal Processing and Conveying Equipment***

Designed/Engineered by: Date Not To Scale

Drawn by: Date 10/10/2014

Approved/Checked by: Sheet No. 1 of 1




N

Black Thunder LNCM - Existing
Permanent Reclamation Areas
Rough Graded Areas
Rough Spoil Areas
Rough Dump Areas
Semi Permanent Reclamation Areas
Rocked Areas (Excluding haulage routes)
Topsoiled - With Temp. Seeding
Topsoiled and Ripped - Not Planted Areas

Coal Haul Road
Overburden Haul Road
Temp and Light Vehicle

**Thunder Basin Coal Company**

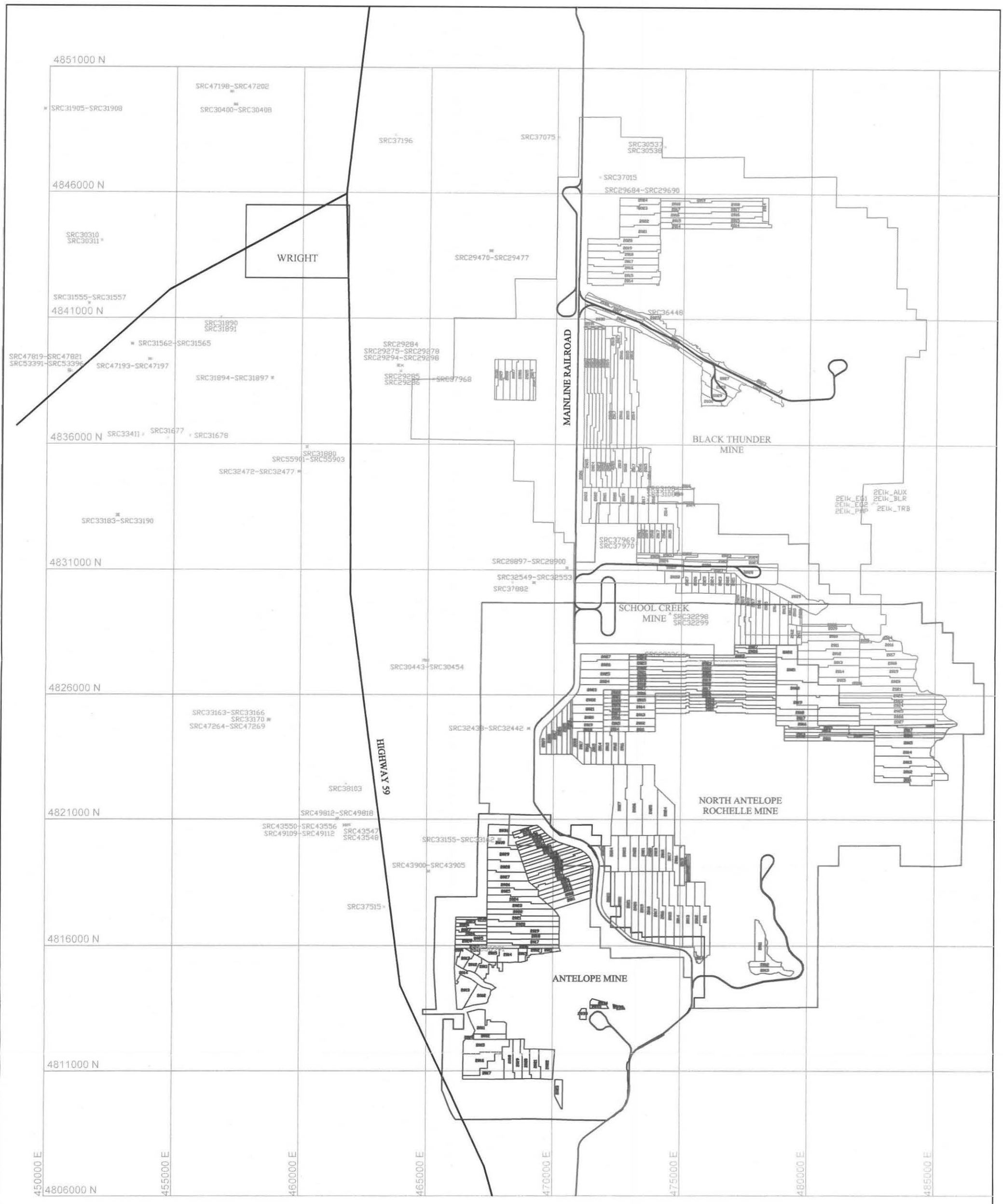
Arch Western Resources, LLC

Black Thunder Mine
P.O. Box 405 Wright, WY 82732

Permit No. 233

## Map 4
## BLACK THUNDER MINE
## Disturbed Acres and Haul Road Treatment Areas for 2013

| | | |
|---|---|---|
| Designed/Engineered by: D. Kline | Scale: No Scale | File: Treated Areas for 2013 report.dwg |
| Drawn by: D. Kline | Date: 21Jan2014 | Ortho Date: September 2013 |
| Approved/Checked by: | Page: 1 of 1 | |

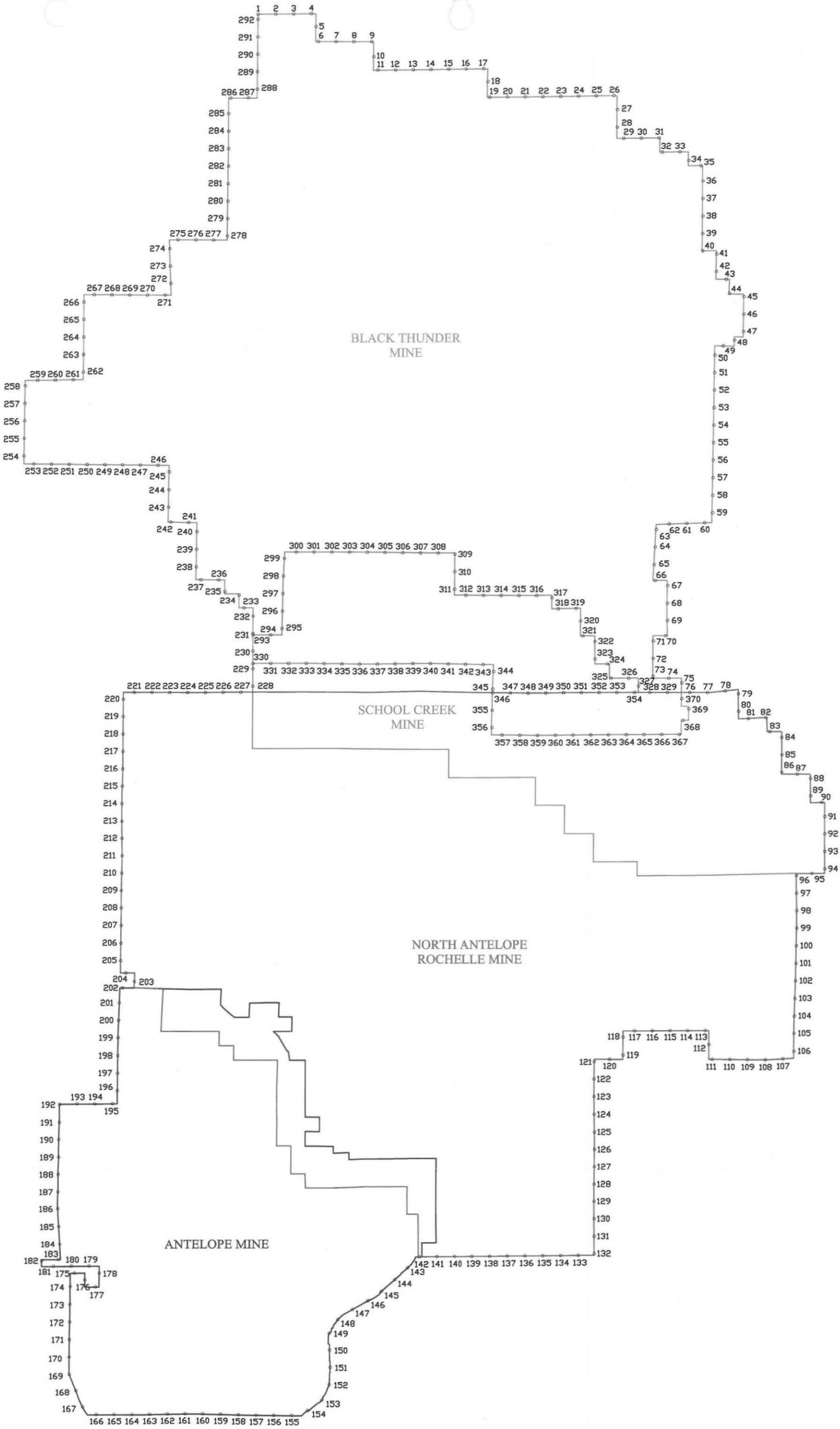



**McVehil-Monnett Associates, Inc.**
*Air Quality ▪ Environmental Management*
44 Inverness Drive East, Building C
Englewood, CO 80112

MAP 5
BLACK THUNDER MINE
MODELING AREA OVERVIEW

PROJECT: 2622-13
DATE: 10/11/14

⊠ REGIONAL POINT SOURCES
⊠ POWER PLANT SOURCES
UTM COORDINATE SYSTEM




**McVEHIL-MONNETT ASSOCIATES, INC.**
*Air Quality ▪ Environmental Management*
44 Inverness Drive East, Building C
Englewood, CO 80112

# MAP 6
# RECEPTOR LOCATIONS FOR $PM_{10}$ MODELING

PROJECT: 2622-13

DATE: 10/11/14

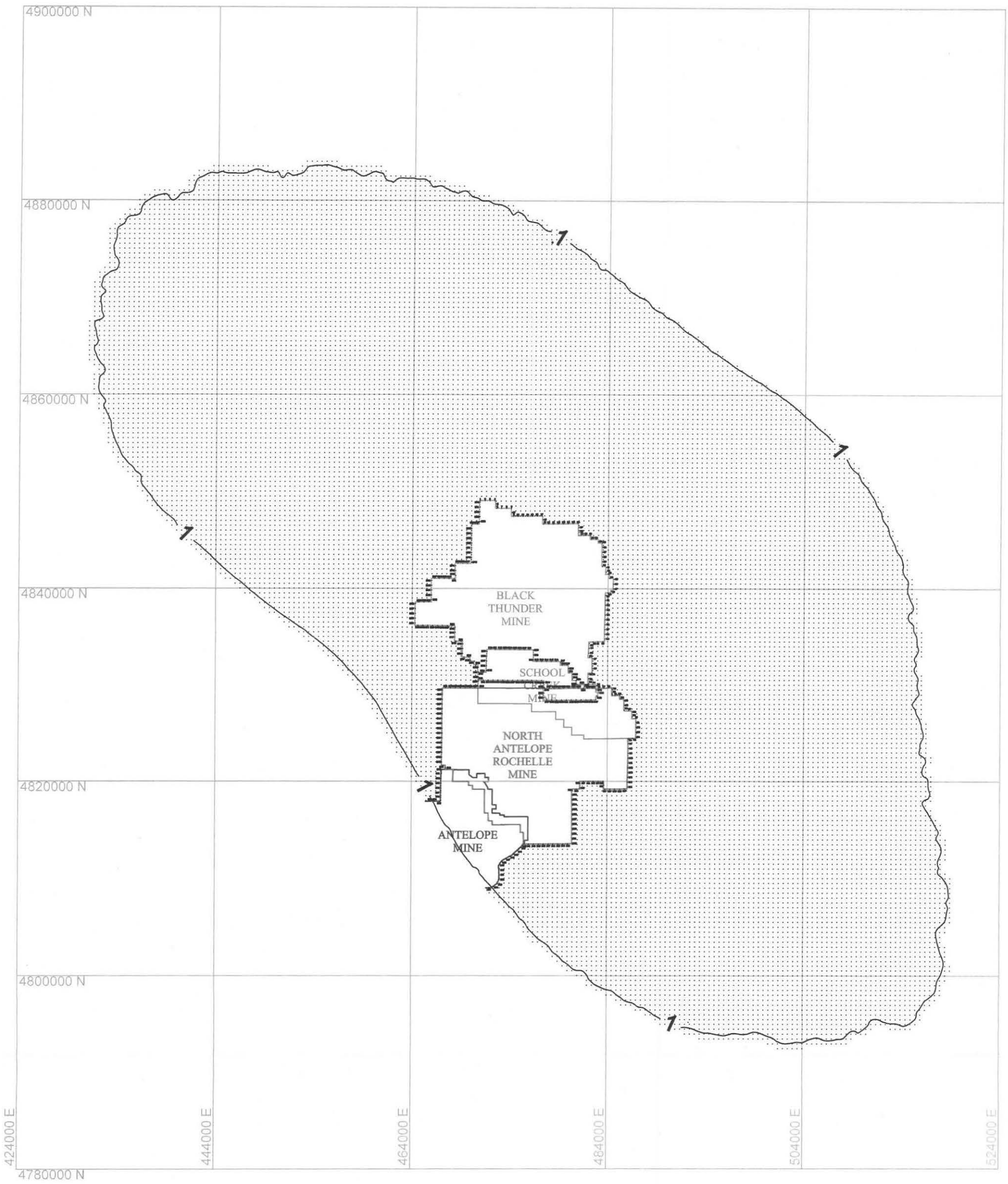
- BLACK THUNDER MINE LNCM
- SCHOOL CREEK MINE LNCM
- NARM LNCM
- ANTELOPE MINE LNCM

**McVEHIL-MONNETT ASSOCIATES, INC.**
*Air Quality ▪ Environmental Management*
44 Inverness Drive East, Building C
Englewood, CO 80112

MAP 7
RECEPTOR LOCATIONS FOR $NO_2$ SIGNIFICANT AREA IMPACT MODELING

PROJECT: 2622-13
DATE: 10/11/14

- BLACK THUNDER MINE LNCM
- SCHOOL CREEK MINE LNCM
- NARM LNCM
- ANTELOPE MINE LNCM
- UTM GRID (NAD 27)

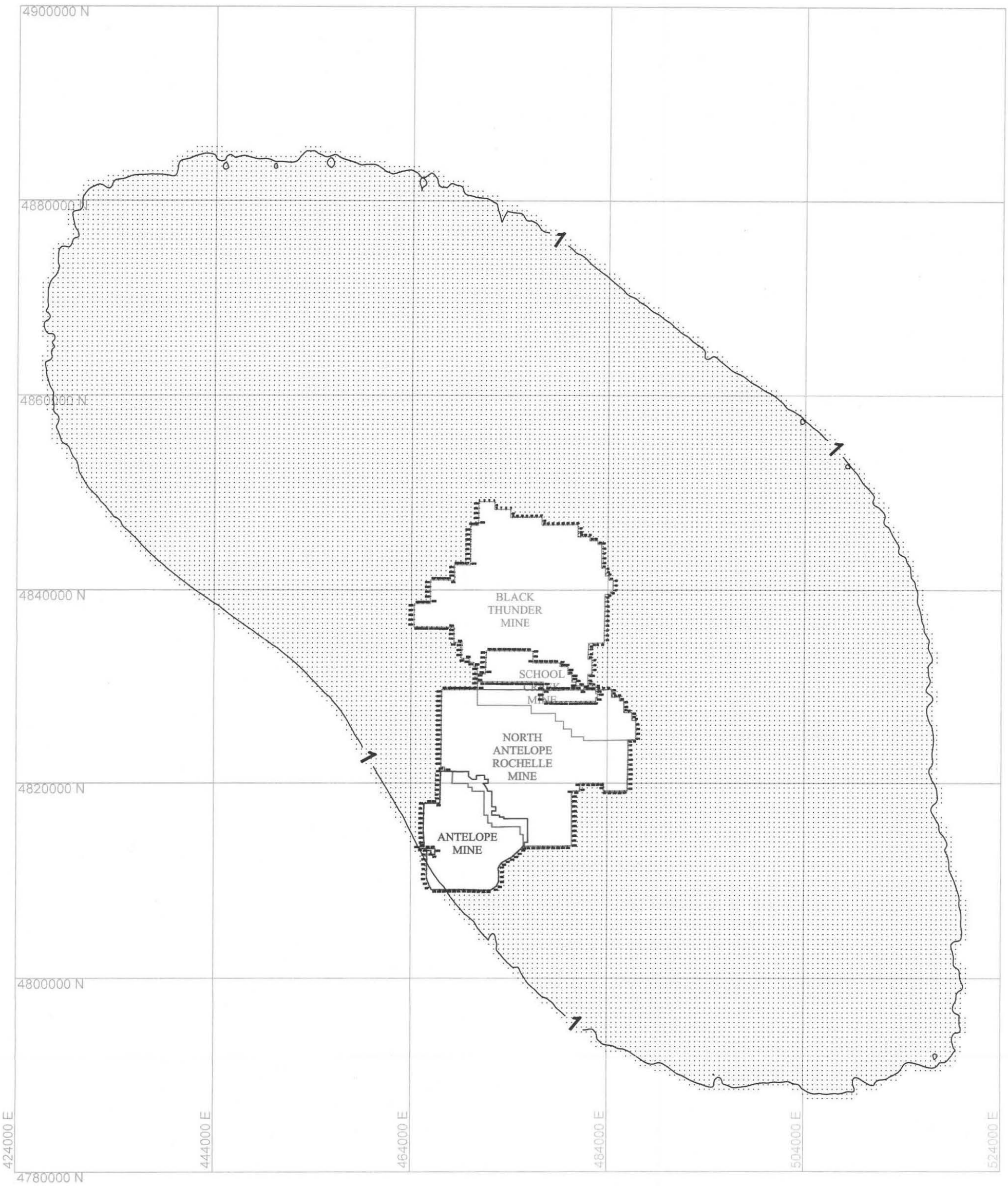



**McVEHIL-MONNETT ASSOCIATES, INC.**
*Air Quality ▪ Environmental Management*
44 Inverness Drive East, Building C
Englewood, CO 80112

MAP 8
RECEPTOR LOCATIONS FOR
2018 $NO_2$ CUMULATIVE
MODELING

PROJECT: 2622-13
DATE: 10/11/14

- BLACK THUNDER MINE LNCM
- SCHOOL CREEK MINE LNCM
- NARM LNCM
- ANTELOPE MINE LNCM
- UTM GRID (NAD 27)
- 1 μg/m³ $NO_2$ SIA CONTOUR



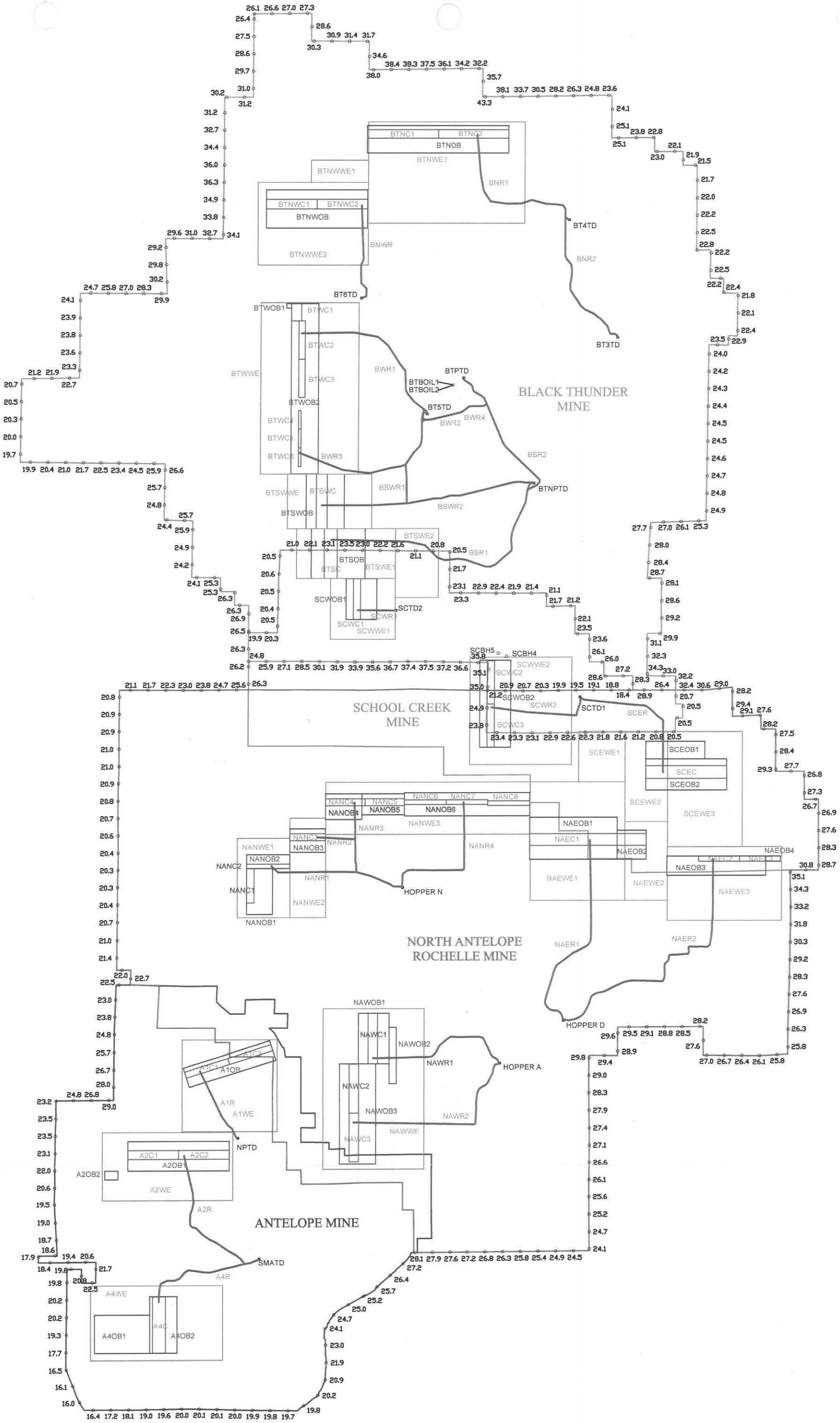

**McVEHIL-MONNETT ASSOCIATES, INC.**
*Air Quality ▪ Environmental Management*
44 Inverness Drive East, Building C
Englewood, CO 80112

# MAP 9
# RECEPTOR LOCATIONS FOR 2023 $NO_2$ CUMULATIVE MODELING

PROJECT: 2622-13

DATE: 10/11/14

- BLACK THUNDER MINE LNCM
- SCHOOL CREEK MINE LNCM
- NARM LNCM
- ANTELOPE MINE LNCM
- UTM GRID (NAD 27)
- 1 μg/m³ $NO_2$ SIA CONTOUR



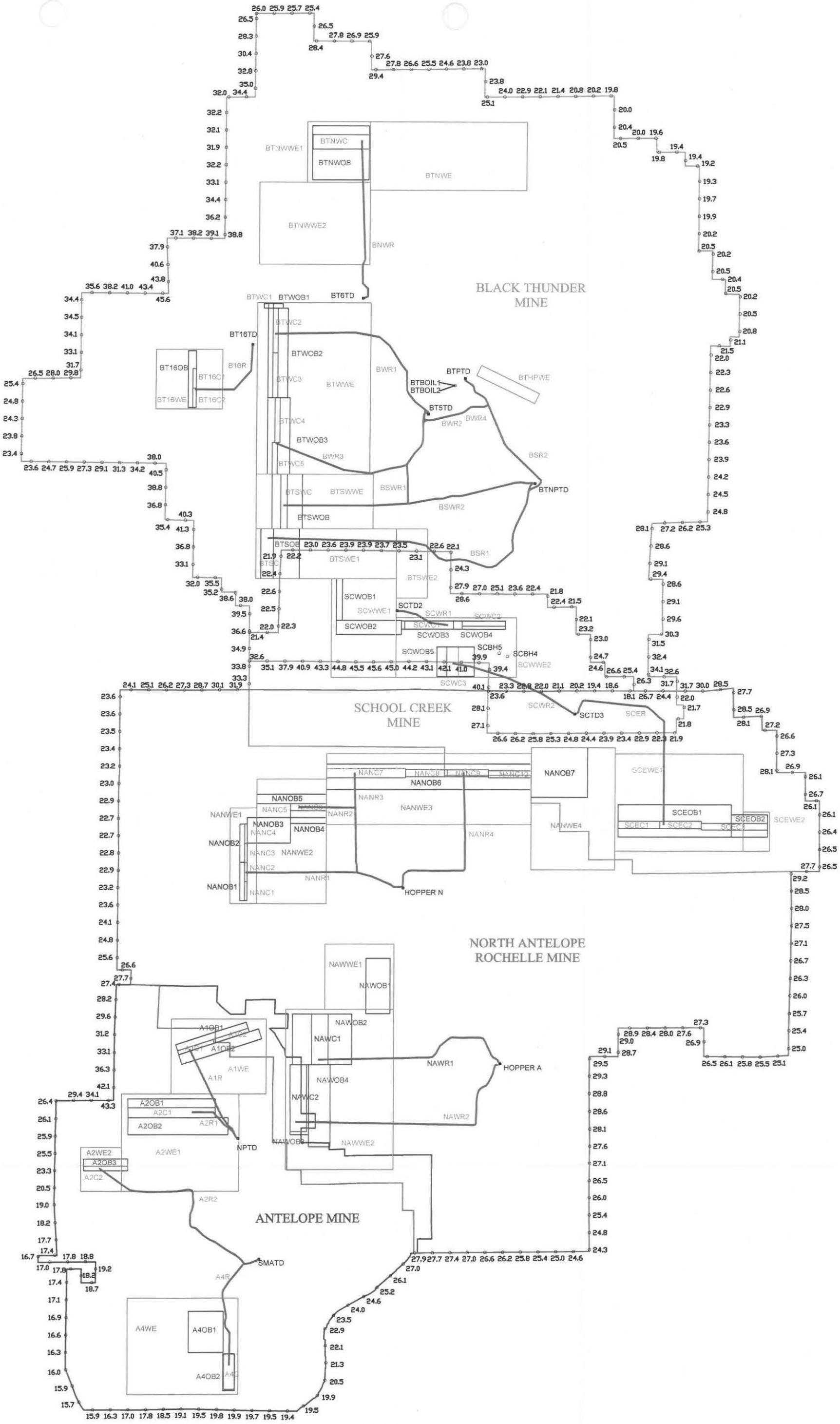

**McVEHIL-MONNETT ASSOCIATES, INC.**
*Air Quality ▪ Environmental Management*
44 Inverness Drive East, Building C
Englewood, CO 80112

# MAP 10
# 2018 AREA SOURCE LOCATIONS AND $PM_{10}$ MODELING RESULTS ($\mu g/m^3$)

PROJECT: 2622-13

DATE: 10/11/14

- BLACK THUNDER MINE LNCM
- SCHOOL CREEK MINE LNCM
- NARM LNCM
- ANTELOPE MINE LNCM



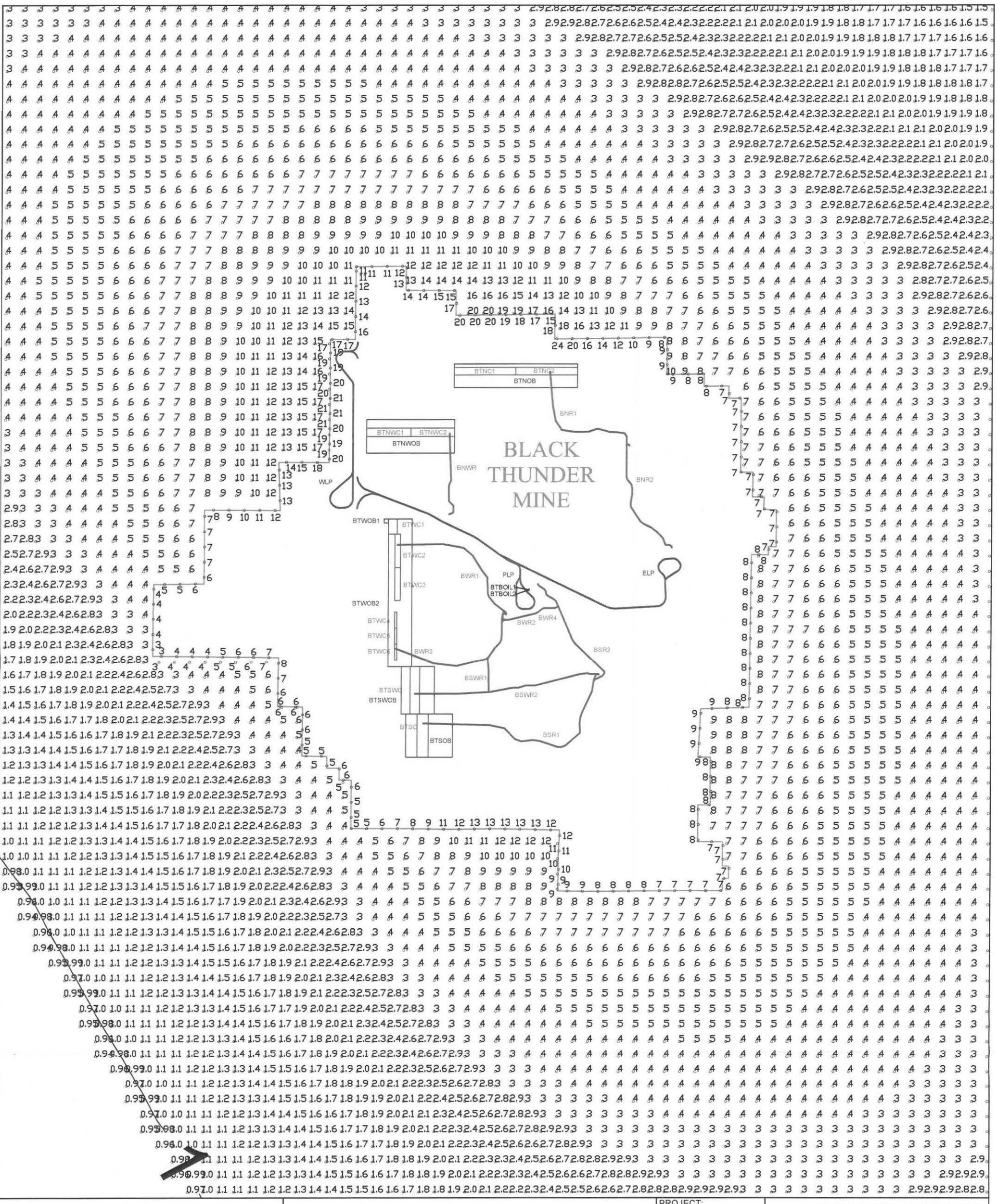

**McVEHIL-MONNETT ASSOCIATES, INC.**
*Air Quality ▪ Environmental Management*
44 Inverness Drive East, Building C
Englewood, CO 80112

# MAP 11
# 2023 AREA SOURCE LOCATIONS AND $PM_{10}$ MODELING RESULTS ($\mu g/m^3$)

PROJECT: 2622-13

DATE: 10/11/14

- BLACK THUNDER MINE LNCM
- SCHOOL CREEK MINE LNCM
- NARM LNCM
- ANTELOPE MINE LNCM




**McVEHIL-MONNETT ASSOCIATES, INC.**
*Air Quality ▪ Environmental Management*
44 Inverness Drive East, Building C
Englewood, CO 80112

# MAP 12
# 2018 $NO_2$ SIGNIFICANT IMPACT AREA RESULTS (μg/m³)

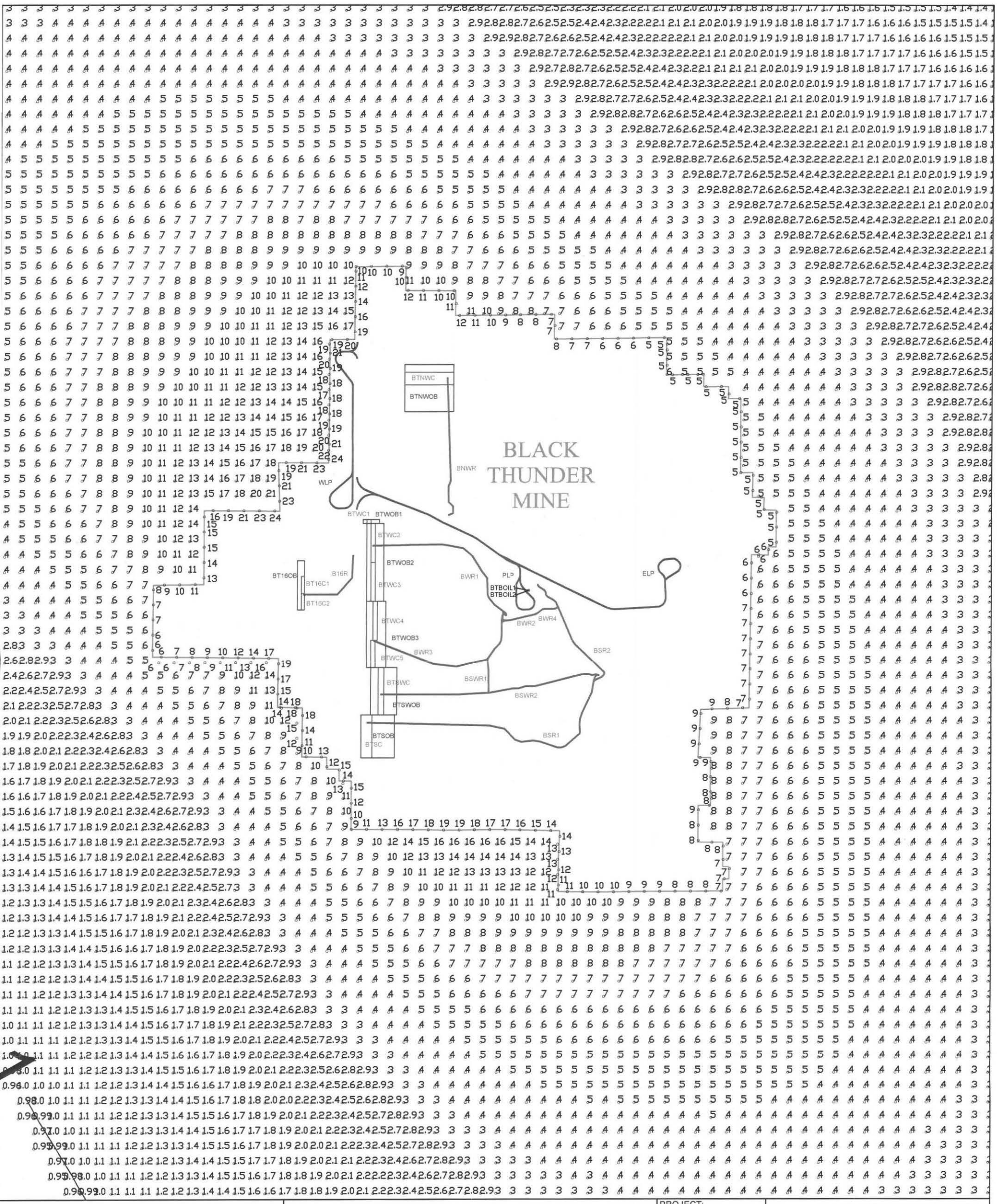
PROJECT: 2622-13

DATE: 10/12/14

BLACK THUNDER MINE LNCM

1 μg/m³ $NO_2$ SIA CONTOUR

0 1 MILE 2 MILES 3 MILES 4 MILES




**McVEHIL-MONNETT ASSOCIATES, INC.**
*Air Quality ▪ Environmental Management*
44 Inverness Drive East, Building C
Englewood, CO 80112

# MAP 13
# 2023 $NO_2$ SIGNIFICANT IMPACT AREA RESULTS ($\mu g/m^3$)

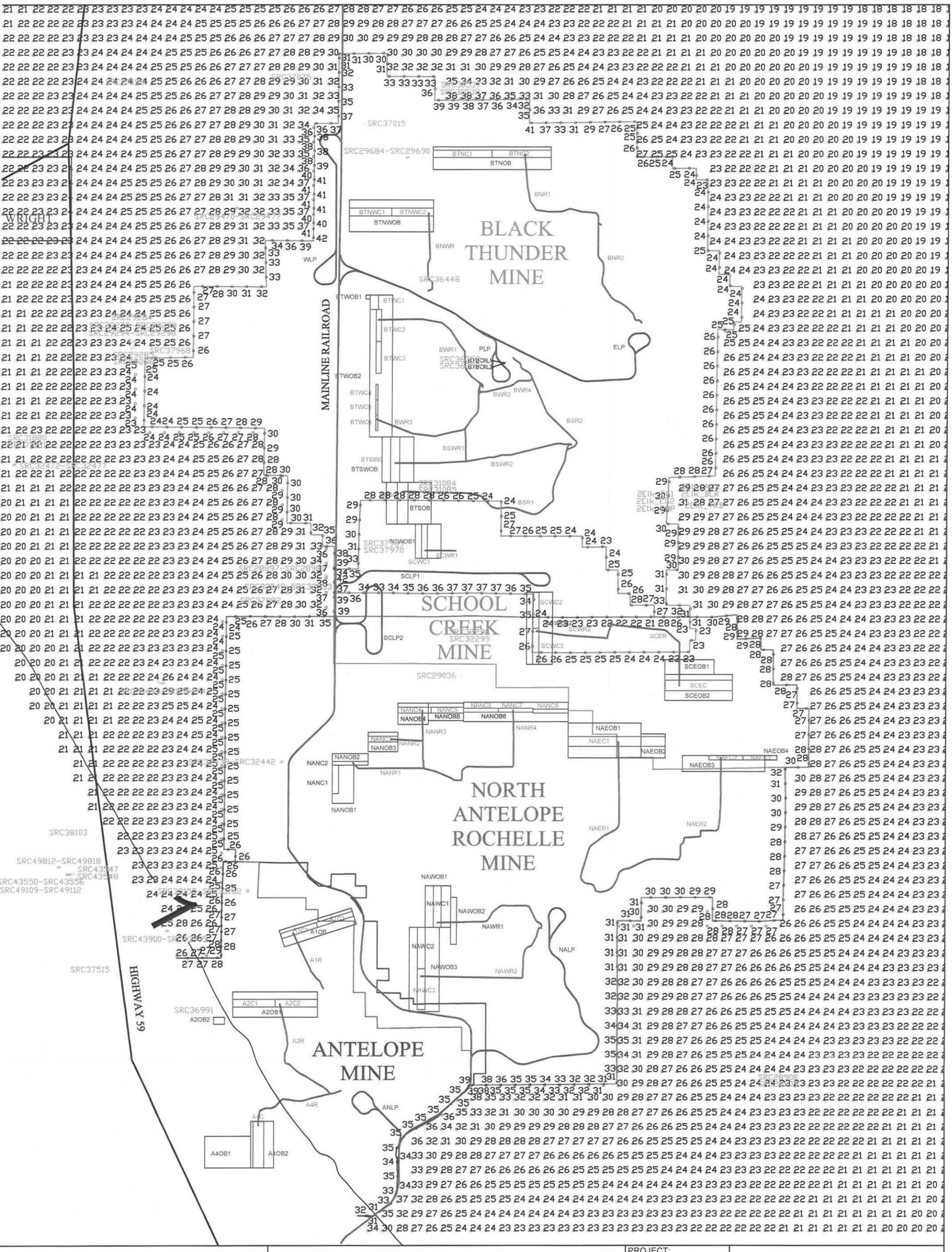
PROJECT: 2622-13

DATE: 10/12/14

BLACK THUNDER MINE LNCM

1 $\mu g/m^3$ $NO_2$ SIA CONTOUR

0 1 MILE 2 MILES 3 MILES 4 MILES




**McVEHIL-MONNETT ASSOCIATES, INC.**
*Air Quality ▪ Environmental Management*
44 Inverness Drive East, Building C
Englewood, CO 80112

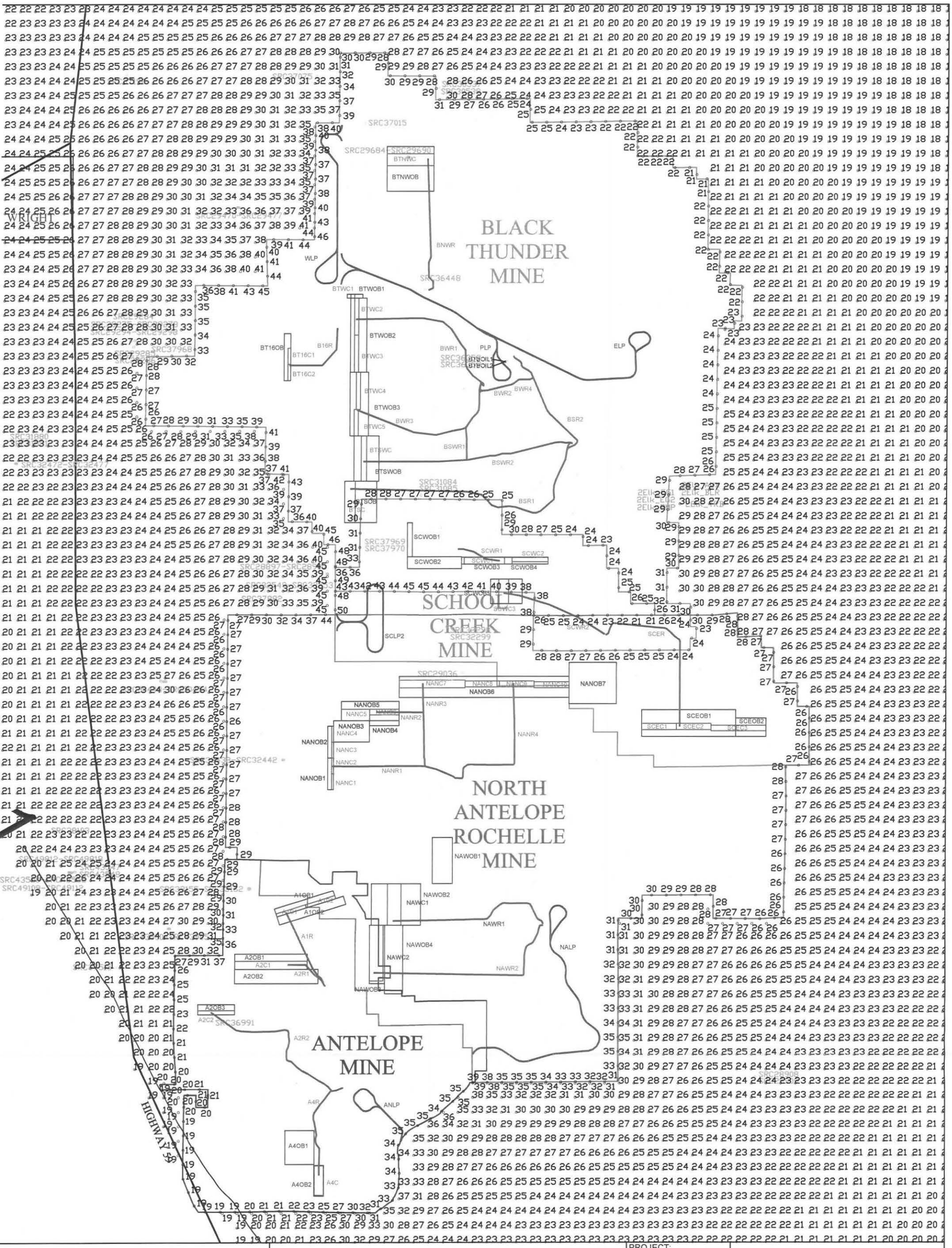
# MAP 14
# 2018 $NO_2$ CUMULATIVE IMPACT RESULTS ($\mu g/m^3$)

PROJECT: 2622-13

DATE: 10/12/14

—— 1 $\mu g/m^3$ $NO_2$ SIA CONTOUR

0 1 MILE 2 MILES 3 MILES 4 MILES




McVEHIL-MONNETT ASSOCIATES, INC.
Air Quality ▪ Environmental Management
44 Inverness Drive East, Building C
Englewood, CO 80112

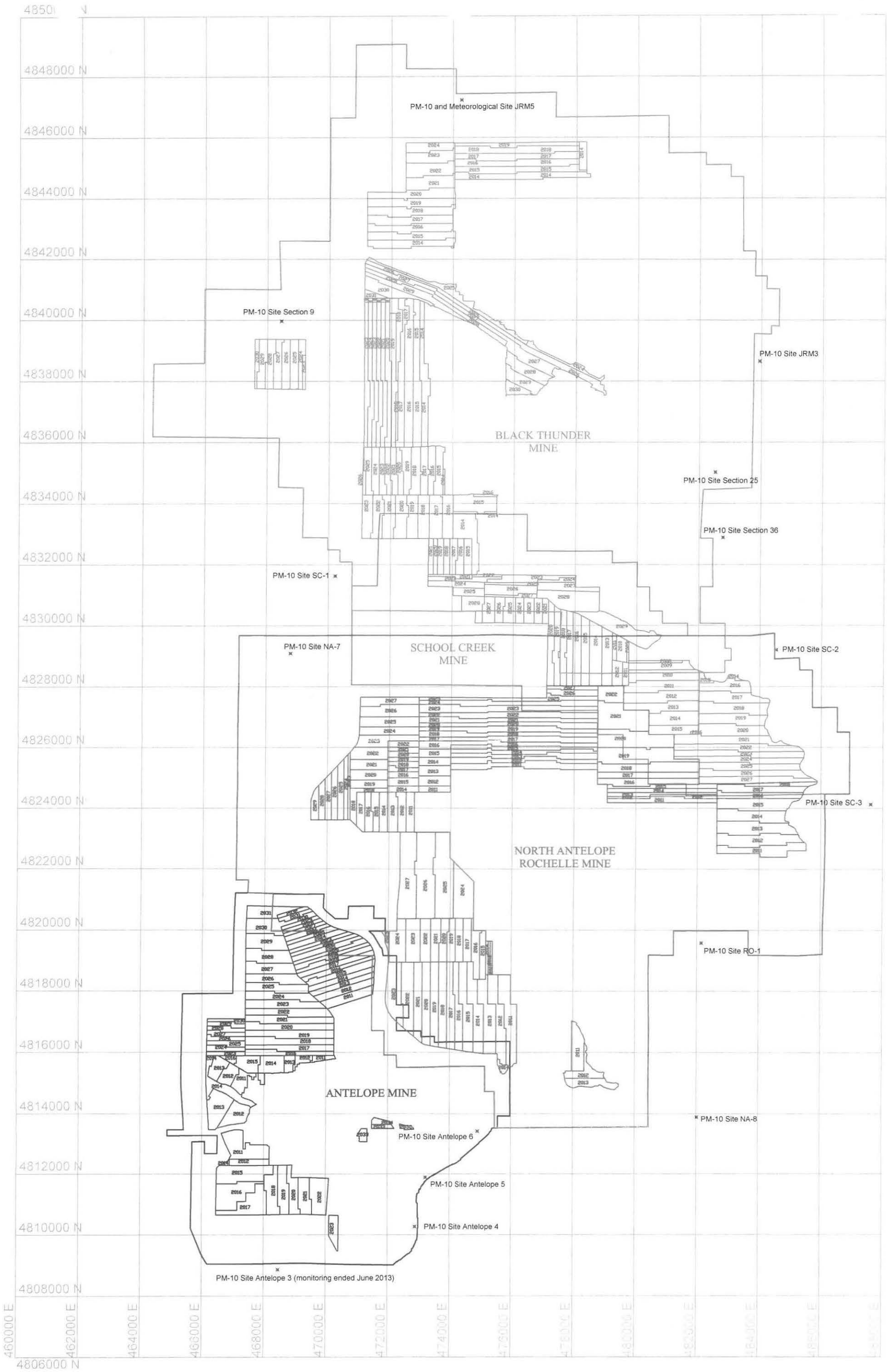
# MAP 15
# 2023 $NO_2$ CUMULATIVE IMPACT RESULTS ($\mu g/m^3$)

PROJECT: 2622-13

DATE: 10/13/14

—— 1 $\mu g/m^3$ $NO_2$ SIA CONTOUR

0 1 MILE 2 MILES 3 MILES 4 MILES




McVEHIL-MONNETT ASSOCIATES, INC.
Air Quality ▪ Environmental Management
44 Inverness Drive East, Building C
Englewood, CO 80112

MAP 16
REGIONAL $PM_{10}$ MONITORING STATION LOCATIONS

PROJECT: 2622-13

DATE: 10/13/14

UTM COORDINATE SYSTEM (NAD 27)

# APPENDIX 1

## PRB Coal Mine Permitting Guidance

*WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY*
*AIR QUALITY DIVISION*

# *Memorandum*

| | |
|---|---|
| **TO:** | Powder River Basin Coal Mine Operators |
| **THROUGH:** | David A. Finley, Administrator, Air Quality Division |
| **FROM:** | Bernie Dailey, NSR Program Manager, Air Quality Division |
| **DATE:** | February 27, 2006 |
| **RE:** | PRB Coal Mine Permitting Guidance |

The following guidance is offered for preparation of permit applications for coal mines in the Powder River Basin (PRB). This memo is to provide applicants guidance with respect to the Division's permit application expectations due to increased particulate levels and on going development in the PRB. The information required per this guidance is in addition to the information that has been submitted with previous permit applications. Permit applications for revisions to the existing mines or for new mines in the PRB must address the following items:

## Dispersion Modeling:

- A modeling analysis is required for annual $PM_{10}$ and $NO_x$ with the following considerations:
- ISCLT3 model required. The use of ISCLT3 for surface mining applications has previously been negotiated and approved by EPA, and therefore meets grand fathering provisions [1].
- Meteorological data in the form of a joint frequency distribution (JFD) will be provided by the Division for each group of mines.
- $PM_{10}$ and $NO_x$ modeling analyses will include neighboring/regional sources.
- $PM_{10}$ modeling analysis will consider model receptors on the LNCM border.
- $NO_x$ modeling analysis will consider model receptors on the LNCM border, as well as a general receptor grid, based on applicant's significance area.
- A $NO_x$ significance analysis shall be submitted, which includes emissions from $NO_x$ sources at the mine, including the rail loop(s), to develop the 1 microgram/cubic meter ($\mu g/m^3$) annual $NO_x$ isopleth using a 500-meter resolution (receptor spacing). The receptors which fall inside the one (1) $\mu g/m^3$ isopleth constitute the general receptor grid.
- Utilize the "Mine A/Mine B" policy for reporting annual $PM_{10}$ and annual $NO_x$ impacts.
- Provide a listing of the concentrations from each group of mines; identify the receptors where the maximum Mine A/Mine B impacts occur in the concentration plots.

- Submission of a table of point, area, and volume sources for each mine that was included in the modeling analysis. Related information shall include:

  - Emission rates for each modeled pollutant in gram/sec and ton/year quantities.
  - Source locations in Universal Transverse Mercator (UTM) coordinates, including UTM Zone, UTM (X), UTM (Y), Datum (i.e., NAD27, NAD83, ...) and Base Elevation.
  - Source release parameters for all operational scenarios in the permit application:

    For Modeled Point Sources:
    - Source ID Used in Modeling Analysis
    - Stack Emission Rate
      - Stack Release Height
      - Stack Exhaust Temperature
      - Stack Release Velocity
      - Stack Exit (Inner) Diameter

    For Modeled Area and Volume Sources:
      - Source ID Used in Modeling Analysis
      - Area or Volume Source Emission Rate
      - Source Release Height
      - Length of Haul Road segments
      - Initial Lateral Dimension (sigma-y) *
      - Initial Vertical Dimension (sigma-z) *

**Note:** The applicant shall include a plot of sources being modeled, including rail loops, haul roads, and mainline rail segments.

## Emission Inventories:

- The $PM_{10}$ inventory will basically remain as has been previously done. The only revision should be to include dozer and water truck emissions in all inventories. If an emission factor for an activity is not available in the Wyoming emission factors, utilize AP-42 factors.

- The $NO_x$ inventory for surrounding mines, mainline railroads, highways, urban sources (towns), and point sources will be obtained from the 2000 NE Wyoming Inventory Database (Excel format). The $NO_x$ source inventory is through 5/1/01, and the emissions included in the spreadsheet under NAAQS 2000 should be utilized for additional sources. Due to the rapid Coal bed Methane (CBM) development in the PRB, applicants will be required to contact the Division for a current CBM $NO_x$ emissions inventory. The NAAQS 2000 emissions inventory represents potential emissions for the mines and point sources, and actual emissions for the mainline rail, rail loop, highway and urban sources.

- The Wyoming Ambient Air Quality Standards (WAAQS) modeling analysis for $NO_x$ will include emissions due to blasting and diesel-fired mobile sources. Initially, the $NO_x$ emissions data for modeling these sources will be based on the NAAQS 2000 inventory database. As new coal mine permits are issued by the Division, applicants will be required to contact the Division to obtain the most current permit for neighboring mines to supplement the emissions inventory contained in the NAAQS 2000 database.

- Initially, the $NO_x$ emissions from each neighboring mine's rail loop(s) shall be modeled based on the NAAQS 2000 inventory. $NO_x$ emissions from the permit applicant's rail loop(s) shall be scaled to the permitted or proposed coal production rate based on the worst-case year(s) to be modeled. Applicants must provide the scaling ratios used in calculating the rail loop emissions.

- After a neighboring mine acquires a new permit that modifies the $NO_x$ emissions from their rail loops, subsequent applicants will be required to incorporate this new information in their modeling analysis, thereby superseding the rail loop emissions provided in the NAAQS 2000 inventory.

- Regional sources to include in the $NO_x$ modeling analysis will be determined using the rectangular source inventory areas, attached as Figure 1; the UTM coordinates for each of the three rectangular areas are also attached. The $NO_x$ inventory can be searched by UTM coordinates to determine the highway, mainline rail, and urban area sources to be incorporated into the modeling analyses. Applicants are required to contact the Division for a current point source emissions inventory.

- The $NO_x$ emissions from all regional power plants (Neil Simpson I and II, Neil Simpson turbines, WYGEN 1 and 2, Two Elk Unit 1, and Wyodak) must be included in the $NO_x$ modeling for any of the three rectangular source inventory areas.

- All permit applications shall contain the annual inventory parameters for $NO_x$ emission estimation and the $NO_x$ emissions estimates for the life of mine of the mine considered in the application.

- For modifications to existing mines, the permit application should contain an actual $NO_x$ inventory for the mine considered in the application based on the previous calender year.

- The applicant shall submit a complete inventory of diesel- or gas-fired generators that are utilized within the mine seeking a permit. The inventory shall include: make, model, size of the generator, annual hours of operation, and type of service that the diesel- or gas-fired generator is employed, (i.e., light plants, water pumps, etc.). $NO_x$, $PM_{10}$, and $SO_2$ emissions from diesel- or gas-fired generators shall be quantified.

- Contact the Air Quality Division for specific guidance on modeling $PM_{10}$ emissions from diesel-fired combustion sources.

- The applicant shall provide the basis for emissions data for each mine represented in the modeling analyses, (i.e., Powder River Coal Co. - Rawhide Mine; Permit MD-703, July 2002).

## $PM_{10}$ Background Concentration:

- Given the ongoing development in the Powder River Basin (PRB), coal mine applicants will need to submit and justify a background $PM_{10}$ concentration with each permit application.

## Short-Term Particulate Standards:

➜ A discussion of ambient air quality monitoring data from the applicant's mine is to be included. This discussion shall include a summary of the data for the previous three (3) years, along with accompanying coal and overburden production statistics. A map showing current locations of ambient and meteorological monitoring sites in relation to pit areas, disturbed acreage, overburden spoils, haul roads, the current LNCM boundary, and proposed LNCM boundary (as applicable) are to be included.

➜ The application should contain a discussion of ambient air quality monitoring data from the designated group of neighboring mines for the previous three years. A demonstration shall be provided to show that modifications to the applicant's mining operations will not cause or contribute to ambient violations at neighboring mine's monitoring sites.

➜ Historical ambient monitored $PM_{10}$ concentrations can be acquired from the AIRS database. If current monitored data is required, or additional monitored data is required that is not in the AIRS database, the applicant should contact Judy Shamley in the Sheridan field office for additional ambient monitored data.

## Equipment Description:

➜ The application should contain the following equipment descriptions:

- A complete list of all major mining equipment, including size, that are utilized by the mine at current production rates. A list of the additional equipment necessary to meet the increased or modified permit levels, including size, is required.

- The number and size of water trucks in use for current production levels, and the frequency that water or dust suppressant controls are applied to the haul roads. Discuss normal operating procedures for water trucks (e.g., the mine has a fleet of 5 water trucks, but they only operate 3 and the remaining 2 are backup equipment). Future plans for additional water trucks as part of any production increase should be addressed.

## Open Acreage:

➜ The application must include a discussion of the land status for the current year and for the years modeled. In the discussion, include a table that summarizes disturbed acreage as follows:

- Topsoil stripping (include areas stripped for sediment control and diversions)
- Topsoil piles - assume piles from previous year and current year as disturbed
- Reclaimed areas - assume previous and current year reclamation as disturbed acreage
- Overburden stockpile areas
- Mine facility areas (excluding buildings and treated areas)
- All roads in the mine permit area
- Active coal pit areas

➜ Maps are to be submitted that delineate the various disturbance areas; the size of the areas should be noted on the maps. (Areas listed in disturbed acreage table should be included on the maps).

## BACT:

- The application must address the BACT requirements of Chapter 6, Section 2(c)(v). The application shall include a discussion of all dust mitigation measures currently employed at the mine with justification that the measures comply with the BACT requirements of the regulations. Future plans for any additional control strategies or revisions to control strategies, as part of any production increase or mine plan change, should be detailed.

- The application must include a discussion of the dust control program for the previous three years as well as the current dust control program. The discussion should include the amount of water and chemical dust suppressant applied to treated roads, active work areas, stockpiles, or open acreage. The application should contain a description of the chemical dust suppressant used and the manufacturer's description of recommended application rates. Also, a summary of the total length of roads watered and total length of roads treated with chemical dust suppressants for the previous three years shall be included. A map(s) is to be included that details which roads or areas were watered and which roads or areas were treated with chemicals for the current year. Future plans for any additional control strategies, as part of any production increase or mine plan change, should be detailed.

- The application should address BACT measures to be employed on open acreage. Reclamation procedures and reclamation rates should be addressed. Potential controls from temporary reclamation or treatment of open areas should be addressed. Future plans for any additional control strategies, as part of any production increase or mine plan change, should be detailed.

- The application must summarize the dust control measures utilized at the coal preparation plant. Any modifications or new coal preparation facilities will require a demonstration that proposed controls represent BACT. Include documentation that emission sources in the prep plant are compliant with existing permit conditions such as stack tests, opacity observations, etc.

## Miscellaneous:

- Submission of an action plan for those mines that have continuous monitors shall be included. The plan should include strategies to follow in case of high readings. The plan shall consider mitigation practices established to go into effect, if hourly monitored concentrations are greater than X $\mu g/m^3$ or the 24-hr avg. is greater than Y $\mu g/m^3$, for example.

- The applicant shall submit a map which identifies the locations of ambient and meteorological monitors at the mine seeking a permit; the coordinate locations of the monitors should also be provided, and referenced using UTM and/or latitude/longitude coordinates. Changes in monitor locations shall be provided in future permit applications.

- Submission of a mitigation plan dealing with coal fires shall be included. The plan shall include notification and record keeping regarding fires, (i.e., the duration of the fire, when the fire started and how long it took to extinguish it, and what actions were taken to suppress the fire.

## References:

[1] SUMMARY OF PUBLIC COMMENTS AND EPA RESPONSES - 7TH CONFERENCE ON AIR QUALITY MODELING, JUNE 28 - 29, 2000; Docket A-99-05, Item V-C-01 (http://www.epa.gov/scram001/guidance/guide/response.pdf)

# APPENDIX 2

## Black Thunder $PM_{10}$ and $PM_{2.5}$ Emission Inventory

## Black Thunder $PM_{10}$ Emission Calculations

### North Pit

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 38,352,223 | 44,076,597 | 43,036,317 | 50,551,300 | 27,399,678 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | $yd^3$/yr | 64,073,144 | 72,581,587 | 74,652,419 | 116,510,680 | 64,632,500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3$/yr | 68,828,929 | 67,280,639 | 69,391,173 | 63,899,223 | 39,787,169 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 5,605 | 6,442 | 6,290 | 7,388 | 4,004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 303 | 314 | 322 | 378 | 225 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 274 | 315 | 307 | 361 | 196 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 1,111,601 | 1,260,711 | 1,297,702 | 2,011,337 | 1,109,947 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 863,374 | 1,044,067 | 1,065,071 | 1,302,777 | 735,318 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 38,352,223 | 44,076,597 | 43,036,317 | 50,551,300 | 27,399,678 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | $1.0 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 0.547 lb/hr | hr/yr | 72,044 | 77,632 | 79,450 | 107,039 | 66,054 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | $18.6 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 9.626 lb/hr | hr/yr | 12,010 | 13,803 | 13,477 | 15,831 | 8,580 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 27,231 | 31,913 | 32,812 | 46,647 | 26,061 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 104,736 | 122,743 | 126,201 | 179,412 | 100,236 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 2,644 | 2,783 | 2,923 | 2,878 | 2,878 | 2,878 | 2,878 | 2,878 | 1,939 | 929 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, treated acres[1] | 0.05 * 0.3 ton/acre/year | | 0.015 ton/acre/year | acres | 294 | 309 | 325 | 320 | 320 | 320 | 320 | 320 | 215 | 103 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Coal Removal[1] | 12.08 | 13.88 | 13.56 | 15.92 | 8.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 250.85 | 284.16 | 292.26 | 456.14 | 253.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 309.73 | 302.76 | 312.26 | 287.55 | 179.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 9.77 | 11.22 | 10.96 | 12.87 | 6.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 1.70 | 1.77 | 1.81 | 2.13 | 1.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 1.08 | 1.24 | 1.21 | 1.42 | 0.77 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 130.71 | 148.24 | 152.59 | 236.51 | 130.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 180.48 | 218.26 | 222.65 | 272.34 | 153.71 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 11.00 | 12.64 | 12.35 | 14.50 | 7.86 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 19.69 | 21.21 | 21.71 | 29.25 | 18.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 57.80 | 66.43 | 64.86 | 76.19 | 41.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 47.45 | 55.61 | 57.17 | 81.28 | 45.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 6.84 | 8.02 | 8.24 | 11.72 | 6.55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 198.27 | 208.73 | 219.19 | 215.82 | 215.82 | 215.82 | 215.82 | 215.82 | 145.45 | 69.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, treated acres[1] | 4.41 | 4.64 | 4.87 | 4.80 | 4.80 | 4.80 | 4.80 | 4.80 | 3.23 | 1.55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | **1241.86** | **1358.82** | **1395.71** | **1718.44** | **1073.73** | **220.62** | **220.62** | **220.62** | **148.68** | **71.22** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

### Northwest Pit

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 43,604,929 | 39,348,198 | 43,533,736 | 38,744,823 | 46,493,528 | 56,557,923 | 54,373,213 | 55,642,602 | 46,212,509 | 36,314,508 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | $yd^3$/yr | 73,786,199 | 71,649,374 | 82,864,102 | 72,827,346 | 98,544,488 | 119,515,756 | 70,294,067 | 78,266,839 | 64,186,469 | 57,018,586 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3$/yr | 57,382,142 | 55,420,310 | 53,475,125 | 49,193,304 | 69,853,808 | 83,139,756 | 86,345,750 | 89,044,394 | 88,812,685 | 54,949,175 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 6,373 | 5,751 | 6,362 | 5,663 | 6,795 | 8,266 | 7,947 | 8,132 | 6,754 | 5,307 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 280 | 270 | 301 | 273 | 356 | 427 | 353 | 373 | 319 | 246 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 311 | 281 | 311 | 277 | 332 | 404 | 388 | 397 | 330 | 259 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 1,279,639 | 1,241,010 | 1,436,869 | 1,263,264 | 1,696,291 | 2,063,896 | 1,226,293 | 1,364,232 | 1,129,680 | 996,814 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 551,472 | 550,426 | 664,365 | 640,612 | 859,180 | 1,112,536 | 1,144,739 | 1,244,316 | 1,086,705 | 1,067,199 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 43,604,929 | 39,348,198 | 43,533,736 | 38,744,823 | 46,493,528 | 56,557,923 | 54,373,213 | 55,642,602 | 46,212,509 | 36,314,508 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | $1.0 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 0.547 lb/hr | hr/yr | 75,653 | 73,654 | 81,798 | 74,014 | 95,303 | 112,605 | 79,508 | 85,535 | 74,722 | 63,722 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | $18.6 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 9.626 lb/hr | hr/yr | 13,655 | 12,322 | 13,633 | 12,133 | 14,560 | 17,712 | 17,027 | 17,425 | 14,472 | 11,372 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 25,905 | 25,437 | 29,842 | 27,035 | 36,419 | 45,258 | 33,279 | 36,690 | 31,146 | 28,411 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 99,636 | 97,834 | 114,778 | 103,983 | 140,073 | 174,069 | 127,997 | 141,115 | 119,791 | 109,273 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 1,512 | 1,632 | 1,752 | 1,872 | 1,992 | 2,112 | 2,232 | 2,352 | 2,313 | 2,313 | 2,313 | 2,313 | 1,578 | 844 | 109 | 0 | 0 |
| Wind Erosion, treated acres[1] | 0.05 * 0.3 ton/acre/year | | 0.015 ton/acre/year | acres | 168 | 181 | 195 | 208 | 221 | 235 | 248 | 261 | 257 | 257 | 257 | 257 | 175 | 94 | 12 | 0 | 0 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Coal Removal[1] | 13.74 | 12.39 | 13.71 | 12.20 | 14.65 | 17.82 | 17.13 | 17.53 | 14.56 | 11.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 288.87 | 280.51 | 324.41 | 285.12 | 385.80 | 467.90 | 275.20 | 306.41 | 251.29 | 223.23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 258.22 | 249.39 | 240.64 | 221.37 | 314.34 | 374.13 | 388.56 | 400.70 | 399.66 | 247.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 11.10 | 10.02 | 11.09 | 9.87 | 11.84 | 14.40 | 13.85 | 14.17 | 11.77 | 9.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 1.58 | 1.52 | 1.70 | 1.54 | 2.00 | 2.40 | 1.99 | 2.10 | 1.79 | 1.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 1.23 | 1.11 | 1.22 | 1.09 | 1.31 | 1.59 | 1.53 | 1.56 | 1.30 | 1.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 150.47 | 145.93 | 168.96 | 148.54 | 199.46 | 242.69 | 144.20 | 160.42 | 132.84 | 117.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 115.28 | 115.06 | 138.88 | 133.92 | 179.61 | 232.57 | 239.30 | 260.12 | 227.17 | 223.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 12.51 | 11.29 | 12.49 | 11.11 | 13.34 | 16.23 | 15.60 | 15.96 | 13.26 | 10.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 20.67 | 20.13 | 22.35 | 20.23 | 26.04 | 30.77 | 21.73 | 23.37 | 20.42 | 17.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 65.72 | 59.30 | 65.61 | 58.39 | 70.07 | 85.24 | 81.95 | 83.86 | 69.65 | 54.73 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 45.14 | 44.32 | 52.00 | 47.11 | 63.46 | 78.86 | 57.99 | 63.93 | 54.27 | 49.51 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 6.51 | 6.39 | 7.50 | 6.79 | 9.15 | 11.37 | 8.36 | 9.22 | 7.83 | 7.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 113.40 | 122.40 | 131.39 | 140.39 | 149.39 | 158.39 | 167.38 | 176.38 | 173.48 | 173.48 | 173.48 | 173.48 | 118.38 | 63.28 | 8.18 | 0.00 | 0.00 |
| Wind Erosion, treated acres[1] | 2.52 | 2.72 | 2.92 | 3.12 | 3.32 | 3.52 | 3.72 | 3.92 | 3.86 | 3.86 | 3.86 | 3.86 | 2.63 | 1.41 | 0.18 | 0.00 | 0.00 |
| | **1106.95** | **1082.48** | **1194.87** | **1100.79** | **1443.78** | **1737.88** | **1438.47** | **1539.66** | **1383.13** | **1150.44** | **177.33** | **177.33** | **121.01** | **64.69** | **8.36** | **0.00** | **0.00** |

### West Pit

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 57,785,815 | 50,800,795 | 54,051,842 | 51,397,668 | 60,785,745 | 71,323,818 | 67,244,730 | 68,974,926 | 66,604,309 | 69,746,350 | 62,017,866 | 1,118,889 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | $yd^3$/yr | 134,562,214 | 157,372,161 | 174,596,180 | 165,165,329 | 135,502,401 | 183,573,119 | 170,367,191 | 183,687,149 | 189,453,268 | 188,871,859 | 165,390,650 | 33,567 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3$/yr | 63,842,448 | 63,947,395 | 65,917,687 | 62,679,040 | 82,554,418 | 98,256,075 | 102,045,182 | 104,960,550 | 104,960,434 | 108,369,927 | 93,646,210 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 8,445 | 7,424 | 7,900 | 7,512 | 8,884 | 10,424 | 9,828 | 10,081 | 9,734 | 10,193 | 9,064 | 164 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 368 | 406 | 441 | 425 | 423 | 537 | 519 | 546 | 556 | 559 | 493 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 413 | 363 | 386 | 367 | 434 | 509 | 480 | 493 | 476 | 498 | 443 | 8 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 2,315,342 | 2,695,753 | 2,995,681 | 2,834,148 | 2,329,821 | 3,156,976 | 2,917,891 | 3,149,907 | 3,275,087 | 3,259,091 | 2,867,288 | 1,490 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 1,148,154 | 1,074,172 | 1,195,932 | 1,188,689 | 1,460,701 | 1,771,030 | 1,727,469 | 1,824,443 | 1,810,948 | 1,890,738 | 1,650,501 | 27,372 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 57,785,815 | 50,800,795 | 54,051,842 | 51,397,668 | 60,785,745 | 71,323,818 | 67,244,730 | 68,974,926 | 66,604,309 | 69,746,350 | 62,017,866 | 1,118,889 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | $1.0 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 0.547 lb/hr | hr/yr | 115,477 | 131,062 | 143,435 | 137,270 | 122,055 | 157,932 | 149,294 | 158,882 | 162,830 | 162,893 | 144,320 | 27 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | $18.6 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 9.626 lb/hr | hr/yr | 18,096 | 15,909 | 16,927 | 16,096 | 19,036 | 22,336 | 21,058 | 21,600 | 20,858 | 21,842 | 19,421 | 350 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 48,722 | 53,733 | 59,833 | 57,489 | 53,637 | 70,125 | 66,169 | 70,974 | 72,711 | 72,645 | 62,544 | 295 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 187,391 | 206,667 | 230,129 | 221,112 | 206,297 | 269,712 | 254,495 | 272,977 | 279,656 | 279,405 | 240,555 | 1,134 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 2,639 | 2,764 | 2,890 | 3,015 | 3,141 | 3,266 | 3,392 | 3,518 | 3,495 | 3,491 | 3,491 | 3,491 | 3,491 | 3,491 | 3,127 | 2,398 | 1,669 |
| Wind Erosion, treated acres[1] | 0.05 * 0.3 ton/acre/year | | 0.015 ton/acre/year | acres | 293 | 307 | 321 | 335 | 349 | 363 | 377 | 391 | 388 | 388 | 388 | 388 | 388 | 388 | 347 | 266 | 185 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Coal Removal[1] | 18.20 | 16.00 | 17.03 | 16.19 | 19.15 | 22.47 | 21.18 | 21.73 | 20.98 | 21.97 | 19.54 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 526.81 | 616.11 | 683.54 | 646.62 | 530.49 | 718.69 | 666.99 | 719.14 | 741.71 | 739.43 | 647.50 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 287.29 | 287.76 | 296.63 | 282.06 | 371.49 | 442.15 | 459.20 | 472.32 | 472.32 | 487.66 | 421.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 14.72 | 12.94 | 13.76 | 13.09 | 15.48 | 18.16 | 17.12 | 17.57 | 16.96 | 17.76 | 15.79 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 2.07 | 2.28 | 2.48 | 2.39 | 2.38 | 3.02 | 2.92 | 3.07 | 3.12 | 3.14 | 2.77 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 1.63 | 1.43 | 1.52 | 1.45 | 1.71 | 2.01 | 1.89 | 1.94 | 1.87 | 1.96 | 1.74 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 272.25 | 316.99 | 352.25 | 333.26 | 273.96 | 371.22 | 343.11 | 370.39 | 385.11 | 383.23 | 337.16 | 0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 240.01 | 224.55 | 250.00 | 248.49 | 305.35 | 370.22 | 361.12 | 381.39 | 378.57 | 395.25 | 345.03 | 5.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 16.58 | 14.57 | 15.51 | 14.74 | 17.44 | 20.46 | 19.29 | 19.79 | 19.11 | 20.01 | 17.79 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 31.56 | 35.81 | 39.20 | 37.51 | 33.35 | 43.16 | 40.80 | 43.42 | 44.50 | 44.51 | 39.44 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 87.09 | 76.57 | 81.47 | 77.46 | 91.61 | 107.50 | 101.35 | 103.96 | 100.38 | 105.12 | 93.47 | 1.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 84.90 | 93.63 | 104.26 | 100.17 | 93.46 | 122.19 | 115.30 | 123.67 | 126.70 | 126.58 | 108.98 | 0.51 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 12.24 | 13.50 | 15.03 | 14.44 | 13.48 | 17.62 | 16.63 | 17.83 | 18.27 | 18.25 | 15.71 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 197.90 | 207.32 | 216.73 | 226.15 | 235.56 | 244.98 | 254.40 | 263.81 | 262.16 | 261.82 | 261.82 | 261.82 | 261.82 | 261.82 | 234.49 | 179.83 | 125.16 |
| Wind Erosion, treated acres[1] | 4.40 | 4.61 | 4.82 | 5.03 | 5.23 | 5.44 | 5.65 | 5.86 | 5.83 | 5.82 | 5.82 | 5.82 | 5.82 | 5.82 | 5.21 | 4.00 | 2.78 |
| | **1797.64** | **1924.07** | **2094.23** | **2019.05** | **2010.15** | **2509.29** | **2426.94** | **2565.88** | **2597.58** | **2632.52** | **2333.98** | **276.94** | **267.64** | **267.64** | **239.70** | **183.82** | **127.95** |

### Southwest Pit

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 18,090,549 | 23,451,572 | 20,381,880 | 23,191,152 | 23,375,091 | 21,324,178 | 24,078,189 | 25,756,732 | 25,261,410 | 31,699,728 | 31,103,228 | 10,130,526 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | $yd^3$/yr | 100,047,346 | 78,642,694 | 76,887,520 | 70,322,438 | 44,989,450 | 55,417,700 | 59,096,787 | 61,458,326 | 69,086,594 | 107,829,250 | 85,440,282 | 16,323,976 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3$/yr | 49,690,891 | 46,384,729 | 49,246,080 | 44,845,450 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 2,644 | 3,427 | 2,979 | 3,389 | 3,416 | 3,117 | 3,519 | 3,764 | 3,692 | 4,633 | 4,546 | 1,481 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 272 | 211 | 213 | 194 | 76 | 96 | 102 | 106 | 121 | 186 | 148 | 30 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 129 | 168 | 146 | 166 | 167 | 152 | 172 | 184 | 180 | 226 | 222 | 72 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 1,700,513 | 1,345,502 | 1,316,328 | 1,207,800 | 776,231 | 952,864 | 1,012,787 | 1,056,155 | 1,195,130 | 1,853,777 | 1,480,436 | 280,166 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 450,840 | 614,351 | 558,558 | 669,287 | 735,624 | 688,863 | 799,669 | 875,503 | 877,611 | 1,100,646 | 1,054,507 | 312,907 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 18,090,549 | 23,451,572 | 20,381,880 | 23,191,152 | 23,375,091 | 21,324,178 | 24,078,189 | 25,756,732 | 25,261,410 | 31,699,728 | 31,103,228 | 10,130,526 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | $1.0 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 0.547 lb/hr | hr/yr | 90,509 | 73,885 | 73,127 | 67,928 | 31,010 | 38,278 | 40,820 | 42,452 | 47,831 | 74,458 | 59,082 | 11,412 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | $18.6 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 9.626 lb/hr | hr/yr | 5,665 | 7,344 | 6,383 | 7,262 | 7,320 | 6,678 | 7,540 | 8,066 | 7,911 | 9,927 | 9,740 | 3,172 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 30,956 | 27,799 | 26,708 | 26,572 | 21,079 | 23,166 | 25,581 | 27,254 | 29,379 | 41,640 | 34,708 | 7,303 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 119,062 | 106,919 | 102,723 | 102,200 | 81,072 | 89,098 | 98,387 | 104,822 | 112,995 | 160,153 | 133,491 | 28,090 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 634 | 698 | 762 | 826 | 890 | 955 | 1,019 | 1,083 | 1,147 | 1,126 | 1,126 | 1,126 | 1,126 | 1,126 | 1,126 | 865 | 493 |
| Wind Erosion, treated acres[1] | 0.05 * 0.3 ton/acre/year | | 0.015 ton/acre/year | acres | 70 | 78 | 85 | 92 | 99 | 106 | 113 | 120 | 127 | 125 | 125 | 125 | 125 | 125 | 125 | 96 | 55 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Coal Removal[1] | 5.70 | 7.39 | 6.42 | 7.31 | 7.36 | 6.72 | 7.58 | 8.11 | 7.96 | 9.99 | 9.80 | 3.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 391.69 | 307.89 | 301.01 | 275.31 | 176.13 | 216.96 | 231.36 | 240.61 | 270.47 | 422.15 | 334.50 | 63.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 223.61 | 208.73 | 221.61 | 201.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 4.61 | 5.97 | 5.19 | 5.91 | 5.95 | 5.43 | 6.13 | 6.56 | 6.43 | 8.07 | 7.92 | 2.58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 1.53 | 1.19 | 1.20 | 1.09 | 0.43 | 0.54 | 0.57 | 0.60 | 0.68 | 1.05 | 0.83 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 0.51 | 0.66 | 0.57 | 0.65 | 0.66 | 0.60 | 0.68 | 0.72 | 0.71 | 0.89 | 0.87 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 199.96 | 158.21 | 154.78 | 142.02 | 91.27 | 112.04 | 119.09 | 124.19 | 140.53 | 217.98 | 174.08 | 32.94 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 94.25 | 128.43 | 116.76 | 139.91 | 153.78 | 144.00 | 167.17 | 183.02 | 183.46 | 230.08 | 220.44 | 65.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 5.19 | 6.73 | 5.85 | 6.65 | 6.71 | 6.12 | 6.91 | 7.39 | 7.25 | 9.09 | 8.92 | 2.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 24.73 | 20.19 | 19.98 | 18.56 | 8.47 | 10.46 | 11.15 | 11.60 | 13.07 | 20.35 | 16.14 | 3.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 27.27 | 35.35 | 30.72 | 34.95 | 35.23 | 32.14 | 36.29 | 38.82 | 38.07 | 47.78 | 46.88 | 15.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 53.94 | 48.44 | 46.54 | 46.30 | 36.73 | 40.37 | 44.57 | 47.49 | 51.19 | 72.56 | 60.48 | 12.73 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 7.78 | 6.98 | 6.71 | 6.68 | 5.30 | 5.82 | 6.43 | 6.85 | 7.38 | 10.46 | 8.72 | 1.84 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 47.52 | 52.34 | 57.15 | 61.96 | 66.78 | 71.59 | 76.40 | 81.21 | 86.03 | 84.47 | 84.47 | 84.47 | 84.47 | 84.47 | 84.47 | 64.88 | 36.96 |
| Wind Erosion, treated acres[1] | 1.06 | 1.16 | 1.27 | 1.38 | 1.48 | 1.59 | 1.70 | 1.80 | 1.91 | 1.88 | 1.88 | 1.88 | 1.88 | 1.88 | 1.88 | 1.44 | 0.82 |
| | **1089.33** | **989.65** | **975.77** | **950.49** | **596.28** | **654.37** | **716.04** | **758.97** | **815.15** | **1136.80** | **975.94** | **290.69** | **86.35** | **86.35** | **86.35** | **66.32** | **37.78** |

**Black Thunder PM$_{10}$ Emission Calculations (continued)**

**South Pit**

| Mining Operation | PM$_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled PM$_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 32,166,483 | 32,322,838 | 28,996,224 | 26,115,057 | 31,945,958 | 40,794,080 | 44,303,868 | 39,625,741 | 40,616,385 | 2,644,678 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | yd$^3$/yr | 66,463,754 | 67,453,961 | 67,016,490 | 51,447,423 | 77,337,339 | 97,618,429 | 108,651,962 | 107,282,552 | 120,372,888 | 79,340 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/yd$^3$ | | 0.009 lb/yd$^3$ | yd$^3$/yr | 55,413,748 | 50,750,481 | 53,811,940 | 49,884,095 | 60,110,599 | 71,548,633 | 74,302,394 | 76,425,168 | 75,297,893 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 4,701 | 4,724 | 4,238 | 3,817 | 4,669 | 5,962 | 6,475 | 5,791 | 5,936 | 387 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 249 | 246 | 245 | 217 | 275 | 346 | 371 | 368 | 387 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 230 | 231 | 207 | 187 | 228 | 291 | 316 | 283 | 290 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 1,146,660 | 1,164,363 | 1,156,822 | 891,347 | 1,327,424 | 1,681,199 | 1,862,081 | 1,839,150 | 2,079,445 | 3,585 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 925,814 | 1,016,796 | 959,687 | 914,252 | 1,269,687 | 1,673,841 | 1,866,726 | 1,712,459 | 1,860,190 | 118,093 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 32,166,483 | 32,322,838 | 28,996,224 | 26,115,057 | 31,945,958 | 40,794,080 | 44,303,868 | 39,625,741 | 40,616,385 | 2,644,678 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | $1.0 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 0.547 lb/hr | hr/yr | 69,204 | 69,353 | 69,216 | 58,290 | 77,967 | 95,155 | 103,325 | 102,696 | 111,426 | 65 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | $18.6 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 9.626 lb/hr | hr/yr | 10,073 | 10,122 | 9,080 | 8,178 | 10,004 | 12,775 | 13,874 | 12,409 | 12,719 | 828 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 28,523 | 30,132 | 29,379 | 24,963 | 36,197 | 46,814 | 52,212 | 49,921 | 55,491 | 1,549 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 109,705 | 115,892 | 112,997 | 96,013 | 139,220 | 180,053 | 200,814 | 192,003 | 213,427 | 5,958 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 1,170 | 1,254 | 1,338 | 1,422 | 1,505 | 1,589 | 1,673 | 1,646 | 1,646 | 1,646 | 1,646 | 1,646 | 1,273 | 901 | 529 | 157 | 0 |
| Wind Erosion, treated acres[1] | 0.05 * 0.3 ton/acre/year | | 0.015 ton/acre/year | acres | 130 | 139 | 149 | 158 | 167 | 177 | 186 | 183 | 183 | 183 | 183 | 183 | 141 | 100 | 59 | 17 | 0 |

| Mining Operation | Controlled PM$_{10}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 10.13 | 10.18 | 9.13 | 8.23 | 10.06 | 12.85 | 13.96 | 12.48 | 12.79 | 0.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 260.21 | 264.08 | 262.37 | 201.42 | 302.78 | 382.18 | 425.37 | 420.01 | 471.26 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 249.36 | 228.38 | 242.15 | 224.48 | 270.50 | 321.97 | 334.36 | 343.91 | 338.84 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 8.19 | 8.23 | 7.38 | 6.65 | 8.14 | 10.39 | 11.28 | 10.09 | 10.34 | 0.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 1.40 | 1.38 | 1.38 | 1.22 | 1.55 | 1.95 | 2.09 | 2.07 | 2.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 0.90 | 0.91 | 0.82 | 0.73 | 0.90 | 1.15 | 1.25 | 1.11 | 1.14 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 134.83 | 136.91 | 136.03 | 104.81 | 156.09 | 197.69 | 218.96 | 216.26 | 244.52 | 0.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 193.54 | 212.55 | 200.62 | 191.12 | 265.42 | 349.91 | 390.23 | 357.98 | 388.86 | 24.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 9.23 | 9.27 | 8.32 | 7.49 | 9.16 | 11.70 | 12.71 | 11.37 | 11.65 | 0.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 18.91 | 18.95 | 18.91 | 15.93 | 21.31 | 26.00 | 28.23 | 28.06 | 30.45 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 48.48 | 48.72 | 43.70 | 39.36 | 48.15 | 61.48 | 66.77 | 59.72 | 61.22 | 3.99 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 49.70 | 52.50 | 51.19 | 43.50 | 63.07 | 81.57 | 90.98 | 86.99 | 96.69 | 2.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 7.17 | 7.57 | 7.38 | 6.27 | 9.09 | 11.76 | 13.12 | 12.54 | 13.94 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 87.78 | 94.06 | 100.34 | 106.61 | 112.89 | 119.17 | 125.45 | 123.42 | 123.42 | 123.42 | 123.42 | 123.42 | 95.50 | 67.58 | 39.66 | 11.74 | 0.00 |
| Wind Erosion, treated acres[1] | 1.95 | 2.09 | 2.23 | 2.37 | 2.51 | 2.65 | 2.79 | 2.74 | 2.74 | 2.74 | 2.74 | 2.74 | 2.12 | 1.50 | 0.88 | 0.26 | 0.00 |
| | **1081.79** | **1095.80** | **1091.96** | **960.19** | **1281.61** | **1592.41** | **1737.54** | **1688.77** | **1810.05** | **161.02** | **126.17** | **126.17** | **97.62** | **69.08** | **40.54** | **12.00** | **0.00** |

**Highway/Plant Pit**

| Mining Operation | PM$_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled PM$_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19,940,151 | 48,949,342 | 123,753,602 | 128,451,858 | 101,181,531 | 118,625,119 | 148,567,029 | 190,000,000 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | yd$^3$/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29,419,032 | 198,545,439 | 151,578,368 | 18,320,881 | 65,616,149 | 116,241,607 | 233,621,179 | 739,423,554 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/yd$^3$ | | 0.009 lb/yd$^3$ | yd$^3$/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 186,413,712 | 248,900,662 | 212,154,763 | 247,985,386 | 253,956,044 | 0 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,914 | 7,154 | 18,086 | 18,990 | 16,144 | 17,867 | 21,713 | 27,768 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 335 | 663 | 668 | 424 | 690 | 912 | 1,246 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 142 | 350 | 884 | 918 | 723 | 847 | 1,061 | 1,357 |
| OB Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 515,331 | 3,420,376 | 2,626,226 | 320,996 | 1,143,114 | 2,019,683 | 4,023,769 | 12,817,829 |
| Coal Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 108,518 | 255,120 | 578,721 | 600,691 | 473,165 | 554,738 | 694,758 | 888,515 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19,940,151 | 48,949,342 | 123,753,602 | 128,451,858 | 101,181,531 | 118,625,119 | 148,567,029 | 190,000,000 |
| Dozers & Loaders on OB[2] | $1.0 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 0.547 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20,267 | 136,453 | 153,120 | 72,980 | 98,631 | 138,942 | 221,154 | 508,207 |
| Dozers & Loaders on Coal[2] | $18.6 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 9.626 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6,244 | 15,329 | 38,754 | 40,515 | 33,494 | 37,855 | 46,525 | 59,500 |
| Graders[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,075 | 54,154 | 45,007 | 10,780 | 21,795 | 35,705 | 67,046 | 200,382 |
| Water Trucks[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34,903 | 208,285 | 173,106 | 41,463 | 83,825 | 137,328 | 257,870 | 770,700 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 128 | 225 | 322 | 419 | 516 | 613 | 582 | 582 | 582 |
| Wind Erosion, treated acres[1] | 0.05 * 0.3 ton/acre/year | | 0.015 ton/acre/year | acres | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 25 | 36 | 47 | 57 | 68 | 65 | 65 | 65 |

| Mining Operation | Controlled PM$_{10}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.28 | 15.42 | 38.98 | 40.46 | 31.87 | 37.37 | 46.80 | 59.85 |
| OB Removal (T/S)[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 115.18 | 777.31 | 593.43 | 71.73 | 256.89 | 455.09 | 914.63 | 2894.84 |
| OB Removal (dragline)[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 838.86 | 1120.05 | 954.70 | 1115.93 | 1142.80 | 0.00 |
| Scrapers[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.08 | 12.47 | 31.52 | 33.09 | 28.13 | 31.13 | 37.83 | 48.39 |
| OB Blasting[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 1.88 | 3.73 | 3.76 | 2.39 | 3.88 | 5.13 | 7.01 |
| Coal Blasting[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.56 | 1.38 | 3.48 | 3.61 | 2.85 | 3.34 | 4.18 | 5.34 |
| OB Haul Roads[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 60.60 | 402.19 | 308.81 | 37.75 | 134.42 | 237.49 | 473.14 | 1507.21 |
| Coal Haul Roads[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 22.68 | 53.33 | 120.98 | 125.57 | 98.91 | 115.96 | 145.23 | 185.74 |
| Coal Dumping[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.72 | 14.04 | 35.50 | 36.85 | 29.03 | 34.03 | 42.62 | 54.51 |
| Dozers & Loaders on OB[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.54 | 37.29 | 41.84 | 19.94 | 26.95 | 37.97 | 60.43 | 138.87 |
| Dozers & Loaders on Coal[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 30.05 | 73.77 | 186.52 | 194.99 | 161.20 | 182.19 | 223.92 | 286.36 |
| Graders[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 15.81 | 94.36 | 78.42 | 18.78 | 37.98 | 62.22 | 116.83 | 349.16 |
| Water Trucks[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.28 | 13.61 | 11.31 | 2.71 | 5.48 | 8.97 | 16.85 | 50.35 |
| Wind Erosion, untreated acres[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 9.57 | 16.85 | 24.12 | 31.40 | 38.67 | 45.95 | 43.65 | 43.65 | 43.65 |
| Wind Erosion, treated acres[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.21 | 0.37 | 0.54 | 0.70 | 0.86 | 1.02 | 0.97 | 0.97 | 0.97 |
| | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **9.78** | **287.28** | **1521.70** | **2325.47** | **1748.83** | **1817.74** | **2370.19** | **3275.01** | **5632.25** |

**Section 16 Pit**

| Mining Operation | PM$_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled PM$_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11,305,388 | 29,654,584 | 47,929,564 | 54,996,983 | 54,996,983 | 46,909,786 | 54,996,983 | 41,432,971 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | yd$^3$/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 117,395,283 | 132,034,113 | 144,097,437 | 168,927,083 | 30,216,686 | 151,670,375 | 181,087,551 | 122,699,621 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/yd$^3$ | | 0.009 lb/yd$^3$ | yd$^3$/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39,571,855 | 91,424,631 | 107,186,139 | 107,186,139 | 91,697,447 | 107,186,139 | 72,152,187 | 0 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,652 | 4,334 | 7,005 | 8,038 | 8,131 | 7,485 | 8,283 | 6,055 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 198 | 296 | 404 | 472 | 473 | 157 | 488 | 335 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 81 | 212 | 342 | 393 | 393 | 335 | 393 | 296 | 0 |
| OB Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,003,963 | 2,262,141 | 2,492,945 | 2,857,791 | 427,674 | 2,491,081 | 3,039,081 | 2,082,770 | 0 |
| Coal Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 94,947 | 282,424 | 499,609 | 578,672 | 642,969 | 603,264 | 771,563 | 629,710 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11,305,388 | 29,654,584 | 47,929,564 | 54,996,983 | 54,996,983 | 46,909,786 | 54,996,983 | 41,432,971 | 0 |
| Dozers & Loaders on OB[2] | $1.0 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 0.547 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 80,614 | 110,445 | 127,776 | 147,430 | 91,726 | 133,545 | 155,894 | 109,645 | 0 |
| Dozers & Loaders on Coal[2] | $18.6 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 9.626 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,540 | 9,287 | 15,010 | 17,223 | 17,347 | 15,529 | 17,550 | 12,975 | 0 |
| Graders[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31,191 | 37,379 | 43,214 | 48,467 | 12,796 | 43,233 | 53,098 | 37,395 | 0 |
| Water Trucks[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 119,964 | 143,765 | 166,208 | 186,412 | 49,214 | 166,279 | 204,222 | 143,826 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 0 | 0 | 0 | 0 | 0 | 0 | 510 | 610 | 710 | 809 | 909 | 1,009 | 1,109 | 1,109 | 1,109 | 1,109 | 573 |
| Wind Erosion, treated acres[1] | 0.05 * 0.3 ton/acre/year | | 0.015 ton/acre/year | acres | 0 | 0 | 0 | 0 | 0 | 0 | 57 | 68 | 79 | 90 | 101 | 112 | 123 | 123 | 123 | 123 | 64 |

| Mining Operation | Controlled PM$_{10}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.56 | 9.34 | 15.10 | 17.32 | 17.32 | 14.78 | 17.32 | 13.05 | 0.00 |
| OB Removal (T/S)[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 459.60 | 516.91 | 564.14 | 661.35 | 118.30 | 593.79 | 708.96 | 480.37 | 0.00 |
| OB Removal (dragline)[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 178.07 | 411.41 | 482.34 | 482.34 | 412.64 | 482.34 | 324.68 | 0.00 |
| Scrapers[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.88 | 7.55 | 12.21 | 14.01 | 14.17 | 13.04 | 14.43 | 10.55 | 0.00 |
| OB Blasting[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.11 | 1.66 | 2.27 | 2.65 | 2.66 | 0.88 | 2.74 | 1.89 | 0.00 |
| Coal Blasting[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.83 | 1.35 | 1.55 | 1.55 | 1.32 | 1.55 | 1.17 | 0.00 |
| OB Haul Roads[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 235.64 | 266.00 | 293.14 | 336.04 | 50.29 | 292.92 | 357.36 | 244.91 | 0.00 |
| Coal Haul Roads[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 19.85 | 59.04 | 104.44 | 120.97 | 134.41 | 126.11 | 161.29 | 131.64 | 0.00 |
| Coal Dumping[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.24 | 8.51 | 13.75 | 15.78 | 15.78 | 13.46 | 15.78 | 11.89 | 0.00 |
| Dozers & Loaders on OB[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 22.03 | 30.18 | 34.92 | 40.29 | 25.07 | 36.49 | 42.60 | 29.96 | 0.00 |
| Dozers & Loaders on Coal[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 17.04 | 44.69 | 72.24 | 82.89 | 83.49 | 74.74 | 84.47 | 62.45 | 0.00 |
| Graders[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 54.35 | 65.13 | 75.30 | 84.45 | 22.30 | 75.33 | 92.52 | 65.16 | 0.00 |
| Water Trucks[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.84 | 9.39 | 10.86 | 12.18 | 3.21 | 10.86 | 13.34 | 9.40 | 0.00 |
| Wind Erosion, untreated acres[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 38.24 | 45.73 | 53.21 | 60.70 | 68.19 | 75.68 | 83.16 | 83.16 | 83.16 | 83.16 | 42.96 |
| Wind Erosion, treated acres[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.85 | 1.02 | 1.18 | 1.35 | 1.52 | 1.68 | 1.85 | 1.85 | 1.85 | 1.85 | 0.95 |
| | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **39.09** | **46.74** | **881.86** | **1259.37** | **1680.82** | **1949.17** | **1055.89** | **1751.37** | **2079.71** | **1472.11** | **43.91** |

**Total**

| Mining Operation | PM$_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled PM$_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 183,448,841 | 148,091,317 | 173,622,102 | 190,000,000 | 190,000,000 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | yd$^3$/yr | 438,932,656 | 447,699,776 | 476,016,709 | 476,273,216 | 421,006,177 | 456,125,004 | 408,410,007 | 430,694,865 | 560,494,500 | 515,252,181 | 593,473,808 | 336,862,994 | 48,537,567 | 217,286,524 | 297,329,158 | 356,320,800 | 739,423,554 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/yd$^3$ | | 0.009 lb/yd$^3$ | yd$^3$/yr | 295,158,158 | 283,783,554 | 291,842,005 | 270,501,112 | 252,305,995 | 252,944,464 | 262,693,326 | 270,430,112 | 269,071,012 | 202,890,957 | 185,070,840 | 293,599,851 | 356,086,801 | 303,852,210 | 355,171,525 | 326,108,231 | 0 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,121 | 23,629 | 26,150 | 27,768 | 27,768 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 1,472 | 1,447 | 1,523 | 1,488 | 1,356 | 1,406 | 1,345 | 1,393 | 1,580 | 1,337 | 1,380 | 1,165 | 1,142 | 581 | 1,178 | 1,247 | 1,246 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,310 | 1,058 | 1,240 | 1,357 | 1,357 |
| OB Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 7,553,755 | 7,707,339 | 8,203,402 | 8,207,896 | 7,239,714 | 7,854,935 | 7,019,051 | 7,409,443 | 9,683,305 | 8,890,739 | 10,261,045 | 5,765,673 | 748,670 | 3,634,194 | 5,058,764 | 6,106,540 | 12,817,829 |
| Coal Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 3,939,654 | 4,299,812 | 4,443,613 | 4,715,616 | 5,060,510 | 5,246,270 | 5,538,604 | 5,656,720 | 5,730,401 | 4,567,616 | 3,459,737 | 1,497,672 | 1,243,660 | 1,076,428 | 1,326,300 | 1,324,468 | 888,515 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 183,448,841 | 148,091,317 | 173,622,102 | 190,000,000 | 190,000,000 |
| Dozers & Loaders on OB[2] | $1.0 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 0.547 lb/hr | hr/yr | 422,888 | 425,586 | 447,025 | 444,541 | 392,390 | 403,970 | 372,948 | 389,565 | 477,422 | 431,850 | 467,631 | 311,990 | 164,705 | 232,176 | 294,836 | 330,799 | 508,207 |
| Dozers & Loaders on Coal[2] | $18.6 * s^{1.5}/M^{1.4} * 0.75 * C$ lb/hr | | 9.626 lb/hr | hr/yr | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 57,862 | 49,023 | 55,406 | 59,500 | 59,500 |
| Graders[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 161,338 | 169,014 | 178,575 | 182,707 | 173,394 | 185,362 | 177,240 | 184,839 | 219,917 | 190,699 | 194,620 | 101,073 | 23,576 | 65,027 | 88,803 | 104,441 | 200,382 |
| Water Trucks[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.3$ lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 620,529 | 650,055 | 686,829 | 702,719 | 666,898 | 712,932 | 681,693 | 710,918 | 845,834 | 733,457 | 748,539 | 388,743 | 90,677 | 250,104 | 341,550 | 401,696 | 770,700 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 8,598 | 9,131 | 9,664 | 10,012 | 10,406 | 10,799 | 11,703 | 12,085 | 11,378 | 10,539 | 9,807 | 10,004 | 9,094 | 8,084 | 6,582 | 5,110 | 3,316 |
| Wind Erosion, treated acres[1] | 0.05 * 0.3 ton/acre/year | | 0.015 ton/acre/year | acres | 955 | 1,015 | 1,074 | 1,112 | 1,156 | 1,200 | 1,300 | 1,343 | 1,264 | 1,171 | 1,090 | 1,112 | 1,010 | 898 | 731 | 568 | 368 |

| Mining Operation | Controlled PM$_{10}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 59.85 | 59.85 | 59.85 | 59.85 | 59.85 | 59.85 | 59.85 | 59.85 | 59.85 | 59.85 | 59.85 | 59.85 | 57.79 | 46.65 | 54.69 | 59.85 | 59.85 |
| OB Removal (T/S)[1] | 1718.42 | 1752.74 | 1863.61 | 1864.61 | 1648.24 | 1785.73 | 1598.93 | 1686.17 | 2194.34 | 2017.21 | 2323.45 | 1318.82 | 190.02 | 850.68 | 1164.04 | 1395.00 | 2894.84 |
| OB Removal (dragline)[1] | 1328.21 | 1277.03 | 1313.29 | 1217.26 | 1135.38 | 1138.25 | 1182.12 | 1216.94 | 1210.82 | 913.01 | 832.82 | 1321.20 | 1602.39 | 1367.33 | 1598.27 | 1467.49 | 0.00 |
| Scrapers[1] | 48.39 | 48.39 | 48.39 | 48.39 | 48.39 | 48.39 | 48.39 | 48.39 | 48.39 | 48.39 | 48.39 | 48.39 | 47.26 | 41.17 | 45.57 | 48.39 | 48.39 |
| OB Blasting[1] | 8.28 | 8.14 | 8.57 | 8.37 | 7.63 | 7.91 | 7.57 | 7.84 | 8.89 | 7.52 | 7.76 | 6.55 | 6.42 | 3.27 | 6.63 | 7.02 | 7.01 |
| Coal Blasting[1] | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.16 | 4.17 | 4.88 | 5.34 | 5.34 |
| OB Haul Roads[1] | 888.22 | 906.28 | 964.61 | 965.[illegible]4 | 851.30 | 923.64 | 825.35 | 871.25 | 1138.63 | 1045.44 | 1206.57 | 677.97 | 88.03 | 427.33 | 594.85 | 718.05 | 1507.21 |
| Coal Haul Roads[1] | 823.56 | 898.85 | 928.91 | 985.77 | 1057.87 | 1096.70 | 1157.81 | 1182.50 | 1197.90 | 954.83 | 723.24 | 313.08 | 259.98 | 225.02 | 277.25 | 276.87 | 185.74 |
| Coal Dumping[1] | 54.51 | 54.51 | 54.51 | 54.51 | 54.51 | 54.51 | 54.51 | 54.51 | 54.51 | 54.51 | 54.51 | 54.51 | 52.63 | 42.48 | 49.81 | 54.51 | 54.51 |
| Dozers & Loaders on OB[2] | 115.56 | 116.30 | 122.16 | 121.48 | 107.23 | 110.39 | 101.91 | 106.45 | 130.46 | 118.01 | 127.79 | 85.26 | 45.01 | 63.45 | 80.57 | 90.39 | 138.87 |
| Dozers & Loaders on Coal[2] | 286.36 | 286.36 | 286.36 | 286.36 | 286.36 | 286.36 | 286.36 | 286.36 | 286.36 | 286.36 | 286.36 | 286.36 | 278.48 | 235.94 | 266.66 | 286.36 | 286.36 |
| Graders[1] | 281.13 | 294.50 | 311.16 | 318.36 | 302.13 | 322.99 | 308.83 | 322.07 | 383.20 | 332.29 | 339.12 | 176.12 | 41.08 | 113.31 | 154.74 | 181.99 | 349.16 |
| Water Trucks[1] | 40.54 | 42.47 | 44.87 | 45.91 | 43.57 | 46.57 | 44.53 | 46.44 | 55.26 | 47.91 | 48.90 | 25.40 | 5.92 | 16.34 | 22.31 | 26.24 | 50.35 |
| Wind Erosion, untreated acres[1] | 644.87 | 684.84 | 724.81 | 750.94 | 780.44 | 809.95 | 877.69 | 906.38 | 853.32 | 790.42 | 735.51 | 750.27 | 682.01 | 606.27 | 493.62 | 383.26 | 248.73 |
| Wind Erosion, treated acres[1] | 14.33 | 15.22 | 16.11 | 16.69 | 17.34 | 18.00 | 19.50 | 20.14 | 18.96 | 17.56 | 16.34 | 16.67 | 15.16 | 13.47 | 10.97 | 8.52 | 5.53 |
| | **6317.57** | **6450.81** | **6752.53** | **6748.96** | **6405.56** | **6714.57** | **6578.69** | **6820.64** | **7646.23** | **6698.64** | **6815.94** | **5145.77** | **3377.34** | **4056.87** | **4824.85** | **5009.27** | **5841.89** |

Constants:

| | | | |
|---|---|---|---|
| Number of wet days, W, (> 0.01")= | 100 | Tire correction factor, T = | 2.5 |
| C = ((365-W)/365) = | 0.726 | Overburden density (ton/yd$^3$) = | 1.74 |
| Silt content of road bed, s, (%) = | 8.6 | Dozed overburden silt content, s, (%) = | 6.9 |
| Speed of OB haul trucks, S, (mph)= | 15 | Dozed overburden moisture content, M, (%) = | 7.9 |
| Speed of coal haul trucks (mph)= | 20 | Dozed coal silt content, s, (%) = | 8.6 |
| Speed of water trucks (mph)= | 10 | Dozed coal moisture content, M, (%) = | 10.4 |

[1] Emission Factor Equation from Wyoming Memorandum Dated January 24, 1979, Subject: Fugitive Dust Emission Factors.

[2] Emission Factor Equations from AP-42 Table 11.9-1, July 1998.

**Black Thunder $PM_{2.5}$ Emission Calculations**

**North Pit**

| Mining Operation | $PM_{2.5}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{2.5}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.03 lb/ton | | 0.0001 lb/ton | ton/yr | 38,352,223 | 44,076,597 | 43,036,317 | 50,551,300 | 27,399,678 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.03 lb/ton | | 0.00045 lb/ton | $yd^3$/yr | 64,073,144 | 72,581,587 | 74,652,419 | 116,510,680 | 64,632,500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.03 lb/$yd^3$ | | 0.0009 lb/$yd^3$ | $yd^3$/yr | 68,828,929 | 67,280,639 | 69,391,173 | 63,899,223 | 39,787,169 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr | 5,605 | 6,442 | 6,290 | 7,388 | 4,004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.03 lb/blast | | 1.125 lb/blast | blasts/yr | 303 | 314 | 322 | 378 | 225 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.03 lb/blast | | 0.788 lb/blast | blasts/yr | 274 | 315 | 307 | 361 | 196 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.059 lb/VMT | VMT/yr | 1,111,601 | 1,260,711 | 1,297,702 | 2,011,337 | 1,109,947 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.105 lb/VMT | VMT/yr | 863,374 | 1,044,067 | 1,065,071 | 1,302,777 | 735,318 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.03 lb/ton | 85 | 0.0004 lb/ton | ton/yr | 38,352,223 | 44,076,597 | 43,036,317 | 50,551,300 | 27,399,678 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | 5.7 * $s^{1.2}/M^{1.3}$ * 0.105 * C lb/hr | | 0.300 lb/hr | hr/yr | 72,044 | 77,632 | 79,450 | 107,039 | 66,054 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | 78.4 * $s^{1.2}/M^{1.3}$ * 0.022 * C lb/hr | | 0.789 lb/hr | hr/yr | 12,010 | 13,803 | 13,477 | 15,831 | 8,580 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 32 * C *0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr | 27,231 | 31,913 | 32,812 | 46,647 | 26,061 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 50 | 0.026 lb/VMT | VMT/yr | 104,736 | 122,743 | 126,201 | 179,412 | 100,236 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.045 ton/acre/year | | 0.01125 ton/acre/year | acres | 2,644 | 2,783 | 2,923 | 2,878 | 2,878 | 2,878 | 2,878 | 2,878 | 1,939 | 929 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, treated acres[1] | 0.05 * 0.045 ton/acre/year | | 0.00225 ton/acre/year | acres | 294 | 309 | 325 | 320 | 320 | 320 | 320 | 320 | 215 | 103 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Mining Operation | Controlled $PM_{2.5}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 1.21 | 1.39 | 1.36 | 1.59 | 0.86 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 25.08 | 28.42 | 29.23 | 45.61 | 25.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 30.97 | 30.28 | 31.23 | 28.75 | 17.90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 0.98 | 1.12 | 1.10 | 1.29 | 0.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 0.17 | 0.18 | 0.18 | 0.21 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 0.11 | 0.12 | 0.12 | 0.14 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 13.07 | 14.82 | 15.26 | 23.65 | 13.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 18.05 | 21.83 | 22.26 | 27.23 | 15.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 1.10 | 1.26 | 1.23 | 1.45 | 0.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 10.82 | 11.66 | 11.93 | 16.08 | 9.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 4.74 | 5.44 | 5.32 | 6.24 | 3.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 4.74 | 5.56 | 5.72 | 8.13 | 4.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 0.68 | 0.80 | 0.82 | 1.17 | 0.65 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 29.74 | 31.31 | 32.88 | 32.37 | 32.37 | 32.37 | 32.37 | 32.37 | 21.82 | 10.45 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, treated acres[1] | 0.66 | 0.70 | 0.73 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.48 | 0.23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | **142.13** | **154.89** | **159.37** | **194.65** | **125.78** | **33.09** | **33.09** | **33.09** | **22.30** | **10.68** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

**Northwest Pit**

| Mining Operation | $PM_{2.5}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{2.5}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.03 lb/ton | | 0.0001 lb/ton | ton/yr | 43,604,929 | 39,348,198 | 43,533,736 | 38,744,823 | 46,493,528 | 56,557,923 | 54,373,213 | 55,642,602 | 46,212,509 | 36,314,508 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.03 lb/ton | | 0.00045 lb/ton | $yd^3$/yr | 73,786,199 | 71,649,374 | 82,864,102 | 72,827,346 | 98,544,488 | 119,515,756 | 70,294,067 | 78,266,839 | 64,186,469 | 57,018,586 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.03 lb/$yd^3$ | | 0.0009 lb/$yd^3$ | $yd^3$/yr | 57,382,142 | 55,420,310 | 53,475,125 | 49,193,304 | 69,853,808 | 83,139,756 | 86,345,750 | 89,044,394 | 88,812,685 | 54,949,175 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr | 6,373 | 5,751 | 6,362 | 5,663 | 6,795 | 8,266 | 7,947 | 8,132 | 6,754 | 5,307 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.03 lb/blast | | 1.125 lb/blast | blasts/yr | 280 | 270 | 301 | 273 | 356 | 427 | 353 | 373 | 319 | 246 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.03 lb/blast | | 0.788 lb/blast | blasts/yr | 311 | 281 | 311 | 277 | 332 | 404 | 388 | 397 | 330 | 259 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.059 lb/VMT | VMT/yr | 1,279,639 | 1,241,010 | 1,436,869 | 1,263,264 | 1,696,291 | 2,063,896 | 1,226,293 | 1,364,232 | 1,129,680 | 996,814 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.105 lb/VMT | VMT/yr | 551,472 | 550,426 | 664,365 | 640,612 | 859,180 | 1,112,536 | 1,144,739 | 1,244,316 | 1,086,705 | 1,067,199 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.03 lb/ton | 85 | 0.0004 lb/ton | ton/yr | 43,604,929 | 39,348,198 | 43,533,736 | 38,744,823 | 46,493,528 | 56,557,923 | 54,373,213 | 55,642,602 | 46,212,509 | 36,314,508 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | 5.7 * $s^{1.2}/M^{1.3}$ * 0.105 * C lb/hr | | 0.300 lb/hr | hr/yr | 75,653 | 73,654 | 81,798 | 74,014 | 95,303 | 112,605 | 79,508 | 85,535 | 74,722 | 63,722 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | 78.4 * $s^{1.2}/M^{1.3}$ * 0.022 * C lb/hr | | 0.789 lb/hr | hr/yr | 13,655 | 12,322 | 13,633 | 12,133 | 14,560 | 17,712 | 17,027 | 17,425 | 14,472 | 11,372 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 32 * C *0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr | 25,905 | 25,437 | 29,842 | 27,035 | 36,419 | 45,258 | 33,279 | 36,690 | 31,146 | 28,411 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 50 | 0.026 lb/VMT | VMT/yr | 99,636 | 97,834 | 114,778 | 103,983 | 140,073 | 174,069 | 127,997 | 141,115 | 119,791 | 109,273 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.045 ton/acre/year | | 0.01125 ton/acre/year | acres | 1,512 | 1,632 | 1,752 | 1,872 | 1,992 | 2,112 | 2,232 | 2,352 | 2,313 | 2,313 | 2,313 | 2,313 | 1,578 | 844 | 109 | 0 | 0 |
| Wind Erosion, treated acres[1] | 0.05 * 0.045 ton/acre/year | | 0.00225 ton/acre/year | acres | 168 | 181 | 195 | 208 | 221 | 235 | 248 | 261 | 257 | 257 | 257 | 257 | 175 | 94 | 12 | 0 | 0 |

| Mining Operation | Controlled $PM_{2.5}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 1.37 | 1.24 | 1.37 | 1.22 | 1.46 | 1.78 | 1.71 | 1.75 | 1.46 | 1.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 28.89 | 28.05 | 32.44 | 28.51 | 38.58 | 46.79 | 27.52 | 30.64 | 25.13 | 22.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 25.82 | 24.94 | 24.06 | 22.14 | 31.43 | 37.41 | 38.86 | 40.07 | 39.97 | 24.73 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 1.11 | 1.00 | 1.11 | 0.99 | 1.18 | 1.44 | 1.38 | 1.42 | 1.18 | 0.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 0.16 | 0.15 | 0.17 | 0.15 | 0.20 | 0.24 | 0.20 | 0.21 | 0.18 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 0.12 | 0.11 | 0.12 | 0.11 | 0.13 | 0.16 | 0.15 | 0.16 | 0.13 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 15.05 | 14.59 | 16.90 | 14.35 | 19.95 | 24.27 | 14.42 | 16.04 | 13.28 | 11.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 11.53 | 11.51 | 13.89 | 13.39 | 17.96 | 23.26 | 23.93 | 26.01 | 22.72 | 22.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 1.25 | 1.13 | 1.25 | 1.11 | 1.33 | 1.62 | 1.56 | 1.60 | 1.33 | 1.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 11.36 | 11.06 | 12.29 | 11.12 | 14.32 | 16.91 | 11.94 | 12.85 | 11.22 | 9.57 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 5.39 | 4.86 | 5.38 | 4.79 | 5.74 | 6.99 | 6.72 | 6.87 | 5.71 | 4.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 4.51 | 4.43 | 5.20 | 4.71 | 6.35 | 7.89 | 5.80 | 6.39 | 5.43 | 4.95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 0.65 | 0.64 | 0.75 | 0.68 | 0.92 | 1.14 | 0.84 | 0.92 | 0.78 | 0.71 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 17.01 | 18.36 | 19.71 | 21.06 | 22.41 | 23.76 | 25.11 | 26.46 | 26.02 | 26.02 | 26.02 | 26.02 | 17.76 | 9.49 | 1.23 | 0.00 | 0.00 |
| Wind Erosion, treated acres[1] | 0.38 | 0.41 | 0.44 | 0.47 | 0.50 | 0.53 | 0.56 | 0.59 | 0.58 | 0.58 | 0.58 | 0.58 | 0.39 | 0.21 | 0.03 | 0.00 | 0.00 |
| | **124.60** | **122.48** | **135.07** | **125.30** | **162.46** | **194.18** | **160.69** | **171.98** | **155.10** | **130.75** | **26.60** | **26.60** | **18.15** | **9.70** | **1.25** | **0.00** | **0.00** |

**West Pit**

| Mining Operation | $PM_{2.5}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{2.5}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.03 lb/ton | | 0.0001 lb/ton | ton/yr | 57,785,815 | 50,800,795 | 54,051,842 | 51,397,668 | 60,785,745 | 71,323,818 | 67,244,730 | 68,974,926 | 66,604,309 | 69,746,350 | 62,017,866 | 1,118,889 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.03 lb/ton | | 0.00045 lb/ton | $yd^3$/yr | 134,562,214 | 157,372,161 | 174,596,180 | 165,165,329 | 135,502,401 | 183,573,119 | 170,367,191 | 183,687,149 | 189,453,268 | 188,871,859 | 165,390,650 | 33,567 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.03 lb/$yd^3$ | | 0.0009 lb/$yd^3$ | $yd^3$/yr | 63,842,448 | 63,947,395 | 65,917,687 | 62,679,040 | 82,554,418 | 98,256,075 | 102,045,182 | 104,960,550 | 104,960,434 | 108,369,927 | 93,646,210 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr | 8,445 | 7,424 | 7,900 | 7,512 | 8,884 | 10,424 | 9,828 | 10,081 | 9,734 | 10,193 | 9,064 | 164 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.03 lb/blast | | 1.125 lb/blast | blasts/yr | 368 | 406 | 441 | 425 | 423 | 537 | 519 | 546 | 556 | 559 | 493 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.03 lb/blast | | 0.788 lb/blast | blasts/yr | 413 | 363 | 386 | 367 | 434 | 509 | 480 | 493 | 476 | 498 | 443 | 8 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.059 lb/VMT | VMT/yr | 2,315,342 | 2,695,753 | 2,995,681 | 2,834,148 | 2,329,821 | 3,156,976 | 2,917,891 | 3,149,907 | 3,275,087 | 3,259,091 | 2,867,288 | 1,490 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.105 lb/VMT | VMT/yr | 1,148,154 | 1,074,172 | 1,195,932 | 1,188,689 | 1,460,701 | 1,771,030 | 1,727,469 | 1,824,443 | 1,810,948 | 1,890,738 | 1,650,501 | 27,372 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.03 lb/ton | 85 | 0.0004 lb/ton | ton/yr | 57,785,815 | 50,800,795 | 54,051,842 | 51,397,668 | 60,785,745 | 71,323,818 | 67,244,730 | 68,974,926 | 66,604,309 | 69,746,350 | 62,017,866 | 1,118,889 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | 5.7 * $s^{1.2}/M^{1.3}$ * 0.105 * C lb/hr | | 0.300 lb/hr | hr/yr | 115,477 | 131,062 | 143,435 | 137,270 | 122,055 | 157,932 | 149,294 | 158,882 | 162,830 | 162,893 | 144,320 | 27 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | 78.4 * $s^{1.2}/M^{1.3}$ * 0.022 * C lb/hr | | 0.789 lb/hr | hr/yr | 18,096 | 15,909 | 16,927 | 16,096 | 19,036 | 22,336 | 21,058 | 21,600 | 20,858 | 21,842 | 19,421 | 350 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 32 * C *0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr | 48,722 | 53,733 | 59,833 | 57,489 | 53,637 | 70,125 | 66,169 | 70,974 | 72,711 | 72,645 | 62,544 | 295 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 50 | 0.026 lb/VMT | VMT/yr | 187,391 | 206,667 | 230,129 | 221,112 | 206,297 | 269,712 | 254,495 | 272,977 | 279,656 | 279,405 | 240,555 | 1,134 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.045 ton/acre/year | | 0.01125 ton/acre/year | acres | 2,639 | 2,764 | 2,890 | 3,015 | 3,141 | 3,266 | 3,392 | 3,518 | 3,495 | 3,491 | 3,491 | 3,491 | 3,491 | 3,491 | 3,127 | 2,398 | 1,669 |
| Wind Erosion, treated acres[1] | 0.05 * 0.045 ton/acre/year | | 0.00225 ton/acre/year | acres | 293 | 307 | 321 | 335 | 349 | 363 | 377 | 391 | 388 | 388 | 388 | 388 | 388 | 388 | 347 | 266 | 185 |

| Mining Operation | Controlled $PM_{2.5}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 1.82 | 1.60 | 1.70 | 1.52 | 1.91 | 2.25 | 2.12 | 2.17 | 2.10 | 2.20 | 1.95 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 52.68 | 61.61 | 68.35 | 64.66 | 53.05 | 71.87 | 66.70 | 71.91 | 74.17 | 73.94 | 64.75 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 28.73 | 28.78 | 29.66 | 28.21 | 37.15 | 44.22 | 45.92 | 47.23 | 47.23 | 48.77 | 42.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 1.47 | 1.29 | 1.38 | 1.31 | 1.55 | 1.82 | 1.71 | 1.76 | 1.70 | 1.78 | 1.58 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 0.21 | 0.23 | 0.25 | 0.24 | 0.24 | 0.30 | 0.29 | 0.31 | 0.31 | 0.31 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 0.16 | 0.14 | 0.15 | 0.14 | 0.17 | 0.20 | 0.19 | 0.19 | 0.19 | 0.20 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 27.23 | 31.70 | 35.23 | 33.33 | 27.40 | 37.12 | 34.31 | 37.04 | 38.51 | 38.32 | 33.72 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 24.00 | 22.45 | 25.00 | 24.85 | 30.54 | 37.02 | 36.11 | 38.14 | 37.86 | 39.52 | 34.50 | 0.57 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 1.66 | 1.46 | 1.55 | 1.47 | 1.74 | 2.05 | 1.93 | 1.98 | 1.91 | 2.00 | 1.78 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 17.35 | 19.69 | 21.55 | 20.62 | 18.33 | 23.72 | 22.43 | 23.87 | 24.46 | 24.47 | 21.68 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 7.14 | 6.27 | 6.68 | 6.35 | 7.51 | 8.81 | 8.30 | 8.52 | 8.23 | 8.61 | 7.66 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 8.49 | 9.36 | 10.43 | 10.02 | 9.35 | 12.22 | 11.53 | 12.37 | 12.67 | 12.66 | 10.90 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 1.22 | 1.35 | 1.50 | 1.44 | 1.35 | 1.76 | 1.66 | 1.78 | 1.83 | 1.83 | 1.57 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 29.68 | 31.10 | 32.51 | 33.92 | 35.33 | 36.75 | 38.16 | 39.57 | 39.32 | 39.27 | 39.27 | 39.27 | 39.27 | 39.27 | 35.17 | 26.97 | 18.77 |
| Wind Erosion, treated acres[1] | 0.66 | 0.69 | 0.72 | 0.75 | 0.79 | 0.82 | 0.85 | 0.88 | 0.87 | 0.87 | 0.87 | 0.87 | 0.87 | 0.87 | 0.78 | 0.60 | 0.42 |
| | **202.50** | **217.73** | **236.65** | **228.93** | **226.40** | **280.92** | **272.21** | **287.72** | **291.35** | **294.75** | **262.83** | **41.05** | **40.15** | **40.15** | **35.96** | **27.57** | **19.19** |

**Southwest Pit**

| Mining Operation | $PM_{2.5}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{2.5}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.03 lb/ton | | 0.0001 lb/ton | ton/yr | 18,090,549 | 23,451,572 | 20,381,880 | 23,191,152 | 23,375,091 | 21,324,178 | 24,078,189 | 25,756,732 | 25,261,410 | 31,699,728 | 31,103,228 | 10,130,526 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.03 lb/ton | | 0.00045 lb/ton | $yd^3$/yr | 100,047,346 | 78,642,694 | 76,887,520 | 70,322,438 | 44,989,450 | 55,417,700 | 59,096,787 | 61,458,326 | 69,086,594 | 107,829,250 | 85,440,282 | 16,323,976 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.03 lb/$yd^3$ | | 0.0009 lb/$yd^3$ | $yd^3$/yr | 49,690,891 | 46,384,729 | 49,246,080 | 44,845,450 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr | 2,644 | 3,427 | 2,979 | 3,389 | 3,416 | 3,117 | 3,519 | 3,764 | 3,692 | 4,633 | 4,546 | 1,481 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.03 lb/blast | | 1.125 lb/blast | blasts/yr | 272 | 211 | 213 | 194 | 76 | 96 | 102 | 106 | 121 | 186 | 148 | 30 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.03 lb/blast | | 0.788 lb/blast | blasts/yr | 129 | 168 | 146 | 166 | 167 | 152 | 172 | 184 | 180 | 226 | 222 | 72 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.059 lb/VMT | VMT/yr | 1,700,513 | 1,345,502 | 1,316,328 | 1,207,800 | 776,231 | 952,864 | 1,012,787 | 1,056,155 | 1,195,130 | 1,853,777 | 1,480,436 | 280,166 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 60 | 0.105 lb/VMT | VMT/yr | 450,840 | 614,351 | 558,558 | 669,287 | 735,624 | 688,863 | 799,669 | 875,503 | 877,611 | 1,100,646 | 1,054,507 | 312,907 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.03 lb/ton | 85 | 0.0004 lb/ton | ton/yr | 18,090,549 | 23,451,572 | 20,381,880 | 23,191,152 | 23,375,091 | 21,324,178 | 24,078,189 | 25,756,732 | 25,261,410 | 31,699,728 | 31,103,228 | 10,130,526 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | 5.7 * $s^{1.2}/M^{1.3}$ * 0.105 * C lb/hr | | 0.300 lb/hr | hr/yr | 90,509 | 73,885 | 73,127 | 67,928 | 31,010 | 38,278 | 40,820 | 42,452 | 47,831 | 74,458 | 59,082 | 11,412 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | 78.4 * $s^{1.2}/M^{1.3}$ * 0.022 * C lb/hr | | 0.789 lb/hr | hr/yr | 5,665 | 7,344 | 6,383 | 7,262 | 7,320 | 6,678 | 7,540 | 8,066 | 7,911 | 9,927 | 9,740 | 3,172 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 32 * C *0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr | 30,956 | 27,799 | 26,708 | 26,572 | 21,079 | 23,166 | 25,581 | 27,254 | 29,379 | 41,640 | 34,708 | 7,303 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.03 lb/VMT | 50 | 0.026 lb/VMT | VMT/yr | 119,062 | 106,919 | 102,723 | 102,200 | 81,072 | 89,098 | 98,387 | 104,822 | 112,995 | 160,153 | 133,491 | 28,090 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.045 ton/acre/year | | 0.01125 ton/acre/year | acres | 634 | 698 | 762 | 826 | 890 | 955 | 1,019 | 1,083 | 1,147 | 1,126 | 1,126 | 1,126 | 1,126 | 1,126 | 1,126 | 865 | 493 |
| Wind Erosion, treated acres[1] | 0.05 * 0.045 ton/acre/year | | 0.00225 ton/acre/year | acres | 70 | 78 | 85 | 92 | 99 | 106 | 113 | 120 | 127 | 125 | 125 | 125 | 125 | 125 | 125 | 96 | 55 |

| Mining Operation | Controlled $PM_{2.5}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.57 | 0.74 | 0.64 | 0.73 | 0.74 | 0.67 | 0.76 | 0.81 | 0.80 | 1.00 | 0.98 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 39.17 | 30.79 | 30.10 | 27.53 | 17.61 | 21.70 | 23.14 | 24.06 | 27.05 | 42.22 | 33.45 | 6.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 22.36 | 20.87 | 22.16 | 20.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 0.46 | 0.60 | 0.52 | 0.59 | 0.60 | 0.54 | 0.61 | 0.66 | 0.64 | 0.81 | 0.79 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 0.15 | 0.12 | 0.12 | 0.11 | 0.04 | 0.05 | 0.06 | 0.06 | 0.07 | 0.10 | 0.08 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 0.05 | 0.07 | 0.06 | 0.07 | 0.07 | 0.06 | 0.07 | 0.07 | 0.07 | 0.09 | 0.09 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 20.00 | 15.82 | 15.48 | 14.20 | 9.13 | 11.20 | 11.91 | 12.42 | 14.05 | 21.80 | 17.41 | 3.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 9.42 | 12.84 | 11.68 | 13.99 | 15.38 | 14.40 | 16.72 | 18.30 | 18.35 | 23.01 | 22.04 | 6.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 0.52 | 0.67 | 0.58 | 0.67 | 0.67 | 0.61 | 0.69 | 0.74 | 0.72 | 0.91 | 0.89 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 13.60 | 11.10 | 10.98 | 10.20 | 4.66 | 5.75 | 6.13 | 6.38 | 7.18 | 11.18 | 8.87 | 1.71 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 2.23 | 2.90 | 2.52 | 2.86 | 2.89 | 2.63 | 2.97 | 3.18 | 3.12 | 3.92 | 3.84 | 1.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 5.39 | 4.84 | 4.65 | 4.63 | 3.67 | 4.04 | 4.46 | 4.75 | 5.12 | 7.26 | 6.05 | 1.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 0.78 | 0.70 | 0.67 | 0.67 | 0.53 | 0.58 | 0.64 | 0.68 | 0.74 | 1.05 | 0.87 | 0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 7.13 | 7.85 | 8.57 | 9.29 | 10.02 | 10.74 | 11.46 | 12.18 | 12.90 | 12.67 | 12.67 | 12.67 | 12.67 | 12.67 | 12.67 | 9.73 | 5.54 |
| Wind Erosion, treated acres[1] | 0.16 | 0.17 | 0.19 | 0.21 | 0.22 | 0.24 | 0.25 | 0.27 | 0.29 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.22 | 0.12 |
| | **121.99** | **110.08** | **108.93** | **105.93** | **66.22** | **73.22** | **79.87** | **84.56** | **91.10** | **126.28** | **108.32** | **34.51** | **12.95** | **12.95** | **12.95** | **9.95** | **5.67** |

**Black Thunder $PM_{2.5}$ Emission Calculations (continued)**

**South Pit**

| Mining Operation | $PM_{2.5}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{2.5}$ Emission Factor | Operations Parameter Units |
|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.03 lb/ton | | 0.0001 lb/ton | ton/yr |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.03 lb/ton | | 0.00045 lb/ton | $yd^3$/yr |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.03 lb/$yd^3$ | | 0.0009 lb/$yd^3$ | $yd^3$/yr |
| Scrapers[1] | 32 * C * 0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr |
| OB Blasting[1] | 50 * 0.75 * 0.03 lb/blast | | 1.125 lb/blast | blasts/yr |
| Coal Blasting[1] | 35 * 0.75 * 0.03 lb/blast | | 0.788 lb/blast | blasts/yr |
| OB Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.03$ lb/VMT | 60 | 0.059 lb/VMT | VMT/yr |
| Coal Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.03$ lb/VMT | 60 | 0.105 lb/VMT | VMT/yr |
| Coal Dumping[1] | 0.017 * 0.75 * 0.03 lb/ton | 85 | 0.0004 lb/ton | ton/yr |
| Dozers & Loaders on OB[2] | $5.7 * s^{1.2}/M^{1.3} * 0.105 * C$ lb/hr | | 0.300 lb/hr | hr/yr |
| Dozers & Loaders on Coal[2] | $78.4 * s^{1.2}/M^{1.3} * 0.022 * C$ lb/hr | | 0.789 lb/hr | hr/yr |
| Graders[1] | 32 * C *0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr |
| Water Trucks[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.03$ lb/VMT | 50 | 0.026 lb/VMT | VMT/yr |
| Wind Erosion, untreated acres[1] | 0.25 * 0.045 ton/acre/year | | 0.01125 ton/acre/year | acres |
| Wind Erosion, treated acres[1] | 0.05 * 0.045 ton/acre/year | | 0.00225 ton/acre/year | acres |

| Mining Operation | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 32,166,483 | 32,322,838 | 28,996,224 | 26,115,057 | 31,945,958 | 40,794,080 | 44,303,868 | 39,625,741 | 40,616,385 | 2,644,678 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 66,463,754 | 67,453,961 | 67,016,490 | 51,447,423 | 77,337,339 | 97,618,429 | 108,651,962 | 107,282,552 | 120,372,888 | 79,340 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 55,413,748 | 50,750,481 | 53,811,940 | 49,884,095 | 60,110,599 | 71,548,633 | 74,302,394 | 76,425,168 | 75,297,893 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 4,701 | 4,724 | 4,238 | 3,817 | 4,669 | 5,962 | 6,475 | 5,791 | 5,936 | 387 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 249 | 246 | 245 | 217 | 275 | 346 | 371 | 368 | 387 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 230 | 231 | 207 | 187 | 228 | 291 | 316 | 283 | 290 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | 1,146,660 | 1,164,363 | 1,156,822 | 891,347 | 1,327,424 | 1,681,199 | 1,862,081 | 1,839,150 | 2,079,445 | 3,585 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | 925,814 | 1,016,796 | 959,687 | 914,252 | 1,269,687 | 1,673,841 | 1,866,726 | 1,712,459 | 1,860,190 | 118,093 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 32,166,483 | 32,322,838 | 28,996,224 | 26,115,057 | 31,945,958 | 40,794,080 | 44,303,868 | 39,625,741 | 40,616,385 | 2,644,678 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on OB[2] | 69,204 | 69,353 | 69,216 | 58,290 | 77,967 | 95,155 | 103,325 | 102,696 | 111,426 | 65 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | 10,073 | 10,122 | 9,080 | 8,178 | 10,004 | 12,775 | 13,874 | 12,409 | 12,719 | 828 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Graders[1] | 28,523 | 30,132 | 29,379 | 24,963 | 36,197 | 46,814 | 52,212 | 49,921 | 55,491 | 1,549 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | 109,705 | 115,892 | 112,997 | 96,013 | 139,220 | 180,053 | 200,814 | 192,003 | 213,427 | 5,958 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 1,170 | 1,254 | 1,338 | 1,422 | 1,505 | 1,589 | 1,673 | 1,646 | 1,646 | 1,646 | 1,646 | 1,646 | 1,273 | 901 | 529 | 157 | 0 |
| Wind Erosion, treated acres[1] | 130 | 139 | 149 | 158 | 167 | 177 | 186 | 183 | 183 | 183 | 183 | 183 | 141 | 100 | 59 | 17 | 0 |

| Mining Operation | Controlled $PM_{2.5}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 1.01 | 1.02 | 0.91 | 0.82 | 1.01 | 1.29 | 1.40 | 1.25 | 1.28 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 26.02 | 26.41 | 26.24 | 20.14 | 30.28 | 38.22 | 42.54 | 42.00 | 47.13 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 24.94 | 22.84 | 24.22 | 22.45 | 27.05 | 32.20 | 33.44 | 34.39 | 33.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 0.82 | 0.82 | 0.74 | 0.67 | 0.81 | 1.04 | 1.13 | 1.01 | 1.03 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 0.14 | 0.14 | 0.14 | 0.12 | 0.15 | 0.19 | 0.21 | 0.21 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 0.09 | 0.09 | 0.08 | 0.07 | 0.09 | 0.11 | 0.12 | 0.11 | 0.11 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 13.48 | 13.69 | 13.60 | 10.48 | 15.61 | 19.77 | 21.90 | 21.63 | 24.45 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 19.35 | 21.26 | 20.06 | 19.11 | 26.54 | 34.99 | 39.02 | 35.80 | 38.89 | 2.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 0.92 | 0.93 | 0.83 | 0.75 | 0.92 | 1.17 | 1.27 | 1.14 | 1.17 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on OB[2] | 10.39 | 10.42 | 10.40 | 8.76 | 11.71 | 14.29 | 15.52 | 15.43 | 16.74 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 3.97 | 3.99 | 3.58 | 3.23 | 3.95 | 5.04 | 5.47 | 4.89 | 5.02 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders[1] | 4.97 | 5.25 | 5.12 | 4.35 | 6.31 | 8.16 | 9.10 | 8.70 | 9.67 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 0.72 | 0.76 | 0.74 | 0.63 | 0.91 | 1.18 | 1.31 | 1.25 | 1.39 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 13.17 | 14.11 | 15.05 | 15.99 | 16.93 | 17.88 | 18.82 | 18.51 | 18.51 | 18.51 | 18.51 | 18.51 | 14.33 | 10.14 | 5.95 | 1.76 | 0.00 |
| Wind Erosion, treated acres[1] | 0.29 | 0.31 | 0.33 | 0.36 | 0.38 | 0.40 | 0.42 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.32 | 0.23 | 0.13 | 0.04 | 0.00 |
| | **120.29** | **122.03** | **122.04** | **107.92** | **142.64** | **175.91** | **191.66** | **186.73** | **199.90** | **22.35** | **18.92** | **18.92** | **14.64** | **10.36** | **6.08** | **1.80** | **0.00** |

**Highway/Plant Pit**

| Mining Operation | $PM_{2.5}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{2.5}$ Emission Factor | Operations Parameter Units |
|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.03 lb/ton | | 0.0001 lb/ton | ton/yr |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.03 lb/ton | | 0.00045 lb/ton | $yd^3$/yr |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.03 lb/$yd^3$ | | 0.0009 lb/$yd^3$ | $yd^3$/yr |
| Scrapers[1] | 32 * C * 0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr |
| OB Blasting[1] | 50 * 0.75 * 0.03 lb/blast | | 1.125 lb/blast | blasts/yr |
| Coal Blasting[1] | 35 * 0.75 * 0.03 lb/blast | | 0.788 lb/blast | blasts/yr |
| OB Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.03$ lb/VMT | 60 | 0.059 lb/VMT | VMT/yr |
| Coal Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.03$ lb/VMT | 60 | 0.105 lb/VMT | VMT/yr |
| Coal Dumping[1] | 0.017 * 0.75 * 0.03 lb/ton | 85 | 0.0004 lb/ton | ton/yr |
| Dozers & Loaders on OB[2] | $5.7 * s^{1.2}/M^{1.3} * 0.105 * C$ lb/hr | | 0.300 lb/hr | hr/yr |
| Dozers & Loaders on Coal[2] | $78.4 * s^{1.2}/M^{1.3} * 0.022 * C$ lb/hr | | 0.789 lb/hr | hr/yr |
| Graders[1] | 32 * C *0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr |
| Water Trucks[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.03$ lb/VMT | 50 | 0.026 lb/VMT | VMT/yr |
| Wind Erosion, untreated acres[1] | 0.25 * 0.045 ton/acre/year | | 0.01125 ton/acre/year | acres |
| Wind Erosion, treated acres[1] | 0.05 * 0.045 ton/acre/year | | 0.00225 ton/acre/year | acres |

| Mining Operation | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19,940,151 | 48,949,342 | 123,753,602 | 128,451,858 | 101,181,531 | 118,625,119 | 148,567,029 | 190,000,000 |
| OB Removal (T/S)[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29,419,032 | 198,545,439 | 151,578,368 | 18,320,881 | 65,616,149 | 116,241,607 | 233,621,179 | 739,423,554 |
| OB Removal (dragline)[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 186,413,712 | 248,900,662 | 212,154,763 | 247,985,386 | 253,956,044 | 0 |
| Scrapers[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,914 | 7,154 | 18,086 | 18,990 | 16,144 | 17,867 | 21,713 | 27,768 |
| OB Blasting[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 335 | 663 | 668 | 424 | 690 | 912 | 1,246 |
| Coal Blasting[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 142 | 350 | 884 | 918 | 723 | 847 | 1,061 | 1,357 |
| OB Haul Roads[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 515,331 | 3,420,376 | 2,626,226 | 320,996 | 1,143,114 | 2,019,683 | 4,023,769 | 12,817,829 |
| Coal Haul Roads[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 108,518 | 255,120 | 578,721 | 600,691 | 473,165 | 554,738 | 694,758 | 888,515 |
| Coal Dumping[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19,940,151 | 48,949,342 | 123,753,602 | 128,451,858 | 101,181,531 | 118,625,119 | 148,567,029 | 190,000,000 |
| Dozers & Loaders on OB[2] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20,267 | 136,453 | 153,120 | 72,980 | 98,631 | 138,942 | 221,154 | 508,207 |
| Dozers & Loaders on Coal[2] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6,244 | 15,329 | 38,754 | 40,515 | 33,494 | 37,855 | 46,525 | 59,500 |
| Graders[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,075 | 54,154 | 45,007 | 10,780 | 21,795 | 35,705 | 67,046 | 200,382 |
| Water Trucks[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34,903 | 208,285 | 173,106 | 41,463 | 83,825 | 137,328 | 257,870 | 770,700 |
| Wind Erosion, untreated acres[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 128 | 225 | 322 | 419 | 516 | 613 | 582 | 582 | 582 |
| Wind Erosion, treated acres[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 25 | 36 | 47 | 57 | 68 | 65 | 65 | 65 |

| Mining Operation | Controlled $PM_{2.5}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.63 | 1.54 | 3.90 | 4.05 | 3.19 | 3.74 | 4.68 | 5.99 |
| OB Removal (T/S)[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.52 | 77.73 | 59.34 | 7.17 | 25.69 | 45.51 | 91.46 | 289.48 |
| OB Removal (dragline)[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 83.89 | 112.01 | 95.47 | 111.59 | 114.28 | 0.00 |
| Scrapers[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.51 | 1.25 | 3.15 | 3.31 | 2.81 | 3.11 | 3.78 | 4.84 |
| OB Blasting[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.19 | 0.37 | 0.38 | 0.24 | 0.39 | 0.51 | 0.70 |
| Coal Blasting[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.14 | 0.35 | 0.36 | 0.28 | 0.33 | 0.42 | 0.53 |
| OB Haul Roads[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.06 | 40.22 | 30.88 | 3.77 | 13.44 | 23.75 | 47.31 | 150.72 |
| Coal Haul Roads[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.27 | 5.33 | 12.10 | 12.56 | 9.89 | 11.60 | 14.52 | 18.57 |
| Coal Dumping[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.57 | 1.40 | 3.55 | 3.68 | 2.90 | 3.40 | 4.26 | 5.45 |
| Dozers & Loaders on OB[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.04 | 20.50 | 23.00 | 10.96 | 14.82 | 20.87 | 33.22 | 76.34 |
| Dozers & Loaders on Coal[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.46 | 6.05 | 15.28 | 15.98 | 13.21 | 14.93 | 18.35 | 23.47 |
| Graders[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.58 | 9.44 | 7.84 | 1.88 | 3.80 | 6.22 | 11.68 | 34.92 |
| Water Trucks[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.23 | 1.36 | 1.13 | 0.27 | 0.55 | 0.90 | 1.68 | 5.03 |
| Wind Erosion, untreated acres[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.44 | 2.53 | 3.62 | 4.71 | 5.80 | 6.89 | 6.55 | 6.55 | 6.55 |
| Wind Erosion, treated acres[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.06 | 0.08 | 0.10 | 0.13 | 0.15 | 0.15 | 0.15 | 0.15 |
| | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **1.47** | **31.54** | **168.84** | **249.60** | **182.31** | **193.33** | **253.03** | **352.86** | **622.73** |

**Section 16 Pit**

| Mining Operation | $PM_{2.5}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{2.5}$ Emission Factor | Operations Parameter Units |
|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.03 lb/ton | | 0.0001 lb/ton | ton/yr |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.03 lb/ton | | 0.00045 lb/ton | $yd^3$/yr |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.03 lb/$yd^3$ | | 0.0009 lb/$yd^3$ | $yd^3$/yr |
| Scrapers[1] | 32 * C * 0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr |
| OB Blasting[1] | 50 * 0.75 * 0.03 lb/blast | | 1.125 lb/blast | blasts/yr |
| Coal Blasting[1] | 35 * 0.75 * 0.03 lb/blast | | 0.788 lb/blast | blasts/yr |
| OB Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.03$ lb/VMT | 60 | 0.059 lb/VMT | VMT/yr |
| Coal Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.03$ lb/VMT | 60 | 0.105 lb/VMT | VMT/yr |
| Coal Dumping[1] | 0.017 * 0.75 * 0.03 lb/ton | 85 | 0.0004 lb/ton | ton/yr |
| Dozers & Loaders on OB[2] | $5.7 * s^{1.2}/M^{1.3} * 0.105 * C$ lb/hr | | 0.300 lb/hr | hr/yr |
| Dozers & Loaders on Coal[2] | $78.4 * s^{1.2}/M^{1.3} * 0.022 * C$ lb/hr | | 0.789 lb/hr | hr/yr |
| Graders[1] | 32 * C *0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr |
| Water Trucks[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.03$ lb/VMT | 50 | 0.026 lb/VMT | VMT/yr |
| Wind Erosion, untreated acres[1] | 0.25 * 0.045 ton/acre/year | | 0.01125 ton/acre/year | acres |
| Wind Erosion, treated acres[1] | 0.05 * 0.045 ton/acre/year | | 0.00225 ton/acre/year | acres |

| Mining Operation | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11,305,388 | 29,654,584 | 47,929,564 | 54,996,983 | 54,996,983 | 46,909,786 | 54,996,983 | 41,432,971 | 0 |
| OB Removal (T/S)[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 117,395,283 | 132,034,113 | 144,097,437 | 168,927,083 | 30,216,686 | 151,670,375 | 181,087,551 | 122,699,621 | 0 |
| OB Removal (dragline)[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39,571,855 | 91,424,631 | 107,186,139 | 107,186,139 | 91,697,447 | 107,186,139 | 72,152,187 | 0 |
| Scrapers[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,652 | 4,334 | 7,005 | 8,038 | 8,131 | 7,485 | 8,283 | 6,055 | 0 |
| OB Blasting[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 198 | 296 | 404 | 472 | 473 | 157 | 488 | 335 | 0 |
| Coal Blasting[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 81 | 212 | 342 | 393 | 393 | 335 | 393 | 296 | 0 |
| OB Haul Roads[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,003,963 | 2,262,141 | 2,492,945 | 2,857,791 | 427,674 | 2,491,081 | 3,039,081 | 2,082,770 | 0 |
| Coal Haul Roads[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 94,947 | 282,424 | 499,609 | 578,672 | 642,969 | 603,264 | 771,563 | 629,710 | 0 |
| Coal Dumping[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11,305,388 | 29,654,584 | 47,929,564 | 54,996,983 | 54,996,983 | 46,909,786 | 54,996,983 | 41,432,971 | 0 |
| Dozers & Loaders on OB[2] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 80,614 | 110,445 | 127,776 | 147,430 | 91,726 | 133,545 | 155,894 | 109,645 | 0 |
| Dozers & Loaders on Coal[2] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,540 | 9,287 | 15,010 | 17,223 | 17,347 | 15,529 | 17,550 | 12,975 | 0 |
| Graders[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31,191 | 37,379 | 43,214 | 48,467 | 12,796 | 43,233 | 53,098 | 37,395 | 0 |
| Water Trucks[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 119,964 | 143,765 | 166,208 | 186,412 | 49,214 | 166,279 | 204,222 | 143,826 | 0 |
| Wind Erosion, untreated acres[1] | 0 | 0 | 0 | 0 | 0 | 0 | 510 | 610 | 710 | 809 | 909 | 1,009 | 1,109 | 1,109 | 1,109 | 1,109 | 573 |
| Wind Erosion, treated acres[1] | 0 | 0 | 0 | 0 | 0 | 0 | 57 | 68 | 79 | 90 | 101 | 112 | 123 | 123 | 123 | 123 | 64 |

| Mining Operation | Controlled $PM_{2.5}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.36 | 0.93 | 1.51 | 1.73 | 1.73 | 1.48 | 1.73 | 1.31 | 0.00 |
| OB Removal (T/S)[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 45.96 | 51.69 | 56.41 | 66.13 | 11.83 | 59.38 | 70.90 | 48.04 | 0.00 |
| OB Removal (dragline)[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 17.81 | 41.14 | 48.23 | 48.23 | 41.26 | 48.23 | 32.47 | 0.00 |
| Scrapers[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.29 | 0.76 | 1.22 | 1.40 | 1.42 | 1.30 | 1.44 | 1.06 | 0.00 |
| OB Blasting[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.17 | 0.23 | 0.27 | 0.27 | 0.09 | 0.27 | 0.19 | 0.00 |
| Coal Blasting[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.08 | 0.13 | 0.15 | 0.15 | 0.13 | 0.15 | 0.12 | 0.00 |
| OB Haul Roads[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 23.56 | 26.60 | 29.31 | 33.60 | 5.03 | 29.29 | 35.74 | 24.49 | 0.00 |
| Coal Haul Roads[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.98 | 5.90 | 10.44 | 12.10 | 13.44 | 12.61 | 16.13 | 13.16 | 0.00 |
| Coal Dumping[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.85 | 1.37 | 1.58 | 1.58 | 1.35 | 1.58 | 1.19 | 0.00 |
| Dozers & Loaders on OB[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 12.11 | 16.59 | 19.19 | 22.15 | 13.78 | 20.06 | 23.42 | 16.47 | 0.00 |
| Dozers & Loaders on Coal[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.40 | 3.66 | 5.92 | 6.79 | 6.84 | 6.12 | 6.92 | 5.12 | 0.00 |
| Graders[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.43 | 6.51 | 7.53 | 8.45 | 2.23 | 7.53 | 9.25 | 6.52 | 0.00 |
| Water Trucks[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.78 | 0.94 | 1.09 | 1.22 | 0.32 | 1.09 | 1.33 | 0.94 | 0.00 |
| Wind Erosion, untreated acres[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.74 | 6.86 | 7.98 | 9.11 | 10.23 | 11.35 | 12.47 | 12.47 | 12.47 | 12.47 | 6.44 |
| Wind Erosion, treated acres[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.15 | 0.18 | 0.20 | 0.23 | 0.25 | 0.28 | 0.28 | 0.28 | 0.28 | 0.14 |
| | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **5.86** | **7.01** | **100.50** | **141.80** | **185.96** | **215.40** | **119.60** | **194.45** | **229.85** | **163.81** | **6.59** |

**Total**

| Mining Operation | $PM_{2.5}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{2.5}$ Emission Factor | Operations Parameter Units |
|---|---|---|---|---|
| Coal Removal[1] | 0.003 * 0.70 * 0.03 lb/ton | | 0.0001 lb/ton | ton/yr |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.03 lb/ton | | 0.00045 lb/ton | $yd^3$/yr |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.03 lb/$yd^3$ | | 0.0009 lb/$yd^3$ | $yd^3$/yr |
| Scrapers[1] | 32 * C * 0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr |
| OB Blasting[1] | 50 * 0.75 * 0.03 lb/blast | | 1.125 lb/blast | blasts/yr |
| Coal Blasting[1] | 35 * 0.75 * 0.03 lb/blast | | 0.788 lb/blast | blasts/yr |
| OB Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.03$ lb/VMT | 60 | 0.059 lb/VMT | VMT/yr |
| Coal Haul Roads[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.03$ lb/VMT | 60 | 0.105 lb/VMT | VMT/yr |
| Coal Dumping[1] | 0.017 * 0.75 * 0.03 lb/ton | 85 | 0.0004 lb/ton | ton/yr |
| Dozers & Loaders on OB[2] | $5.7 * s^{1.2}/M^{1.3} * 0.105 * C$ lb/hr | | 0.300 lb/hr | hr/yr |
| Dozers & Loaders on Coal[2] | $78.4 * s^{1.2}/M^{1.3} * 0.022 * C$ lb/hr | | 0.789 lb/hr | hr/yr |
| Graders[1] | 32 * C *0.03 lb/hr | 50 | 0.697 lb/hr | hr/yr |
| Water Trucks[1] | $0.81 * s * (S/30)^2 * C * 0.62T * 0.03$ lb/VMT | 50 | 0.026 lb/VMT | VMT/yr |
| Wind Erosion, untreated acres[1] | 0.25 * 0.045 ton/acre/year | | 0.01125 ton/acre/year | acres |
| Wind Erosion, treated acres[1] | 0.05 * 0.045 ton/acre/year | | 0.00225 ton/acre/year | acres |

| Mining Operation | Operations Parameters by Year 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 183,448,841 | 148,091,317 | 173,622,102 | 190,000,000 | 190,000,000 |
| OB Removal (T/S)[1] | 438,932,656 | 447,699,776 | 476,016,709 | 476,273,216 | 421,006,177 | 456,125,004 | 408,410,007 | 430,694,865 | 560,494,500 | 515,252,181 | 593,473,808 | 336,862,994 | 48,537,567 | 217,286,524 | 297,329,158 | 356,320,800 | 739,423,554 |
| OB Removal (dragline)[1] | 295,158,158 | 283,783,554 | 291,842,005 | 270,501,112 | 252,305,995 | 252,944,464 | 262,693,326 | 270,430,112 | 269,071,012 | 202,890,957 | 185,070,840 | 293,599,851 | 356,086,801 | 303,852,210 | 355,171,525 | 326,108,231 | 0 |
| Scrapers[1] | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,121 | 23,629 | 26,150 | 27,768 | 27,768 |
| OB Blasting[1] | 1,472 | 1,447 | 1,523 | 1,488 | 1,356 | 1,406 | 1,345 | 1,393 | 1,580 | 1,337 | 1,380 | 1,165 | 1,142 | 581 | 1,178 | 1,247 | 1,246 |
| Coal Blasting[1] | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,357 | 1,310 | 1,058 | 1,240 | 1,357 | 1,357 |
| OB Haul Roads[1] | 7,553,755 | 7,707,339 | 8,203,402 | 8,207,896 | 7,239,714 | 7,854,935 | 7,019,051 | 7,409,443 | 9,683,305 | 8,890,739 | 10,261,045 | 5,765,673 | 748,670 | 3,634,194 | 5,058,764 | 6,106,540 | 12,817,829 |
| Coal Haul Roads[1] | 3,939,654 | 4,299,812 | 4,443,613 | 4,715,616 | 5,060,510 | 5,246,270 | 5,538,604 | 5,656,720 | 5,730,401 | 4,567,616 | 3,459,737 | 1,497,672 | 1,243,660 | 1,076,428 | 1,326,300 | 1,324,468 | 888,515 |
| Coal Dumping[1] | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 190,000,000 | 183,448,841 | 148,091,317 | 173,622,102 | 190,000,000 | 190,000,000 |
| Dozers & Loaders on OB[2] | 422,888 | 425,586 | 447,025 | 444,541 | 392,390 | 403,970 | 372,948 | 389,565 | 477,422 | 431,850 | 467,631 | 311,990 | 164,705 | 232,176 | 294,836 | 330,799 | 508,207 |
| Dozers & Loaders on Coal[2] | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 59,500 | 57,862 | 49,023 | 55,406 | 59,500 | 59,500 |
| Graders[1] | 161,338 | 169,014 | 178,575 | 182,707 | 173,394 | 185,362 | 177,240 | 184,839 | 219,917 | 190,699 | 194,620 | 101,073 | 23,576 | 65,027 | 88,803 | 104,441 | 200,382 |
| Water Trucks[1] | 620,529 | 650,055 | 686,829 | 702,719 | 666,898 | 712,932 | 681,693 | 710,918 | 845,834 | 733,457 | 748,539 | 388,743 | 90,677 | 250,104 | 341,550 | 401,696 | 770,700 |
| Wind Erosion, untreated acres[1] | 8,598 | 9,131 | 9,664 | 10,012 | 10,406 | 10,799 | 11,703 | 12,085 | 11,378 | 10,539 | 9,807 | 10,004 | 9,094 | 8,084 | 6,582 | 5,110 | 3,316 |
| Wind Erosion, treated acres[1] | 955 | 1,015 | 1,074 | 1,112 | 1,156 | 1,200 | 1,300 | 1,343 | 1,264 | 1,171 | 1,090 | 1,112 | 1,010 | 898 | 731 | 568 | 368 |

| Mining Operation | Controlled $PM_{2.5}$ Emissions (tons/yr) 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal[1] | 5.99 | 5.99 | 5.99 | 5.99 | 5.99 | 5.99 | 5.99 | 5.99 | 5.99 | 5.99 | 5.99 | 5.99 | 5.78 | 4.66 | 5.47 | 5.99 | 5.99 |
| OB Removal (T/S)[1] | 171.84 | 175.27 | 186.36 | 186.46 | 164.82 | 178.57 | 159.89 | 168.62 | 219.43 | 201.72 | 232.34 | 131.88 | 19.00 | 85.07 | 116.40 | 139.50 | 289.48 |
| OB Removal (dragline)[1] | 132.82 | 127.70 | 131.33 | 121.73 | 113.54 | 113.83 | 118.21 | 121.69 | 121.08 | 91.30 | 83.28 | 132.12 | 160.24 | 136.73 | 159.83 | 146.75 | 0.00 |
| Scrapers[1] | 4.84 | 4.84 | 4.84 | 4.84 | 4.84 | 4.84 | 4.84 | 4.84 | 4.84 | 4.84 | 4.84 | 4.84 | 4.73 | 4.12 | 4.56 | 4.84 | 4.84 |
| OB Blasting[1] | 0.83 | 0.81 | 0.86 | 0.84 | 0.76 | 0.79 | 0.76 | 0.78 | 0.89 | 0.75 | 0.78 | 0.66 | 0.64 | 0.33 | 0.66 | 0.70 | 0.70 |
| Coal Blasting[1] | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.52 | 0.42 | 0.49 | 0.53 | 0.53 |
| OB Haul Roads[1] | 88.82 | 90.63 | 96.46 | 96.51 | 85.13 | 92.36 | 82.53 | 87.13 | 113.86 | 104.54 | 120.66 | 67.80 | 8.80 | 42.73 | 59.48 | 71.80 | 150.72 |
| Coal Haul Roads[1] | 82.36 | 89.88 | 92.89 | 98.58 | 105.79 | 109.67 | 115.78 | 118.25 | 119.79 | 95.48 | 72.32 | 31.31 | 26.00 | 22.50 | 27.73 | 27.69 | 18.57 |
| Coal Dumping[1] | 5.45 | 5.45 | 5.45 | 5.45 | 5.45 | 5.45 | 5.45 | 5.45 | 5.45 | 5.45 | 5.45 | 5.45 | 5.26 | 4.25 | 4.98 | 5.45 | 5.45 |
| Dozers & Loaders on OB[2] | 63.52 | 63.93 | 67.15 | 66.77 | 58.94 | 60.68 | 56.02 | 58.52 | 71.71 | 64.87 | 70.24 | 46.86 | 24.74 | 34.87 | 44.29 | 49.69 | 76.34 |
| Dozers & Loaders on Coal[2] | 23.47 | 23.47 | 23.47 | 23.47 | 23.47 | 23.47 | 23.47 | 23.47 | 23.47 | 23.47 | 23.47 | 23.47 | 22.82 | 19.33 | 21.85 | 23.47 | 23.47 |
| Graders[1] | 28.11 | 29.45 | 31.12 | 31.84 | 30.21 | 32.30 | 30.88 | 32.21 | 38.32 | 33.23 | 33.91 | 17.61 | 4.11 | 11.33 | 15.47 | 18.20 | 34.92 |
| Water Trucks[1] | 4.05 | 4.25 | 4.49 | 4.59 | 4.36 | 4.66 | 4.45 | 4.64 | 5.53 | 4.79 | 4.89 | 2.54 | 0.59 | 1.63 | 2.23 | 2.62 | 5.03 |
| Wind Erosion, untreated acres[1] | 96.73 | 102.73 | 108.72 | 112.64 | 117.07 | 121.49 | 131.65 | 135.96 | 128.00 | 118.56 | 110.33 | 112.54 | 102.30 | 90.94 | 74.04 | 57.49 | 37.31 |
| Wind Erosion, treated acres[1] | 2.15 | 2.28 | 2.42 | 2.50 | 2.60 | 2.70 | 2.93 | 3.02 | 2.84 | 2.63 | 2.45 | 2.50 | 2.27 | 2.02 | 1.65 | 1.28 | 0.83 |
| | **711.51** | **727.21** | **762.06** | **762.73** | **723.49** | **757.32** | **743.39** | **771.09** | **861.73** | **758.16** | **771.48** | **586.09** | **387.80** | **460.94** | **539.13** | **555.99** | **654.18** |

Constants:

| | | | |
|---|---|---|---|
| Number of wet days, W, (> 0.01")= | 100 | Tire correction factor, T = | 2.5 |
| C = ((365-W)/365) = | 0.726 | Overburden density (ton/$yd^3$) = | 1.74 |
| Silt content of road bed, s, (%) = | 8.6 | Dozed overburden silt content, s, (%) = | 6.9 |
| Speed of OB haul trucks, S, (mph)= | 15 | Dozed overburden moisture content, M, (%) = | 7.9 |
| Speed of coal haul trucks (mph)= | 20 | Dozed coal silt content, s, (%) = | 8.6 |
| Speed of water trucks (mph)= | 10 | Dozed coal moisture content, M, (%) = | 10.4 |

[1] Emission Factor Equation from Wyoming Memorandum Dated January 24, 1979, Subject: Fugitive Dust Emission Factors.
[2] Emission Factor Equations from AP-42 Table 11.9-1, July 1998.

**Black Thunder $PM_{10}$ Mobile Source Emission Calculations**

**North Pit**

| Mining Operation | $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | | $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| OB Haul Trucks | 0.26 lb/hr | hr/yr | 127,770 | 144,909 | 149,161 | 231,188 | 127,580 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16.61 | 18.84 | 19.39 | 30.05 | 16.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Trucks | 0.26 lb/hr | hr/yr | 81,701 | 100,577 | 103,242 | 127,637 | 72,892 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10.62 | 13.07 | 13.42 | 16.59 | 9.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders | 0.06 lb/hr | hr/yr | 27,231 | 31,913 | 32,812 | 46,647 | 26,061 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.82 | 0.96 | 0.98 | 1.40 | 0.78 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on OB | 0.17 lb/hr | hr/yr | 8,456 | 8,166 | 8,741 | 10,668 | 6,670 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.72 | 0.69 | 0.74 | 0.91 | 0.57 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on Coal | 0.17 lb/hr | hr/yr | 9,588 | 11,019 | 10,759 | 12,638 | 6,850 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.81 | 0.94 | 0.91 | 1.07 | 0.58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on OB | 0.17 lb/hr | hr/yr | 14,034 | 14,921 | 15,167 | 18,127 | 10,515 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.19 | 1.27 | 1.29 | 1.54 | 0.89 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on Coal | 0.17 lb/hr | hr/yr | 2,422 | 2,784 | 2,718 | 3,193 | 1,731 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.21 | 0.24 | 0.23 | 0.27 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Track Dozers on OB | 0.11 lb/hr | hr/yr | 49,554 | 54,545 | 55,541 | 78,244 | 48,869 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.73 | 3.00 | 3.05 | 4.30 | 2.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers | 0.41 lb/hr | hr/yr | 5,605 | 6,442 | 6,290 | 7,388 | 4,004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.15 | 1.32 | 1.29 | 1.51 | 0.82 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on OB | 0.14 lb/hr | hr/yr | 11,346 | 11,833 | 12,151 | 14,584 | 8,595 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.79 | 0.83 | 0.85 | 1.02 | 0.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on Coal | 0.14 lb/hr | hr/yr | 2,535 | 2,990 | 2,822 | 3,610 | 1,402 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.18 | 0.21 | 0.20 | 0.25 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks | 0.26 lb/hr | hr/yr | 10,474 | 12,274 | 12,620 | 17,941 | 10,024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.36 | 1.60 | 1.64 | 2.33 | 1.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Locomotives | 0.18492 lb/engine hr | hr/yr | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | | | | | | | | | | **37.19** | **42.96** | **44.01** | **61.26** | **34.54** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

**Northwest Pit**

| Mining Operation | $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | | $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| OB Haul Trucks | 0.26 lb/hr | hr/yr | 147,085 | 142,645 | 165,157 | 145,203 | 194,976 | 237,229 | 140,953 | 156,808 | 129,848 | 114,576 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19.12 | 18.54 | 21.47 | 18.88 | 25.35 | 30.84 | 18.32 | 20.39 | 16.88 | 14.89 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Trucks | 0.26 lb/hr | hr/yr | 52,186 | 53,024 | 64,400 | 62,763 | 85,170 | 110,908 | 115,040 | 125,422 | 109,733 | 103,970 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6.78 | 6.89 | 8.37 | 8.16 | 11.07 | 14.42 | 14.96 | 16.30 | 14.27 | 13.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders | 0.06 lb/hr | hr/yr | 25,905 | 25,437 | 29,842 | 27,035 | 36,419 | 45,258 | 33,279 | 36,690 | 31,146 | 28,411 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.78 | 0.76 | 0.90 | 0.81 | 1.09 | 1.36 | 1.00 | 1.10 | 0.93 | 0.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on OB | 0.17 lb/hr | hr/yr | 6,771 | 6,960 | 7,551 | 6,910 | 10,034 | 11,950 | 8,254 | 9,081 | 8,673 | 6,188 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.58 | 0.59 | 0.64 | 0.59 | 0.85 | 1.02 | 0.70 | 0.77 | 0.74 | 0.53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on Coal | 0.17 lb/hr | hr/yr | 10,901 | 9,837 | 10,883 | 9,686 | 11,623 | 14,139 | 13,593 | 13,911 | 11,553 | 9,079 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.93 | 0.84 | 0.93 | 0.82 | 0.99 | 1.20 | 1.16 | 1.18 | 0.98 | 0.77 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on OB | 0.17 lb/hr | hr/yr | 13,745 | 13,064 | 14,338 | 12,908 | 16,844 | 20,292 | 16,992 | 17,882 | 15,732 | 11,874 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.17 | 1.11 | 1.22 | 1.10 | 1.43 | 1.72 | 1.44 | 1.52 | 1.34 | 1.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on Coal | 0.17 lb/hr | hr/yr | 2,754 | 2,485 | 2,749 | 2,447 | 2,936 | 3,572 | 3,434 | 3,514 | 2,919 | 2,294 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.23 | 0.21 | 0.23 | 0.21 | 0.25 | 0.30 | 0.29 | 0.30 | 0.25 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Track Dozers on OB | 0.11 lb/hr | hr/yr | 55,136 | 53,631 | 59,908 | 54,197 | 68,425 | 80,363 | 54,262 | 58,572 | 50,317 | 45,659 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.03 | 2.95 | 3.29 | 2.98 | 3.76 | 4.42 | 2.98 | 3.22 | 2.77 | 2.51 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers | 0.41 lb/hr | hr/yr | 6,373 | 5,751 | 6,362 | 5,663 | 6,795 | 8,266 | 7,947 | 8,132 | 6,754 | 5,307 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.31 | 1.18 | 1.30 | 1.16 | 1.39 | 1.69 | 1.63 | 1.67 | 1.38 | 1.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on OB | 0.14 lb/hr | hr/yr | 10,690 | 10,307 | 11,288 | 10,193 | 13,586 | 16,328 | 13,182 | 13,983 | 12,493 | 9,330 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.75 | 0.72 | 0.79 | 0.71 | 0.95 | 1.14 | 0.92 | 0.98 | 0.87 | 0.65 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on Coal | 0.14 lb/hr | hr/yr | 2,883 | 2,669 | 2,855 | 2,767 | 2,379 | 2,439 | 2,251 | 2,239 | 1,860 | 1,420 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.20 | 0.19 | 0.20 | 0.19 | 0.17 | 0.17 | 0.16 | 0.16 | 0.13 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks | 0.26 lb/hr | hr/yr | 9,964 | 9,783 | 11,478 | 10,398 | 14,007 | 17,407 | 12,800 | 14,112 | 11,979 | 10,927 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.30 | 1.27 | 1.49 | 1.35 | 1.82 | 2.26 | 1.66 | 1.83 | 1.56 | 1.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Locomotives | 0.18492 lb/engine hr | hr/yr | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | | | | | | | | | | **36.17** | **35.26** | **40.84** | **36.96** | **49.13** | **60.55** | **45.23** | **49.42** | **42.10** | **37.54** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

**West Pit**

| Mining Operation | $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | | $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| OB Haul Trucks | 0.26 lb/hr | hr/yr | 266,131 | 309,857 | 344,331 | 325,764 | 267,795 | 362,871 | 335,390 | 362,058 | 376,447 | 374,608 | 329,573 | 171 | 0 | 0 | 0 | 0 | 0 | 34.60 | 40.28 | 44.76 | 42.35 | 34.81 | 47.17 | 43.60 | 47.07 | 48.94 | 48.70 | 42.84 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Trucks | 0.26 lb/hr | hr/yr | 108,650 | 103,477 | 115,927 | 116,459 | 144,798 | 176,553 | 173,601 | 183,897 | 182,866 | 184,201 | 151,537 | 2,097 | 0 | 0 | 0 | 0 | 0 | 14.12 | 13.45 | 15.07 | 15.14 | 18.82 | 22.95 | 22.57 | 23.91 | 23.77 | 23.95 | 19.70 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders | 0.06 lb/hr | hr/yr | 48,722 | 53,733 | 59,833 | 57,489 | 53,637 | 70,125 | 66,169 | 70,974 | 72,711 | 72,645 | 62,544 | 295 | 0 | 0 | 0 | 0 | 0 | 1.46 | 1.61 | 1.80 | 1.72 | 1.61 | 2.10 | 1.99 | 2.13 | 2.18 | 2.18 | 1.88 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on OB | 0.17 lb/hr | hr/yr | 8,915 | 12,044 | 13,385 | 13,134 | 11,858 | 16,124 | 15,826 | 16,999 | 17,892 | 17,598 | 15,336 | 0 | 0 | 0 | 0 | 0 | 0 | 0.76 | 1.02 | 1.14 | 1.12 | 1.01 | 1.37 | 1.35 | 1.44 | 1.52 | 1.50 | 1.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on Coal | 0.17 lb/hr | hr/yr | 14,446 | 12,700 | 13,513 | 12,849 | 15,196 | 17,831 | 16,811 | 17,244 | 16,651 | 17,437 | 15,504 | 280 | 0 | 0 | 0 | 0 | 0 | 1.23 | 1.08 | 1.15 | 1.09 | 1.29 | 1.52 | 1.43 | 1.47 | 1.42 | 1.48 | 1.32 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on OB | 0.17 lb/hr | hr/yr | 18,170 | 19,245 | 20,921 | 20,209 | 21,042 | 26,409 | 25,385 | 26,633 | 26,867 | 27,249 | 23,987 | 83 | 0 | 0 | 0 | 0 | 0 | 1.54 | 1.64 | 1.78 | 1.72 | 1.79 | 2.24 | 2.16 | 2.26 | 2.28 | 2.32 | 2.04 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on Coal | 0.17 lb/hr | hr/yr | 3,650 | 3,208 | 3,414 | 3,246 | 3,839 | 4,505 | 4,247 | 4,356 | 4,207 | 4,405 | 3,917 | 71 | 0 | 0 | 0 | 0 | 0 | 0.31 | 0.27 | 0.29 | 0.28 | 0.33 | 0.38 | 0.36 | 0.37 | 0.36 | 0.37 | 0.33 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Track Dozers on OB | 0.11 lb/hr | hr/yr | 88,393 | 99,773 | 109,129 | 103,928 | 89,156 | 115,399 | 108,084 | 115,249 | 118,072 | 118,047 | 104,997 | 118 | 0 | 0 | 0 | 0 | 0 | 4.86 | 5.49 | 6.00 | 5.72 | 4.90 | 6.35 | 5.94 | 6.34 | 6.49 | 6.49 | 5.77 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers | 0.41 lb/hr | hr/yr | 8,445 | 7,424 | 7,900 | 7,512 | 8,884 | 10,424 | 9,828 | 10,081 | 9,734 | 10,193 | 9,064 | 164 | 0 | 0 | 0 | 0 | 0 | 1.73 | 1.52 | 1.62 | 1.54 | 1.82 | 2.14 | 2.01 | 2.07 | 2.00 | 2.09 | 1.86 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on OB | 0.14 lb/hr | hr/yr | 14,121 | 15,685 | 17,132 | 16,606 | 16,782 | 21,410 | 20,671 | 21,799 | 22,198 | 22,360 | 19,640 | 4 | 0 | 0 | 0 | 0 | 0 | 0.99 | 1.10 | 1.20 | 1.16 | 1.17 | 1.50 | 1.45 | 1.53 | 1.55 | 1.57 | 1.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on Coal | 0.14 lb/hr | hr/yr | 3,820 | 3,446 | 3,544 | 3,671 | 3,110 | 3,075 | 2,783 | 2,776 | 2,680 | 2,726 | 2,424 | 37 | 0 | 0 | 0 | 0 | 0 | 0.27 | 0.24 | 0.25 | 0.26 | 0.22 | 0.22 | 0.19 | 0.19 | 0.19 | 0.19 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks | 0.26 lb/hr | hr/yr | 18,739 | 20,667 | 23,013 | 22,111 | 20,630 | 26,971 | 25,450 | 27,298 | 27,966 | 27,940 | 24,056 | 113 | 0 | 0 | 0 | 0 | 0 | 2.44 | 2.69 | 2.99 | 2.87 | 2.68 | 3.51 | 3.31 | 3.55 | 3.64 | 3.63 | 3.13 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Locomotives | 0.18492 lb/engine hr | hr/yr | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | | | | | | | | | | **64.31** | **70.39** | **78.04** | **74.97** | **70.46** | **91.45** | **86.36** | **92.32** | **94.34** | **94.46** | **81.72** | **0.40** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

**Southwest Pit**

| Mining Operation | $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | | $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| OB Haul Trucks | 0.26 lb/hr | hr/yr | 195,461 | 154,655 | 151,302 | 138,828 | 89,222 | 109,525 | 116,412 | 121,397 | 137,371 | 213,078 | 170,165 | 32,203 | 0 | 0 | 0 | 0 | 0 | 25.41 | 20.11 | 19.67 | 18.05 | 11.60 | 14.24 | 15.13 | 15.78 | 17.86 | 27.70 | 22.12 | 4.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Trucks | 0.26 lb/hr | hr/yr | 42,663 | 59,182 | 54,143 | 65,572 | 72,922 | 68,672 | 80,362 | 88,247 | 88,619 | 107,228 | 96,817 | 23,978 | 0 | 0 | 0 | 0 | 0 | 5.55 | 7.69 | 7.04 | 8.52 | 9.48 | 8.93 | 10.45 | 11.47 | 11.52 | 13.94 | 12.59 | 3.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders | 0.06 lb/hr | hr/yr | 30,956 | 27,799 | 26,708 | 26,572 | 21,079 | 23,166 | 25,581 | 27,254 | 29,379 | 41,640 | 34,708 | 7,303 | 0 | 0 | 0 | 0 | 0 | 0.93 | 0.83 | 0.80 | 0.80 | 0.63 | 0.69 | 0.77 | 0.82 | 0.88 | 1.25 | 1.04 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on OB | 0.17 lb/hr | hr/yr | 11,428 | 7,558 | 8,141 | 6,711 | 391 | 1,719 | 1,620 | 1,571 | 2,417 | 4,897 | 2,971 | 0 | 0 | 0 | 0 | 0 | 0 | 0.97 | 0.64 | 0.69 | 0.57 | 0.03 | 0.15 | 0.14 | 0.13 | 0.21 | 0.42 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on Coal | 0.17 lb/hr | hr/yr | 4,523 | 5,863 | 5,095 | 5,798 | 5,844 | 5,331 | 6,020 | 6,439 | 6,315 | 7,925 | 7,776 | 2,533 | 0 | 0 | 0 | 0 | 0 | 0.38 | 0.50 | 0.43 | 0.49 | 0.50 | 0.45 | 0.51 | 0.55 | 0.54 | 0.67 | 0.66 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on OB | 0.17 lb/hr | hr/yr | 12,406 | 10,438 | 10,295 | 9,729 | 4,849 | 5,484 | 5,942 | 6,230 | 6,792 | 9,973 | 8,359 | 1,946 | 0 | 0 | 0 | 0 | 0 | 1.05 | 0.89 | 0.88 | 0.83 | 0.41 | 0.47 | 0.51 | 0.53 | 0.58 | 0.85 | 0.71 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on Coal | 0.17 lb/hr | hr/yr | 1,143 | 1,481 | 1,287 | 1,465 | 1,476 | 1,347 | 1,521 | 1,627 | 1,595 | 2,002 | 1,964 | 640 | 0 | 0 | 0 | 0 | 0 | 0.10 | 0.13 | 0.11 | 0.12 | 0.13 | 0.11 | 0.13 | 0.14 | 0.14 | 0.17 | 0.17 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Track Dozers on OB | 0.11 lb/hr | hr/yr | 66,675 | 55,889 | 54,691 | 51,487 | 25,770 | 31,075 | 33,258 | 34,651 | 38,622 | 59,589 | 47,751 | 9,498 | 0 | 0 | 0 | 0 | 0 | 3.67 | 3.07 | 3.01 | 2.83 | 1.42 | 1.71 | 1.83 | 1.91 | 2.12 | 3.28 | 2.63 | 0.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers | 0.41 lb/hr | hr/yr | 2,644 | 3,427 | 2,979 | 3,389 | 3,416 | 3,117 | 3,519 | 3,764 | 3,692 | 4,633 | 4,546 | 1,481 | 0 | 0 | 0 | 0 | 0 | 0.54 | 0.70 | 0.61 | 0.69 | 0.70 | 0.64 | 0.72 | 0.77 | 0.76 | 0.95 | 0.93 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on OB | 0.14 lb/hr | hr/yr | 11,136 | 8,794 | 8,866 | 8,104 | 3,212 | 3,990 | 4,255 | 4,426 | 5,022 | 7,751 | 6,180 | 1,236 | 0 | 0 | 0 | 0 | 0 | 0.78 | 0.62 | 0.62 | 0.57 | 0.22 | 0.28 | 0.30 | 0.31 | 0.35 | 0.54 | 0.43 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on Coal | 0.14 lb/hr | hr/yr | 1,196 | 1,591 | 1,336 | 1,656 | 1,196 | 919 | 997 | 1,036 | 1,017 | 1,239 | 1,216 | 338 | 0 | 0 | 0 | 0 | 0 | 0.08 | 0.11 | 0.09 | 0.12 | 0.08 | 0.06 | 0.07 | 0.07 | 0.07 | 0.09 | 0.09 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks | 0.26 lb/hr | hr/yr | 11,906 | 10,692 | 10,272 | 10,220 | 8,107 | 8,910 | 9,839 | 10,482 | 11,300 | 16,015 | 13,349 | 2,809 | 0 | 0 | 0 | 0 | 0 | 1.55 | 1.39 | 1.34 | 1.33 | 1.05 | 1.16 | 1.28 | 1.36 | 1.47 | 2.08 | 1.74 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Locomotives | 0.18492 lb/engine hr | hr/yr | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | | | | | | | | | | **41.01** | **36.68** | **35.29** | **34.92** | **26.26** | **28.89** | **31.83** | **33.84** | **36.49** | **51.94** | **43.35** | **9.26** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

**Black Thunder $PM_{10}$ Mobile Source Emission Calculations (continued)**

**South Pit**

| Mining Operation | $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | PM10 Emissions (tons/yr) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| OB Haul Trucks | 0.26 lb/hr | hr/yr | 131,800 | 133,835 | 132,968 | 102,454 | 152,577 | 193,241 | 214,032 | 211,397 | 239,017 | 412 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17.13 | 17.40 | 17.29 | 13.32 | 19.84 | 25.12 | 27.82 | 27.48 | 31.07 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Trucks | 0.26 lb/hr | hr/yr | 87,610 | 97,950 | 93,026 | 89,572 | 125,863 | 166,864 | 187,596 | 172,609 | 187,838 | 11,505 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11.39 | 12.73 | 12.09 | 11.64 | 16.36 | 21.69 | 24.39 | 22.44 | 24.42 | 1.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders | 0.06 lb/hr | hr/yr | 28,523 | 30,132 | 29,379 | 24,963 | 36,197 | 46,814 | 52,212 | 49,921 | 55,491 | 1,549 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.86 | 0.90 | 0.88 | 0.75 | 1.09 | 1.40 | 1.57 | 1.50 | 1.66 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on OB | 0.17 lb/hr | hr/yr | 7,138 | 6,904 | 7,488 | 6,411 | 8,884 | 11,134 | 11,903 | 12,702 | 13,579 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.61 | 0.59 | 0.64 | 0.54 | 0.76 | 0.95 | 1.01 | 1.08 | 1.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on Coal | 0.17 lb/hr | hr/yr | 8,042 | 8,081 | 7,249 | 6,529 | 7,986 | 10,199 | 11,076 | 9,906 | 10,154 | 661 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.68 | 0.69 | 0.62 | 0.55 | 0.68 | 0.87 | 0.94 | 0.84 | 0.86 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on OB | 0.17 lb/hr | hr/yr | 11,807 | 11,655 | 11,462 | 10,064 | 13,121 | 16,592 | 17,873 | 17,584 | 18,459 | 196 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.00 | 0.99 | 0.97 | 0.86 | 1.12 | 1.41 | 1.52 | 1.49 | 1.57 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on Coal | 0.17 lb/hr | hr/yr | 2,032 | 2,041 | 1,831 | 1,649 | 2,018 | 2,576 | 2,798 | 2,503 | 2,565 | 167 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.17 | 0.17 | 0.16 | 0.14 | 0.17 | 0.22 | 0.24 | 0.21 | 0.22 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Track Dozers on OB | 0.11 lb/hr | hr/yr | 50,259 | 50,794 | 50,266 | 41,814 | 55,962 | 67,428 | 73,549 | 72,410 | 79,388 | 278 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.76 | 2.79 | 2.76 | 2.30 | 3.08 | 3.71 | 4.05 | 3.98 | 4.37 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers | 0.41 lb/hr | hr/yr | 4,701 | 4,724 | 4,238 | 3,817 | 4,669 | 5,962 | 6,475 | 5,791 | 5,936 | 387 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.96 | 0.97 | 0.87 | 0.78 | 0.96 | 1.22 | 1.33 | 1.19 | 1.22 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on OB | 0.14 lb/hr | hr/yr | 9,552 | 9,389 | 9,429 | 8,234 | 10,882 | 13,733 | 14,767 | 14,806 | 15,611 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.67 | 0.66 | 0.66 | 0.58 | 0.76 | 0.96 | 1.03 | 1.04 | 1.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on Coal | 0.14 lb/hr | hr/yr | 2,126 | 2,193 | 1,901 | 1,865 | 1,634 | 1,759 | 1,834 | 1,595 | 1,634 | 103 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.15 | 0.15 | 0.13 | 0.13 | 0.11 | 0.12 | 0.13 | 0.11 | 0.11 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks | 0.26 lb/hr | hr/yr | 10,971 | 11,589 | 11,300 | 9,601 | 13,922 | 18,005 | 20,081 | 19,200 | 21,343 | 596 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.43 | 1.51 | 1.47 | 1.25 | 1.81 | 2.34 | 2.61 | 2.50 | 2.77 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Locomotives | 0.18492 lb/engine hr | hr/yr | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | | | | | | | | | | **37.82** | **39.55** | **38.54** | **32.85** | **46.73** | **60.02** | **66.63** | **63.86** | **70.53** | **1.86** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

**Highway/Plant Pit**

| Mining Operation | $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | PM10 Emissions (tons/yr) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| OB Haul Trucks | 0.26 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 59,233 | 393,147 | 301,865 | 36,896 | 131,392 | 232,147 | 462,502 | 1,473,314 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.70 | 51.11 | 39.24 | 4.80 | 17.08 | 30.18 | 60.13 | 191.53 |
| Coal Haul Trucks | 0.26 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10,572 | 23,423 | 44,346 | 46,030 | 36,258 | 42,509 | 53,238 | 68,085 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.37 | 3.05 | 5.77 | 5.98 | 4.71 | 5.53 | 6.92 | 8.85 |
| Graders | 0.06 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,075 | 54,154 | 45,007 | 10,780 | 21,795 | 35,705 | 67,046 | 200,382 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 1.62 | 1.35 | 0.32 | 0.65 | 1.07 | 2.01 | 6.01 |
| Wheeled Loaders on OB | 0.17 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10,157 | 14,516 | 7,975 | 11,903 | 17,424 | 24,533 | 36,614 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.86 | 1.23 | 0.68 | 1.01 | 1.48 | 2.09 | 3.11 |
| Wheeled Loaders on Coal | 0.17 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4,985 | 12,237 | 30,938 | 32,113 | 25,295 | 29,656 | 37,142 | 47,500 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.42 | 1.04 | 2.63 | 2.73 | 2.15 | 2.52 | 3.16 | 4.04 |
| RT Dozers on OB | 0.17 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,493 | 17,418 | 35,353 | 31,180 | 28,932 | 36,618 | 47,969 | 65,422 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 1.48 | 3.01 | 2.65 | 2.46 | 3.11 | 4.08 | 5.56 |
| RT Dozers on Coal | 0.17 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,259 | 3,092 | 7,816 | 8,402 | 8,199 | 8,199 | 9,383 | 12,000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.26 | 0.66 | 0.71 | 0.70 | 0.70 | 0.80 | 1.02 |
| Track Dozers on OB | 0.11 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17,268 | 108,877 | 103,251 | 33,825 | 57,796 | 84,900 | 148,651 | 406,170 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.95 | 5.99 | 5.68 | 1.86 | 3.18 | 4.67 | 8.18 | 22.34 |
| Scrapers | 0.41 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,914 | 7,154 | 18,086 | 18,990 | 16,144 | 17,867 | 21,713 | 27,768 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.60 | 1.47 | 3.71 | 3.89 | 3.31 | 3.66 | 4.45 | 5.69 |
| Drills on OB | 0.14 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,097 | 13,987 | 26,682 | 22,181 | 21,843 | 28,306 | 37,558 | 52,107 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.98 | 1.87 | 1.55 | 1.53 | 1.98 | 2.63 | 3.65 |
| Drills on Coal | 0.14 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 779 | 1,913 | 4,126 | 4,283 | 3,955 | 3,955 | 3,075 | 646 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.13 | 0.29 | 0.30 | 0.28 | 0.28 | 0.22 | 0.05 |
| Water Trucks | 0.26 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,490 | 20,828 | 17,311 | 4,146 | 8,383 | 13,733 | 25,787 | 77,070 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.45 | 2.71 | 2.25 | 0.54 | 1.09 | 1.79 | 3.35 | 10.02 |
| Locomotives | 0.18492 lb/engine hr | hr/yr | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | | | | | | | | | | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **12.38** | **70.70** | **67.68** | **26.02** | **38.15** | **56.96** | **98.00** | **261.87** |

**Section 16 Pit**

| Mining Operation | $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | PM10 Emissions (tons/yr) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| OB Haul Trucks | 0.26 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 230,341 | 260,016 | 286,545 | 328,482 | 49,158 | 286,331 | 349,320 | 239,399 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 29.94 | 33.80 | 37.25 | 42.70 | 6.39 | 37.22 | 45.41 | 31.12 | 0.00 |
| Coal Haul Trucks | 0.26 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,588 | 27,515 | 45,871 | 44,343 | 49,270 | 46,227 | 59,124 | 48,254 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.25 | 3.58 | 5.96 | 5.76 | 6.41 | 6.01 | 7.69 | 6.27 | 0.00 |
| Graders | 0.06 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31,191 | 37,379 | 43,214 | 48,467 | 12,796 | 43,233 | 53,098 | 37,395 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.94 | 1.12 | 1.30 | 1.45 | 0.38 | 1.30 | 1.59 | 1.12 | 0.00 |
| Wheeled Loaders on OB | 0.17 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8,784 | 11,325 | 14,584 | 17,160 | 26,822 | 15,278 | 18,136 | 11,758 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.75 | 0.96 | 1.24 | 1.46 | 2.28 | 1.30 | 1.54 | 1.00 | 0.00 |
| Wheeled Loaders on Coal | 0.17 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,826 | 7,414 | 11,982 | 13,749 | 13,749 | 11,727 | 13,749 | 10,358 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.24 | 0.63 | 1.02 | 1.17 | 1.17 | 1.00 | 1.17 | 0.88 | 0.00 |
| RT Dozers on OB | 0.17 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,031 | 14,575 | 20,663 | 24,040 | 31,555 | 21,005 | 24,800 | 17,201 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.77 | 1.24 | 1.76 | 2.04 | 2.68 | 1.79 | 2.11 | 1.46 | 0.00 |
| RT Dozers on Coal | 0.17 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 714 | 1,873 | 3,027 | 3,473 | 3,598 | 3,801 | 3,801 | 2,617 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.16 | 0.26 | 0.30 | 0.31 | 0.32 | 0.32 | 0.22 | 0.00 |
| Track Dozers on OB | 0.11 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 62,799 | 84,545 | 92,529 | 106,230 | 33,348 | 97,262 | 112,958 | 80,686 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.45 | 4.65 | 5.09 | 5.84 | 1.83 | 5.35 | 6.21 | 4.44 | 0.00 |
| Scrapers | 0.41 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,652 | 4,334 | 7,005 | 8,038 | 8,131 | 7,485 | 8,283 | 6,055 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.34 | 0.89 | 1.44 | 1.65 | 1.67 | 1.53 | 1.70 | 1.24 | 0.00 |
| Drills on OB | 0.14 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8,237 | 12,495 | 17,303 | 20,185 | 27,697 | 17,716 | 20,944 | 14,297 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.58 | 0.87 | 1.21 | 1.41 | 1.94 | 1.24 | 1.47 | 1.00 | 0.00 |
| Drills on Coal | 0.14 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 455 | 1,159 | 1,874 | 1,834 | 1,834 | 1,834 | 1,834 | 858 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.08 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.06 | 0.00 |
| Water Trucks | 0.26 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11,996 | 14,377 | 16,621 | 18,641 | 4,921 | 16,628 | 20,422 | 14,383 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.56 | 1.87 | 2.16 | 2.42 | 0.64 | 2.16 | 2.65 | 1.87 | 0.00 |
| Locomotives | 0.18492 lb/engine hr | hr/yr | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | | | | | | | | | | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **39.90** | **49.85** | **58.81** | **66.34** | **25.82** | **59.35** | **71.99** | **50.69** | **0.00** |

**Total**

| Mining Operation | $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | PM10 Emissions (tons/yr) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| OB Haul Trucks | 0.26 lb/hr | hr/yr | 868,248 | 885,901 | 942,920 | 943,436 | 832,151 | 902,866 | 806,788 | 851,660 | 1,113,024 | 1,021,924 | 1,179,430 | 662,721 | 86,054 | 417,724 | 581,467 | 701,901 | 1,473,314 | 112.87 | 115.17 | 122.58 | 122.65 | 108.18 | 117.37 | 104.88 | 110.72 | 144.69 | 132.85 | 153.33 | 86.15 | 11.19 | 54.30 | 75.59 | 91.25 | 191.53 |
| Coal Haul Trucks | 0.26 lb/hr | hr/yr | 372,811 | 414,209 | 430,737 | 462,002 | 501,645 | 522,997 | 556,599 | 570,175 | 578,644 | 444,991 | 317,648 | 114,764 | 95,300 | 82,485 | 101,632 | 101,492 | 68,085 | 48.47 | 53.85 | 56.00 | 60.06 | 65.21 | 67.99 | 72.36 | 74.12 | 75.22 | 57.85 | 41.29 | 14.92 | 12.39 | 10.72 | 13.21 | 13.19 | 8.85 |
| Graders | 0.06 lb/hr | hr/yr | 161,338 | 169,014 | 178,575 | 182,707 | 173,394 | 185,362 | 177,240 | 184,839 | 219,917 | 190,699 | 194,620 | 101,073 | 23,576 | 65,027 | 88,803 | 104,441 | 200,382 | 4.84 | 5.07 | 5.36 | 5.48 | 5.20 | 5.56 | 5.32 | 5.55 | 6.60 | 5.72 | 5.84 | 3.03 | 0.71 | 1.95 | 2.66 | 3.13 | 6.01 |
| Wheeled Loaders on OB | 0.17 lb/hr | hr/yr | 42,709 | 41,631 | 45,307 | 43,834 | 37,836 | 40,928 | 37,603 | 40,353 | 51,345 | 40,008 | 43,049 | 31,676 | 34,797 | 27,181 | 35,560 | 36,291 | 36,614 | 3.63 | 3.54 | 3.85 | 3.73 | 3.22 | 3.48 | 3.20 | 3.43 | 4.36 | 3.40 | 3.66 | 2.69 | 2.96 | 2.31 | 3.02 | 3.08 | 3.11 |
| Wheeled Loaders on Coal | 0.17 lb/hr | hr/yr | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 45,862 | 37,023 | 43,406 | 47,500 | 47,500 | 4.04 | 4.04 | 4.04 | 4.04 | 4.04 | 4.04 | 4.04 | 4.04 | 4.04 | 4.04 | 4.04 | 4.04 | 3.90 | 3.15 | 3.69 | 4.04 | 4.04 |
| RT Dozers on OB | 0.17 lb/hr | hr/yr | 70,162 | 69,324 | 72,183 | 71,037 | 66,372 | 68,777 | 66,192 | 68,330 | 76,879 | 67,360 | 70,427 | 61,422 | 62,735 | 49,936 | 61,418 | 65,171 | 65,422 | 5.96 | 5.89 | 6.14 | 6.04 | 5.64 | 5.85 | 5.63 | 5.81 | 6.53 | 5.73 | 5.99 | 5.22 | 5.33 | 4.24 | 5.22 | 5.54 | 5.56 |
| RT Dozers on Coal | 0.17 lb/hr | hr/yr | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 |
| Track Dozers on OB | 0.11 lb/hr | hr/yr | 310,017 | 314,631 | 329,535 | 329,670 | 288,182 | 294,266 | 269,153 | 280,882 | 349,197 | 325,385 | 354,155 | 219,096 | 67,174 | 155,058 | 197,858 | 229,337 | 406,170 | 17.05 | 17.30 | 18.12 | 18.13 | 15.85 | 16.18 | 14.80 | 15.45 | 19.21 | 17.90 | 19.48 | 12.05 | 3.69 | 8.53 | 10.88 | 12.61 | 22.34 |
| Scrapers | 0.41 lb/hr | hr/yr | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,121 | 23,629 | 26,150 | 27,768 | 27,768 | 5.69 | 5.69 | 5.69 | 5.69 | 5.69 | 5.69 | 5.69 | 5.69 | 5.69 | 5.69 | 5.69 | 5.69 | 5.56 | 4.84 | 5.36 | 5.69 | 5.69 |
| Drills on OB | 0.14 lb/hr | hr/yr | 56,845 | 56,007 | 58,865 | 57,720 | 53,056 | 55,460 | 52,876 | 55,014 | 63,560 | 54,043 | 57,110 | 48,108 | 49,878 | 39,558 | 49,249 | 51,855 | 52,107 | 3.98 | 3.92 | 4.12 | 4.04 | 3.71 | 3.88 | 3.70 | 3.85 | 4.45 | 3.78 | 4.00 | 3.37 | 3.49 | 2.77 | 3.45 | 3.63 | 3.65 |
| Drills on Coal | 0.14 lb/hr | hr/yr | 12,561 | 12,888 | 12,459 | 13,570 | 9,721 | 8,192 | 7,864 | 7,646 | 7,646 | 7,427 | 7,427 | 6,335 | 6,117 | 5,789 | 5,789 | 3,932 | 646 | 0.88 | 0.90 | 0.87 | 0.95 | 0.68 | 0.57 | 0.55 | 0.54 | 0.54 | 0.52 | 0.52 | 0.44 | 0.43 | 0.41 | 0.41 | 0.28 | 0.05 |
| Water Trucks | 0.26 lb/hr | hr/yr | 62,053 | 65,005 | 68,683 | 70,272 | 66,690 | 71,293 | 68,169 | 71,092 | 84,583 | 73,346 | 74,854 | 38,874 | 9,068 | 25,010 | 34,155 | 40,170 | 77,070 | 8.07 | 8.45 | 8.93 | 9.14 | 8.67 | 9.27 | 8.86 | 9.24 | 11.00 | 9.53 | 9.73 | 5.05 | 1.18 | 3.25 | 4.44 | 5.22 | 10.02 |
| Locomotives | 0.18492 lb/engine hr | hr/yr | 224,040 | 225,285 | 225,328 | 227,027 | 221,242 | 214,465 | 214,293 | 214,393 | 214,541 | 216,782 | 217,648 | 224,112 | 225,000 | 225,000 | 225,000 | 225,000 | 225,000 | 20.71 | 20.83 | 20.83 | 20.99 | 20.46 | 19.83 | 19.81 | 19.82 | 19.84 | 20.04 | 20.12 | 20.72 | 20.80 | 20.80 | 20.80 | 20.80 | 20.80 |
| | | | | | | | | | | | | | | | | | | | | **237.21** | **245.67** | **257.55** | **261.95** | **247.57** | **260.74** | **249.86** | **259.27** | **303.19** | **268.07** | **274.71** | **164.40** | **72.65** | **118.30** | **149.76** | **169.49** | **282.67** |

# APPENDIX 3

## Black Thunder Non-Road Engine Emission Inventory

## Black Thunder Mine
## Pumps

| | | | | | | | | g/hp-hr [1] | | | TPY | | | g/s | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Equipment # | Description | Engine Manufacturer | Engine Year | Engine Tier Level | Horsepower | Fuel Type | Hrs/year | $NO_x$ | $PM_{10}$ | $SO_2$ | $NO_x$ | $PM_{10}$ | $SO_2$ | $NO_x$ | $PM_{10}$ | $SO_2$ |
| 28 | Water Pump | John Deere | Unknown | NA | 150 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 2.790 | 0.198 | 0.185 | 0.080 | 0.006 | 0.005 |
| 29 | Water Pump | John Deere | Unknown | NA | 150 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 2.790 | 0.198 | 0.185 | 0.080 | 0.006 | 0.005 |
| 31 | Water Pump | John Deere | Unknown | NA | 150 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 2.790 | 0.198 | 0.185 | 0.080 | 0.006 | 0.005 |
| 32 | Water Pump | Cat | Unknown | NA | 500 | Diesel | 1,000 | 14.1 | 0.998 | 0.930 | 7.749 | 0.550 | 0.513 | 0.223 | 0.016 | 0.015 |
| 33 | Water Pump | Detroit | Unknown | NA | 220 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 4.092 | 0.290 | 0.271 | 0.118 | 0.008 | 0.008 |
| 34 | Water Pump | John Deere | Unknown | NA | 150 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 2.790 | 0.198 | 0.185 | 0.080 | 0.006 | 0.005 |
| 37 | Water Pump | John Deere | Unknown | NA | 150 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 2.790 | 0.198 | 0.185 | 0.080 | 0.006 | 0.005 |
| 39 | Water Pump | John Deere | Unknown | NA | 150 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 2.790 | 0.198 | 0.185 | 0.080 | 0.006 | 0.005 |
| 41 | Water Pump | John Deere | Unknown | NA | 150 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 2.790 | 0.198 | 0.185 | 0.080 | 0.006 | 0.005 |
| 42 | Water Pump | John Deere | Unknown | NA | 102 | Diesel | 1,100 | 14.1 | 0.998 | 0.930 | 1.739 | 0.123 | 0.115 | 0.050 | 0.004 | 0.003 |
| 43 | Water Pump | John Deere | Unknown | NA | 102 | Diesel | 1,100 | 14.1 | 0.998 | 0.930 | 1.739 | 0.123 | 0.115 | 0.050 | 0.004 | 0.003 |
| 45 | Water Pump | John Deere | Unknown | NA | 102 | Diesel | 1,100 | 14.1 | 0.998 | 0.930 | 1.739 | 0.123 | 0.115 | 0.050 | 0.004 | 0.003 |
| 46 | Water Pump | John Deere | Unknown | NA | 150 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 2.790 | 0.198 | 0.185 | 0.080 | 0.006 | 0.005 |
| 47 | Water Pump | John Deere | Unknown | NA | 150 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 2.790 | 0.198 | 0.185 | 0.080 | 0.006 | 0.005 |
| 48 | Water Pump | John Deere | Unknown | NA | 102 | Diesel | 1,100 | 14.1 | 0.998 | 0.930 | 1.739 | 0.123 | 0.115 | 0.050 | 0.004 | 0.003 |
| 49 | Water Pump | John Deere | Unknown | NA | 150 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 2.790 | 0.198 | 0.185 | 0.080 | 0.006 | 0.005 |
| 50 | Water Pump | John Deere | Unknown | NA | 150 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 2.790 | 0.198 | 0.185 | 0.080 | 0.006 | 0.005 |
| 51 | Water Pump | John Deere | Unknown | NA | 150 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 2.790 | 0.198 | 0.185 | 0.080 | 0.006 | 0.005 |
| 52 | Water Pump | John Deere | Unknown | NA | 220 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 4.092 | 0.290 | 0.271 | 0.118 | 0.008 | 0.008 |
| 53 | Water Pump | John Deere | Unknown | NA | 220 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 4.092 | 0.290 | 0.271 | 0.118 | 0.008 | 0.008 |
| 54 | Water Pump | Yanmar | Unknown | NA | 36 | Diesel | 1,000 | 14.1 | 0.998 | 0.930 | 0.558 | 0.040 | 0.037 | 0.016 | 0.001 | 0.001 |
| 55 | Water Pump | John Deere | Unknown | NA | 150 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 2.790 | 0.198 | 0.185 | 0.080 | 0.006 | 0.005 |
| 56 | Water Pump | Yanmar | 2013 | 4 | 36 | Diesel | 1,000 | 3.5 | 0.022 | 0.930 | 0.139 | 0.001 | 0.037 | 0.004 | 0.000 | 0.001 |
| 57 | Water Pump | John Deere | Unknown | NA | 150 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 2.790 | 0.198 | 0.185 | 0.080 | 0.006 | 0.005 |
| 59 | Water Pump | Honda | 1998 | NA | 25 | Diesel | 1,000 | 14.1 | 0.998 | 0.930 | 0.387 | 0.028 | 0.026 | 0.011 | 0.001 | 0.001 |
| 61 | Water Pump | John Deere | 2006 | 2 | 102 | Diesel | 1,100 | 4.9 | 0.220 | 0.930 | 0.606 | 0.027 | 0.115 | 0.017 | 0.001 | 0.003 |
| 62 | Water Pump | John Deere | 2006 | 2 | 102 | Diesel | 1,100 | 4.9 | 0.220 | 0.930 | 0.606 | 0.027 | 0.115 | 0.017 | 0.001 | 0.003 |
| 63 | Water Pump | John Deere | 2006 | 2 | 150 | Diesel | 1,200 | 4.9 | 0.220 | 0.930 | 0.972 | 0.044 | 0.185 | 0.028 | 0.001 | 0.005 |
| 64 | Water Pump | Yanmar | 2013 | 4 | 25 | Diesel | 1,000 | 3.5 | 0.022 | 0.930 | 0.096 | 0.001 | 0.026 | 0.003 | 0.000 | 0.001 |
| 64 | Water Pump | John Deere | 2008 | 3 | 150 | Diesel | 1,200 | 3.0 | 0.220 | 0.930 | 0.595 | 0.044 | 0.185 | 0.017 | 0.001 | 0.005 |
| 65 | Water Pump | John Deere | 2008 | 3 | 150 | Diesel | 1,200 | 3.0 | 0.220 | 0.930 | 0.595 | 0.044 | 0.185 | 0.017 | 0.001 | 0.005 |
| 67 | Water Pump | John Deere | 2008 | 4 | 25 | Diesel | 1,000 | 5.6 | 0.220 | 0.930 | 0.154 | 0.006 | 0.026 | 0.004 | 0.000 | 0.001 |
| 67 | Water Pump | Yanmar | 2013 | 4 | 25 | Diesel | 1,000 | 3.5 | 0.022 | 0.930 | 0.096 | 0.001 | 0.026 | 0.003 | 0.000 | 0.001 |
| 68 | Water Pump | John Deere | 2008 | 4 | 25 | Diesel | 1,000 | 5.6 | 0.220 | 0.930 | 0.154 | 0.006 | 0.026 | 0.004 | 0.000 | 0.001 |
| 69 | Water Pump | Yanmar | 2013 | 4 | 25 | Diesel | 1,000 | 3.5 | 0.022 | 0.930 | 0.096 | 0.001 | 0.026 | 0.003 | 0.000 | 0.001 |
| 69 | Water Pump | Detroit | Unknown | NA | 150 | Diesel | 1,200 | 14.1 | 0.998 | 0.930 | 2.790 | 0.198 | 0.185 | 0.080 | 0.006 | 0.005 |
| 70 | Water Pump | Detroit | Unknown | NA | 102 | Diesel | 1,100 | 14.1 | 0.998 | 0.930 | 1.739 | 0.123 | 0.115 | 0.050 | 0.004 | 0.003 |
| 70 | Water Pump | John Deere | 2013 | 4 | 102 | Diesel | 1,100 | 0.3 | 0.015 | 0.930 | 0.037 | 0.002 | 0.115 | 0.001 | 0.000 | 0.003 |
| 71 | Water Pump | Cat | Unknown | NA | 102 | Diesel | 1,100 | 14.1 | 0.998 | 0.930 | 1.739 | 0.123 | 0.115 | 0.050 | 0.004 | 0.003 |
| 73 | Water Pump | John Deere | Unknown | NA | 102 | Diesel | 1,100 | 14.1 | 0.998 | 0.930 | 1.739 | 0.123 | 0.115 | 0.050 | 0.004 | 0.003 |
| 74 | Water Pump | John Deere | Unknown | NA | 102 | Diesel | 1,100 | 14.1 | 0.998 | 0.930 | 1.739 | 0.123 | 0.115 | 0.050 | 0.004 | 0.003 |
| 75 | Water Pump | John Deere | Unknown | NA | 102 | Diesel | 1,100 | 14.1 | 0.998 | 0.930 | 1.739 | 0.123 | 0.115 | 0.050 | 0.004 | 0.003 |
| 77 | Water Pump | John Deere | Unknown | NA | 102 | Diesel | 1,100 | 14.1 | 0.998 | 0.930 | 1.739 | 0.123 | 0.115 | 0.050 | 0.004 | 0.003 |

## Black Thunder Mine
## Pumps

| | | | | | | | | g/hp-hr [1] | | | TPY | | | g/s | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Equipment # | Description | Engine Manufacturer | Engine Year | Engine Tier Level | Horsepower | Fuel Type | Hrs/year | $NO_x$ | $PM_{10}$ | $SO_2$ | $NO_x$ | $PM_{10}$ | $SO_2$ | $NO_x$ | $PM_{10}$ | $SO_2$ |
| 78 | Water Pump | John Deere | Unknown | NA | 102 | Diesel | 1,100 | 14.1 | 0.998 | 0.930 | 1.739 | 0.123 | 0.115 | 0.050 | 0.004 | 0.003 |
| 79 | Water Pump | John Deere | Unknown | NA | 102 | Diesel | 1,100 | 14.1 | 0.998 | 0.930 | 1.739 | 0.123 | 0.115 | 0.050 | 0.004 | 0.003 |
| 80 | Water Pump | John Deere | Unknown | NA | 102 | Diesel | 1,100 | 14.1 | 0.998 | 0.930 | 1.739 | 0.123 | 0.115 | 0.050 | 0.004 | 0.003 |
| 81 | Water Pump | John Deere | Unknown | NA | 102 | Diesel | 1,100 | 14.1 | 0.998 | 0.930 | 1.739 | 0.123 | 0.115 | 0.050 | 0.004 | 0.003 |
| 82 | Water Pump | John Deere | Unknown | NA | 102 | Diesel | 1,100 | 14.1 | 0.998 | 0.930 | 1.739 | 0.123 | 0.115 | 0.050 | 0.004 | 0.003 |
| 83 | Water Pump | John Deere | Unknown | NA | 102 | Diesel | 1,100 | 14.1 | 0.998 | 0.930 | 1.739 | 0.123 | 0.115 | 0.050 | 0.004 | 0.003 |
| 84 | Water Pump | John Deere | 2010 | 3 | 150 | Diesel | 1,200 | 3.0 | 0.220 | 0.930 | 0.595 | 0.044 | 0.185 | 0.017 | 0.001 | 0.005 |
| 85 | Water Pump | Yanmar | 2010 | 4 | 25 | Diesel | 1,000 | 5.6 | 0.220 | 0.930 | 0.154 | 0.006 | 0.026 | 0.004 | 0.000 | 0.001 |
| 85 | Water Pump | Yanmar | 2014 | 4 | 36 | Diesel | 1,000 | 3.5 | 0.022 | 0.930 | 0.139 | 0.001 | 0.037 | 0.004 | 0.000 | 0.001 |
| 86 | Water Pump | Yanmar | 2010 | 4 | 25 | Diesel | 1,000 | 5.6 | 0.220 | 0.930 | 0.154 | 0.006 | 0.026 | 0.004 | 0.000 | 0.001 |
| 87 | Water Pump | Yanmar | 2010 | 4 | 25 | Diesel | 1,000 | 5.6 | 0.220 | 0.930 | 0.154 | 0.006 | 0.026 | 0.004 | 0.000 | 0.001 |
| 88 | Water Pump | Yanmar | 2010 | 4 | 25 | Diesel | 1,000 | 5.6 | 0.220 | 0.930 | 0.154 | 0.006 | 0.026 | 0.004 | 0.000 | 0.001 |
| 89 | Water Pump | John Deere | 2010 | 3 | 150 | Diesel | 1,200 | 3.0 | 0.220 | 0.930 | 0.595 | 0.044 | 0.185 | 0.017 | 0.001 | 0.005 |
| 90 | Water Pump | John Deere | 2011 | 2 | 102 | Diesel | 1,100 | 4.9 | 0.220 | 0.930 | 0.606 | 0.027 | 0.115 | 0.017 | 0.001 | 0.003 |
| 91 | Water Pump | Unknown | 2011 | 4 | 220 | Diesel | 1,200 | 0.3 | 0.015 | 0.930 | 0.087 | 0.004 | 0.271 | 0.003 | 0.000 | 0.008 |
| 92 | Water Pump | Unknown | 2011 | 4 | 220 | Diesel | 1,200 | 0.3 | 0.015 | 0.930 | 0.087 | 0.004 | 0.271 | 0.003 | 0.000 | 0.008 |
| 93 | Water Pump | Yanmar | 2011 | 2 | 102 | Diesel | 1,100 | 4.9 | 0.220 | 0.930 | 0.606 | 0.027 | 0.115 | 0.017 | 0.001 | 0.003 |
| 93 | Water Pump | Yanmar | 2013 | 4 | 36 | Diesel | 1,000 | 3.5 | 0.022 | 0.930 | 0.139 | 0.001 | 0.037 | 0.004 | 0.000 | 0.001 |
| 94 | Water Pump | John Deere | 2011 | 2 | 102 | Diesel | 1,100 | 4.9 | 0.220 | 0.930 | 0.606 | 0.027 | 0.115 | 0.017 | 0.001 | 0.003 |
| 95 | Water Pump | John Deere | 2011 | 2 | 102 | Diesel | 1,100 | 4.9 | 0.220 | 0.930 | 0.606 | 0.027 | 0.115 | 0.017 | 0.001 | 0.003 |
| 96 | Water Pump | Yanmar | 2011 | 4 | 25 | Diesel | 1,000 | 5.6 | 0.220 | 0.930 | 0.154 | 0.006 | 0.026 | 0.004 | 0.000 | 0.001 |
| 97 | Water Pump | Yanmar | 2011 | 4 | 25 | Diesel | 1,000 | 5.6 | 0.220 | 0.930 | 0.154 | 0.006 | 0.026 | 0.004 | 0.000 | 0.001 |
| 98 | Water Pump | John Deere | 2011 | 3 | 150 | Diesel | 1,200 | 3.0 | 0.220 | 0.930 | 0.595 | 0.044 | 0.185 | 0.017 | 0.001 | 0.005 |
| 99 | Water Pump | John Deere | 2011 | 3 | 150 | Diesel | 1,200 | 3.0 | 0.220 | 0.930 | 0.595 | 0.044 | 0.185 | 0.017 | 0.001 | 0.005 |
| 100 | Water Pump | John Deere | 2012 | 3 | 102 | Diesel | 1,100 | 3.0 | 0.220 | 0.930 | 0.371 | 0.027 | 0.115 | 0.011 | 0.001 | 0.003 |
| 101 | Water Pump | Cat | 2012 | 3 | 225 | Diesel | 1,200 | 3.0 | 0.150 | 0.930 | 0.893 | 0.045 | 0.277 | 0.026 | 0.001 | 0.008 |
| | | | | | | | Total | | | | 102.23 | 7.04 | 9.42 | 2.94 | 0.20 | 0.27 |

[1] AP-42, Section 3.3 Gasoline and Diesel Industrial Equipment, Table 3.3-1 Emission Factors for Uncontrolled Gasoline & Diesel Industrial Engines, or Tier standard when available.

**Black Thunder Mine**

**W s**

| | | | | | | | | g/hp-hr [1] | | | TPY | | | g/s | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Equipment # | Description | Engine Manufacturer | Engine Year | Engine Tier Level | Horsepower | Fuel Type | Hrs/year | $NO_x$ | $PM_{10}$ | $SO_2$ | $NO_x$ | $PM_{10}$ | $SO_2$ | $NO_x$ | $PM_{10}$ | $SO_2$ |
| 1 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 2 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 3 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 4 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 5 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 6 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 7 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 8 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 9 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 10 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 11 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 12 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 13 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 14 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 15 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 16 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 17 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 18 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 19 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 20 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 21 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 22 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 23 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 24 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 25 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 26 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 27 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 28 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 29 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 30 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 31 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 32 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 33 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 34 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 35 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 36 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 37 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 38 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 39 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 40 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 41 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 42 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 43 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 44 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 45 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 46 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 47 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 48 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 49 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| 50 | Welder | Unknown | Unknown | NA | 50 | Diesel | 750 | 14.1 | 0.998 | 0.930 | 0.581 | 0.041 | 0.038 | 0.017 | 0.001 | 0.001 |
| | | | | | | | Total | | | | 29.06 | 2.06 | 1.92 | 0.84 | 0.06 | 0.06 |

[1] AP-42, Section 3.3 Gasoline and Diesel Industrial Equipment, Table 3.3-1 Emission Factors for Uncontrolled Gasoline & Diesel Industrial Engines.

## Black Thunder Mine
## Light Plants and Generators

| | | | | | | | | g/hp-hr [1] | | | TPY | | | g/s | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Equipment # | Description | Engine Manufacturer | Engine Year | Engine Tier Level | Horsepower | Fuel Type | Hrs/year | $NO_x$ | $PM_{10}$ | $SO_2$ | $NO_x$ | $PM_{10}$ | $SO_2$ | $NO_x$ | $PM_{10}$ | $SO_2$ |
| 8 | Light Plant | Unknown | 1982 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 19 | Light Plant | Unknown | 1984 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 50 | Light Plant | Unknown | 1984 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 66 | Light Plant | Unknown | 1995 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 71 | Light Plant | Unknown | 1996 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 73 | Light Plant | Unknown | 1998 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 74 | Light Plant | Unknown | 1998 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 79 | Light Plant | Unknown | 1999 | 1 | 25 | Diesel | 1,750 | 7.1 | 0.600 | 0.930 | 0.342 | 0.029 | 0.045 | 0.010 | 0.001 | 0.001 |
| 83 | Light Plant | Unknown | 2003 | 1 | 25 | Diesel | 1,750 | 7.1 | 0.600 | 0.930 | 0.342 | 0.029 | 0.045 | 0.010 | 0.001 | 0.001 |
| 85 | Light Plant | Unknown | 2003 | 1 | 25 | Diesel | 1,750 | 7.1 | 0.600 | 0.930 | 0.342 | 0.029 | 0.045 | 0.010 | 0.001 | 0.001 |
| 86 | Light Plant | Unknown | 2003 | 1 | 25 | Diesel | 1,750 | 7.1 | 0.600 | 0.930 | 0.342 | 0.029 | 0.045 | 0.010 | 0.001 | 0.001 |
| 87 | Light Plant | Unknown | 2001 | 1 | 25 | Diesel | 1,750 | 7.1 | 0.600 | 0.930 | 0.342 | 0.029 | 0.045 | 0.010 | 0.001 | 0.001 |
| 88 | Light Plant | Unknown | 2008 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 90 | Light Plant | Unknown | 2003 | 1 | 25 | Diesel | 1,750 | 7.1 | 0.600 | 0.930 | 0.342 | 0.029 | 0.045 | 0.010 | 0.001 | 0.001 |
| 95 | Light Plant | Unknown | 2007 | 2 | 25 | Diesel | 1,750 | 5.6 | 0.450 | 0.930 | 0.270 | 0.022 | 0.045 | 0.008 | 0.001 | 0.001 |
| 96 | Light Plant | Unknown | 2007 | 2 | 25 | Diesel | 1,750 | 5.6 | 0.450 | 0.930 | 0.270 | 0.022 | 0.045 | 0.008 | 0.001 | 0.001 |
| 97 | Light Plant | Unknown | 2007 | 2 | 25 | Diesel | 1,750 | 5.6 | 0.450 | 0.930 | 0.270 | 0.022 | 0.045 | 0.008 | 0.001 | 0.001 |
| 98 | Light Plant | Unknown | 2008 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 99 | Light Plant | Unknown | 2008 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 100 | Light Plant | Unknown | 2008 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 101 | Light Plant | Unknown | 2008 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 102 | Light Plant | Unknown | 2008 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 104 | Light Plant | Unknown | 1988 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 105 | Light Plant | Unknown | 1989 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 106 | Light Plant | Unknown | 1990 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 107 | Light Plant | Unknown | 1992 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 108 | Light Plant | Unknown | 1992 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 109 | Light Plant | Unknown | 1997 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 111 | Light Plant | Unknown | 1997 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 112 | Light Plant | Unknown | Unknown | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 113 | Light Plant | Unknown | Unknown | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 114 | Light Plant | Unknown | Unknown | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 115 | Light Plant | Unknown | 1985 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 116 | Light Plant | Unknown | 1985 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 117 | Light Plant | Unknown | 1985 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 118 | Light Plant | Unknown | 1998 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 119 | Light Plant | Unknown | 1985 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 120 | Light Plant | Unknown | 1987 | NA | 25 | Diesel | 1,750 | 14.1 | 0.998 | 0.930 | 0.678 | 0.048 | 0.045 | 0.020 | 0.001 | 0.001 |
| 121 | Light Plant | Unknown | 2003 | 1 | 25 | Diesel | 1,750 | 7.1 | 0.600 | 0.930 | 0.342 | 0.029 | 0.045 | 0.010 | 0.001 | 0.001 |
| 122 | Light Plant | Unknown | 2003 | 1 | 25 | Diesel | 1,750 | 7.1 | 0.600 | 0.930 | 0.342 | 0.029 | 0.045 | 0.010 | 0.001 | 0.001 |
| 123 | Light Plant | Unknown | 2005 | 2 | 25 | Diesel | 1,750 | 5.6 | 0.450 | 0.930 | 0.270 | 0.022 | 0.045 | 0.008 | 0.001 | 0.001 |
| 124 | Light Plant | Unknown | 2006 | 2 | 25 | Diesel | 1,750 | 5.6 | 0.450 | 0.930 | 0.270 | 0.022 | 0.045 | 0.008 | 0.001 | 0.001 |

## Black Thunder Mine
## Light Plants and Generators

| | | | | | | | | g/hp-hr [1] | | | TPY | | | g/s | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Equipment # | Description | Engine Manufacturer | Engine Year | Engine Tier Level | Horsepower | Fuel Type | Hrs/year | $NO_x$ | $PM_{10}$ | $SO_2$ | $NO_x$ | $PM_{10}$ | $SO_2$ | $NO_x$ | $PM_{10}$ | $SO_2$ |
| 125 | Light Plant | Unknown | 2006 | 2 | 25 | Diesel | 1,750 | 5.6 | 0.450 | 0.930 | 0.270 | 0.022 | 0.045 | 0.008 | 0.001 | 0.001 |
| 126 | Light Plant | Unknown | 2007 | 2 | 25 | Diesel | 1,750 | 5.6 | 0.450 | 0.930 | 0.270 | 0.022 | 0.045 | 0.008 | 0.001 | 0.001 |
| 127 | Light Plant | Unknown | 2008 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 128 | Light Plant | Unknown | 2008 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 129 | Light Plant | Unknown | 2010 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 130 | Light Plant | Unknown | 2010 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 131 | Light Plant | Unknown | 2011 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 132 | Light Plant | Unknown | 2011 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 134 | Light Plant | Unknown | 2011 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 135 | Light Plant | Unknown | 2011 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 136 | Light Plant | Unknown | 2011 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 137 | Light Plant | Unknown | 2011 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 138 | Light Plant | Unknown | 2011 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 139 | Light Plant | Unknown | 2011 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 140 | Light Plant | Unknown | 2011 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 141 | Light Plant | Unknown | 2011 | 4 | 25 | Diesel | 1,750 | 5.6 | 0.220 | 0.930 | 0.270 | 0.011 | 0.045 | 0.008 | 0.000 | 0.001 |
| 137_2013 | Light Plant | Kubota D-1105-BG | 2013 | 4 | 13.1 | Diesel | 1,750 | 5.6 | 0.300 | 0.930 | 0.142 | 0.008 | 0.024 | 0.004 | 0.000 | 0.001 |
| 142_2013 | Light Plant | Kubota D-1105-BG | 2013 | 4 | 13.1 | Diesel | 1,750 | 5.6 | 0.300 | 0.930 | 0.142 | 0.008 | 0.024 | 0.004 | 0.000 | 0.001 |
| 143_2013 | Light Plant | Kubota D-1105-BG | 2013 | 4 | 13.1 | Diesel | 1,750 | 5.6 | 0.300 | 0.930 | 0.142 | 0.008 | 0.024 | 0.004 | 0.000 | 0.001 |
| 30 | Generator | Perkins KD31401U | Unknown | NA | 20 | Diesel | 700 | 14.1 | 0.998 | 0.930 | 0.217 | 0.015 | 0.014 | 0.006 | 0.000 | 0.000 |
| 55 | Generator | Perkins KD30246U | Unknown | NA | 20 | Diesel | 700 | 14.1 | 0.998 | 0.930 | 0.217 | 0.015 | 0.014 | 0.006 | 0.000 | 0.000 |
| 56 | Generator | Unknown | Unknown | NA | 20 | Diesel | 700 | 14.1 | 0.998 | 0.930 | 0.217 | 0.015 | 0.014 | 0.006 | 0.000 | 0.000 |
| 58 | Generator | Unknown | Unknown | NA | 20 | Diesel | 700 | 14.1 | 0.998 | 0.930 | 0.217 | 0.015 | 0.014 | 0.006 | 0.000 | 0.000 |
| 851 | Generator | Unknown | Unknown | NA | 20 | Diesel | 700 | 14.1 | 0.998 | 0.930 | 0.217 | 0.015 | 0.014 | 0.006 | 0.000 | 0.000 |
| 958 | Generator | Unknown | Unknown | NA | 20 | Diesel | 700 | 14.1 | 0.998 | 0.930 | 0.217 | 0.015 | 0.014 | 0.006 | 0.000 | 0.000 |
| 1739 | Generator | Koehler | Unknown | NA | 20 | Diesel | 700 | 14.1 | 0.998 | 0.930 | 0.217 | 0.015 | 0.014 | 0.006 | 0.000 | 0.000 |
| 1740 | Generator | Detroit | Unknown | NA | 20 | Diesel | 700 | 14.1 | 0.998 | 0.930 | 0.217 | 0.015 | 0.014 | 0.006 | 0.000 | 0.000 |
| 1741 | Generator | Unknown | Unknown | NA | 20 | Diesel | 700 | 14.1 | 0.998 | 0.930 | 0.217 | 0.015 | 0.014 | 0.006 | 0.000 | 0.000 |
| 1742 | Generator | Unknown | Unknown | NA | 20 | Diesel | 700 | 14.1 | 0.998 | 0.930 | 0.217 | 0.015 | 0.014 | 0.006 | 0.000 | 0.000 |
| 1744 | Generator | Detroit | Unknown | NA | 20 | Diesel | 700 | 14.1 | 0.998 | 0.930 | 0.217 | 0.015 | 0.014 | 0.006 | 0.000 | 0.000 |
| 1745 | Generator | Detroit | Unknown | NA | 20 | Diesel | 700 | 14.1 | 0.998 | 0.930 | 0.217 | 0.015 | 0.014 | 0.006 | 0.000 | 0.000 |
| 1746 | Generator | Unknown | Unknown | NA | 20 | Diesel | 700 | 14.1 | 0.998 | 0.930 | 0.217 | 0.015 | 0.014 | 0.006 | 0.000 | 0.000 |
| 1747 | Generator | Unknown | Unknown | NA | 20 | Diesel | 700 | 14.1 | 0.998 | 0.930 | 0.217 | 0.015 | 0.014 | 0.006 | 0.000 | 0.000 |
| 1812 | Generator | Unknown | 1998 | NA | 20 | Diesel | 700 | 14.1 | 0.998 | 0.930 | 0.217 | 0.015 | 0.014 | 0.006 | 0.000 | 0.000 |
| | | | | | | | | | | Totals | 29.31 | 1.96 | 2.89 | 0.84 | 0.06 | 0.08 |

[1] AP-42, Section 3.3 Gasoline and Diesel Industrial Equipment, Table 3.3-1 Emission Factors for Uncontrolled Gasoline & Diesel Industrial Engines, or Tier standard when available.

# APPENDIX 4

## Black Thunder $NO_X$ Emission Inventory

## BLACK THUNDER NOx EMISSION CALCULATIONS

Title: Black Thunder Actual $NO_X$ Emissions for Year 2013

Pit: All

| Year | OB Haul Truck Hours | Coal Haul Truck Hours | Grader Hours | Wheeled Loader Hours | RT Dozer Hours | Track Dozer Hours | Scraper Hours | Drill Hours | Water Truck Hours | Blasting on OB Tons of Explosive | Blasting on Coal Tons of Explosive | Locomotive Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2013 | 211,978 | 220,393 | 90,925 | 22,962 | 82,854 | 188,798 | 24,395 | 49,318 | 29,634 | 147,850 | 27,033 | 133,156 |

| Vehicle Type | Emission Factor (lb/operating hr) | | $NO_X$ Emission Rate g/sec | TPY |
|---|---|---|---|---|
| OB Haul Trucks | 4.17 | | 12.70 | 441.55 |
| Coal Haul Trucks | 4.17 | | 13.21 | 459.08 |
| Graders | 0.71 | | 0.93 | 32.41 |
| Wheeled Loaders | 1.89 | | 0.62 | 21.70 |
| RT Dozers | 4.17 | | 4.96 | 172.59 |
| Track Dozers | 1.26 | | 3.42 | 118.94 |
| Scrapers | 3.84 | | 1.35 | 46.84 |
| Drills | 1.69 | | 1.20 | 41.70 |
| Water Trucks | 4.17 | | 1.78 | 61.73 |
| Blasting on OB | 17 | (lb/ton) | 36.15 | 1256.72 |
| Blasting on Coal | 17 | (lb/ton) | 6.61 | 229.78 |
| Locomotives | 6.759 | (lb/locomotive-hour) | 12.94 | 450.00 |
| Total | | | 95.88 | 3333.04 |

**Black Thunder $NO_X$ Emission Calculations**

**North Pit**

| Mining Operation | $NO_X$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | | $NO_X$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| OB Haul Trucks | 4.166 lb/hr | hr/yr | 127,770 | 144,909 | 149,161 | 231,188 | 127,580 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 266.15 | 301.85 | 310.70 | 481.56 | 265.75 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Trucks | 4.166 lb/hr | hr/yr | 81,701 | 100,577 | 103,242 | 127,637 | 72,892 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 170.18 | 209.50 | 215.05 | 265.87 | 151.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders | 0.713 lb/hr | hr/yr | 27,231 | 31,913 | 32,812 | 46,647 | 26,061 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9.71 | 11.38 | 11.70 | 16.63 | 9.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on OB | 1.89 lb/hr | hr/yr | 8,456 | 8,166 | 8,741 | 10,668 | 6,670 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7.99 | 7.72 | 8.26 | 10.08 | 6.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on Coal | 1.89 lb/hr | hr/yr | 9,588 | 11,019 | 10,759 | 12,638 | 6,850 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9.06 | 10.41 | 10.17 | 11.94 | 6.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on OB | 4.166 lb/hr | hr/yr | 14,034 | 14,921 | 15,167 | 18,127 | 10,515 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29.23 | 31.08 | 31.59 | 37.76 | 21.90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on Coal | 4.166 lb/hr | hr/yr | 2,422 | 2,784 | 2,718 | 3,193 | 1,731 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.05 | 5.80 | 5.66 | 6.65 | 3.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Track Dozers on OB | 1.26 lb/hr | hr/yr | 49,554 | 54,545 | 55,541 | 78,244 | 48,869 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31.22 | 34.36 | 34.99 | 49.29 | 30.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers | 3.84 lb/hr | hr/yr | 5,605 | 6,442 | 6,290 | 7,388 | 4,004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10.76 | 12.37 | 12.08 | 14.18 | 7.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on OB | 1.691 lb/hr | hr/yr | 11,346 | 11,833 | 12,151 | 14,584 | 8,595 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9.59 | 10.00 | 10.27 | 12.33 | 7.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on Coal | 1.691 lb/hr | hr/yr | 2,535 | 2,990 | 2,822 | 3,610 | 1,402 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.14 | 2.53 | 2.39 | 3.05 | 1.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks | 4.166 lb/hr | hr/yr | 10,474 | 12,274 | 12,620 | 17,941 | 10,024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21.82 | 25.57 | 26.29 | 37.37 | 20.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Blasting on OB | 17 lb/ton | ton/yr | 53,005 | 54,925 | 56,404 | 66,200 | 39,396 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 450.54 | 466.86 | 479.43 | 562.70 | 334.87 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Blasting on Coal | 17 lb/ton | ton/yr | 9,588 | 11,019 | 10,759 | 12,638 | 6,850 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 81.50 | 93.66 | 91.45 | 107.42 | 58.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Locomotives | 6.759 lb/engine hr | hr/yr | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | | | | | | | | | | **1104.94** | **1223.09** | **1250.04** | **1616.85** | **926.06** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

**Northwest Pit**

| Mining Operation | $NO_X$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | | $NO_X$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| OB Haul Trucks | 4.166 lb/hr | hr/yr | 147,085 | 142,645 | 165,157 | 145,203 | 194,976 | 237,229 | 140,953 | 156,808 | 129,848 | 114,576 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 306.38 | 297.13 | 344.02 | 302.46 | 406.14 | 494.15 | 293.61 | 326.63 | 270.47 | 238.66 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Trucks | 4.166 lb/hr | hr/yr | 52,186 | 53,024 | 64,400 | 62,763 | 85,170 | 110,908 | 115,040 | 125,422 | 109,733 | 103,970 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 108.70 | 110.45 | 134.14 | 130.73 | 177.41 | 231.02 | 239.63 | 261.25 | 228.57 | 216.57 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders | 0.713 lb/hr | hr/yr | 25,905 | 25,437 | 29,842 | 27,035 | 36,419 | 45,258 | 33,279 | 36,690 | 31,146 | 28,411 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9.24 | 9.07 | 10.64 | 9.64 | 12.98 | 16.13 | 11.86 | 13.08 | 11.10 | 10.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on OB | 1.89 lb/hr | hr/yr | 6,771 | 6,960 | 7,551 | 6,910 | 10,034 | 11,950 | 8,254 | 9,081 | 8,673 | 6,188 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6.40 | 6.58 | 7.14 | 6.53 | 9.48 | 11.29 | 7.80 | 8.58 | 8.20 | 5.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on Coal | 1.89 lb/hr | hr/yr | 10,901 | 9,837 | 10,883 | 9,686 | 11,623 | 14,139 | 13,593 | 13,911 | 11,553 | 9,079 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10.30 | 9.30 | 10.28 | 9.15 | 10.98 | 13.36 | 12.85 | 13.15 | 10.92 | 8.58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on OB | 4.166 lb/hr | hr/yr | 13,745 | 13,064 | 14,338 | 12,908 | 16,844 | 20,292 | 16,992 | 17,882 | 15,732 | 11,874 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 28.63 | 27.21 | 29.87 | 26.89 | 35.09 | 42.27 | 35.39 | 37.25 | 32.77 | 24.73 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on Coal | 4.166 lb/hr | hr/yr | 2,754 | 2,485 | 2,749 | 2,447 | 2,936 | 3,572 | 3,434 | 3,514 | 2,919 | 2,294 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.74 | 5.18 | 5.73 | 5.10 | 6.12 | 7.44 | 7.15 | 7.32 | 6.08 | 4.78 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Track Dozers on OB | 1.26 lb/hr | hr/yr | 55,136 | 53,631 | 59,908 | 54,197 | 68,425 | 80,363 | 54,262 | 58,572 | 50,317 | 45,659 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34.74 | 33.79 | 37.74 | 34.14 | 43.11 | 50.63 | 34.18 | 36.90 | 31.70 | 28.77 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers | 3.84 lb/hr | hr/yr | 6,373 | 5,751 | 6,362 | 5,663 | 6,795 | 8,266 | 7,947 | 8,132 | 6,754 | 5,307 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12.24 | 11.04 | 12.22 | 10.87 | 13.05 | 15.87 | 15.26 | 15.61 | 12.97 | 10.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on OB | 1.691 lb/hr | hr/yr | 10,690 | 10,307 | 11,288 | 10,193 | 13,586 | 16,328 | 13,182 | 13,983 | 12,493 | 9,330 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9.04 | 8.71 | 9.54 | 8.62 | 11.49 | 13.81 | 11.15 | 11.82 | 10.56 | 7.89 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on Coal | 1.691 lb/hr | hr/yr | 2,883 | 2,669 | 2,855 | 2,767 | 2,379 | 2,439 | 2,251 | 2,239 | 1,860 | 1,420 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.44 | 2.26 | 2.41 | 2.34 | 2.01 | 2.06 | 1.90 | 1.89 | 1.57 | 1.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks | 4.166 lb/hr | hr/yr | 9,964 | 9,783 | 11,478 | 10,398 | 14,007 | 17,407 | 12,800 | 14,112 | 11,979 | 10,927 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20.75 | 20.38 | 23.91 | 21.66 | 29.18 | 36.26 | 26.66 | 29.39 | 24.95 | 22.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Blasting on OB | 17 lb/ton | ton/yr | 49,020 | 47,243 | 52,759 | 47,829 | 62,284 | 74,788 | 61,792 | 65,293 | 55,819 | 43,119 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 416.67 | 401.57 | 448.45 | 406.54 | 529.42 | 635.70 | 525.23 | 554.99 | 474.46 | 366.51 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Blasting on Coal | 17 lb/ton | ton/yr | 10,901 | 9,837 | 10,883 | 9,686 | 11,623 | 14,139 | 13,593 | 13,911 | 11,553 | 9,079 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92.66 | 83.61 | 92.51 | 82.33 | 98.80 | 120.19 | 115.54 | 118.24 | 98.20 | 77.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Locomotives | 6.759 lb/engine hr | hr/yr | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | | | | | | | | | | **1063.92** | **1026.27** | **1168.61** | **1057.01** | **1385.24** | **1690.18** | **1338.22** | **1436.12** | **1222.53** | **1023.78** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

**West Pit**

| Mining Operation | $NO_X$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | | $NO_X$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| OB Haul Trucks | 4.166 lb/hr | hr/yr | 266,131 | 309,857 | 344,331 | 325,764 | 267,795 | 362,871 | 335,390 | 362,058 | 376,447 | 374,608 | 329,573 | 171 | 0 | 0 | 0 | 0 | 0 | 554.35 | 645.43 | 717.24 | 678.57 | 557.82 | 755.86 | 698.62 | 754.17 | 784.14 | 780.31 | 686.50 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Trucks | 4.166 lb/hr | hr/yr | 108,650 | 103,477 | 115,927 | 116,459 | 144,798 | 176,553 | 173,601 | 183,897 | 182,866 | 184,201 | 151,537 | 2,097 | 0 | 0 | 0 | 0 | 0 | 226.32 | 215.54 | 241.47 | 242.58 | 301.62 | 367.76 | 361.61 | 383.06 | 380.91 | 383.69 | 315.65 | 4.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders | 0.713 lb/hr | hr/yr | 48,722 | 53,733 | 59,833 | 57,489 | 53,637 | 70,125 | 66,169 | 70,974 | 72,711 | 72,645 | 62,544 | 295 | 0 | 0 | 0 | 0 | 0 | 17.37 | 19.16 | 21.33 | 20.49 | 19.12 | 25.00 | 23.59 | 25.30 | 25.92 | 25.90 | 22.30 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on OB | 1.89 lb/hr | hr/yr | 8,915 | 12,044 | 13,385 | 13,134 | 11,858 | 16,124 | 15,826 | 16,999 | 17,892 | 17,598 | 15,336 | 0 | 0 | 0 | 0 | 0 | 0 | 8.42 | 11.38 | 12.65 | 12.41 | 11.21 | 15.24 | 14.96 | 16.06 | 16.91 | 16.63 | 14.49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on Coal | 1.89 lb/hr | hr/yr | 14,446 | 12,700 | 13,513 | 12,849 | 15,196 | 17,831 | 16,811 | 17,244 | 16,651 | 17,437 | 15,504 | 280 | 0 | 0 | 0 | 0 | 0 | 13.65 | 12.00 | 12.77 | 12.14 | 14.36 | 16.85 | 15.89 | 16.30 | 15.74 | 16.48 | 14.65 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on OB | 4.166 lb/hr | hr/yr | 18,170 | 19,245 | 20,921 | 20,209 | 21,042 | 26,409 | 25,385 | 26,633 | 26,867 | 27,249 | 23,987 | 83 | 0 | 0 | 0 | 0 | 0 | 37.85 | 40.09 | 43.58 | 42.10 | 43.83 | 55.01 | 52.88 | 55.48 | 55.96 | 56.76 | 49.97 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on Coal | 4.166 lb/hr | hr/yr | 3,650 | 3,208 | 3,414 | 3,246 | 3,839 | 4,505 | 4,247 | 4,356 | 4,207 | 4,405 | 3,917 | 71 | 0 | 0 | 0 | 0 | 0 | 7.60 | 6.68 | 7.11 | 6.76 | 8.00 | 9.38 | 8.85 | 9.07 | 8.76 | 9.18 | 8.16 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Track Dozers on OB | 1.26 lb/hr | hr/yr | 88,393 | 99,773 | 109,129 | 103,928 | 89,156 | 115,399 | 108,084 | 115,249 | 118,072 | 118,047 | 104,997 | 118 | 0 | 0 | 0 | 0 | 0 | 55.69 | 62.86 | 68.75 | 65.47 | 56.17 | 72.70 | 68.09 | 72.61 | 74.39 | 74.37 | 66.15 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers | 3.84 lb/hr | hr/yr | 8,445 | 7,424 | 7,900 | 7,512 | 8,884 | 10,424 | 9,828 | 10,081 | 9,734 | 10,193 | 9,064 | 164 | 0 | 0 | 0 | 0 | 0 | 16.22 | 14.26 | 15.17 | 14.42 | 17.06 | 20.01 | 18.87 | 19.35 | 18.69 | 19.57 | 17.40 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on OB | 1.691 lb/hr | hr/yr | 14,121 | 15,685 | 17,132 | 16,606 | 16,782 | 21,410 | 20,671 | 21,799 | 22,198 | 22,360 | 19,640 | 4 | 0 | 0 | 0 | 0 | 0 | 11.94 | 13.26 | 14.49 | 14.04 | 14.19 | 18.10 | 17.48 | 18.43 | 18.77 | 18.91 | 16.61 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on Coal | 1.691 lb/hr | hr/yr | 3,820 | 3,446 | 3,544 | 3,671 | 3,110 | 3,075 | 2,783 | 2,776 | 2,680 | 2,726 | 2,424 | 37 | 0 | 0 | 0 | 0 | 0 | 3.23 | 2.91 | 3.00 | 3.10 | 2.63 | 2.60 | 2.35 | 2.35 | 2.27 | 2.31 | 2.05 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks | 4.166 lb/hr | hr/yr | 18,739 | 20,667 | 23,013 | 22,111 | 20,630 | 26,971 | 25,450 | 27,298 | 27,966 | 27,940 | 24,056 | 113 | 0 | 0 | 0 | 0 | 0 | 39.03 | 43.05 | 47.94 | 46.06 | 42.97 | 56.18 | 53.01 | 56.86 | 58.25 | 58.20 | 50.11 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Blasting on OB | 17 lb/ton | ton/yr | 64,370 | 71,053 | 77,204 | 74,391 | 74,092 | 93,986 | 90,779 | 95,517 | 97,218 | 97,815 | 86,210 | 10 | 0 | 0 | 0 | 0 | 0 | 547.15 | 603.95 | 656.24 | 632.33 | 629.78 | 798.88 | 771.62 | 811.89 | 826.35 | 831.43 | 732.78 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Blasting on Coal | 17 lb/ton | ton/yr | 14,446 | 12,700 | 13,513 | 12,849 | 15,196 | 17,831 | 16,811 | 17,244 | 16,651 | 17,437 | 15,504 | 280 | 0 | 0 | 0 | 0 | 0 | 122.79 | 107.95 | 114.86 | 109.22 | 129.17 | 151.56 | 142.90 | 146.57 | 141.53 | 148.21 | 131.79 | 2.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Locomotives | 6.759 lb/engine hr | hr/yr | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | | | | | | | | | | **1661.61** | **1798.52** | **1976.59** | **1899.70** | **1847.91** | **2365.14** | **2250.70** | **2387.50** | **2428.58** | **2441.93** | **2128.60** | **8.54** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

**Southwest Pit**

| Mining Operation | $NO_X$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | | $NO_X$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| OB Haul Trucks | 4.166 lb/hr | hr/yr | 195,461 | 154,655 | 151,302 | 138,828 | 89,222 | 109,525 | 116,412 | 121,397 | 137,371 | 213,078 | 170,165 | 32,203 | 0 | 0 | 0 | 0 | 0 | 407.15 | 322.15 | 315.16 | 289.18 | 185.85 | 228.14 | 242.49 | 252.87 | 286.14 | 443.84 | 354.45 | 67.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Trucks | 4.166 lb/hr | hr/yr | 42,663 | 59,182 | 54,143 | 65,572 | 72,922 | 68,672 | 80,362 | 88,247 | 88,619 | 107,228 | 96,817 | 23,978 | 0 | 0 | 0 | 0 | 0 | 88.87 | 123.28 | 112.78 | 136.59 | 151.90 | 143.04 | 157.39 | 183.82 | 184.59 | 223.36 | 201.67 | 49.95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders | 0.713 lb/hr | hr/yr | 30,956 | 27,799 | 26,708 | 26,572 | 21,079 | 23,166 | 25,581 | 27,254 | 29,379 | 41,640 | 34,708 | 7,303 | 0 | 0 | 0 | 0 | 0 | 11.04 | 9.91 | 9.52 | 9.47 | 7.51 | 8.26 | 9.12 | 9.72 | 10.47 | 14.84 | 12.37 | 2.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on OB | 1.89 lb/hr | hr/yr | 11,428 | 7,558 | 8,141 | 6,711 | 391 | 1,719 | 1,620 | 1,571 | 2,417 | 4,897 | 2,971 | 0 | 0 | 0 | 0 | 0 | 0 | 10.80 | 7.14 | 7.69 | 6.34 | 0.37 | 1.62 | 1.53 | 1.48 | 2.28 | 4.63 | 2.81 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on Coal | 1.89 lb/hr | hr/yr | 4,523 | 5,863 | 5,095 | 5,798 | 5,844 | 5,331 | 6,020 | 6,439 | 6,315 | 7,925 | 7,776 | 2,533 | 0 | 0 | 0 | 0 | 0 | 4.27 | 5.54 | 4.82 | 5.48 | 5.52 | 5.04 | 5.69 | 6.09 | 5.97 | 7.49 | 7.35 | 2.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on OB | 4.166 lb/hr | hr/yr | 12,406 | 10,438 | 10,295 | 9,729 | 4,849 | 5,484 | 5,942 | 6,230 | 6,792 | 9,973 | 8,359 | 1,946 | 0 | 0 | 0 | 0 | 0 | 25.84 | 21.74 | 21.44 | 20.27 | 10.10 | 11.42 | 12.38 | 12.98 | 14.15 | 20.77 | 17.41 | 4.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on Coal | 4.166 lb/hr | hr/yr | 1,143 | 1,481 | 1,287 | 1,465 | 1,476 | 1,347 | 1,521 | 1,627 | 1,595 | 2,002 | 1,964 | 640 | 0 | 0 | 0 | 0 | 0 | 2.38 | 3.09 | 2.68 | 3.05 | 3.08 | 2.81 | 3.17 | 3.39 | 3.32 | 4.17 | 4.09 | 1.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Track Dozers on OB | 1.26 lb/hr | hr/yr | 66,675 | 55,889 | 54,691 | 51,487 | 25,770 | 31,075 | 33,258 | 34,651 | 38,622 | 59,589 | 47,751 | 9,498 | 0 | 0 | 0 | 0 | 0 | 42.01 | 35.21 | 34.46 | 32.44 | 16.24 | 19.58 | 20.95 | 21.83 | 24.33 | 37.54 | 30.08 | 5.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers | 3.84 lb/hr | hr/yr | 2,644 | 3,427 | 2,979 | 3,389 | 3,416 | 3,117 | 3,519 | 3,764 | 3,692 | 4,633 | 4,546 | 1,481 | 0 | 0 | 0 | 0 | 0 | 5.08 | 6.58 | 5.72 | 6.51 | 6.56 | 5.98 | 6.76 | 7.23 | 7.09 | 8.90 | 8.73 | 2.84 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on OB | 1.691 lb/hr | hr/yr | 11,136 | 8,794 | 8,866 | 8,104 | 3,212 | 3,990 | 4,255 | 4,426 | 5,022 | 7,751 | 6,180 | 1,236 | 0 | 0 | 0 | 0 | 0 | 9.42 | 7.44 | 7.50 | 6.85 | 2.72 | 3.37 | 3.60 | 3.74 | 4.25 | 6.55 | 5.23 | 1.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on Coal | 1.691 lb/hr | hr/yr | 1,196 | 1,591 | 1,336 | 1,656 | 1,196 | 919 | 997 | 1,036 | 1,017 | 1,239 | 1,216 | 338 | 0 | 0 | 0 | 0 | 0 | 1.01 | 1.35 | 1.13 | 1.40 | 1.01 | 0.78 | 0.84 | 0.88 | 0.86 | 1.05 | 1.03 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks | 4.166 lb/hr | hr/yr | 11,906 | 10,692 | 10,272 | 10,220 | 8,107 | 8,910 | 9,839 | 10,482 | 11,300 | 16,015 | 13,349 | 2,809 | 0 | 0 | 0 | 0 | 0 | 24.80 | 22.27 | 21.40 | 21.29 | 16.89 | 18.56 | 20.49 | 21.83 | 23.54 | 33.36 | 27.81 | 5.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Blasting on OB | 17 lb/ton | ton/yr | 47,585 | 36,909 | 37,237 | 34,021 | 13,376 | 16,733 | 17,835 | 18,543 | 21,137 | 32,598 | 25,973 | 5,219 | 0 | 0 | 0 | 0 | 0 | 404.48 | 313.73 | 316.51 | 289.18 | 113.69 | 142.23 | 151.59 | 157.61 | 179.66 | 277.08 | 220.77 | 44.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Blasting on Coal | 17 lb/ton | ton/yr | 4,523 | 5,863 | 5,095 | 5,798 | 5,844 | 5,331 | 6,020 | 6,439 | 6,315 | 7,925 | 7,776 | 2,533 | 0 | 0 | 0 | 0 | 0 | 38.44 | 49.83 | 43.31 | 49.28 | 49.67 | 45.31 | 51.17 | 54.73 | 53.68 | 67.36 | 66.09 | 21.53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Locomotives | 6.759 lb/engine hr | hr/yr | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | | | | | | | | | | **1075.57** | **929.25** | **904.12** | **877.32** | **571.10** | **636.15** | **697.17** | **738.20** | **800.34** | **1150.94** | **959.90** | **209.31** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

**Black Thunder $NO_X$ Emission Calculations (continued)**

**South Pit**

| Mining Operation | $NO_X$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | | $NO_X$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| OB Haul Trucks | 4.166 lb/hr | hr/yr | 131,800 | 133,835 | 132,968 | 102,454 | 152,577 | 193,241 | 214,032 | 211,397 | 239,017 | 412 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 274.54 | 278.78 | 276.97 | 213.41 | 317.82 | 402.52 | 445.83 | 440.34 | 497.87 | 0.86 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Trucks | 4.166 lb/hr | hr/yr | 87,610 | 97,950 | 93,026 | 89,572 | 125,863 | 166,864 | 187,596 | 172,609 | 187,838 | 11,505 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 182.49 | 204.03 | 193.77 | 186.58 | 262.17 | 347.58 | 390.76 | 359.54 | 391.27 | 23.96 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders | 0.713 lb/hr | hr/yr | 28,523 | 30,132 | 29,379 | 24,963 | 36,197 | 46,814 | 52,212 | 49,921 | 55,491 | 1,549 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10.17 | 10.74 | 10.47 | 8.90 | 12.90 | 16.69 | 18.61 | 17.80 | 19.78 | 0.55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on OB | 1.89 lb/hr | hr/yr | 7,138 | 6,904 | 7,488 | 6,411 | 8,884 | 11,134 | 11,903 | 12,702 | 13,579 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6.75 | 6.52 | 7.08 | 6.06 | 8.40 | 10.52 | 11.25 | 12.00 | 12.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wheeled Loaders on Coal | 1.89 lb/hr | hr/yr | 8,042 | 8,081 | 7,249 | 6,529 | 7,986 | 10,199 | 11,076 | 9,906 | 10,154 | 661 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7.60 | 7.64 | 6.85 | 6.17 | 7.55 | 9.64 | 10.47 | 9.36 | 9.60 | 0.62 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on OB | 4.166 lb/hr | hr/yr | 11,807 | 11,655 | 11,462 | 10,064 | 13,121 | 16,592 | 17,873 | 17,584 | 18,459 | 196 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24.59 | 24.28 | 23.87 | 20.96 | 27.33 | 34.56 | 37.23 | 36.63 | 38.45 | 0.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RT Dozers on Coal | 4.166 lb/hr | hr/yr | 2,032 | 2,041 | 1,831 | 1,649 | 2,018 | 2,576 | 2,798 | 2,503 | 2,565 | 167 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.23 | 4.25 | 3.81 | 3.44 | 4.20 | 5.37 | 5.83 | 5.21 | 5.34 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Track Dozers on OB | 1.26 lb/hr | hr/yr | 50,259 | 50,794 | 50,266 | 41,814 | 55,962 | 67,428 | 73,549 | 72,410 | 79,388 | 278 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31.66 | 32.00 | 31.67 | 26.34 | 35.26 | 42.48 | 46.34 | 45.62 | 50.01 | 0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers | 3.84 lb/hr | hr/yr | 4,701 | 4,724 | 4,238 | 3,817 | 4,669 | 5,962 | 6,475 | 5,791 | 5,936 | 387 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9.03 | 9.07 | 8.14 | 7.33 | 8.96 | 11.45 | 12.43 | 11.12 | 11.40 | 0.74 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on OB | 1.691 lb/hr | hr/yr | 9,552 | 9,389 | 9,429 | 8,234 | 10,882 | 13,733 | 14,767 | 14,806 | 15,611 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8.08 | 7.94 | 7.97 | 6.96 | 9.20 | 11.61 | 12.49 | 12.52 | 13.20 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Drills on Coal | 1.691 lb/hr | hr/yr | 2,126 | 2,193 | 1,901 | 1,865 | 1,634 | 1,759 | 1,834 | 1,595 | 1,634 | 103 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.80 | 1.85 | 1.61 | 1.58 | 1.38 | 1.49 | 1.55 | 1.35 | 1.38 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks | 4.166 lb/hr | hr/yr | 10,971 | 11,589 | 11,300 | 9,601 | 13,922 | 18,005 | 20,081 | 19,200 | 21,343 | 596 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22.85 | 24.14 | 23.54 | 20.00 | 29.00 | 37.50 | 41.83 | 39.99 | 44.46 | 1.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Blasting on OB | 17 lb/ton | ton/yr | 43,610 | 43,032 | 42,925 | 37,920 | 48,089 | 60,617 | 64,974 | 64,484 | 67,751 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 370.68 | 365.78 | 364.86 | 322.32 | 408.76 | 515.25 | 552.28 | 548.11 | 575.88 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Blasting on Coal | 17 lb/ton | ton/yr | 8,042 | 8,081 | 7,249 | 6,529 | 7,986 | 10,199 | 11,076 | 9,906 | 10,154 | 661 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 68.35 | 68.69 | 61.62 | 55.49 | 67.89 | 86.69 | 94.15 | 84.20 | 86.31 | 5.62 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Locomotives | 6.759 lb/engine hr | hr/yr | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | | | | | | | | | | **1022.82** | **1045.70** | **1022.24** | **885.54** | **1200.82** | **1533.34** | **1681.03** | **1623.80** | **1757.78** | **34.83** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

**Highway/Plant Pit**

| Mining Operation | $NO_X$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | | $NO_X$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| OB Haul Trucks | 4.166 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 59,233 | 393,147 | 301,865 | 36,896 | 131,392 | 232,147 | 462,502 | 1,473,314 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 123.38 | 818.92 | 628.78 | 76.85 | 273.69 | 483.56 | 963.39 | 3068.91 |
| Coal Haul Trucks | 4.166 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10,572 | 23,423 | 44,346 | 46,030 | 36,258 | 42,509 | 53,238 | 68,085 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 22.02 | 48.79 | 92.37 | 95.88 | 75.53 | 88.55 | 110.90 | 141.82 |
| Graders | 0.713 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,075 | 54,154 | 45,007 | 10,780 | 21,795 | 35,705 | 67,046 | 200,382 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.24 | 19.31 | 16.05 | 3.84 | 7.77 | 12.73 | 23.90 | 71.44 |
| Wheeled Loaders on OB | 1.89 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10,157 | 14,516 | 7,975 | 11,903 | 17,424 | 24,533 | 36,614 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 9.60 | 13.72 | 7.54 | 11.25 | 16.47 | 23.18 | 34.60 |
| Wheeled Loaders on Coal | 1.89 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4,985 | 12,237 | 30,938 | 32,113 | 25,295 | 29,656 | 37,142 | 47,500 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.71 | 11.56 | 29.24 | 30.35 | 23.90 | 28.03 | 35.10 | 44.89 |
| RT Dozers on OB | 4.166 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,493 | 17,418 | 35,353 | 31,180 | 28,932 | 36,618 | 47,969 | 65,422 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.28 | 36.28 | 73.64 | 64.95 | 60.27 | 76.28 | 99.92 | 136.27 |
| RT Dozers on Coal | 4.166 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,259 | 3,092 | 7,816 | 8,402 | 8,199 | 8,199 | 9,383 | 12,000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.62 | 6.44 | 16.28 | 17.50 | 17.08 | 17.08 | 19.55 | 25.00 |
| Track Dozers on OB | 1.26 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17,268 | 108,877 | 103,251 | 33,825 | 57,796 | 84,900 | 148,651 | 406,170 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 10.88 | 68.59 | 65.05 | 21.31 | 36.41 | 53.49 | 93.65 | 255.89 |
| Scrapers | 3.84 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,914 | 7,154 | 18,086 | 18,990 | 16,144 | 17,867 | 21,713 | 27,768 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.60 | 13.74 | 34.73 | 36.46 | 31.00 | 34.30 | 41.69 | 53.32 |
| Drills on OB | 1.691 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,097 | 13,987 | 26,682 | 22,181 | 21,843 | 28,306 | 37,558 | 52,107 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.77 | 11.83 | 22.56 | 18.75 | 18.47 | 23.93 | 31.76 | 44.06 |
| Drills on Coal | 1.691 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 779 | 1,913 | 4,126 | 4,283 | 3,955 | 3,955 | 3,075 | 646 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.66 | 1.62 | 3.49 | 3.62 | 3.34 | 3.34 | 2.60 | 0.55 |
| Water Trucks | 4.166 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,490 | 20,828 | 17,311 | 4,146 | 8,383 | 13,733 | 25,787 | 77,070 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.27 | 43.39 | 36.06 | 8.64 | 17.46 | 28.61 | 53.71 | 160.54 |
| Blasting on OB | 17 lb/ton | ton/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8,679 | 58,571 | 116,044 | 116,952 | 74,247 | 120,832 | 159,590 | 218,130 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 73.77 | 497.85 | 986.37 | 994.10 | 631.10 | 1027.07 | 1356.51 | 1854.10 |
| Blasting on Coal | 17 lb/ton | ton/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4,985 | 12,237 | 30,938 | 32,113 | 25,295 | 29,656 | 37,142 | 47,500 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 42.37 | 104.02 | 262.98 | 272.96 | 215.01 | 252.08 | 315.70 | 403.75 |
| Locomotives | 6.759 lb/engine hr | hr/yr | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | | | | | | | | | | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **305.57** | **1691.93** | **2281.31** | **1652.75** | **1422.27** | **2145.50** | **3171.56** | **6295.12** |

**Section 16 Pit**

| Mining Operation | $NO_X$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | | $NO_X$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| OB Haul Trucks | 4.166 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 230,341 | 260,016 | 286,545 | 328,482 | 49,158 | 286,331 | 349,320 | 239,399 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 479.80 | 541.61 | 596.87 | 684.23 | 102.40 | 596.43 | 727.63 | 498.67 | 0.00 |
| Coal Haul Trucks | 4.166 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,588 | 27,515 | 45,871 | 44,343 | 49,270 | 46,227 | 59,124 | 48,254 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 19.97 | 57.31 | 95.55 | 92.37 | 102.63 | 96.29 | 123.15 | 100.51 | 0.00 |
| Graders | 0.713 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31,191 | 37,379 | 43,214 | 48,467 | 12,796 | 43,233 | 53,098 | 37,395 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.12 | 13.33 | 15.41 | 17.28 | 4.56 | 15.41 | 18.93 | 13.33 | 0.00 |
| Wheeled Loaders on OB | 1.89 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8,784 | 11,325 | 14,584 | 17,160 | 26,822 | 15,278 | 18,136 | 11,758 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8.30 | 10.70 | 13.78 | 16.22 | 25.35 | 14.44 | 17.14 | 11.11 | 0.00 |
| Wheeled Loaders on Coal | 1.89 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,826 | 7,414 | 11,982 | 13,749 | 13,749 | 11,727 | 13,749 | 10,358 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.67 | 7.01 | 11.32 | 12.99 | 12.99 | 11.08 | 12.99 | 9.79 | 0.00 |
| RT Dozers on OB | 4.166 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,031 | 14,575 | 20,663 | 24,040 | 31,555 | 21,005 | 24,800 | 17,201 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 18.81 | 30.36 | 43.04 | 50.08 | 65.73 | 43.75 | 51.66 | 35.83 | 0.00 |
| RT Dozers on Coal | 4.166 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 714 | 1,873 | 3,027 | 3,473 | 3,598 | 3,801 | 3,801 | 2,617 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.49 | 3.90 | 6.31 | 7.24 | 7.49 | 7.92 | 7.92 | 5.45 | 0.00 |
| Track Dozers on OB | 1.26 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 62,799 | 84,545 | 92,529 | 106,230 | 33,348 | 97,262 | 112,958 | 80,686 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 39.56 | 53.26 | 58.29 | 66.92 | 21.01 | 61.28 | 71.16 | 50.83 | 0.00 |
| Scrapers | 3.84 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,652 | 4,334 | 7,005 | 8,038 | 8,131 | 7,485 | 8,283 | 6,055 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.17 | 8.32 | 13.45 | 15.43 | 15.61 | 14.37 | 15.90 | 11.63 | 0.00 |
| Drills on OB | 1.691 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8,237 | 12,495 | 17,303 | 20,185 | 27,697 | 17,716 | 20,944 | 14,297 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.96 | 10.56 | 14.63 | 17.07 | 23.42 | 14.98 | 17.71 | 12.09 | 0.00 |
| Drills on Coal | 1.691 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 455 | 1,159 | 1,874 | 1,834 | 1,834 | 1,834 | 1,834 | 858 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 | 0.98 | 1.58 | 1.55 | 1.55 | 1.55 | 1.55 | 0.73 | 0.00 |
| Water Trucks | 4.166 lb/hr | hr/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11,996 | 14,377 | 16,621 | 18,641 | 4,921 | 16,628 | 20,422 | 14,383 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 24.99 | 29.95 | 34.62 | 38.83 | 10.25 | 34.64 | 42.54 | 29.96 | 0.00 |
| Blasting on OB | 17 lb/ton | ton/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34,632 | 51,729 | 70,775 | 82,547 | 82,827 | 27,499 | 85,393 | 58,670 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 294.37 | 439.70 | 601.59 | 701.65 | 704.03 | 233.74 | 725.84 | 498.70 | 0.00 |
| Blasting on Coal | 17 lb/ton | ton/yr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,826 | 7,414 | 11,982 | 13,749 | 13,749 | 11,727 | 13,749 | 10,358 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 24.02 | 63.02 | 101.85 | 116.87 | 116.87 | 99.68 | 116.87 | 88.05 | 0.00 |
| Locomotives | 6.759 lb/engine hr | hr/yr | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | | | | | | | | | | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **935.63** | **1270.01** | **1608.30** | **1838.72** | **1213.89** | **1245.55** | **1951.00** | **1366.67** | **0.00** |

**Total**

| Mining Operation | $NO_X$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | | $NO_X$ Emissions (tons/yr) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| OB Haul Trucks | 4.166 lb/hr | hr/yr | 868,248 | 885,901 | 942,920 | 943,436 | 832,151 | 902,866 | 806,788 | 851,660 | 1,113,024 | 1,021,924 | 1,179,430 | 662,721 | 86,054 | 417,724 | 581,467 | 701,901 | 1,473,314 | 1808.56 | 1845.33 | 1964.10 | 1965.18 | 1733.37 | 1880.67 | 1680.54 | 1774.01 | 2318.43 | 2128.67 | 2456.75 | 1380.45 | 179.25 | 870.12 | 1211.20 | 1462.06 | 3068.91 |
| Coal Haul Trucks | 4.166 lb/hr | hr/yr | 372,811 | 414,209 | 430,737 | 462,002 | 501,645 | 522,997 | 556,599 | 570,175 | 578,644 | 444,991 | 317,648 | 114,764 | 95,300 | 82,485 | 101,632 | 101,492 | 68,085 | 776.57 | 862.80 | 897.23 | 962.35 | 1044.93 | 1089.40 | 1159.39 | 1187.67 | 1205.32 | 926.92 | 661.66 | 239.05 | 198.51 | 171.82 | 211.70 | 211.41 | 141.82 |
| Graders | 0.713 lb/hr | hr/yr | 161,338 | 169,014 | 178,575 | 182,707 | 173,394 | 185,362 | 177,240 | 184,839 | 219,917 | 190,699 | 194,620 | 101,073 | 23,576 | 65,027 | 88,803 | 104,441 | 200,382 | 57.52 | 60.25 | 63.66 | 65.14 | 61.81 | 66.08 | 63.19 | 65.89 | 78.40 | 67.98 | 69.38 | 36.03 | 8.40 | 23.18 | 31.66 | 37.23 | 71.44 |
| Wheeled Loaders on OB | 1.89 lb/hr | hr/yr | 42,709 | 41,631 | 45,307 | 43,834 | 37,836 | 40,928 | 37,603 | 40,353 | 51,345 | 40,008 | 43,049 | 31,676 | 34,797 | 27,181 | 35,560 | 36,291 | 36,614 | 40.36 | 39.34 | 42.81 | 41.42 | 35.75 | 38.68 | 35.54 | 38.13 | 48.52 | 37.81 | 40.68 | 29.93 | 32.88 | 25.69 | 33.60 | 34.29 | 34.60 |
| Wheeled Loaders on Coal | 1.89 lb/hr | hr/yr | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 45,862 | 37,023 | 43,406 | 47,500 | 47,500 | 44.89 | 44.89 | 44.89 | 44.89 | 44.89 | 44.89 | 44.89 | 44.89 | 44.89 | 44.89 | 44.89 | 44.89 | 43.34 | 34.99 | 41.02 | 44.89 | 44.89 |
| RT Dozers on OB | 4.166 lb/hr | hr/yr | 70,162 | 69,324 | 72,183 | 71,037 | 66,372 | 68,777 | 66,192 | 68,330 | 76,879 | 67,360 | 70,427 | 61,422 | 62,735 | 49,936 | 61,418 | 65,171 | 65,422 | 146.15 | 144.40 | 150.36 | 147.97 | 138.25 | 143.26 | 137.88 | 142.33 | 160.14 | 140.31 | 146.70 | 127.94 | 130.68 | 104.02 | 127.93 | 135.75 | 136.27 |
| RT Dozers on Coal | 4.166 lb/hr | hr/yr | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 |
| Track Dozers on OB | 1.26 lb/hr | hr/yr | 310,017 | 314,631 | 329,535 | 329,670 | 288,182 | 294,266 | 269,153 | 280,882 | 349,197 | 325,385 | 354,155 | 219,096 | 67,174 | 155,058 | 197,858 | 229,337 | 406,170 | 195.31 | 198.22 | 207.61 | 207.69 | 181.55 | 185.39 | 169.57 | 176.96 | 219.99 | 204.99 | 223.12 | 138.03 | 42.32 | 97.69 | 124.65 | 144.48 | 255.89 |
| Scrapers | 3.84 lb/hr | hr/yr | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,768 | 27,121 | 23,629 | 26,150 | 27,768 | 27,768 | 53.32 | 53.32 | 53.32 | 53.32 | 53.32 | 53.32 | 53.32 | 53.32 | 53.32 | 53.32 | 53.32 | 53.32 | 52.07 | 45.37 | 50.21 | 53.32 | 53.32 |
| Drills on OB | 1.691 lb/hr | hr/yr | 56,845 | 56,007 | 58,865 | 57,720 | 53,056 | 55,460 | 52,876 | 55,014 | 63,560 | 54,043 | 57,110 | 48,108 | 49,878 | 39,558 | 49,249 | 51,855 | 52,107 | 48.06 | 47.35 | 49.77 | 48.80 | 44.86 | 46.89 | 44.71 | 46.51 | 53.74 | 45.69 | 48.29 | 40.67 | 42.17 | 33.45 | 41.64 | 43.84 | 44.06 |
| Drills on Coal | 1.691 lb/hr | hr/yr | 12,561 | 12,888 | 12,459 | 13,570 | 9,721 | 8,192 | 7,864 | 7,646 | 7,646 | 7,427 | 7,427 | 6,335 | 6,117 | 5,789 | 5,789 | 3,932 | 646 | 10.62 | 10.90 | 10.53 | 11.47 | 8.22 | 6.93 | 6.65 | 6.46 | 6.46 | 6.28 | 6.28 | 5.36 | 5.17 | 4.89 | 4.89 | 3.32 | 0.55 |
| Water Trucks | 4.166 lb/hr | hr/yr | 62,053 | 65,005 | 68,683 | 70,272 | 66,690 | 71,293 | 68,169 | 71,092 | 84,583 | 73,346 | 74,854 | 38,874 | 9,068 | 25,010 | 34,155 | 40,170 | 77,070 | 129.26 | 135.41 | 143.07 | 146.38 | 138.91 | 148.50 | 142.00 | 148.08 | 176.19 | 152.78 | 155.92 | 80.98 | 18.89 | 52.10 | 71.14 | 83.67 | 160.54 |
| Blasting on OB | 17 lb/ton | ton/yr | 257,590 | 253,163 | 266,529 | 260,362 | 237,237 | 246,125 | 235,379 | 243,836 | 276,556 | 233,964 | 241,529 | 203,820 | 199,780 | 101,745 | 206,224 | 218,260 | 218,130 | 2189.52 | 2151.88 | 2265.50 | 2213.07 | 2016.51 | 2092.06 | 2000.72 | 2072.61 | 2350.72 | 1988.69 | 2053.00 | 1732.47 | 1698.13 | 864.83 | 1752.91 | 1855.21 | 1854.10 |
| Blasting on Coal | 17 lb/ton | ton/yr | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 47,500 | 45,862 | 37,023 | 43,406 | 47,500 | 47,500 | 403.75 | 403.75 | 403.75 | 403.75 | 403.75 | 403.75 | 403.75 | 403.75 | 403.75 | 403.75 | 403.75 | 403.75 | 389.83 | 314.69 | 368.95 | 403.75 | 403.75 |
| Locomotives | 6.759 lb/engine hr | hr/yr | 224,040 | 225,285 | 225,328 | 227,027 | 221,242 | 214,465 | 214,293 | 214,393 | 214,541 | 216,782 | 217,648 | 224,112 | 225,000 | 225,000 | 225,000 | 225,000 | 225,000 | 757.14 | 761.35 | 761.50 | 767.24 | 747.69 | 724.78 | 724.20 | 724.54 | 725.04 | 732.62 | 735.54 | 757.39 | 760.39 | 760.39 | 760.39 | 760.39 | 760.39 |
| Pumps | | | | | | | | | | | | | | | | | | | | 102.23 | 102.23 | 102.23 | 102.23 | 102.23 | 102.23 | 102.23 | 102.23 | 102.23 | 102.23 | 102.23 | 102.23 | 102.23 | 102.23 | 102.23 | 102.23 | 102.23 |
| Welders | | | | | | | | | | | | | | | | | | | | 29.06 | 29.06 | 29.06 | 29.06 | 29.06 | 29.06 | 29.06 | 29.06 | 29.06 | 29.06 | 29.06 | 29.06 | 29.06 | 29.06 | 29.06 | 29.06 | 29.06 |
| Light Plants and Generators | | | | | | | | | | | | | | | | | | | | 29.31 | 29.31 | 29.31 | 29.31 | 29.31 | 29.31 | 29.31 | 29.31 | 29.31 | 29.31 | 29.31 | 29.31 | 29.31 | 29.31 | 29.31 | 29.31 | 29.31 |
| | | | | | | | | | | | | | | | | | | | | **6846.61** | **6944.78** | **7243.69** | **7264.26** | **6839.42** | **7110.20** | **6851.92** | **7070.76** | **8030.50** | **7120.29** | **7284.87** | **5255.86** | **3787.63** | **3588.81** | **5017.49** | **5459.22** | **7216.11** |

# APPENDIX 5

## Neighboring Mine $PM_{10}$ Emission Inventory

## School Creek $PM_{10}$ Emission Calculations

### East Pit

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | $yd^3$/yr | 31,800,000 | 1,537,500 | 1,768,750 | 2,902,500 | 3,371,250 | 3,675,000 | 7,054,167 | 11,058,750 | 13,145,000 | 12,901,250 | 13,936,250 | 15,516,250 | 14,693,750 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3$/yr | 16,250,000 | 16,250,000 | 15,500,000 | 16,125,000 | 18,250,000 | 19,250,000 | 22,500,000 | 25,000,000 | 20,750,000 | 20,375,000 | 21,250,000 | 22,000,000 | 20,875,000 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 213 | 14 | 19 | 27 | 31 | 33 | 62 | 85 | 97 | 95 | 102 | 113 | 107 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 133 | 133 | 133 | 133 | 133 | 133 | 133 | 133 | 133 | 133 | 133 | 133 | 133 | 0 | 0 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 330,660 | 20,555 | 12,699 | 20,839 | 24,204 | 26,385 | 61,998 | 105,407 | 130,174 | 127,760 | 110,408 | 122,925 | 145,511 | 0 | 0 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 320,513 | 348,193 | 377,331 | 406,469 | 435,606 | 464,744 | 555,798 | 579,108 | 602,418 | 625,728 | 649,038 | 672,348 | 695,659 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 0 | 0 |
| Dozers on OB[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 21,960 | 13,701 | 12,528 | 13,282 | 14,174 | 14,630 | 14,655 | 18,420 | 18,239 | 17,819 | 17,760 | 18,443 | 15,769 | 0 | 0 |
| Dozers on Reclamation[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 6,625 | 501 | 412 | 676 | 743 | 778 | 1,045 | 2,239 | 2,662 | 2,615 | 2,862 | 3,220 | 3,022 | 0 | 0 |
| Dozers & Loaders on Coal[2] | 18.6 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 9.626 lb/hr | hr/yr | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 0 | 0 |
| Graders on Coal Roads[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 6,564 | 7,073 | 7,810 | 7,810 | 8,566 | 9,080 | 9,055 | 9,323 | 9,055 | 9,348 | 9,323 | 9,055 | 9,055 | 0 | 0 |
| Graders on OB Roads[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 4,376 | 4,715 | 5,207 | 5,207 | 5,711 | 6,054 | 6,037 | 6,215 | 6,037 | 6,232 | 6,215 | 6,037 | 6,037 | 0 | 0 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 27,877 | 23,342 | 26,588 | 27,245 | 29,620 | 31,369 | 32,133 | 37,438 | 35,958 | 37,479 | 38,431 | 36,142 | 36,142 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 1,713 | 1,837 | 1,961 | 2,085 | 2,049 | 2,013 | 1,976 | 1,940 | 1,904 | 1,806 | 1,709 | 1,612 | 1,154 | 696 | 206 |
| Wind Erosion, treated acres[1] | 0.05 * 0.3 ton/acre/year | | 0.015 ton/acre/year | acres | 734 | 787 | 840 | 894 | 878 | 863 | 847 | 831 | 816 | 774 | 732 | 691 | 494 | 298 | 88 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Coal Removal[1] | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 124.50 | 6.02 | 6.92 | 11.36 | 13.20 | 14.39 | 27.62 | 43.30 | 51.46 | 50.51 | 54.56 | 60.75 | 57.53 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 73.13 | 73.13 | 69.75 | 72.56 | 82.13 | 86.63 | 101.25 | 112.50 | 93.38 | 91.69 | 95.63 | 99.00 | 93.94 | 0.00 | 0.00 |
| Scrapers[1] | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 0.00 | 0.00 |
| OB Blasting[1] | 1.20 | 0.08 | 0.11 | 0.15 | 0.17 | 0.19 | 0.35 | 0.48 | 0.55 | 0.54 | 0.58 | 0.64 | 0.60 | 0.00 | 0.00 |
| Coal Blasting[1] | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.00 | 0.00 |
| OB Haul Roads[1] | 38.88 | 2.42 | 1.49 | 2.45 | 2.85 | 3.10 | 7.29 | 12.39 | 15.31 | 15.02 | 12.98 | 14.45 | 17.11 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 67.00 | 72.79 | 78.88 | 84.97 | 91.06 | 97.15 | 116.19 | 121.06 | 125.93 | 130.80 | 135.68 | 140.55 | 145.42 | 0.00 | 0.00 |
| Coal Dumping[1] | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 0.00 | 0.00 |
| Dozers on OB[2] | 6.00 | 3.74 | 3.42 | 3.63 | 3.87 | 4.00 | 4.00 | 5.03 | 4.98 | 4.87 | 4.85 | 5.04 | 4.31 | 0.00 | 0.00 |
| Dozers on Reclamation[2] | 1.81 | 0.14 | 0.11 | 0.18 | 0.20 | 0.21 | 0.29 | 0.61 | 0.73 | 0.71 | 0.78 | 0.88 | 0.83 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 0.00 | 0.00 |
| Graders on Coal Roads[1] | 11.44 | 12.32 | 13.61 | 13.61 | 14.93 | 15.82 | 15.78 | 16.24 | 15.78 | 16.29 | 16.24 | 15.78 | 15.78 | 0.00 | 0.00 |
| Graders on OB Roads[1] | 7.63 | 8.22 | 9.07 | 9.07 | 9.95 | 10.55 | 10.52 | 10.83 | 10.52 | 10.86 | 10.83 | 10.52 | 10.52 | 0.00 | 0.00 |
| Water Trucks[1] | 1.82 | 1.52 | 1.74 | 1.78 | 1.93 | 2.05 | 2.10 | 2.45 | 2.35 | 2.45 | 2.51 | 2.36 | 2.36 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 128.48 | 137.78 | 147.08 | 156.38 | 153.67 | 150.95 | 148.23 | 145.51 | 142.78 | 135.47 | 128.17 | 120.87 | 86.53 | 52.20 | 15.45 |
| Wind Erosion, treated acres[1] | 11.01 | 11.81 | 12.61 | 13.40 | 13.17 | 12.94 | 12.71 | 12.47 | 12.24 | 11.61 | 10.99 | 10.36 | 7.42 | 4.47 | 1.32 |
| | **515.04** | **372.12** | **386.95** | **411.70** | **429.28** | **440.13** | **488.47** | **525.02** | **518.15** | **512.98** | **515.95** | **523.35** | **484.50** | **56.67** | **16.77** |

### West Pit

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 35,000,000 | 35,000,000 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | $yd^3$/yr | 33,046,575 | 35,915,000 | 47,213,333 | 47,325,833 | 52,429,167 | 55,947,500 | 77,945,000 | 52,575,000 | 49,026,667 | 50,840,000 | 44,497,500 | 42,307,500 | 45,081,667 | 90,027,292 | 47,694,956 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3$/yr | 26,301,370 | 23,750,000 | 24,166,667 | 24,833,333 | 25,333,333 | 24,833,333 | 25,000,000 | 20,833,333 | 18,833,333 | 23,416,667 | 24,750,000 | 25,000,000 | 25,000,000 | 34,270,833 | 43,718,046 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 4,614 | 9,229 | 9,229 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 248 | 261 | 331 | 332 | 367 | 390 | 531 | 365 | 340 | 355 | 314 | 299 | 318 | 614 | 337 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 133 | 133 | 133 | 133 | 133 | 133 | 133 | 133 | 133 | 133 | 133 | 133 | 133 | 233 | 233 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 257,716 | 284,532 | 251,309 | 251,908 | 279,072 | 297,799 | 424,537 | 305,880 | 321,650 | 327,253 | 275,410 | 319,464 | 334,831 | 668,652 | 354,241 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 218,531 | 168,269 | 201,049 | 221,445 | 238,928 | 256,410 | 237,835 | 262,966 | 302,302 | 301,209 | 319,784 | 350,379 | 373,689 | 782,707 | 293,196 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 20,000,000 | 35,000,000 | 35,000,000 |
| Dozers on OB[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 25,386 | 31,355 | 32,404 | 32,254 | 32,568 | 32,846 | 32,691 | 29,530 | 29,108 | 30,262 | 28,380 | 27,697 | 24,190 | 48,081 | 39,263 |
| Dozers on Reclamation[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 6,884 | 11,711 | 10,997 | 11,028 | 11,551 | 11,845 | 11,544 | 10,645 | 9,927 | 10,304 | 9,137 | 8,779 | 9,272 | 12,919 | 10,229 |
| Dozers & Loaders on Coal[2] | 18.6 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 9.626 lb/hr | hr/yr | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 4,478 | 8,955 | 8,955 |
| Graders on Coal Roads[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 6,564 | 7,073 | 7,810 | 7,810 | 8,566 | 9,080 | 9,055 | 9,323 | 9,055 | 9,348 | 9,323 | 9,055 | 9,055 | 18,161 | 18,111 |
| Graders on OB Roads[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 4,376 | 4,715 | 5,207 | 5,207 | 5,711 | 6,054 | 6,037 | 6,215 | 6,037 | 6,232 | 6,215 | 6,037 | 6,037 | 12,107 | 12,074 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 20,389 | 28,663 | 30,837 | 30,180 | 33,368 | 35,398 | 34,451 | 31,112 | 30,626 | 31,260 | 30,119 | 30,442 | 30,442 | 66,767 | 66,584 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 1,713 | 1,837 | 1,961 | 2,085 | 2,049 | 2,013 | 1,976 | 1,940 | 1,904 | 1,806 | 1,709 | 1,612 | 1,514 | 2,138 | 2,168 |
| Wind Erosion, treated acres[1] | 0.05 * 0.3 ton/acre/year | | 0.015 ton/acre/year | acres | 734 | 787 | 840 | 894 | 878 | 863 | 847 | 831 | 816 | 774 | 732 | 691 | 649 | 916 | 929 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Coal Removal[1] | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 11.03 | 11.03 |
| OB Removal (T/S)[1] | 129.38 | 140.61 | 184.84 | 185.28 | 205.26 | 219.03 | 305.15 | 205.83 | 191.94 | 199.04 | 174.21 | 165.63 | 176.49 | 352.46 | 186.73 |
| OB Removal (dragline)[1] | 118.36 | 106.88 | 108.75 | 111.75 | 114.00 | 111.75 | 112.50 | 93.75 | 84.75 | 105.38 | 111.38 | 112.50 | 112.50 | 154.22 | 196.73 |
| Scrapers[1] | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 16.08 | 16.08 |
| OB Blasting[1] | 1.39 | 1.47 | 1.86 | 1.87 | 2.06 | 2.19 | 2.99 | 2.05 | 1.91 | 2.00 | 1.76 | 1.68 | 1.79 | 3.45 | 1.89 |
| Coal Blasting[1] | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.92 | 0.92 |
| OB Haul Roads[1] | 30.30 | 33.46 | 29.55 | 29.62 | 32.82 | 35.02 | 49.92 | 35.97 | 37.82 | 38.48 | 32.38 | 37.56 | 39.37 | 78.62 | 41.65 |
| Coal Haul Roads[1] | 45.68 | 35.18 | 42.03 | 46.29 | 49.95 | 53.60 | 49.72 | 54.97 | 63.19 | 62.97 | 66.85 | 73.24 | 78.12 | 163.62 | 61.29 |
| Coal Dumping[1] | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 5.74 | 10.04 | 10.04 |
| Dozers on OB[2] | 6.94 | 8.57 | 8.85 | 8.81 | 8.90 | 8.98 | 8.93 | 8.07 | 7.95 | 8.27 | 7.76 | 7.57 | 6.61 | 13.14 | 10.73 |
| Dozers on Reclamation[2] | 1.88 | 3.20 | 3.01 | 3.01 | 3.16 | 3.24 | 3.15 | 2.91 | 2.71 | 2.82 | 2.50 | 2.40 | 2.53 | 3.53 | 2.80 |
| Dozers & Loaders on Coal[2] | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 21.55 | 43.10 | 43.10 |
| Graders on Coal Roads[1] | 11.44 | 12.32 | 13.61 | 13.61 | 14.93 | 15.82 | 15.78 | 16.24 | 15.78 | 16.29 | 16.24 | 15.78 | 15.78 | 31.64 | 31.56 |
| Graders on OB Roads[1] | 7.63 | 8.22 | 9.07 | 9.07 | 9.95 | 10.55 | 10.52 | 10.83 | 10.52 | 10.86 | 10.83 | 10.52 | 10.52 | 21.10 | 21.04 |
| Water Trucks[1] | 1.33 | 1.87 | 2.01 | 1.97 | 2.18 | 2.31 | 2.25 | 2.03 | 2.00 | 2.04 | 1.97 | 1.99 | 1.99 | 4.36 | 4.35 |
| Wind Erosion, untreated acres[1] | 128.48 | 137.78 | 147.08 | 156.38 | 153.67 | 150.95 | 148.23 | 145.51 | 142.78 | 135.47 | 128.17 | 120.87 | 113.56 | 160.33 | 162.58 |
| Wind Erosion, treated acres[1] | 11.01 | 11.81 | 12.61 | 13.40 | 13.17 | 12.94 | 12.71 | 12.47 | 12.24 | 11.61 | 10.99 | 10.36 | 9.73 | 13.74 | 13.94 |
| | **535.97** | **543.51** | **605.43** | **623.23** | **652.19** | **668.54** | **764.01** | **632.79** | **615.75** | **637.37** | **607.18** | **602.26** | **611.15** | **1081.37** | **816.45** |

### Total

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 35,000,000 | 35,000,000 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | $yd^3$/yr | 64,846,575 | 37,452,500 | 48,982,083 | 50,228,333 | 55,800,417 | 59,622,500 | 84,999,167 | 63,633,750 | 62,171,667 | 63,741,250 | 58,433,750 | 57,823,750 | 59,775,417 | 90,027,292 | 47,694,956 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3$/yr | 42,551,370 | 40,000,000 | 39,666,667 | 40,958,333 | 43,583,333 | 44,083,333 | 47,500,000 | 45,833,333 | 39,583,333 | 43,791,667 | 46,000,000 | 47,000,000 | 45,875,000 | 34,270,833 | 43,718,046 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 9,229 | 9,229 | 9,229 | 9,229 | 9,229 | 9,229 | 9,229 | 9,229 | 9,229 | 9,229 | 9,229 | 9,229 | 9,229 | 9,229 | 9,229 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 461 | 275 | 350 | 359 | 397 | 423 | 593 | 450 | 437 | 450 | 416 | 412 | 425 | 614 | 337 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 267 | 267 | 267 | 267 | 267 | 267 | 267 | 267 | 267 | 267 | 267 | 267 | 267 | 233 | 233 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 588,376 | 305,086 | 264,008 | 272,747 | 303,276 | 324,185 | 486,535 | 411,288 | 451,824 | 455,013 | 385,818 | 442,389 | 480,343 | 668,652 | 354,241 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 539,044 | 516,463 | 578,380 | 627,914 | 674,534 | 721,154 | 793,633 | 842,075 | 904,720 | 926,938 | 968,823 | 1,022,727 | 1,069,347 | 782,707 | 293,196 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 40,000,000 | 35,000,000 | 35,000,000 |
| Dozers on OB[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 47,346 | 45,056 | 44,933 | 45,536 | 46,743 | 47,476 | 47,346 | 47,953 | 47,346 | 48,081 | 46,139 | 46,139 | 39,959 | 48,081 | 39,263 |
| Dozers on Reclamation[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 13,509 | 12,212 | 11,409 | 11,704 | 12,294 | 12,623 | 12,589 | 12,884 | 12,589 | 12,919 | 11,999 | 11,999 | 12,294 | 12,919 | 10,229 |
| Dozers & Loaders on Coal[2] | 18.6 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 9.626 lb/hr | hr/yr | 8,955 | 8,955 | 8,955 | 8,955 | 8,955 | 8,955 | 8,955 | 8,955 | 8,955 | 8,955 | 8,955 | 8,955 | 8,955 | 8,955 | 8,955 |
| Graders on Coal Roads[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 13,128 | 14,145 | 15,620 | 15,620 | 17,133 | 18,161 | 18,111 | 18,646 | 18,111 | 18,697 | 18,646 | 18,111 | 18,111 | 18,161 | 18,111 |
| Graders on OB Roads[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 8,752 | 9,430 | 10,413 | 10,413 | 11,422 | 12,107 | 12,074 | 12,430 | 12,074 | 12,465 | 12,430 | 12,074 | 12,074 | 12,107 | 12,074 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 48,266 | 52,004 | 57,425 | 57,425 | 62,988 | 66,767 | 66,584 | 68,550 | 66,584 | 68,738 | 68,550 | 66,584 | 66,584 | 66,767 | 66,584 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 3,426 | 3,674 | 3,922 | 4,170 | 4,098 | 4,025 | 3,953 | 3,880 | 3,807 | 3,613 | 3,418 | 3,223 | 2,668 | 2,834 | 2,374 |
| Wind Erosion, treated acres[1] | 0.05 * 0.3 ton/acre/year | | 0.015 ton/acre/year | acres | 1,468 | 1,575 | 1,681 | 1,787 | 1,756 | 1,725 | 1,694 | 1,663 | 1,632 | 1,548 | 1,465 | 1,381 | 1,143 | 1,214 | 1,017 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Coal Removal[1] | 12.60 | 12.60 | 12.60 | 12.60 | 12.60 | 12.60 | 12.60 | 12.60 | 12.60 | 12.60 | 12.60 | 12.60 | 12.60 | 11.03 | 11.03 |
| OB Removal (T/S)[1] | 253.87 | 146.63 | 191.76 | 196.64 | 218.46 | 233.42 | 332.77 | 249.13 | 243.40 | 249.55 | 228.77 | 226.38 | 234.02 | 352.46 | 186.73 |
| OB Removal (dragline)[1] | 191.48 | 180.00 | 178.50 | 184.31 | 196.13 | 198.38 | 213.75 | 206.25 | 178.13 | 197.06 | 207.00 | 211.50 | 206.44 | 154.22 | 196.73 |
| Scrapers[1] | 16.08 | 16.08 | 16.08 | 16.08 | 16.08 | 16.08 | 16.08 | 16.08 | 16.08 | 16.08 | 16.08 | 16.08 | 16.08 | 16.08 | 16.08 |
| OB Blasting[1] | 2.59 | 1.55 | 1.97 | 2.02 | 2.24 | 2.38 | 3.34 | 2.53 | 2.46 | 2.53 | 2.34 | 2.32 | 2.39 | 3.45 | 1.89 |
| Coal Blasting[1] | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 0.92 | 0.92 |
| OB Haul Roads[1] | 69.19 | 35.87 | 31.04 | 32.07 | 35.66 | 38.12 | 57.21 | 48.36 | 53.13 | 53.50 | 45.37 | 52.02 | 56.48 | 78.62 | 41.65 |
| Coal Haul Roads[1] | 112.68 | 107.96 | 120.91 | 131.26 | 141.01 | 150.75 | 165.90 | 176.03 | 189.13 | 193.77 | 202.53 | 213.79 | 223.54 | 163.62 | 61.29 |
| Coal Dumping[1] | 11.48 | 11.48 | 11.48 | 11.48 | 11.48 | 11.48 | 11.48 | 11.48 | 11.48 | 11.48 | 11.48 | 11.48 | 11.48 | 10.04 | 10.04 |
| Dozers on OB[2] | 12.94 | 12.31 | 12.28 | 12.44 | 12.77 | 12.97 | 12.94 | 13.10 | 12.94 | 13.14 | 12.61 | 12.61 | 10.92 | 13.14 | 10.73 |
| Dozers on Reclamation[2] | 3.69 | 3.34 | 3.12 | 3.20 | 3.36 | 3.45 | 3.44 | 3.52 | 3.44 | 3.53 | 3.28 | 3.28 | 3.36 | 3.53 | 2.80 |
| Dozers & Loaders on Coal[2] | 43.10 | 43.10 | 43.10 | 43.10 | 43.10 | 43.10 | 43.10 | 43.10 | 43.10 | 43.10 | 43.10 | 43.10 | 43.10 | 43.10 | 43.10 |
| Graders on Coal Roads[1] | 22.88 | 24.65 | 27.22 | 27.22 | 29.85 | 31.64 | 31.56 | 32.49 | 31.56 | 32.58 | 32.49 | 31.56 | 31.56 | 31.64 | 31.56 |
| Graders on OB Roads[1] | 15.25 | 16.43 | 18.14 | 18.14 | 19.90 | 21.10 | 21.04 | 21.66 | 21.04 | 21.72 | 21.66 | 21.04 | 21.04 | 21.10 | 21.04 |
| Water Trucks[1] | 3.15 | 3.40 | 3.75 | 3.75 | 4.11 | 4.36 | 4.35 | 4.48 | 4.35 | 4.49 | 4.48 | 4.35 | 4.35 | 4.36 | 4.35 |
| Wind Erosion, untreated acres[1] | 256.95 | 275.56 | 294.16 | 312.75 | 307.34 | 301.91 | 296.47 | 291.02 | 285.55 | 270.95 | 256.34 | 241.73 | 200.10 | 212.52 | 178.03 |
| Wind Erosion, treated acres[1] | 22.02 | 23.62 | 25.21 | 26.81 | 26.34 | 25.88 | 25.41 | 24.94 | 24.48 | 23.22 | 21.97 | 20.72 | 17.15 | 18.22 | 15.26 |
| | **1051.00** | **915.62** | **992.38** | **1034.93** | **1081.48** | **1108.67** | **1252.48** | **1157.81** | **1133.89** | **1150.35** | **1123.13** | **1125.61** | **1095.65** | **1138.05** | **833.22** |

Constants:

| | |
|---|---|
| Number of wet days, W, (> 0.01")= | 100 |
| C = ((365-W)/365) = | 0.726 |
| Silt content of road bed, s, (%) = | 8.6 |
| Speed of OB haul trucks, S, (mph)= | 15 |
| Speed of coal haul trucks (mph)= | 20 |
| Speed of water trucks (mph)= | 10 |
| Tire correction factor, T = | 2.5 |
| Overburden Density (ton/$yd^3$) = | 1.74 |
| Dozed Overburden silt content, s, (%) = | 6.9 |
| Dozed Overburden moisture content, M, (%) = | 7.9 |
| Dozed Coal silt content, s, (%) = | 8.6 |
| Dozed Coal moisture content, M, (%) = | 10.4 |

[1] Emission Factor Equation from Wyoming Memorandum Dated January 24, 1979, Subject: Fugitive Dust Emission Factors.

[2] Emission Factor Equations from AP-42 Table 11.9-1, July 1998.

**NARM $PM_{10}$ Emission Calculations**

**North Pit**

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 56,000,000 | 56,000,000 | 56,000,000 | 44,800,000 | 44,800,000 | 44,800,000 | 44,800,000 | 44,800,000 | 87,500,000 | 87,500,000 | 87,500,000 | 87,500,000 | 87,500,000 | 140,000,000 | 140,000,000 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | $yd^3$/yr | 100,000,000 | 96,250,000 | 96,250,000 | 101,250,000 | 106,250,000 | 106,250,000 | 110,000,000 | 118,750,000 | 126,250,000 | 118,750,000 | 123,750,000 | 128,750,000 | 121,250,000 | 211,250,000 | 257,500,000 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3$/yr | 90,180,000 | 85,637,500 | 85,782,500 | 53,750,000 | 53,750,000 | 53,750,000 | 53,750,000 | 53,750,000 | 53,750,000 | 53,750,000 | 53,750,000 | 53,750,000 | 53,750,000 | 78,750,000 | 93,750,000 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 19,204 | 21,800 | 21,764 | 17,408 | 17,408 | 17,408 | 18,944 | 18,944 | 37,000 | 34,000 | 37,000 | 37,000 | 40,000 | 68,800 | 72,800 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 460 | 442 | 442 | 441 | 461 | 461 | 476 | 511 | 541 | 511 | 531 | 551 | 521 | 898 | 1,093 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 373 | 373 | 373 | 299 | 299 | 299 | 299 | 299 | 583 | 583 | 583 | 583 | 583 | 933 | 933 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 1,210,762 | 1,165,359 | 1,165,359 | 1,225,897 | 1,286,435 | 1,286,435 | 1,331,839 | 1,437,780 | 1,528,587 | 1,437,780 | 1,498,318 | 1,558,857 | 1,468,049 | 2,557,735 | 3,117,713 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 1,243,200 | 1,265,600 | 1,268,400 | 639,520 | 641,760 | 672,000 | 495,040 | 483,840 | 1,010,625 | 1,034,688 | 1,047,813 | 1,100,313 | 1,126,563 | 1,834,000 | 1,967,000 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 56,000,000 | 56,000,000 | 56,000,000 | 44,800,000 | 44,800,000 | 44,800,000 | 44,800,000 | 44,800,000 | 87,500,000 | 87,500,000 | 87,500,000 | 87,500,000 | 87,500,000 | 140,000,000 | 140,000,000 |
| Dozers on OB[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 54,263 | 54,068 | 54,345 | 43,102 | 43,209 | 43,862 | 43,667 | 41,799 | 73,712 | 70,991 | 76,848 | 70,513 | 73,795 | 120,863 | 129,621 |
| Dozers on Reclamation[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 30,014 | 25,151 | 25,005 | 25,947 | 25,308 | 25,346 | 25,081 | 25,876 | 38,011 | 37,349 | 39,918 | 43,413 | 40,134 | 71,590 | 76,863 |
| Dozers & Loaders on Coal[2] | 18.6 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 9.626 lb/hr | hr/yr | 11,887 | 11,748 | 11,630 | 9,419 | 9,344 | 9,569 | 9,569 | 10,002 | 19,535 | 19,096 | 18,656 | 19,682 | 19,648 | 34,015 | 31,643 |
| Graders on Coal Roads[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 15,525 | 15,286 | 15,222 | 11,904 | 11,776 | 12,160 | 12,160 | 12,928 | 25,250 | 24,250 | 23,750 | 25,500 | 25,500 | 45,200 | 49,200 |
| Graders on OB Roads[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 29,120 | 23,582 | 23,395 | 24,789 | 24,062 | 24,104 | 23,439 | 24,708 | 34,003 | 32,911 | 36,173 | 40,150 | 36,420 | 67,800 | 73,800 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 261,211 | 291,525 | 290,569 | 247,141 | 259,420 | 251,664 | 233,588 | 257,912 | 327,373 | 309,342 | 318,664 | 368,563 | 353,617 | 612,788 | 585,975 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 3,790 | 3,790 | 3,790 | 3,032 | 3,032 | 3,032 | 3,032 | 3,032 | 5,922 | 5,922 | 5,922 | 5,922 | 5,922 | 9,475 | 9,475 |
| Wind Erosion, treated acres[1] | 0.05 * 0.3 ton/acre/year | | 0.015 ton/acre/year | acres | 842 | 842 | 842 | 673 | 673 | 673 | 673 | 673 | 1,315 | 1,315 | 1,315 | 1,315 | 1,315 | 2,104 | 2,104 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Coal Removal[1] | 17.64 | 17.64 | 17.64 | 14.11 | 14.11 | 14.11 | 14.11 | 14.11 | 27.56 | 27.56 | 27.56 | 27.56 | 27.56 | 44.10 | 44.10 |
| OB Removal (T/S)[1] | 391.50 | 376.82 | 376.82 | 396.39 | 415.97 | 415.97 | 430.65 | 464.91 | 494.27 | 464.91 | 484.48 | 504.06 | 474.69 | 827.04 | 1008.11 |
| OB Removal (dragline)[1] | 405.81 | 385.37 | 386.02 | 241.88 | 241.88 | 241.88 | 241.88 | 241.88 | 241.88 | 241.88 | 241.88 | 241.88 | 241.88 | 354.38 | 421.88 |
| Scrapers[1] | 33.46 | 37.99 | 37.92 | 30.33 | 30.33 | 30.33 | 33.01 | 33.01 | 64.47 | 59.24 | 64.47 | 64.47 | 69.70 | 119.88 | 126.85 |
| OB Blasting[1] | 2.59 | 2.49 | 2.49 | 2.48 | 2.59 | 2.59 | 2.68 | 2.87 | 3.04 | 2.87 | 2.99 | 3.10 | 2.93 | 5.05 | 6.15 |
| Coal Blasting[1] | 1.47 | 1.47 | 1.47 | 1.18 | 1.18 | 1.18 | 1.18 | 1.18 | 2.30 | 2.30 | 2.30 | 2.30 | 2.30 | 3.68 | 3.68 |
| OB Haul Roads[1] | 142.37 | 137.03 | 137.03 | 144.15 | 151.27 | 151.27 | 156.61 | 169.06 | 179.74 | 169.06 | 176.18 | 183.30 | 172.62 | 300.76 | 366.60 |
| Coal Haul Roads[1] | 259.88 | 264.57 | 265.15 | 133.69 | 134.16 | 140.48 | 103.48 | 101.14 | 211.26 | 216.29 | 219.04 | 230.01 | 235.50 | 383.39 | 411.19 |
| Coal Dumping[1] | 16.07 | 16.07 | 16.07 | 12.85 | 12.85 | 12.85 | 12.85 | 12.85 | 25.10 | 25.10 | 25.10 | 25.10 | 25.10 | 40.16 | 40.16 |
| Dozers on OB[2] | 14.83 | 14.77 | 14.85 | 11.78 | 11.81 | 11.99 | 11.93 | 11.42 | 20.14 | 19.40 | 21.00 | 19.27 | 20.17 | 33.03 | 35.42 |
| Dozers on Reclamation[2] | 8.20 | 6.87 | 6.83 | 7.09 | 6.92 | 6.93 | 6.85 | 7.07 | 10.39 | 10.21 | 10.91 | 11.86 | 10.97 | 19.56 | 21.00 |
| Dozers & Loaders on Coal[2] | 57.21 | 56.54 | 55.97 | 45.33 | 44.97 | 46.06 | 46.06 | 48.14 | 94.02 | 91.90 | 89.79 | 94.72 | 94.56 | 163.71 | 152.29 |
| Graders on Coal Roads[1] | 27.05 | 26.64 | 26.52 | 20.74 | 20.52 | 21.19 | 21.19 | 22.53 | 44.00 | 42.25 | 41.38 | 44.43 | 44.43 | 78.76 | 85.73 |
| Graders on OB Roads[1] | 50.74 | 41.09 | 40.77 | 43.19 | 41.93 | 42.00 | 40.84 | 43.05 | 59.25 | 57.35 | 63.03 | 69.96 | 63.46 | 118.14 | 128.59 |
| Water Trucks[1] | 17.06 | 19.04 | 18.98 | 16.14 | 16.95 | 16.44 | 15.26 | 16.85 | 21.39 | 20.21 | 20.82 | 24.08 | 23.10 | 40.03 | 38.28 |
| Wind Erosion, untreated acres[1] | 284.26 | 284.26 | 284.26 | 227.40 | 227.40 | 227.40 | 227.40 | 227.40 | 444.15 | 444.15 | 444.15 | 444.15 | 444.15 | 710.64 | 710.64 |
| Wind Erosion, treated acres[1] | 12.63 | 12.63 | 12.63 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 19.73 | 19.73 | 19.73 | 19.73 | 19.73 | 31.56 | 31.56 |
| | **1742.77** | **1701.27** | **1701.41** | **1358.85** | **1384.93** | **1392.76** | **1376.08** | **1427.58** | **1962.68** | **1914.41** | **1954.80** | **2009.98** | **1972.85** | **3273.86** | **3632.24** |

**East Pit**

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 42,000,000 | 42,000,000 | 42,000,000 | 56,000,000 | 56,000,000 | 56,000,000 | 56,000,000 | 56,000,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | $yd^3$/yr | 22,986,250 | 44,875,000 | 48,750,000 | 51,250,000 | 52,500,000 | 50,000,000 | 52,500,000 | 67,500,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3$/yr | 40,940,000 | 40,620,000 | 40,731,250 | 62,500,000 | 62,500,000 | 63,750,000 | 62,500,000 | 62,500,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 14,403 | 16,350 | 16,323 | 21,760 | 21,760 | 21,760 | 23,680 | 23,680 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 119 | 207 | 222 | 247 | 252 | 243 | 252 | 312 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 280 | 280 | 280 | 373 | 373 | 373 | 373 | 373 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 19,585 | 38,234 | 41,536 | 43,666 | 44,731 | 42,601 | 44,731 | 57,511 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 829,500 | 258,300 | 258,300 | 359,800 | 418,600 | 474,600 | 467,600 | 439,600 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 42,000,000 | 42,000,000 | 42,000,000 | 56,000,000 | 56,000,000 | 56,000,000 | 56,000,000 | 56,000,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers on OB[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 36,259 | 38,590 | 39,090 | 48,476 | 48,683 | 49,323 | 49,277 | 47,315 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers on Reclamation[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 9,198 | 12,981 | 13,747 | 16,228 | 15,650 | 15,170 | 15,432 | 17,544 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dozers & Loaders on Coal[2] | 18.6 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 9.626 lb/hr | hr/yr | 8,915 | 8,811 | 8,722 | 11,774 | 11,681 | 11,962 | 11,962 | 12,503 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Graders on Coal Roads[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 11,644 | 11,465 | 11,416 | 14,880 | 14,720 | 15,200 | 15,200 | 16,160 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Graders on OB Roads[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 6,694 | 10,995 | 11,849 | 12,547 | 11,889 | 11,343 | 11,187 | 14,045 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 90,380 | 35,561 | 35,798 | 53,453 | 62,337 | 66,462 | 65,508 | 66,720 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 2,843 | 2,843 | 2,843 | 3,790 | 3,790 | 3,790 | 3,790 | 3,790 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wind Erosion, treated acres[1] | 0.05 * 0.3 ton/acre/year | | 0.015 ton/acre/year | acres | 631 | 631 | 631 | 842 | 842 | 842 | 842 | 842 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Coal Removal[1] | 13.23 | 13.23 | 13.23 | 17.64 | 17.64 | 17.64 | 17.64 | 17.64 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 89.99 | 175.69 | 190.86 | 200.64 | 205.54 | 195.75 | 205.54 | 264.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 184.23 | 182.79 | 183.29 | 281.25 | 281.25 | 286.88 | 281.25 | 281.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 25.10 | 28.49 | 28.44 | 37.92 | 37.92 | 37.92 | 41.26 | 41.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Blasting[1] | 0.67 | 1.16 | 1.25 | 1.39 | 1.42 | 1.36 | 1.42 | 1.75 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Blasting[1] | 1.10 | 1.10 | 1.10 | 1.47 | 1.47 | 1.47 | 1.47 | 1.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OB Haul Roads[1] | 2.30 | 4.50 | 4.88 | 5.13 | 5.26 | 5.01 | 5.26 | 6.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 173.40 | 54.00 | 54.00 | 75.21 | 87.51 | 99.21 | 97.75 | 91.90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coal Dumping[1] | 12.05 | 12.05 | 12.05 | 16.07 | 16.07 | 16.07 | 16.07 | 16.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers on OB[2] | 9.91 | 10.55 | 10.68 | 13.25 | 13.30 | 13.48 | 13.47 | 12.93 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers on Reclamation[2] | 2.51 | 3.55 | 3.76 | 4.43 | 4.28 | 4.15 | 4.22 | 4.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 42.91 | 42.40 | 41.98 | 56.67 | 56.22 | 57.57 | 57.57 | 60.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders on Coal Roads[1] | 20.29 | 19.98 | 19.89 | 25.93 | 25.65 | 26.49 | 26.49 | 28.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Graders on OB Roads[1] | 11.66 | 19.16 | 20.65 | 21.86 | 20.72 | 19.77 | 19.49 | 24.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Trucks[1] | 5.90 | 2.32 | 2.34 | 3.49 | 4.07 | 4.34 | 4.28 | 4.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 213.19 | 213.19 | 213.19 | 284.26 | 284.26 | 284.26 | 284.26 | 284.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wind Erosion, treated acres[1] | 9.47 | 9.47 | 9.47 | 12.63 | 12.63 | 12.63 | 12.63 | 12.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | **817.92** | **793.62** | **811.06** | **1059.23** | **1075.17** | **1083.97** | **1090.04** | **1154.13** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

**West Pit**

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 42,000,000 | 42,000,000 | 42,000,000 | 39,200,000 | 39,200,000 | 39,200,000 | 39,200,000 | 39,200,000 | 52,500,000 | 52,500,000 | 52,500,000 | 52,500,000 | 52,500,000 | 0 | 0 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | $yd^3$/yr | 76,936,250 | 92,838,750 | 89,840,000 | 75,416,250 | 85,000,000 | 95,000,000 | 105,000,000 | 105,000,000 | 98,750,000 | 91,250,000 | 71,250,000 | 67,500,000 | 82,500,000 | 0 | 0 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3$/yr | 33,057,500 | 32,525,000 | 32,670,000 | 32,497,500 | 68,750,000 | 68,750,000 | 72,500,000 | 72,500,000 | 72,500,000 | 72,500,000 | 72,500,000 | 72,500,000 | 72,500,000 | 0 | 0 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 14,403 | 16,350 | 16,323 | 15,232 | 15,232 | 15,232 | 16,576 | 16,576 | 22,200 | 20,400 | 22,200 | 22,200 | 24,000 | 0 | 0 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 330 | 393 | 381 | 323 | 386 | 426 | 468 | 468 | 443 | 413 | 333 | 318 | 378 | 0 | 0 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 280 | 280 | 280 | 261 | 261 | 261 | 261 | 261 | 350 | 350 | 350 | 350 | 350 | 0 | 0 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 931,515 | 1,124,057 | 1,087,749 | 913,112 | 1,029,148 | 1,150,224 | 1,271,300 | 1,271,300 | 1,195,628 | 1,104,821 | 862,668 | 817,265 | 998,879 | 0 | 0 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 567,000 | 602,700 | 594,300 | 735,980 | 471,380 | 530,180 | 532,140 | 531,160 | 657,563 | 702,188 | 737,625 | 581,438 | 531,563 | 0 | 0 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 42,000,000 | 42,000,000 | 42,000,000 | 39,200,000 | 39,200,000 | 39,200,000 | 39,200,000 | 39,200,000 | 52,500,000 | 52,500,000 | 52,500,000 | 52,500,000 | 52,500,000 | 0 | 0 |
| Dozers on OB[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 40,862 | 42,033 | 42,016 | 36,769 | 37,279 | 38,514 | 38,755 | 36,641 | 46,042 | 44,235 | 45,852 | 41,417 | 45,135 | 0 | 0 |
| Dozers on Reclamation[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 23,006 | 23,310 | 22,525 | 19,868 | 20,558 | 22,582 | 23,585 | 22,842 | 28,251 | 27,331 | 23,180 | 23,376 | 26,655 | 0 | 0 |
| Dozers & Loaders on Coal[2] | 18.6 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 9.626 lb/hr | hr/yr | 8,915 | 8,811 | 8,722 | 8,242 | 8,176 | 8,373 | 8,373 | 8,752 | 11,721 | 11,457 | 11,194 | 11,809 | 11,789 | 0 | 0 |
| Graders on Coal Roads[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 11,644 | 11,465 | 11,416 | 10,416 | 10,304 | 10,640 | 10,640 | 11,312 | 15,150 | 14,550 | 14,250 | 15,300 | 15,300 | 0 | 0 |
| Graders on OB Roads[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 22,404 | 22,746 | 21,837 | 18,464 | 19,249 | 21,552 | 22,374 | 21,847 | 26,597 | 25,289 | 20,827 | 21,050 | 24,780 | 0 | 0 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 159,509 | 207,076 | 200,821 | 218,481 | 201,881 | 215,937 | 230,591 | 241,918 | 238,927 | 226,083 | 200,286 | 193,862 | 208,583 | 0 | 0 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 2,843 | 2,843 | 2,843 | 2,653 | 2,653 | 2,653 | 2,653 | 2,653 | 3,553 | 3,553 | 3,553 | 3,553 | 3,553 | 0 | 0 |
| Wind Erosion, treated acres[1] | 0.05 * 0.3 ton/acre/year | | 0.015 ton/acre/year | acres | 631 | 631 | 631 | 589 | 589 | 589 | 589 | 589 | 789 | 789 | 789 | 789 | 789 | 0 | 0 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Coal Removal[1] | 13.23 | 13.23 | 13.23 | 12.35 | 12.35 | 12.35 | 12.35 | 12.35 | 16.54 | 16.54 | 16.54 | 16.54 | 16.54 | 0.00 | 0.00 |
| OB Removal (T/S)[1] | 301.21 | 363.46 | 351.72 | 295.25 | 332.78 | 371.93 | 411.08 | 411.08 | 386.61 | 357.24 | 278.94 | 264.26 | 322.99 | 0.00 | 0.00 |
| OB Removal (dragline)[1] | 148.76 | 146.36 | 147.02 | 146.24 | 309.38 | 309.38 | 326.25 | 326.25 | 326.25 | 326.25 | 326.25 | 326.25 | 326.25 | 0.00 | 0.00 |
| Scrapers[1] | 25.10 | 28.49 | 28.44 | 26.54 | 26.54 | 26.54 | 28.88 | 28.88 | 38.68 | 35.55 | 38.68 | 38.68 | 41.82 | 0.00 | 0.00 |
| OB Blasting[1] | 1.86 | 2.21 | 2.14 | 1.82 | 2.17 | 2.40 | 2.63 | 2.63 | 2.49 | 2.33 | 1.88 | 1.79 | 2.13 | 0.00 | 0.00 |
| Coal Blasting[1] | 1.10 | 1.10 | 1.10 | 1.03 | 1.03 | 1.03 | 1.03 | 1.03 | 1.38 | 1.38 | 1.38 | 1.38 | 1.38 | 0.00 | 0.00 |
| OB Haul Roads[1] | 109.53 | 132.17 | 127.91 | 107.37 | 121.01 | 135.25 | 149.49 | 149.49 | 140.59 | 129.91 | 101.44 | 96.10 | 117.46 | 0.00 | 0.00 |
| Coal Haul Roads[1] | 118.53 | 125.99 | 124.23 | 153.85 | 98.54 | 110.83 | 111.24 | 111.04 | 137.46 | 146.79 | 154.20 | 121.55 | 111.12 | 0.00 | 0.00 |
| Coal Dumping[1] | 12.05 | 12.05 | 12.05 | 11.25 | 11.25 | 11.25 | 11.25 | 11.25 | 15.06 | 15.06 | 15.06 | 15.06 | 15.06 | 0.00 | 0.00 |
| Dozers on OB[2] | 11.17 | 11.49 | 11.48 | 10.05 | 10.19 | 10.52 | 10.59 | 10.01 | 12.58 | 12.09 | 12.53 | 11.32 | 12.33 | 0.00 | 0.00 |
| Dozers on Reclamation[2] | 6.29 | 6.37 | 6.16 | 5.43 | 5.62 | 6.17 | 6.44 | 6.24 | 7.72 | 7.47 | 6.33 | 6.39 | 7.28 | 0.00 | 0.00 |
| Dozers & Loaders on Coal[2] | 42.91 | 42.40 | 41.98 | 39.67 | 39.35 | 40.30 | 40.30 | 42.12 | 56.41 | 55.14 | 53.87 | 56.83 | 56.74 | 0.00 | 0.00 |
| Graders on Coal Roads[1] | 20.29 | 19.98 | 19.89 | 18.15 | 17.95 | 18.54 | 18.54 | 19.71 | 26.40 | 25.35 | 24.83 | 26.66 | 26.66 | 0.00 | 0.00 |
| Graders on OB Roads[1] | 39.04 | 39.63 | 38.05 | 32.17 | 33.54 | 37.55 | 38.99 | 38.07 | 46.34 | 44.07 | 36.29 | 36.68 | 43.18 | 0.00 | 0.00 |
| Water Trucks[1] | 10.42 | 13.53 | 13.12 | 14.27 | 13.19 | 14.11 | 15.06 | 15.80 | 15.61 | 14.77 | 13.08 | 12.66 | 13.63 | 0.00 | 0.00 |
| Wind Erosion, untreated acres[1] | 213.19 | 213.19 | 213.19 | 198.98 | 198.98 | 198.98 | 198.98 | 198.98 | 266.49 | 266.49 | 266.49 | 266.49 | 266.49 | 0.00 | 0.00 |
| Wind Erosion, treated acres[1] | 9.47 | 9.47 | 9.47 | 8.84 | 8.84 | 8.84 | 8.84 | 8.84 | 11.84 | 11.84 | 11.84 | 11.84 | 11.84 | 0.00 | 0.00 |
| | **1084.13** | **1181.13** | **1161.18** | **1083.25** | **1242.69** | **1315.95** | **1391.93** | **1393.76** | **1508.45** | **1468.25** | **1359.63** | **1310.48** | **1392.88** | **0.00** | **0.00** |

**NARM $PM_{10}$ Emission Calculations (continued)**

**Total**

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | ton/yr | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 |
| OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | $yd^3$/yr | 199,922,500 | 233,963,750 | 234,840,000 | 227,916,250 | 243,750,000 | 251,250,000 | 267,500,000 | 291,250,000 | 225,000,000 | 210,000,000 | 195,000,000 | 196,250,000 | 203,750,000 | 211,250,000 | 257,500,000 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/$yd^3$ | | 0.009 lb/$yd^3$ | $yd^3$/yr | 164,177,500 | 158,782,500 | 159,183,750 | 148,747,500 | 185,000,000 | 186,250,000 | 188,750,000 | 188,750,000 | 126,250,000 | 126,250,000 | 126,250,000 | 126,250,000 | 126,250,000 | 78,750,000 | 93,750,000 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 48,011 | 54,501 | 54,411 | 54,400 | 54,400 | 54,400 | 59,200 | 59,200 | 59,200 | 54,400 | 59,200 | 59,200 | 64,000 | 68,800 | 72,800 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | blasts/yr | 909 | 1,042 | 1,045 | 1,011 | 1,098 | 1,129 | 1,196 | 1,291 | 984 | 924 | 864 | 869 | 899 | 898 | 1,093 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | blasts/yr | 933 | 933 | 933 | 933 | 933 | 933 | 933 | 933 | 933 | 933 | 933 | 933 | 933 | 933 | 933 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 0.588 lb/VMT | VMT/yr | 2,161,862 | 2,327,650 | 2,294,643 | 2,182,674 | 2,360,314 | 2,479,260 | 2,647,870 | 2,766,592 | 2,724,215 | 2,542,601 | 2,360,987 | 2,376,121 | 2,466,928 | 2,557,735 | 3,117,713 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 1.045 lb/VMT | VMT/yr | 2,639,700 | 2,126,600 | 2,121,000 | 1,735,300 | 1,531,740 | 1,676,780 | 1,494,780 | 1,454,600 | 1,668,188 | 1,736,875 | 1,785,438 | 1,681,750 | 1,658,125 | 1,834,000 | 1,967,000 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | ton/yr | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 | 140,000,000 |
| Dozers on OB[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 131,384 | 134,691 | 135,451 | 128,348 | 129,172 | 131,699 | 131,699 | 125,754 | 119,754 | 115,227 | 122,699 | 111,930 | 118,930 | 120,863 | 129,621 |
| Dozers on Reclamation[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | hr/yr | 62,218 | 61,442 | 61,277 | 62,043 | 61,516 | 63,098 | 64,098 | 66,262 | 66,262 | 64,680 | 63,098 | 66,789 | 66,789 | 71,590 | 76,863 |
| Dozers & Loaders on Coal[2] | 18.6 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 9.626 lb/hr | hr/yr | 29,718 | 29,369 | 29,074 | 29,436 | 29,201 | 29,904 | 29,904 | 31,256 | 31,256 | 30,553 | 29,850 | 31,491 | 31,437 | 34,015 | 31,643 |
| Graders on Coal Roads[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 38,812 | 38,216 | 38,054 | 37,200 | 36,800 | 38,000 | 38,000 | 40,400 | 40,400 | 38,800 | 38,000 | 40,800 | 40,800 | 45,200 | 49,200 |
| Graders on OB Roads[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | hr/yr | 58,218 | 57,323 | 57,082 | 55,800 | 55,200 | 57,000 | 57,000 | 60,600 | 60,600 | 58,200 | 57,000 | 61,200 | 61,200 | 67,800 | 73,800 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 50 | 0.261 lb/VMT | VMT/yr | 511,100 | 534,163 | 527,188 | 519,075 | 523,638 | 534,063 | 529,688 | 566,550 | 566,300 | 535,425 | 518,950 | 562,425 | 562,200 | 612,788 | 585,975 |
| Wind Erosion, untreated acres[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | acres | 9,475 | 9,475 | 9,475 | 9,475 | 9,475 | 9,475 | 9,475 | 9,475 | 9,475 | 9,475 | 9,475 | 9,475 | 9,475 | 9,475 | 9,475 |
| Wind Erosion, treated acres[1] | 0.05 * 0.3 ton/acre/year | | 0.015 ton/acre/year | acres | 2,104 | 2,104 | 2,104 | 2,104 | 2,104 | 2,104 | 2,104 | 2,104 | 2,104 | 2,104 | 2,104 | 2,104 | 2,104 | 2,104 | 2,104 |

| Mining Operation | Controlled $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Coal Removal[1] | 44.10 | 44.10 | 44.10 | 44.10 | 44.10 | 44.10 | 44.10 | 44.10 | 44.10 | 44.10 | 44.10 | 44.10 | 44.10 | 44.10 | 44.10 |
| OB Removal (T/S)[1] | 782.70 | 915.97 | 919.40 | 892.29 | 954.28 | 983.64 | 1047.26 | 1140.24 | 880.88 | 822.15 | 763.43 | 768.32 | 797.68 | 827.04 | 1008.11 |
| OB Removal (dragline)[1] | 738.80 | 714.52 | 716.33 | 669.36 | 832.50 | 838.13 | 849.38 | 849.38 | 568.13 | 568.13 | 568.13 | 568.13 | 568.13 | 354.38 | 421.88 |
| Scrapers[1] | 83.66 | 94.97 | 94.81 | 94.79 | 94.79 | 94.79 | 103.15 | 103.15 | 103.15 | 94.79 | 103.15 | 103.15 | 111.52 | 119.88 | 126.85 |
| OB Blasting[1] | 5.11 | 5.86 | 5.88 | 5.69 | 6.18 | 6.35 | 6.73 | 7.26 | 5.54 | 5.20 | 4.86 | 4.89 | 5.06 | 5.05 | 6.15 |
| Coal Blasting[1] | 3.68 | 3.68 | 3.68 | 3.68 | 3.68 | 3.68 | 3.68 | 3.68 | 3.68 | 3.68 | 3.68 | 3.68 | 3.68 | 3.68 | 3.68 |
| OB Haul Roads[1] | 254.21 | 273.70 | 269.82 | 256.65 | 277.54 | 291.53 | 311.36 | 325.32 | 320.33 | 298.98 | 277.62 | 279.40 | 290.08 | 300.76 | 366.60 |
| Coal Haul Roads[1] | 551.81 | 444.55 | 443.38 | 362.75 | 320.20 | 350.52 | 312.47 | 304.07 | 348.72 | 363.08 | 373.23 | 351.56 | 346.62 | 383.39 | 411.19 |
| Coal Dumping[1] | 40.16 | 40.16 | 40.16 | 40.16 | 40.16 | 40.16 | 40.16 | 40.16 | 40.16 | 40.16 | 40.16 | 40.16 | 40.16 | 40.16 | 40.16 |
| Dozers on OB[2] | 35.90 | 36.81 | 37.01 | 35.07 | 35.30 | 35.99 | 35.99 | 34.36 | 32.72 | 31.49 | 33.53 | 30.59 | 32.50 | 33.03 | 35.42 |
| Dozers on Reclamation[2] | 17.00 | 16.79 | 16.74 | 16.95 | 16.81 | 17.24 | 17.52 | 18.11 | 18.11 | 17.67 | 17.24 | 18.25 | 18.25 | 19.56 | 21.00 |
| Dozers & Loaders on Coal[2] | 143.03 | 141.35 | 139.93 | 141.67 | 140.54 | 143.92 | 143.92 | 150.43 | 150.43 | 147.05 | 143.66 | 151.56 | 151.30 | 163.71 | 152.29 |
| Graders on Coal Roads[1] | 67.63 | 66.59 | 66.31 | 64.82 | 64.12 | 66.21 | 66.21 | 70.40 | 70.40 | 67.61 | 66.21 | 71.09 | 71.09 | 78.76 | 85.73 |
| Graders on OB Roads[1] | 101.44 | 99.88 | 99.46 | 97.23 | 96.18 | 99.32 | 99.32 | 105.59 | 105.59 | 101.41 | 99.32 | 106.64 | 106.64 | 118.14 | 128.59 |
| Water Trucks[1] | 33.39 | 34.89 | 34.44 | 33.91 | 34.21 | 34.89 | 34.60 | 37.01 | 36.99 | 34.98 | 33.90 | 36.74 | 36.73 | 40.03 | 38.28 |
| Wind Erosion, untreated acres[1] | 710.64 | 710.64 | 710.64 | 710.64 | 710.64 | 710.64 | 710.64 | 710.64 | 710.64 | 710.64 | 710.64 | 710.64 | 710.64 | 710.64 | 710.64 |
| Wind Erosion, treated acres[1] | 31.56 | 31.56 | 31.56 | 31.56 | 31.56 | 31.56 | 31.56 | 31.56 | 31.56 | 31.56 | 31.56 | 31.56 | 31.56 | 31.56 | 31.56 |
| | **3644.82** | **3676.02** | **3673.65** | **3501.33** | **3702.79** | **3792.68** | **3858.05** | **3975.46** | **3471.13** | **3382.67** | **3314.43** | **3320.46** | **3365.73** | **3273.86** | **3632.24** |

Constants:

| | |
|---|---|
| Number of wet days, W, (> 0.01")= | 100 |
| C = ((365-W)/365) = | 0.726 |
| Silt content of road bed, s, (%) = | 8.6 |
| Speed of OB haul trucks, S, (mph)= | 15 |
| Speed of coal haul trucks (mph)= | 20 |
| Speed of water trucks (mph)= | 10 |
| Tire correction factor, T = | 2.5 |
| Overburden density (ton/$yd^3$) = | 1.74 |
| Dozed overburden silt content, s, (%) = | 6.9 |
| Dozed overburden moisture content, M, (%) = | 7.9 |
| Dozed coal silt content, s, (%) = | 8.6 |
| Dozed coal moisture content, M, (%) = | 10.4 |

[1] Emission Factor Equation from Wyoming Memorandum Dated January 24, 1979, Subject: Fugitive Dust Emission Factors.

[2] Emission Factor Equations from AP-42 Table 11.9-1, July 1998.

**Antelope Mine $PM_{10}$ Emission Calculations**

| Mining Operation | Operations Parameter Units | Operations Parameters by Year | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 |
| Coal Removal | ton/yr | 52,000,000 | 52,000,000 | 52,000,000 | 52,000,000 | 52,000,000 | 52,000,000 | 52,000,000 | 52,000,000 | 52,000,000 | 50,555,556 | 44,777,778 | 43,333,333 | 41,888,889 | 41,888,889 | 44,777,778 | 44,777,778 | 20,222,222 | 9,662,220 | 6,500,000 | 8,088,889 | 4,718,233 |
| Topsoil and OB Removal (T/S) | $yd^3$/yr | 142,081,013 | 161,202,994 | 178,944,893 | 217,750,532 | 207,819,633 | 208,454,959 | 216,882,155 | 218,227,163 | 209,589,378 | 216,221,243 | 218,149,459 | 219,201,508 | 218,232,745 | 216,176,340 | 209,010,065 | 210,332,592 | 132,963,425 | 32,749,102 | 20,804,006 | 21,249,637 | 9,091,752 |
| OB Removal (dragline) | $yd^3$/yr | 36,492,186 | 40,124,244 | 39,937,725 | 40,352,362 | 40,132,980 | 40,483,434 | 40,390,079 | 40,342,811 | 40,351,332 | 40,570,370 | 40,931,159 | 40,399,367 | 40,552,642 | 40,429,704 | 40,122,022 | 40,115,845 | 39,924,188 | 32,472,108 | 0 | 0 | 0 |
| Scrapers | hr/yr | 13,994 | 15,521 | 16,689 | 18,974 | 18,298 | 18,221 | 18,636 | 18,829 | 18,489 | 18,907 | 18,554 | 18,510 | 18,383 | 18,384 | 18,352 | 18,502 | 10,899 | 3,729 | 1,479 | 1,659 | 785 |
| OB Blasting | blasts/yr | 471 | 545 | 607 | 741 | 703 | 710 | 726 | 745 | 751 | 769 | 766 | 761 | 755 | 749 | 720 | 727 | 461 | 118 | 71 | 72 | 30 |
| Coal Blasting | blasts/yr | 572 | 572 | 572 | 572 | 572 | 572 | 572 | 572 | 572 | 556 | 493 | 477 | 461 | 461 | 493 | 493 | 223 | 106 | 72 | 89 | 52 |
| OB Haul Roads | VMT/yr | 2,099,077 | 2,652,091 | 3,057,701 | 3,699,832 | 3,522,987 | 3,609,249 | 3,783,758 | 3,816,682 | 3,611,103 | 3,725,264 | 3,811,689 | 3,833,533 | 3,820,542 | 3,807,180 | 3,530,537 | 3,479,581 | 2,276,030 | 666,981 | 85,452 | 140,767 | 61,314 |
| Coal Haul Roads | VMT/yr | 1,773,045 | 1,992,452 | 2,086,312 | 2,139,700 | 2,086,291 | 2,002,592 | 1,905,773 | 1,967,183 | 2,150,775 | 2,191,441 | 2,054,797 | 2,082,145 | 2,147,589 | 2,293,020 | 2,600,131 | 2,699,963 | 1,154,145 | 495,319 | 194,705 | 214,730 | 96,585 |
| Coal Dumping | ton/yr | 52,000,000 | 52,000,000 | 52,000,000 | 52,000,000 | 52,000,000 | 52,000,000 | 52,000,000 | 52,000,000 | 52,000,000 | 50,555,556 | 44,777,778 | 43,333,333 | 41,888,889 | 41,888,889 | 44,777,778 | 44,777,778 | 20,222,222 | 9,662,220 | 6,500,000 | 8,088,889 | 4,718,233 |
| Dozers and Loaders on OB | hr/yr | 92,311 | 100,656 | 104,131 | 119,178 | 114,993 | 114,820 | 118,889 | 118,761 | 111,395 | 111,940 | 114,108 | 112,070 | 110,895 | 109,703 | 106,762 | 107,199 | 76,188 | 32,105 | 7,661 | 7,874 | 3,353 |
| Dozers and Loaders on Coal | hr/yr | 41,362 | 39,450 | 37,752 | 38,071 | 39,014 | 38,690 | 38,468 | 38,617 | 39,038 | 38,263 | 34,079 | 33,122 | 32,209 | 32,436 | 35,015 | 35,248 | 15,774 | 7,589 | 4,648 | 5,749 | 3,312 |
| Graders | hr/yr | 65,732 | 73,287 | 78,935 | 89,487 | 86,207 | 85,675 | 87,475 | 88,550 | 87,196 | 89,339 | 87,792 | 87,621 | 87,121 | 87,312 | 87,381 | 88,183 | 51,604 | 17,984 | 6,351 | 7,225 | 3,386 |
| Water Trucks | VMT/yr | 231,736 | 257,041 | 276,383 | 314,229 | 303,029 | 301,761 | 308,619 | 311,829 | 306,191 | 313,122 | 307,288 | 306,554 | 304,457 | 304,474 | 303,950 | 306,425 | 180,503 | 61,758 | 24,488 | 27,461 | 12,989 |
| Wind Erosion | acres | 5,340 | 5,350 | 5,480 | 5,500 | 5,510 | 5,525 | 5,640 | 6,000 | 6,200 | 5,800 | 5,750 | 5,700 | 5,655 | 5,660 | 5,800 | 5,900 | 2,850 | 2,800 | 2,200 | 2,000 | 1,800 |

| Mining Operation | $PM_{10}$ Emission Factor Equations | Control Factor % | Uncontrolled $PM_{10}$ Emission Factor | Controlled $PM_{10}$ Emissions (tons/yr) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 |
| Coal Removal[1] | 0.003 * 0.70 * 0.3 lb/ton | | 0.001 lb/ton | 16.38 | 16.38 | 16.38 | 16.38 | 16.38 | 16.38 | 16.38 | 16.38 | 16.38 | 15.93 | 14.11 | 13.65 | 13.20 | 13.20 | 14.11 | 14.11 | 6.37 | 3.04 | 2.05 | 2.55 | 1.49 |
| Topsoil and OB Removal (T/S)[1] | 0.02 * 0.75 * 0.3 lb/ton | | 0.0045 lb/ton | 556.25 | 631.11 | 700.57 | 852.49 | 813.61 | 816.10 | 849.09 | 854.36 | 820.54 | 846.51 | 854.06 | 858.17 | 854.38 | 846.33 | 818.27 | 823.45 | 520.55 | 128.21 | 81.45 | 83.19 | 35.59 |
| OB Removal (dragline)[1] | 0.04 * 0.75 * 0.3 lb/$yd^3$ | | 0.009 lb/$yd^3$ | 164.21 | 180.56 | 179.72 | 181.59 | 180.60 | 182.18 | 181.76 | 181.54 | 181.58 | 182.57 | 184.19 | 181.80 | 182.49 | 181.93 | 180.55 | 180.52 | 179.66 | 146.12 | 0.00 | 0.00 | 0.00 |
| Scrapers[1] | 32 * C * 0.3 lb/hr | 50 | 6.970 lb/hr | 24.38 | 27.05 | 29.08 | 33.06 | 31.88 | 31.75 | 32.47 | 32.81 | 32.22 | 32.94 | 32.33 | 32.25 | 32.03 | 32.03 | 31.98 | 32.24 | 18.99 | 6.50 | 2.58 | 2.89 | 1.37 |
| OB Blasting[1] | 50 * 0.75 * 0.3 lb/blast | | 11.250 lb/blast | 2.65 | 3.07 | 3.42 | 4.17 | 3.95 | 3.99 | 4.08 | 4.19 | 4.23 | 4.33 | 4.31 | 4.28 | 4.25 | 4.21 | 4.05 | 4.09 | 2.59 | 0.67 | 0.40 | 0.40 | 0.17 |
| Coal Blasting[1] | 35 * 0.75 * 0.3 lb/blast | | 7.875 lb/blast | 2.25 | 2.25 | 2.25 | 2.25 | 2.25 | 2.25 | 2.25 | 2.25 | 2.25 | 2.19 | 1.94 | 1.88 | 1.82 | 1.82 | 1.94 | 1.94 | 0.88 | 0.42 | 0.28 | 0.35 | 0.20 |
| OB Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 0.588 lb/VMT | 246.82 | 311.85 | 359.55 | 435.05 | 414.26 | 424.40 | 444.92 | 448.79 | 424.62 | 438.04 | 448.21 | 450.77 | 449.25 | 447.68 | 415.15 | 409.15 | 267.63 | 78.43 | 10.05 | 16.55 | 7.21 |
| Coal Haul Roads[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 60 | 1.045 lb/VMT | 370.64 | 416.51 | 436.13 | 447.29 | 436.13 | 418.63 | 398.39 | 411.23 | 449.61 | 458.11 | 429.54 | 435.26 | 448.94 | 479.34 | 543.54 | 564.41 | 241.27 | 103.54 | 40.70 | 44.89 | 20.19 |
| Coal Dumping[1] | 0.017 * 0.75 * 0.3 lb/ton | 85 | 0.004 lb/ton | 14.92 | 14.92 | 14.92 | 14.92 | 14.92 | 14.92 | 14.92 | 14.92 | 14.92 | 14.50 | 12.85 | 12.43 | 12.02 | 12.02 | 12.85 | 12.85 | 5.80 | 2.77 | 1.86 | 2.32 | 1.35 |
| Dozers and Loaders on OB[2] | 1.0 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 0.547 lb/hr | 25.23 | 27.51 | 28.46 | 32.57 | 31.42 | 31.38 | 32.49 | 32.45 | 30.44 | 30.59 | 31.18 | 30.62 | 30.30 | 29.98 | 29.17 | 29.29 | 20.82 | 8.77 | 2.09 | 2.15 | 0.92 |
| Dozers and Loaders on Coal[2] | 18.6 * $s^{1.5}/M^{1.4}$ * 0.75 * C lb/hr | | 9.626 lb/hr | 199.06 | 189.86 | 181.69 | 183.23 | 187.77 | 186.21 | 185.14 | 185.86 | 187.88 | 184.15 | 164.01 | 159.41 | 155.02 | 156.11 | 168.52 | 169.64 | 75.92 | 36.52 | 22.37 | 27.67 | 15.94 |
| Graders[1] | 32 * C *0.3 lb/hr | 50 | 6.970 lb/hr | 114.54 | 127.70 | 137.54 | 155.93 | 150.21 | 149.29 | 152.42 | 154.29 | 151.94 | 155.67 | 152.97 | 152.68 | 151.81 | 152.14 | 152.26 | 153.66 | 89.92 | 31.34 | 11.07 | 12.59 | 5.90 |
| Water Trucks[1] | 0.81 * s * $(S/30)^2$ * C * 0.62T * 0.3 lb/VMT | 50 | 0.261 lb/VMT | 15.14 | 16.79 | 18.06 | 20.53 | 19.80 | 19.71 | 20.16 | 20.37 | 20.00 | 20.46 | 20.07 | 20.03 | 19.89 | 19.89 | 19.86 | 20.02 | 11.79 | 4.03 | 1.60 | 1.79 | 0.85 |
| Wind Erosion[1] | 0.25 * 0.3 ton/acre/year | | 0.075 ton/acre/year | 400.50 | 401.25 | 411.00 | 412.50 | 413.25 | 414.38 | 423.00 | 450.00 | 465.00 | 435.00 | 431.25 | 427.50 | 424.13 | 424.50 | 435.00 | 442.50 | 213.75 | 210.00 | 165.00 | 150.00 | 135.00 |
| | | | | **2152.98** | **2366.81** | **2518.76** | **2791.96** | **2716.43** | **2711.56** | **2757.47** | **2809.45** | **2801.60** | **2820.98** | **2781.02** | **2780.73** | **2779.50** | **2801.17** | **2827.24** | **2857.87** | **1655.94** | **760.38** | **341.50** | **347.35** | **226.18** |

Constants:

| | |
|---|---|
| Number of wet days, W, (> 0.01")= | 100 |
| C = ((365-W)/365) = | 0.726 |
| Silt content of road bed, s, (%) = | 8.6 |
| Speed of OB haul trucks, S, (mph)= | 15 |
| Speed of coal haul trucks (mph)= | 20 |
| Speed of water trucks (mph)= | 10 |
| Tire correction factor, T = | 2.5 |
| Overburden Density (ton/$yd^3$) = | 1.74 |
| Dozed Overburden silt content, s, (%) = | 6.9 |
| Dozed Overburden moisture content, M, (%) = | 7.9 |
| Dozed Coal silt content, s, (%) = | 8.6 |
| Dozed Coal moisture content, M, (%) = | 10.4 |

[1] Emission Factor Equation from Wyoming Memorandum Dated January 24, 1979, Subject: Fugitive Dust Emission Factors.

[2] Emission Factor Equations from AP-42 Table 11.9-1, July 1998.

# APPENDIX 6

## Neighboring Mine $NO_X$ Emission Inventory

## WYOMING $NO_X$ EMISSION CALCULATIONS

Title: School Creek
Pit: All
Production Parameters:

| Year | | OB Haul Truck Hours | Coal Haul Truck Hours | Grader Hours on OB | Graders Hours on Coal | Wheeled Loader Hours | RT Dozer Hours on OB | RT Dozer Hours on Coal | Track Dozer Hours on OB | Track Dozer Hours on Reclaim | Scraper Hours | Drill Hours on OB | Drill Hours on Coal | Water Truck Hours | OB Blasting Tons of Explosives | Coal Blasting Tons of Explosives | Locomotive Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2018 | West Pit | 116,257 | 23,115 | 6,508 | 9,762 | 2,348 | 8,649 | 3,622 | 32,209 | 13,785 | 5,768 | 9,858 | 3,254 | 4,181 | 18,509 | 4,200 | NA |
| | East Pit | 9,617 | 42,428 | 6,508 | 9,762 | 2,348 | 8,649 | 3,622 | 8,493 | 845 | 5,768 | 2,599 | 3,254 | 1,561 | 2,955 | 4,200 | NA |
| | Total | 125,875 | 65,542 | 13,016 | 19,525 | 4,695 | 17,299 | 7,245 | 40,702 | 14,630 | 11,536 | 12,458 | 6,507 | 5,743 | 21,464 | 8,400 | 75,168 |

| Vehicle Type | Emission Factor (lb/operating hr) | | $NO_X$ Emission Rate g/sec | TPY |
|---|---|---|---|---|
| OB Haul Trucks | 4.17 | | 7.54 | 262.20 |
| Coal Haul Trucks | 4.17 | | 3.93 | 136.52 |
| Graders on OB | 0.71 | | 0.13 | 4.64 |
| Graders on Coal | 0.71 | | 0.20 | 6.96 |
| Wheeled Loaders | 1.89 | | 0.13 | 4.44 |
| RT Dozers on OB | 4.17 | | 1.04 | 36.03 |
| RT Dozers on Coal | 4.17 | | 0.43 | 15.09 |
| Track Dozers on OB | 1.26 | | 0.74 | 25.64 |
| Track Dozers on Reclaim | 1.26 | | 0.27 | 9.22 |
| Scrapers | 3.84 | | 0.64 | 22.15 |
| Drills on OB | 1.69 | | 0.30 | 10.53 |
| Drills on Coal | 1.69 | | 0.16 | 5.50 |
| Water Trucks | 4.17 | | 0.34 | 11.96 |
| OB Blasting | 17 | (lb/ton) | 5.25 | 182.45 |
| Coal Blasting | 17 | (lb/ton) | 2.05 | 71.40 |
| Locomotives | 6.759 | (lb/locomotive-hour) | 7.31 | 254.03 |
| Pumps | | | 0.32 | 11.10 |
| Welders | | | 0.25 | 8.73 |
| Light Plants and Generators | | | 0.93 | 32.43 |
| | | Total | 31.96 | 1111.03 |

## WYOMING $NO_X$ EMISSION CALCULATIONS

Title: School Creek
Pit: All
Production Parameters:

| Year | | OB Haul Truck Hours | Coal Haul Truck Hours | Grader Hours on OB | Graders Hours on Coal | Wheeled Loader Hours | RT Dozer Hours on OB | RT Dozer Hours on Coal | Track Dozer Hours on OB | Track Dozer Hours on Reclaim | Scraper Hours | Drill Hours on OB | Drill Hours on Coal | Water Truck Hours | OB Blasting Tons of Explosives | Coal Blasting Tons of Explosives | Locomotive Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2023 | West Pit | 106,677 | 24,090 | 7,546 | 11,319 | 2,348 | 9,856 | 3,622 | 27,144 | 12,409 | 5,768 | 8,319 | 3,254 | 3,923 | 17,584 | 4,200 | NA |
| | East Pit | 43,173 | 48,006 | 7,546 | 11,319 | 2,348 | 9,856 | 3,622 | 13,558 | 3,327 | 5,768 | 4,155 | 3,254 | 2,735 | 5,496 | 4,200 | NA |
| | Total | 149,851 | 72,097 | 15,092 | 22,639 | 4,695 | 19,712 | 7,245 | 40,702 | 15,736 | 11,536 | 12,474 | 6,507 | 6,658 | 23,080 | 8,400 | 75,168 |

| Vehicle Type | Emission Factor (lb/operating hr) | | $NO_X$ Emission Rate g/sec | TPY |
|---|---|---|---|---|
| OB Haul Trucks | 4.17 | | 8.98 | 312.14 |
| Coal Haul Trucks | 4.17 | | 4.32 | 150.18 |
| Graders on OB | 0.71 | | 0.15 | 5.38 |
| Graders on Coal | 0.71 | | 0.23 | 8.07 |
| Wheeled Loaders | 1.89 | | 0.13 | 4.44 |
| RT Dozers on OB | 4.17 | | 1.18 | 41.06 |
| RT Dozers on Coal | 4.17 | | 0.43 | 15.09 |
| Track Dozers on OB | 1.26 | | 0.74 | 25.64 |
| Track Dozers on Reclaim | 1.26 | | 0.29 | 9.91 |
| Scrapers | 3.84 | | 0.64 | 22.15 |
| Drills on OB | 1.69 | | 0.30 | 10.55 |
| Drills on Coal | 1.69 | | 0.16 | 5.50 |
| Water Trucks | 4.17 | | 0.40 | 13.87 |
| OB Blasting | 17 | (lb/ton) | 5.64 | 196.18 |
| Coal Blasting | 17 | (lb/ton) | 2.05 | 71.40 |
| Locomotives | 6.759 | (lb/locomotive-hour) | 7.31 | 254.03 |
| Pumps | | | 0.32 | 11.10 |
| Welders | | | 0.25 | 8.73 |
| Light Plants and Generators | | | 0.93 | 32.43 |
| | | Total | 34.46 | 1197.85 |

## WYOMING $NO_X$ EMISSION CALCULATIONS

Title: NARM
Pit: All
Production Parameters:

| Year | | OB Haul Truck Hours | Coal Haul Truck Hours | Grader Hours on OB | Graders Hours on Coal | Wheeled Loader Hours | RT Dozer Hours on OB | RT Dozer Hours on Coal | Track Dozer Hours on OB | Track Dozer Hours on Reclaim | Scraper Hours | Drill Hours on OB | Drill Hours on Coal | Water Truck Hours | OB Blasting Tons of Explosives | Coal Blasting Tons of Explosives | Locomotive Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2018 | West Pit | 91,823 | 47,600 | 23,080 | 13,020 | 2,852 | 28,850 | 8,138 | 39,200 | 4,550 | 19,040 | 6,856 | 3,866 | 21,848 | 43,526 | 9,800 | NA |
| | North Pit | 123,277 | 54,400 | 30,986 | 14,880 | 3,259 | 38,732 | 9,300 | 44,800 | 5,200 | 21,760 | 9,847 | 4,418 | 24,714 | 62,518 | 11,200 | NA |
| | East Pit | 62,400 | 68,000 | 15,684 | 18,600 | 4,074 | 19,605 | 11,625 | 56,000 | 6,500 | 27,200 | 7,227 | 5,523 | 5,345 | 45,881 | 14,000 | NA |
| | Total | 277,500 | 170,000 | 69,750 | 46,500 | 10,185 | 87,188 | 29,063 | 140,000 | 16,250 | 68,000 | 23,930 | 13,808 | 51,908 | 151,925 | 35,000 | 187,895 |

| Vehicle Type | Emission Factor (lb/operating hr) | | $NO_X$ Emission Rate g/sec | TPY |
|---|---|---|---|---|
| OB Haul Trucks | 4.17 | | 16.63 | 578.03 |
| Coal Haul Trucks | 4.17 | | 10.19 | 354.11 |
| Graders on OB | 0.71 | | 0.72 | 24.87 |
| Graders on Coal | 0.71 | | 0.48 | 16.58 |
| Wheeled Loaders | 1.89 | | 0.28 | 9.62 |
| RT Dozers on OB | 4.17 | | 5.22 | 181.61 |
| RT Dozers on Coal | 4.17 | | 1.74 | 60.54 |
| Track Dozers on OB | 1.26 | | 2.54 | 88.20 |
| Track Dozers on Reclaim | 1.26 | | 0.29 | 10.24 |
| Scrapers | 3.84 | | 3.76 | 130.56 |
| Drills on OB | 1.69 | | 0.58 | 20.23 |
| Drills on Coal | 1.69 | | 0.34 | 11.67 |
| Water Trucks | 4.17 | | 3.11 | 108.12 |
| OB Blasting | 17 | (lb/ton) | 37.15 | 1291.37 |
| Coal Blasting | 17 | (lb/ton) | 8.56 | 297.50 |
| Locomotives | 6.759 | (lb/locomotive-hour) | 18.27 | 634.99 |
| Pumps | | | 0.34 | 11.69 |
| Welders | | | 0.40 | 13.88 |
| Light Plants and Generators | | | 3.49 | 121.34 |
| | | Total | 114.06 | 3965.16 |

## WYOMING $NO_X$ EMISSION CALCULATIONS

Title: NARM
Pit: All
Production Parameters:

| Year | | OB Haul Truck Hours | Coal Haul Truck Hours | Grader Hours on OB | Graders Hours on Coal | Wheeled Loader Hours | RT Dozer Hours on OB | RT Dozer Hours on Coal | Track Dozer Hours on OB | Track Dozer Hours on Reclaim | Scraper Hours | Drill Hours on OB | Drill Hours on Coal | Water Truck Hours | OB Blasting Tons of Explosives | Coal Blasting Tons of Explosives | Locomotive Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2023 | West Pit | 146,479 | 58,594 | 33,246 | 18,938 | 3,792 | 41,557 | 11,836 | 47,813 | 6,094 | 27,750 | 14,568 | 5,178 | 23,893 | 67,098 | 13,125 | NA |
| | North Pit | 187,271 | 97,656 | 42,504 | 31,563 | 6,320 | 53,130 | 19,727 | 79,688 | 10,156 | 46,250 | 15,312 | 8,630 | 32,737 | 70,527 | 21,875 | NA |
| | Total | 333,750 | 156,250 | 75,750 | 50,500 | 10,113 | 94,688 | 31,563 | 127,500 | 16,250 | 74,000 | 29,880 | 13,808 | 56,630 | 137,625 | 35,000 | 187,895 |

| Vehicle Type | Emission Factor (lb/operating hr) | | $NO_X$ Emission Rate g/sec | TPY |
|---|---|---|---|---|
| OB Haul Trucks | 4.17 | | 20.00 | 695.20 |
| Coal Haul Trucks | 4.17 | | 9.36 | 325.47 |
| Graders on OB | 0.71 | | 0.78 | 27.00 |
| Graders on Coal | 0.71 | | 0.52 | 18.00 |
| Wheeled Loaders | 1.89 | | 0.27 | 9.56 |
| RT Dozers on OB | 4.17 | | 5.67 | 197.23 |
| RT Dozers on Coal | 4.17 | | 1.89 | 65.74 |
| Track Dozers on OB | 1.26 | | 2.31 | 80.33 |
| Track Dozers on Reclaim | 1.26 | | 0.29 | 10.24 |
| Scrapers | 3.84 | | 4.09 | 142.08 |
| Drills on OB | 1.69 | | 0.73 | 25.26 |
| Drills on Coal | 1.69 | | 0.34 | 11.67 |
| Water Trucks | 4.17 | | 3.39 | 117.96 |
| OB Blasting | 17 | (lb/ton) | 33.65 | 1169.81 |
| Coal Blasting | 17 | (lb/ton) | 8.56 | 297.50 |
| Locomotives | 6.759 | (lb/locomotive-hour) | 18.27 | 634.99 |
| Pumps | | | 0.34 | 11.69 |
| Welders | | | 0.40 | 13.88 |
| Light Plants and Generators | | | 3.49 | 121.34 |
| | | Total | 114.35 | 3974.97 |

## WYOMING $NO_X$ EMISSION CALCULATIONS

Title: Antelope Mine
Pit: All
Production Parameters:

| Year | | OB Haul Truck Hours | Coal Haul Truck Hours | Grader Hours | Wheeled Loader Hours on OB | Wheeled Loader Hours on Coal | RT Dozer Hours on OB | RT Dozer Hours on Coal | Track Dozer Hours on OB | Track Dozer Hours on Coal | Scraper Hours | Drill Hours on OB | Drill Hours on Coal | Water Truck Hours | OB Blasting Tons of Explosives | Coal Blasting Tons of Explosives | Locomotive Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2018 | Pit 1 | 38,978 | 35,984 | 27,991 | 504 | 414 | 4,091 | 5,675 | 11,009 | 6,496 | 5,062 | 5,058 | 1,106 | 5,035 | 22,414 | 4,021 | NA |
| | Pit 2 | 167,301 | 61,344 | 47,717 | 2,631 | 651 | 21,366 | 8,918 | 57,496 | 10,207 | 10,946 | 10,935 | 1,738 | 12,680 | 48,463 | 6,319 | NA |
| | Pit 4 | 40,691 | 17,714 | 13,779 | 713 | 188 | 5,789 | 2,575 | 15,578 | 2,948 | 2,966 | 2,963 | 502 | 3,234 | 13,131 | 1,825 | NA |
| | Total | 246,970 | 115,042 | 89,487 | 3,847 | 1,253 | 31,247 | 17,168 | 84,084 | 19,651 | 18,974 | 18,956 | 3,345 | 20,949 | 84,008 | 12,165 | 19,077 |

| Vehicle Type | Emission Factor (lb/operating hr) | | $NO_X$ Emission Rate g/sec | TPY |
|---|---|---|---|---|
| OB Haul Trucks | 4.17 | | 14.80 | 514.44 |
| Coal Haul Trucks | 4.17 | | 6.89 | 239.63 |
| Graders | 0.71 | | 0.92 | 31.90 |
| Wheeled Loaders on OB | 1.89 | | 0.10 | 3.64 |
| Wheeled Loaders on Coal | 1.89 | | 0.03 | 1.18 |
| RT Dozers on OB | 4.17 | | 1.87 | 65.09 |
| RT Dozers on Coal | 4.17 | | 1.03 | 35.76 |
| Track Dozers on OB | 1.26 | | 1.52 | 52.97 |
| Track Dozers on Coal | 1.26 | | 0.36 | 12.38 |
| Scrapers | 3.84 | | 1.05 | 36.43 |
| Drills on OB | 1.69 | | 0.46 | 16.03 |
| Drills on Coal | 1.69 | | 0.08 | 2.83 |
| Water Trucks | 4.17 | | 1.26 | 43.64 |
| OB Blasting | 17 | (lb/ton) | 20.54 | 714.07 |
| Coal Blasting | 17 | (lb/ton) | 2.97 | 103.41 |
| Locomotives | 6.759 | (lb/locomotive-hour) | 1.85 | 64.47 |
| Pumps | | | 1.46 | 50.89 |
| Welders | | | 0.15 | 5.07 |
| Light Plants and Generators | | | 0.49 | 17.00 |
| Compressors | | | 0.03 | 0.93 |
| | | Total | 57.87 | 2011.75 |

## WYOMING $NO_X$ EMISSION CALCULATIONS

Title: Antelope Mine
Pit: All
Production Parameters:

| Year | | OB Haul Truck Hours | Coal Haul Truck Hours | Grader Hours | Wheeled Loader Hours on OB | Wheeled Loader Hours on Coal | RT Dozer Hours on OB | RT Dozer Hours on Coal | Track Dozer Hours on OB | Track Dozer Hours on Coal | Scraper Hours | Drill Hours on OB | Drill Hours on Coal | Water Truck Hours | OB Blasting Tons of Explosives | Coal Blasting Tons of Explosives | Locomotive Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2023 | Pit 1 | 39,925 | 32,704 | 24,816 | 527 | 341 | 4,323 | 4,665 | 11,102 | 5,621 | 5,205 | 5,219 | 891 | 4,684 | 18,987 | 3,312 | NA |
| | Pit 2 | 200,720 | 80,986 | 61,451 | 3,154 | 898 | 25,859 | 12,287 | 66,406 | 14,803 | 13,280 | 13,316 | 2,345 | 15,658 | 48,442 | 8,722 | NA |
| | Pit 4 | 52 | 1,224 | 929 | 1 | 14 | 6 | 186 | 16 | 224 | 3 | 3 | 35 | 71 | 12 | 132 | NA |
| | Total | 240,696 | 114,914 | 87,196 | 3,682 | 1,252 | 30,189 | 17,138 | 77,524 | 20,648 | 18,489 | 18,538 | 3,271 | 20,413 | 67,441 | 12,165 | 19,077 |

| Vehicle Type | Emission Factor (lb/operating hr) | | $NO_X$ Emission Rate g/sec | TPY |
|---|---|---|---|---|
| OB Haul Trucks | 4.17 | | 14.42 | 501.37 |
| Coal Haul Trucks | 4.17 | | 6.89 | 239.37 |
| Graders | 0.71 | | 0.89 | 31.09 |
| Wheeled Loaders on OB | 1.89 | | 0.10 | 3.48 |
| Wheeled Loaders on Coal | 1.89 | | 0.03 | 1.18 |
| RT Dozers on OB | 4.17 | | 1.81 | 62.88 |
| RT Dozers on Coal | 4.17 | | 1.03 | 35.70 |
| Track Dozers on OB | 1.26 | | 1.40 | 48.84 |
| Track Dozers on Coal | 1.26 | | 0.37 | 13.01 |
| Scrapers | 3.84 | | 1.02 | 35.50 |
| Drills on OB | 1.69 | | 0.45 | 15.67 |
| Drills on Coal | 1.69 | | 0.08 | 2.77 |
| Water Trucks | 4.17 | | 1.22 | 42.52 |
| OB Blasting | 17 | (lb/ton) | 16.49 | 573.25 |
| Coal Blasting | 17 | (lb/ton) | 2.97 | 103.41 |
| Locomotives | 6.759 | (lb/locomotive-hour) | 1.85 | 64.47 |
| Pumps | | | 1.46 | 50.89 |
| Welders | | | 0.15 | 5.07 |
| Light Plants and Generators | | | 0.49 | 17.00 |
| Compressors | | | 0.03 | 0.93 |
| | | Total | 53.17 | 1848.39 |

# APPENDIX 7

## Regional $NO_X$ Emission Inventory

# Mainline Train $NO_X$ Sources

| Segment Name | Operation Mode | UTM Easting Begin (m) | UTM Northing Begin (m) | UTM Easting End (m) | UTM Northing End (m) | Elevation (m) | Height (m) | NAAQS 2000 Emissions (TPY) | NAAQS 2000 Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|
| T069 | Line | 471053 | 4852249 | 470977 | 4842531 | 1463 | 10 | 127 | 3.65 |
| T070 | Line | 470977 | 4842531 | 470910 | 4832402 | 1465 | 10 | 341 | 9.81 |
| T071 | Line | 470910 | 4832402 | 469850 | 4825284 | 1471 | 10 | 277 | 7.97 |
| T072 | Line | 469850 | 4825284 | 471659 | 4818200 | 1448 | 10 | 282 | 8.10 |
| T073 | Line | 471659 | 4818200 | 475464 | 4815373 | 1419 | 10 | 183 | 5.25 |
| T074 | Line | 475464 | 4815373 | 473129 | 4810362 | 1413 | 10 | 304 | 8.75 |
| T075 | Line | 473129 | 4810362 | 470991 | 4805155 | 1455 | 10 | 346 | 9.96 |
| T091 | Line | 470965 | 4840950 | 474454 | 4840947 | 1442 | 10 | 87 | 2.50 |
| | | | | | | | **Total** | **1,946** | **TPY** |

# Power Plant $NO_X$ Point Sources

| Source ID | Company | Facility | UTM Easting (m) | UTM Northing (m) | Elev (m) | Emission Rate (TPY) | Emission Rate (g/s) | Stack Ht (m) | Stack Temp (K) | Stack Vel (m/s) | Stack Dia (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NSimp1 | Black Hills Corporation | Neil Simpson I | 469090 | 4903545 | 1351 | 963 | 27.689 | 76.2 | 415.9 | 21.31 | 1.83 |
| NSimp2 | Black Hills Corporation | Neil Simpson II | 469365 | 4903397 | 1348 | 1,310 | 37.674 | 89.9 | 345.9 | 27.80 | 2.82 |
| NSimp3 | Black Hills Corporation | Neil Simpson II | 469858 | 4903365 | 1346 | 149 | 4.284 | 18.3 | 722.0 | 46.94 | 2.74 |
| NSimp4 | Black Hills Corporation | Neil Simpson II | 469858 | 4903346 | 1346 | 149 | 4.284 | 18.3 | 722.0 | 46.94 | 2.74 |
| Wyod1 | PacifiCorp | Wyodak Plant | 469389 | 4903687 | 1348 | 5,926 | 170.478 | 121.9 | 333.2 | 22.56 | 6.10 |
| WYG1 | Black Hills Corporation | WYGEN Station | 469370 | 4903475 | 1346 | 736 | 21.168 | 89.9 | 341.5 | 27.43 | 2.82 |
| WYG2 | Black Hills Corporation | WYGEN Station | 469603 | 4904065 | 1343 | 399 | 11.466 | 121.0 | 344.3 | 27.64 | 3.12 |
| WYG3 | Black Hills Corporation | WYGEN Station | 469726 | 4904066 | 1347 | 285 | 8.190 | 121.0 | 344.3 | 27.64 | 3.12 |
| DryFrk1 | Basin Electric Corporation | Dry Fork Station | 463430 | 4915090 | 1291 | 833 | 23.953 | 152.4 | 350.0 | 24.24 | 5.94 |
| 2Elk_BLR | Two Elk Generation Partners | Two Elk Facility | 482580 | 4833718 | 1440 | 1,167 | 33.565 | 103.6 | 344.3 | 27.43 | 4.94 |
| 2Elk_AUX | Two Elk Generation Partners | Two Elk Facility | 482580 | 4833718 | 1440 | 2 | 0.066 | 103.6 | 491.5 | 1.65 | 4.94 |
| 2Elk_TRB | Two Elk Generation Partners | Two Elk Facility | 482700 | 4833680 | 1440 | 24 | 0.693 | 9.8 | 733.2 | 21.95 | 5.49 |
| 2Elk_EG1 | Two Elk Generation Partners | Two Elk Facility | 482490 | 4833666 | 1440 | 8 | 0.242 | 7.0 | 706.6 | 30.58 | 0.40 |
| 2Elk_EG2 | Two Elk Generation Partners | Two Elk Facility | 482490 | 4833666 | 1440 | 8 | 0.242 | 7.0 | 706.6 | 30.58 | 0.40 |
| 2Elk_PMP | Two Elk Generation Partners | Two Elk Facility | 482490 | 4833666 | 1440 | 3 | 0.083 | 7.0 | 706.6 | 30.58 | 0.21 |
| | | | | | **Total** | **11,961** | **TPY** | | | | |

# Highway $NO_X$ Sources

| Road Segment | Segment IDs | UTM Easting Begin (m) | UTM Northing Begin (m) | Elev (m) | UTM Easting End (m) | UTM Northing End (m) | Emissions (kg/m year) | Seg Length (m) | NAAQS 2000 Emissions (kg/yr) | NAAQS 2000 Emissions (TPY) | NAAQS 2000 Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Wright FAP 42 | RD001-RD027 | 461694 | 4845954 | 1502 | 462568 | 4853913 | 3.3 | 8006.8 | 26422.4 | 29.1 | 0.838 |
| WY59, Douglas FAP 58 | RD028-RD054 | 461913 | 4838019 | 1533 | 461694 | 4845954 | 1.3 | 7938.0 | 10319.4 | 11.4 | 0.327 |
| WY59, Douglas FAP 58 | RD055-RD081 | 461949 | 4830043 | 1505.5 | 461913 | 4838019 | 1.3 | 7976.1 | 10368.9 | 11.4 | 0.329 |
| WY59, Douglas FAP 58 | RD082-RD107 | 462947 | 4822343 | 1502 | 461949 | 4830043 | 1.3 | 7764.4 | 10093.7 | 11.1 | 0.320 |
| WY59, Douglas FAP 58 | RD108-RD134 | 463981 | 4814400 | 1484 | 462947 | 4822343 | 1.3 | 8010.0 | 10413.0 | 11.5 | 0.330 |
| WY59, Douglas FAP 58 | RD135-RD161 | 467311 | 4807179 | 1464 | 463981 | 4814400 | 1.3 | 7951.8 | 10337.3 | 11.4 | 0.328 |
| WY59, Douglas FAP 58 | RD162-RD188 | 469437 | 4799486 | 1470 | 467311 | 4807179 | 1.3 | 7981.4 | 10375.8 | 11.4 | 0.329 |
| I-25, FAI 25 | RD189-RD215 | 454777 | 4842118 | 1555 | 461694 | 4845954 | 0.6 | 7909.5 | 4745.7 | 5.2 | 0.150 |
| I-25, FAI 25 | RD216-RD242 | 448813 | 4836720 | 1572 | 454777 | 4842118 | 0.6 | 8044.1 | 4826.5 | 5.3 | 0.153 |
| | | | | | | | | | **Total:** | **107.9** | **TPY** |

## Urban $NO_X$ Sources

| Urban Area | County | UTM Zone | Elev. (m) | NE Corner E-UTM | NE Corner N-UTM | NW Corner E-UTM | NW Corner N-UTM | SW Corner E-UTM | SW Corner N-UTM | SE Corner E-UTM | SE Corner N-UTM | Area (sq km) | NAAQS 2000 NOx (TPY) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wright | Campbell | 13 | 1524 | 461803 | 4845486 | 457753 | 4845486 | 457753 | 4842599 | 461803 | 4842599 | 11.7 | 21 |

# Regional $NO_x$ Point Sources

| Source ID | UTM Easting | UTM Northing | Elevation (m) | Emission Rate (g/s) | Stack Height (m) | Stack Temp (K) | Velocity (m/s) | Diameter (m) |
|---|---|---|---|---|---|---|---|---|
| ** Facility: Whiting Oil and Gas Corporation - Torchlight Madison - Tensleep Battery 1, Sources: 1 ** | | | | | | | | |
| SRC37882 | 468348.10 | 4830498.10 | 1481.79 | 0.012 | 8.19 | 590.0 | 5.369 | 0.404 |
| ** Facility: DCP Midstream, LP - West Porcupine Booster, Sources: 4 ** | | | | | | | | |
| SRC28897 | 470486.20 | 4831088.10 | 1491.11 | 0.406 | 7.90 | 866.0 | 28.901 | 0.250 |
| SRC28898 | 470495.90 | 4831088.10 | 1491.04 | 0.406 | 7.90 | 866.0 | 28.901 | 0.250 |
| SRC28899 | 470504.70 | 4831088.10 | 1491.00 | 0.406 | 7.90 | 866.0 | 28.901 | 0.250 |
| SRC28900 | 470513.60 | 4831088.00 | 1491.00 | 0.406 | 7.90 | 866.0 | 28.901 | 0.250 |
| ** Facility: Kinder Morgan Operating L.P. "A" - Gopher Booster, Sources: 1 ** | | | | | | | | |
| SRC36448 | 473800.00 | 4840900.00 | 1440.37 | 0.029 | 4.57 | 644.3 | 5.369 | 0.091 |
| ** Facility: Western Gas Resources, Inc. - Porcupine Compressor Station, Sources: 1 ** | | | | | | | | |
| SRC29036 | 475116.80 | 4827666.40 | 1478.53 | 0.277 | 9.22 | 752.6 | 27.320 | 0.250 |
| ** Facility: WGR Asset Holding Company LLC - Little Thunder/Stratus Compressor Station, Sources: 12 ** | | | | | | | | |
| SRC29275 | 463947.00 | 4839128.00 | 1483.10 | 0.466 | 7.54 | 899.8 | 61.300 | 0.310 |
| SRC29276 | 463936.00 | 4839128.00 | 1483.10 | 0.466 | 7.61 | 899.8 | 61.300 | 0.310 |
| SRC29277 | 463782.00 | 4839152.00 | 1482.80 | 0.233 | 8.04 | 867.0 | 42.000 | 0.250 |
| SRC29278 | 463770.00 | 4839151.00 | 1482.70 | 0.233 | 8.19 | 867.0 | 42.000 | 0.250 |
| SRC29284 | 463925.00 | 4839128.00 | 1483.10 | 0.466 | 7.89 | 899.8 | 61.300 | 0.310 |
| SRC29285 | 463896.00 | 4838909.10 | 1483.10 | 0.466 | 8.44 | 899.8 | 61.300 | 0.310 |
| SRC29286 | 463885.00 | 4838908.10 | 1483.10 | 0.466 | 8.43 | 899.8 | 61.300 | 0.310 |
| SRC29294 | 463802.30 | 4839117.50 | 1483.00 | 0.043 | 17.00 | 505.4 | 8.910 | 0.360 |
| SRC29295 | 463802.60 | 4839137.00 | 1483.00 | 0.046 | 17.00 | 505.4 | 13.650 | 0.610 |
| SRC29296 | 463802.60 | 4839133.50 | 1483.00 | 0.046 | 17.00 | 505.4 | 13.650 | 0.610 |
| SRC29297 | 463802.60 | 4839130.00 | 1483.00 | 0.046 | 17.00 | 505.4 | 13.650 | 0.610 |
| SRC29298 | 463802.60 | 4839126.50 | 1483.00 | 0.046 | 17.00 | 505.4 | 13.650 | 0.610 |
| ** Facility: WGR Asset Holding Company, LLC - Cloud Compressor Station, Sources: 8 ** | | | | | | | | |
| SRC29470 | 467410.70 | 4843711.10 | 1463.72 | 0.233 | 8.71 | 866.5 | 42.370 | 0.250 |
| SRC29471 | 467423.20 | 4843711.10 | 1463.64 | 0.233 | 8.90 | 866.5 | 42.370 | 0.250 |
| SRC29472 | 467445.70 | 4843710.10 | 1463.51 | 0.089 | 8.10 | 783.2 | 19.810 | 0.250 |
| SRC29473 | 467434.80 | 4843711.10 | 1463.57 | 0.383 | 10.00 | 710.9 | 36.220 | 0.300 |
| SRC29474 | 467398.10 | 4843711.10 | 1463.80 | 0.383 | 10.00 | 710.9 | 36.220 | 0.300 |
| SRC29475 | 467385.00 | 4843711.10 | 1463.89 | 0.460 | 10.00 | 729.8 | 27.970 | 0.410 |
| SRC29476 | 467373.10 | 4843711.10 | 1463.98 | 0.460 | 10.00 | 729.8 | 27.970 | 0.410 |
| SRC29477 | 467456.90 | 4843710.10 | 1463.45 | 0.089 | 10.00 | 783.2 | 19.810 | 0.250 |
| ** Facility: Western Gas Resources, Inc. - Lightning Compressor Station, Sources: 7 ** | | | | | | | | |
| SRC29684 | 473181.20 | 4845460.10 | 1457.54 | 0.111 | 6.20 | 789.3 | 18.810 | 0.250 |
| SRC29685 | 473171.20 | 4845460.10 | 1457.50 | 0.111 | 6.10 | 789.3 | 18.810 | 0.250 |
| SRC29686 | 473191.20 | 4845462.10 | 1457.56 | 0.380 | 10.00 | 710.9 | 36.220 | 0.300 |
| SRC29687 | 473200.20 | 4845462.10 | 1457.59 | 0.380 | 10.00 | 710.9 | 36.220 | 0.300 |
| SRC29688 | 473208.20 | 4845462.10 | 1457.62 | 0.460 | 10.00 | 729.8 | 27.970 | 0.410 |
| SRC29689 | 473216.20 | 4845462.10 | 1457.64 | 0.460 | 10.00 | 729.8 | 27.970 | 0.410 |
| SRC29690 | 473223.20 | 4845461.10 | 1457.67 | 0.089 | 10.00 | 783.2 | 19.810 | 0.250 |
| ** Facility: North Finn - Kane Screw, Sources: 1 ** | | | | | | | | |
| SRC37515 | 463349.60 | 4817519.90 | 1432.01 | 0.106 | 7.32 | 719.8 | 30.389 | 0.213 |
| ** Facility: Rowdy Pipeline, LLC - Reno Compressor Station, Sources: 2 ** | | | | | | | | |
| SRC31084 | 473681.20 | 4833790.20 | 1457.00 | 0.040 | 10.06 | 829.8 | 5.230 | 0.310 |
| SRC31085 | 473681.20 | 4833807.00 | 1456.00 | 0.147 | 10.06 | 720.9 | 17.950 | 0.310 |
| ** Facility: Rowdy Pipeline, LLC - Monte Central, Sources: 3 ** | | | | | | | | |
| SRC31555 | 451628.20 | 4841568.10 | 1593.73 | 0.147 | 10.06 | 710.9 | 17.710 | 0.305 |
| SRC31556 | 451628.20 | 4841584.10 | 1593.12 | 0.558 | 10.06 | 674.8 | 49.680 | 0.305 |
| SRC31557 | 451628.20 | 4841601.60 | 1592.44 | 0.558 | 10.06 | 674.8 | 49.680 | 0.305 |
| ** Facility: Rowdy Pipeline, LLC - Wright Compressor Station, Sources: 4 ** | | | | | | | | |
| SRC31562 | 453344.40 | 4839972.00 | 1588.44 | 0.178 | 7.92 | 710.9 | 39.980 | 0.203 |
| SRC31563 | 453358.10 | 4839971.70 | 1588.46 | 0.178 | 8.84 | 710.9 | 39.980 | 0.203 |
| SRC31564 | 453329.70 | 4839973.40 | 1588.67 | 0.178 | 8.84 | 721.5 | 46.600 | 0.203 |
| SRC31565 | 453316.60 | 4839973.50 | 1588.97 | 0.178 | 8.84 | 721.5 | 46.600 | 0.203 |
| ** Facility: Rowdy Pipeline, LLC - Sunburst Compressor Station, Sources: 9 ** | | | | | | | | |
| SRC47819 | 450834.70 | 4838891.00 | 1582.33 | 0.193 | 6.71 | 811.0 | 31.792 | 0.305 |
| SRC47820 | 450884.90 | 4838930.70 | 1580.69 | 0.178 | 6.71 | 811.0 | 31.792 | 0.305 |
| SRC47821 | 450866.60 | 4838836.70 | 1583.89 | 0.009 | 4.42 | 477.8 | 25.000 | 0.102 |
| SRC53391 | 450856.30 | 4838880.90 | 1583.00 | 0.193 | 6.71 | 811.0 | 25.760 | 0.254 |

# Regional $NO_x$ Point Sources

| Source ID | UTM Easting | UTM Northing | Elevation (m) | Emission Rate (g/s) | Stack Height (m) | Stack Temp (K) | Velocity (m/s) | Diameter (m) |
|---|---|---|---|---|---|---|---|---|
| SRC53392 | 450851.40 | 4838904.20 | 1582.29 | 0.193 | 6.71 | 811.0 | 31.792 | 0.305 |
| SRC53393 | 450868.10 | 4838917.50 | 1581.99 | 0.193 | 6.71 | 811.0 | 31.792 | 0.305 |
| SRC53394 | 450873.00 | 4838894.10 | 1583.00 | 0.178 | 6.71 | 811.0 | 25.760 | 0.254 |
| SRC53395 | 450889.70 | 4838907.30 | 1582.00 | 0.178 | 6.71 | 811.0 | 25.760 | 0.254 |
| SRC53396 | 450965.20 | 4838879.60 | 1585.50 | 0.017 | 3.05 | 1273.0 | 20.000 | 0.951 |
| ** Facility: Rowdy Pipeline, LLC - Cosner Satellite 2 Compressor Station, Sources: 1 ** | | | | | | | | |
| SRC31677 | 454747.10 | 4836240.20 | 1536.71 | 0.147 | 10.07 | 710.9 | 17.170 | 0.305 |
| ** Facility: Rowdy Pipeline, LLC - Cosner Satellite 3 Compressor Station, Sources: 1 ** | | | | | | | | |
| SRC31678 | 455621.10 | 4836326.20 | 1547.76 | 0.147 | 10.07 | 710.9 | 17.170 | 0.305 |
| ** Facility: Thunder Creek Gas Services, LLC - SC-2732 Compressor Station, Sources: 4 ** | | | | | | | | |
| SRC31880 | 460231.20 | 4835862.10 | 1527.96 | 0.163 | 6.40 | 810.0 | 41.406 | 0.154 |
| SRC55901 | 460228.40 | 4835873.40 | 1527.96 | 0.178 | 6.40 | 705.9 | 28.499 | 0.305 |
| SRC55902 | 460225.50 | 4835884.70 | 1527.96 | 0.178 | 6.40 | 705.9 | 28.499 | 0.305 |
| SRC55903 | 460222.60 | 4835896.10 | 1527.96 | 0.177 | 6.40 | 705.9 | 28.499 | 0.305 |
| ** Facility: Thunder Creek Gas Services, LLC - SC-0532 Compressor Station, Sources: 2 ** | | | | | | | | |
| SRC31890 | 456815.20 | 4841035.10 | 1545.70 | 0.163 | 7.32 | 572.2 | 39.200 | 0.200 |
| SRC31891 | 456815.20 | 4841022.50 | 1545.70 | 0.163 | 7.32 | 572.0 | 39.200 | 0.200 |
| ** Facility: Thunder Creek Gas Services, LLC - SC-1632 Compressor Station, Sources: 4 ** | | | | | | | | |
| SRC31894 | 458840.10 | 4838635.40 | 1570.00 | 0.163 | 7.32 | 644.3 | 31.100 | 0.300 |
| SRC31895 | 458840.10 | 4838623.20 | 1570.00 | 0.163 | 7.32 | 644.3 | 31.100 | 0.300 |
| SRC31896 | 458840.10 | 4838611.00 | 1570.00 | 0.163 | 7.32 | 644.3 | 31.100 | 0.300 |
| SRC31897 | 458878.20 | 4838634.50 | 1570.00 | 0.163 | 7.32 | 644.3 | 31.100 | 0.300 |
| ** Facility: Thunder Creek Gas Services, LLC - SC-0943 Compressor Station, Sources: 4 ** | | | | | | | | |
| SRC31905 | 449834.60 | 4849323.00 | 1520.38 | 0.163 | 7.32 | 644.3 | 31.100 | 0.300 |
| SRC31906 | 449834.60 | 4849310.80 | 1520.67 | 0.163 | 7.32 | 644.3 | 31.100 | 0.300 |
| SRC31907 | 449834.60 | 4849298.60 | 1520.82 | 0.163 | 7.32 | 644.3 | 31.100 | 0.300 |
| SRC31908 | 449872.70 | 4849322.10 | 1518.51 | 0.163 | 7.32 | 644.3 | 31.100 | 0.300 |
| ** Facility: Thunder Creek Gas Services, LLC - SC-3543 Compressor Station, Sources: 2 ** | | | | | | | | |
| SRC30310 | 452102.20 | 4844088.00 | 1568.50 | 0.164 | 6.40 | 705.9 | 30.138 | 0.203 |
| SRC30311 | 452102.90 | 4844099.60 | 1568.50 | 0.178 | 6.40 | 705.9 | 28.499 | 0.305 |
| ** Facility: WGR Asset Holding Company, LLC - West Fork Compressor Station, Sources: 9 ** | | | | | | | | |
| SRC30400 | 457271.80 | 4849515.00 | 1529.90 | 0.233 | 8.13 | 866.5 | 42.370 | 0.250 |
| SRC30401 | 457283.80 | 4849515.00 | 1529.10 | 0.233 | 8.08 | 866.5 | 42.370 | 0.250 |
| SRC30402 | 457295.80 | 4849515.00 | 1528.70 | 0.233 | 7.50 | 866.5 | 42.370 | 0.250 |
| SRC30403 | 457307.80 | 4849515.00 | 1528.50 | 0.233 | 7.50 | 866.5 | 42.370 | 0.250 |
| SRC30404 | 457319.80 | 4849515.00 | 1528.20 | 0.233 | 7.50 | 866.5 | 42.370 | 0.250 |
| SRC30405 | 457331.80 | 4849515.00 | 1527.80 | 0.233 | 7.50 | 866.5 | 42.370 | 0.250 |
| SRC30406 | 457343.80 | 4849515.00 | 1527.50 | 0.233 | 7.50 | 866.5 | 42.370 | 0.250 |
| SRC30407 | 457355.80 | 4849515.00 | 1527.50 | 0.088 | 7.50 | 783.2 | 19.810 | 0.250 |
| SRC30408 | 457367.80 | 4849515.00 | 1527.90 | 0.088 | 7.50 | 783.2 | 19.810 | 0.250 |
| ** Facility: WGR Asset Holding Company, LLC - Pronghorn/Oryx, Sources: 12 ** | | | | | | | | |
| SRC30443 | 464950.90 | 4827372.40 | 1490.69 | 0.233 | 8.01 | 866.5 | 42.370 | 0.250 |
| SRC30444 | 464963.90 | 4827372.40 | 1490.69 | 0.233 | 8.06 | 866.5 | 42.370 | 0.250 |
| SRC30445 | 464999.90 | 4827372.40 | 1490.73 | 0.233 | 8.10 | 866.5 | 42.370 | 0.250 |
| SRC30446 | 465012.90 | 4827372.40 | 1490.74 | 0.233 | 8.12 | 866.5 | 42.370 | 0.250 |
| SRC30447 | 464974.90 | 4827372.40 | 1490.71 | 0.088 | 7.57 | 783.2 | 19.810 | 0.250 |
| SRC30448 | 464986.90 | 4827372.40 | 1490.71 | 0.088 | 7.61 | 783.2 | 19.810 | 0.250 |
| SRC30449 | 464877.90 | 4827395.40 | 1491.01 | 0.467 | 8.59 | 899.8 | 61.265 | 0.305 |
| SRC30450 | 464865.90 | 4827372.40 | 1491.70 | 0.467 | 7.51 | 899.8 | 61.265 | 0.305 |
| SRC30451 | 465025.90 | 4827372.40 | 1490.75 | 0.383 | 7.51 | 710.9 | 59.990 | 0.204 |
| SRC30452 | 465039.90 | 4827372.40 | 1490.73 | 0.383 | 7.51 | 710.9 | 59.990 | 0.204 |
| SRC30453 | 464853.90 | 4827395.40 | 1491.46 | 0.466 | 7.51 | 899.8 | 61.265 | 0.305 |
| SRC30454 | 464841.90 | 4827395.40 | 1491.68 | 0.466 | 7.51 | 899.8 | 61.265 | 0.305 |
| ** Facility: Kinder Morgan Upstream, LLC - Thunder Booster, Sources: 2 ** | | | | | | | | |
| SRC30537 | 474222.30 | 4847868.10 | 1497.41 | 0.244 | 4.57 | 755.4 | 38.100 | 0.250 |
| SRC30538 | 474222.30 | 4847868.10 | 1497.41 | 0.244 | 4.57 | 755.4 | 38.100 | 0.250 |
| ** Facility: Rowdy Pipeline, LLC - Thunder Basin Compressor Station, Sources: 2 ** | | | | | | | | |
| SRC32298 | 474572.30 | 4829250.20 | 1500.00 | 0.178 | 6.71 | 721.5 | 46.600 | 0.200 |
| SRC32299 | 474572.30 | 4829267.00 | 1500.00 | 0.178 | 6.71 | 721.5 | 46.600 | 0.200 |

# Regional $NO_x$ Point Sources

| Source ID | UTM Easting | UTM Northing | Elevation (m) | Emission Rate (g/s) | Stack Height (m) | Stack Temp (K) | Velocity (m/s) | Diameter (m) |
|---|---|---|---|---|---|---|---|---|
| ** Facility: Coleman Oil & Gas, Inc. - Sioux Ranch 21-2, Sources: 1 ** | | | | | | | | |
| SRC38103 | 461815.90 | 4822423.70 | 1508.70 | 0.035 | 7.84 | 807.9 | 39.481 | 0.098 |
| ** Facility: Western Gas Resources, Inc. - Alley Oop Compressor Station, Sources: 5 ** | | | | | | | | |
| SRC32438 | 469010.90 | 4824652.50 | 1459.70 | 0.233 | 7.50 | 866.5 | 42.370 | 0.250 |
| SRC32439 | 469021.90 | 4824652.50 | 1459.43 | 0.233 | 7.50 | 866.5 | 42.370 | 0.250 |
| SRC32440 | 469032.90 | 4824652.50 | 1459.17 | 0.233 | 7.50 | 866.5 | 42.370 | 0.250 |
| SRC32441 | 469043.90 | 4824652.50 | 1458.96 | 0.088 | 7.50 | 783.2 | 19.810 | 0.250 |
| SRC32442 | 469054.90 | 4824652.50 | 1458.82 | 0.088 | 7.50 | 783.2 | 19.810 | 0.250 |
| ** Facility: WGR Asset Holding Company, LLC - Tuit Compressor Station, Sources: 6 ** | | | | | | | | |
| SRC32472 | 459896.90 | 4834899.20 | 1525.20 | 0.233 | 7.50 | 866.5 | 42.370 | 0.250 |
| SRC32473 | 459907.90 | 4834899.20 | 1525.50 | 0.233 | 7.50 | 866.5 | 42.370 | 0.250 |
| SRC32474 | 459918.90 | 4834899.20 | 1526.00 | 0.233 | 7.50 | 866.5 | 42.370 | 0.250 |
| SRC32475 | 459929.90 | 4834899.20 | 1526.40 | 0.233 | 7.50 | 866.5 | 42.370 | 0.250 |
| SRC32476 | 459940.90 | 4834899.20 | 1526.10 | 0.088 | 7.50 | 783.2 | 19.810 | 0.250 |
| SRC32477 | 459951.90 | 4834899.20 | 1525.70 | 0.088 | 7.50 | 783.2 | 19.810 | 0.250 |
| ** Facility: Hilcorp Energy Company - Thunder Basin Coal CBM Facility, Sources: 2 ** | | | | | | | | |
| SRC37969 | 473243.40 | 4832058.20 | 1472.71 | 0.052 | 7.84 | 807.9 | 39.481 | 0.102 |
| SRC37970 | 473243.40 | 4832058.20 | 1472.71 | 0.009 | 7.84 | 807.9 | 39.481 | 0.115 |
| ** Facility: Merit Energy Company - Porcupine Compressor Station, Sources: 5 ** | | | | | | | | |
| SRC32549 | 469199.10 | 4830490.20 | 1481.00 | 0.558 | 8.24 | 730.3 | 47.700 | 0.310 |
| SRC32550 | 469209.10 | 4830490.20 | 1482.00 | 0.558 | 8.24 | 730.3 | 47.700 | 0.310 |
| SRC32551 | 469219.10 | 4830490.20 | 1482.00 | 0.558 | 8.24 | 730.3 | 47.700 | 0.310 |
| SRC32552 | 469229.10 | 4830490.20 | 1483.00 | 0.558 | 8.24 | 730.3 | 47.700 | 0.310 |
| SRC32553 | 469189.10 | 4830490.20 | 1481.00 | 0.558 | 8.24 | 730.3 | 47.700 | 0.310 |
| ** Facility: Kerr-McGee Oil & Gas Onshore LP - Rochelle #32-18, Sources: 1 ** | | | | | | | | |
| SRC37968 | 465175.10 | 4838583.60 | 1472.98 | 0.026 | 7.84 | 807.9 | 39.481 | 0.089 |
| ** Facility: Rowdy Pipeline, LLC - Rochelle Hills, Sources: 8 ** | | | | | | | | |
| SRC33155 | 467867.90 | 4820177.60 | 1442.56 | 0.178 | 6.71 | 721.5 | 46.600 | 0.203 |
| SRC33156 | 467867.90 | 4820194.40 | 1441.37 | 0.178 | 6.71 | 721.5 | 46.600 | 0.203 |
| SRC33157 | 467867.90 | 4820211.10 | 1440.56 | 0.178 | 6.71 | 721.5 | 46.600 | 0.203 |
| SRC33158 | 467867.90 | 4820227.90 | 1441.39 | 0.178 | 6.71 | 721.5 | 46.600 | 0.203 |
| SRC33159 | 467909.20 | 4820177.60 | 1440.24 | 0.144 | 6.71 | 541.5 | 29.100 | 0.305 |
| SRC33160 | 467909.20 | 4820194.40 | 1440.65 | 0.144 | 6.71 | 541.5 | 29.100 | 0.305 |
| SRC33161 | 467909.20 | 4820211.10 | 1441.30 | 0.144 | 6.71 | 541.5 | 29.100 | 0.305 |
| SRC33162 | 467909.20 | 4820227.90 | 1442.15 | 0.144 | 6.71 | 541.5 | 29.100 | 0.305 |
| ** Facility: Rowdy Pipeline, LLC - Uprising, Sources: 11 ** | | | | | | | | |
| SRC33163 | 458763.20 | 4825005.20 | 1501.00 | 0.178 | 7.32 | 721.5 | 40.200 | 0.203 |
| SRC33164 | 458775.20 | 4825003.10 | 1501.00 | 0.178 | 7.32 | 721.5 | 40.200 | 0.203 |
| SRC33165 | 458787.20 | 4825000.90 | 1501.00 | 0.178 | 7.32 | 721.5 | 40.200 | 0.203 |
| SRC33166 | 458799.20 | 4824998.80 | 1501.00 | 0.178 | 7.32 | 721.5 | 40.200 | 0.203 |
| SRC33170 | 458795.00 | 4824974.80 | 1501.00 | 0.147 | 6.71 | 541.5 | 29.100 | 0.305 |
| SRC47264 | 458759.00 | 4824981.20 | 1501.00 | 0.193 | 10.67 | 807.6 | 43.400 | 0.356 |
| SRC47265 | 458771.00 | 4824979.10 | 1501.00 | 0.193 | 10.67 | 807.6 | 43.400 | 0.356 |
| SRC47266 | 458783.00 | 4824976.90 | 1501.00 | 0.193 | 10.67 | 807.6 | 43.400 | 0.356 |
| SRC47267 | 458807.00 | 4824972.70 | 1501.00 | 0.098 | 6.71 | 513.7 | 4.500 | 0.305 |
| SRC47268 | 458827.90 | 4825008.40 | 1501.00 | 0.009 | 3.66 | 477.6 | 7.620 | 0.102 |
| SRC47269 | 458827.10 | 4825003.60 | 1501.00 | 0.009 | 3.66 | 477.6 | 7.620 | 0.102 |
| ** Facility: Rowdy Pipeline, LLC - Mustang, Sources: 8 ** | | | | | | | | |
| SRC33183 | 452782.10 | 4833119.20 | 1569.92 | 0.178 | 6.71 | 721.5 | 46.600 | 0.203 |
| SRC33184 | 452782.10 | 4833136.00 | 1571.28 | 0.178 | 6.71 | 721.5 | 46.600 | 0.203 |
| SRC33185 | 452782.10 | 4833152.70 | 1572.01 | 0.178 | 6.71 | 721.5 | 46.600 | 0.203 |
| SRC33186 | 452782.10 | 4833169.50 | 1572.66 | 0.178 | 6.71 | 721.5 | 46.600 | 0.203 |
| SRC33187 | 452823.40 | 4833119.30 | 1570.52 | 0.144 | 6.71 | 541.5 | 29.060 | 0.305 |
| SRC33188 | 452823.40 | 4833136.00 | 1572.31 | 0.144 | 6.71 | 541.5 | 29.060 | 0.305 |
| SRC33189 | 452823.40 | 4833152.70 | 1573.63 | 0.144 | 6.71 | 541.5 | 29.060 | 0.305 |
| SRC33190 | 452823.40 | 4833169.50 | 1574.07 | 0.144 | 6.71 | 541.5 | 29.060 | 0.305 |
| ** Facility: C&H Oil & Gas, Inc. - East Springen, Sources: 1 ** | | | | | | | | |
| SRC37015 | 471699.50 | 4846639.90 | 1457.85 | 0.026 | 7.84 | 807.9 | 39.481 | 0.090 |
| ** Facility: C&H Oil & Gas, Inc. - West Springen, Sources: 1 ** | | | | | | | | |
| SRC37075 | 470072.80 | 4848242.30 | 1489.39 | 0.026 | 7.84 | 807.9 | 39.481 | 0.090 |

# Regional $NO_x$ Point Sources

| Source ID | UTM Easting | UTM Northing | Elevation (m) | Emission Rate (g/s) | Stack Height (m) | Stack Temp (K) | Velocity (m/s) | Diameter (m) |
|---|---|---|---|---|---|---|---|---|
| ** Facility: Basic Energy Services, L.P. - Durham Ranch Pit, Sources: 1 ** | | | | | | | | |
| SRC37196 | 463610.70 | 4848307.70 | 1522.79 | 0.175 | 6.57 | 735.1 | 41.469 | 0.222 |
| ** Facility: Cosner CBM - Cosner Project, Sources: 1 ** | | | | | | | | |
| SRC33411 | 453783.10 | 4836357.20 | 1540.99 | 0.178 | 7.77 | 644.3 | 29.107 | 0.254 |
| ** Facility: WGR Operating LP - Sioux-Jr. Reno Compressor Station, Sources: 13 ** | | | | | | | | |
| SRC43547 | 461949.80 | 4820791.30 | 1465.43 | 0.233 | 8.08 | 875.4 | 35.910 | 0.254 |
| SRC43548 | 461962.00 | 4820791.30 | 1465.47 | 0.233 | 8.03 | 875.4 | 35.910 | 0.254 |
| SRC43550 | 461986.40 | 4820790.10 | 1465.49 | 0.319 | 10.48 | 721.5 | 25.090 | 0.381 |
| SRC43551 | 461872.40 | 4820772.60 | 1465.02 | 0.345 | 7.50 | 721.5 | 25.090 | 0.380 |
| SRC43552 | 461859.40 | 4820772.60 | 1464.98 | 0.345 | 7.50 | 737.0 | 27.950 | 0.510 |
| SRC43553 | 461846.40 | 4820772.60 | 1464.94 | 0.253 | 7.50 | 737.0 | 27.950 | 0.510 |
| SRC43554 | 461833.40 | 4820772.60 | 1464.88 | 0.253 | 7.50 | 737.0 | 27.950 | 0.510 |
| SRC43555 | 461812.90 | 4820776.60 | 1464.87 | 0.501 | 7.50 | 733.2 | 30.240 | 0.330 |
| SRC43556 | 461800.90 | 4820776.60 | 1464.81 | 0.345 | 7.50 | 733.2 | 30.240 | 0.330 |
| SRC49109 | 461752.90 | 4820776.60 | 1464.68 | 0.319 | 7.50 | 729.8 | 37.540 | 0.350 |
| SRC49110 | 461764.90 | 4820776.60 | 1464.71 | 0.319 | 7.50 | 729.8 | 37.540 | 0.350 |
| SRC49111 | 461776.90 | 4820776.60 | 1464.75 | 0.253 | 7.50 | 733.2 | 30.240 | 0.330 |
| SRC49112 | 461788.90 | 4820776.60 | 1464.78 | 0.253 | 7.50 | 733.2 | 30.240 | 0.330 |
| ** Facility: WGR Operating, LP - Durango Compressor Station, Sources: 6 ** | | | | | | | | |
| SRC43900 | 465074.40 | 4818949.10 | 1481.97 | 0.345 | 10.00 | 737.0 | 27.950 | 0.508 |
| SRC43901 | 465082.60 | 4818947.90 | 1482.40 | 0.345 | 10.00 | 737.0 | 27.950 | 0.508 |
| SRC43902 | 465094.70 | 4818946.00 | 1482.93 | 0.381 | 10.00 | 733.2 | 30.240 | 0.330 |
| SRC43903 | 465102.20 | 4818944.80 | 1483.20 | 0.381 | 10.00 | 733.2 | 30.240 | 0.330 |
| SRC43904 | 465109.70 | 4818943.90 | 1483.53 | 0.479 | 10.00 | 721.5 | 25.090 | 0.381 |
| SRC43905 | 465116.90 | 4818942.50 | 1483.93 | 0.479 | 10.00 | 721.5 | 25.090 | 0.381 |
| ** Facility: Thunder Creek Gas Services, LLC - FB 12-33 Compressor Station, Sources: 5 ** | | | | | | | | |
| SRC47193 | 454032.00 | 4839362.00 | 1596.89 | 0.177 | 7.32 | 811.0 | 33.400 | 0.203 |
| SRC47194 | 454032.20 | 4839376.10 | 1597.45 | 0.177 | 7.32 | 811.0 | 33.400 | 0.203 |
| SRC47195 | 453996.90 | 4839361.40 | 1596.29 | 0.177 | 7.32 | 811.0 | 33.400 | 0.203 |
| SRC47196 | 453997.20 | 4839375.50 | 1596.46 | 0.177 | 7.32 | 811.0 | 33.400 | 0.203 |
| SRC47197 | 454095.10 | 4839364.30 | 1598.02 | 0.012 | 3.66 | 477.8 | 8.530 | 0.254 |
| ** Facility: Thunder Creek Gas Services, LLC - FB 08-42 Compressor Station, Sources: 5 ** | | | | | | | | |
| SRC47198 | 457164.80 | 4850033.20 | 1524.37 | 0.177 | 7.32 | 811.0 | 33.400 | 0.203 |
| SRC47199 | 457164.80 | 4850019.50 | 1524.34 | 0.177 | 7.32 | 811.0 | 33.400 | 0.203 |
| SRC47200 | 457129.80 | 4850033.20 | 1523.08 | 0.177 | 7.32 | 811.0 | 33.400 | 0.203 |
| SRC47201 | 457129.80 | 4850019.50 | 1522.77 | 0.177 | 7.32 | 811.0 | 33.400 | 0.203 |
| SRC47202 | 457216.50 | 4850023.80 | 1525.03 | 0.012 | 3.66 | 477.8 | 8.530 | 0.254 |
| ** Facility: DCP Midstream, LP - Arbalest Compressor Station, Sources: 7 ** | | | | | | | | |
| SRC49812 | 461484.40 | 4821033.20 | 1471.95 | 0.288 | 12.19 | 909.3 | 56.609 | 0.305 |
| SRC49813 | 461494.40 | 4821033.20 | 1471.62 | 0.288 | 12.19 | 909.3 | 56.609 | 0.305 |
| SRC49814 | 461504.40 | 4821033.20 | 1471.33 | 0.288 | 12.19 | 909.3 | 56.609 | 0.305 |
| SRC49815 | 461514.40 | 4821033.20 | 1471.20 | 0.288 | 12.19 | 909.3 | 56.609 | 0.305 |
| SRC49816 | 461524.40 | 4821033.20 | 1471.02 | 0.288 | 12.19 | 909.3 | 56.609 | 0.305 |
| SRC49817 | 461464.40 | 4821013.20 | 1471.53 | 0.155 | 12.19 | 750.9 | 20.258 | 0.305 |
| SRC49818 | 461474.40 | 4821013.20 | 1471.34 | 0.155 | 12.19 | 750.9 | 20.258 | 0.305 |
| ** Facility: Bowers Oil & Gas, Inc. - CBM #3 Antelope CM, Sources: 1 ** | | | | | | | | |
| SRC36991 | 466664.00 | 4815890.00 | 1424.15 | 0.101 | 7.84 | 807.9 | 39.481 | 0.176 |

# APPENDIX 8

## $PM_{10}$ Emission Apportioning

**$PM_{10}$ Emission Apportioning**
**Year 2018**
**Black Thunder Mine**

| Emission Activities | Total Annual $PM_{10}$ Emissions (g/s) | North Annual $PM_{10}$ Emissions (g/s) | Northwest Annual $PM_{10}$ Emissions (g/s) | West Annual $PM_{10}$ Emissions (g/s) | Southwest Annual $PM_{10}$ Emissions (g/s) | South Annual $PM_{10}$ Emissions (g/s) | North Coal Area 1 $PM_{10}$ Emissions (g/s) | North Coal Area 2 $PM_{10}$ Emissions (g/s) | North OB Area $PM_{10}$ Emissions (g/s) | North Wind Erosion Area $PM_{10}$ Emissions (g/s) | Northwest Coal Area 1 $PM_{10}$ Emissions (g/s) | Northwest Coal Area 2 $PM_{10}$ Emissions (g/s) | Northwest OB Area $PM_{10}$ Emissions (g/s) | Northwest Wind Erosion Area 1 $PM_{10}$ Emissions (g/s) | Northwest Wind Erosion Area 2 $PM_{10}$ Emissions (g/s) | West Coal Area 1 $PM_{10}$ Emissions (g/s) | West Coal Area 2 $PM_{10}$ Emissions (g/s) | West Coal Area 3 $PM_{10}$ Emissions (g/s) | West Coal Area 4 $PM_{10}$ Emissions (g/s) | West Coal Area 5 $PM_{10}$ Emissions (g/s) | West Coal Area 6 $PM_{10}$ Emissions (g/s) | West OB Area 1 $PM_{10}$ Emissions (g/s) | West OB Area 2 $PM_{10}$ Emissions (g/s) | West Wind Erosion Area $PM_{10}$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal | 1.722 | 0.458 | 0.351 | 0.466 | 0.210 | 0.237 | 0.229 | 0.229 | | | 0.176 | 0.176 | | | | 0.102 | 0.141 | 0.141 | 0.027 | 0.027 | 0.027 | | | |
| OB Removal (T/S) | 53.639 | 13.122 | 8.202 | 18.601 | 7.920 | 5.794 | | | 13.122 | | | | 8.202 | | | | | | | | | 0.089 | 18.513 | |
| OB Removal (dragline) | 35.017 | 8.272 | 6.368 | 8.114 | 5.805 | 6.458 | | | 8.272 | | | | 6.368 | | | | | | | | | 0.039 | 8.075 | |
| Scrapers | 1.392 | 0.370 | 0.284 | 0.377 | 0.170 | 0.191 | | | 0.370 | | | | 0.284 | | | | | | | | | 0.002 | 0.375 | |
| OB Blasting | 0.241 | 0.061 | 0.044 | 0.069 | 0.031 | 0.035 | | | 0.061 | | | | 0.044 | | | | | | | | | 0.000 | 0.068 | |
| Coal Blasting | 0.154 | 0.041 | 0.031 | 0.042 | 0.019 | 0.021 | 0.020 | 0.020 | | | 0.016 | 0.016 | | | | 0.009 | 0.013 | 0.013 | 0.002 | 0.002 | 0.002 | | | |
| OB Haul Roads | 27.764 | 6.804 | 4.273 | 9.587 | 4.086 | 3.015 | | | 6.804 | | | | 4.273 | | | | | | | | | 0.046 | 9.541 | |
| Coal Haul Roads | 28.358 | 7.834 | 3.852 | 7.148 | 4.025 | 5.498 | | | | | | | | | | | | | | | | | | |
| Coal Dumping | 1.568 | 0.417 | 0.320 | 0.424 | 0.191 | 0.216 | | | | | | | | | | | | | | | | | | |
| Dozers & Loaders on OB | 3.495 | 0.841 | 0.582 | 1.079 | 0.534 | 0.458 | | | 0.841 | | | | 0.582 | | | | | | | | | 0.005 | 1.074 | |
| Dozers & Loaders on Coal | 8.238 | 2.192 | 1.680 | 2.228 | 1.005 | 1.132 | 1.096 | 1.096 | | | 0.840 | 0.840 | | | | 0.486 | 0.675 | 0.675 | 0.131 | 0.131 | 0.131 | | | |
| Graders | 9.158 | 2.338 | 1.355 | 2.882 | 1.332 | 1.251 | | | | | | | | | | | | | | | | | | |
| Water Trucks | 1.321 | 0.337 | 0.195 | 0.416 | 0.192 | 0.180 | | | | | | | | | | | | | | | | | | |
| Wind Erosion | 22.082 | 6.346 | 4.128 | 6.650 | 1.822 | 3.135 | | | | 6.346 | | | | 0.503 | 3.625 | | | | | | | | | 6.650 |
| **Total** | **194.1482** | **49.4344** | **31.6667** | **58.0823** | **27.3429** | **27.6219** | **1.3454** | **1.3454** | **29.4703** | **6.3465** | **1.0311** | **1.0311** | **19.7533** | **0.5031** | **3.6253** | **0.5970** | **0.8290** | **0.8290** | **0.1603** | **0.1603** | **0.1603** | **0.1808** | **37.6459** | **6.6502** |

Modeling Summary:

| Source Description | North Coal Area 1 | North Coal Area 2 | North OB Area | North Wind Erosion Area | Northwest Coal Area 1 | Northwest Coal Area 2 | Northwest OB Area | Northwest Wind Erosion Area 1 | Northwest Wind Erosion Area 2 | West Coal Area 1 | West Coal Area 2 | West Coal Area 3 | West Coal Area 4 | West Coal Area 5 | West Coal Area 6 | West OB Area 1 | West OB Area 2 | West Wind Erosion Area |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | BTNC1 | BTNC2 | BTNOB | BTNWE1 | BTNWC1 | BTNWC2 | BTNWOB | BTNWWE1 | BTNWWE2 | BTWC1 | BTWC2 | BTWC3 | BTWC4 | BTWC5 | BTWC6 | BTWOB1 | BTWOB2 | BTWWE |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area |
| SW X-Coordinate | 474066.1654 | 476077.8454 | 474066.1654 | 474092.4963 | 471222.3814 | 472654.5941 | 471222.3814 | 472482.2452 | 470984.3417 | 471946.2814 | 472156.5934 | 472156.5934 | 472156.5934 | 472156.5934 | 472156.5934 | 471806.0734 | 471946.2814 | 471081.7014 |
| SW Y-Coordinate | 4845476.2155 | 4845476.2155 | 4845049.4955 | 4843033.8686 | 4843450.8195 | 4843450.8195 | 4842902.1795 | 4844208.7214 | 4841830.5817 | 4840232.1315 | 4839134.8515 | 4838037.5715 | 4837129.8366 | 4836598.7124 | 4836067.5882 | 4840597.8915 | 4835846.0595 | 4835844.8170 |
| Angle | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Area X-Dimension (m) | 2011.6800 | 2011.6800 | 4023.3600 | 4444.0443 | 1432.2127 | 1432.2127 | 2864.4254 | 1610.2511 | 3108.1546 | 280.4160 | 175.5435 | 175.5435 | 70.1040 | 70.1040 | 70.1040 | 140.2080 | 771.1440 | 2763.7604 |
| Area Y-Dimension (m) | 247.5726 | 247.5726 | 784.4633 | 2911.6436 | 274.3200 | 274.3200 | 1097.2800 | 636.9998 | 2378.1396 | 494.6523 | 1097.2800 | 1097.2800 | 531.1241 | 531.1242 | 531.1242 | 128.8923 | 4880.7243 | 4906.0219 |
| Area ($m^2$) | 498,037 | 498,037 | 3,156,178 | 12,939,473 | 392,885 | 392,885 | 3,143,077 | 1,025,730 | 7,391,626 | 138,708 | 192,620 | 192,620 | 37,234 | 37,234 | 37,234 | 18,072 | 3,763,741 | 13,559,069 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Road Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Model Emission Rate[1] | 2.701331E-06 | 2.701331E-06 | 9.337339E-06 | 4.904745E-07 | 2.624554E-06 | 2.624554E-06 | 6.284697E-06 | 4.904628E-07 | 4.904628E-07 | 4.303894E-06 | 4.303894E-06 | 4.303894E-06 | 4.303894E-06 | 4.303894E-06 | 4.303894E-06 | 1.000226E-05 | 1.000226E-05 | 4.904625E-07 |

1. Units are g/s-$m^2$ for area sources.

**$PM_{10}$ Emission Apportioning**
**Year 2018**
**Black Thunder Mine**

| Southwest Coal Area | Southwest OB Area | Southwest Wind Erosion Area | South Coal Area | South OB Area | South Wind Erosion Area 1 | South Wind Erosion Area 2 | North Haul Road 1 to Circuit 4 Dump | North Haul Road 2 to Circuit 3 Dump | Northwest Haul Road to 6-North Dump | West Haul Road 1 to 5-West Dump | West Haul Road 2 to Primary Dump | West Haul Road 3 to 5-West Dump | West Haul Road 4 to Primary Dump | Southwest Haul Road 1 to Primary Dump | Southwest Haul Road 2 to Near Pit Dump | South Haul Road 1 to Near Pit Dump | South Haul Road 2 to Primary Dump | Circuit 4 Truck Dump | Circuit 3 Truck Dump | 6-North Truck Dump | 5-West Truck Dump | Primary Truck Dump | Near Pit Truck Dump |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) |
| 0.210 | | | 0.237 | | | | | | | | | | | | | | | | | | | | |
| | 7.920 | | | 5.794 | | | | | | | | | | | | | | | | | | | |
| | 5.805 | | | 6.458 | | | | | | | | | | | | | | | | | | | |
| | 0.170 | | | 0.191 | | | | | | | | | | | | | | | | | | | |
| | 0.031 | | | 0.035 | | | | | | | | | | | | | | | | | | | |
| 0.019 | | | 0.021 | | | | | | | | | | | | | | | | | | | | |
| | 4.086 | | | 3.015 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 5.883 | 1.952 | 3.852 | 3.828 | 2.064 | 0.831 | 0.425 | 0.505 | 3.520 | 4.707 | 0.791 | | | | | | |
| | | | | | | | | | | | | | | | | | | 0.355 | 0.063 | 0.320 | 0.318 | 0.147 | 0.366 |
| | 0.534 | | | 0.458 | | | | | | | | | | | | | | | | | | | |
| 1.005 | | | 1.132 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 1.756 | 0.583 | 1.355 | 1.543 | 0.832 | 0.335 | 0.171 | 0.167 | 1.165 | 1.071 | 0.180 | | | | | | |
| | | | | | | | 0.253 | 0.084 | 0.195 | 0.223 | 0.120 | 0.048 | 0.025 | 0.024 | 0.168 | 0.154 | 0.026 | | | | | | |
| | | 1.822 | | | 1.957 | 1.179 | | | | | | | | | | | | | | | | | |
| **1.2344** | **18.5462** | **1.8221** | **1.3900** | **15.9515** | **1.9566** | **1.1785** | **7.8915** | **2.6182** | **5.4030** | **5.5940** | **3.0159** | **1.2144** | **0.6211** | **0.6965** | **4.8523** | **5.9330** | **0.9967** | **0.3546** | **0.0626** | **0.3197** | **0.3181** | **0.1467** | **0.3662** |

| Southwest Coal Area | Southwest OB Area | Southwest Wind Erosion Area | South Coal Area | South OB Area | South Wind Erosion Area 1 | South Wind Erosion Area 2 | North Haul Road 1 to Circuit 4 Dump | North Haul Road 2 to Circuit 3 Dump | Northwest Haul Road to 6-North Dump | West Haul Road 1 to 5-West Dump | West Haul Road 2 to Primary Dump | West Haul Road 3 to 5-West Dump | West Haul Road 4 to Primary Dump | Southwest Haul Road 1 to Primary Dump | Southwest Haul Road 2 to Near Pit Dump | South Haul Road 1 to Near Pit Dump | South Haul Road 2 to Primary Dump | Circuit 4 Truck Dump | Circuit 3 Truck Dump | 6-North Truck Dump | 5-West Truck Dump | Primary Truck Dump | Near Pit Truck Dump |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BTSWC | BTSWOB | BTSWWE | BTSC | BTSOB | BTSWE1 | BTSWE2 | BNR1_1-20 | BNR2_1-40 | BNWR_1-12 | BWR1_1-23 | BWR2_1-44 | BWR3_1-25 | BWR4_1-43 | BSWR1_1-44 | BSWR2_1-25 | BSR1_1-37 | BSR2_1-59 | BT4TD | BT3TD | BT6TD | BT5TD | BTPTD | BTNPTD |
| Area | Area | Area | Area | Area | Area | Area | Areas | Areas | Areas | Areas | Areas | Areas | Areas | Areas | Areas | Areas | Areas | Area | Area | Area | Area | Area | Area |
| 472668.6574 | 472380.6229 | 471848.9894 | 472899.8482 | 472534.0882 | 472111.1638 | 474904.8014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 479767.5031 | 481152.9307 | 473886.8930 | 475758.6691 | 476805.4664 | 478800.6291 |
| 4834282.4355 | 4834282.4355 | 4834282.4355 | 4832854.4303 | 4832854.4303 | 4832854.4303 | 4832312.7556 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4843113.2555 | 4839749.3099 | 4840858.8153 | 4837546.3517 | 4838572.6800 | 4835563.7317 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 304.7999 | 1080.5145 | 2377.8739 | 365.7600 | 1524.4827 | 2793.6376 | 1219.9481 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 50.0000 | 50.0000 | 50.0000 | 50.0000 | 50.0000 | 50.0000 |
| 1562.3814 | 1562.3814 | 1562.3814 | 1428.0053 | 1428.0053 | 1428.0053 | 1969.6799 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 50.0000 | 50.0000 | 50.0000 | 50.0000 | 50.0000 | 50.0000 |
| 476,214 | 1,688,176 | 3,715,146 | 522,307 | 2,176,969 | 3,989,329 | 2,402,907 | 137,267 | 258,068 | 85,812 | 147,895 | 239,206 | 146,380 | 224,605 | 236,231 | 182,852 | 228,850 | 346,007 | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 |
| -- | -- | -- | -- | -- | -- | -- | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | -- | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- | -- | 4,576 | 8,602 | 2,860 | 4,930 | 7,974 | 4,879 | 7,487 | 7,874 | 6,095 | 7,628 | 11,534 | -- | -- | -- | -- | -- | -- |
| 2.592133E-06 | 1.098592E-05 | 4.904485E-07 | 2.661349E-06 | 7.327377E-06 | 4.904636E-07 | 4.904636E-07 | 5.749033E-05 | 1.014535E-05 | 6.296249E-05 | 3.782417E-05 | 1.260806E-05 | 8.296415E-06 | 2.765472E-06 | 2.948518E-06 | 2.653666E-05 | 2.592520E-05 | 2.880577E-06 | 1.418405E-04 | 2.503068E-05 | 1.278977E-04 | 1.272488E-04 | 5.869239E-05 | 1.464850E-04 |

**$PM_{10}$ Emission Apportioning**
**Year 2023**
**Black Thunder Mine**

| Emission Activities | Total Annual $PM_{10}$ Emissions (g/s) | North Annual $PM_{10}$ Emissions (g/s) | Northwest Annual $PM_{10}$ Emissions (g/s) | West Annual $PM_{10}$ Emissions (g/s) | Southwest Annual $PM_{10}$ Emissions (g/s) | South Annual $PM_{10}$ Emissions (g/s) | H-way/Plant Annual $PM_{10}$ Emissions (g/s) | Section 16 Annual $PM_{10}$ Emissions (g/s) | North Wind Erosion Area $PM_{10}$ Emissions (g/s) | Northwest Coal Area $PM_{10}$ Emissions (g/s) | Northwest OB Area $PM_{10}$ Emissions (g/s) | Northwest Wind Erosion Area 1 $PM_{10}$ Emissions (g/s) | Northwest Wind Erosion Area 2 $PM_{10}$ Emissions (g/s) | West Coal Area 1 $PM_{10}$ Emissions (g/s) | West Coal Area 2 $PM_{10}$ Emissions (g/s) | West Coal Area 3 $PM_{10}$ Emissions (g/s) | West Coal Area 4 $PM_{10}$ Emissions (g/s) | West Coal Area 5 $PM_{10}$ Emissions (g/s) | West OB Area 1 $PM_{10}$ Emissions (g/s) | West OB Area 2 $PM_{10}$ Emissions (g/s) | West OB Area 3 $PM_{10}$ Emissions (g/s) | West Wind Erosion Area $PM_{10}$ Emissions (g/s) | Southwest Coal Area $PM_{10}$ Emissions (g/s) | Southwest OB Area $PM_{10}$ Emissions (g/s) | Southwest Wind Erosion Area $PM_{10}$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal | 1.722 | 0.000 | 0.419 | 0.604 | 0.229 | 0.368 | 0.000 | 0.102 | | 0.419 | | | | 0.015 | 0.158 | 0.158 | 0.159 | 0.113 | | | | | 0.229 | | |
| OB Removal (T/S) | 63.125 | 0.000 | 7.229 | 21.337 | 7.781 | 13.557 | 0.000 | 13.221 | | | 7.229 | | | | | | | | 0.513 | 10.565 | 10.259 | | | 7.781 | |
| OB Removal (dragline) | 34.832 | 0.000 | 11.497 | 13.587 | 0.000 | 9.747 | 0.000 | 0.000 | | | 11.497 | | | | | | | | 0.327 | 6.728 | 6.533 | | | 0.000 | |
| Scrapers | 1.392 | 0.000 | 0.339 | 0.488 | 0.185 | 0.298 | 0.000 | 0.083 | | | 0.339 | | | | | | | | 0.012 | 0.242 | 0.235 | | | 0.185 | |
| OB Blasting | 0.256 | 0.000 | 0.052 | 0.090 | 0.020 | 0.063 | 0.000 | 0.032 | | | 0.052 | | | | | | | | 0.002 | 0.045 | 0.043 | | | 0.020 | |
| Coal Blasting | 0.154 | 0.000 | 0.037 | 0.054 | 0.020 | 0.033 | 0.000 | 0.009 | | 0.037 | | | | 0.001 | 0.014 | 0.014 | 0.014 | 0.010 | | | | | 0.020 | | |
| OB Haul Roads | 32.755 | 0.000 | 3.821 | 11.078 | 4.043 | 7.034 | 0.000 | 6.779 | | | 3.821 | | | | | | | | 0.266 | 5.485 | 5.327 | | | 4.043 | |
| Coal Haul Roads | 34.460 | 0.000 | 6.535 | 10.890 | 5.278 | 11.186 | 0.000 | 0.571 | | | | | | | | | | | | | | | | | |
| Coal Dumping | 1.568 | 0.000 | 0.381 | 0.550 | 0.208 | 0.335 | 0.000 | 0.093 | | | | | | | | | | | | | | | | | |
| Dozers & Loaders on OB | 3.753 | 0.000 | 0.587 | 1.280 | 0.376 | 0.876 | 0.000 | 0.634 | | | 0.587 | | | | | | | | 0.031 | 0.634 | 0.615 | | | 0.376 | |
| Dozers & Loaders on Coal | 8.238 | 0.000 | 2.004 | 2.888 | 1.095 | 1.761 | 0.000 | 0.490 | | 2.004 | | | | 0.073 | 0.758 | 0.758 | 0.759 | 0.540 | | | | | 1.095 | | |
| Graders | 11.023 | 0.000 | 1.561 | 3.645 | 1.473 | 2.782 | 0.000 | 1.563 | | | | | | | | | | | | | | | | | |
| Water Trucks | 1.590 | 0.000 | 0.225 | 0.526 | 0.212 | 0.401 | 0.000 | 0.225 | | | | | | | | | | | | | | | | | |
| Wind Erosion | 25.093 | 4.277 | 5.101 | 7.709 | 2.530 | 3.629 | 0.281 | 1.565 | 4.277 | | | 1.510 | 3.592 | | | | | | | | | 7.709 | | | 2.530 |
| **Total** | **219.9600** | **4.2772** | **39.7886** | **74.7250** | **23.4494** | **52.0699** | **0.2814** | **25.3684** | **4.2772** | **2.4598** | **23.5247** | **1.5098** | **3.5917** | **0.0893** | **0.9304** | **0.9304** | **0.9323** | **0.6627** | **1.1505** | **23.6980** | **23.0119** | **7.7092** | **1.3446** | **12.4041** | **2.5297** |

Modeling Summary:

| Source Description | North Wind Erosion Area | Northwest Coal Area | Northwest OB Area | Northwest Wind Erosion Area 1 | Northwest Wind Erosion Area 2 | West Coal Area 1 | West Coal Area 2 | West Coal Area 3 | West Coal Area 4 | West Coal Area 5 | West OB Area 1 | West OB Area 2 | West OB Area 3 | West Wind Erosion Area | Southwest Coal Area | Southwest OB Area | Southwest Wind Erosion Area |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | BTNWE1 | BTNWC | BTNWOB | BTNWWE1 | BTNWWE2 | BTWC1 | BTWC2 | BTWC3 | BTWC4 | BTWC5 | BTWOB1 | BTWOB2 | BTWOB3 | BTWWE | BTSWC | BTSWOB | BTSWWE |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area |
| SW X-Coordinate | 474092.4963 | 472470.2420 | 472468.7580 | 472320.1286 | 470984.3417 | 471251.8272 | 471385.4494 | 471385.4494 | 471455.5534 | 471385.4494 | 471131.3700 | 471251.8272 | 471248.2777 | 470937.0160 | 471632.3374 | 471388.1926 | 470937.0160 |
| SW Y-Coordinate | 4843983.2285 | 4845165.3195 | 4844273.7795 | 4844208.7214 | 4841852.6729 | 4840597.8915 | 4839317.7315 | 4838037.5715 | 4836754.8512 | 4835843.0115 | 4840597.8915 | 4838037.5715 | 4835843.0115 | 4835844.8170 | 4834282.4355 | 4834282.4355 | 4834282.4355 |
| Angle | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Area X-Dimension (m) | 4444.0443 | 1595.9233 | 1597.4073 | 1772.3677 | 3108.1546 | 133.6222 | 140.2080 | 140.2080 | 140.2080 | 140.2080 | 534.4954 | 554.2462 | 627.8996 | 3203.8469 | 182.8800 | 853.7448 | 3301.3075 |
| Area Y-Dimension (m) | 1962.2837 | 411.4800 | 1550.3141 | 1736.7908 | 2356.0484 | 128.8923 | 1280.1600 | 1280.1600 | 1282.7203 | 911.8397 | 128.8923 | 2560.3200 | 2194.5600 | 4906.0219 | 1560.5760 | 1560.5760 | 1562.3814 |
| Area ($m^2$) | 8,720,476 | 656,691 | 2,476,483 | 3,078,232 | 7,322,963 | 17,223 | 179,489 | 179,489 | 179,848 | 127,847 | 68,892 | 1,419,048 | 1,377,963 | 15,718,143 | 285,398 | 1,332,334 | 5,157,901 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Road Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Model Emission Rate[1] | 4.904780E-07 | 3.745723E-06 | 9.499247E-06 | 4.904641E-07 | 4.904641E-07 | 5.183818E-06 | 5.183818E-06 | 5.183818E-06 | 5.183818E-06 | 5.183818E-06 | 1.669996E-05 | 1.669996E-05 | 1.669996E-05 | 4.904635E-07 | 4.711328E-06 | 9.310020E-06 | 4.904545E-07 |

1. Units are g/s-$m^2$ for area sources.

**$PM_{10}$ Emission Apportioning**
**Year 2023**
**Black Thunder Mine**

| South Coal Area | South OB Area | South Wind Erosion Area 1 | South Wind Erosion Area 2 | H-way/Plant Wind Erosion Area | Section 16 Coal Area 1 | Section 16 Coal Area 2 | Section 16 OB Area | Section 16 Wind Erosion Area | Northwest Haul Road to 6-North Dump | West Haul Road 1 to 5-West Dump | West Haul Road 2 to Primary Dump | West Haul Road 3 to 5-West Dump | West Haul Road 4 to Primary Dump | Southwest Haul Road 1 to Primary Dump | Southwest Haul Road 2 to Near Pit Dump | South Haul Road 1 to Near Pit Dump | South Haul Road 2 to Primary Dump | Section 16 Haul Road to West Hilight Dump | 6-North Truck Dump | 5-West Truck Dump | Primary Truck Dump | Near Pit Truck Dump | West Hilight Truck Dump |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) |
| 0.368 | | | | | 0.051 | 0.051 | | | | | | | | | | | | | | | | | |
| | 13.557 | | | | | | 13.221 | | | | | | | | | | | | | | | | |
| | 9.747 | | | | | | 0.000 | | | | | | | | | | | | | | | | |
| | 0.298 | | | | | | 0.083 | | | | | | | | | | | | | | | | |
| | 0.063 | | | | | | 0.032 | | | | | | | | | | | | | | | | |
| 0.033 | | | | | 0.005 | 0.005 | | | | | | | | | | | | | | | | | |
| | 7.034 | | | | | | 6.779 | | | | | | | | | | | | | | | | |
| | | | | | | | | | 6.535 | 3.965 | 2.026 | 3.293 | 1.607 | 0.642 | 4.635 | 9.668 | 1.519 | 0.571 | | | | | |
| | | | | | | | | | | | | | | | | | | | 0.381 | 0.412 | 0.192 | 0.489 | 0.093 |
| | 0.876 | | | | | | 0.634 | | | | | | | | | | | | | | | | |
| 1.761 | | | | | 0.245 | 0.245 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | 1.561 | 1.327 | 0.678 | 1.102 | 0.538 | 0.179 | 1.293 | 2.404 | 0.378 | 1.563 | | | | | |
| | | | | | | | | | 0.225 | 0.191 | 0.098 | 0.159 | 0.078 | 0.026 | 0.186 | 0.347 | 0.054 | 0.225 | | | | | |
| | | 2.779 | 0.850 | 0.281 | | | | 1.565 | | | | | | | | | | | | | | | |
| **2.1619** | **31.5744** | **2.7790** | **0.8504** | **0.2814** | **0.3009** | **0.3009** | **20.7487** | **1.5648** | **8.3213** | **5.4826** | **2.8019** | **4.5536** | **2.2223** | **0.8475** | **6.1150** | **12.4183** | **1.9507** | **2.3599** | **0.3814** | **0.4122** | **0.1918** | **0.4893** | **0.0933** |

| South Coal Area | South OB Area | South Wind Erosion Area 1 | South Wind Erosion Area 2 | H-way/Plant Wind Erosion Area | Section 16 Coal Area 1 | Section 16 Coal Area 2 | Section 16 OB Area | Section 16 Wind Erosion Area | Northwest Haul Road to 6-North Dump | West Haul Road 1 to 5-West Dump | West Haul Road 2 to Primary Dump | West Haul Road 3 to 5-West Dump | West Haul Road 4 to Primary Dump | Southwest Haul Road 1 to Primary Dump | Southwest Haul Road 2 to Near Pit Dump | South Haul Road 1 to Near Pit Dump | South Haul Road 2 to Primary Dump | Section 16 Haul Road to West Hilight Dump | 6-North Truck Dump | 5-West Truck Dump | Primary Truck Dump | Near Pit Truck Dump | West Hilight Truck Dump |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BTSC | BTSOB | BTSWE1 | BTSWE2 | BTHPWE | BT16C1 | BT16C2 | BT16OB | BT16WE | BNWR_1-18 | BWR1_1-26 | BWR2_1-47 | BWR3_1-27 | BWR4_1-45 | BSWR1_1-48 | BSWR2_1-29 | BSR1_1-43 | BSR2_1-65 | B16R_1-10 | BT6TD | BT5TD | BTPTD | BTNPTD | BT16TD |
| Area | Area | Area | Area | Area | Area | Area | Area | Area | Areas | Areas | Areas | Areas | Areas | Areas | Areas | Areas | Areas | Areas | Area | Area | Area | Area | Area |
| 471082.0978 | 471082.0978 | 470937.0160 | 474904.8014 | 477155.0138 | 469133.5104 | 469133.5104 | 469004.8247 | 468087.5108 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 473886.8930 | 475758.6691 | 476805.4664 | 478800.6291 | 470784.3774 |
| 4832856.7922 | 4832856.7922 | 4832854.4303 | 4832312.7556 | 4838685.1296 | 4838307.0047 | 4837750.0529 | 4837750.0529 | 4837711.1436 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4840858.8153 | 4837546.3517 | 4838572.6800 | 4835563.7317 | 4839527.4275 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 25.9513 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 352.0196 | 1086.2304 | 3967.7853 | 880.3060 | 1828.6965 | 95.5951 | 95.5951 | 224.2808 | 1879.6145 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 50.0000 | 50.0000 | 50.0000 | 50.0000 | 50.0000 |
| 1425.6434 | 1425.6434 | 1428.0053 | 1969.6799 | 313.8107 | 556.9518 | 556.9518 | 1624.0140 | 1697.5049 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 50.0000 | 50.0000 | 50.0000 | 50.0000 | 50.0000 |
| 501,854 | 1,548,577 | 5,666,018 | 1,733,921 | 573,865 | 53,242 | 53,242 | 364,235 | 3,190,655 | 141,179 | 171,264 | 262,576 | 168,561 | 246,786 | 269,148 | 215,769 | 283,136 | 400,293 | 76,887 | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | 4,706 | 5,709 | 8,753 | 5,619 | 8,226 | 8,972 | 7,192 | 9,438 | 13,343 | 2,563 | -- | -- | -- | -- | -- |
| 4.307848E-06 | 2.038928E-05 | 4.904645E-07 | 4.904645E-07 | 4.904007E-07 | 5.651179E-06 | 5.651179E-06 | 5.696505E-05 | 4.904470E-07 | 5.894145E-05 | 3.201270E-05 | 1.067090E-05 | 2.701490E-05 | 9.004965E-06 | 3.148959E-06 | 2.834063E-05 | 4.385978E-05 | 4.873309E-06 | 3.069277E-05 | 1.525488E-04 | 1.648970E-04 | 7.671210E-05 | 1.957180E-04 | 3.731939E-05 |

**$PM_{10}$ Emission Apportioning**
**Year 2018**
**School Creek Mine**

| Emission Activities | Total Annual $PM_{10}$ Emissions (g/s) | West Annual $PM_{10}$ Emissions (g/s) | East Annual $PM_{10}$ Emissions (g/s) | West Coal Area 1 $PM_{10}$ Emissions (g/s) | West Coal Area 2 $PM_{10}$ Emissions (g/s) | West Coal Area 3 $PM_{10}$ Emissions (g/s) | West OB Area 1 $PM_{10}$ Emissions (g/s) | West OB Area 2 $PM_{10}$ Emissions (g/s) | West Wind Erosion Area 1 $PM_{10}$ Emissions (g/s) | West Wind Erosion Area 2 $PM_{10}$ Emissions (g/s) | East Coal Area $PM_{10}$ Emissions (g/s) | East OB Area 1 $PM_{10}$ Emissions (g/s) | East OB Area 2 $PM_{10}$ Emissions (g/s) | East Wind Erosion Area 1 $PM_{10}$ Emissions (g/s) | East Wind Erosion Area 2 $PM_{10}$ Emissions (g/s) | East Wind Erosion Area 3 $PM_{10}$ Emissions (g/s) | West Haul Road 1 to Truck Dump 2 $PM_{10}$ Emissions (g/s) | West Haul Road 2 to Truck Dump 1 $PM_{10}$ Emissions (g/s) | East Haul Road to Truck Dump 1 $PM_{10}$ Emissions (g/s) | Truck Dump 1 $PM_{10}$ Emissions (g/s) | Truck Dump 2 $PM_{10}$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal | 0.362 | 0.181 | 0.181 | 0.057 | 0.062 | 0.062 | | | | | 0.181 | | | | | | | | | | |
| OB Removal (T/S) | 5.657 | 5.330 | 0.327 | | | | 1.702 | 3.628 | | | | 0.095 | 0.232 | | | | | | | | |
| OB Removal (dragline) | 5.302 | 3.215 | 2.087 | | | | 1.026 | 2.188 | | | | 0.606 | 1.482 | | | | | | | | |
| Scrapers | 0.463 | 0.231 | 0.231 | | | | 0.074 | 0.157 | | | | 0.067 | 0.164 | | | | | | | | |
| OB Blasting | 0.058 | 0.054 | 0.004 | | | | 0.017 | 0.037 | | | | 0.001 | 0.003 | | | | | | | | |
| Coal Blasting | 0.030 | 0.015 | 0.015 | 0.005 | 0.005 | 0.005 | | | | | 0.015 | | | | | | | | | | |
| OB Haul Roads | 0.923 | 0.852 | 0.070 | | | | 0.272 | 0.580 | | | | 0.020 | 0.050 | | | | | | | | |
| Coal Haul Roads | 3.776 | 1.332 | 2.444 | | | | | | | | | | | | | | 0.190 | 1.142 | 2.444 | | |
| Coal Dumping | 0.330 | 0.165 | 0.165 | | | | | | | | | | | | | | | | | 0.278 | 0.052 |
| Dozers on OB | 0.358 | 0.254 | 0.104 | | | | 0.081 | 0.173 | | | | 0.030 | 0.074 | | | | | | | | |
| Dozers on Reclamation | 0.092 | 0.087 | 0.005 | | | | 0.028 | 0.059 | | | | 0.002 | 0.004 | | | | | | | | |
| Dozers & Loaders on Coal | 1.240 | 0.620 | 0.620 | 0.197 | 0.212 | 0.212 | | | | | 0.620 | | | | | | | | | | |
| Graders on Coal Roads | 0.783 | 0.391 | 0.391 | | | | | | | | | | | | | | 0.056 | 0.336 | 0.391 | | |
| Graders on OB Roads | 0.522 | 0.261 | 0.261 | | | | 0.083 | 0.178 | | | | 0.076 | 0.185 | | | | | | | | |
| Water Trucks | 0.108 | 0.057 | 0.051 | | | | | | | | | | | | | | 0.008 | 0.049 | 0.051 | | |
| Wind Erosion | 9.768 | 4.884 | 4.884 | | | | | | 1.290 | 3.594 | | | | 0.771 | 1.261 | 2.852 | | | | | |
| **Total** | **29.7719** | **17.9284** | **11.8435** | **0.2588** | **0.2787** | **0.2787** | **3.2835** | **6.9997** | **1.2898** | **3.5943** | **0.8162** | **0.8971** | **2.1940** | **0.7712** | **1.2609** | **2.8520** | **0.2534** | **1.5265** | **2.8870** | **0.2778** | **0.0523** |

Modeling Summary:

| Source Description | West Coal Area 1 | West Coal Area 2 | West Coal Area 3 | West OB Area 1 | West OB Area 2 | West Wind Erosion Area 1 | West Wind Erosion Area 2 | East Coal Area | East OB Area 1 | East OB Area 2 | East Wind Erosion Area 1 | East Wind Erosion Area 2 | East Wind Erosion Area 3 | West Haul Road 1 to Truck Dump 2 | West Haul Road 2 to Truck Dump 1 | East Haul Road to Truck Dump 1 | Truck Dump 1 | Truck Dump 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | SCWC1 | SCWC2 | SCWC3 | SCWOB1 | SCWOB2 | SCWWE1 | SCWWE2 | SCEC | SCEOB1 | SCEOB2 | SCEWE1 | SCEWE2 | SCEWE3 | SCWR1_1-4 | SCWR2_1-13 | SCER_1-19 | SCTD1 | SCTD2 |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Areas | Areas | Areas | Area | Area |
| SW X-Coordinate | 473728.7271 | 477540.6394 | 477540.6394 | 473527.5591 | 477339.4664 | 473072.7882 | 477045.8675 | 482040.7604 | 482039.2702 | 482039.2702 | 480126.9426 | 481440.8799 | 482643.0616 | -- | -- | -- | 480133.0000 | 474903.0000 |
| SW Y-Coordinate | 4831678.2607 | 4829264.7048 | 4828026.0468 | 4831678.2607 | 4828023.4825 | 4831116.8599 | 4827524.5201 | 4827111.2372 | 4827681.4254 | 4826775.9410 | 4827015.8475 | 4825875.7747 | 4825146.4163 | -- | -- | -- | 4829440.0000 | 4831920.0000 |
| Angle | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | 0.0000 | 0.0000 |
| Area X-Dimension (m) | 201.1680 | 205.6688 | 205.6688 | 871.7280 | 876.2596 | 1832.0132 | 2873.8153 | 2294.8259 | 1671.0067 | 2296.3161 | 1313.9373 | 1202.1817 | 2121.4932 | -- | -- | -- | 50.0000 | 50.0000 |
| Area Y-Dimension (m) | 1175.8017 | 1238.6580 | 1238.6580 | 1175.8017 | 2493.5963 | 1737.5704 | 3086.8867 | 370.7482 | 508.7752 | 905.4844 | 1448.5545 | 2588.6273 | 3317.9857 | -- | -- | -- | 50.0000 | 50.0000 |
| Area ($m^2$) | 236,534 | 254,753 | 254,753 | 1,024,979 | 2,185,038 | 3,183,252 | 8,871,142 | 850,803 | 850,167 | 2,079,278 | 1,903,310 | 3,112,000 | 7,039,084 | 31,735 | 88,766 | 120,909 | 2,500 | 2,500 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 30 | 30 | 30 | -- | -- |
| Road Segment Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,058 | 2,959 | 4,030 | -- | -- |
| Model Emission Rate[1] | 1.094107E-06 | 1.094107E-06 | 1.094107E-06 | 3.203457E-06 | 3.203457E-06 | 4.051705E-07 | 4.051705E-07 | 9.593858E-07 | 1.055181E-06 | 1.055181E-06 | 4.051705E-07 | 4.051705E-07 | 4.051705E-07 | 7.983549E-06 | 1.719701E-05 | 2.387750E-05 | 1.111091E-04 | 2.093196E-05 |

1. Units are g/s-$m^2$ for area sources.

**$PM_{10}$ Emission Apportioning**
**Year 2023**
**School Creek Mine**

| Emission Activities | Total Annual $PM_{10}$ Emissions (g/s) | West Annual $PM_{10}$ Emissions (g/s) | East Annual $PM_{10}$ Emissions (g/s) | West Coal Area 1 $PM_{10}$ Emissions (g/s) | West Coal Area 2 $PM_{10}$ Emissions (g/s) | West Coal Area 3 $PM_{10}$ Emissions (g/s) | West OB Area 1 $PM_{10}$ Emissions (g/s) | West OB Area 2 $PM_{10}$ Emissions (g/s) | West OB Area 3 $PM_{10}$ Emissions (g/s) | West OB Area 4 $PM_{10}$ Emissions (g/s) | West OB Area 5 $PM_{10}$ Emissions (g/s) | West Wind Erosion Area 1 $PM_{10}$ Emissions (g/s) | West Wind Erosion Area 2 $PM_{10}$ Emissions (g/s) | East Coal Area 1 $PM_{10}$ Emissions (g/s) | East Coal Area 2 $PM_{10}$ Emissions (g/s) | East Coal Area 3 $PM_{10}$ Emissions (g/s) | East OB Area 1 $PM_{10}$ Emissions (g/s) | East OB Area 2 $PM_{10}$ Emissions (g/s) | East Wind Erosion Area 1 $PM_{10}$ Emissions (g/s) | East Wind Erosion Area 2 $PM_{10}$ Emissions (g/s) | West Haul Road 1 to Truck Dump 2 $PM_{10}$ Emissions (g/s) | West Haul Road 2 to Truck Dump 3 $PM_{10}$ Emissions (g/s) | East Haul Road to Truck Dump 3 $PM_{10}$ Emissions (g/s) | Truck Dump 2 $PM_{10}$ Emissions (g/s) | Truck Dump 3 $PM_{10}$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal | 0.362 | 0.181 | 0.181 | 0.082 | 0.038 | 0.061 | | | | | | | | 0.053 | 0.053 | 0.075 | | | | | | | | | |
| OB Removal (T/S) | 7.002 | 5.522 | 1.480 | | | | 0.435 | 1.621 | 0.765 | 0.765 | 1.936 | | | | | | 1.212 | 0.269 | | | | | | | |
| OB Removal (dragline) | 5.124 | 2.438 | 2.686 | | | | 0.192 | 0.716 | 0.338 | 0.338 | 0.855 | | | | | | 2.199 | 0.487 | | | | | | | |
| Scrapers | 0.463 | 0.231 | 0.231 | | | | 0.018 | 0.068 | 0.032 | 0.032 | 0.081 | | | | | | 0.189 | 0.042 | | | | | | | |
| OB Blasting | 0.071 | 0.055 | 0.016 | | | | 0.004 | 0.016 | 0.008 | 0.008 | 0.019 | | | | | | 0.013 | 0.003 | | | | | | | |
| Coal Blasting | 0.030 | 0.015 | 0.015 | 0.007 | 0.003 | 0.005 | | | | | | | | 0.004 | 0.004 | 0.006 | | | | | | | | | |
| OB Haul Roads | 1.528 | 1.088 | 0.440 | | | | 0.086 | 0.319 | 0.151 | 0.151 | 0.382 | | | | | | 0.360 | 0.080 | | | | | | | |
| Coal Haul Roads | 5.441 | 1.818 | 3.623 | | | | | | | | | | | | | | | | | | 0.806 | 1.012 | 3.623 | | |
| Coal Dumping | 0.330 | 0.165 | 0.165 | | | | | | | | | | | | | | | | | | | | | 0.110 | 0.221 |
| Dozers on OB | 0.372 | 0.229 | 0.143 | | | | 0.018 | 0.067 | 0.032 | 0.032 | 0.080 | | | | | | 0.117 | 0.026 | | | | | | | |
| Dozers on Reclamation | 0.099 | 0.078 | 0.021 | | | | 0.006 | 0.023 | 0.011 | 0.011 | 0.027 | | | | | | 0.017 | 0.004 | | | | | | | |
| Dozers & Loaders on Coal | 1.240 | 0.620 | 0.620 | 0.280 | 0.131 | 0.208 | | | | | | | | 0.181 | 0.181 | 0.258 | | | | | | | | | |
| Graders on Coal Roads | 0.908 | 0.454 | 0.454 | | | | | | | | | | | | | | | | | | 0.201 | 0.253 | 0.454 | | |
| Graders on OB Roads | 0.605 | 0.303 | 0.303 | | | | 0.024 | 0.089 | 0.042 | 0.042 | 0.106 | | | | | | 0.248 | 0.055 | | | | | | | |
| Water Trucks | 0.125 | 0.058 | 0.068 | | | | | | | | | | | | | | | | | | 0.026 | 0.032 | 0.068 | | |
| Wind Erosion | 8.919 | 4.459 | 4.459 | | | | | | | | | 2.091 | 2.368 | | | | | | 4.115 | 0.344 | | | | | |
| **Total** | **32.6188** | **17.7133** | **14.9055** | **0.3691** | **0.1730** | **0.2742** | **0.7828** | **2.9197** | **1.3772** | **1.3772** | **3.4865** | **2.0912** | **2.3681** | **0.2382** | **0.2382** | **0.3398** | **4.3553** | **0.9655** | **4.1149** | **0.3444** | **1.0326** | **1.2968** | **4.1442** | **0.1096** | **0.2205** |

Modeling Summary:

| Source Description | West Coal Area 1 | West Coal Area 2 | West Coal Area 3 | West OB Area 1 | West OB Area 2 | West OB Area 3 | West OB Area 4 | West OB Area 5 | West Wind Erosion Area 1 | West Wind Erosion Area 2 | East Coal Area 1 | East Coal Area 2 | East Coal Area 3 | East OB Area 1 | East OB Area 2 | East Wind Erosion Area 1 | East Wind Erosion Area 2 | West Haul Road 1 to Truck Dump 2 | West Haul Road 2 to Truck Dump 3 | East Haul Road to Truck Dump 3 | Truck Dump 2 | Truck Dump 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | SCWC1 | SCWC2 | SCWC3 | SCWOB1 | SCWOB2 | SCWOB3 | SCWOB4 | SCWOB5 | SCWWE1 | SCWWE2 | SCEC1 | SCEC2 | SCEC3 | SCEOB1 | SCEOB2 | SCEWE1 | SCEWE2 | SCWR1_1-8 | SCWR2_1-14 | SCER_1-28 | SCTD2 | SCTD3 |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Areas | Areas | Areas | Area | Area |
| SW X-Coordinate | 475155.1789 | 476797.3366 | 476350.4378 | 473222.6123 | 473222.6123 | 475071.4083 | 476551.4459 | 476082.1856 | 473072.7882 | 474904.8014 | 481236.1916 | 482413.9994 | 483591.8071 | 481236.1916 | 484440.2793 | 481135.3956 | 484764.5548 | -- | -- | -- | 474903.0000 | 479954.6692 |
| SW Y-Coordinate | 4831417.1968 | 4831501.7936 | 4830066.6313 | 4831670.1451 | 4831261.8310 | 4831417.1968 | 4831417.1968 | 4830066.6313 | 4830037.2297 | 4830037.2297 | 4825697.9332 | 4825697.9332 | 4825654.9574 | 4825456.5332 | 4825456.5332 | 4825050.3287 | 4825050.3287 | -- | -- | -- | 4831920.0000 | 4828970.8280 |
| Angle | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | 0.0000 | 0.0000 |
| Area X-Dimension (m) | 1642.1577 | 1233.9089 | 332.6904 | 170.8348 | 1848.7959 | 1480.0376 | 1480.0376 | 1070.3098 | 1832.0132 | 3419.3031 | 1177.8078 | 1177.8078 | 1877.1276 | 3204.0877 | 1028.6554 | 3629.1591 | 749.5793 | -- | -- | -- | 50.0000 | 50.0000 |
| Area Y-Dimension (m) | 229.6378 | 143.2393 | 842.2422 | 1184.7445 | 408.3141 | 240.5827 | 240.5827 | 842.2422 | 2817.2006 | 1709.3155 | 214.6290 | 214.6290 | 192.1276 | 932.2825 | 643.7441 | 2798.4100 | 1133.8912 | -- | -- | -- | 50.0000 | 50.0000 |
| Area ($m^2$) | 377,101 | 176,744 | 280,206 | 202,396 | 754,889 | 356,071 | 356,071 | 901,460 | 5,161,149 | 5,844,668 | 252,792 | 252,792 | 360,648 | 2,987,115 | 662,191 | 10,155,875 | 849,941 | 45,270 | 112,370 | 177,092 | 2,500 | 2,500 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 30 | 30 | 30 | -- | -- |
| Road Segment Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,509 | 3,746 | 5,903 | -- | -- |
| Model Emission Rate[1] | 9.786539E-07 | 9.786539E-07 | 9.786539E-07 | 3.867658E-06 | 3.867658E-06 | 3.867658E-06 | 3.867658E-06 | 3.867658E-06 | 4.051751E-07 | 4.051751E-07 | 9.422977E-07 | 9.422977E-07 | 9.422977E-07 | 1.458026E-06 | 1.458026E-06 | 4.051751E-07 | 4.051751E-07 | 2.281002E-05 | 1.154022E-05 | 2.340126E-05 | 4.384045E-05 | 8.820065E-05 |

1. Units are g/s-$m^2$ for area sources.

**$PM_{10}$ Emission Apportioning**
**Year 2018**
**NARM**

| Emission Activities | Total Annual $PM_{10}$ Emissions (g/s) | West Annual $PM_{10}$ Emissions (g/s) | North Annual $PM_{10}$ Emissions (g/s) | East Annual $PM_{10}$ Emissions (g/s) | West Coal Area 1 $PM_{10}$ Emissions (g/s) | West Coal Area 2 $PM_{10}$ Emissions (g/s) | West Coal Area 3 $PM_{10}$ Emissions (g/s) | West OB Area 1 $PM_{10}$ Emissions (g/s) | West OB Area 2 $PM_{10}$ Emissions (g/s) | West OB Area 3 $PM_{10}$ Emissions (g/s) | West Wind Erosion Area $PM_{10}$ Emissions (g/s) | North Coal Area 1 $PM_{10}$ Emissions (g/s) | North Coal Area 2 $PM_{10}$ Emissions (g/s) | North Coal Area 3 $PM_{10}$ Emissions (g/s) | North Coal Area 4 $PM_{10}$ Emissions (g/s) | North Coal Area 5 $PM_{10}$ Emissions (g/s) | North Coal Area 6 $PM_{10}$ Emissions (g/s) | North Coal Area 7 $PM_{10}$ Emissions (g/s) | North Coal Area 8 $PM_{10}$ Emissions (g/s) | North OB Area 1 $PM_{10}$ Emissions (g/s) | North OB Area 2 $PM_{10}$ Emissions (g/s) | North OB Area 3 $PM_{10}$ Emissions (g/s) | North OB Area 4 $PM_{10}$ Emissions (g/s) | North OB Area 5 $PM_{10}$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal | 1.269 | 0.355 | 0.406 | 0.507 | 0.120 | 0.117 | 0.117 | | | | | 0.056 | 0.044 | 0.054 | 0.061 | 0.061 | 0.043 | 0.043 | 0.044 | | | | | |
| OB Removal (T/S) | 25.669 | 8.494 | 11.403 | 5.772 | | | | 2.344 | 0.618 | 5.532 | | | | | | | | | | 1.841 | 0.929 | 1.280 | 1.445 | 1.378 |
| OB Removal (dragline) | 19.256 | 4.207 | 6.958 | 8.091 | | | | 1.161 | 0.306 | 2.740 | | | | | | | | | | 1.123 | 0.567 | 0.781 | 0.882 | 0.841 |
| Scrapers | 2.727 | 0.764 | 0.873 | 1.091 | | | | 0.211 | 0.056 | 0.497 | | | | | | | | | | 0.141 | 0.071 | 0.098 | 0.111 | 0.105 |
| OB Blasting | 0.164 | 0.052 | 0.071 | 0.040 | | | | 0.014 | 0.004 | 0.034 | | | | | | | | | | 0.012 | 0.006 | 0.008 | 0.009 | 0.009 |
| Coal Blasting | 0.106 | 0.030 | 0.034 | 0.042 | 0.010 | 0.010 | 0.010 | | | | | 0.005 | 0.004 | 0.005 | 0.005 | 0.005 | 0.004 | 0.004 | 0.004 | | | | | |
| OB Haul Roads | 7.383 | 3.089 | 4.147 | 0.148 | | | | 0.853 | 0.225 | 2.012 | | | | | | | | | | 0.669 | 0.338 | 0.465 | 0.526 | 0.501 |
| Coal Haul Roads | 10.435 | 4.426 | 3.846 | 2.164 | | | | | | | | | | | | | | | | | | | | |
| Coal Dumping | 1.155 | 0.324 | 0.370 | 0.462 | | | | | | | | | | | | | | | | | | | | |
| Dozers on OB | 1.009 | 0.289 | 0.339 | 0.381 | | | | 0.080 | 0.021 | 0.188 | | | | | | | | | | 0.055 | 0.028 | 0.038 | 0.043 | 0.041 |
| Dozers on Reclamation | 0.488 | 0.156 | 0.204 | 0.128 | | | | 0.043 | 0.011 | 0.102 | | | | | | | | | | 0.033 | 0.017 | 0.023 | 0.026 | 0.025 |
| Dozers & Loaders on Coal | 4.075 | 1.141 | 1.304 | 1.630 | 0.387 | 0.377 | 0.377 | | | | | 0.181 | 0.142 | 0.175 | 0.196 | 0.196 | 0.138 | 0.138 | 0.140 | | | | | |
| Graders on Coal Roads | 1.865 | 0.522 | 0.597 | 0.746 | | | | | | | | | | | | | | | | | | | | |
| Graders on OB Roads | 2.797 | 0.926 | 1.243 | 0.629 | | | | 0.255 | 0.067 | 0.603 | | | | | | | | | | 0.201 | 0.101 | 0.139 | 0.157 | 0.150 |
| Water Trucks | 0.975 | 0.411 | 0.464 | 0.100 | | | | | | | | | | | | | | | | | | | | |
| Wind Erosion | 21.351 | 5.978 | 6.832 | 8.540 | | | | | | | 5.978 | | | | | | | | | | | | | |
| **Total** | **100.7233** | **31.1621** | **39.0901** | **30.4711** | **0.5170** | **0.5045** | **0.5045** | **4.9616** | **1.3070** | **11.7072** | **5.9783** | **0.2419** | **0.1895** | **0.2339** | **0.2618** | **0.2618** | **0.1840** | **0.1840** | **0.1869** | **4.0743** | **2.0554** | **2.8325** | **3.1986** | **3.0500** |

Modeling Summary:

| Source Description | West Coal Area 1 | West Coal Area 2 | West Coal Area 3 | West OB Area 1 | West OB Area 2 | West OB Area 3 | West Wind Erosion Area | North Coal Area 1 | North Coal Area 2 | North Coal Area 3 | North Coal Area 4 | North Coal Area 5 | North Coal Area 6 | North Coal Area 7 | North Coal Area 8 | North OB Area 1 | North OB Area 2 | North OB Area 3 | North OB Area 4 | North OB Area 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | NAWC1 | NAWC2 | NAWC3 | NAWOB1 | NAWOB2 | NAWOB3 | NAWWE | NANC1 | NANC2 | NANC3 | NANC4 | NANC5 | NANC6 | NANC7 | NANC8 | NANOB1 | NANOB2 | NANOB3 | NANOB4 | NANOB5 |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area |
| SW X-Coordinate | 474183.8130 | 473646.8908 | 473646.8908 | 473915.4859 | 474783.5390 | 473378.6716 | 472901.5851 | 470741.0351 | 470741.0351 | 471958.2939 | 472964.1297 | 474082.7585 | 475201.3872 | 476383.2485 | 477565.1097 | 470741.0351 | 470741.0351 | 471958.2963 | 472964.1317 | 473997.1655 |
| SW Y-Coordinate | 4818950.7672 | 4817551.7232 | 4816154.5916 | 4818950.7672 | 4818376.6757 | 4816082.1815 | 4815929.5148 | 4823548.3489 | 4824534.1932 | 4825338.8025 | 4826344.2106 | 4826344.2106 | 4826375.1852 | 4826375.1852 | 4826344.7062 | 4823209.2229 | 4824534.1929 | 4825003.1354 | 4825942.1946 | 4826076.4836 |
| Angle | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Area X-Dimension (m) | 267.7497 | 268.2240 | 268.2240 | 868.0531 | 204.6210 | 1025.7408 | 2860.9312 | 211.4237 | 1217.2637 | 1005.8409 | 1118.6288 | 1118.6288 | 1181.8612 | 1181.8612 | 1199.0195 | 732.7219 | 1217.2637 | 1005.8366 | 1033.0338 | 1204.2230 |
| Area Y-Dimension (m) | 1434.2172 | 1397.1316 | 1397.1316 | 1436.5800 | 1605.3622 | 2868.5857 | 4586.3331 | 985.8443 | 134.1011 | 200.3423 | 201.6605 | 201.6605 | 134.1675 | 134.1675 | 134.3168 | 1324.9701 | 402.3372 | 671.0129 | 737.7936 | 603.5046 |
| Area ($m^2$) | 384,011 | 374,744 | 374,744 | 1,247,028 | 328,491 | 2,942,425 | 13,121,183 | 208,431 | 163,236 | 201,512 | 225,583 | 225,583 | 158,567 | 158,567 | 161,048 | 970,835 | 489,750 | 674,929 | 762,166 | 726,754 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Road Segment Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Model Emission Rate[1] | 1.346206E-06 | 1.346206E-06 | 1.346206E-06 | 3.978757E-06 | 3.978757E-06 | 3.978757E-06 | 4.556215E-07 | 1.160651E-06 | 1.160651E-06 | 1.160651E-06 | 1.160651E-06 | 1.160651E-06 | 1.160651E-06 | 1.160651E-06 | 1.160651E-06 | 4.196748E-06 | 4.196748E-06 | 4.196748E-06 | 4.196748E-06 | 4.196748E-06 |

1. Units are g/s-$m^2$ for area sources.

**$PM_{10}$ Emission Apportioning**
**Year 2018**
**NARM**

| North OB Area 6 | North WInd Erosion Area 1 | North WInd Erosion Area 2 | North WInd Erosion Area 3 | East Coal Area 1 | East Coal Area 2 | East Coal Area 3 | East OB Area 1 | East OB Area 2 | East OB Area 3 | East OB Area 4 | East Wind Erosion Area 1 | East Wind Erosion Area 2 | East Wind Erosion Area 3 | West Haul Road 1 to Hopper A | West Haul Road 2 to Hopper A | North Haul Road 1 to Hopper N | North Haul Road 2 to Hopper N | North Haul Road 3 to Hopper N | North Haul Road 4 to Hopper N | East Haul Road 1 to Hopper D | East Haul Road 2 to Hopper D | Truck Hopper A | Truck Hopper N | Truck Hopper D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) |
| | | | | 0.384 | 0.062 | 0.062 | | | | | | | | | | | | | | | | | | |
| 4.530 | | | | | | | 3.259 | 0.744 | 1.700 | 0.069 | | | | | | | | | | | | | | |
| 2.764 | | | | | | | 4.569 | 1.043 | 2.383 | 0.097 | | | | | | | | | | | | | | |
| 0.347 | | | | | | | 0.616 | 0.141 | 0.321 | 0.013 | | | | | | | | | | | | | | |
| 0.028 | | | | | | | 0.023 | 0.005 | 0.012 | 0.000 | | | | | | | | | | | | | | |
| | | | | 0.032 | 0.005 | 0.005 | | | | | | | | | | | | | | | | | | |
| 1.647 | | | | | | | 0.083 | 0.019 | 0.043 | 0.002 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 1.259 | 3.167 | 0.983 | 0.469 | 1.046 | 1.347 | 1.520 | 0.643 | | | |
| | | | | | | | | | | | | | | | | | | | | | | 0.324 | 0.370 | 0.462 |
| 0.135 | | | | | | | 0.215 | 0.049 | 0.112 | 0.005 | | | | | | | | | | | | | | |
| 0.081 | | | | | | | 0.072 | 0.016 | 0.038 | 0.002 | | | | | | | | | | | | | | |
| | | | | 1.234 | 0.198 | 0.198 | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 0.149 | 0.374 | 0.153 | 0.073 | 0.162 | 0.209 | 0.524 | 0.222 | | | |
| 0.494 | | | | | | | 0.355 | 0.081 | 0.185 | 0.008 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 0.117 | 0.294 | 0.119 | 0.057 | 0.126 | 0.163 | 0.071 | 0.030 | | | |
| | 1.546 | 1.314 | 3.972 | | | | | | | | 4.158 | 1.245 | 3.138 | | | | | | | | | | | |
| **10.0264** | **1.5463** | **1.3136** | **3.9725** | **1.6502** | **0.2649** | **0.2649** | **9.1926** | **2.0978** | **4.7939** | **0.1943** | **4.1583** | **1.2446** | **3.1375** | **1.5245** | **3.8341** | **1.2543** | **0.5987** | **1.3350** | **1.7190** | **2.1149** | **0.8951** | **0.3235** | **0.3697** | **0.4621** |

| North OB Area 6 | North WInd Erosion Area 1 | North WInd Erosion Area 2 | North WInd Erosion Area 3 | East Coal Area 1 | East Coal Area 2 | East Coal Area 3 | East OB Area 1 | East OB Area 2 | East OB Area 3 | East OB Area 4 | East Wind Erosion Area 1 | East Wind Erosion Area 2 | East Wind Erosion Area 3 | West Haul Road 1 to Hopper A | West Haul Road 2 to Hopper A | North Haul Road 1 to Hopper N | North Haul Road 2 to Hopper N | North Haul Road 3 to Hopper N | North Haul Road 4 to Hopper N | East Haul Road 1 to Hopper D | East Haul Road 2 to Hopper D | Truck Hopper A | Truck Hopper N | Truck Hopper D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NANOB6 | NANWE1 | NANWE2 | NANWE3 | NAEC1 | NAEC2 | NAEC3 | NAEOB1 | NAEOB2 | NAEOB3 | NAEOB4 | NAEWE1 | NAEWE2 | NAEWE3 | NAWR1 1-25 | NAWR2 1-32 | NANR1 1-18 | NANR2 1-18 | NANR3 1-19 | NANR4 1-27 | NAER1 1-43 | NAER2 1-76 | HOPPERA | HOPPERN | HOPPERD |
| Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Areas | Areas | Areas | Areas | Areas | Areas | Areas | Areas | Area | Area | Area |
| 475201.3886 | 470474.8875 | 471958.2945 | 472964.1330 | 478763.1767 | 483540.0825 | 484701.1478 | 478762.7088 | 481236.0452 | 482643.0628 | 485448.8565 | 478766.1811 | 481440.8799 | 482643.0616 | -- | -- | -- | -- | -- | -- | -- | -- | 477892.4523 | 475114.8473 | 479688.2709 |
| 4826039.9052 | 4823118.1387 | 4823118.1387 | 4825513.1287 | 4825190.6328 | 4824723.1613 | 4824723.1613 | 4824787.6344 | 4824787.6344 | 4824320.8204 | 4824723.1613 | 4823603.5489 | 4823603.5489 | 4823020.4526 | -- | -- | -- | -- | -- | -- | -- | -- | 4818937.4957 | 4823955.5138 | 4820149.3278 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | -- | -- | -- | -- | -- | 0.0000 | 0.0000 | 0.0000 |
| 3562.8092 | 1483.4070 | 1005.8385 | 5802.0481 | 3294.1388 | 1161.0654 | 1161.0654 | 2473.3364 | 821.5333 | 2805.7938 | 413.3567 | 2674.6988 | 1202.1817 | 3239.1878 | -- | -- | -- | -- | -- | -- | -- | -- | 50.0000 | 50.0000 | 50.0000 |
| 670.5600 | 2287.8320 | 2866.3860 | 1502.7188 | 335.4007 | 152.7370 | 152.7370 | 1207.4658 | 829.5894 | 555.0779 | 152.7370 | 3412.2986 | 2272.2258 | 2125.9637 | -- | -- | -- | -- | -- | -- | -- | -- | 50.0000 | 50.0000 | 50.0000 |
| 2,389,077 | 3,393,786 | 2,883,121 | 8,718,847 | 1,104,856 | 177,338 | 177,338 | 2,986,469 | 681,535 | 1,557,434 | 63,135 | 9,126,871 | 2,731,628 | 6,886,396 | 126,791 | 163,385 | 115,535 | 101,715 | 101,303 | 123,074 | 180,048 | 237,389 | 2,500 | 2,500 | 2,500 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | -- | -- | -- |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4,226 | 5,446 | 3,851 | 3,391 | 3,377 | 4,102 | 6,002 | 7,913 | -- | -- | -- |
| 4.196748E-06 | 4.556179E-07 | 4.556179E-07 | 4.556179E-07 | 1.493555E-06 | 1.493555E-06 | 1.493555E-06 | 3.078077E-06 | 3.078077E-06 | 3.078077E-06 | 3.078077E-06 | 4.556130E-07 | 4.556130E-07 | 4.556130E-07 | 1.202347E-05 | 2.346664E-05 | 1.085604E-05 | 5.885984E-06 | 1.317814E-05 | 1.396727E-05 | 1.174622E-05 | 3.770711E-06 | ~~1.294003E-04~~ | ~~1.478860E-04~~ | ~~1.848575E-04~~ |

**$PM_{10}$ Emission Apportioning**
**Year 2023**
**NARM**

| Emission Activities | Total Annual $PM_{10}$ Emissions (g/s) | West Annual $PM_{10}$ Emissions (g/s) | North Annual $PM_{10}$ Emissions (g/s) | West Coal Area 1 $PM_{10}$ Emissions (g/s) | West Coal Area 2 $PM_{10}$ Emissions (g/s) | West OB Area 1 $PM_{10}$ Emissions (g/s) | West OB Area 2 $PM_{10}$ Emissions (g/s) | West OB Area 3 $PM_{10}$ Emissions (g/s) | West OB Area 4 $PM_{10}$ Emissions (g/s) | West Wind Erosion Area 1 $PM_{10}$ Emissions (g/s) | West Wind Erosion Area 2 $PM_{10}$ Emissions (g/s) | North Coal Area 1 $PM_{10}$ Emissions (g/s) | North Coal Area 2 $PM_{10}$ Emissions (g/s) | North Coal Area 3 $PM_{10}$ Emissions (g/s) | North Coal Area 4 $PM_{10}$ Emissions (g/s) | North Coal Area 5 $PM_{10}$ Emissions (g/s) | North Coal Area 6 $PM_{10}$ Emissions (g/s) | North Coal Area 7 $PM_{10}$ Emissions (g/s) | North Coal Area 8 $PM_{10}$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal | 1.269 | 0.476 | 0.793 | 0.205 | 0.271 | | | | | | | 0.014 | 0.014 | 0.014 | 0.014 | 0.149 | 0.078 | 0.231 | 0.092 |
| OB Removal (T/S) | 25.340 | 11.122 | 14.219 | | | 2.011 | 4.493 | 1.934 | 2.683 | | | | | | | | | | |
| OB Removal (dragline) | 16.343 | 9.385 | 6.958 | | | 1.697 | 3.791 | 1.632 | 2.264 | | | | | | | | | | |
| Scrapers | 2.967 | 1.113 | 1.855 | | | 0.201 | 0.450 | 0.194 | 0.268 | | | | | | | | | | |
| OB Blasting | 0.159 | 0.072 | 0.088 | | | 0.013 | 0.029 | 0.012 | 0.017 | | | | | | | | | | |
| Coal Blasting | 0.106 | 0.040 | 0.066 | 0.017 | 0.023 | | | | | | | 0.001 | 0.001 | 0.001 | 0.001 | 0.012 | 0.007 | 0.019 | 0.008 |
| OB Haul Roads | 9.215 | 4.044 | 5.171 | | | 0.731 | 1.634 | 0.703 | 0.976 | | | | | | | | | | |
| Coal Haul Roads | 10.032 | 3.954 | 6.077 | | | | | | | | | | | | | | | | |
| Coal Dumping | 1.155 | 0.433 | 0.722 | | | | | | | | | | | | | | | | |
| Dozers on OB | 0.941 | 0.362 | 0.579 | | | 0.065 | 0.146 | 0.063 | 0.087 | | | | | | | | | | |
| Dozers on Reclamation | 0.521 | 0.222 | 0.299 | | | 0.040 | 0.090 | 0.039 | 0.054 | | | | | | | | | | |
| Dozers & Loaders on Coal | 4.327 | 1.623 | 2.705 | 0.699 | 0.924 | | | | | | | 0.049 | 0.049 | 0.049 | 0.049 | 0.507 | 0.266 | 0.789 | 0.314 |
| Graders on Coal Roads | 2.025 | 0.759 | 1.266 | | | | | | | | | | | | | | | | |
| Graders on OB Roads | 3.038 | 1.333 | 1.704 | | | 0.241 | 0.539 | 0.232 | 0.322 | | | | | | | | | | |
| Water Trucks | 1.064 | 0.449 | 0.615 | | | | | | | | | | | | | | | | |
| Wind Erosion | 21.351 | 8.007 | 13.344 | | | | | | | 1.645 | 6.361 | | | | | | | | |
| **Total** | **99.8545** | **43.3937** | **56.4607** | **0.9205** | **1.2177** | **5.0007** | **11.1708** | **4.8093** | **6.6721** | **1.6453** | **6.3614** | **0.0647** | **0.0647** | **0.0647** | **0.0647** | **0.6677** | **0.3509** | **1.0394** | **0.4131** |

Modeling Summary:

| Source Description | West Coal Area 1 | West Coal Area 2 | West OB Area 1 | West OB Area 2 | West OB Area 3 | West OB Area 4 | West Wind Erosion Area 1 | West Wind Erosion Area 2 | North Coal Area 1 | North Coal Area 2 | North Coal Area 3 | North Coal Area 4 | North Coal Area 5 | North Coal Area 6 | North Coal Area 7 | North Coal Area 8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | NAWC1 | NAWC2 | NAWOB1 | NAWOB2 | NAWOB3 | NAWOB4 | NAWWE1 | NAWWE2 | NANC1 | NANC2 | NANC3 | NANC4 | NANC5 | NANC6 | NANC7 | NANC8 |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area |
| SW X-Coordinate | 472578.3766 | 471976.6677 | 474112.7751 | 472037.5468 | 471976.6677 | 472496.7554 | 472940.3898 | 471843.6814 | 470671.5529 | 470671.5529 | 470671.5529 | 470671.5529 | 471002.7667 | 471958.2905 | 472964.1281 | 475201.3872 |
| SW Y-Coordinate | 4818939.3405 | 4817032.8460 | 4820382.5731 | 4818939.3407 | 4816947.1225 | 4816596.9922 | 4820515.8479 | 4815929.5148 | 4823619.0895 | 4824169.2004 | 4824719.3113 | 4825269.4222 | 4826009.4257 | 4826210.5975 | 4827149.4790 | 4827179.8572 |
| Angle | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Area X-Dimension (m) | 465.0102 | 463.2151 | 680.3406 | 1676.4000 | 520.0877 | 613.6874 | 1947.5901 | 3044.2984 | 67.6841 | 67.6841 | 67.6841 | 67.6841 | 955.5229 | 1005.8376 | 2237.2591 | 1181.8611 |
| Area Y-Dimension (m) | 1435.6214 | 1906.4947 | 1583.5795 | 1435.6212 | 1992.2183 | 2342.3484 | 1854.1486 | 4586.3331 | 550.1109 | 550.1109 | 550.1109 | 550.1109 | 402.1433 | 200.7641 | 267.3656 | 201.1692 |
| Area ($m^2$) | 667,579 | 883,117 | 1,077,373 | 2,406,675 | 1,036,128 | 1,437,470 | 3,611,121 | 13,962,167 | 37,234 | 37,234 | 37,234 | 37,234 | 384,257 | 201,936 | 598,166 | 237,754 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Road Segment Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Model Emission Rate[1] | 1.378847E-06 | 1.378847E-06 | 4.641585E-06 | 4.641585E-06 | 4.641585E-06 | 4.641585E-06 | 4.556143E-07 | 4.556143E-07 | 1.737718E-06 | 1.737718E-06 | 1.737718E-06 | 1.737718E-06 | 1.737718E-06 | 1.737718E-06 | 1.737718E-06 | 1.737718E-06 |

1. Units are g/s-$m^2$ for area sources.

**$PM_{10}$ Emission Apportioning**
**Year 2023**
**NARM**

| North Coal Area 9 | North Coal Area 10 | North OB Area 1 | North OB Area 2 | North OB Area 3 | North OB Area 4 | North OB Area 5 | North OB Area 6 | North OB Area 7 | North WInd Erosion Area 1 | North WInd Erosion Area 2 | North WInd Erosion Area 3 | North WInd Erosion Area 4 | West Haul Road 1 to Hopper A | West Haul Road 2 to Hopper A | North Haul Road 1 to Hopper N | North Haul Road 2 to Hopper N | North Haul Road 3 to Hopper N | North Haul Road 4 to Hopper N | Truck Hopper A | Truck Hopper N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) | $PM_{10}$ Emissions (g/s) |
| 0.092 | 0.094 | | | | | | | | | | | | | | | | | | | |
| | | 0.335 | 0.335 | 1.359 | 0.261 | 1.988 | 6.468 | 3.473 | | | | | | | | | | | | |
| | | 0.164 | 0.164 | 0.665 | 0.128 | 0.973 | 3.165 | 1.700 | | | | | | | | | | | | |
| | | 0.044 | 0.044 | 0.177 | 0.034 | 0.259 | 0.844 | 0.453 | | | | | | | | | | | | |
| | | 0.002 | 0.002 | 0.008 | 0.002 | 0.012 | 0.040 | 0.021 | | | | | | | | | | | | |
| 0.008 | 0.008 | | | | | | | | | | | | | | | | | | | |
| | | 0.122 | 0.122 | 0.494 | 0.095 | 0.723 | 2.352 | 1.263 | | | | | | | | | | | | |
| | | | | | | | | | | | | | 1.507 | 2.447 | 0.425 | 1.795 | 1.604 | 2.254 | | |
| | | | | | | | | | | | | | | | | | | | 0.433 | 0.722 |
| | | 0.014 | 0.014 | 0.055 | 0.011 | 0.081 | 0.264 | 0.142 | | | | | | | | | | | | |
| | | 0.007 | 0.007 | 0.029 | 0.005 | 0.042 | 0.136 | 0.073 | | | | | | | | | | | | |
| 0.314 | 0.319 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | 0.289 | 0.470 | 0.088 | 0.374 | 0.334 | 0.469 | | |
| | | 0.040 | 0.040 | 0.163 | 0.031 | 0.238 | 0.775 | 0.416 | | | | | | | | | | | | |
| | | | | | | | | | | | | | 0.171 | 0.278 | 0.043 | 0.182 | 0.162 | 0.228 | | |
| | | | | | | | | | 0.937 | 3.209 | 5.391 | 3.807 | | | | | | | | |
| **0.4131** | **0.4204** | **0.7269** | **0.7269** | **2.9514** | **0.5658** | **4.3170** | **14.0429** | **7.5415** | **0.9375** | **3.2090** | **5.3912** | **3.8067** | **1.9677** | **3.1950** | **0.5561** | **2.3508** | **2.1005** | **2.9510** | **0.4333** | **0.7221** |

| North Coal Area 9 | North Coal Area 10 | North OB Area 1 | North OB Area 2 | North OB Area 3 | North OB Area 4 | North OB Area 5 | North OB Area 6 | North OB Area 7 | North WInd Erosion Area 1 | North WInd Erosion Area 2 | North WInd Erosion Area 3 | North WInd Erosion Area 4 | West Haul Road 1 to Hopper A | West Haul Road 2 to Hopper A | North Haul Road 1 to Hopper N | North Haul Road 2 to Hopper N | North Haul Road 3 to Hopper N | North Haul Road 4 to Hopper N | Truck Hopper A | Truck Hopper N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NANC9 | NANC10 | NANOB1 | NANOB2 | NANOB3 | NANOB4 | NANOB5 | NANOB6 | NANOB7 | NANWE1 | NANWE2 | NANWE3 | NANWE4 | NAWR1_1-31 | NAWR2_1-38 | NANR1_1-21 | NANR2_1-25 | NANR3_1-22 | NANR4_1-30 | HOPPERA | HOPPERN |
| Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Areas | Areas | Areas | Areas | Areas | Areas | Area | Area |
| 476383.2483 | 477565.1097 | 470537.9628 | 470537.9628 | 470739.2370 | 471958.2896 | 471002.7667 | 472964.1281 | 478764.4177 | 470257.2773 | 471002.7667 | 472964.1281 | 478764.4177 | -- | -- | -- | -- | -- | -- | 477892.4523 | 475114.8473 |
| 4827179.8572 | 4827149.3782 | 4823619.0895 | 4824719.3113 | 4825271.8094 | 4825838.0626 | 4826009.4257 | 4826814.1030 | 4826598.9961 | 4823523.4788 | 4823523.4788 | 4825813.6124 | 4824504.7358 | -- | -- | -- | -- | -- | -- | 4818937.4957 | 4823955.5138 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | -- | -- | -- | 0.0000 | 0.0000 |
| 1181.8611 | 1199.3080 | 201.2743 | 201.2743 | 1219.0526 | 1005.8385 | 1961.3614 | 5800.2896 | 1607.2016 | 745.4894 | 1961.3614 | 5800.2896 | 2370.9779 | -- | -- | -- | -- | -- | -- | 50.0000 | 50.0000 |
| 201.1692 | 201.7374 | 1100.2218 | 1100.2218 | 737.6164 | 171.3632 | 670.5650 | 737.6114 | 1429.5797 | 2760.0036 | 3590.9928 | 2040.0376 | 3523.8400 | -- | -- | -- | -- | -- | -- | 50.0000 | 50.0000 |
| 237,754 | 241,945 | 221,446 | 221,446 | 899,193 | 172,364 | 1,315,220 | 4,278,360 | 2,297,623 | 2,057,553 | 7,043,235 | 11,832,809 | 8,354,947 | 172,959 | 212,291 | 134,739 | 144,706 | 126,710 | 148,418 | 2,500 | 2,500 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 30 | 30 | 30 | 30 | 30 | 30 | -- | -- |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5,765 | 7,076 | 4,491 | 4,824 | 4,224 | 4,947 | -- | -- |
| 1.737718E-06 | 1.737718E-06 | 3.282309E-06 | 3.282309E-06 | 3.282309E-06 | 3.282309E-06 | 3.282309E-06 | 3.282309E-06 | 3.282309E-06 | 4.556185E-07 | 4.556185E-07 | 4.556185E-07 | 4.556185E-07 | 1.137682E-05 | 1.505002E-05 | 4.127450E-06 | 1.624522E-05 | 1.657703E-05 | 1.988285E-05 | 1.733039E-04 | 2.888399E-04 |

**$PM_{10}$ Emission Apportioning**
**Year 2018**
**Antelope Mine**

| Emission Activities | Total Annual $PM_{10}$ Emissions (g/s) | Pit 1 Annual $PM_{10}$ Emissions (g/s) | Pit 2 Annual $PM_{10}$ Emissions (g/s) | Pit 4 Annual $PM_{10}$ Emissions (g/s) | Pit 1 Coal Area 1 $PM_{10}$ Emissions (g/s) | Pit 1 Coal Area 2 $PM_{10}$ Emissions (g/s) | Pit 1 OB Area $PM_{10}$ Emissions (g/s) | Pit 1 Wind Erosion Area $PM_{10}$ Emissions (g/s) | Pit 2 Coal Area 1 $PM_{10}$ Emissions (g/s) | Pit 2 Coal Area 2 $PM_{10}$ Emissions (g/s) | Pit 2 OB Area 1 $PM_{10}$ Emissions (g/s) | Pit 2 OB Area 2 $PM_{10}$ Emissions (g/s) | Pit 2 WInd Erosion Area $PM_{10}$ Emissions (g/s) | Pit 4 Coal Area $PM_{10}$ Emissions (g/s) | Pit 4 OB Area 1 $PM_{10}$ Emissions (g/s) | Pit 4 OB Area 2 $PM_{10}$ Emissions (g/s) | Pit 4 Wind Erosion Area $PM_{10}$ Emissions (g/s) | Pit 1 Haul Road $PM_{10}$ Emissions (g/s) | Pit 2 Haul Road $PM_{10}$ Emissions (g/s) | Pit 4 Haul Road $PM_{10}$ Emissions (g/s) | Near Pit Truck Dump $PM_{10}$ Emissions (g/s) | SMA Truck Dump $PM_{10}$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal | 0.471 | 0.156 | 0.245 | 0.071 | 0.078 | 0.078 | | | 0.122 | 0.122 | | | | 0.071 | | | | | | | | |
| Topsoil and OB Removal (T/S) | 24.524 | 3.211 | 16.769 | 4.544 | | | 3.211 | | | | 16.169 | 0.600 | | | 2.626 | 1.917 | | | | | | |
| OB Removal (dragline) | 5.224 | 5.224 | 0.000 | 0.000 | | | 5.224 | | | | 0.000 | 0.000 | | | 0.000 | 0.000 | | | | | | |
| Scrapers | 0.951 | 0.254 | 0.549 | 0.149 | | | 0.254 | | | | 0.529 | 0.020 | | | 0.086 | 0.063 | | | | | | |
| OB Blasting | 0.120 | 0.032 | 0.069 | 0.019 | | | 0.032 | | | | 0.067 | 0.002 | | | 0.011 | 0.008 | | | | | | |
| Coal Blasting | 0.065 | 0.021 | 0.034 | 0.010 | 0.011 | 0.011 | | | 0.017 | 0.017 | | | | 0.010 | | | | | | | | |
| OB Haul Roads | 12.515 | 1.975 | 8.478 | 2.062 | | | 1.975 | | | | 8.174 | 0.304 | | | 1.192 | 0.870 | | | | | | |
| Coal Haul Roads | 12.867 | 4.025 | 6.861 | 1.981 | | | | | | | | | | | | | | 4.025 | 6.861 | 1.981 | | |
| Coal Dumping | 0.429 | 0.142 | 0.223 | 0.064 | | | | | | | | | | | | | | | | | 0.142 | 0.287 |
| Dozers and Loaders on OB | 0.937 | 0.123 | 0.641 | 0.174 | | | 0.123 | | | | 0.618 | 0.023 | | | 0.100 | 0.073 | | | | | | |
| Dozers and Loaders on Coal | 5.271 | 1.742 | 2.738 | 0.791 | 0.871 | 0.871 | | | 1.369 | 1.369 | | | | 0.791 | | | | | | | | |
| Graders | 4.486 | 1.403 | 2.392 | 0.691 | | | | | | | | | | | | | | 1.403 | 2.392 | 0.691 | | |
| Water Trucks | 0.591 | 0.142 | 0.357 | 0.091 | | | | | | | | | | | | | | 0.142 | 0.357 | 0.091 | | |
| Wind Erosion | 11.866 | 3.731 | 3.884 | 4.251 | | | | 3.731 | | | | | 3.884 | | | | 4.251 | | | | | |
| **Total** | **80.3165** | **22.1805** | **43.2400** | **14.8959** | **0.9598** | **0.9598** | **10.8183** | **3.7311** | **1.5082** | **1.5082** | **25.5567** | **0.9491** | **3.8845** | **0.8711** | **4.0153** | **2.9312** | **4.2509** | **5.5698** | **9.6105** | **2.7632** | **0.1419** | **0.2873** |

Modeling Summary:

| Source Description | Pit 1 Coal Area 1 | Pit 1 Coal Area 2 | Pit 1 OB Area | Pit 1 Wind Erosion Area | Pit 2 Coal Area 1 | Pit 2 Coal Area 2 | Pit 2 OB Area 1 | Pit 2 OB Area 2 | Pit 2 WInd Erosion Area | Pit 4 Coal Area | Pit 4 OB Area 1 | Pit 4 OB Area 2 | Pit 4 Wind Erosion Area | Pit 1 Haul Road | Pit 2 Haul Road | Pit 4 Haul Road | Near Pit Truck Dump | SMA Truck Dump |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | A1C1 | A1C2 | A1OB | A1WE | A2C1 | A2C2 | A2OB1 | A2OB2 | A2WE | A4C | A4OB1 | A4OB2 | A4WE | A1R_1-10 | A2R_1-26 | A4R_1-22 | NPTD | SMATD |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Areas | Areas | Areas | Area | Area |
| SW X-Coordinate | 469058.4886 | 470276.1032 | 469147.1152 | 468930.8896 | 467401.3146 | 468834.3547 | 467401.3146 | 466747.8882 | 466673.9652 | 468101.4416 | 466466.3199 | 468028.2896 | 466345.1027 | -- | -- | -- | 470476.5932 | 471083.6893 |
| SW Y-Coordinate | 4818561.3095 | 4818948.7821 | 4818282.8048 | 4817023.5200 | 4816244.7787 | 4816244.7787 | 4815894.2575 | 4815649.7459 | 4815027.0811 | 4810668.1226 | 4810664.8326 | 4810664.8326 | 4810454.2572 | -- | -- | -- | 4816812.1095 | 4813327.8251 |
| Angle | -17.6523 | -17.6523 | -17.6523 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | 0.0000 | 0.0000 |
| Area X-Dimension (m) | 1277.7794 | 1277.7794 | 2555.5588 | 2680.7087 | 1433.0402 | 1433.0402 | 2866.3888 | 371.6866 | 3690.4987 | 365.7600 | 1561.9698 | 771.3478 | 3730.3358 | -- | -- | -- | 50.0000 | 50.0000 |
| Area Y-Dimension (m) | 177.7617 | 177.7617 | 581.4476 | 2610.7088 | 253.4365 | 253.4365 | 849.6318 | 243.3180 | 1974.3547 | 1613.0702 | 1096.9590 | 1621.6106 | 2137.5011 | -- | -- | -- | 50.0000 | 50.0000 |
| Area ($m^2$) | 227,140 | 227,140 | 1,485,924 | 6,998,550 | 363,185 | 363,185 | 2,435,375 | 90,438 | 7,286,353 | 589,997 | 1,713,417 | 1,250,826 | 7,973,597 | 65,627 | 131,273 | 104,073 | 2,500 | 2,500 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 30 | 30 | 30 | -- | -- |
| Road Segment Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,188 | 4,376 | 3,469 | -- | -- |
| Model Emission Rate[1] | 4.225465E-06 | 4.225465E-06 | 7.280535E-06 | 5.331194E-07 | 4.152749E-06 | 4.152749E-06 | 1.049394E-05 | 1.049394E-05 | 5.331194E-07 | 1.476372E-06 | 2.343426E-06 | 2.343426E-06 | 5.331194E-07 | 8.487025E-05 | 7.320953E-05 | 2.655019E-05 | 5.674099E-05 | 1.149124E-04 |

1. Units are g/s-$m^2$ for area sources.

**$PM_{10}$ Emission Apportioning**
**Year 2023**
**Antelope Mine**

| Emission Activities | Total Annual $PM_{10}$ Emissions (g/s) | Pit 1 Annual $PM_{10}$ Emissions (g/s) | Pit 2 Annual $PM_{10}$ Emissions (g/s) | Pit 4 Annual $PM_{10}$ Emissions (g/s) | Pit 1 Coal Area 1 $PM_{10}$ Emissions (g/s) | Pit 1 Coal Area 2 $PM_{10}$ Emissions (g/s) | Pit 1 OB Area 1 $PM_{10}$ Emissions (g/s) | Pit 1 OB Area 2 $PM_{10}$ Emissions (g/s) | Pit 1 Wind Erosion Area $PM_{10}$ Emissions (g/s) | Pit 2 Coal Area 1 $PM_{10}$ Emissions (g/s) | Pit 2 Coal Area 2 $PM_{10}$ Emissions (g/s) | Pit 2 OB Area 1 $PM_{10}$ Emissions (g/s) | Pit 2 OB Area 2 $PM_{10}$ Emissions (g/s) | Pit 2 OB Area 3 $PM_{10}$ Emissions (g/s) | Pit 2 WInd Erosion Area 1 $PM_{10}$ Emissions (g/s) | Pit 2 WInd Erosion Area 2 $PM_{10}$ Emissions (g/s) | Pit 4 Coal Area $PM_{10}$ Emissions (g/s) | Pit 4 OB Area 1 $PM_{10}$ Emissions (g/s) | Pit 4 OB Area 2 $PM_{10}$ Emissions (g/s) | Pit 4 Wind Erosion Area $PM_{10}$ Emissions (g/s) | Pit 1 Haul Road $PM_{10}$ Emissions (g/s) | Pit 2 Haul Road 1 $PM_{10}$ Emissions (g/s) | Pit 2 Haul Road 2 $PM_{10}$ Emissions (g/s) | Pit 4 Haul Road $PM_{10}$ Emissions (g/s) | Near Pit Truck Dump $PM_{10}$ Emissions (g/s) | SMA Truck Dump $PM_{10}$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Removal | 0.471 | 0.128 | 0.338 | 0.005 | 0.064 | 0.064 | | | | 0.270 | 0.067 | | | | | | 0.005 | | | | | | | | | |
| Topsoil and OB Removal (T/S) | 23.605 | 3.380 | 20.219 | 0.005 | | | 1.586 | 1.795 | | | | 8.414 | 8.980 | 2.825 | | | | 0.004 | 0.001 | | | | | | | |
| OB Removal (dragline) | 5.224 | 5.224 | 0.000 | 0.000 | | | 2.450 | 2.773 | | | | 0.000 | 0.000 | 0.000 | | | | 0.000 | 0.000 | | | | | | | |
| Scrapers | 0.927 | 0.261 | 0.666 | 0.000 | | | 0.122 | 0.139 | | | | 0.277 | 0.296 | 0.093 | | | | 0.000 | 0.000 | | | | | | | |
| OB Blasting | 0.122 | 0.034 | 0.087 | 0.000 | | | 0.016 | 0.018 | | | | 0.036 | 0.039 | 0.012 | | | | 0.000 | 0.000 | | | | | | | |
| Coal Blasting | 0.065 | 0.018 | 0.046 | 0.001 | 0.009 | 0.009 | | | | 0.037 | 0.009 | | | | | | 0.001 | | | | | | | | | |
| OB Haul Roads | 12.215 | 2.026 | 10.186 | 0.003 | | | 0.950 | 1.076 | | | | 4.239 | 4.524 | 1.423 | | | | 0.002 | 0.001 | | | | | | | |
| Coal Haul Roads | 12.934 | 3.681 | 9.115 | 0.138 | | | | | | | | | | | | | | | | | 3.681 | 4.642 | 4.473 | 0.138 | | |
| Coal Dumping | 0.429 | 0.117 | 0.308 | 0.005 | | | | | | | | | | | | | | | | | | | | | 0.117 | 0.312 |
| Dozers and Loaders on OB | 0.876 | 0.125 | 0.750 | 0.000 | | | 0.059 | 0.067 | | | | 0.312 | 0.333 | 0.105 | | | | 0.000 | 0.000 | | | | | | | |
| Dozers and Loaders on Coal | 5.405 | 1.471 | 3.875 | 0.059 | 0.736 | 0.736 | | | | 3.102 | 0.773 | | | | | | 0.059 | | | | | | | | | |
| Graders | 4.371 | 1.244 | 3.080 | 0.047 | | | | | | | | | | | | | | | | | 1.244 | 1.569 | 1.512 | 0.047 | | |
| Water Trucks | 0.575 | 0.132 | 0.441 | 0.002 | | | | | | | | | | | | | | | | | 0.132 | 0.225 | 0.217 | 0.002 | | |
| Wind Erosion | 13.377 | 3.239 | 5.256 | 4.881 | | | | | 3.050 | | | | | | 4.949 | 0.781 | | | | 4.596 | | | | | | |
| **Total** | **80.5940** | **21.0808** | **54.3685** | **5.1447** | **0.8086** | **0.8086** | **5.1837** | **5.8669** | **3.0501** | **3.4099** | **0.8494** | **13.2789** | **14.1709** | **4.4588** | **4.9492** | **0.7811** | **0.0644** | **0.0062** | **0.0019** | **4.5963** | **5.0569** | **6.4351** | **6.2017** | **0.1863** | **0.1168** | **0.3123** |

Modeling Summary:

| Source Description | Pit 1 Coal Area 1 | Pit 1 Coal Area 2 | Pit 1 OB Area 1 | Pit 1 OB Area 2 | Pit 1 Wind Erosion Area | Pit 2 Coal Area 1 | Pit 2 Coal Area 2 | Pit 2 OB Area 1 | Pit 2 OB Area 2 | Pit 2 OB Area 3 | Pit 2 WInd Erosion Area 1 | Pit 2 WInd Erosion Area 2 | Pit 4 Coal Area | Pit 4 OB Area 1 | Pit 4 OB Area 2 | Pit 4 Wind Erosion Area | Pit 1 Haul Road | Pit 2 Haul Road 1 | Pit 2 Haul Road 2 | Pit 4 Haul Road | Near Pit Truck Dump | SMA Truck Dump |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | A1C1 | A1C2 | A1OB1 | A1OB2 | A1WE | A2C1 | A2C2 | A2OB1 | A2OB2 | A2OB3 | A2WE1 | A2WE2 | A4C | A4OB1 | A4OB2 | A4WE | A1R_1-13 | A2R1_1-8 | A2R2_1-35 | A4R_1-24 | NPTD | SMATD |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Areas | Areas | Areas | Areas | Area | Area |
| SW X-Coordinate | 468836.3309 | 469831.3875 | 468836.3309 | 468924.2382 | 468614.7473 | 467402.3697 | 466149.1671 | 467402.3697 | 467401.3146 | 466149.1671 | 467214.7512 | 466064.1658 | 470120.1908 | 469125.5696 | 470102.1095 | 467392.2561 | -- | -- | -- | -- | 470476.5932 | 471083.6893 |
| SW Y-Coordinate | 4819225.5205 | 4819542.1701 | 4819225.5205 | 4818949.2760 | 4818103.3139 | 4817436.5531 | 4815895.8961 | 4817436.5531 | 4816945.8209 | 4815895.8961 | 4815304.2711 | 4815304.2711 | 4809628.2991 | 4810683.9411 | 4809596.1364 | 4809481.3541 | -- | -- | -- | -- | 4816812.1095 | 4813327.8251 |
| Angle | -17.6523 | -17.6523 | -17.6523 | -17.6523 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | -- | 0.0000 | 0.0000 |
| Area X-Dimension (m) | 1044.2244 | 1044.2244 | 2088.4488 | 2358.7649 | 2680.7087 | 2458.7567 | 1252.1474 | 2463.7798 | 2829.2340 | 1252.1474 | 3316.6275 | 1150.5854 | 306.6704 | 987.6316 | 333.4500 | 3130.0000 | -- | -- | -- | -- | 50.0000 | 50.0000 |
| Area Y-Dimension (m) | 115.4929 | 115.4929 | 289.2926 | 289.8943 | 2134.2513 | 283.3089 | 138.5700 | 528.0523 | 490.7323 | 348.8817 | 2799.0428 | 1273.3705 | 1009.8863 | 1177.3589 | 1049.0267 | 2754.5016 | -- | -- | -- | -- | 50.0000 | 50.0000 |
| Area ($m^2$) | 120,601 | 120,601 | 604,173 | 683,792 | 5,721,306 | 696,588 | 173,510 | 1,301,005 | 1,388,397 | 436,851 | 9,283,382 | 1,465,122 | 309,702 | 1,162,797 | 349,798 | 8,621,590 | 85,850 | 47,801 | 184,949 | 106,899 | 2,500 | 2,500 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 30 | 30 | 30 | 30 | -- | -- |
| Road Segment Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,862 | 1,593 | 6,165 | 3,563 | -- | -- |
| Model Emission Rate[1] | 6.704942E-06 | 6.704942E-06 | 8.579899E-06 | 8.579899E-06 | 5.331194E-07 | 4.895161E-06 | 4.895161E-06 | 1.020668E-05 | 1.020668E-05 | 1.020668E-05 | 5.331194E-07 | 5.331194E-07 | 2.078439E-07 | 5.295564E-09 | 5.295564E-09 | 5.331194E-07 | 5.890396E-05 | 1.346212E-04 | 3.353222E-05 | 1.742874E-06 | 4.672788E-05 | 1.249255E-04 |

1. Units are g/s-$m^2$ for area sources.

# APPENDIX 9

## $NO_X$ Emission Apportioning

**$NO_X$ Emission Apportioning**
**Year 2018**
**Black Thunder Mine**

| West OB Area 2 | Southwest Coal Area | Southwest OB Area | South Coal Area | South OB Area | North Haul Road 1 to Circuit 4 Dump | North Haul Road 2 to Circuit 3 Dump | Northwest Haul Road to 6-North Dump | West Haul Road 1 to 5-West Dump | West Haul Road 2 to Primary Dump | West Haul Road 3 to 5-West Dump | West Haul Road 4 to Primary Dump | Southwest Haul Road 1 to Primary Dump | Southwest Haul Road 2 to Near Pit Dump | South Haul Road 1 to Near Pit Dump | South Haul Road 2 to Primary Dump | West Loadout Train Loop | Primary Loadout Train Loop | East Loadout Train Loop |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) |
| 19.427 | | 8.319 | | 6.139 | | | | | | | | | | | | | | |
| | | | | | 5.743 | 1.905 | 3.761 | 3.737 | 2.015 | 0.811 | 0.415 | 0.493 | 3.436 | 4.595 | 0.772 | | | |
| | | | | | 0.359 | 0.119 | 0.277 | 0.316 | 0.170 | 0.069 | 0.035 | 0.034 | 0.238 | 0.219 | 0.037 | | | |
| 0.355 | | 0.182 | | 0.174 | | | | | | | | | | | | | | |
| | 0.158 | | 0.177 | | | | | | | | | | | | | | | |
| 1.205 | | 0.583 | | 0.603 | | | | | | | | | | | | | | |
| | 0.088 | | 0.099 | | | | | | | | | | | | | | | |
| 1.875 | | 0.933 | | 0.758 | | | | | | | | | | | | | | |
| 0.413 | | 0.187 | | 0.211 | | | | | | | | | | | | | | |
| 0.402 | | 0.197 | | 0.200 | | | | | | | | | | | | | | |
| | 0.040 | | 0.045 | | | | | | | | | | | | | | | |
| | | | | | 0.807 | 0.268 | 0.623 | 0.710 | 0.383 | 0.154 | 0.079 | 0.077 | 0.536 | 0.493 | 0.083 | | | |
| 18.103 | | 8.319 | | 9.272 | | | | | | | | | | | | | | |
| | 1.418 | | 1.596 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | 4.461 | 10.821 | 6.790 |
| 1.025 | | 0.460 | | 0.593 | | | | | | | | | | | | | | |
| 0.291 | | 0.131 | | 0.168 | | | | | | | | | | | | | | |
| 0.243 | | 0.109 | | 0.141 | 0.009 | 0.017 | 0.006 | 0.010 | 0.015 | 0.009 | 0.015 | 0.015 | 0.012 | 0.015 | 0.022 | | | |
| **43.3396** | **1.7033** | **19.4200** | **1.9181** | **18.2596** | **6.9182** | **2.3090** | **4.6667** | **4.7721** | **2.5831** | **1.0434** | **0.5433** | **0.6196** | **4.2216** | **5.3219** | **0.9139** | **4.4606** | **10.8208** | **6.7898** |

| West OB Area 2 | Southwest Coal Area | Southwest OB Area | South Coal Area | South OB Area | North Haul Road 1 to Circuit 4 Dump | North Haul Road 2 to Circuit 3 Dump | Northwest Haul Road to 6-North Dump | West Haul Road 1 to 5-West Dump | West Haul Road 2 to Primary Dump | West Haul Road 3 to 5-West Dump | West Haul Road 4 to Primary Dump | Southwest Haul Road 1 to Primary Dump | Southwest Haul Road 2 to Near Pit Dump | South Haul Road 1 to Near Pit Dump | South Haul Road 2 to Primary Dump | West Loadout Train Loop | Primary Loadout Train Loop | East Loadout Train Loop |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BTWOB2 Area | BTSWC Area | BTSWOB Area | BTSC Area | BTSOB Area | BNR1_1-20 Areas | BNR2_1-40 Areas | BNWR_1-12 Areas | BWR1_1-23 Areas | BWR2_1-44 Areas | BWR3_1-25 Areas | BWR4_1-43 Areas | BSWR1_1-44 Areas | BSWR2_1-25 Areas | BSR1_1-37 Areas | BSR2_1-59 Areas | WLP_1-90 Areas | PLP_1-83 Areas | ELP_1-130 Areas |
| 471946.2814 | 472668.6574 | 472380.6229 | 472899.8482 | 472534.0882 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4835846.0595 | 4834282.4355 | 4834282.4355 | 4832854.4303 | 4832854.4303 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 771.1440 | 304.7999 | 1080.5145 | 365.7600 | 1524.4827 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4880.7243 | 1562.3814 | 1562.3814 | 1428.0053 | 1428.0053 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3,763,741 | 476,214 | 1,688,176 | 522,307 | 2,176,969 | 137,267 | 258,068 | 85,812 | 147,895 | 239,206 | 146,380 | 224,605 | 236,231 | 182,852 | 228,850 | 346,007 | 388,477 | 473,048 | 785,189 |
| -- | -- | -- | -- | -- | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| -- | -- | -- | -- | -- | 4,576 | 8,602 | 2,860 | 4,930 | 7,974 | 4,879 | 7,487 | 7,874 | 6,095 | 7,628 | 11,534 | 12,949 | 15,768 | 26,173 |
| 1.151503E-05 | 3.576852E-06 | 1.150354E-05 | 3.672362E-06 | 8.387637E-06 | 5.039976E-05 | 8.947331E-06 | 5.438322E-05 | 3.226707E-05 | 1.079880E-05 | 7.127996E-06 | 2.419111E-06 | 2.622780E-06 | 2.308767E-05 | 2.325501E-05 | 2.641374E-06 | 1.148223E-05 | 2.287469E-05 | 8.647349E-06 |

**$NO_X$ Emission Apportioning**
**Year 2023**
**Black Thunder Mine**

| Emission Activities | Total Annual $NO_X$ Emissions (g/s) | Northwest Annual $NO_X$ Emissions (g/s) | West Annual $NO_X$ Emissions (g/s) | Southwest Annual $NO_X$ Emissions (g/s) | South Annual $NO_X$ Emissions (g/s) | Section 16 Annual $NO_X$ Emissions (g/s) | Northwest Coal Area $NO_X$ Emissions (g/s) | Northwest OB Area $NO_X$ Emissions (g/s) | West Coal Area 1 $NO_X$ Emissions (g/s) | West Coal Area 2 $NO_X$ Emissions (g/s) | West Coal Area 3 $NO_X$ Emissions (g/s) | West Coal Area 4 $NO_X$ Emissions (g/s) | West Coal Area 5 $NO_X$ Emissions (g/s) | West OB Area 1 $NO_X$ Emissions (g/s) | West OB Area 2 $NO_X$ Emissions (g/s) | West OB Area 3 $NO_X$ Emissions (g/s) | Southwest Coal Area $NO_X$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OB Haul Truck | 66.695 | 7.781 | 22.557 | 8.232 | 14.322 | 13.802 | | 7.781 | | | | | | 0.542 | 11.169 | 10.846 | |
| Coal Haul Truck | 34.673 | 6.575 | 10.958 | 5.310 | 11.256 | 0.575 | | | | | | | | | | | |
| Graders | 2.255 | 0.319 | 0.746 | 0.301 | 0.569 | 0.320 | | | | | | | | | | | |
| Wheeled Loaders on OB | 1.396 | 0.236 | 0.486 | 0.066 | 0.369 | 0.239 | | 0.236 | | | | | | 0.012 | 0.241 | 0.234 | |
| Wheeled Loaders on Coal | 1.291 | 0.314 | 0.453 | 0.172 | 0.276 | 0.077 | 0.314 | | 0.011 | 0.119 | 0.119 | 0.119 | 0.085 | | | | 0.172 |
| RT Dozers on OB | 4.607 | 0.943 | 1.610 | 0.407 | 1.106 | 0.541 | | 0.943 | | | | | | 0.039 | 0.797 | 0.774 | |
| RT Dozers on Coal | 0.719 | 0.175 | 0.252 | 0.096 | 0.154 | 0.043 | 0.175 | | 0.006 | 0.066 | 0.066 | 0.066 | 0.047 | | | | 0.096 |
| Track Dozers on OB | 6.329 | 0.912 | 2.140 | 0.700 | 1.439 | 1.138 | | 0.912 | | | | | | 0.051 | 1.060 | 1.029 | |
| Scrapers | 1.534 | 0.373 | 0.538 | 0.204 | 0.328 | 0.091 | | 0.373 | | | | | | 0.013 | 0.266 | 0.259 | |
| Drills on OB | 1.546 | 0.304 | 0.540 | 0.122 | 0.380 | 0.200 | | 0.304 | | | | | | 0.013 | 0.267 | 0.260 | |
| Drills on Coal | 0.186 | 0.045 | 0.065 | 0.025 | 0.040 | 0.011 | 0.045 | | 0.002 | 0.017 | 0.017 | 0.017 | 0.012 | | | | 0.025 |
| Water Truck | 5.068 | 0.718 | 1.676 | 0.677 | 1.279 | 0.719 | | | | | | | | | | | |
| Blasting on OB | 67.624 | 13.649 | 23.772 | 5.168 | 16.566 | 8.468 | | 13.649 | | | | | | 0.571 | 11.771 | 11.430 | |
| Blasting on Coal | 11.615 | 2.825 | 4.072 | 1.544 | 2.483 | 0.691 | 2.825 | | 0.103 | 1.069 | 1.069 | 1.071 | 0.761 | | | | 1.544 |
| Locomotives | 20.857 | | | | | | | | | | | | | | | | |
| Pumps | 2.941 | | | | | | | 0.848 | | | | | | 0.024 | 0.486 | 0.472 | |
| Welders | 0.836 | | | | | | | 0.241 | | | | | | 0.007 | 0.138 | 0.134 | |
| Light Plants and Generators | 0.843 | | | | | | | 0.193 | | | | | | 0.005 | 0.111 | 0.107 | |
| **Total** | **231.0145** | **35.1687** | **69.8633** | **23.0235** | **50.5663** | **26.9153** | **3.3592** | **25.4790** | **0.1219** | **1.2706** | **1.2706** | **1.2732** | **0.9051** | **1.2771** | **26.3055** | **25.5439** | **1.8362** |

Modeling Summary:

| Source Description | Northwest Coal Area | Northwest OB Area | West Coal Area 1 | West Coal Area 2 | West Coal Area 3 | West Coal Area 4 | West Coal Area 5 | West OB Area 1 | West OB Area 2 | West OB Area 3 | Southwest Coal Area |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | BTNWC | BTNWOB | BTWC1 | BTWC2 | BTWC3 | BTWC4 | BTWC5 | BTWOB1 | BTWOB2 | BTWOB3 | BTSWC |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area |
| SW X-Coordinate | 472470.2420 | 472468.7580 | 471251.8272 | 471385.4494 | 471385.4494 | 471455.5534 | 471385.4494 | 471131.3700 | 471251.8272 | 471248.2777 | 471632.3374 |
| SW Y-Coordinate | 4845165.3195 | 4844273.7795 | 4840597.8915 | 4839317.7315 | 4838037.5715 | 4836754.8512 | 4835843.0115 | 4840597.8915 | 4838037.5715 | 4835843.0115 | 4834282.4355 |
| Angle | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Area X-Dimension (m) | 1595.9233 | 1597.4073 | 133.6222 | 140.2080 | 140.2080 | 140.2080 | 140.2080 | 534.4954 | 554.2462 | 627.8996 | 182.8800 |
| Area Y-Dimension (m) | 411.4800 | 1550.3141 | 128.8923 | 1280.1600 | 1280.1600 | 1282.7203 | 911.8397 | 128.8923 | 2560.3200 | 2194.5600 | 1560.5760 |
| Area ($m^2$) | 656,691 | 2,476,483 | 17,223 | 179,489 | 179,489 | 179,848 | 127,847 | 68,892 | 1,419,048 | 1,377,963 | 285,398 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Road Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Model Emission Rate[1] | 5.115305E-06 | 1.028839E-05 | 7.079223E-06 | 7.079223E-06 | 7.079223E-06 | 7.079223E-06 | 7.079223E-06 | 1.853744E-05 | 1.853744E-05 | 1.853744E-05 | 6.433973E-06 |

1. Units are g/s-$m^2$ for area sources.

**$NO_X$ Emission Apportioning**
**Year 2023**
**Black Thunder Mine**

| Southwest OB Area | South Coal Area | South OB Area | Section 16 Coal Area 1 | Section 16 Coal Area 2 | Section 16 OB Area | Northwest Haul Road to 6-North Dump | West Haul Road 1 to 5-West Dump | West Haul Road 2 to Primary Dump | West Haul Road 3 to 5-West Dump | West Haul Road 4 to Primary Dump | Southwest Haul Road 1 to Primary Dump | Southwest Haul Road 2 to Near Pit Dump | South Haul Road 1 to Near Pit Dump | South Haul Road 2 to Primary Dump | Section 16 Haul Road to West Hilight Dump | West Loadout Train Loop | Primary Loadout Train Loop |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) |
| 8.232 | | 14.322 | | | 13.802 | | | | | | | | | | | | |
| | | | | | | 6.575 | 3.989 | 2.039 | 3.313 | 1.617 | 0.646 | 4.664 | 9.728 | 1.528 | 0.575 | | |
| | | | | | | 0.319 | 0.271 | 0.139 | 0.225 | 0.110 | 0.037 | 0.265 | 0.492 | 0.077 | 0.320 | | |
| 0.066 | | 0.369 | | | 0.239 | | | | | | | | | | | | |
| | 0.276 | | 0.038 | 0.038 | | | | | | | | | | | | | |
| 0.407 | | 1.106 | | | 0.541 | | | | | | | | | | | | |
| | 0.154 | | 0.021 | 0.021 | | | | | | | | | | | | | |
| 0.700 | | 1.439 | | | 1.138 | | | | | | | | | | | | |
| 0.204 | | 0.328 | | | 0.091 | | | | | | | | | | | | |
| 0.122 | | 0.380 | | | 0.200 | | | | | | | | | | | | |
| | 0.040 | | 0.006 | 0.006 | | | | | | | | | | | | | |
| | | | | | | 0.718 | 0.610 | 0.312 | 0.507 | 0.247 | 0.082 | 0.595 | 1.105 | 0.174 | 0.719 | | |
| 5.168 | | 16.566 | | | 8.468 | | | | | | | | | | | | |
| | 2.483 | | 0.346 | 0.346 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | 6.622 | 14.235 |
| 0.456 | | 0.530 | | | 0.125 | | | | | | | | | | | | |
| 0.130 | | 0.151 | | | 0.035 | | | | | | | | | | | | |
| 0.104 | | 0.121 | | | 0.028 | 0.011 | 0.013 | 0.020 | 0.013 | 0.019 | 0.021 | 0.017 | 0.022 | 0.031 | 0.006 | | |
| **15.5884** | **2.9524** | **35.3120** | **0.4109** | **0.4109** | **24.6688** | **7.6236** | **4.8839** | **2.5096** | **4.0584** | **1.9934** | **0.7865** | **5.5399** | **11.3467** | **1.8101** | **1.6192** | **6.6219** | **14.2355** |

| Southwest OB Area | South Coal Area | South OB Area | Section 16 Coal Area 1 | Section 16 Coal Area 2 | Section 16 OB Area | Northwest Haul Road to 6-North Dump | West Haul Road 1 to 5-West Dump | West Haul Road 2 to Primary Dump | West Haul Road 3 to 5-West Dump | West Haul Road 4 to Primary Dump | Southwest Haul Road 1 to Primary Dump | Southwest Haul Road 2 to Near Pit Dump | South Haul Road 1 to Near Pit Dump | South Haul Road 2 to Primary Dump | Section 16 Haul Road to West Hilight Dump | West Loadout Train Loop | Primary Loadout Train Loop |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BTSWOB Area | BTSC Area | BTSOB Area | BT16C1 Area | BT16C2 Area | BT16OB Area | BNWR_1-18 Areas | BWR1_1-26 Areas | BWR2_1-47 Areas | BWR3_1-27 Areas | BWR4_1-45 Areas | BSWR1_1-48 Areas | BSWR2_1-29 Areas | BSR1_1-43 Areas | BSR2_1-65 Areas | B16R_1-10 Areas | WLP_1-90 Areas | PLP_1-83 Areas |
| 471388.1926 | 471082.0978 | 471082.0978 | 469133.5104 | 469133.5104 | 469004.8247 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4834282.4355 | 4832856.7922 | 4832856.7922 | 4838307.0047 | 4837750.0529 | 4837750.0529 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 853.7448 | 352.0196 | 1086.2304 | 95.5951 | 95.5951 | 224.2808 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1560.5760 | 1425.6434 | 1425.6434 | 556.9518 | 556.9518 | 1624.0140 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,332,334 | 501,854 | 1,548,577 | 53,242 | 53,242 | 364,235 | 141,179 | 171,264 | 262,576 | 168,561 | 246,786 | 269,148 | 215,769 | 283,136 | 400,293 | 76,887 | 388,477 | 473,048 |
| -- | -- | -- | -- | -- | -- | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| -- | -- | -- | -- | -- | -- | 4,706 | 5,709 | 8,753 | 5,619 | 8,226 | 8,972 | 7,192 | 9,438 | 13,343 | 2,563 | 12,949 | 15,768 |
| 1.170009E-05 | 5.882965E-06 | 2.280288E-05 | 7.717471E-06 | 7.717471E-06 | 6.772771E-05 | 5.399981E-05 | 2.851661E-05 | 9.557464E-06 | 2.407677E-05 | 8.077519E-06 | 2.922048E-06 | 2.567529E-05 | 4.007514E-05 | 4.522032E-06 | 2.105974E-05 | 1.704573E-05 | 3.009305E-05 |

## $NO_X$ Emission Apportioning
## Year 2018
## School Creek Mine

| Emission Activities | Total Annual $NO_X$ Emissions (g/s) | West Annual $NO_X$ Emissions (g/s) | East Annual $NO_X$ Emissions (g/s) | West Coal Area 1 $NO_X$ Emissions (g/s) | West Coal Area 2 $NO_X$ Emissions (g/s) | West Coal Area 3 $NO_X$ Emissions (g/s) | West OB Area 1 $NO_X$ Emissions (g/s) | West OB Area 2 $NO_X$ Emissions (g/s) | East Coal Area $NO_X$ Emissions (g/s) | East OB Area 1 $NO_X$ Emissions (g/s) | East OB Area 2 $NO_X$ Emissions (g/s) | West Haul Road 1 to Truck Dump 2 $NO_X$ Emissions (g/s) | West Haul Road 2 to Truck Dump 1 $NO_X$ Emissions (g/s) | East Haul Road to Truck Dump 1 $NO_X$ Emissions (g/s) | Train Loop 1 $NO_X$ Emissions (g/s) | Train Loop 2 $NO_X$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OB Haul Trucks | 7.542 | 6.966 | 0.576 | | | | 2.224 | 4.742 | | 0.167 | 0.409 | | | | | |
| Coal Haul Trucks | 3.927 | 1.385 | 2.542 | | | | | | | | | 0.197 | 1.188 | 2.542 | | |
| Graders on OB | 0.133 | 0.067 | 0.067 | | | | 0.021 | 0.045 | | 0.019 | 0.047 | | | | | |
| Graders on Coal | 0.200 | 0.100 | 0.100 | | | | | | | | | 0.014 | 0.086 | 0.100 | | |
| Wheeled Loaders | 0.128 | 0.064 | 0.064 | 0.020 | 0.022 | 0.022 | | | 0.064 | | | | | | | |
| RT Dozers on OB | 1.037 | 0.518 | 0.518 | | | | 0.165 | 0.353 | | 0.150 | 0.368 | | | | | |
| RT Dozers on Coal | 0.434 | 0.217 | 0.217 | 0.069 | 0.074 | 0.074 | | | 0.217 | | | | | | | |
| Track Dozers on OB | 0.738 | 0.584 | 0.154 | | | | 0.186 | 0.397 | | 0.045 | 0.109 | | | | | |
| Track Dozers on Reclaim | 0.265 | 0.250 | 0.015 | | | | 0.080 | 0.170 | | 0.004 | 0.011 | | | | | |
| Scrapers | 0.637 | 0.319 | 0.319 | | | | 0.102 | 0.217 | | 0.092 | 0.226 | | | | | |
| Drills on OB | 0.303 | 0.240 | 0.063 | | | | 0.077 | 0.163 | | 0.018 | 0.045 | | | | | |
| Drills on Coal | 0.158 | 0.079 | 0.079 | 0.025 | 0.027 | 0.027 | | | 0.079 | | | | | | | |
| Water Trucks | 0.344 | 0.251 | 0.094 | | | | | | | | | 0.036 | 0.215 | 0.094 | | |
| Blasting on OB | 5.248 | 4.526 | 0.723 | | | | 1.445 | 3.081 | | 0.210 | 0.513 | | | | | |
| Blasting on Coal | 2.054 | 1.027 | 1.027 | 0.326 | 0.351 | 0.351 | | | 1.027 | | | | | | | |
| Locomotives | 7.308 | | | | | | | | | | | | | | 4.928 | 2.380 |
| Pumps | 0.319 | | | | | | 0.053 | 0.114 | | 0.044 | 0.108 | | | | | |
| Welders | 0.251 | | | | | | 0.042 | 0.089 | | 0.035 | 0.085 | | | | | |
| Light Plants & Generators | 0.933 | | | | | | 0.150 | 0.319 | | 0.124 | 0.304 | 0.005 | 0.013 | 0.018 | | |
| **Total** | **31.9604** | **16.5916** | **6.5578** | **0.4397** | **0.4736** | **0.4736** | **4.5458** | **9.6907** | **1.3870** | **0.9099** | **2.2254** | **0.2517** | **1.5016** | **2.7536** | **4.9279** | **2.3797** |

Modeling Summary:

| Source Description | West Coal Area 1 | West Coal Area 2 | West Coal Area 3 | West OB Area 1 | West OB Area 2 | East Coal Area | East OB Area 1 | East OB Area 2 | West Haul Road 1 to Truck Dump 2 | West Haul Road 2 to Truck Dump 1 | East Haul Road to Truck Dump 1 | Train Loop 1 | Train Loop 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | SCWC1 | SCWC2 | SCWC3 | SCWOB1 | SCWOB2 | SCEC | SCEOB1 | SCEOB2 | SCWR1_1-4 | SCWR2_1-13 | SCER_1-19 | SCLP1_1-93 | SCLP2_1-61 |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Areas | Areas | Areas | Areas | Areas |
| SW X-Coordinate | 473728.7271 | 477540.6394 | 477540.6394 | 473527.5591 | 477339.4664 | 482040.7604 | 482039.2702 | 482039.2702 | -- | -- | -- | -- | -- |
| SW Y-Coordinate | 4831678.2607 | 4829264.7048 | 4828026.0468 | 4831678.2607 | 4828023.4825 | 4827111.2372 | 4827681.4254 | 4826775.9410 | -- | -- | -- | -- | -- |
| Angle | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | -- | -- |
| Area X-Dimension (m) | 201.1680 | 205.6688 | 205.6688 | 871.7280 | 876.2596 | 2294.8259 | 1671.0067 | 2296.3161 | -- | -- | -- | -- | -- |
| Area Y-Dimension (m) | 1175.8017 | 1238.6580 | 1238.6580 | 1175.8017 | 2493.5963 | 370.7482 | 508.7752 | 905.4844 | -- | -- | -- | -- | -- |
| Area ($m^2$) | 236,534 | 254,753 | 254,753 | 1,024,979 | 2,185,038 | 850,803 | 850,167 | 2,079,278 | 31,735 | 88,766 | 120,909 | 461,631 | 222,922 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | 30 | 30 | 30 | 30 | 30 |
| Road Segment Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | 1,058 | 2,959 | 4,030 | 15,388 | 7,431 |
| Model Emission Rate[1] | 1.859112E-06 | 1.859112E-06 | 1.859112E-06 | 4.435044E-06 | 4.435044E-06 | 1.630193E-06 | 1.070296E-06 | 1.070296E-06 | 7.931645E-06 | 1.691646E-05 | 2.277448E-05 | 1.067491E-05 | 1.067491E-05 |

1. Units are g/s-$m^2$ for area sources.

**$NO_X$ Emission Apportioning**
**Year 2023**
**School Creek Mine**

| Emission Activities | Total Annual $NO_X$ Emissions (g/s) | West Annual $NO_X$ Emissions (g/s) | East Annual $NO_X$ Emissions (g/s) | West Coal Area 1 $NO_X$ Emissions (g/s) | West Coal Area 2 $NO_X$ Emissions (g/s) | West Coal Area 3 $NO_X$ Emissions (g/s) | West OB Area 1 $NO_X$ Emissions (g/s) | West OB Area 2 $NO_X$ Emissions (g/s) | West OB Area 3 $NO_X$ Emissions (g/s) | West OB Area 4 $NO_X$ Emissions (g/s) | West OB Area 5 $NO_X$ Emissions (g/s) | East Coal Area 1 $NO_X$ Emissions (g/s) | East Coal Area 2 $NO_X$ Emissions (g/s) | East Coal Area 3 $NO_X$ Emissions (g/s) | East OB Area 1 $NO_X$ Emissions (g/s) | East OB Area 2 $NO_X$ Emissions (g/s) | West Haul Road 1 to Truck Dump 2 $NO_X$ Emissions (g/s) | West Haul Road 2 to Truck Dump 3 $NO_X$ Emissions (g/s) | East Haul Road to Truck Dump 3 $NO_X$ Emissions (g/s) | Train Loop 2 $NO_X$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OB Haul Trucks | 8.979 | 6.392 | 2.587 | | | | 0.503 | 1.877 | 0.885 | 0.885 | 2.241 | | | | 2.118 | 0.469 | | | | |
| Coal Haul Trucks | 4.320 | 1.444 | 2.877 | | | | | | | | | | | | | | 0.640 | 0.804 | 2.877 | |
| Graders on OB | 0.155 | 0.077 | 0.077 | | | | 0.006 | 0.023 | 0.011 | 0.011 | 0.027 | | | | 0.063 | 0.014 | | | | |
| Graders on Coal | 0.232 | 0.116 | 0.116 | | | | | | | | | | | | | | 0.051 | 0.065 | 0.116 | |
| Wheeled Loaders | 0.128 | 0.064 | 0.064 | 0.029 | 0.014 | 0.021 | | | | | | 0.019 | 0.019 | 0.027 | | | | | | |
| RT Dozers on OB | 1.181 | 0.591 | 0.591 | | | | 0.046 | 0.173 | 0.082 | 0.082 | 0.207 | | | | 0.483 | 0.107 | | | | |
| RT Dozers on Coal | 0.434 | 0.217 | 0.217 | 0.098 | 0.046 | 0.073 | | | | | | 0.063 | 0.063 | 0.090 | | | | | | |
| Track Dozers on OB | 0.738 | 0.492 | 0.246 | | | | 0.039 | 0.144 | 0.068 | 0.068 | 0.172 | | | | 0.201 | 0.045 | | | | |
| Track Dozers on Reclaim | 0.285 | 0.225 | 0.060 | | | | 0.018 | 0.066 | 0.031 | 0.031 | 0.079 | | | | 0.049 | 0.011 | | | | |
| Scrapers | 0.637 | 0.319 | 0.319 | | | | 0.025 | 0.094 | 0.044 | 0.044 | 0.112 | | | | 0.261 | 0.058 | | | | |
| Drills on OB | 0.303 | 0.202 | 0.101 | | | | 0.016 | 0.059 | 0.028 | 0.028 | 0.071 | | | | 0.083 | 0.018 | | | | |
| Drills on Coal | 0.158 | 0.079 | 0.079 | 0.036 | 0.017 | 0.027 | | | | | | 0.023 | 0.023 | 0.033 | | | | | | |
| Water Trucks | 0.399 | 0.235 | 0.164 | | | | | | | | | | | | | | 0.104 | 0.131 | 0.164 | |
| Blasting on OB | 5.643 | 4.300 | 1.344 | | | | 0.338 | 1.262 | 0.595 | 0.595 | 1.508 | | | | 1.100 | 0.244 | | | | |
| Blasting on Coal | 2.054 | 1.027 | 1.027 | 0.464 | 0.218 | 0.345 | | | | | | 0.300 | 0.300 | 0.428 | | | | | | |
| Locomotives | 7.308 | | | | | | | | | | | | | | | | | | | 7.308 |
| Pumps | 0.319 | | | | | | 0.010 | 0.039 | 0.018 | 0.018 | 0.046 | | | | 0.153 | 0.034 | | | | |
| Welders | 0.251 | | | | | | 0.008 | 0.030 | 0.014 | 0.014 | 0.036 | | | | 0.121 | 0.027 | | | | |
| Light Plants & Generators | 0.933 | | | | | | 0.029 | 0.107 | 0.051 | 0.051 | 0.128 | | | | 0.425 | 0.094 | 0.006 | 0.016 | 0.025 | |
| **Total** | **34.4580** | **15.7790** | **9.8680** | **0.6271** | **0.2939** | **0.4660** | **1.0391** | **3.8757** | **1.8281** | **1.8281** | **4.6282** | **0.4048** | **0.4048** | **0.5775** | **5.0574** | **1.1211** | **0.8020** | **1.0151** | **3.1818** | **7.3075** |

Modeling Summary:

| Source Description | West Coal Area 1 | West Coal Area 2 | West Coal Area 3 | West OB Area 1 | West OB Area 2 | West OB Area 3 | West OB Area 4 | West OB Area 5 | East Coal Area 1 | East Coal Area 2 | East Coal Area 3 | East OB Area 1 | East OB Area 2 | West Haul Road 1 to Truck Dump 2 | West Haul Road 2 to Truck Dump 3 | East Haul Road to Truck Dump 3 | Train Loop 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | SCWC1 | SCWC2 | SCWC3 | SCWOB1 | SCWOB2 | SCWOB3 | SCWOB4 | SCWOB5 | SCEC1 | SCEC2 | SCEC3 | SCEOB1 | SCEOB2 | SCWR1_1-8 | SCWR2_1-14 | SCER_1-28 | SCLP2_1-61 |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Areas | Areas | Areas | Areas |
| SW X-Coordinate | 475155.1789 | 476797.3366 | 476350.4378 | 473222.6123 | 473222.6123 | 475071.4083 | 476551.4459 | 476082.1856 | 481236.1916 | 482413.9994 | 483591.8071 | 481236.1916 | 484440.2793 | -- | -- | -- | -- |
| SW Y-Coordinate | 4831417.1968 | 4831501.7936 | 4830066.6313 | 4831670.1451 | 4831261.8310 | 4831417.1968 | 4831417.1968 | 4830066.6313 | 4825697.9332 | 4825697.9332 | 4825654.9574 | 4825456.5332 | 4825456.5332 | -- | -- | -- | -- |
| Angle | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | -- |
| Area X-Dimension (m) | 1642.1577 | 1233.9089 | 332.6904 | 170.8348 | 1848.7959 | 1480.0376 | 1480.0376 | 1070.3098 | 1177.8078 | 1177.8078 | 1877.1276 | 3204.0877 | 1028.6554 | -- | -- | -- | -- |
| Area Y-Dimension (m) | 229.6378 | 143.2393 | 842.2422 | 1184.7445 | 408.3141 | 240.5827 | 240.5827 | 842.2422 | 214.6290 | 214.6290 | 192.1276 | 932.2825 | 643.7441 | -- | -- | -- | -- |
| Area ($m^2$) | 377,101 | 176,744 | 280,206 | 202,396 | 754,889 | 356,071 | 356,071 | 901,460 | 252,792 | 252,792 | 360,648 | 2,987,115 | 662,191 | 45,270 | 112,370 | 177,092 | 222,922 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 30 | 30 | 30 | 30 |
| Road Segment Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,509 | 3,746 | 5,903 | 7,431 |
| Model Emission Rate[1] | 1.662933E-06 | 1.662933E-06 | 1.662933E-06 | 5.134066E-06 | 5.134066E-06 | 5.134066E-06 | 5.134066E-06 | 5.134066E-06 | 1.601157E-06 | 1.601157E-06 | 1.601157E-06 | 1.693088E-06 | 1.693088E-06 | 1.771614E-05 | 9.033409E-06 | 1.796671E-05 | 3.278075E-05 |

1. Units are g/s-$m^2$ for area sources.

**$NO_X$ Emission Apportioning**
**Year 2018**
**NARM**

| Emission Activities | Total Annual $NO_X$ Emissions (g/s) | West Annual $NO_X$ Emissions (g/s) | North Annual $NO_X$ Emissions (g/s) | East Annual $NO_X$ Emissions (g/s) | West Coal Area 1 $NO_X$ Emissions (g/s) | West Coal Area 2 $NO_X$ Emissions (g/s) | West Coal Area 3 $NO_X$ Emissions (g/s) | West OB Area 1 $NO_X$ Emissions (g/s) | West OB Area 2 $NO_X$ Emissions (g/s) | West OB Area 3 $NO_X$ Emissions (g/s) | North Coal Area 1 $NO_X$ Emissions (g/s) | North Coal Area 2 $NO_X$ Emissions (g/s) | North Coal Area 3 $NO_X$ Emissions (g/s) | North Coal Area 4 $NO_X$ Emissions (g/s) | North Coal Area 5 $NO_X$ Emissions (g/s) | North Coal Area 6 $NO_X$ Emissions (g/s) | North Coal Area 7 $NO_X$ Emissions (g/s) | North Coal Area 8 $NO_X$ Emissions (g/s) | North OB Area 1 $NO_X$ Emissions (g/s) | North OB Area 2 $NO_X$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OB Haul Trucks | 16.628 | 5.502 | 7.387 | 3.739 | | | | 1.519 | 0.400 | 3.583 | | | | | | | | | 1.193 | 0.602 |
| Coal Haul Trucks | 10.187 | 2.852 | 3.260 | 4.075 | | | | | | | | | | | | | | | | |
| Graders on OB | 0.715 | 0.237 | 0.318 | 0.161 | | | | 0.065 | 0.017 | 0.154 | | | | | | | | | 0.051 | 0.026 |
| Graders on Coal | 0.477 | 0.134 | 0.153 | 0.191 | | | | | | | | | | | | | | | | |
| Wheeled Loaders | 0.277 | 0.078 | 0.089 | 0.111 | 0.026 | 0.026 | 0.026 | | | | 0.012 | 0.010 | 0.012 | 0.013 | 0.013 | 0.009 | 0.009 | 0.009 | | |
| RT Dozers on OB | 5.224 | 1.729 | 2.321 | 1.175 | | | | 0.477 | 0.126 | 1.126 | | | | | | | | | 0.375 | 0.189 |
| RT Dozers on Coal | 1.741 | 0.488 | 0.557 | 0.697 | 0.165 | 0.161 | 0.161 | | | | 0.077 | 0.061 | 0.075 | 0.084 | 0.084 | 0.059 | 0.059 | 0.060 | | |
| Track Dozers on OB | 2.537 | 0.710 | 0.812 | 1.015 | | | | 0.196 | 0.052 | 0.463 | | | | | | | | | 0.131 | 0.066 |
| Track Dozers on Reclaim | 0.294 | 0.082 | 0.094 | 0.118 | | | | 0.023 | 0.006 | 0.054 | | | | | | | | | 0.015 | 0.008 |
| Scrapers | 3.756 | 1.052 | 1.202 | 1.502 | | | | 0.290 | 0.076 | 0.685 | | | | | | | | | 0.194 | 0.098 |
| Drills on OB | 0.582 | 0.167 | 0.240 | 0.176 | | | | 0.046 | 0.012 | 0.109 | | | | | | | | | 0.039 | 0.020 |
| Drills on Coal | 0.336 | 0.094 | 0.107 | 0.134 | 0.032 | 0.031 | 0.031 | | | | 0.015 | 0.012 | 0.014 | 0.016 | 0.016 | 0.011 | 0.011 | 0.012 | | |
| Water Trucks | 3.110 | 1.309 | 1.481 | 0.320 | | | | | | | | | | | | | | | | |
| Blasting on OB | 37.148 | 10.643 | 15.287 | 11.218 | | | | 2.938 | 0.774 | 6.931 | | | | | | | | | 2.468 | 1.245 |
| Blasting on Coal | 8.558 | 2.396 | 2.739 | 3.423 | 0.812 | 0.792 | 0.792 | | | | 0.380 | 0.298 | 0.367 | 0.411 | 0.411 | 0.289 | 0.289 | 0.294 | | |
| Locomotives | 18.266 | | | | | | | | | | | | | | | | | | | |
| Pumps | 0.336 | | | | | | | 0.027 | 0.007 | 0.063 | | | | | | | | | 0.021 | 0.010 |
| Welders | 0.399 | | | | | | | 0.031 | 0.008 | 0.074 | | | | | | | | | 0.025 | 0.012 |
| Light Plants & Generators | 3.491 | | | | | | | 0.257 | 0.068 | 0.605 | | | | | | | | | 0.200 | 0.101 |
| **Total** | **114.0637** | **27.4719** | **36.0447** | **28.0544** | **1.0351** | **1.0101** | **1.0101** | **5.8684** | **1.5458** | **13.8468** | **0.4844** | **0.3794** | **0.4683** | **0.5243** | **0.5243** | **0.3685** | **0.3685** | **0.3743** | **4.7103** | **2.3762** |

Modeling Summary:

| Source Description | West Coal Area 1 | West Coal Area 2 | West Coal Area 3 | West OB Area 1 | West OB Area 2 | West OB Area 3 | North Coal Area 1 | North Coal Area 2 | North Coal Area 3 | North Coal Area 4 | North Coal Area 5 | North Coal Area 6 | North Coal Area 7 | North Coal Area 8 | North OB Area 1 | North OB Area 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | NAWC1 | NAWC2 | NAWC3 | NAWOB1 | NAWOB2 | NAWOB3 | NANC1 | NANC2 | NANC3 | NANC4 | NANC5 | NANC6 | NANC7 | NANC8 | NANOB1 | NANOB2 |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area |
| SW X-Coordinate | 474183.8130 | 473646.8908 | 473646.8908 | 473915.4859 | 474783.5390 | 473378.6716 | 470741.0351 | 470741.0351 | 471958.2939 | 472964.1297 | 474082.7585 | 475201.3872 | 476383.2485 | 477565.1097 | 470741.0351 | 470741.0351 |
| SW Y-Coordinate | 4818950.7672 | 4817551.7232 | 4816154.5916 | 4818950.7672 | 4818376.6757 | 4816082.1815 | 4823548.3489 | 4824534.1932 | 4825338.8025 | 4826344.2106 | 4826344.2106 | 4826375.1852 | 4826375.1852 | 4826344.7062 | 4823209.2229 | 4824534.1929 |
| Angle | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Area X-Dimension (m) | 267.7497 | 268.2240 | 268.2240 | 868.0531 | 204.6210 | 1025.7408 | 211.4237 | 1217.2637 | 1005.8409 | 1118.6288 | 1118.6288 | 1181.8612 | 1181.8612 | 1199.0195 | 732.7219 | 1217.2637 |
| Area Y-Dimension (m) | 1434.2172 | 1397.1316 | 1397.1316 | 1436.5800 | 1605.3622 | 2868.5857 | 985.8443 | 134.1011 | 200.3423 | 201.6605 | 201.6605 | 134.1675 | 134.1675 | 134.3168 | 1324.9701 | 402.3372 |
| Area ($m^2$) | 384,011 | 374,744 | 374,744 | 1,247,028 | 328,491 | 2,942,425 | 208,431 | 163,236 | 201,512 | 225,583 | 225,583 | 158,567 | 158,567 | 161,048 | 970,835 | 489,750 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Road Segment Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Model Emission Rate[1] | 2.695553E-06 | 2.695553E-06 | 2.695553E-06 | 4.705912E-06 | 4.705912E-06 | 4.705912E-06 | 2.324011E-06 | 2.324011E-06 | 2.324011E-06 | 2.324011E-06 | 2.324011E-06 | 2.324011E-06 | 2.324011E-06 | 2.324011E-06 | 4.851791E-06 | 4.851791E-06 |

1. Units are g/s-$m^2$ for area sources.

**$NO_X$ Emission Apportioning**
**Year 2018**
**NARM**

| North OB Area 3 | North OB Area 4 | North OB Area 5 | North OB Area 6 | East Coal Area 1 | East Coal Area 2 | East Coal Area 3 | East OB Area 1 | East OB Area 2 | East OB Area 3 | East OB Area 4 | West Haul Road 1 to Hopper A | West Haul Road 2 to Hopper A | North Haul Road 1 to Hopper N | North Haul Road 2 to Hopper N | North Haul Road 3 to Hopper N | North Haul Road 4 to Hopper N | East Haul Road 1 to Hopper D | East Haul Road 2 to Hopper D | Train Loop |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) |
| 0.829 | 0.936 | 0.893 | 2.935 | | | | 2.111 | 0.482 | 1.101 | 0.045 | | | | | | | | | |
| | | | | | | | | | | | 0.811 | 2.041 | 0.833 | 0.398 | 0.887 | 1.142 | 2.863 | 1.212 | |
| 0.036 | 0.040 | 0.038 | 0.126 | | | | 0.091 | 0.021 | 0.047 | 0.002 | | | | | | | | | |
| | | | | | | | | | | | 0.038 | 0.096 | 0.039 | 0.019 | 0.042 | 0.053 | 0.134 | 0.057 | |
| | | | | 0.084 | 0.013 | 0.013 | | | | | | | | | | | | | |
| 0.260 | 0.294 | 0.280 | 0.922 | | | | 0.663 | 0.151 | 0.346 | 0.014 | | | | | | | | | |
| | | | | 0.527 | 0.085 | 0.085 | | | | | | | | | | | | | |
| 0.091 | 0.103 | 0.098 | 0.323 | | | | 0.573 | 0.131 | 0.299 | 0.012 | | | | | | | | | |
| 0.011 | 0.012 | 0.011 | 0.037 | | | | 0.067 | 0.015 | 0.035 | 0.001 | | | | | | | | | |
| 0.135 | 0.152 | 0.145 | 0.477 | | | | 0.848 | 0.194 | 0.442 | 0.018 | | | | | | | | | |
| 0.027 | 0.030 | 0.029 | 0.095 | | | | 0.099 | 0.023 | 0.052 | 0.002 | | | | | | | | | |
| | | | | 0.102 | 0.016 | 0.016 | | | | | | | | | | | | | |
| | | | | | | | | | | | 0.372 | 0.937 | 0.379 | 0.181 | 0.403 | 0.519 | 0.225 | 0.095 | |
| 1.716 | 1.937 | 1.847 | 6.073 | | | | 6.335 | 1.446 | 3.304 | 0.134 | | | | | | | | | |
| | | | | 2.591 | 0.416 | 0.416 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | 18.266 |
| 0.014 | 0.016 | 0.015 | 0.051 | | | | 0.063 | 0.014 | 0.033 | 0.001 | | | | | | | | | |
| 0.017 | 0.019 | 0.018 | 0.060 | | | | 0.075 | 0.017 | 0.039 | 0.002 | | | | | | | | | |
| 0.139 | 0.157 | 0.149 | 0.491 | | | | 0.614 | 0.140 | 0.320 | 0.013 | 0.026 | 0.034 | 0.024 | 0.021 | 0.021 | 0.025 | 0.037 | 0.049 | |
| **3.2746** | **3.6979** | **3.5261** | **11.5913** | **3.3042** | **0.5303** | **0.5303** | **11.5412** | **2.6338** | **6.0187** | **0.2440** | **1.2479** | **3.1066** | **1.2745** | **0.6179** | **1.3521** | **1.7395** | **3.2590** | **1.4125** | **18.2664** |

| North OB Area 3 | North OB Area 4 | North OB Area 5 | North OB Area 6 | East Coal Area 1 | East Coal Area 2 | East Coal Area 3 | East OB Area 1 | East OB Area 2 | East OB Area 3 | East OB Area 4 | West Haul Road 1 to Hopper A | West Haul Road 2 to Hopper A | North Haul Road 1 to Hopper N | North Haul Road 2 to Hopper N | North Haul Road 3 to Hopper N | North Haul Road 4 to Hopper N | East Haul Road 1 to Hopper D | East Haul Road 2 to Hopper D | Train Loop |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NANOB3 | NANOB4 | NANOB5 | NANOB6 | NAEC1 | NAEC2 | NAEC3 | NAEOB1 | NAEOB2 | NAEOB3 | NAEOB4 | NAWR1_1-25 | NAWR2_1-32 | NANR1_1-18 | NANR2_1-18 | NANR3_1-19 | NANR4_1-27 | NAER1_1-43 | NAER2_1-76 | NALP_1-128 |
| Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Areas | Areas | Areas | Areas | Areas | Areas | Areas | Areas | Areas |
| 471958.2963 | 472964.1317 | 473997.1655 | 475201.3886 | 478763.1767 | 483540.0825 | 484701.1478 | 478762.7088 | 481236.0452 | 482643.0628 | 485448.8565 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4825003.1354 | 4825942.1946 | 4826076.4836 | 4826039.9052 | 4825190.6328 | 4824723.1613 | 4824723.1613 | 4824787.6344 | 4824787.6344 | 4824320.8204 | 4824723.1613 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1005.8366 | 1033.0338 | 1204.2230 | 3562.8092 | 3294.1388 | 1161.0654 | 1161.0654 | 2473.3364 | 821.5333 | 2805.7938 | 413.3567 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 671.0129 | 737.7936 | 603.5046 | 670.5600 | 335.4007 | 152.7370 | 152.7370 | 1207.4658 | 829.5894 | 555.0779 | 152.7370 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 674,929 | 762,166 | 726,754 | 2,389,077 | 1,104,856 | 177,338 | 177,338 | 2,986,469 | 681,535 | 1,557,434 | 63,135 | 126,791 | 163,385 | 115,535 | 101,715 | 101,303 | 123,074 | 180,048 | 237,389 | 611,379 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4,226 | 5,446 | 3,851 | 3,391 | 3,377 | 4,102 | 6,002 | 7,913 | 20,379 |
| 4.851791E-06 | 4.851791E-06 | 4.851791E-06 | 4.851791E-06 | 2.990595E-06 | 2.990595E-06 | 2.990595E-06 | 3.864490E-06 | 3.864490E-06 | 3.864490E-06 | 3.864490E-06 | 9.842517E-06 | 1.901422E-05 | 1.103125E-05 | 6.075150E-06 | 1.334682E-05 | 1.413374E-05 | 1.810065E-05 | 5.950240E-06 | 2.987743E-05 |

# $NO_X$ Emission Apportioning
## Year 2023
## NARM

| Emission Activities | Total Annual $NO_X$ Emissions (g/s) | West Annual $NO_X$ Emissions (g/s) | North Annual $NO_X$ Emissions (g/s) | West Coal Area 1 $NO_X$ Emissions (g/s) | West Coal Area 2 $NO_X$ Emissions (g/s) | West OB Area 1 $NO_X$ Emissions (g/s) | West OB Area 2 $NO_X$ Emissions (g/s) | West OB Area 3 $NO_X$ Emissions (g/s) | West OB Area 4 $NO_X$ Emissions (g/s) | North Coal Area 1 $NO_X$ Emissions (g/s) | North Coal Area 2 $NO_X$ Emissions (g/s) | North Coal Area 3 $NO_X$ Emissions (g/s) | North Coal Area 4 $NO_X$ Emissions (g/s) | North Coal Area 5 $NO_X$ Emissions (g/s) | North Coal Area 6 $NO_X$ Emissions (g/s) | North Coal Area 7 $NO_X$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OB Haul Trucks | 19.998 | 8.777 | 11.221 | | | 1.587 | 3.546 | 1.526 | 2.118 | | | | | | | |
| Coal Haul Trucks | 9.363 | 3.511 | 5.852 | | | | | | | | | | | | | |
| Graders on OB | 0.777 | 0.341 | 0.436 | | | 0.062 | 0.138 | 0.059 | 0.082 | | | | | | | |
| Graders on Coal | 0.518 | 0.194 | 0.324 | | | | | | | | | | | | | |
| Wheeled Loaders | 0.275 | 0.103 | 0.172 | 0.044 | 0.059 | | | | | 0.003 | 0.003 | 0.003 | 0.003 | 0.032 | 0.017 | 0.050 |
| RT Dozers on OB | 5.674 | 2.490 | 3.184 | | | 0.450 | 1.006 | 0.433 | 0.601 | | | | | | | |
| RT Dozers on Coal | 1.891 | 0.709 | 1.182 | 0.305 | 0.404 | | | | | 0.021 | 0.021 | 0.021 | 0.021 | 0.221 | 0.116 | 0.345 |
| Track Dozers on OB | 2.311 | 0.867 | 1.444 | | | 0.157 | 0.350 | 0.151 | 0.209 | | | | | | | |
| Track Dozers on Reclaim | 0.294 | 0.110 | 0.184 | | | 0.020 | 0.045 | 0.019 | 0.027 | | | | | | | |
| Scrapers | 4.087 | 1.533 | 2.554 | | | 0.277 | 0.619 | 0.267 | 0.370 | | | | | | | |
| Drills on OB | 0.727 | 0.354 | 0.372 | | | 0.064 | 0.143 | 0.062 | 0.085 | | | | | | | |
| Drills on Coal | 0.336 | 0.126 | 0.210 | 0.054 | 0.072 | | | | | 0.004 | 0.004 | 0.004 | 0.004 | 0.039 | 0.021 | 0.061 |
| Water Trucks | 3.393 | 1.432 | 1.962 | | | | | | | | | | | | | |
| Blasting on OB | 33.651 | 16.407 | 17.245 | | | 2.967 | 6.628 | 2.853 | 3.959 | | | | | | | |
| Blasting on Coal | 8.558 | 3.209 | 5.349 | 1.382 | 1.828 | | | | | 0.097 | 0.097 | 0.097 | 0.097 | 1.002 | 0.527 | 1.560 |
| Locomotives | 18.266 | | | | | | | | | | | | | | | |
| Pumps | 0.336 | | | | | 0.024 | 0.053 | 0.023 | 0.031 | | | | | | | |
| Welders | 0.399 | | | | | 0.028 | 0.063 | 0.027 | 0.037 | | | | | | | |
| Light Plants & Generators | 3.491 | | | | | 0.231 | 0.515 | 0.222 | 0.308 | | | | | | | |
| **Total** | **114.3460** | **40.1630** | **51.6903** | **1.7855** | **2.3620** | **5.8663** | **13.1044** | **5.6417** | **7.8271** | **0.1255** | **0.1255** | **0.1255** | **0.1255** | **1.2952** | **0.6807** | **2.0163** |

Modeling Summary:

| Source Description | West Coal Area 1 | West Coal Area 2 | West OB Area 1 | West OB Area 2 | West OB Area 3 | West OB Area 4 | North Coal Area 1 | North Coal Area 2 | North Coal Area 3 | North Coal Area 4 | North Coal Area 5 | North Coal Area 6 | North Coal Area 7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | NAWC1 | NAWC2 | NAWOB1 | NAWOB2 | NAWOB3 | NAWOB4 | NANC1 | NANC2 | NANC3 | NANC4 | NANC5 | NANC6 | NANC7 |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area |
| SW X-Coordinate | 472578.3766 | 471976.6677 | 474112.7751 | 472037.5468 | 471976.6677 | 472496.7554 | 470671.5529 | 470671.5529 | 470671.5529 | 470671.5529 | 471002.7667 | 471958.2905 | 472964.1281 |
| SW Y-Coordinate | 4818939.3405 | 4817032.8460 | 4820382.5731 | 4818939.3407 | 4816947.1225 | 4816596.9922 | 4823619.0895 | 4824169.2004 | 4824719.3113 | 4825269.4222 | 4826009.4257 | 4826210.5975 | 4827149.4790 |
| Angle | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Area X-Dimension (m) | 465.0102 | 463.2151 | 680.3406 | 1676.4000 | 520.0877 | 613.6874 | 67.6841 | 67.6841 | 67.6841 | 67.6841 | 955.5229 | 1005.8376 | 2237.2591 |
| Area Y-Dimension (m) | 1435.6214 | 1906.4947 | 1583.5795 | 1435.6212 | 1992.2183 | 2342.3484 | 550.1109 | 550.1109 | 550.1109 | 550.1109 | 402.1433 | 200.7641 | 267.3656 |
| Area ($m^2$) | 667,579 | 883,117 | 1,077,373 | 2,406,675 | 1,036,128 | 1,437,470 | 37,234 | 37,234 | 37,234 | 37,234 | 384,257 | 201,936 | 598,166 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Road Segment Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Model Emission Rate[1] | 2.674607E-06 | 2.674607E-06 | 5.445023E-06 | 5.445023E-06 | 5.445023E-06 | 5.445023E-06 | 3.370723E-06 | 3.370723E-06 | 3.370723E-06 | 3.370723E-06 | 3.370723E-06 | 3.370723E-06 | 3.370723E-06 |

1. Units are g/s-$m^2$ for area sources.

**$NO_X$ Emission Apportioning**
**Year 2023**
**NARM**

| North Coal Area 8 | North Coal Area 9 | North Coal Area 10 | North OB Area 1 | North OB Area 2 | North OB Area 3 | North OB Area 4 | North OB Area 5 | North OB Area 6 | North OB Area 7 | West Haul Road 1 to Hopper A | West Haul Road 2 to Hopper A | North Haul Road 1 to Hopper N | North Haul Road 2 to Hopper N | North Haul Road 3 to Hopper N | North Haul Road 4 to Hopper N | Train Loop |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) | $NO_X$ Emissions (g/s) |
| | | | 0.264 | 0.264 | 1.073 | 0.206 | 1.569 | 5.104 | 2.741 | | | | | | | |
| | | | | | | | | | | 1.338 | 2.173 | 0.409 | 1.728 | 1.544 | 2.170 | |
| | | | 0.010 | 0.010 | 0.042 | 0.008 | 0.061 | 0.198 | 0.106 | | | | | | | |
| | | | | | | | | | | 0.074 | 0.120 | 0.023 | 0.096 | 0.085 | 0.120 | |
| 0.020 | 0.020 | 0.020 | | | | | | | | | | | | | | |
| | | | 0.075 | 0.075 | 0.304 | 0.058 | 0.445 | 1.448 | 0.778 | | | | | | | |
| 0.137 | 0.137 | 0.139 | | | | | | | | | | | | | | |
| | | | 0.034 | 0.034 | 0.138 | 0.026 | 0.202 | 0.657 | 0.353 | | | | | | | |
| | | | 0.004 | 0.004 | 0.018 | 0.003 | 0.026 | 0.084 | 0.045 | | | | | | | |
| | | | 0.060 | 0.060 | 0.244 | 0.047 | 0.357 | 1.162 | 0.624 | | | | | | | |
| | | | 0.009 | 0.009 | 0.036 | 0.007 | 0.052 | 0.169 | 0.091 | | | | | | | |
| 0.024 | 0.024 | 0.025 | | | | | | | | | | | | | | |
| | | | | | | | | | | 0.546 | 0.886 | 0.137 | 0.579 | 0.518 | 0.727 | |
| | | | 0.406 | 0.406 | 1.649 | 0.316 | 2.411 | 7.844 | 4.213 | | | | | | | |
| 0.620 | 0.620 | 0.631 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | 18.266 |
| | | | 0.005 | 0.005 | 0.020 | 0.004 | 0.029 | 0.094 | 0.050 | | | | | | | |
| | | | 0.006 | 0.006 | 0.023 | 0.004 | 0.034 | 0.111 | 0.060 | | | | | | | |
| | | | 0.047 | 0.047 | 0.193 | 0.037 | 0.282 | 0.916 | 0.492 | 0.037 | 0.045 | 0.029 | 0.031 | 0.027 | 0.032 | |
| **0.8014** | **0.8014** | **0.8155** | **0.9207** | **0.9207** | **3.7385** | **0.7166** | **5.4682** | **17.7877** | **9.5526** | **1.9949** | **3.2244** | **0.5975** | **2.4345** | **2.1747** | **3.0490** | **18.2664** |

| North Coal Area 8 | North Coal Area 9 | North Coal Area 10 | North OB Area 1 | North OB Area 2 | North OB Area 3 | North OB Area 4 | North OB Area 5 | North OB Area 6 | North OB Area 7 | West Haul Road 1 to Hopper A | West Haul Road 2 to Hopper A | North Haul Road 1 to Hopper N | North Haul Road 2 to Hopper N | North Haul Road 3 to Hopper N | North Haul Road 4 to Hopper N | Train Loop |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NANC8 | NANC9 | NANC10 | NANOB1 | NANOB2 | NANOB3 | NANOB4 | NANOB5 | NANOB6 | NANOB7 | NAWR1_1-31 | NAWR2_1-38 | NANR1_1-21 | NANR2_1-25 | NANR3_1-22 | NANR4_1-30 | NALP_1-128 |
| Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Areas | Areas | Areas | Areas | Areas | Areas | Areas |
| 475201.3872 | 476383.2483 | 477565.1097 | 470537.9628 | 470537.9628 | 470739.2370 | 471958.2896 | 471002.7667 | 472964.1281 | 478764.4177 | -- | -- | -- | -- | -- | -- | -- |
| 4827179.8572 | 4827179.8572 | 4827149.3782 | 4823619.0895 | 4824719.3113 | 4825271.8094 | 4825838.0626 | 4826009.4257 | 4826814.1030 | 4826598.9961 | -- | -- | -- | -- | -- | -- | -- |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | -- | -- | -- | -- |
| 1181.8611 | 1181.8611 | 1199.3080 | 201.2743 | 201.2743 | 1219.0526 | 1005.8385 | 1961.3614 | 5800.2896 | 1607.2016 | -- | -- | -- | -- | -- | -- | -- |
| 201.1692 | 201.1692 | 201.7374 | 1100.2218 | 1100.2218 | 737.6164 | 171.3632 | 670.5650 | 737.6114 | 1429.5797 | -- | -- | -- | -- | -- | -- | -- |
| 237,754 | 237,754 | 241,945 | 221,446 | 221,446 | 899,193 | 172,364 | 1,315,220 | 4,278,360 | 2,297,623 | 172,959 | 212,291 | 134,739 | 144,706 | 126,710 | 148,418 | 611,379 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5,765 | 7,076 | 4,491 | 4,824 | 4,224 | 4,947 | 20,379 |
| 3.370723E-06 | 3.370723E-06 | 3.370723E-06 | 4.157606E-06 | 4.157606E-06 | 4.157606E-06 | 4.157606E-06 | 4.157606E-06 | 4.157606E-06 | 4.157606E-06 | 1.153392E-05 | 1.518870E-05 | 4.434165E-06 | 1.682385E-05 | 1.716310E-05 | 2.054310E-05 | 2.987743E-05 |

**$NO_X$ Emission Apportioning**
**Year 2018**
**Antelope Mine**

| Emission Activities | Total Annual $NO_X$ Emissions (g/s) | Pit 1 Annual $NO_X$ Emissions (g/s) | Pit 2 Annual $NO_X$ Emissions (g/s) | Pit 4 Annual $NO_X$ Emissions (g/s) | Pit 1 Coal Area 1 $NO_X$ Emissions (g/s) | Pit 1 Coal Area 2 $NO_X$ Emissions (g/s) | Pit 1 OB Area $NO_X$ Emissions (g/s) | Pit 2 Coal Area 1 $NO_X$ Emissions (g/s) | Pit 2 Coal Area 2 $NO_X$ Emissions (g/s) | Pit 2 OB Area 1 $NO_X$ Emissions (g/s) | Pit 2 OB Area 2 $NO_X$ Emissions (g/s) | Pit 4 Coal Area $NO_X$ Emissions (g/s) | Pit 4 OB Area 1 $NO_X$ Emissions (g/s) | Pit 4 OB Area 2 $NO_X$ Emissions (g/s) | Pit 1 Haul Road $NO_X$ Emissions (g/s) | Pit 2 Haul Road $NO_X$ Emissions (g/s) | Pit 4 Haul Road $NO_X$ Emissions (g/s) | Train Loop $NO_X$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OB Haul Trucks | 14.799 | 2.336 | 10.025 | 2.438 | | | 2.336 | | | 9.666 | 0.359 | | 1.409 | 1.029 | | | | |
| Coal Haul Trucks | 6.893 | 2.156 | 3.676 | 1.061 | | | | | | | | | | | 2.156 | 3.676 | 1.061 | |
| Graders | 0.918 | 0.287 | 0.489 | 0.141 | | | | | | | | | | | 0.287 | 0.489 | 0.141 | |
| Wheeled Loaders on OB | 0.105 | 0.014 | 0.072 | 0.019 | | | 0.014 | | | 0.069 | 0.003 | | 0.011 | 0.008 | | | | |
| Wheeled Loaders on Coal | 0.034 | 0.011 | 0.018 | 0.005 | 0.006 | 0.006 | | 0.009 | 0.009 | | | 0.005 | | | | | | |
| RT Dozers on OB | 1.872 | 0.245 | 1.280 | 0.347 | | | 0.245 | | | 1.234 | 0.046 | | 0.201 | 0.146 | | | | |
| RT Dozers on Coal | 1.029 | 0.340 | 0.534 | 0.154 | 0.170 | 0.170 | | 0.267 | 0.267 | | | 0.154 | | | | | | |
| Track Dozers on OB | 1.524 | 0.200 | 1.042 | 0.282 | | | 0.200 | | | 1.005 | 0.037 | | 0.163 | 0.119 | | | | |
| Track Dozers on Coal | 0.356 | 0.118 | 0.185 | 0.053 | 0.059 | 0.059 | | 0.092 | 0.092 | | | 0.053 | | | | | | |
| Scrapers | 1.048 | 0.280 | 0.605 | 0.164 | | | 0.280 | | | 0.583 | 0.022 | | 0.095 | 0.069 | | | | |
| Drills on OB | 0.461 | 0.123 | 0.266 | 0.072 | | | 0.123 | | | 0.256 | 0.010 | | 0.042 | 0.030 | | | | |
| Drills on Coal | 0.081 | 0.027 | 0.042 | 0.012 | 0.013 | 0.013 | | 0.021 | 0.021 | | | 0.012 | | | | | | |
| Water Trucks | 1.255 | 0.302 | 0.760 | 0.194 | | | | | | | | | | | 0.302 | 0.760 | 0.194 | |
| OB Blasting | 20.541 | 5.481 | 11.850 | 3.211 | | | 5.481 | | | 11.426 | 0.424 | | 1.856 | 1.355 | | | | |
| Coal Blasting | 2.975 | 0.983 | 1.545 | 0.446 | 0.492 | 0.492 | | 0.773 | 0.773 | | | 0.446 | | | | | | |
| Locomotives | 1.855 | | | | | | | | | | | | | | | | | 1.855 |
| Pumps | 1.464 | | | | | | 0.312 | | | 0.511 | 0.019 | | 0.360 | 0.263 | | | | |
| Welders | 0.146 | | | | | | 0.031 | | | 0.051 | 0.002 | | 0.036 | 0.026 | | | | |
| Light Plants and Generators | 0.489 | | | | | | 0.100 | | | 0.164 | 0.006 | | 0.115 | 0.084 | 0.004 | 0.009 | 0.007 | |
| Compressors | 0.027 | | | | | | 0.006 | | | 0.009 | 0.000 | | 0.007 | 0.005 | | | | |
| **Total** | **57.8709** | **12.9012** | **32.3885** | **8.6011** | **0.7396** | **0.7396** | **9.1255** | **1.1622** | **1.1622** | **24.9740** | **0.9274** | **0.6712** | **4.2936** | **3.1344** | **2.7494** | **4.9337** | **1.4035** | **1.8546** |

Modeling Summary:

| Source Description | Pit 1 Coal Area 1 | Pit 1 Coal Area 2 | Pit 1 OB Area | Pit 2 Coal Area 1 | Pit 2 Coal Area 2 | Pit 2 OB Area 1 | Pit 2 OB Area 2 | Pit 4 Coal Area | Pit 4 OB Area 1 | Pit 4 OB Area 2 | Pit 1 Haul Road | Pit 2 Haul Road | Pit 4 Haul Road | Train Loop |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | A1C1 | A1C2 | A1OB | A2C1 | A2C2 | A2OB1 | A2OB2 | A4C | A4OB1 | A4OB2 | A1R_1-10 | A2R_1-26 | A4R_1-22 | ANLP_1-52 |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Areas | Areas | Areas | Areas |
| SW X-Coordinate | 469058.4886 | 470276.1032 | 469147.1152 | 467401.3146 | 468834.3547 | 467401.3146 | 466747.8882 | 468101.4416 | 466466.3199 | 468028.2896 | -- | -- | -- | -- |
| SW Y-Coordinate | 4818561.3095 | 4818948.7821 | 4818282.8048 | 4816244.7787 | 4816244.7787 | 4815894.2575 | 4815649.7459 | 4810668.1226 | 4810664.8326 | 4810664.8326 | -- | -- | -- | -- |
| Angle | -17.6523 | -17.6523 | -17.6523 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | -- |
| Area X-Dimension (m) | 1277.7794 | 1277.7794 | 2555.5588 | 1433.0402 | 1433.0402 | 2866.3888 | 371.6866 | 365.7600 | 1561.9698 | 771.3478 | -- | -- | -- | -- |
| Area Y-Dimension (m) | 177.7617 | 177.7617 | 581.4476 | 253.4365 | 253.4365 | 849.6318 | 243.3180 | 1613.0702 | 1096.9590 | 1621.6106 | -- | -- | -- | -- |
| Area ($m^2$) | 227,140 | 227,140 | 1,485,924 | 363,185 | 363,185 | 2,435,375 | 90,438 | 589,997 | 1,713,417 | 1,250,826 | 65,627 | 131,273 | 104,073 | 166,197 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 30 | 30 | 30 | 30 |
| Road Segment Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,188 | 4,376 | 3,469 | 5,540 |
| Model Emission Rate[1] | 3.256121E-06 | 3.256121E-06 | 6.141312E-06 | 3.200086E-06 | 3.200086E-06 | 1.025469E-05 | 1.025469E-05 | 1.137685E-06 | 2.505843E-06 | 2.505843E-06 | 4.189404E-05 | 3.758336E-05 | 1.348595E-05 | 1.115889E-05 |

1. Units are g/s-$m^2$ for area sources.

**$NO_X$ Emission Apportioning**
**Year 2023**
**Antelope Mine**

| Emission Activities | Total Annual $NO_X$ Emissions (g/s) | Pit 1 Annual $NO_X$ Emissions (g/s) | Pit 2 Annual $NO_X$ Emissions (g/s) | Pit 4 Annual $NO_X$ Emissions (g/s) | Pit 1 Coal Area 1 $NO_X$ Emissions (g/s) | Pit 1 Coal Area 2 $NO_X$ Emissions (g/s) | Pit 1 OB Area 1 $NO_X$ Emissions (g/s) | Pit 1 OB Area 2 $NO_X$ Emissions (g/s) | Pit 2 Coal Area 1 $NO_X$ Emissions (g/s) | Pit 2 Coal Area 2 $NO_X$ Emissions (g/s) | Pit 2 OB Area 1 $NO_X$ Emissions (g/s) | Pit 2 OB Area 2 $NO_X$ Emissions (g/s) | Pit 2 OB Area 3 $NO_X$ Emissions (g/s) | Pit 4 Coal Area $NO_X$ Emissions (g/s) | Pit 4 OB Area 1 $NO_X$ Emissions (g/s) | Pit 4 OB Area 2 $NO_X$ Emissions (g/s) | Pit 1 Haul Road $NO_X$ Emissions (g/s) | Pit 2 Haul Road 1 $NO_X$ Emissions (g/s) | Pit 2 Haul Road 2 $NO_X$ Emissions (g/s) | Pit 4 Haul Road $NO_X$ Emissions (g/s) | Train Loop $NO_X$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OB Haul Trucks | 14.423 | 2.392 | 12.027 | 0.003 | | | 1.122 | 1.270 | | | 5.005 | 5.341 | 1.681 | | 0.002 | 0.001 | | | | | |
| Coal Haul Trucks | 6.886 | 1.960 | 4.853 | 0.073 | | | | | | | | | | | | | 1.960 | 2.471 | 2.382 | 0.073 | |
| Graders | 0.894 | 0.254 | 0.630 | 0.010 | | | | | | | | | | | | | 0.254 | 0.321 | 0.309 | 0.010 | |
| Wheeled Loaders on OB | 0.100 | 0.014 | 0.086 | 0.000 | | | 0.007 | 0.008 | | | 0.036 | 0.038 | 0.012 | | 0.000 | 0.000 | | | | | |
| Wheeled Loaders on Coal | 0.034 | 0.009 | 0.024 | 0.000 | 0.005 | 0.005 | | | 0.020 | 0.005 | | | | 0.000 | | | | | | | |
| RT Dozers on OB | 1.809 | 0.259 | 1.550 | 0.000 | | | 0.122 | 0.138 | | | 0.645 | 0.688 | 0.217 | | 0.000 | 0.000 | | | | | |
| RT Dozers on Coal | 1.027 | 0.280 | 0.736 | 0.011 | 0.140 | 0.140 | | | 0.589 | 0.147 | | | | 0.011 | | | | | | | |
| Track Dozers on OB | 1.405 | 0.201 | 1.203 | 0.000 | | | 0.094 | 0.107 | | | 0.501 | 0.534 | 0.168 | | 0.000 | 0.000 | | | | | |
| Track Dozers on Coal | 0.374 | 0.102 | 0.268 | 0.004 | 0.051 | 0.051 | | | 0.215 | 0.053 | | | | 0.004 | | | | | | | |
| Scrapers | 1.021 | 0.287 | 0.733 | 0.000 | | | 0.135 | 0.153 | | | 0.305 | 0.326 | 0.102 | | 0.000 | 0.000 | | | | | |
| Drills on OB | 0.451 | 0.127 | 0.324 | 0.000 | | | 0.060 | 0.067 | | | 0.135 | 0.144 | 0.045 | | 0.000 | 0.000 | | | | | |
| Drills on Coal | 0.080 | 0.022 | 0.057 | 0.001 | 0.011 | 0.011 | | | 0.046 | 0.011 | | | | 0.001 | | | | | | | |
| Water Trucks | 1.223 | 0.281 | 0.938 | 0.004 | | | | | | | | | | | | | 0.281 | 0.478 | 0.460 | 0.004 | |
| OB Blasting | 16.490 | 4.643 | 11.845 | 0.003 | | | 2.178 | 2.465 | | | 4.929 | 5.260 | 1.655 | | 0.002 | 0.001 | | | | | |
| Coal Blasting | 2.975 | 0.810 | 2.133 | 0.032 | 0.405 | 0.405 | | | 1.707 | 0.425 | | | | 0.032 | | | | | | | |
| Locomotives | 1.855 | | | | | | | | | | | | | | | | | | | | 1.855 |
| Pumps | 1.464 | | | | | | 0.149 | 0.169 | | | 0.321 | 0.343 | 0.108 | | 0.287 | 0.086 | | | | | |
| Welders | 0.146 | | | | | | 0.015 | 0.017 | | | 0.032 | 0.034 | 0.011 | | 0.029 | 0.009 | | | | | |
| Light Plants and Generators | 0.489 | | | | | | 0.047 | 0.053 | | | 0.100 | 0.107 | 0.034 | | 0.090 | 0.027 | 0.007 | 0.004 | 0.014 | 0.008 | |
| Compressors | 0.027 | | | | | | 0.003 | 0.003 | | | 0.006 | 0.006 | 0.002 | | 0.005 | 0.002 | | | | | |
| **Total** | **53.1716** | **11.6408** | **37.4079** | **0.1428** | **0.6111** | **0.6111** | **3.9304** | **4.4483** | **2.5768** | **0.6418** | **12.0152** | **12.8223** | **4.0345** | **0.0486** | **0.4160** | **0.1251** | **2.5014** | **3.2735** | **3.1655** | **0.0954** | **1.8546** |

Modeling Summary:

| Source Description | Pit 1 Coal Area 1 | Pit 1 Coal Area 2 | Pit 1 OB Area 1 | Pit 1 OB Area 2 | Pit 2 Coal Area 1 | Pit 2 Coal Area 2 | Pit 2 OB Area 1 | Pit 2 OB Area 2 | Pit 2 OB Area 3 | Pit 4 Coal Area | Pit 4 OB Area 1 | Pit 4 OB Area 2 | Pit 1 Haul Road | Pit 2 Haul Road 1 | Pit 2 Haul Road 2 | Pit 4 Haul Road | Train Loop |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | A1C1 | A1C2 | A1OB1 | A1OB2 | A2C1 | A2C2 | A2OB1 | A2OB2 | A2OB3 | A4C | A4OB1 | A4OB2 | A1R_1-13 | A2R1_1-8 | A2R2_1-35 | A4R_1-24 | ANLP_1-52 |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Areas | Areas | Areas | Areas | Areas |
| SW X-Coordinate | 468836.3309 | 469831.3875 | 468836.3309 | 468924.2382 | 467402.3697 | 466149.1671 | 467402.3697 | 467401.3146 | 466149.1671 | 470120.1908 | 469125.5696 | 470102.1095 | -- | -- | -- | -- | -- |
| SW Y-Coordinate | 4819225.5205 | 4819542.1701 | 4819225.5205 | 4818949.2760 | 4817436.5531 | 4815895.8961 | 4817436.5531 | 4816945.8209 | 4815895.8961 | 4809628.2991 | 4810683.9411 | 4809596.1364 | -- | -- | -- | -- | -- |
| Angle | -17.6523 | -17.6523 | -17.6523 | -17.6523 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -- | -- | -- | -- | -- |
| Area X-Dimension (m) | 1044.2244 | 1044.2244 | 2088.4488 | 2358.7649 | 2458.7567 | 1252.1474 | 2463.7798 | 2829.2340 | 1252.1474 | 306.6704 | 987.6316 | 333.4500 | -- | -- | -- | -- | -- |
| Area Y-Dimension (m) | 115.4929 | 115.4929 | 289.2926 | 289.8943 | 283.3089 | 138.5700 | 528.0523 | 490.7323 | 348.8817 | 1009.8863 | 1177.3589 | 1049.0267 | -- | -- | -- | -- | -- |
| Area ($m^2$) | 120,601 | 120,601 | 604,173 | 683,792 | 696,588 | 173,510 | 1,301,005 | 1,388,397 | 436,851 | 309,702 | 1,162,797 | 349,798 | 85,850 | 47,801 | 184,949 | 106,899 | 166,197 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 30 | 30 | 30 | 30 | 30 |
| Road Segment Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,862 | 1,593 | 6,165 | 3,563 | 5,540 |
| Model Emission Rate[1] | 5.066743E-06 | 5.066743E-06 | 6.505348E-06 | 6.505348E-06 | 3.699141E-06 | 3.699141E-06 | 9.235343E-06 | 9.235343E-06 | 9.235343E-06 | 1.570620E-07 | 3.577310E-07 | 3.577310E-07 | 2.913730E-05 | 6.848198E-05 | 1.711571E-05 | 8.919809E-07 | 1.115889E-05 |

1. Units are g/s-$m^2$ for area sources.

**$NO_X$ Emission Apportioning**
**Year 2018**
**Black Thunder Mine**

| Emission Activities | Total Annual $NO_X$ Emissions (g/s) | North Annual $NO_X$ Emissions (g/s) | Northwest Annual $NO_X$ Emissions (g/s) | West Annual $NO_X$ Emissions (g/s) | Southwest Annual $NO_X$ Emissions (g/s) | South Annual $NO_X$ Emissions (g/s) | North Coal Area 1 $NO_X$ Emissions (g/s) | North Coal Area 2 $NO_X$ Emissions (g/s) | North OB Area $NO_X$ Emissions (g/s) | Northwest Coal Area 1 $NO_X$ Emissions (g/s) | Northwest Coal Area 2 $NO_X$ Emissions (g/s) | Northwest OB Area $NO_X$ Emissions (g/s) | West Coal Area 1 $NO_X$ Emissions (g/s) | West Coal Area 2 $NO_X$ Emissions (g/s) | West Coal Area 3 $NO_X$ Emissions (g/s) | West Coal Area 4 $NO_X$ Emissions (g/s) | West Coal Area 5 $NO_X$ Emissions (g/s) | West Coal Area 6 $NO_X$ Emissions (g/s) | West OB Area 1 $NO_X$ Emissions (g/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OB Haul Truck | 56.533 | 13.853 | 8.701 | 19.520 | 8.319 | 6.139 | | | 13.853 | | | 8.701 | | | | | | | 0.093 |
| Coal Haul Truck | 27.684 | 7.648 | 3.761 | 6.978 | 3.929 | 5.367 | | | | | | | | | | | | | |
| Graders | 1.874 | 0.478 | 0.277 | 0.590 | 0.273 | 0.256 | | | | | | | | | | | | | |
| Wheeled Loaders on OB | 1.192 | 0.290 | 0.188 | 0.357 | 0.182 | 0.174 | | | 0.290 | | | 0.188 | | | | | | | 0.002 |
| Wheeled Loaders on Coal | 1.291 | 0.344 | 0.263 | 0.349 | 0.158 | 0.177 | 0.172 | 0.172 | | 0.132 | 0.132 | | 0.076 | 0.106 | 0.106 | 0.020 | 0.020 | 0.020 | |
| RT Dozers on OB | 4.257 | 1.086 | 0.773 | 1.211 | 0.583 | 0.603 | | | 1.086 | | | 0.773 | | | | | | | 0.006 |
| RT Dozers on Coal | 0.719 | 0.191 | 0.147 | 0.195 | 0.088 | 0.099 | 0.096 | 0.096 | | 0.073 | 0.073 | | 0.042 | 0.059 | 0.059 | 0.011 | 0.011 | 0.011 | |
| Track Dozers on OB | 5.975 | 1.418 | 0.982 | 1.884 | 0.933 | 0.758 | | | 1.418 | | | 0.982 | | | | | | | 0.009 |
| Scrapers | 1.534 | 0.408 | 0.313 | 0.415 | 0.187 | 0.211 | | | 0.408 | | | 0.313 | | | | | | | 0.002 |
| Drills on OB | 1.404 | 0.355 | 0.248 | 0.404 | 0.197 | 0.200 | | | 0.355 | | | 0.248 | | | | | | | 0.002 |
| Drills on Coal | 0.330 | 0.088 | 0.067 | 0.089 | 0.040 | 0.045 | 0.044 | 0.044 | | 0.034 | 0.034 | | 0.019 | 0.027 | 0.027 | 0.005 | 0.005 | 0.005 | |
| Water Truck | 4.211 | 1.075 | 0.623 | 1.325 | 0.612 | 0.575 | | | | | | | | | | | | | |
| Blasting on OB | 63.664 | 16.187 | 11.695 | 18.190 | 8.319 | 9.272 | | | 16.187 | | | 11.695 | | | | | | | 0.087 |
| Blasting on Coal | 11.615 | 3.090 | 2.368 | 3.142 | 1.418 | 1.596 | 1.545 | 1.545 | | 1.184 | 1.184 | | 0.686 | 0.952 | 0.952 | 0.184 | 0.184 | 0.184 | |
| Locomotives | 22.071 | | | | | | | | | | | | | | | | | | |
| Pumps | 2.941 | | | | | | | | 0.859 | | | 0.856 | | | | | | | 0.005 |
| Welders | 0.836 | | | | | | | | 0.244 | | | 0.243 | | | | | | | 0.001 |
| Light Plants and Generators | 0.843 | | | | | | | | 0.204 | | | 0.203 | | | | | | | 0.001 |
| **Total** | **208.9719** | **46.5121** | **30.4071** | **54.6490** | **25.2381** | **25.4745** | **1.8564** | **1.8564** | **34.9051** | **1.4229** | **1.4229** | **24.2023** | **0.8238** | **1.1440** | **1.1440** | **0.2211** | **0.2211** | **0.2211** | **0.2081** |

Modeling Summary:

| Source Description | North Coal Area 1 | North Coal Area 2 | North OB Area | Northwest Coal Area 1 | Northwest Coal Area 2 | Northwest OB Area | West Coal Area 1 | West Coal Area 2 | West Coal Area 3 | West Coal Area 4 | West Coal Area 5 | West Coal Area 6 | West OB Area 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Source ID | BTNC1 | BTNC2 | BTNOB | BTNWC1 | BTNWC2 | BTNWOB | BTWC1 | BTWC2 | BTWC3 | BTWC4 | BTWC5 | BTWC6 | BTWOB1 |
| Source Type | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area |
| SW X-Coordinate | 474066.1654 | 476077.8454 | 474066.1654 | 471222.3814 | 472654.5941 | 471222.3814 | 471946.2814 | 472156.5934 | 472156.5934 | 472156.5934 | 472156.5934 | 472156.5934 | 471806.0734 |
| SW Y-Coordinate | 4845476.2155 | 4845476.2155 | 4845049.4955 | 4843450.8195 | 4843450.8195 | 4842902.1795 | 4840232.1315 | 4839134.8515 | 4838037.5715 | 4837129.8366 | 4836598.7124 | 4836067.5882 | 4840597.8915 |
| Angle | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Area X-Dimension (m) | 2011.6800 | 2011.6800 | 4023.3600 | 1432.2127 | 1432.2127 | 2864.4254 | 280.4160 | 175.5435 | 175.5435 | 70.1040 | 70.1040 | 70.1040 | 140.2080 |
| Area Y-Dimension (m) | 247.5726 | 247.5726 | 784.4633 | 274.3200 | 274.3200 | 1097.2800 | 494.6523 | 1097.2800 | 1097.2800 | 531.1241 | 531.1242 | 531.1242 | 128.8923 |
| Area ($m^2$) | 498,037 | 498,037 | 3,156,178 | 392,885 | 392,885 | 3,143,077 | 138,708 | 192,620 | 192,620 | 37,234 | 37,234 | 37,234 | 18,072 |
| Road Width (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Road Length (m) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Model Emission Rate[1] | 3.727532E-06 | 3.727532E-06 | 1.105929E-05 | 3.621589E-06 | 3.621589E-06 | 7.700179E-06 | 5.938889E-06 | 5.938889E-06 | 5.938889E-06 | 5.938889E-06 | 5.938889E-06 | 5.938889E-06 | 1.151503E-05 |

1. Units are g/s-$m^2$ for area sources.

# APPENDIX 10

## Background $PM_{10}$ Determination

# BLACK THUNDER MINE

# BACKGROUND $PM_{10}$ DETERMINATION

**Prepared for Thunder Basin Coal Company, Inc.**

**By**

**McVehil-Monnett Associates, Inc.**

**May 2014**

**Black Thunder Mine Background $PM_{10}$ Determination**

The Black Thunder Mine is an existing surface coal mine located in Campbell County, approximately 12 miles southeast of Wright, Wyoming. The mine is located in the Powder River Basin's (PRB) South Group of mines. Thunder Basin Coal Company is in the process of permitting additional lease areas and a new pit progression.

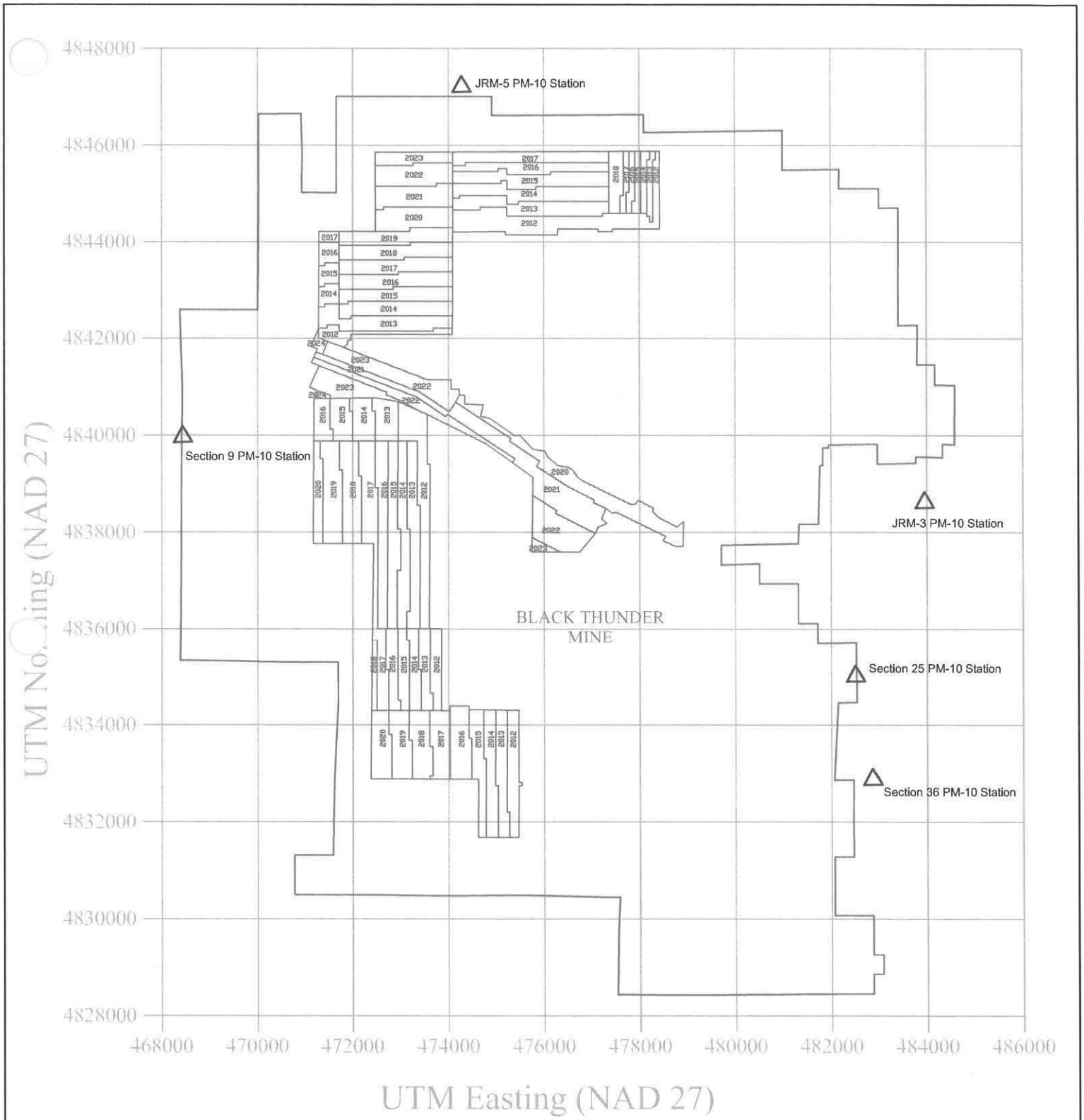
The Wyoming Department of Environmental Quality – Air Quality Division (WDEQ-AQD) has required all mines in the PRB to "submit and justify a background $PM_{10}$ concentration with each permit application" according to their most recent guidance (*PRB Coal Mine Permitting Guidance*, 2/27/2006).

Black Thunder Mine currently operates 5 $PM_{10}$ monitoring stations with 9 samplers (Figure 1). The Section 9 station is located on the west side of Black Thunder's boundary, the JRM 5 station is on the north boundary, and the JRM 3, Section 25, and Section 36 stations are all on the east boundary. The Section 25 station was selected for analysis to develop a background $PM_{10}$ concentration at the mine due to its distance from mining activities.

An annual site-specific $PM_{10}$ background value was developed for Black Thunder Mine using on-site monitoring data obtained from EPA's AirData system. A four-year period (2010-2013) of $PM_{10}$ monitored concentrations were analyzed for the Section 25 station (Table 1). The four annual values were averaged to develop a background $PM_{10}$ concentration of 11.2 $\mu g/m^3$. This value will be added to modeled results to arrive at the final $PM_{10}$ concentrations.

**Table 1**
**Black Thunder Mine Section 25 Station**
**Annual $PM_{10}$ Monitored Concentrations Summary ($\mu g/m^3$)**

| Year | Annual Average |
|---|---|
| 2010 | 11.5 |
| 2011 | 10.2 |
| 2012 | 12.4 |
| 2013 | 10.7 |
| Four-Year Average | 11.2 |




McVEHIL-MONNETT ASSOCIATES, INC.
Air Quality • Environmental Management
44 Inverness Drive East, Building C
Englewood, CO 80112

FIGURE 1
BLACK THUNDER MINE
MONITORING STATION LOCATIONS

PROJECT: 2622-13
DATE: 5/30/14

BLACK THUNDER MINE LNCM
UTM COORDINATE GRID (NAD 27)

# APPENDIX 11

## Ambient Air Monitoring Network Justification

# Ambient Air Monitoring Network Justification

## Black Thunder Mine
## Thunder Basin Coal Company
## Campbell County, Wyoming

January 2015

Prepared by:

IML Air Science
a division of Inter-Mountain Laboratories, Inc.
555 Absaraka St.
Sheridan, WY 82801
(307) 674-7506

## 1.0 Introduction

Thunder Basin Coal Company has obtained an air quality permit, MD-10986, for the Black Thunder Mine (hereafter BTM) issued by the Wyoming Department of Environmental Quality, Air Quality Division. This air permit requires the operation of an ambient air monitoring network near the perimeter of the mine. The network is required to measure ambient concentrations of particulate matter as $PM_{10}$, and meteorological parameters.

The meteorological and particulate monitoring stations were located and installed following consultation with representatives of the Wyoming Department of Environmental Quality, Air Quality Division through consideration of topography, regional meteorology, industrial activity, and power availability, and according to 40 CFR Part 58, Appendix E.

Ambient concentrations of particulate matter as $PM_{10}$ are measured at five sites near BTM in accordance with both Federal Equivalent Method (FEM) and Federal Reference Method (FRM). Concentrations are measured on a 1-in-3 day and continuous sampling schedule and the 24 hour values are compared to the NAAQS $PM_{10}$ standard. Precision measurements follow the 1-in-6 day sampling schedule. Meteorological parameters are measured at three sites. The 17 Site is operated as part of the conditions in the air permit. The 12 and JR5 sites are voluntarily operated.

The current locations of the monitoring sites and mine progression are shown in the following section along with a 17 Site 5-year wind rose (Figure 3); hereafter in the narrative referred to as the "Admin" meteorological station. Figure 3 provides a snapshot view of the wind patterns that occurred throughout the mine during the 2009 - 2013 period. The current locations and relative locations to the operations and LNCM boundary are identified in Figure 1. The proposed network, LNCM boundary, and mine progression are shown in Figure 2. Future mining operations will expand to the north and the west resulting in changes to the LNCM boundary and air monitoring network.

The Table 1 and 2 are located on the following page. Table 1 summarizes the locations of the current air monitoring network while Table 2 contains the locations for the proposed changes to the network. The changes are denoted by the # symbol in the site id and the text is in italics.

**Table 1: Current Air Monitoring Network Locations**

| Site | UTM (m)* | | GCS (WGS 84) | | Elev. (ft) | Parameters |
|---|---|---|---|---|---|---|
| | Northing | Easting | Lat | Lon | | |
| 9 Site | 4,840,180 | 468,438 | 43.71° | -105.39° | 4830 | Two low volume $PM_{10}$ samplers |
| 12 Site | 4,830,220 | 482,683 | 43.62° | -105.22° | 4792 | Wind speed & direction, temperature, precipitation |
| 17 Site | 4,838,990 | 476,360 | 43.70° | -105.29° | 4695 | Wind speed & direction, temperature, relative humidity, precipitation |
| 25 Site | 4,835,210 | 482,484 | 43.67° | -105.22° | 4797 | Three high volume $PM_{10}$ samplers |
| 36 Site | 4,833,080 | 482,750 | 43.65° | -105.21° | 4814 | Continuous $PM_{10}$ |
| 3 Site | 4,838,820 | 483,924 | 43.70° | -105.20° | 4810 | Low volume $PM_{10}$ with satellite |
| JR5 | 4,847,440 | 474,337 | 43.78° | -105.32° | 4933 | Continuous $PM_{10}$, Wind speed & direction, temperature, relative humidity, precipitation |

**Table 2: Proposed Air Monitoring Network Locations**

| Site | UTM (m)* | | GCS (WGS 84) | | Elev. (ft) | Parameters |
|---|---|---|---|---|---|---|
| | Northing | Easting | Lat | Lon | | |
| *#6 Site* | *4,841,613* | *465,151* | *43.65°* | *-105.21°* | *4991* | *Two low volume $PM_{10}$ samplers* |
| 12 Site | 4,830,220 | 482,683 | 43.62° | -105.22° | 4792 | Wind speed & direction, temperature, precipitation |
| 17 Site | 4,838,990 | 476,360 | 43.70° | -105.29° | 4695 | Wind speed & direction, temperature, relative humidity, precipitation |
| ~~#25 Site~~ | ~~4,835,210~~ | ~~482,484~~ | ~~43.67°~~ | ~~-105.22°~~ | ~~4797~~ | ~~Three high volume $PM_{10}$ samplers~~ |
| 36 Site | 4,833,080 | 482,750 | 43.65° | -105.21° | 4814 | Continuous $PM_{10}$ |
| *#3 Site* | *4,838,820* | *483,924* | *43.70°* | *-105.20°* | *4810* | *Three high volume $PM_{10}$ samplers* |
| *#12N Site* | *4,849,437* | *472,733* | *43.80°* | *-105.34°* | *5161* | *Continuous $PM_{10}$, wind speed & direction, temperature, relative humidity, precipitation* |

*UTM Zone 13 and NAD 83

*#Sites with proposed changes to the current network.*

## 2.0 Air Monitoring Network Maps and Wind Rose

Figure 1 is a map showing the current ambient air monitoring network along with the BTM LNCM boundary.

**Figure 1: Current Air Monitoring Network**

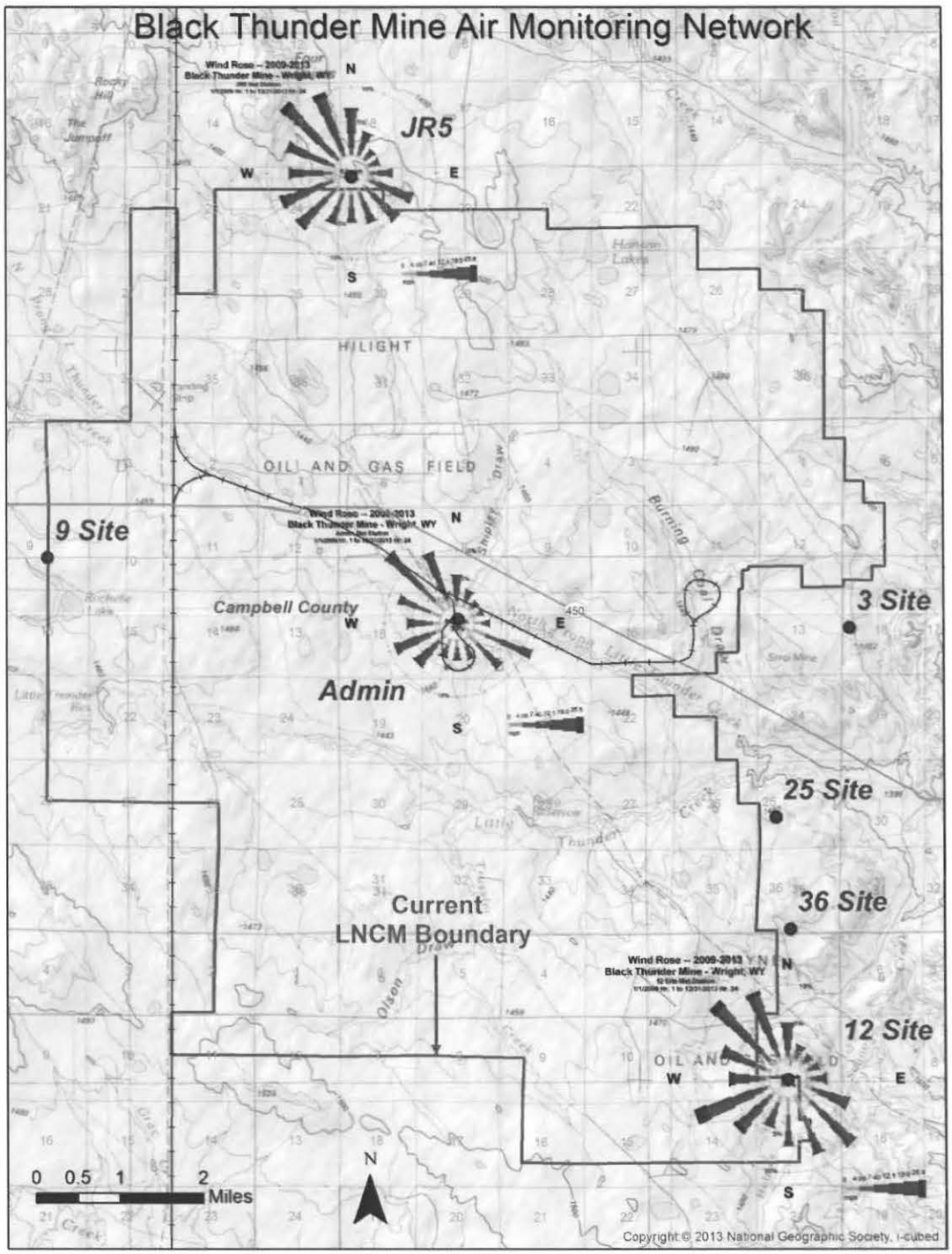


Figure 2 is a map depicting future coal removal and scoria pit progressions, updated LNCM boundary, wind roses, and proposed ambient air monitoring network.

**Figure 2: Proposed Air Monitoring Network**

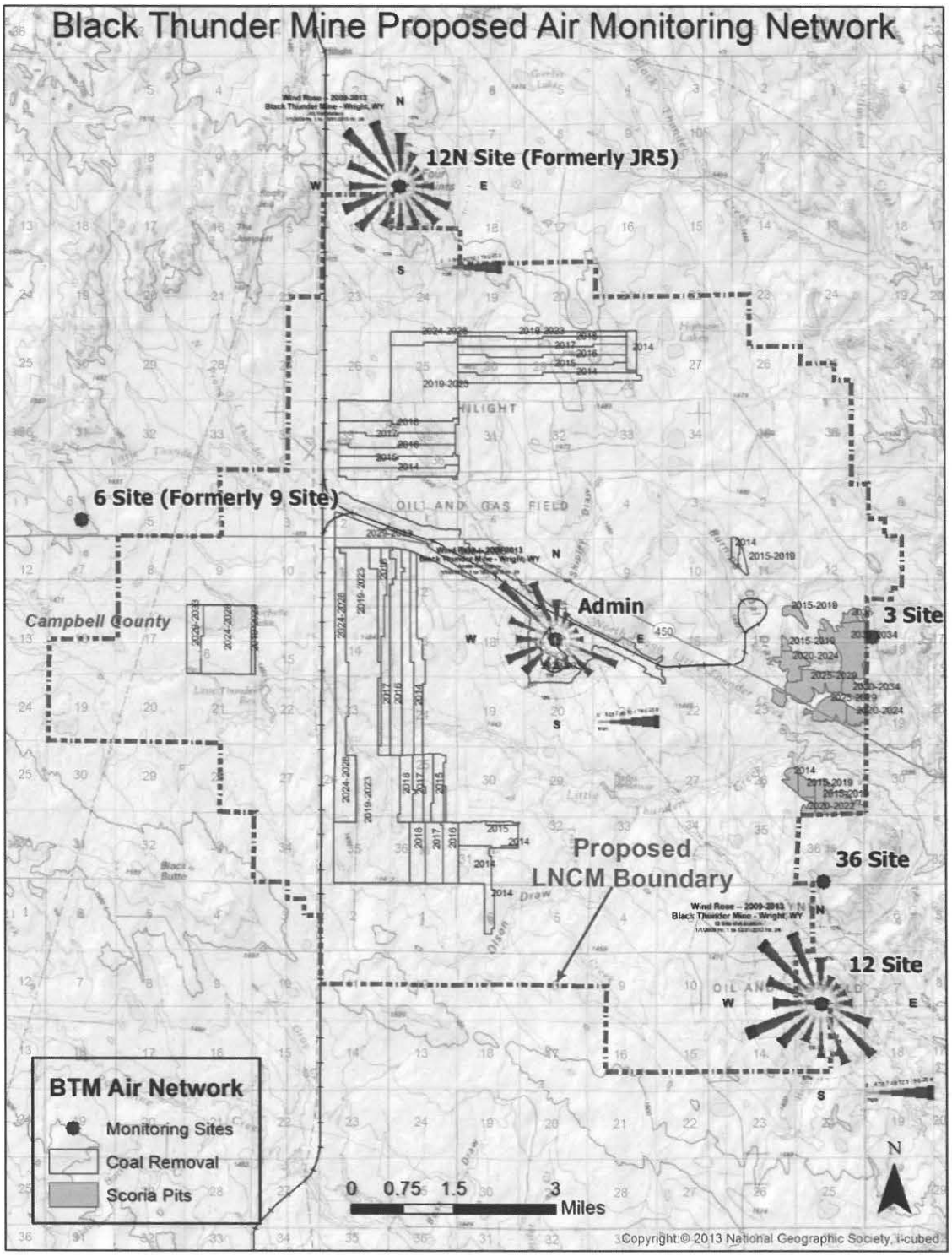
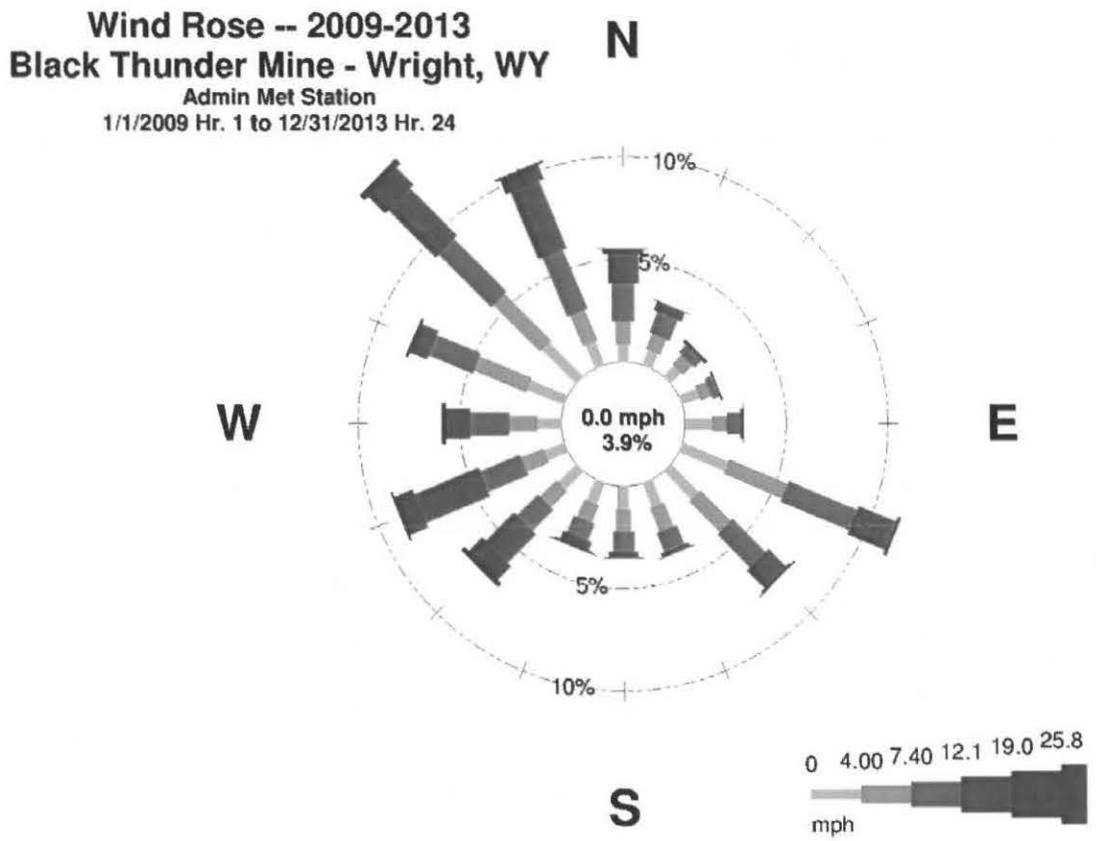


Figure 3 contains a wind rose based on data collected at the Admin meteorological monitoring site from 2009 through 2013. Data recovery for the 5 year period was 98.7% with each individual year having recovery rates greater than 97%. Seasonal wind roses are included in the appendices along with the wind report for the entire period.

**Figure 3: 5 Year Admin Station Wind Rose**

+



## 3.0 Discussion

Air monitoring sites at BTM are located near the western, northern, eastern, and southeastern region of the LNCM boundary. Three meteorological monitoring sites provide sufficient coverage of all conditions occurring throughout the mine. The Admin site (required) is centrally located in the middle of the operations, the JR5 site (voluntary) is located on the northern LNCM boundary, and the 12 Site (voluntary) is located on the southeastern corner of the LNCM boundary. The wind roses included in the figures and discussion show a fairly uniform distribution of the wind patterns throughout the mine. The wind roses show a bi-modal distribution typical of the region with a predominant northwestern component and secondary southeastern component.

All particulate monitoring sites are operated as both upwind and downwind measurement sites. The 9 Site and JR5 Site serve as upwind monitors the majority of the time when northwest winds are occurring. The 3 Site, 25 Site, and 36 Site serve as upwind monitors during periods of southeasterly winds. Locations on the southern boundary are limited due to adjacent mining activity. No monitoring site is located to the southwest of the operations as east and northeast winds are infrequent. All sites are currently sited in ambient air.

Expansion of the LNCM boundary to the north and west will require relocation of the 9 Site and JR5 Site becoming the 6 Site and 12N Site, respectively to accommodate for planned mining activities. The proposed sites shown in Figure 2 and listed in Table 2 are near currently installed power, have good site access, and are situated on property owned by Thunder Basin Coal Company; all of which would allow for ease in moving the sites. The 25 Site would also be located inside the proposed LNCM boundary due to a change in the eastern boundary. Relocation of this monitor would place it very near either the 3 Site monitor or the 36 Site monitor. As can be seen in Table 3 below, the 36 Site annual averages are very similar to those recorded at the monitoring sites in the network. Therefore the 25 Site would be decommissioned and the 3 site would become the collocated monitor site. The three decommissioned hi volume samplers would be relocated to the 3 Site replacing the single low volume sampler. The 3 site would then serve as the precision monitoring site for the network.

**Table 3: 2013 $PM_{10}$ Annual Statistics at STP**

| Parameter | Concentration ($\mu g/m^3$) | | | | |
|---|---|---|---|---|---|
| | 9 Site | JR5 | 25 Site | 3 Site | 36 Site |
| Mean YTD | 19.4 | 22.1 | 10.7 | 20.5 | 22.4 |
| High 24-hour | 97 | 99.5 | 36 | 66 | 71.7 |
| 2nd High 24-hour | 66 | 79 | 34 | 58 | 64.2 |

## 4.0 Conclusion

The current $PM_{10}$ monitoring sites were selected based on the following criteria:

- Meteorology – pollutant transport and dispersion, representativeness of existing data sets
- Distance and direction from current and future mining activities
- Ambient air – siting locations relative to LNCM boundary
- Topography – influence on pollutant transport and deposition
- Access – roads, inclement weather and land ownership
- Power availability

The changes of the current configuration of the ambient air monitoring network at BTM are justified by:

- Changes in mine activity and proposed LNCM boundary would place current monitoring locations (JR5, 9 Site, and 25 Site) within the LNCM boundary and no longer in ambient air requiring monitors to be relocated.
- Pit progressions will continue to move to the north and west approaching both the 9 Site and JR5 locations. Future activity would have coal removal occurring within a ½ mile of the 9 Site and less than 1 mile of the JR5 monitor.
- Scoria pit operations on the eastern boundary will surround the 25 Site and progress eastward requiring relocation of the site within a "nearby" proximity of the 3 or 36 Site. Relocation would be duplicate measurement of either site measurements. The 3 and 36 Sites will adequately measure the downwind impacts of the mine and the 25 Site can be shut down.
- As a result of the 25 Site being shut down, begin operation of collocated sampling at the 3 Site for network precision measurements and replacement of the low volume sampler with the 25 Site high volume samplers.

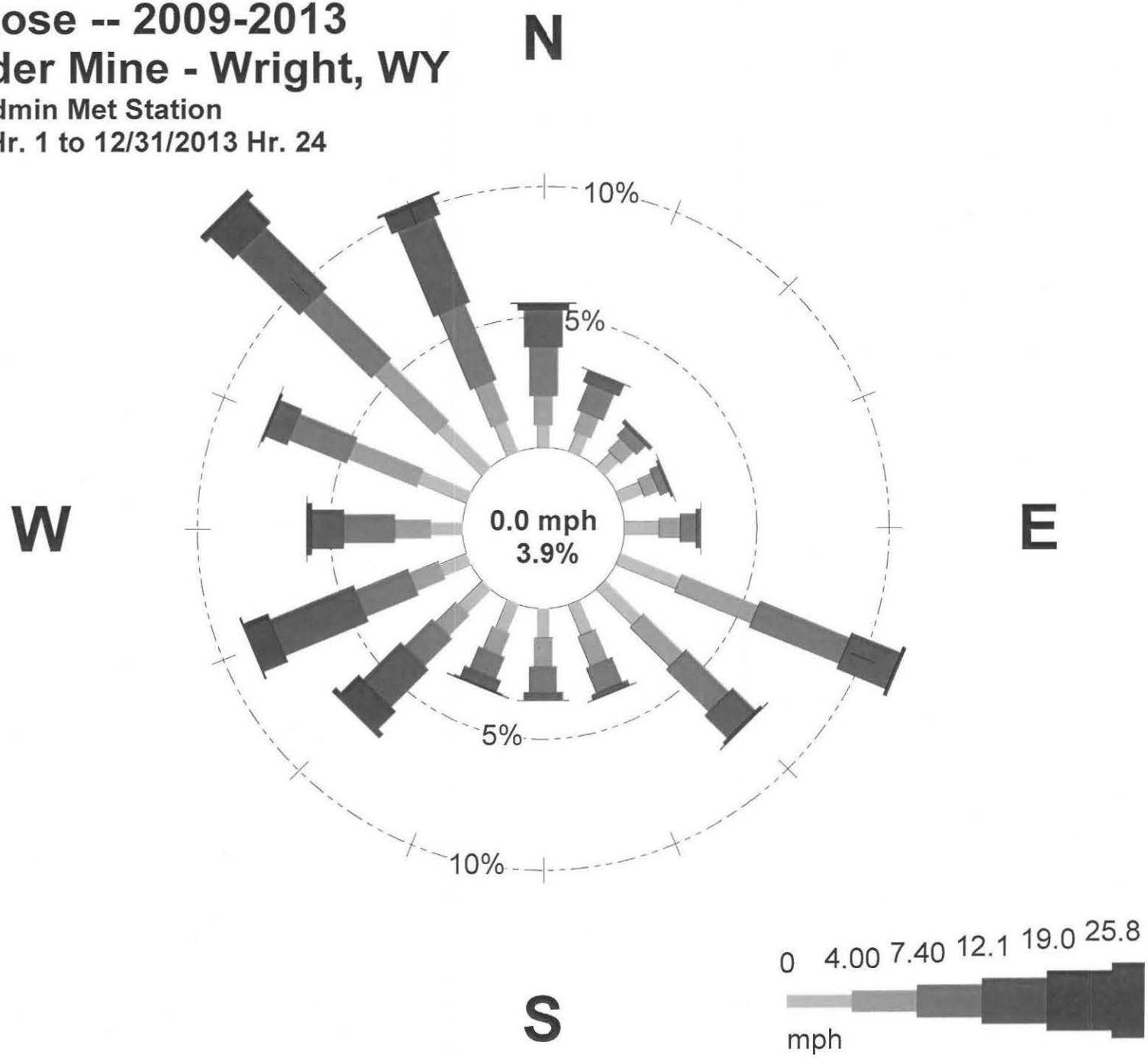
## 5.0 Appendices

- Admin Met Station 5-Year Wind Rose, 2009– 2013
- Admin Met Station Relative Frequency Table, 2009– 2013
- Seasonal Wind Roses by Calendar Quarter

# Wind Rose -- 2009-2013
# Black Thunder Mine - Wright, WY

**Admin Met Station**

**1/1/2009 Hr. 1 to 12/31/2013 Hr. 24**



# Wind Rose -- 2009-2013
# Black Thunder Mine -- Wright, WY
### Admin Met Station
### 1/1/2009 Hr. 1 to 12/31/2013 Hr. 24

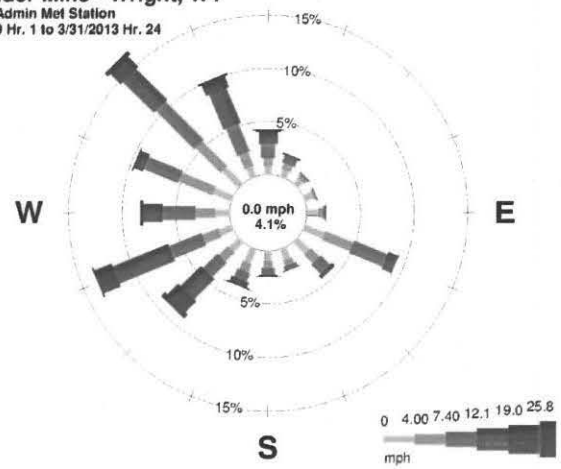
## RELATIVE FREQUENCY (% of Recorded Winds) TABLE

| | mph | | | | | | |
|---|---|---|---|---|---|---|---|
| Wind Direction | 0.0- 4.0 | 4.0- 7.4 | 7.4-12.1 | 12.1-19.0 | 19.0-25.8 | 25.8-100.0 | Row Total |
| 0.0 deg.(North) | 0.9 | 1.1 | 1.9 | 1.4 | 0.2 | 0.0 | 5.6 |
| 22.5 deg. | 0.8 | 0.8 | 1.1 | 0.5 | 0.0 | | 3.2 |
| 45.0 deg. | 0.8 | 0.7 | 0.5 | 0.2 | 0.0 | | 2.1 |
| 67.5 deg. | 1.0 | 0.6 | 0.4 | 0.1 | 0.0 | | 2.0 |
| 90.0 deg. | 1.3 | 0.8 | 0.6 | 0.2 | 0.0 | | 2.9 |
| 112.5 deg. | 2.5 | 3.1 | 3.7 | 2.0 | 0.1 | | 11.4 |
| 135.0 deg. | 1.9 | 2.1 | 2.3 | 1.2 | 0.1 | 0.0 | 7.7 |
| 157.5 deg. | 1.3 | 1.2 | 1.0 | 0.2 | 0.0 | | 3.8 |
| 180.0 deg. | 1.1 | 1.1 | 0.9 | 0.3 | 0.0 | | 3.5 |
| 202.5 deg. | 1.1 | 0.9 | 0.9 | 0.5 | 0.1 | 0.0 | 3.5 |
| 225.0 deg. | 1.3 | 1.1 | 1.5 | 2.0 | 0.9 | 0.2 | 7.0 |
| 247.5 deg. | 1.1 | 1.2 | 2.1 | 3.4 | 1.0 | 0.1 | 8.9 |
| 270.0 deg. | 1.2 | 1.4 | 1.9 | 1.2 | 0.2 | 0.0 | 5.9 |
| 292.5 deg. | 2.0 | 2.8 | 2.4 | 0.9 | 0.1 | 0.0 | 8.1 |
| 315.0 deg. | 2.4 | 3.2 | 3.6 | 3.3 | 1.2 | 0.3 | 14.0 |
| 337.5 deg. | 1.3 | 1.6 | 3.1 | 3.6 | 0.7 | 0.1 | 10.4 |
| | 22.0 | 23.8 | 27.9 | 20.9 | 4.8 | 0.7 | 100.0 |

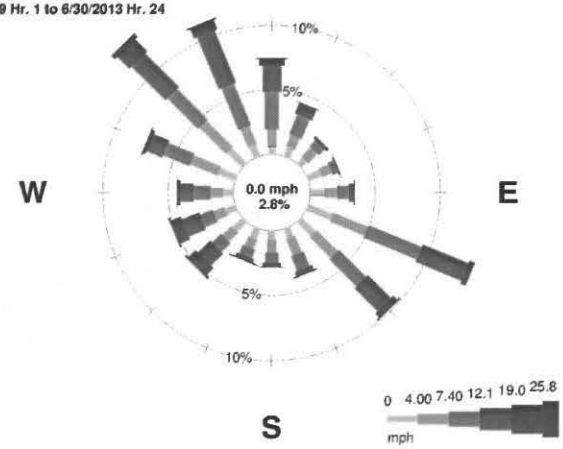
0 mph ( 3.9%) INVALID READINGS 573

NUMBER OF POSSIBLE READINGS 43824 VALID READINGS 43251 DATA CAPTURE 98.69%

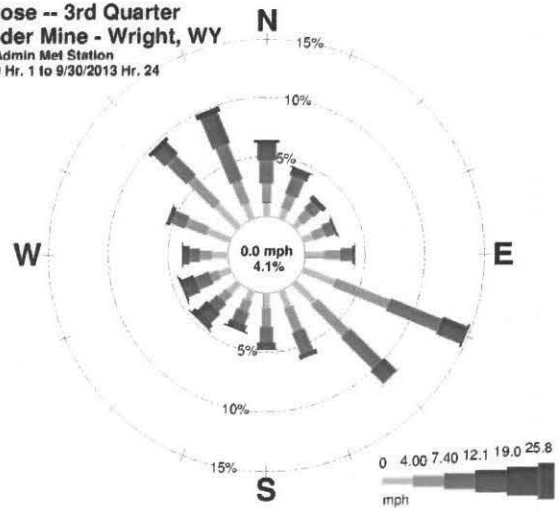
**Wind Rose -- 1st Quarter**
**Black Thunder Mine - Wright, WY**
Admin Met Station
1/1/2009 Hr. 1 to 3/31/2013 Hr. 24

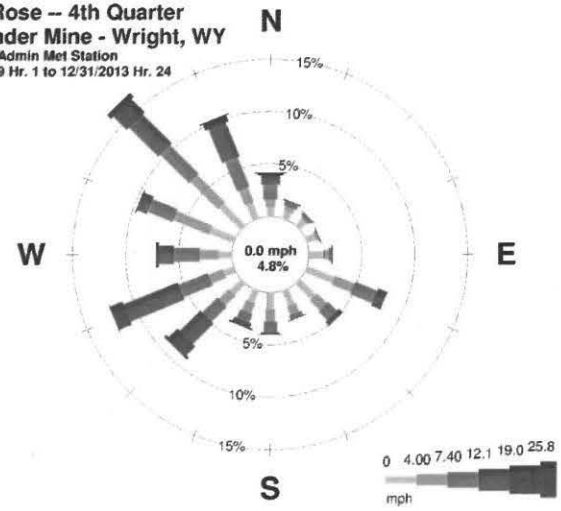



**Wind Rose -- 2nd Quarter**
**Black Thunder Mine - Wright, WY**
Admin Met Station
4/1/2009 Hr. 1 to 6/30/2013 Hr. 24




**Wind Rose -- 3rd Quarter**
**Black Thunder Mine - Wright, WY**
Admin Met Station
7/1/2009 Hr. 1 to 9/30/2013 Hr. 24




**Wind Rose -- 4th Quarter**
**Black Thunder Mine - Wright, WY**
Admin Met Station
10/1/2009 Hr. 1 to 12/31/2013 Hr. 24